NTT DATA
Trusted Global Innovator

Cross-ministerial Strategic Innovation Promotion Program(SIP) Phase 2/Automated Driving for Universal Services Research for Design and Development of Automated Driving/Drive Assistance Architectures Entrusted Business for Development of a Portal Site to Promote the Exchange of Geographic Data “Verification Experiments at the Tokyo Waterfront Area” “Research to Organize and Develop Geographic Data and Urban Traffic Condition Data for Linkage between Mobility Service and Logistics Service”
Report (Summary Version)

NTT DATA Corporation

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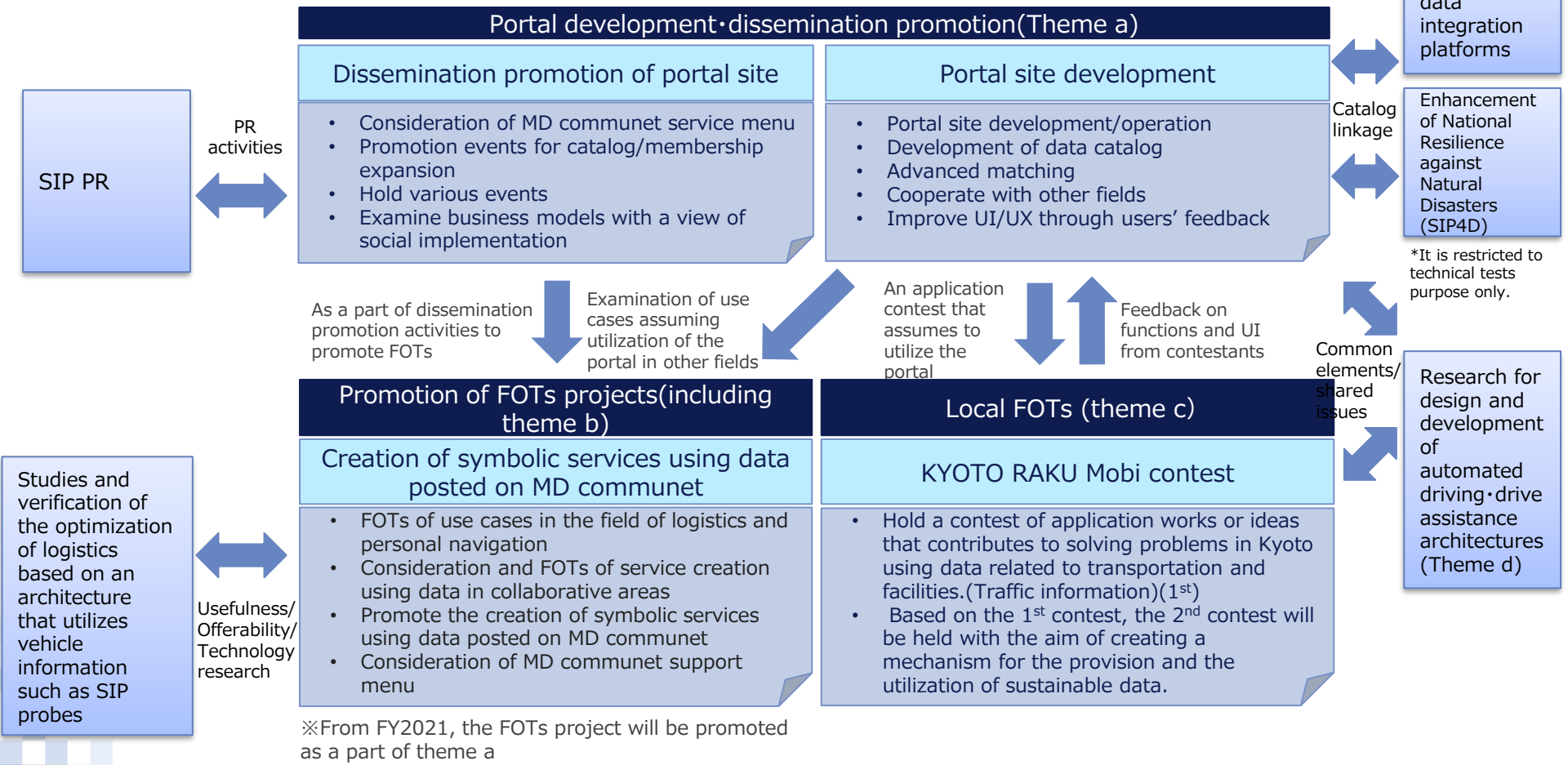
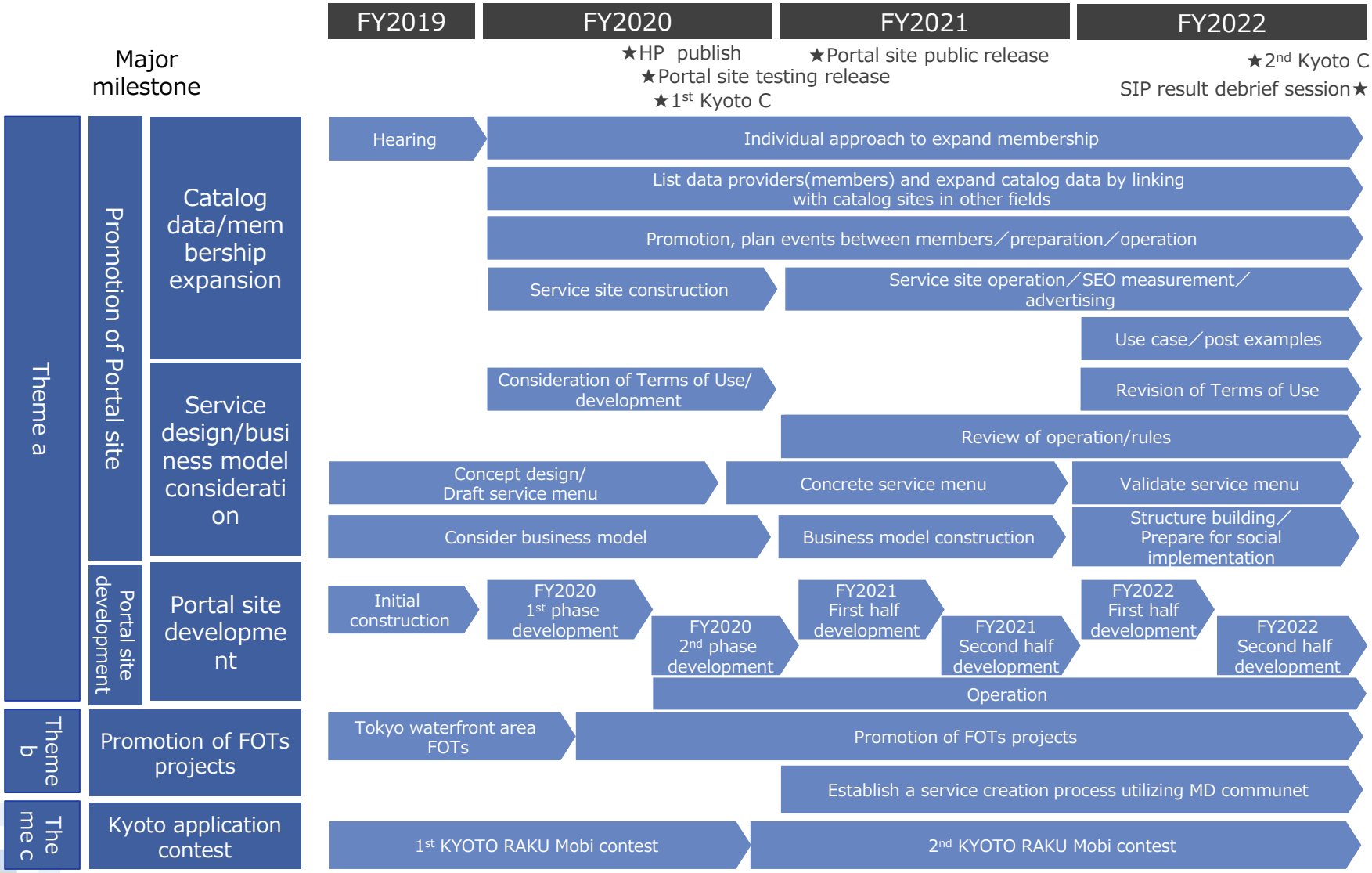
0. Introduction: Overview of this project
Linkage chart for each initiative

- In theme a, efforts were put to promote the dissemination promotion of portal site and to develop portal functions.
- In theme b, a FOTs project was promoted to develop necessary processes for creating the symbolic service unique to MD communet®.
- In theme c, an application contest was held to widely disseminate the creation of services that solve social issues.
- Each theme was coordinated with other related SIP initiatives.



0. Introduction: Overview of this project
Overall schedule

Milestone and task



1. Development and operation of a portal site designed to promote the distribution of geographic data and dynamic traffic information (Theme a)

NTT DATA

1.1 Dissemination promotion activities for sustainable operation of the portal site

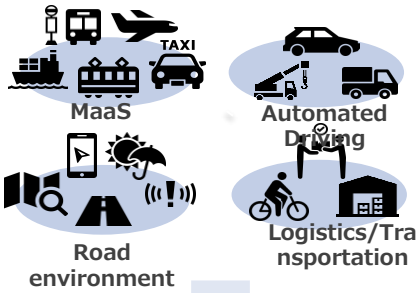
1.1 Dissemination promotion activities for sustainable operation of the portal site Dissemination promotion of traffic environment information portal「MD communet」

- Initiative①,②have been largely implemented to promote the spread of MD communet and to build a business model for social implementation, and social implementation will start in 2023 by NTT DATA.
- Details of the initiatives for each item from FY2019 to FY2022 are described on the following pages

MD communet overall concept and initiatives

Dissemination promotion of MD communet／Construction of business models for social implementation

①Catalog data collection／Necessary promotion for membership expansion

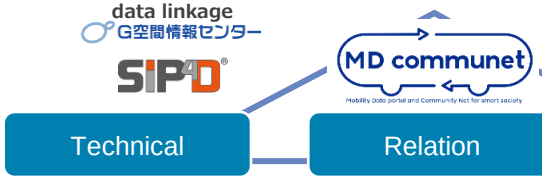


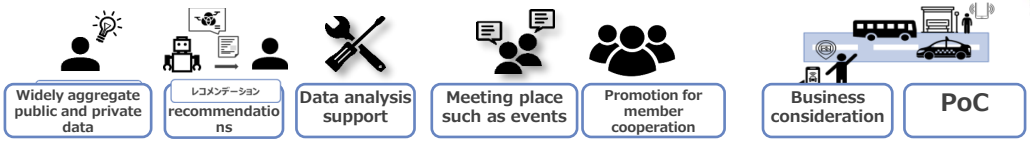
Collect catalog data of traffic environment information
◎Participation of XXX business operators

By CKAN or CADDE catalog data linkage

G空間情報センター

SIP4D



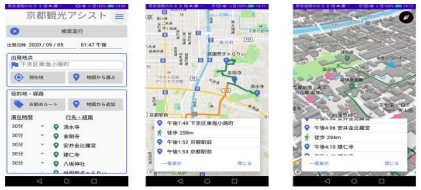


The gap here =Solve the problem

②Support service design that is necessary for the emergence of matching・service

Service① Optimal delivery route guidance with dynamic information（Safe･Easy to drive）

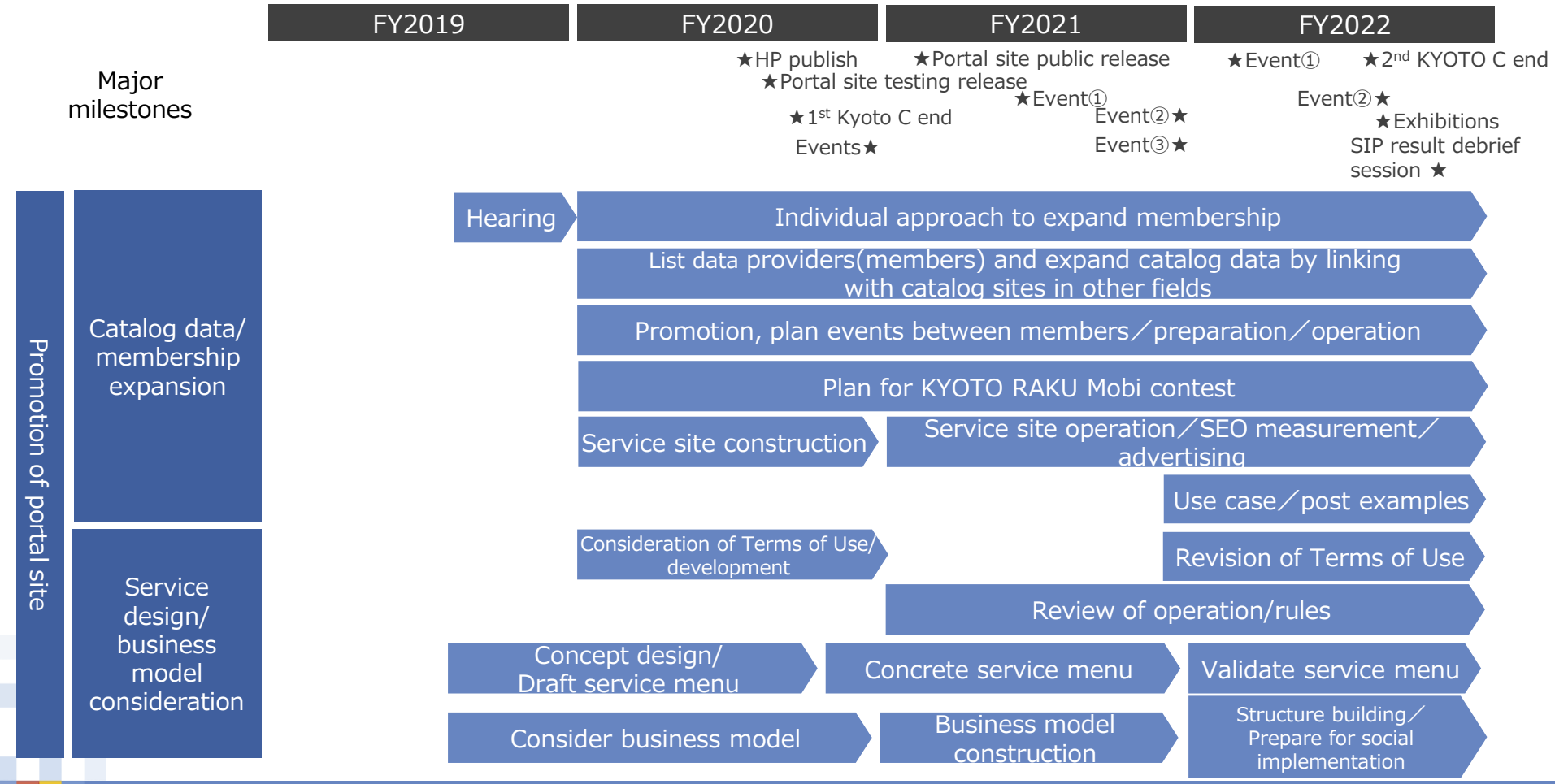
Service② Suggest the best route for travelers（Congestion,interests,etc）



1.1 Dissemination promotion activities for sustainable operation of the portal site Milestone in promoting the dissemination of traffic environment information portal 「MD communet」

■ Milestones were set for each fiscal year, and tasks for dissemination promotion and social implementation of MD communet were identified.

Milestones and tasks

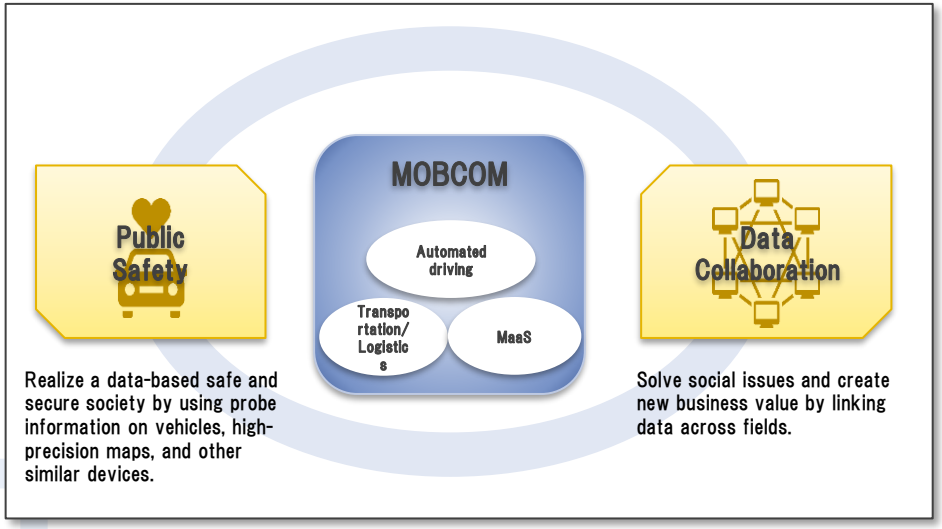


1.1.1 Dissemination promotion activities for sustainable operation of the portal site (FY2019)

1.1.1 Dissemination promotion activities for sustainable operation of the portal site(FY2019) Conceptual design of the portal site

- To implement and continuously operate a social system: establish a place for exchanging data that is attractive to both data providers and data users; build data exchange systems that enable enterprises to mutually use their various data; and promote widespread use of such systems.

- Confirm data discovery through matching between needs and seeds and a suggestion-type portal site. Study, demonstrate, and introduce cases of using traffic environment data to promote the use of data and its applications, thus helping to create new services, realize a safe and secure society, and solve social issues.



Concept of portal site

Service menu (planned)

1.1.1 Dissemination promotion activities for sustainable operation of the portal site(FY2019) Interviews/promotional activities to stakeholders/interviews with end users

■ We interviewed business operators in the "data provider group," "user group," and "platform provider group" about the project to introduce it to them, promote its presence, and identify their expectations and requests.

Interview in FY2019 (11 companies)

- Data user group (4 companies): 1 map company, 2 logistics companies, 1 infrastructure company
- Platform provider group (2 companies): 1 map company, 1 academic-government organization
- Data provider group (5 companies): 1 manufacturing company, 4 map companies

Opinions (extracted)

- There are various data related to the automotive field, but **the data is scattered and not organized**.
- We are interested in various data such as smartphone location, human mobility, Twitter, and road traffic.
- We are studying combinations of data types, and things that can be done through them, but have **no good ideas**.
- **We may be able to use** data catalogs in order to advertise and publicize the data we have.
- It is difficult to identify internally **the value of our data and new purposes for it**.

Observations

- Logistics companies and map companies have some need for a **portal site that gives users an overview of data** in automotive-related fields.
- It is important to **provide various data with various properties** on the portal site, assuming various cases, such as in a disaster when real-time availability is indispensable.
- It is assumed that companies will publish their data catalogs on the portal site and efficiently use it to **publicize their data**.
- Some data providers may **not know how to use their data, or may be unaware of the value**.

Future actions

- Increase the **types of data available on the portal site: Increase data types and data properties (e.g., static/dynamic) on the portal site and provide sufficient data in automotive-related fields that can be referenced with an integrated view**.
- Provide user support: Provide **support services and helpful tools to allow users** to use the portal site easily.
- Promote our data utilization business: Provide **fields and opportunities** to expand the semi-closed business and semi-open business.

1.1.1 Dissemination promotion activities for sustainable operation of the portal site(FY2019) Suggestion of business models for a permanent portal site

- Based on to the interviews, we identified considerations in data exchange processes and making plans for promoting the exchange of data.
- After FY2020, we will make more specific plans to promote the exchange of data, establish a consortium for data exchange, conduct studies on making the portal site widely used, and take proactive measures.

Data exchange process	Data provision			Matching		Data utilization	
	Data application planning	Data commercialization	Publication on the portal site	Data search/Matching	Agreement/Payment	Data provision	Service planning/development
Considerations	• Degrees of data coverage and amount (types, quantity, and quality) • UI, IF, and data formats usable on the portal site • Data pricing • Field for planning			• Contract/Agreement for providing data • Payment method/Receipt method • Requirements for portal users		• Agreements on data utilization and secondary use • Assurance of original authenticity of data	
	Presence of the portal site/Business models						

Examination to promote data exchange

Plans to promote data exchange	
	• **Promoting technologies**: Advance data conversion technologies and standardize interfaces to the portal site • **Establishing regulations/rules**: Establish systems and rules for data exchange (e.g., agreement, payment, and security assurance) • **Promoting data provision/utilization**: Prompt data providers and data users to use the portal site, and link it with other portal sites

Planned practical actions

Promote the portal site with major member enterprises through the consortium (planned)

1.1.2 Dissemination promotion activities for sustainable operation of the portal site (FY2020)

1.1.2 Dissemination promotion activities for sustainable operation of the portal site(FY2020) Plan for dissemination promotion activities

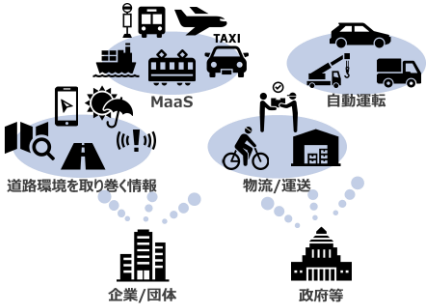
- In FY2020, the portal site will be refrained from opening to the public, in order to make it known to the world that it is an attractive portal site, various promotion activities will be conducted with the aim of expanding the data, expanding the number of participating companies, and improving recognition.
- The implementation will be based on the results of FY 2019, with an eye toward future commercialization, and with the awareness of “What is unique to MD communet“. The purpose is to clarify the appeal points and to have both public and private sectors agree on this initiative.

Policy on dissemination promotion activities in FY2020

Create MD communet community

- ✓ Find a partner who agrees with MD communet efforts and can create together.
- ✓ Consider the promotion system based on the activities of data utilization in MD communet.
- ✓ Development of Terms of Use to facilitate smooth transactions between users.

Post data unique to MD communet



- ✓ To promote the use of data,collect traffic environment information from various companies and post it as catalog data.
- ✓ Collect traffic environment information from public and private sectors widely and post the distinctive data unique to MD communet as catalog data.

Improve recognition of MD communet

- ✓ Establish an information dissemination site for MD communet.
- ✓ Conduct various promotional activities such as exhibitions, events and news releases.

1.1.2 Dissemination promotion activities for sustainable operation of the portal site(FY2020) FY2020 Promotional action plan

■ Activities were detailed in preparation for the first release of the portal site and the second release at the end of April, which are major milestones in the FY2020 plan. Activity policies and tasks were identified for the content of activities, and preparations were made to ensure that they would be released.

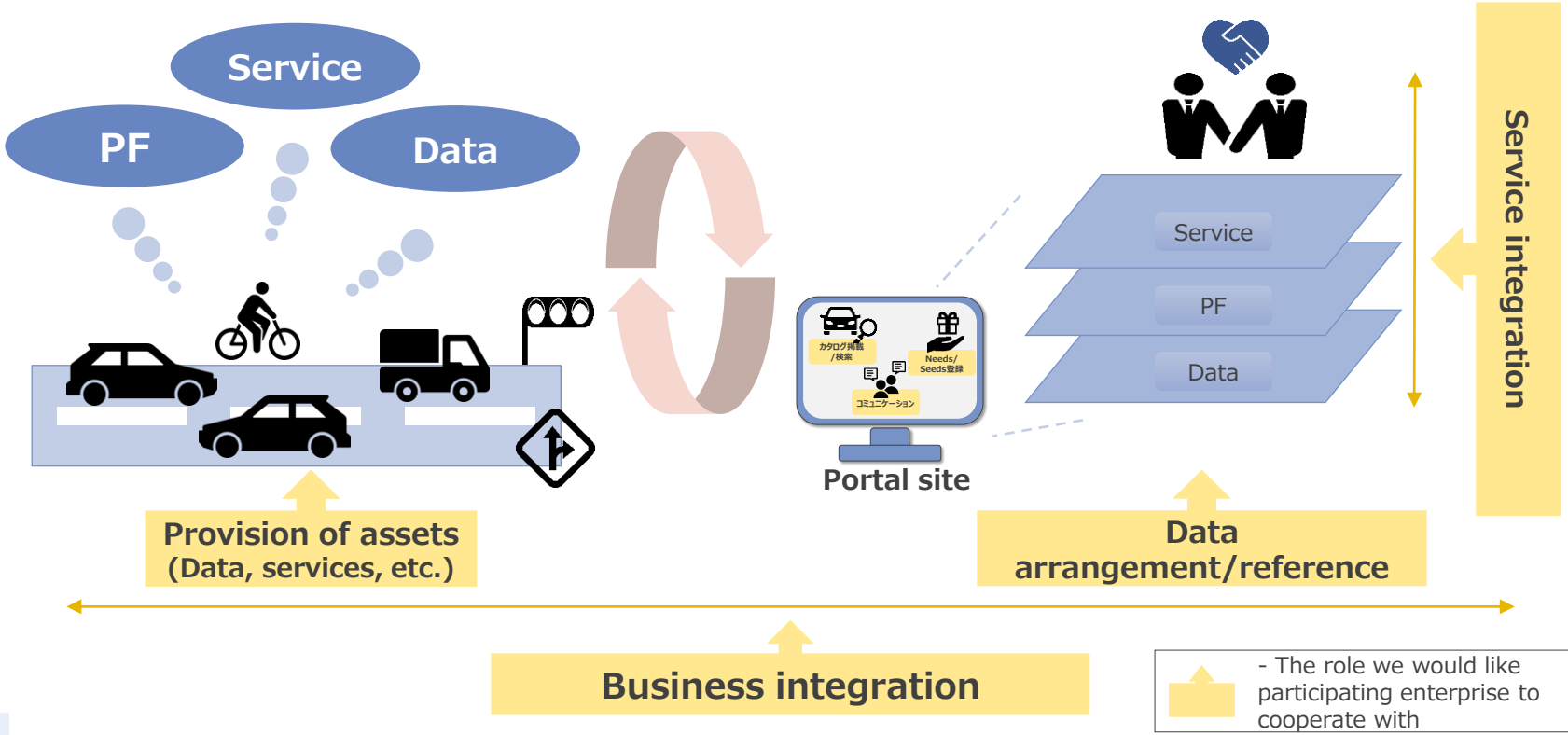
Target of activities	Action Plan		Main Activities
User	To expand catalog data Efforts	• Agree to publish the data on the portal site to the data providers (target: companies participating in the first phase of SIP and interviewees in FY2019) • Publication of additional catalogs for primary participating companies • Reaching an agreement with the secondary participating candidate companies to post the information on the portal site • Publication of catalogs of companies that are candidates for secondary participation	• Re-visit hearing sites in previous years / reach agreement on publication • Confirmation of specific data specifications • Additional discussion with primary participating companies • Additional Catalog Listing
	Acquire participating companies	• Obtain agreement to participate from data providers (target companies participating in the first phase of SIP and interviewees in FY2019). • Selection of candidate companies for secondary participation • Exchanging opinions and building consensus on use with candidate companies for secondary participation • Coordination and contract for participation	• Re-visit hearing sites in previous years / reach agreement on publication • P16 Visit candidate companies / reach consensus on listing • Confirmation of specific data specifications (creation of registration forms)
Contracts/ Rules	Formulation of portal site terms of use and contracts	• Formulation of terms of use for the portal site • Individual coordination with participating companies (if necessary) • Conclusion of contracts with participating companies based on the terms of use of the portal site	• Development/maintenance of terms of use for this portal site • Conclusion of contracts with participating companies
Internet portal (Promotion HP/) (Portal)	Consideration of contents for promotion website	• Planning, production, and publication of promotion websites ✓ Consensus building within the SIP on the content of the promotion website • Publication of use cases ✓ 2019 results for issues b, c, and d are posted as use cases. ✓ Consideration and target selection for posting new use cases for the second release	• Planning and production of content for promotion websites • Organize the empirical results of issues b, c, and d and make use cases
	Setting the public range of the portal	• Open to companies participating in SIP Phase 1, data providers, and interviewees	• Consideration of publication method/information to publishers
Event Support	Promotional events	• Idea generation event using Prof. Shirasaka's idea generation method at Keio University	• Event planning/preparation/implementation • Attract participating companies
	SIP results briefing	• Experiencing the portal site at the SIP results briefing	• Event planning/preparation/implementation

1.1.2 Dissemination promotion activities for sustainable operation of the portal site(FY2020) MD communet identification of appeal points

- It is necessary to establish a world view that we will create with the companies who will participate in MD communet to identify the appeal of MD communet. Therefore, based on the purpose of the project and the concept that was put forth in the previous fiscal year, we reorganized the world view aimed for by MD communet and the value it provides.

Ecosystem to be formed by this project

✓ We will form an ecosystem for creating and facilitating data utilization businesses by using the assets and specialized capabilities of the various enterprises and groups that will participate in this project.

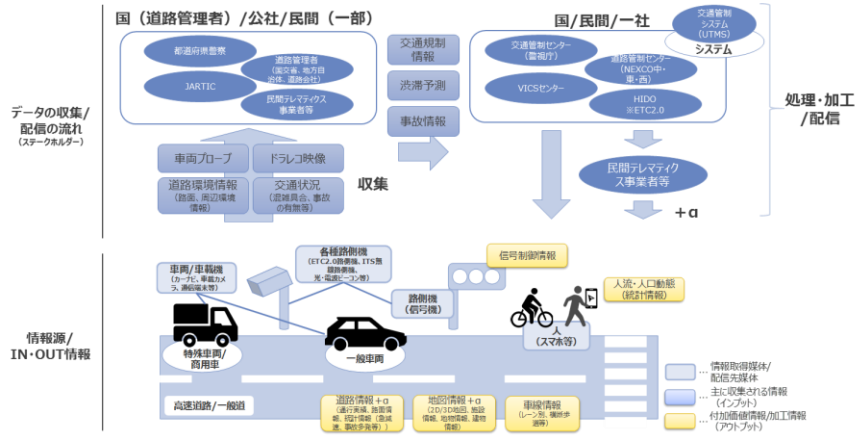


1.1.2 Dissemination promotion activities for sustainable operation of the portal site(FY2020) Approach to identify stakeholders and expand membership in this project

- Conducted surveys/sorted out the stakeholders that are necessary to realize the ecosystem MD communet is aiming for. In addition to the business operators sorted out in FY2019, new business operators identified in this survey were added, and firstly, candidate business operators were selected and opinions were exchanged mainly among the SIP related parties.

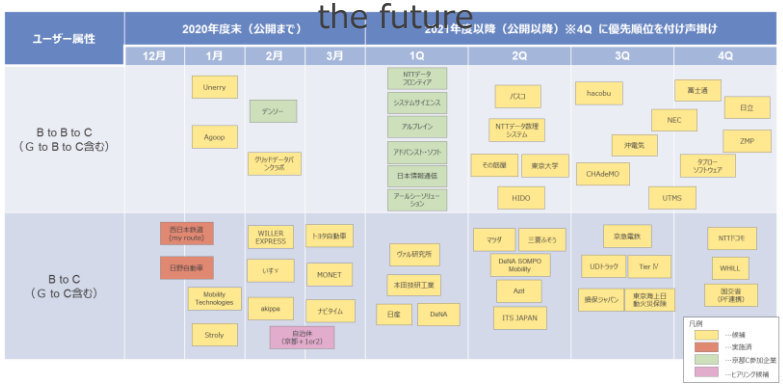
Selection of stakeholders

Survey of public and private sector data holders



Business operator mapping organized in FY2019

Mapping of data providers/users to focus on in the future



1.1.2 Dissemination promotion activities for sustainable operation of the portal site(FY2020)
Promotion activities（Events/External transmission）

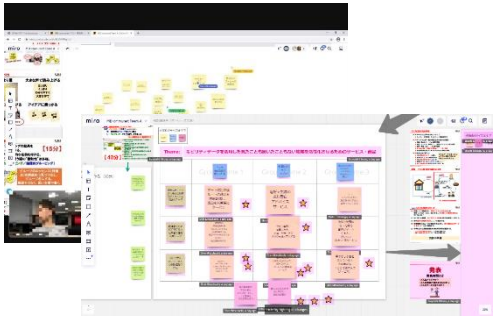
- In order to promote recognition of MD communet and the possibility of utilizing mobility data, external transmission, such as news releases, publication in technical magazines, and promotion at various exhibitions and presentations, was conducted.
- Also, after hearing from MD communet members that「They don't have the know-how to come up with service ideas」, events were held to generate ideas. In addition to learning about design thinking, it also could be used as a place for members communication.

Membership expansion/Matching emergence events

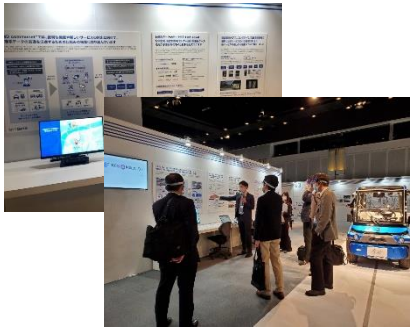
Contents	Implementation date
Press release by the Cabinet Office, NEDO／NTT DATA news release	Oct.2020
Dissemination promotion HP released	Oct.2020
Published in the November issue of NTT technical journal	Nov.2020
SIP-adus Workshop2020 result debrief session	Nov.2020
SIP café news published	Nov.2020
NTT DATA Innovation conference	Jan.2021
MD communet event	Mar.2021
SIP result debrief session	Mar.2021

<Event design >

<Idea emergence event>



<Interim results presentation>



<Cooperate with SIP café>

1.1.2 Dissemination promotion activities for sustainable operation of the portal site(FY2020) Promotion activities（Creation/publication of dissemination promotion HP)

- Until now, although MD communet has been promoted through exchanges of views with companies and organizations, and through events, and by improving individual approaches with using materials, it is believed that tools are needed for raising recognition and interest among the public in the future dissemination promotion.
- Therefore, dissemination promotion HP(service site) is created and released in Oct.2020.

Dissemination promotion HP top page

1.1.2 Dissemination promotion activities for sustainable operation of the portal site(FY2020) Development of Terms of Use for the portal site

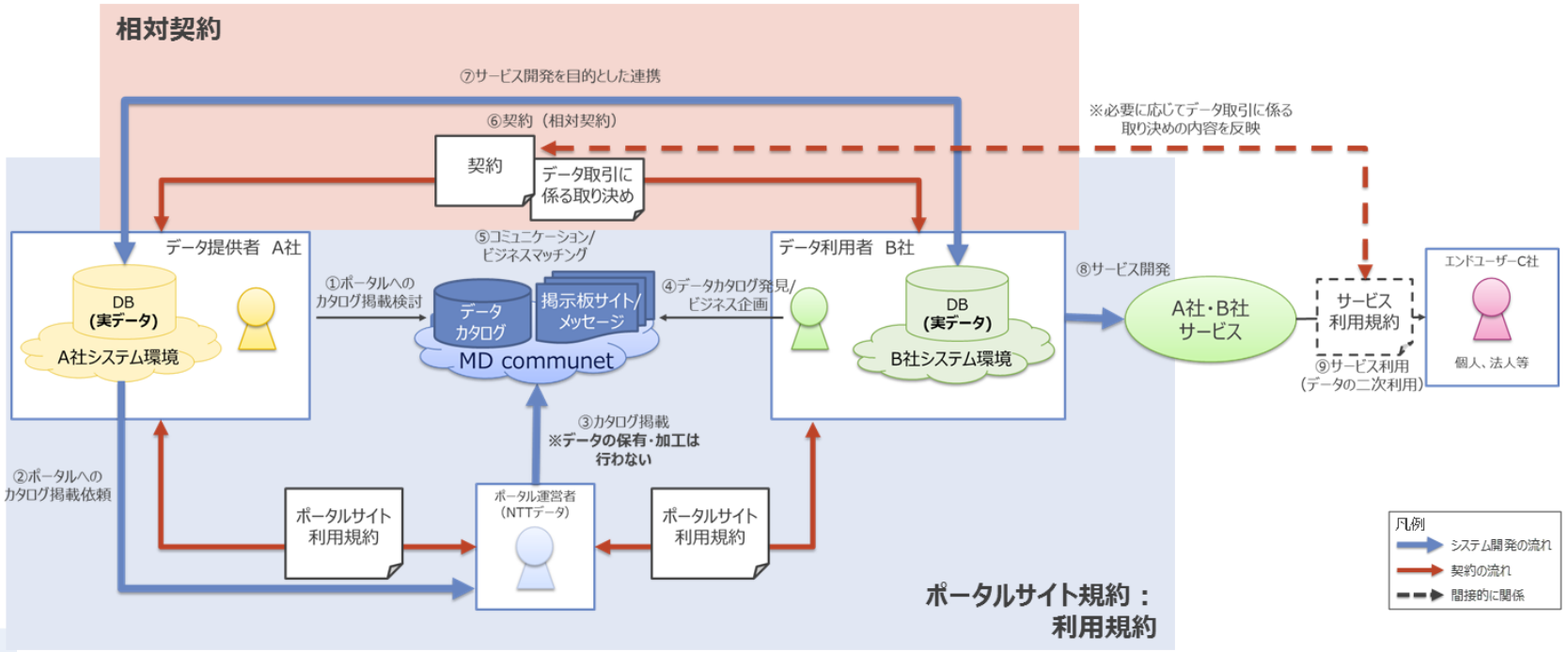
- The MD communet Terms of Use has been developed for the use of the portal site. The development was carried out with reference to the existing Terms of Use and guidelines, such as the Terms of Use of SIP themed platforms, contract guidelines on the use of AI・Data by the Ministry of Economy, Trade and Industry.

Arrangement of the development of the Terms of Use

<Overview>

- As a portal site, the service coverage is set up mainly up to business matching.
- For data transactions after business matching, it is assumed that a bilateral contract is concluded between the data provider and data users.
- The right to provide data belong to the data provider in principle.

Usage image of the portal site・scope covered by the Terms of Use



1.1.2 Dissemination promotion activities for sustainable operation of the portal site(FY2020) Benefits of participating in the MD communet initiative and future challenges

■ To further clarify how data users will use collected data, in addition to initial participant enterprises who are already using the limited release version, we conducted interviews and held discussions about how to use the portal site with potential participant enterprises whom we approached for participation.

Summary of Hearing Results

Type	Value	Issues
Data providers	✓ **Sales Channels** for new data (including PR) ✓ We can learn **about the needs of users** ✓ **Matching** with **other sectors** (enterprises/organizations/local authorities, etc.) ✓ Expectations for use as a **matching tool**	✓ **Data processing** issues ✓ Lack of **community functions**
Data users	✓ Can **reduce the effort needed to search for data** ✓ **Matching** with **other sectors** (enterprises/organizations/local authorities, etc.)	✓ **Enhance data** (completeness/collaboration with local authorities) ✓ **Enhance sample data** ✓ Create **closed community functions**
Data platforms	✓ **Develop new markets** ✓ **Matching** with **other sectors,** usage case creation	✓ **Improve environments** that data can be used (particularly for other sectors) ✓ **Step up from verification experiments to business**

1.1.2 Dissemination promotion activities for sustainable operation of the portal site(FY2020) Interviews about future business models

■ When investigating future promotion systems and business models, we interviewed initial participating enterprises about what kind of portal site functions and systems are required.

Type	Requirements demanded (for functions)	Requirements demanded (for systems)
Data provider	✓ Differentiation with other portal sites ✓ Provision of processed data through the portal site ✓ One-stop transactions including agreement/payment	✓ Establish a business model and structure that can be operated even after the SIP period
Data users	✓ Standardization of APIs and data formats ✓ Improvement in data completeness	✓ Establish a system that can implement measures for standardization and promote them ✓ Collaboration with local authorities, open data organizations, and civic tech
Data platforms	✓ Mechanisms where collaboration is possible without significant modifications to functions (ease of collaboration) ✓ Create systems where platforms can develop other areas through collaboration.	✓ Organize business models for collaboration with membership-based data platforms (scope of data disclosure, usage fees, etc.)

1.1.2 Dissemination promotion activities for sustainable operation of the portal site(FY2020) Consideration of business model and promotion system

■ Based on the aforementioned interviews, we investigated the business model and the promotion system. From the FY2021 onwards, we will conduct investigations focusing on the below three points and proceed so that they can be reflected in the system.

- ✓ With regard to data providers, while they are optimistic about listing on the portal site to increase sales channels, they are also expecting certain value that can only be obtained by listing on the portal site.
  - ➢ **We need to closely examine the value we can provide in addition to listing it on the catalog.**

    E.g., Data storage and data processing such as privacy practices
- ✓ From the perspective of data users, they want not only data completeness but also have data in an easy-to-use format.
  - ➢ **We will conduct assessments in the FY2021's operations for the promotion system and others, such as conducting data standardization and data format conversion in the form of intermediate processing on the portal site.**

    E.g., Coordination with local authorities and civic tech organizations, and investigations into promotion system for standardization
- ✓ If we pursue differentiation from other portal sites, business matching could possibly become one factor in differentiation.
  - ➢ **We will construct systems for providing value on the portal site, including intervening as consultants when necessary for semi-closed business matching.**

1.1.3 Dissemination promotion activities for sustainable operation of the portal site (FY2021)

1.1.3 Dissemination promotion activities for sustainable operation of the portal site(FY2021) Overall policy

■ Traffic environment information toward the creation of data-driven services and businesses by means of online and real actions to address issues and concerns of data users and providers in the data transaction process, leading to the realization of services. Promotion of the creation of systems

Issues and concerns of each player in the data trading process

data transaction process / For each player Issues and interests	data provision			Matching		service-oriented (Use of Data)	
	data planning	Machining Data / Commercialization	Formation of sales channels and channels	business meeting	Contract (Rules Arrangement)	data transfer	service development
data user (Service Providers)	—			• Data Discovery (Trigger) • Build relationships and opportunities with data providers (・ Service planning)		• Processing data for service development	
data provider	• Recognize marketable data (understand needs) • Processing to standard data formats • Valuing Data			• Build relationships and opportunities with data consumers		・Reprocessing to provide data	
MD communet	• Discovery of needs and data • Data Machining Support (● Temporary retention of data)			• Planning support for service creation • Creating a meeting/business meeting place ・Search and mediation of business operators		(・ Service Development Support	

*For ... MD communet activities in bold black

Facilitating Matching in Online/Real by MD communet

Creation of services and businesses through matching and **smooth data transactions** to support them, verification and improvement of systems and functions necessary for portals, **establishment of concrete systems and mechanisms for social implementation,** and aiming to be.

1.1.3 Dissemination promotion activities for sustainable operation of the portal site(FY2021) Items to be implemented and verified on MD communet (Implementation Policy)

- It is necessary to formulate a support menu required for commercialization while keeping in mind the post-general-release operation of the portal site, continued acquisition of members, accumulation of key data, matching between companies, and service creation.
- We identified the policy and task for each activity and worked towards commercializing the portal site.

Plan for Promotion Activities in FY2021 (Details)

Target for activities	Activity policy		Task
Users	**Initiatives to expand the amount of catalog data**	• Increase unique MD communet data (public, private)	• Coordination of data listing with potential member companies • Create use cases • List additional catalogues
	Acquisition of member companies	• List companies that are necessary to create new services • Redefine companies that possess data unique to MD communet	• Redefinition of potential member companies • Visit potential member companies, consensus-building regarding use, procedures
Investigation of operation models	**Review of operation/rules**	• While summarizing the needs of member companies, review and improve operation and rules	• Review content-based response to inquires • Incorporate the outcomes of investigations
	Formulation of the support menu	• Formulate the service menu provided by MD communet	• Establish support system • Verification of the support menu
Use cases	**Creation of use cases by data matching**	• Create use cases that make data users utilize listed/unlisted data on MD communet	• Investigate use cases • Approach data users • Materialization of use cases
	Creation of use cases using matching support	• Create use cases that can lead local governments and companies to solve their issues	• Consultation about issues • Investigation and materialization of use case services
Event support	**Dissemination promotion event**	• Planning and implementation of an event dedicated to matching and service creation	• Event planning/preparation/ implementation • Attract companies to participate
	Kyoto Raku Mobi Contest	• Plan a contest in conjunction with MD communet	• Contest planning • Investigation regarding data provision

1.1.3 Dissemination promotion activities for sustainable operation of the portal site(FY2021) Setting of service hypotheses to be provided by MD communet

■ After MD communet's general release, we received registration applications and inquiries from several companies, and we conducted consultations regarding expectations towards MD communet (reason for membership registration) and data utilization issues

Identification of needs for MD communet

Issues faced by users (mainly data providers)

- I don't know what needs (area, industry, buyer) and value (including monetary value) of my data
- Regarding technical aspects, I don't have the fundamental technology to provide data. I want to know how data is being provided globally (I want to know standard methods, and I want to align with these methods)
- Without regard to whether data is listed on MD communet or not, I want to prevent being put at a disadvantage (data I charged for until now, or data that I was planning to charge for, becoming free) by making my data openly available.
- I want to know what other companies or competitors are doing

What users are looking for in MD communet/What users want to do on MD communet

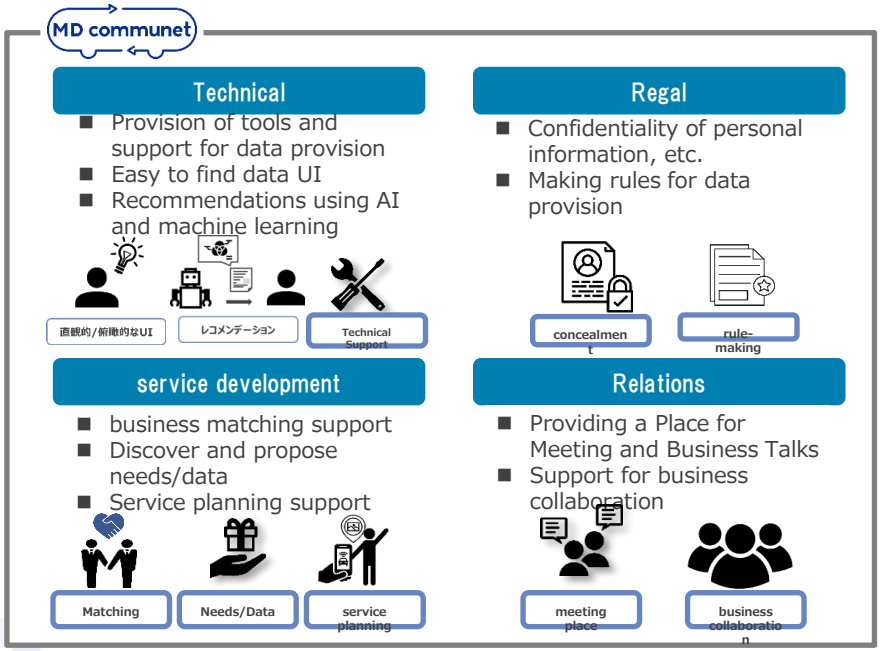
- Marketing in the mobility market, research into the trends of companies
- Searching and mediation when there is data that I want or a company that I want to connect with
- I want to think about plans for services together; I want you to solve our issues
- I want you to process our data into a format where it can be sold As an extension of this, I want you to list the data on MD communet and sell it

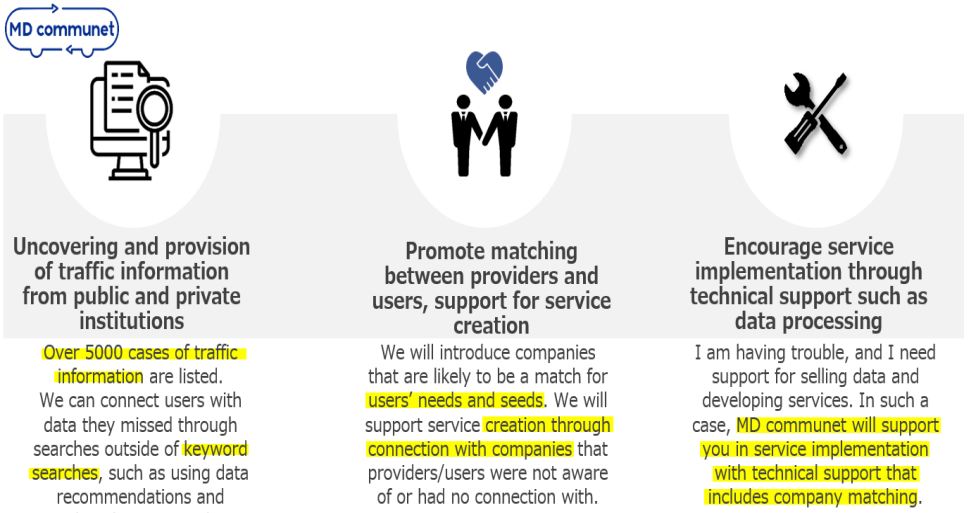
Based on the outcomes of past investigations and the opinions and feedback from our users, we need to investigate a service menu focused on commercialization

1.1.3 Dissemination promotion activities for sustainable operation of the portal site(FY2021) Setting of service hypotheses to be provided by MD communet

- Needs were identified based on the results of interviews, and a service menu for members was considered based on the issues faced by member companies and inquiry companies and the requests for the MD communet.
- We created a service menu plan, defined it as a service/value provided by MD communet, and verified it through FOTs and various promotional activities.

Proposed MD communet service menu and service value



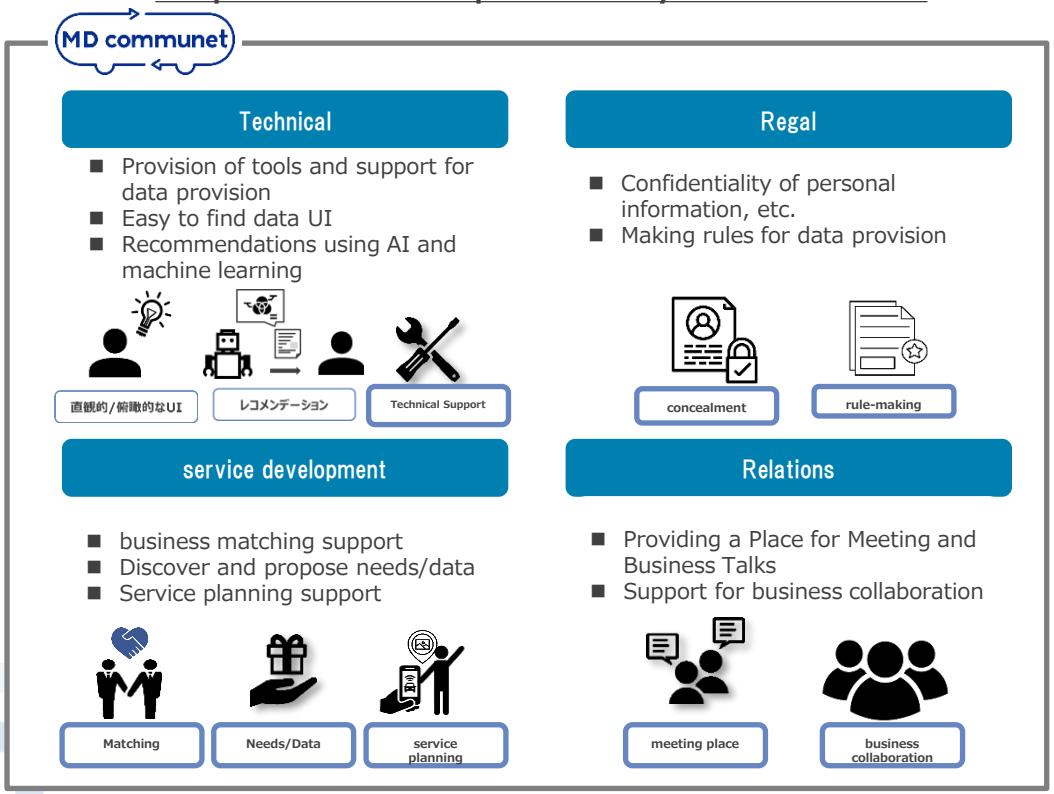


1.1.3 Dissemination promotion activities for sustainable operation of the portal site(FY2021) Matters to be implemented and verified by MD communet (Overview)

■ In order to examine the contents of the service that MD communet continuously provides, we conducted a trial in each effort such as business matching, event, FOTs, KYOTO Raku Mobi contest, etc., and examined the contents of the service at the time of social implementation while ascertaining the necessary functions and services ((1) below applies).

Items to be implemented and verified in this fiscal year to establish the MD communet service

Proposed services provided by MD communet



Implementation and verification in the MD communet

① Building relationships with key players (public and private)

To increase the appeal of the MD communet, it is necessary to create symbolic examples. Focus on creating services with key players to build the strength of MD communet

② Support for problem solving (government and local governments)

Through the KYOTO Raku Mobi Contest, we will create a place where local governments can voluntarily solve their problems by using data and provide support for data provision.

③ Support for resolving issues (private companies)

Support the creation of services that are connected to other means of transportation and associated services by posting examples of service creation using transportation-related information, including issue d

④ Development of necessary processes from the viewpoint of data users

Increase the probability and efficiency of service creation by creating a set of service examples and guidelines (service creation process, etc.)

1.1.3 Dissemination promotion activities for sustainable operation of the portal site(FY2021) Items to be implemented and verified on MD communet (1) (Relationship building with public and private key players)

■ We consider the member registration of private companies that possess a wide variety of data critical in improving the appeal of MD communet. We encouraged companies who mostly use data related to mobility and are developing or using advanced information communications technology to register on MD communet.

Definition of key players

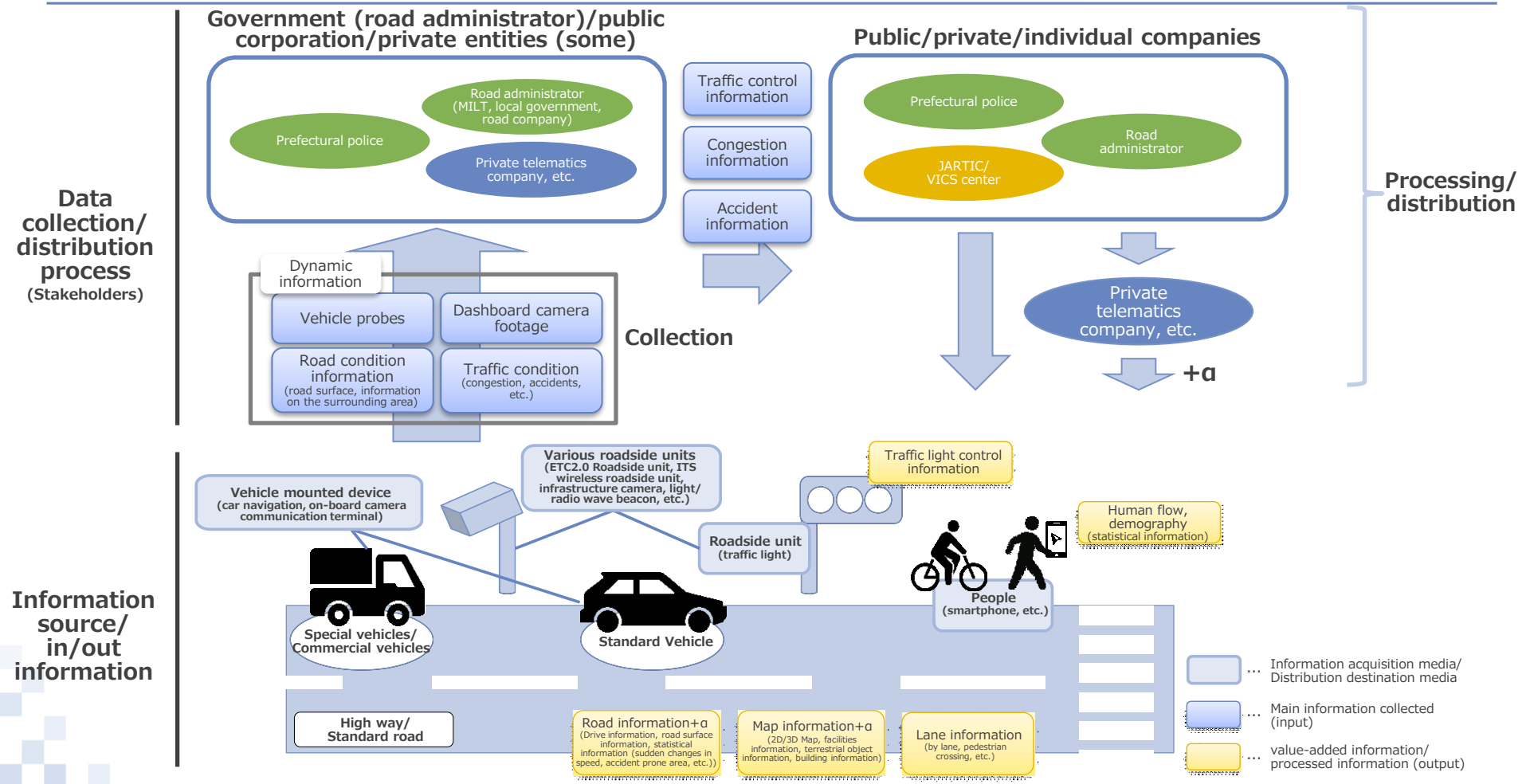
Make MD communet into a meeting place that continues to create innovative services by combining data in the transportation and mobility fields, technology for generating this data, data processing and analysis technology, and services.

For MD communet to become a meeting place, it must continue to create innovative or topical services. The presence of public and private key players is essential for this to become a reality.

1.1.3 Dissemination promotion activities for sustainable operation of the portal site(FY2021) Items to be implemented and verified on MD communet (1) (Relationship building with public and private key players)

- It was hypothesized that value-added information would be generated by combining distinctive government data and private data, and that the creation of new services utilizing this information would accelerate the resolution of social issues.
- Therefore, we decided to approach data providers who have such data to post the data.

Public-Private Data Integration Diagram



1.1.3 Dissemination promotion activities for sustainable operation of the portal site(FY2021) Matters to be implemented and verified by MD communet①(Build relationship with key players(public and private))

- MD communet has established an event plan for catalog listing, matching, service creation, which are the processes of using traffic environment information portal, with the main aim of strengthening the matching process and enhancing promotion.
- In 2021, a new matching event and idea creation workshop were held in addition to the idea creation event held in 2020.Futhermore, seminars were held in the collaboration with SIP café, and to promote matching among members, and to raise recognition.

Event for expanding membership

Events	Implementation date
2nd idea emergence event	Nov.2021
1st MD com match	Mar.2022
Idea emergence workshop	Mar.2022
4th Technical seminar「Collaborative areas in the use and provision of mobility data」	Mar.2022
3rd Idea emergence event (KYOTO RAKU Mobi contest collaboration event)	Jun.2022

<Idea emergence event>

Data introduction

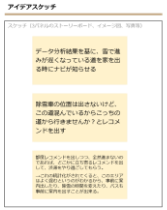
Discussion scene

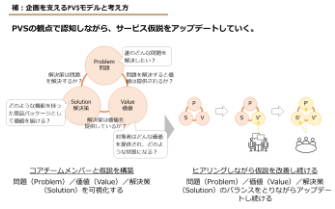
Idea

<Matching event>

<Seminar>

<Idea emergence workshop>

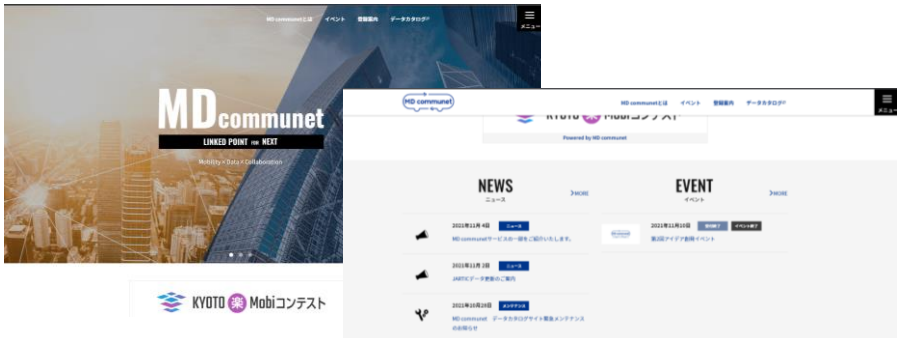




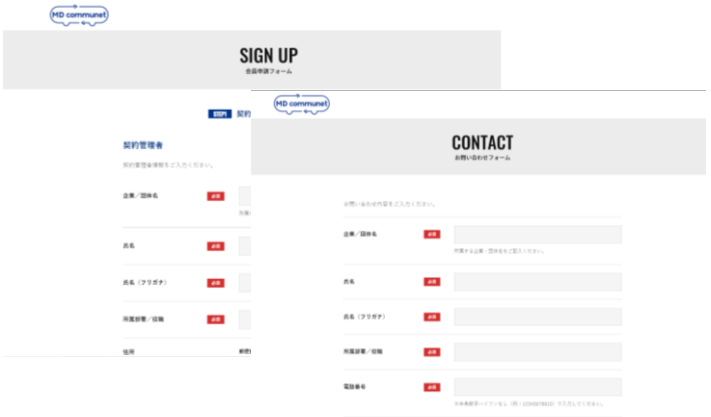
1.1.3 Dissemination promotion activities for sustainable operation of the portal site Addition to be made to the dissemination promotion website

- Regarding the improvements of the dissemination promotion website, we added extra functions and a new page to improve user experience and enhance information dissemination in the renewal of the dissemination promotion website on November 10.
- With the addition of functions and new pages, more information can be sent, which improves the MD communet withdrawal rate and the number of inflows to the data catalog site.

The renewed dissemination promotion website



Revisions: Top menu changed, banner added, news changed, events added, etc.



Set up at member application form and inquiry form

Added an event page

Added the list of members

1.1.3 Dissemination promotion activities for sustainable operation of the portal site(FY2021) Study toward social implementation of MD communet (business model hypothesis)

- Considering that MD communet will be implemented in society in the future, we examined a business model for MD communet to operate on its own.
- In considering the plan, referring to the service menu plan set at the beginning of the fiscal year, in order to eliminate bottlenecks until the provision of services, we set a hypothesis that it may be necessary not only to mediate data but also to develop products based on the needs of data users, process data, and identify issues in the industry assumed as service users.

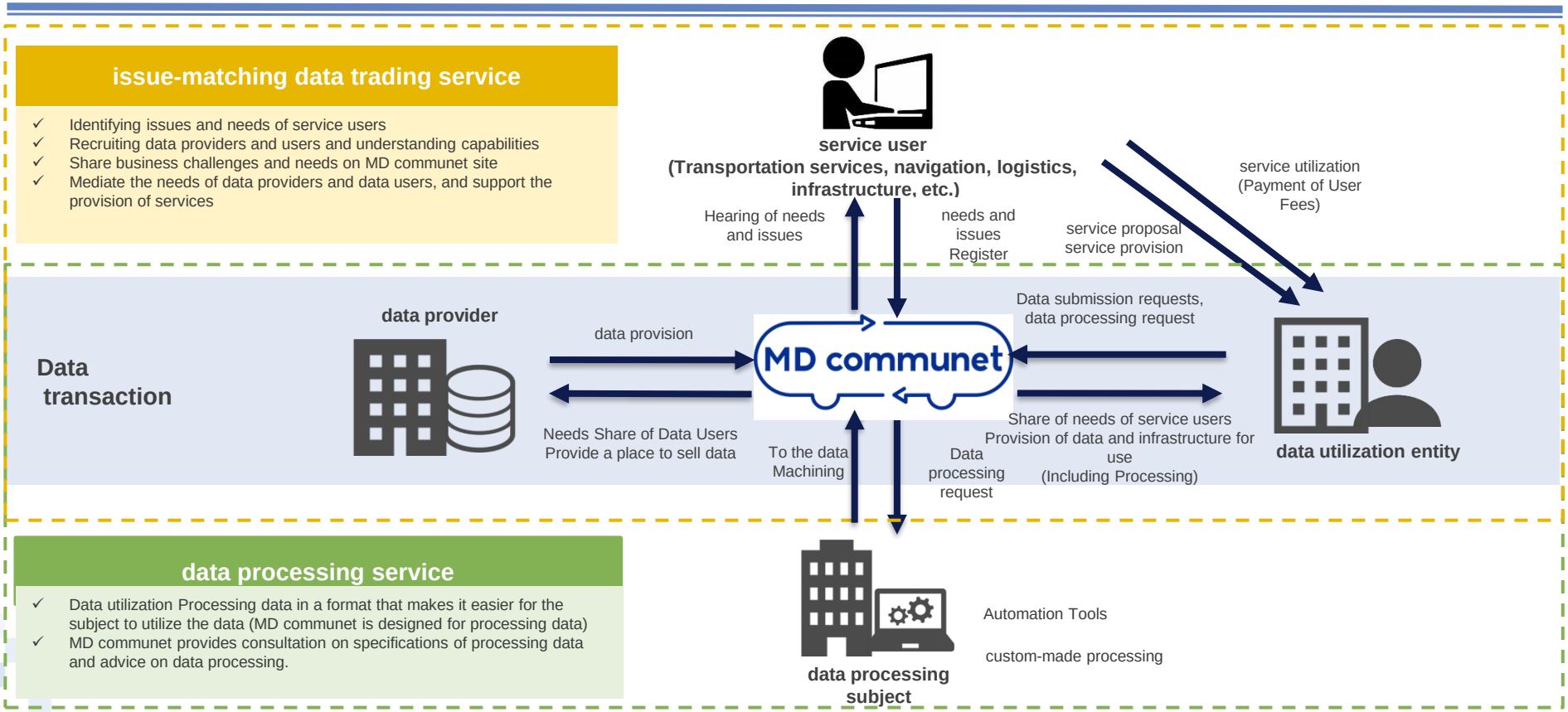
Organize the expected role of MD communet in data utilization (hypothesis)

	data provision (Publication in catalog)	seeds and needs matching ・conclusion of transaction	service development	service provision
Flow	• Cataloged data that can be provided by the data provider • Disseminate information on MD communet	• Introduce the necessary data according to the needs of the data utilization subject • When a match is made, the data is passed	• Extracting necessary data and correcting formats for data utilization • Develop services utilizing data and use them to improve our own services	➢ The data consumer is a service, Providing Knowledge Based on Data Analysis
concerned party	data provider	MD communet Data providers/data users	Data Leveraging Entity (Service Provider) / Service user	
Bottle Neck	✓ data provider ➢ You don't know what services your data can help you with. ➢ Data users do not know what type of data they need ✓ data utilization entity ➢ I can't find the data I want/I can't find the data I want in the catalog		✓ data utilization entity ➢ Lack of technology and resources to utilize and analyze data obtained from data providers (Wrong format, untagged annotation, etc.) ➢ You look at the data and you don't know what kind of analysis you can do. ➢ We have the technology to make use of data, but we don't know what kind of service to make.	
To the MD communet Expected role (Hypothesis)	**✓ Intermediation between data providers and data consumers ✓ Ideason matching event for data utilization ✓ Feedback of the needs of data consumers/joint data product proposals**		**✓ Data utilization Process data into a format that is easy for the subject to utilize. (* Format conversion, annotation, data analysis, etc.) ✓ Discover issues for service users and support the creation of services using data**	

1.1.3 Dissemination promotion activities for sustainable operation of the portal site(FY2021) Study toward social implementation of MD communet (business model hypothesis)

- This paper arranges the whole image of assumed data transaction business based on the set problem hypothesis. In data trading services, it is assumed that understanding the issues and needs of service users and using the data of members in the MD communet to solve them will promote data trading.
- Data processing services are supposed to facilitate service creation by providing data in the form desired by the data user or by providing tools capable of processing the data

Overall view of MD communet service in data utilization



1.1.3 Dissemination promotion activities for sustainable operation of the portal site(FY2021) Study toward social implementation of MD communet (business model hypothesis)

- By sharing the issues of service users, data utilization entities can utilize them in their own service development. In addition, for data providers, MD communet supports matching is expected to increase opportunities to utilize their own data and reduce the burden on business.
- The main advantages of data processing services are expected to be the reduction of costs and personnel resources for service development by data users. We expect it to help data processing entities sell their services.
- Therefore, it was decided to proceed with the concrete realization of further services in FY2022.

Expected benefits of service delivery

	issue-matching data trading service	data processing service
Overview	・Identify issues and needs of service users and share them on MD communet site ・Mediate the needs of data providers and data users, and support the provision of services	・Data utilization Process data in a format that makes it easier for the subject to utilize the data (Design of machining data is MD communet) ・MD communet provides consultation on specifications of processing data and advice on data processing.
data provision Benefits of the principal	✓ Ability to sell their data to more companies on MD communet (promotion) ✓ MD communet can shoulder the burden of sales (sales agent)	✓ There is a possibility that data utilization entities who did not have the know-how to handle their own data can use the data (sales promotion). ✓ Reduction of costs and manpower for processing required when providing data
data utilization Benefits of the principal	✓ Interested in using data to improve their services and solve problems in the field ✓ Ability to find and purchase specialized data such as automated driving and logistics ✓ Capturing the issues and needs of service users and utilizing them in the development of our own services	✓ Data can be processed into any format required by the company, reducing costs and personnel for service development and provision. ✓ Receive advice on data utilization and apply it to the development of your own services
data processing subject Benefits of	✓ Participate not only in processing, but also in data modeling and the development of ideas for processing.	✓ Can lead to more orders for data processing (sales promotion)
Benefits to service users	✓ Providing information on business issues has the potential to provide a variety of services and problem-solving ideas from more service providers.	–

1.1.4 Dissemination promotion activities for sustainable operation of the portal site (FY2022)

1.1.4 Dissemination promotion activities for sustainable operation of the portal site(FY2022) Plan for FY2022

- For dissemination promotion activities in the overall plan listed on page 6, to achieve the goal of 100 member companies/organizations at FY2023 social implementation and the end of FY2022, we established policies focused on 1) increasing the number of members, 2) expansion of case studies and 3) materialization of service provision. We then incorporated these into the implementation items on the next page.

Increase the number of members

- **Active PR activities using** collaboration with SIP café, and the implementation of exhibitions and events, etc.
- **Continued outreach to** companies and government agencies involved in the automotive industry and operators in different fields with a high affinity with mobility

Expand case studies

- **Publication of** case studies of service creation with members and case studies for verification of other themes
- **Publication of verification PoC case studies that involve local governments**
- **Listing contents and tools** that will **provide hints for data utilization**

Materialization for service provision

- **Confirmation of detailed support content for** matching and technical support
- Creation of systems with cooperating companies **based on the content of their support**
- **Materialization of business models**

1.1.4 Dissemination promotion activities for sustainable operation of the portal site(FY2022) Items to be implemented and verified on MD communet (Implementation Policy)

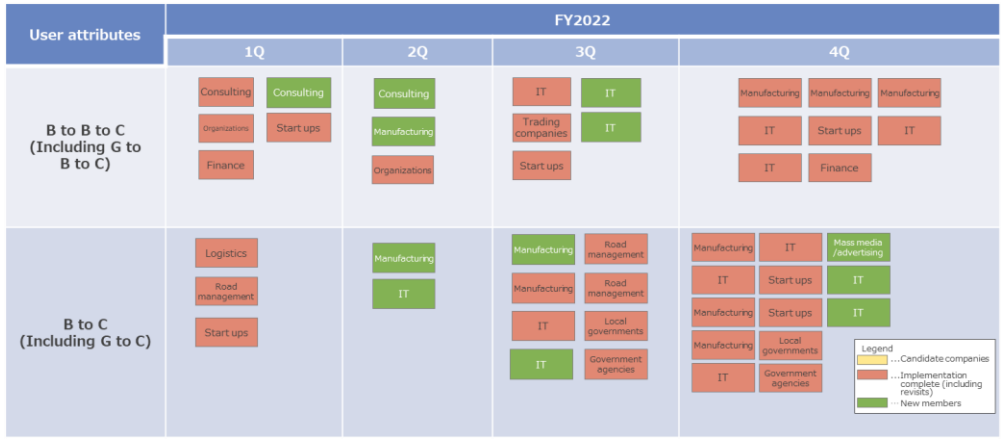
■ We established activity policies based on the policy on page 9. Towards the social implementation in FY2023, we will look to conduct more proactive external communication and enhance content, establish models required for operation, improve the terms of use as necessary, and strengthen internal and external measures.

Target for activities	Activity policy		Task
Users	**Initiatives to expand the amount of catalog data**	• Increase unique MD communet data (public, private)	• Coordination of data listing with potential members • List use cases • List catalogues
	Increase the number of members	• Data users • Redefine companies that possess data unique to MD communet	• Redefinition of potential members • Visits to potential members, consensus-building regarding use, procedures
Operation models	**Review the terms of use**	• Revise the terms of use as necessary while collecting requests from members	• Create a revision proposal for the terms of use • Revise the terms of use
	Materialization of the support menu	• Materialize the service menu provided by MD communet • Create a support system, including systems	• Establish support system • Materialization of the support menu
Use cases	**List utilization use cases**	• List use cases that allow MD communet visitors to visualize data usage	• Investigate use cases composition • Outreach and coordination for listing • List use cases
	List PoC and verification experiment use cases	• List use cases that can lead local governments and companies to solve their issues	• Investigate use cases composition • Outreach and coordination for listing • List use cases
Event	**Dissemination promotion event**	• Strengthen external communication to increase awareness of MD communet • Hold events to support matching and idea creation	• External communication, event planning/preparation/implementation
	KYOTO Raku Mobi contest	• Plan a contest in conjunction with MD communet	• Contest planning/implementation

1.1.4 Dissemination promotion activities for sustainable operation of the portal site(FY2022) Initiatives to increase the number of MD communet members

- Aiming for 100 companies/organizations at the FY2023 social application, of all the players, including OEM companies, we focused on companies/organizations active in data utilization and creating mobility services, arranged the organizations as below, and held discussions with the organizations.
- In addition to the below table, we held discussions with close to 100 companies/organizations, and as of March 2023, we were able to increase the number of members to 80 companies/organizations.

Approach List and Our partners (Partial)



MS&AD あいおいニッセイ同和損保 / ITS Japan / ALPS ALPINE / unerry / AIM Co.,Ltd. / S.RIDE / NTT InfraNet / NTTタウンページ / NTT DATA / 兼松株式会社 KANEMATSU CORPORATION / 京都市観光協会 KYOTO CITY TOURISM ASSOCIATION / GeoTechnologies / G空間情報センター / ジョルダン / 住友ゴム工業株式会社 SUMITOMO RUBBER INDUSTRIES, LTD. / ZENRIN / ZENRIN DataCom / SOMPO 損保ジャパン / PACIFIC / DYNAMIC MAP PLATFORM / 東京海上日動 / docomo InsightMarketing / tomtom / JARTIC 日本道路交通情報センター / 0テレ / Pioneer / Parkopedia / Pacific Consultants / パーソルR&D / here / HALEX / V-Drive / HONDA / MS&AD 三井住友海上 / YAZAKI / YAHOO! JAPAN

1.1.4 Dissemination promotion activities for sustainable operation of the portal site(FY2022) Promotional activities

- To achieve 100 member companies and organizations by the end of FY2022, for the event policy in FY2022, we implemented initiatives to increase awareness amongst pre-actualized and pre-potential members interested in utilizing traffic information broadly in various industries.
- In addition to events for members, through active promotion using webinars and exhibitions, we held events that increased awareness of MD communet and increased the number of members.

Event/external communication	Date implemented
Ideathon Event: In Kyoto	July 2022
2nd Automated Driving Live News	June 2022
Internal webinar at the Sumitomo Group (volunteer)	September 2022
SIP-adus Workshop2022	October 2022
MIRAI LAB PALETTE Day	October 2022
GITA-JAPAN Conference	November 2022
MIRAI LAB PALETTE Collaboration Event	November 2022
Ichi Biz Award	December 2022
Press release event for verification projects	January 2023
Automotive World 2023 3rd MaaS EXPO	January 2023

Examples of past events and sponsorships

MIRAI LAB PALETTE Collaboration Event

Ichi Biz Award sponsorship

Automotive World

2nd Automated Driving Live News

1.1.4 Dissemination promotion activities for sustainable operation of the portal site(FY2022) Policy for regular improvement and implemented content for the dissemination promotion website

- We consider improving the dissemination promotion website and data catalog along with enhancing content and promotion for the recognition and understanding phase urgent matters in accelerating the social application of MD communet and formulated policies accordingly.
- In addition to SEO-focused inflow policies, we investigated adding content to increase awareness and interest after inflow and website flow to improve website navigation.

Improvement of the portal site and data catalog ⇒ attract users/acquire users

After the FY2021 release of the portal site, we increased the number of members through news releases and by Kuzumaki and NTT Data approaching companies. However, there is **insufficient organic acquisition of members.**

In the briefing session last year, issues regarding promotion were raised by those involved. They mentioned the **insufficient** promotion of what MD communet will do for its members and that MD communet does not come up in search results.

Identification and selection of necessary policies

ID	Policy name	Indicator	Overview
1	SEO measures	Number of inflows	Increase the number of inflows from organic search by formulating an SEO strategy and reviewing content creation and measures within the website
2	Improve website UI	CVR	Aim for improved CVR by improving UI within the website
3	Utilization of external media	Number of inflows	Aim to increase the number of inflows by having external media establish links to guide users to the dissemination promotion website
4	Add contents (from the perspective of CVR)	CVR	Add contents that users feel is necessary for membership registration
5	Establish micro cv points	Number of inflows CVR	Aim to enclose potential users by establishing CV points outside of membership registration (Ex.: downloads of e-newsletter, white paper, etc.)
6	Web Advertising	Number of inflows	Listing, SNS, and network advertisements aimed at increasing the number of inflows to the website

1.1.4 Dissemination promotion activities for sustainable operation of the portal site(FY2022) Details of implemented policies

- We improved the design of the website and enhanced listed content to make the initiatives of MD communet easier to understand for visitors to the dissemination promotion website. Also, due to the need for foreign languages with the recent increase in access from outside Japan, we sequentially added foreign languages to the website.
- We increased the number of members by approaching pre-potential and actualized members with web advertising.

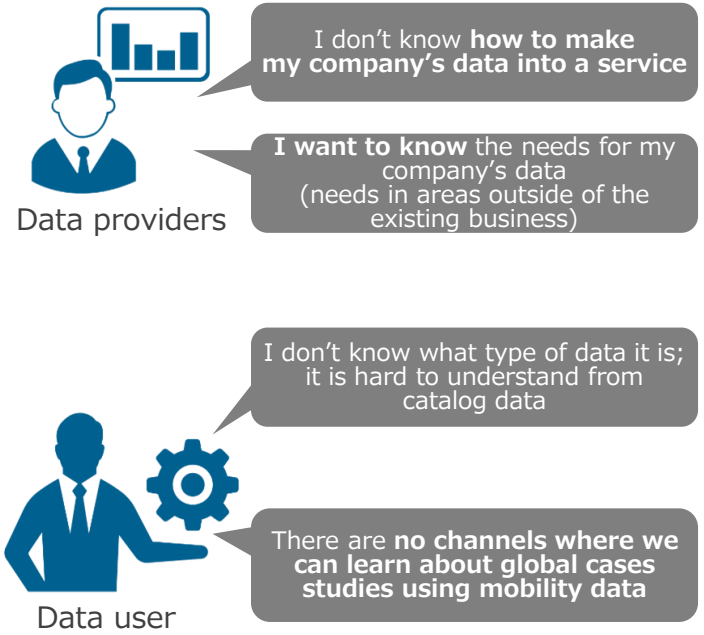
Improving website design

Adding foreign languages/enhancing listed content

Web Advertising

1.1.4 Dissemination promotion activities for sustainable operation of the portal site(FY2022) Introduction of case studies for increasing the number of members

- In previous interviews and member feedback, many commented that they wanted to make their own data-based services or provide data, but they did not know how it could be utilized.
- That is why we listed case studies for utilizing mobility data on the website and linked this with catalog data to arouse interest and connect this to inquiries and membership registration, in addition to giving both providers and users an idea of mobility data utilization.
- By doing so, we made it easier for potential members to envision data utilization and created opportunities for all kinds of people to become interested in services and data.



Wrote and published an article to make it easy to get an idea of service utilization

Case study (service) Overview

Overview of various data

What can be done by using data

Future outlook

1.1.4 Dissemination promotion activities for sustainable operation of the portal site(FY2022) Organization of service content and monetization points

- We organized a service menu from matching to the creation of services that solve social issues for the operation of MD communet for next year onwards. We envision dividing members between free and paid, and some services, such as matching and technical support, will only be available to paid members.
- With membership fees as the main source of financing, we envision that there will be a separate fee structure for optional services such as introducing data processing companies and business support.

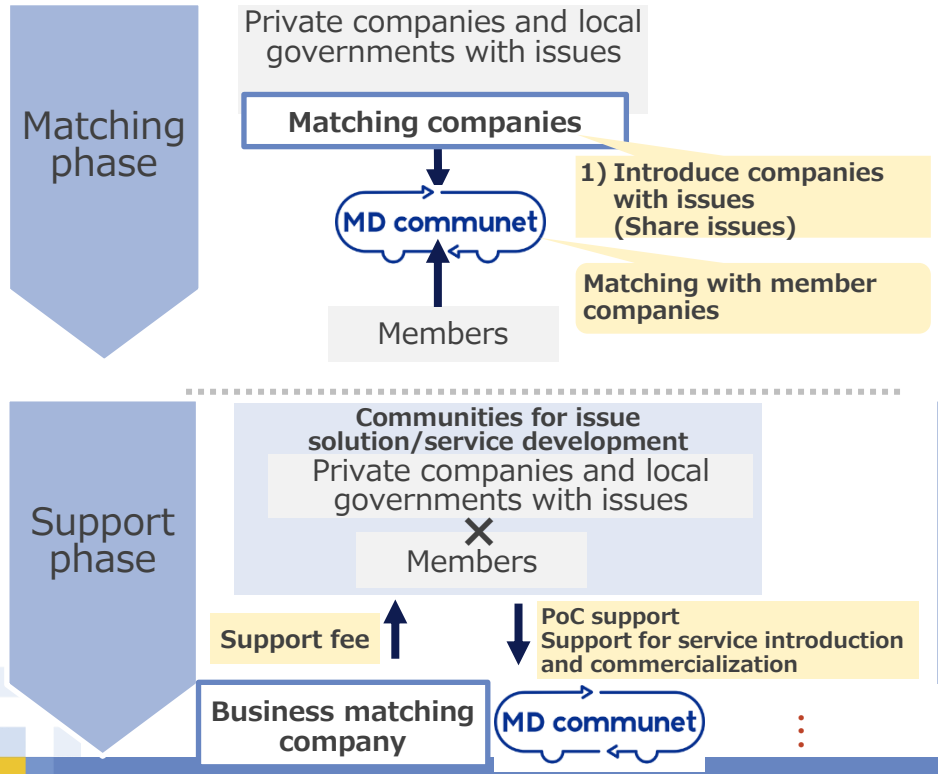
MD communet services

	Service menu		Overview
Matching	Matching support	company profile Catalog and search functions	Provide functions for registering and searching company profiles and data catalogs on the website.
		Matching event	Provide venues for open innovation events and explanatory sessions for data usage Collaboration with matching PF, etc. Meeting with non-member companies or organization.
		Approach members	Approach and match member companies with one another in light of social and member needs.
		Communication tools for matching candidates	Provision of chat tools and message exchange with partners that companies want to match with
data providers	Technical support	Advisory concerning data processing	Provision of a template for visualizing the process from the preprocessing of various data to data analysis and utilization Data utilization support for technicians
		Data standardization (introduce data processing companies)	Introduce companies can support data providers who are unable to conduct preprocessing (anonymization, etc.) of their data for provision
Services Development	Technical support	Data utilization support (introduce data processing companies)	Introduce companies that can support companies who do not have expertise regarding preprocessing (annotation, batch processing, noise removal, etc.) for data utilization
	Commercialization support	Side-by-side business creation	PMO support, including post-matching formulation of business strategy, fine-tuning of co-creation models, and side-by-side PoC support (Business model campus, etc.)
	Website operation	Gather information about use cases	Gather information about matching case studies and introduce them on the website Acquisition of new members and matching support for member companies

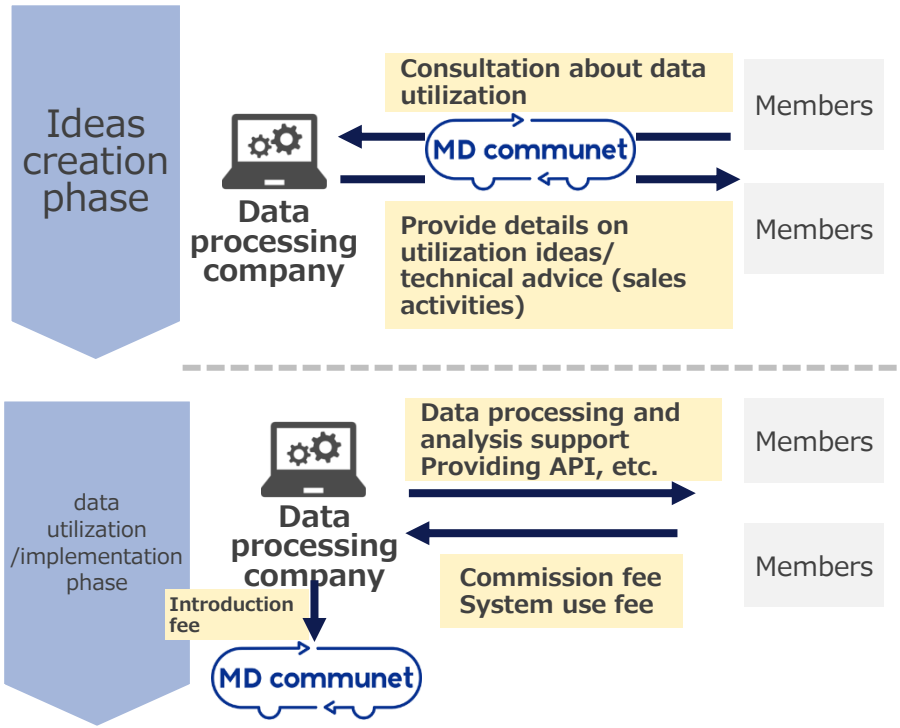
1.1.4 Dissemination promotion activities for sustainable operation of the portal site(FY2022)
Project collaboration system of partner companies (hypothesis)

- We are investigating collaboration between business matching operators and data processors to create a structure to support the business matching and data processing necessary to materialize the service menu.
- In the matching phase, matching is conducted between private companies and local governments with issues and members that have data. After matching, we will provide support for PoC in service creation and commercialization.
- Data processing companies will provide advice to members about data processing, provide their expertise on data processing and analysis, and subsequently provide opportunities for support with processing and analysis.

Collaboration with matching companies



Collaboration with data processing companies



1.1.4 Dissemination promotion activities for sustainable operation of the portal site(FY2022) Organize the roles and selection criteria expected for collaboration partners (matching companies)

- Organize the conditions for identifying potential partners based on the themes targeted by MD communet and the expertise and roles expected of collaboration partners.
- We are investigating the following as conditions: participation of companies and organizations not only from mobility but also from adjacent fields, such as disaster prevention, tourism, area marketing, and the environment; matching orientated at new business development; companies that can provide event venues for promotion; companies that can support commercialization for members.

Preconditions related to investigating selection criteria

Features of MD communet

- A forum for attractive information exchange for both providers and users of traffic information data
- Solve social issues such as reducing traffic accidents or traffic or the creation of new services or value

Matching Roles expected of matching companies

- **Acquire members/provide opportunities for promotion**
  - Provide opportunities for outreach to private companies or local governments with issues, such as having them attend events held by matching companies
- **Role in matching**
  - Identify the issues of registered companies.
  - Provide side-by-side support for projects during and after matching

Conditions for potential collaboration matching companies

Industry trends of registered companies and organizations

- ✓ Transportation and logistics companies, local governments, and companies related to the mobility industry are participating
- ✓ Companies and organizations from adjacent industries, such as disaster prevention, tourism, area marketing, and the environment, are participating

Companies' or organizations' registration purpose/orientation for matching

- ✓ Companies and organizations are coming together to collaborate on service development (Not matching solely aimed at creating sales channels)

Hold mobility-themed events

- ✓ Hold matching events for mobility-related companies, and AI or data-science-related companies

Side-by-side implementation support for matching of registered companies and organizations

- ✓ Providing support for matching and post-matching side-by-side implementation support

1.1.4 Dissemination promotion activities for sustainable operation of the portal site(FY2022) Organize the roles and selection criteria expected for collaboration partners (data processors)

- Organize the conditions for identifying potential partners based on the themes targeted by MD communet and the expertise and roles expected of collaboration partners.
- As traffic data will be handled, it is preferable that we coordinate with a data processor with experience in handling map data or probe information or, a data processor with experience in developing algorithms and can participate by giving advice about data utilization. Regarding data processing and analysis support, we also need to confirm that data processors can perform various types of processing in addition to their capacity to process quantitative data.

Preconditions related to investigating selection criteria		Conditions for potential collaboration matching companies
Features of MD communet	• A forum for attractive information exchange for both providers and users of traffic information data • Solve social issues such as reducing traffic accidents or traffic or the creation of new services or value	• **Experience in handling traffic information** ✓ Experience in handling information including probe information, operation route information, weather information, map information, and traffic information
Data processing Role expected of data processing companies	• **Provide details on ideas for data utilization** ➢ Provide details on ideas about what data is needed for service realization and how to analyze this data • **Preprocessing and processing of data** ➢ Support for data sampling, cleansing, and anonymization required for data processing ➢ Support for data analysis and processing (including the provision of processing tools)	• **Experience in developing algorithms** ✓ Experience in modeling, data sampling, analysis, and dashboard development • **Variation in data processing capabilities** ✓ Types of processing possible ・Cleansing ・Data extraction ・Anonymization ・Annotation, etc. ✓ Capability to process large quantities of data

1.1.4 Dissemination promotion activities for sustainable operation of the portal site(FY2022) Outcomes from interviews with data processing companies

- To process various types of data, we want to create a collaboration system with companies that can handle various data, including image and video data, point cloud data, and location data. Many businesses are interested in participating from the perspective of providing advice on data processing or consultations on protecting personal privacy.
- Many businesses were concerned about their expertise being leaked to rival companies and requested that we formulate rules for handing information between menbers.

Outcomes from interviews with data processing companies

Company	Data/services handled Services	Intention to collaborate	Protection of personal information	Concerns about collaboration	Other
Company D	Annotation of data such as image and video; modeling and solution proposals	Participation possible by providing advice about data processing	Masking of image data possible Consultation possible about working in line with customers' policy	**Wants to prevent processing expertise being leaked to rivals** Does not want other customers to know their sales information	Wants projects to be introduced with an understanding of the strengths of each data company
Company E	Annotation and masking of image and video data;	Participation possible by providing advice about data processing Willing to provide annotation data	Masking of image data possible Experience in working with GDPR Consultation possible about working in line with customers' policy	**Wants to prevent processing expertise being leaked to rivals** (e.g., conclusion of NDA, etc.)	N/A
Company F	Proposals for modeling and solution through collaboration on valiable data, and annotation groups for text	Participation possible by providing advice about data processing	Consultation possible about working in line with customers' policy	**Wants to prevent processing expertise being leaked to rivals** (e.g., conclusion of NDA, etc.)	Proposals for data acquisition and rules also possible
Company G	Location data (can also handle data such as human flow data, map data, globe data, and video data)	Participation possible by providing advice about data processing Willing to participate by providing data or solutions	Consultation possible about working in line with customers' policy Regular discussions with specialists	Concerned about time and energy in the process from individual consultation to conclusion	They would prefer to know the trends regarding best-selling products They can also provide engines to MDC
Company H	Map data, location data (processed by mesh and administrative data), video data Provision of GIS tools and analysis of commercial areas	Willing to provide data Advice on data processing is difficult due to concerns about expertise being leaked	Policy not to handle personal information	Will not disclose experience and technology even when the scope of disclosure is limited to members	Concerned about securing resources for data processing

1.1.4 Dissemination promotion activities for sustainable operation of the portal site(FY2022) Interviews with potential collaboration matching companies

- We held interviews with three matching companies that support business matching. As a result, we are investigating a collaboration system with Company A, based on its affinity with the participation purpose of registered companies and organizations and the initiatives of MD communet, and the superior quality of its pre- and post-matching support.
- We are investigating collaboration with Company A regarding holding open innovation events as a service to support matching and post-matching support for commercialization.

Results of interviews and investigations with potential collaboration partners

	Registered companies and organizations	Support during matching	Post-matching side-by-side support
Business matching Company A	**Aim for the development of new projects** **Tens of thousands of companies and local governments** Manufacturing, logistics, medical, construction, real estate, raw materials, energy, etc.	• Provision of matching platforms • Open innovation events • Identification and promotion of matching candidates • Support for the selection of collaboration partners	• PMO support • PoC establishment support • Brushup of joint models
Business matching Company B	**Thousands of companies and local governments** Manufacturing, logistics, medical, construction, real estate, raw materials, energy, etc.	• Provision of matching platforms only	• Introduction of specialists (not provided)
Business matching Company C	**Focused on local governments**	• Matching with local governments • Sales for sales to local governments	• PMO support • PoC establishment support • Field adjustments, etc.

We are investigating a collaboration system with Company A in light of its affinity with the participation purpose of registered companies and the content of its support

1.1.4 Dissemination promotion activities for sustainable operation of the portal site(FY2022) Rules for handing information between members and organization of information flow

- We investigated rules for information that may be exchanged when using MD communet and the rules of handling this information to prevent new businesses between members and expertise on data handling being leaked.
- The information provider makes the final decision on the scope of disclosure. Through disseminating the below case studies and promoting mutual understanding between members, we anticipate that members will help one another in preventing expertise from being leaked.

Investigation into the terms of use (items regarding the handling of information)

	Example of handled information	Handing after revision of the terms of use		Example of exchanged information
Site visit	• Data catalog (data overview, etc.) • company profile	**Standard Available to all**	Viewable by people other than the contractors as publicly available information	• Members can register and publish information on the website.
Search for matching partner	• Use cases, co-creation case studies • Sample data (dummy data) • Solution materials • Door-knocking sales tools	**Members only**	Only viewable by contractors as it may contain individual confidential information	• MD communet distributes information by email to member companies • Members can register and publish information on the website.
Verification of matching viability	• Sample data • Solution materials • Door-knocking sales tools	**Related parties only**	The scope of information disclosure can be limited based on the consent of the information provider	• The information provider distributes information within the scope of disclosure they set • MD communet provides information to potential co-creation partners after gaining the permission of the information provider
Post-matching co-creation	• Co-creation idea, proposal materials • Sales partner information, meeting minutes • Provided data (part of raw data) • Technical specification	As usual (**information is not disclosed to parties outside of the companies involved** as the co-creation materialization phase contains a lot of expertise that is unique to companies and business secrets)		• The information provider distributes information within the scope of disclosure they set without the intervention of MDC as a secretariat
Contract	• Contract • Provided data (raw data for development)			

⋮

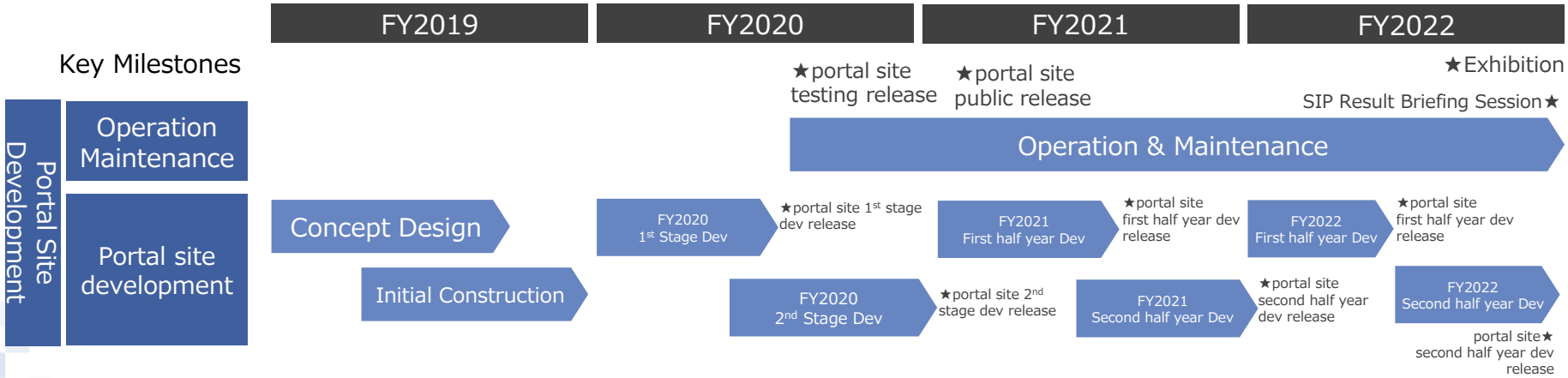
Example of information where the scope of information disclosure may cover multiple boundaries
Door-knocking sales tools, solution materials, sample data, etc.
(MD communet has already provided the function to upload sample data. There are cases where a link is listed on the HP from which users can download the data.)

1.2 Portal site development

Summary of MD communet Data Catalog Site Development

- In FY2019, we conducted initial construction while conducting concept design.
- After that, we continuously added and improved functions in approximately a half-year cycle based on the initially constructed system.
- We conducted testing release in the second half of FY2020 and public release in the first half of FY2021 and conducted operations and maintenance in parallel with the development.
- After public release, we continuously added and improved functions on a half-year cycle based on user opinions.

Milestones and Tasks



1.2.1 Portal site development (FY2019)

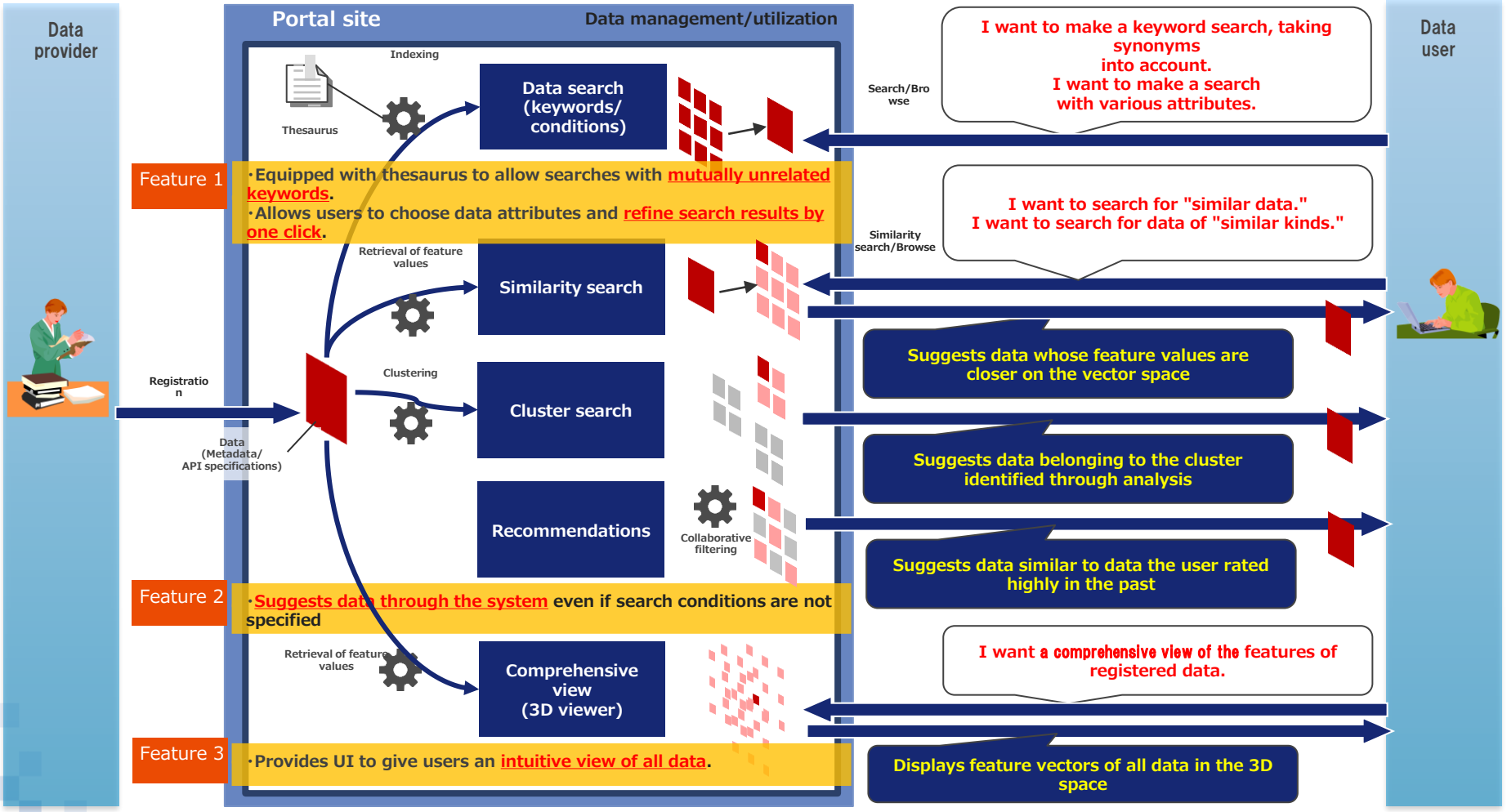
1.2 Portal site development(FY2019)
Construction concept

- We developed a portal site using the outcomes of studies on dynamic maps and service platforms for the automated driving system in SIP Phase I and focused on matching between seeds and needs.

No.	Category	Subject	Requirements
1	Portal	Suggestion search service	・To make a search, users need to know what other users are looking for and information retrieval techniques. Thus, implement a "suggestion service" that helps users access data that is not available through conventional search services without such knowledge and techniques. ・To implement the "suggestion service," create data to help searches automatically generated with minimum operations by data providers.
2			・Collaborative filtering: Record the behaviors of users and offer suggestions based on the records.
3	Matching	Matching between seeds/needs	・Visualize the needs of data users and seeds of data providers and match them through a simplified system for data registration even if metadata is not fully organized.
4		Promotion of communication	・Help to find new ways of using data through mutual communication.
5	Support	Service development support	・Help service developers to use various data and API with unified specifications. ・Support service developers who use available data and API, to reduce costs.

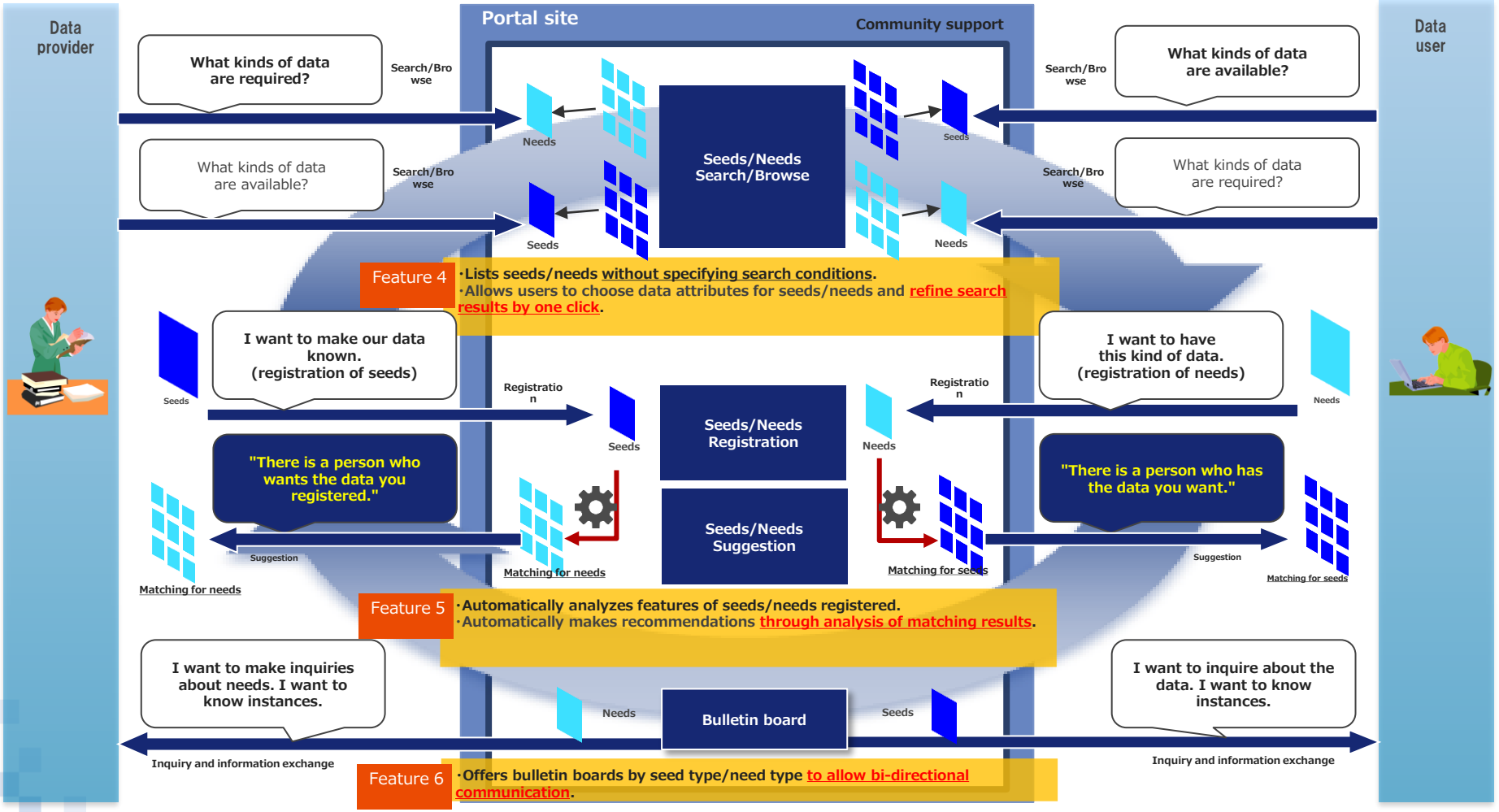
1.2 Portal site development(FY2019)
Structure of the constructed portal

- Automatically analyze and sense data with various techniques to help data users to find and encounter new data.



1.2 Portal site development(FY2019)
Structure of the constructed portal

- Allow searches for data needs and data seeds, suggestions, and mutual communication to improve matching between them before registration of data specifications and API specifications with a data catalog.



1.2 Portal site development(FY2019)
Structure of the constructed portal

- Make suggestion search methods (with matching between needs and seeds, similarity search, or cluster search) available for data users to help them encounter new data.

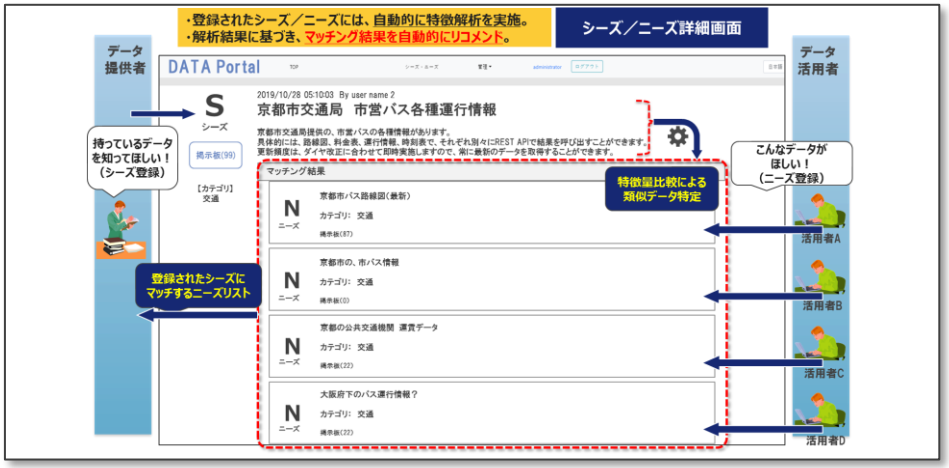


Image of a screen displaying data for matching between needs/seeds

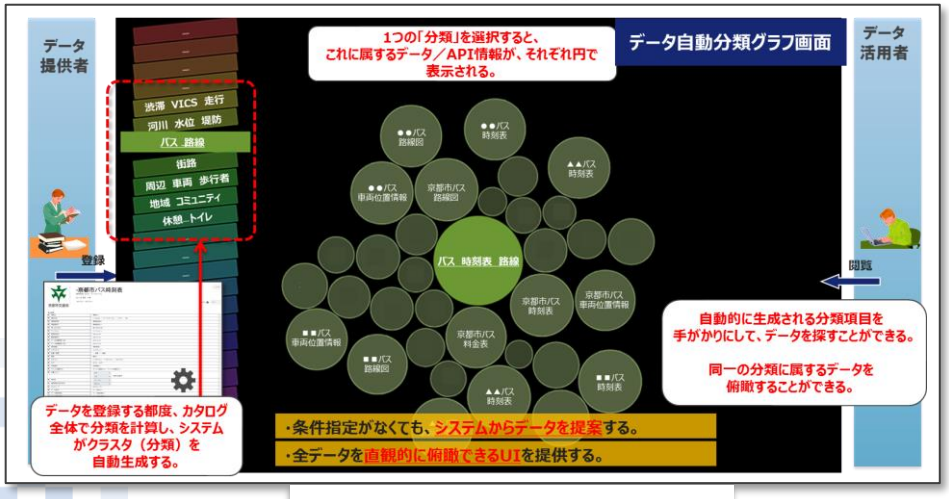


Image of a screen for cluster search

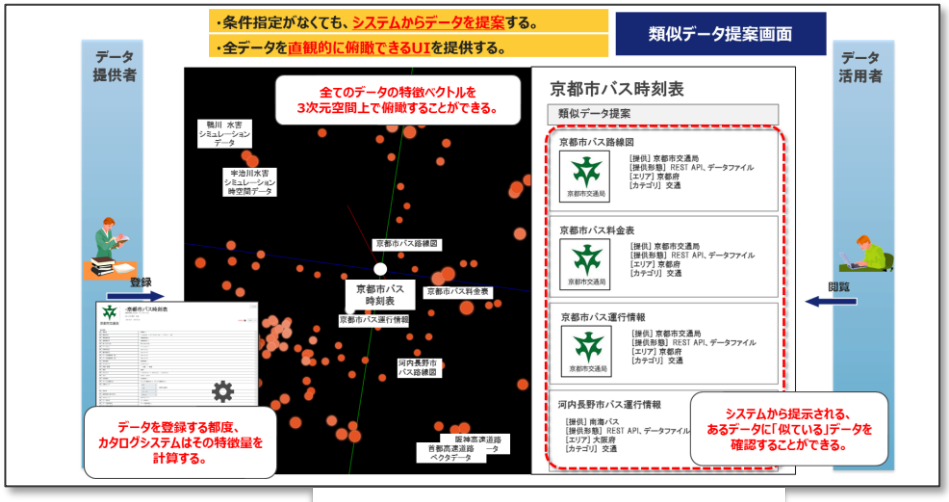


Image of a screen for similarity search

1.2.2 Portal site development (FY2020)

1.2 Portal site development(FY2020)
Consideration of additional functions in consideration of business matching sites

- For FY2020, while taking the fact the portal site will be released to some members into consideration, we set a development policy with a focus on improving the matching rate and usability for users.
  - ✓ Approach 1: Initiatives to increase the amount of data handled (data set, seeds/needs) in order to increase matching parameters
  - ✓ Approach 2: Improve ease of matching through innovations regarding ease of use and UI
  - ✓ Approach 3: Continuous improvements to usability from user feedback and operational issues

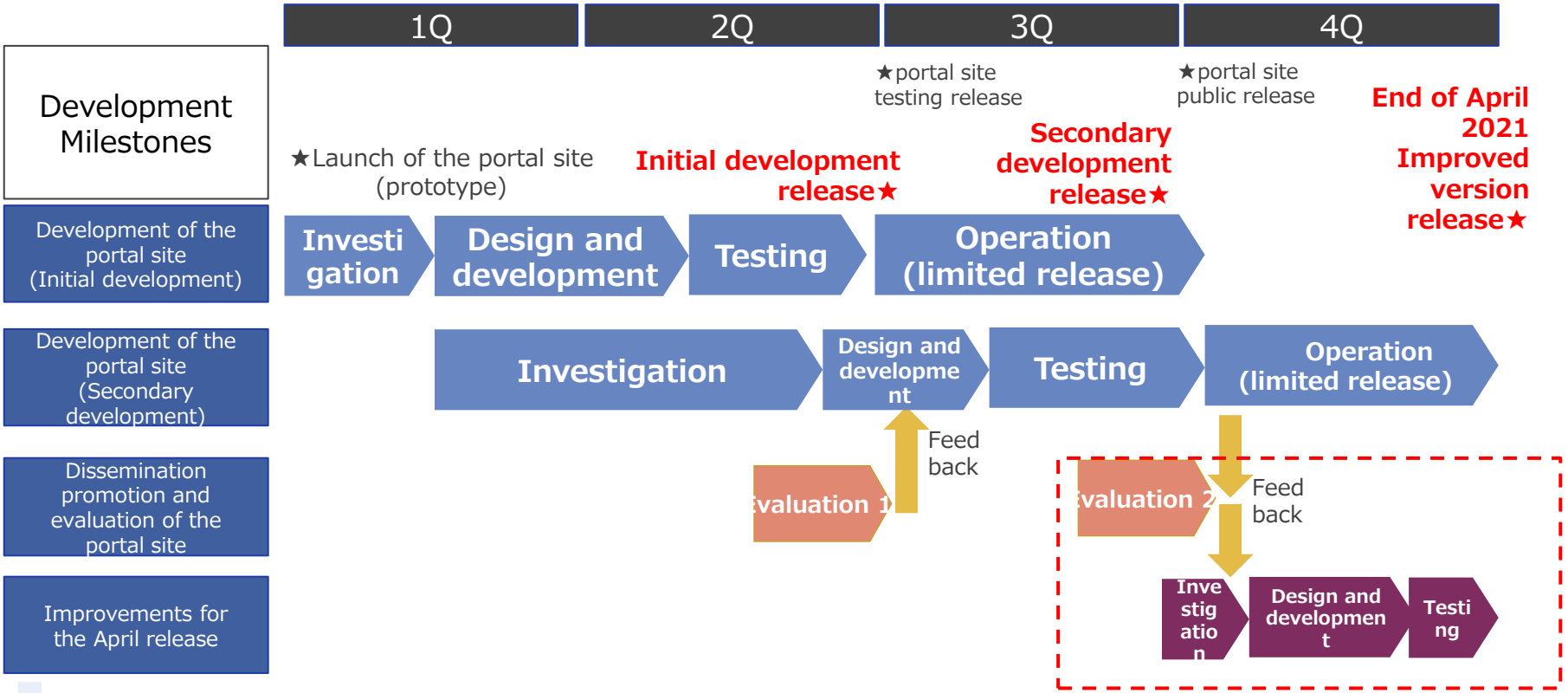
Approach 1 Increase the amount of data handled	Build a comprehensive machine learning model	Through creating **a comprehensive machine learning model that includes both data sets and needs/seeds,** create **the possibility of new matching that combines needs and data sets (=seeds that have been specified).**
	Periodic collection of metadata ※See details later	To **dynamically reflect** the renewal of metadata **on the portal site, regularly harvest external metadata and create a catalog** by combining this with our metadata.
Approach 2 Improve the ease of matching	Relevance according to human intuition	**By incorporating abstract criteria such as human intuition** as well as mechanical criteria such as the similarity of text descriptions, we became able to **encourage users' imagination and associations.**
	Prompt metadata description at data registration ※See details later	Metadata for data sets and seeds/needs can be registered in a free format. However, **we will induce users to unify each data description to a certain extent.**
	Change the content of log output	To make this the recommended input, make changes so that it outputs information of the user who has accessed the log. We are intent to implement future improvements to recommendations by using the information that is output here.
Approach 3 Ongoing improvements to usability	Functions will be improved using feedback from users and operational issues	- **Reflect the opinions of contest participants** (improvements responding to complaints that it is hard to view and difficult to understand) - Tuning of automatic classification and display of similar data, add "provision" to facet items and apply the new design **- Reflect the opinions of contest winners and data providers**
	Change the dataset representation to a more intuitive format	- The visual representation UI **was changed from text-based to thumbnail images making it more intuitive.** - Made improvements so that **each thumbnail displayed at the linkage destination is also obtained** for externally linked data - Tuning of the amount of information displayed at one time.
	- Improve the usage flow from the perspective of catalog users	- **Optimization of usage flows** including the dissemination promotion website - **Redefine screen configuration** according to the usage flow - **Unify the design** with the dissemination promotion website

FY 2020

FY 2021

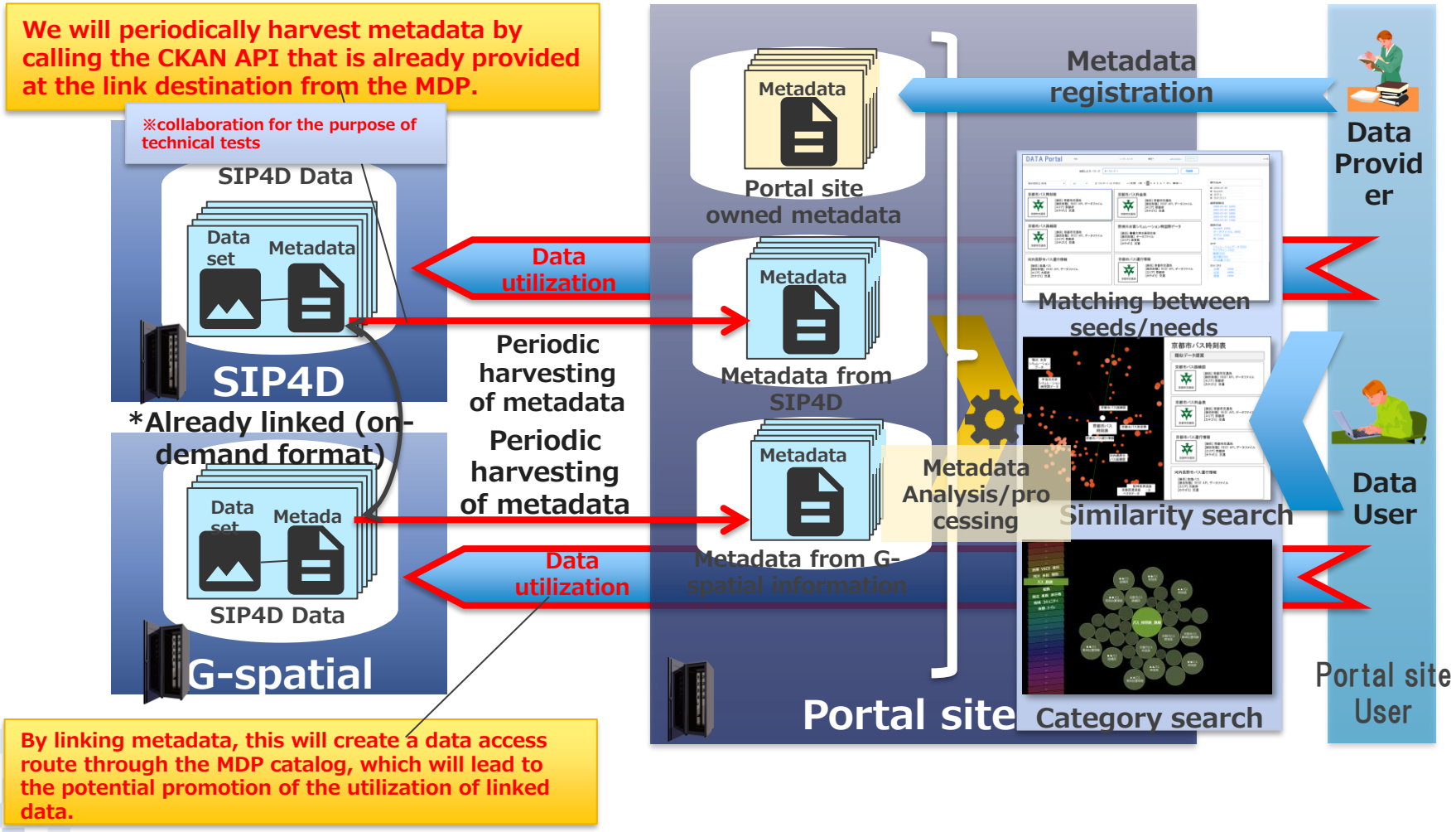
1.2 Portal site development(FY2020) Functional development schedule

- In phase one of development, we primarily reflected the results of the evaluation conducted in FY2019 in the addition of CKAN-format data collection functions (periodic harvesting of metadata).
- In phase two of development, we renewed screen design, improved matching accuracy, and added functions for setting the scope of data disclosure. In addition, we also reflected the opinions we received from contest participants at the portal site evaluation.
- We began the registration of actual data in the operation of the limited release from the third quarter, and we conducted investigations for further improvements looking ahead to the release of the improved version in April.



1.2 Portal site development(FY2020)
Periodic harvesting of metadata

- By collecting (harvesting) external metadata on a regular basis, it is possible to dynamically reflect metadata updates on the data provider side on the portal site.

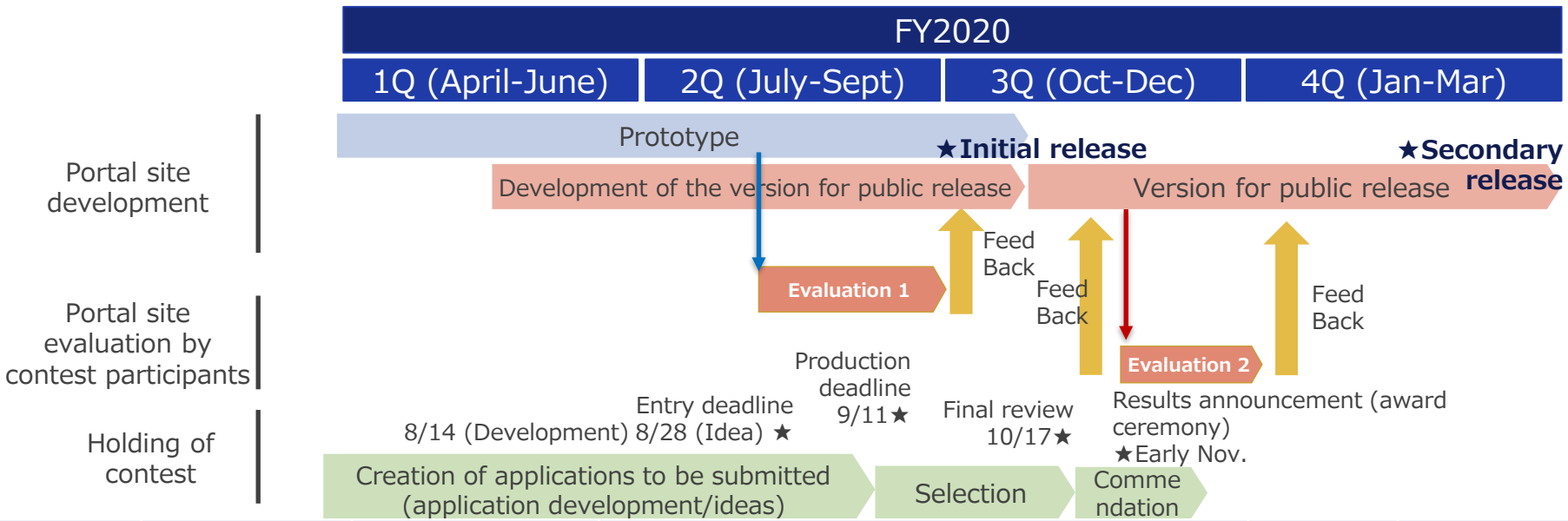


1.2 Portal site development(FY2020)
Metadata description guidance for data registration

- By providing a function that suggests data that has already been registered, it facilitates registration by the data registrant and increases the relevance of the data to other data by guiding the description.

1.2 Portal site development(FY2020)
Evaluation of Portal Sites, Implementation plan

- The contest participants and contest evaluators were asked to actually operate the portal site, and evaluation was conducted by questionnaires and interviews on how the portal site could contribute to data search for aplication development and as a mechanism for distribution and utilization of the company's data.



	Implementation period	Evaluator	Primary concerns	Target for evaluation	Main evaluation method
Evaluation 1	After the deadline for contest applications (After 9/4)	• Route navigation provider • Data provider • Local authority	• Portal site functions and usability (searchability of data, etc.) • Possibilities and issues as a system that leads to the distribution and utilization of data	• Prototype	• Questionnaire • Interview
		• Contest participant	• Portal site functions and usability (searchability of data, etc.) • Data presented and provided by the portal site, API, etc.	• Prototype	• Questionnaire • Interview
Evaluation 2	After the announcement of results (After late Nov.)	• Contest winner	• Portal site functions and usability (searchability of data, etc.) • Data presented and provided by the portal site, API, etc.	• Initial version for public release	• Interview

1.2 Portal site development(FY2020)
Evaluation of Portal Sites, Evaluation design

- We organized the draft portal site evaluation items according to the attributes of the evaluator, created a questionnaire, and conducted a questionnaire study.

Evaluators and functions for evaluation

	Evaluator	Evaluation Role	Number of evaluators (estimated)	Evaluation timing		Relevant functions*				
				Evaluation 1	Evaluation 2	A	B	C	D	E/F
1	Contest participant (Development enterprise/idea enterprise/university)	Data User	Around 10 to 20 people	✓		×	✓	✓	✓	×
2	Contest winner		Around 5 people		✓	×	✓	✓	✓	×
3	Route navigation provider (Jorudan, Navitime Val Laboratory Corporation, Ekitan)		Around 4 providers (At least one person from each company)	✓		×	✓	✓	✓	×
4	Data provider (Bus, train, distribution, facility)	Data Provider	Around 5 providers (At least one person from each company)	✓		✓	×	✓	✓	×
5	Local authority (Kyoto City)	Local Authority	At least one person	✓		✓	✓	✓	✓	×

*Relevant functions

A: Registration of data information catalog
B: Utilization of data information catalog
C: Matching between seeds/needs and communication space
D: Common features for log-in, homepage, etc.
E: Account creation
F: Operation control

1.2 Portal site development(FY2020)
Evaluation of Portal Sites, Evaluation perspective

- We specified success factors (merit=value) for the project linked to the definition and conception of the value that the portal provides that we investigated in FY2019
  *This time, we evaluated the sections of the portal site inside the red-dotted line

Specify objective and provided value

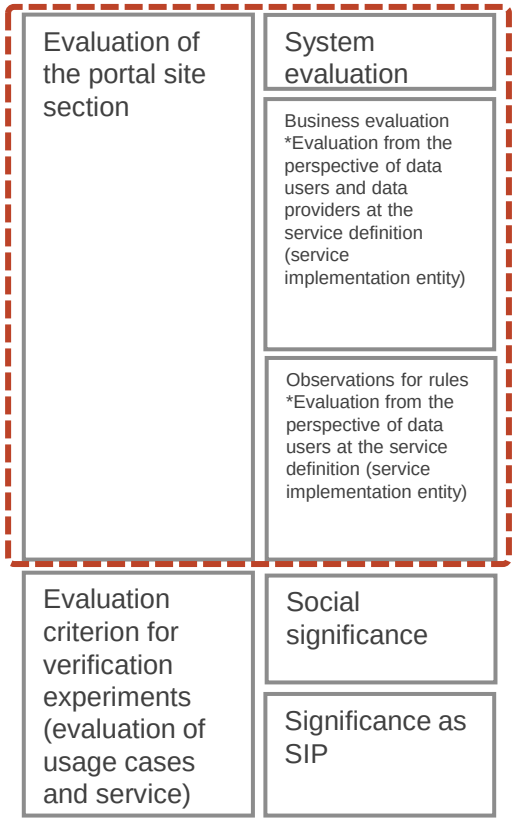
The below items listed in FY 2018 Report Summary Version, "2.4 Value for SPF Users", are positioned as requirements for the request

-Functions
-Interface
-Data
-Business
-Rules

Method and provided content (define functions)

Requirements	Requirements (merit=value) *Based on the FY2018 Report Summary Version
Functions	- Each data is managed in a way that is easy to overlay on a map (for example, being able to obtain multiple data for a specific time frame for the desired area)
Interface	- When collecting multiple data, there is no need to separately develop interfaces, and an API with a standardized specification in SPF can be used to reduce the development workload for integrators.
Data	- By obtaining information from SPF, information from reliable information providers can be obtained.
Business	- As SPF provides diverse data, new business ideas are likely to come about, such as discovering new products and entering new markets using various types of information.
Rules	- Information will be made easier to handle by standardizing the scope of use (industry, use) for the information provided by SPF and the concept of ownership of the deliverables produced based on the information.

Project success factors (evaluation)



1.2 Portal site development(FY2020)
Evaluation of Portal Sites, Evaluation Items

- In accordance with the success factors, we defined the aspects for evaluation items as, 1. System aspects, 2. Business aspects, and 3. Rules aspects

Category	Proposed evaluation items
System aspects	Seeds/needs registration functions
	Data attributes (static/dynamic)
	Catalog search functions
	Functions for referencing category representation term by automatic classification
	Functions for referencing the level of data similarity
	Features for catalog registration
Business aspects	When looking at the functions for referencing category representation term by automatic classification, whether all of the related data and information is included in the same category (recall rate)
	When looking at the functions for referencing category representation term by automatic classification, whether any unrelated data or information (noise) is not included in the same category (relevance=accuracy)
	Whether there are any terms that have been split unnaturally or unintended terms in the category representation terms
	When looking at similar data, is all of the related data and information proposed? (recall rate)
	When looking at similar data, is there no unrelated data or information (noise) being proposed? (relevance=accuracy)
	Are there enterprises that are considering doing business using portal site data?
	Do data providers feel that they want to provide to the portal site exclusively? (conformity, reproducibility)
Rule aspects	Is the information made easier to handle by standardizing both the scope of use (industry, use) for the information provided and the concept of ownership of deliverables produced based on the information?

1.2 Portal site development(FY2020)
Evaluation of Portal Sites, Feedback from Users and Extraction of Areas for Improvement

■ We conducted interviews with primary participating enterprises who actually used the portal site as well as contest participants, and we established a response strategy.

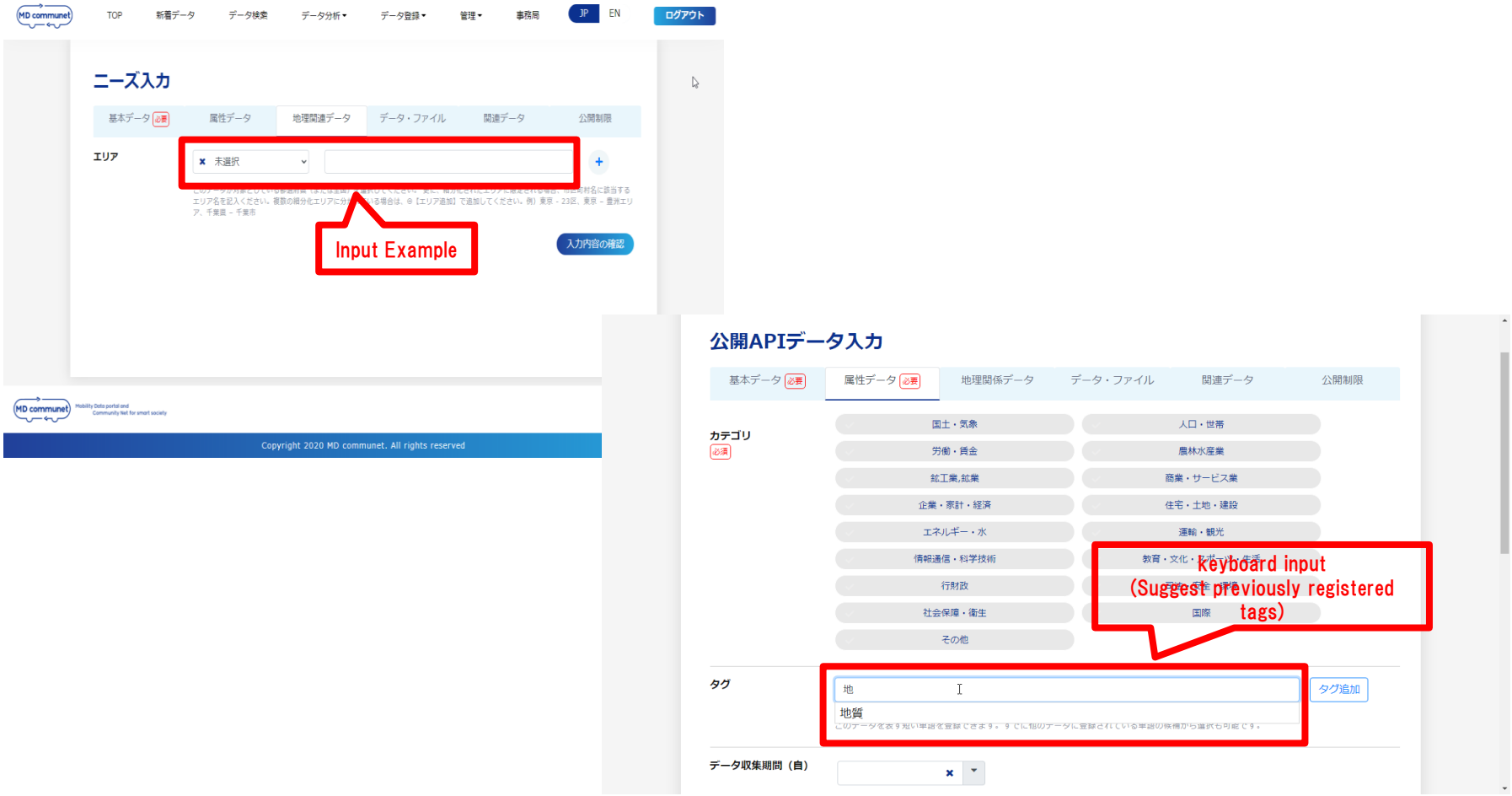
	Feedback points	Response strategy
Participants	• The granularity of registered data is inconsistent, and the rules are unclear. (This seems to lead to answers that registered data is difficult to objectively understand, hard to search, and difficult to compare with other data.)	• Investigate the establishment of rules for the granularity of registered and linked data • Consider layering and formalizing the handled data set descriptions **Continue to explore ways to improve functionality**
	• Improved data retrievability in catalog searches (especially when it's harder to find data that you registered yourself compared to that registered by the data registrant)	• Add "Information Provider" to the filter items, and create a method for specifying with one click **Implemented in the phase two development release**
	• The display and operation method for the automatic classification graph and 3D similarity data search are difficult to understand and use. (remove duplicates of displayed data, usability for changing viewpoints)	• Solve the issue of missing titles for the 3D display of similar data (automatically hide leading numbers, extensions, and other strings) • Aggregation of mixed titles/replace with municipal titles with prefectural titles **Implement in the phase two development release** • Improvement in display and operation methods, noise removal (on-going implementation) **Scheduled for April 2021**
	• Rules regarding the use of the site and the overall handling of data are unclear.	• Clarification of the policy. Make improvements so that rules conform throughout the whole site, including the portal site public release website. **Scheduled for April 2021**
	• It is difficult to understand how to enter data during registration.	• Include examples of entries on the registration screen and add assistance measures **Implemented in the phase two development release**
Prize winner	• I am used to Google search, so having the search bar at the beginning is natural.	• Optimize screen flow **Scheduled for April 2021**
	• There is a large amount of visualized information. It would be good if we could apply filters.	• Adjust the visual representation of displayed information and the number displayed **Scheduled for April 2021**
	• When classifying data, I would like to display the meaning of clusters as a representation similar to human intuition or perception.	• We plan to investigate how and when to implement.
	• Use entity information (the meaning of items) to make decisions when coming up with ideas	
Data provider	• I would like push notifications when a comment is added to registered data. Not noticing the comments could lead to opportunity loss.	
	• I want a flag for public or private comments.	
	• It would be good to analyze needs based on browsing and search history by tagging user attributes.	
	• If each data is linked to instances, the use of data that is actually used together may be promoted.	

1.2 Portal site development(FY2020)
Development of additional functions, etc. and consideration for the FY2021
Improvement of data searchability

- Improved the searchability of data by adding “information provider” to the refinement items and building a system that enables data providers and users to identify information providers with a single click.

1.2 Portal site development(FY2020)
Development of additional functions, etc. and consideration for the FY2021 Assistance with user data entry

- By adding input support functions such as input examples on the registration screen and suggestions for tags that have already been registered, we have made it easier to enter information in a free format.



Improvement of the screen image of the first stage of development

1.2 Portal site development(FY2020)
Development of additional functions, etc. and consideration for the FY2021 Review of improvement policy

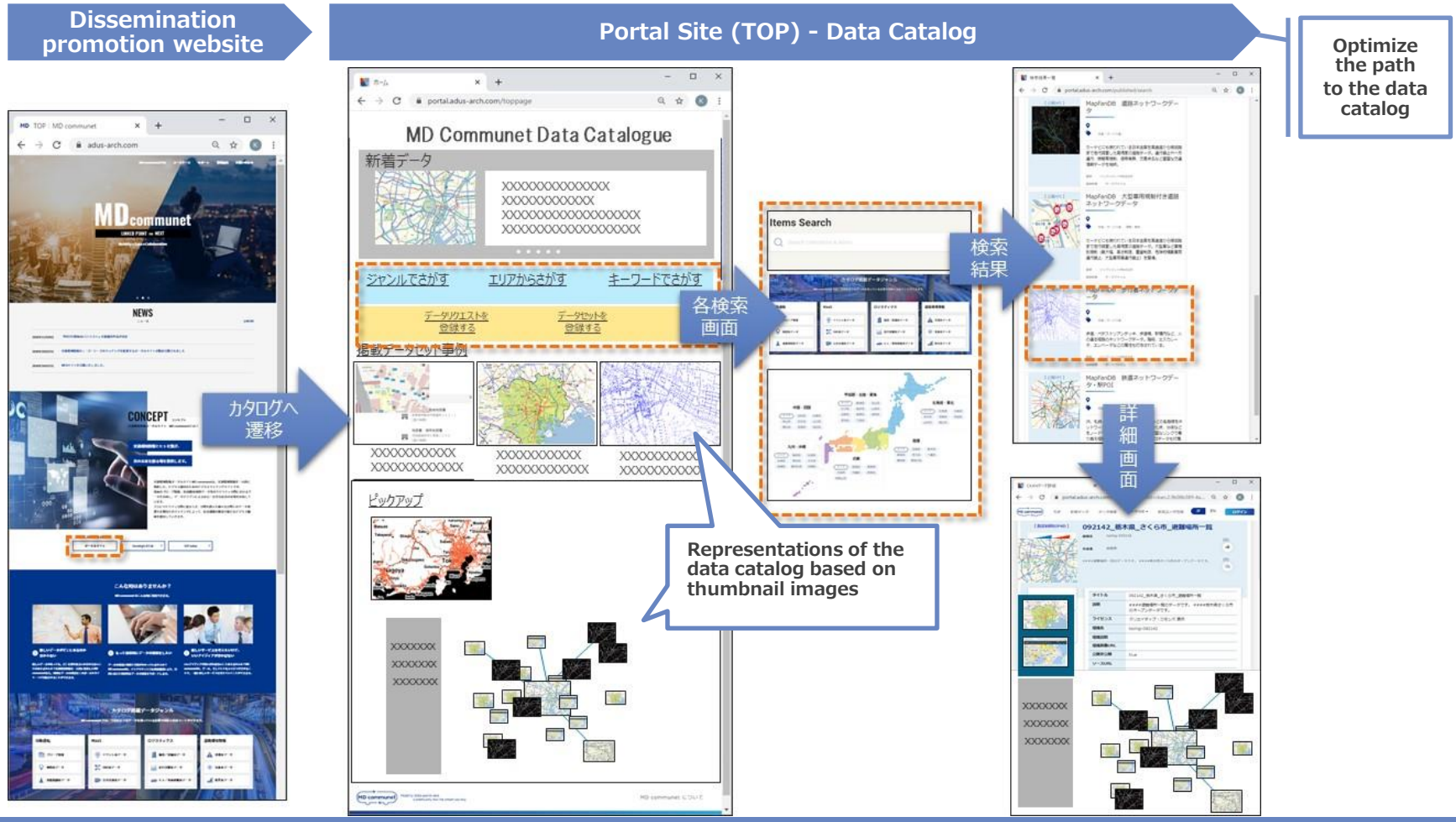
- Based on the evaluation results, for the FY2021, we established an improvement strategy of improving the flow from the dissemination promotion website to the portal site, to the data catalog, and representing content in a more intuitive manner, with the expectation that the portal site will be used by more users.

Intuitive representations of the data catalog	◆ Change representations based on objects such as text and figures to representations based on thumbnail images ➢ For each data set that was collected externally, modify so that a representative thumbnail image is obtained ◆ Adjust information that is visualized ➢ Adjust the amount of information displayed by applying filters for visualized information. Make it easier to see and get to the data you want to find
Improve usage flow from the user's perspective	◆ Clearly define the roles of the dissemination promotion website and the portal site, and optimize the routing to the data catalog. ➢ Review the definition of each screen and screen transition ➢ Integrate with the dissemination promotion website (for example, improve the design)

Integrate the dissemination promotion website and the portal site, and work to optimize access to the data catalog and significantly improve the displayed information and UI

1.2 Portal site development(FY2020)
Development of additional functions, etc. and consideration for the FY2021
Portal site after improvement (image)

- As the line to the portal site is complicated, the design will be improved to allow direct transition from the promotion website to the catalog search.
- We implemented changes to use thumbnail images as the basis for representation, aiming to achieve an intuitive UI.
- We made improvements on the above points towards the public release, and successfully carried out the public release in April 2021.



1.2.3 Portal site development (FY2021)

1.2 Portal site development(FY2021) Development policy

- The portal site we have continued to develop since FY2020 was released to the general public at the end of April 2021, and we have continued development as described below
  - ✓ UI/UX improvements based on user/operation feedback
  - ✓ Enhancement of matching (people and data)
  - ✓ Expand the amount of data

MD communet development policy for FY2021

Development for the general release (released at the end of April 2021)

- Aligned the design of the entire site with the dissemination promotion website
- Changed to thumbnail-oriented UI to improve visibility

Development in the first half of FY2021 (released at the end of September)

- Improvement based on user/operation feedback
- Enhancement of matching (people and data)
  Add and improve searching and recommendation functions that use RDF and machine learning

Development in second half of FY2021 (April 2022 release)

- Improvement of UIUX
- Expand the amount of data
- Promotion of matching

Data catalogue site

NTT DATA

1.2 Portal site development(FY2021) List of development items

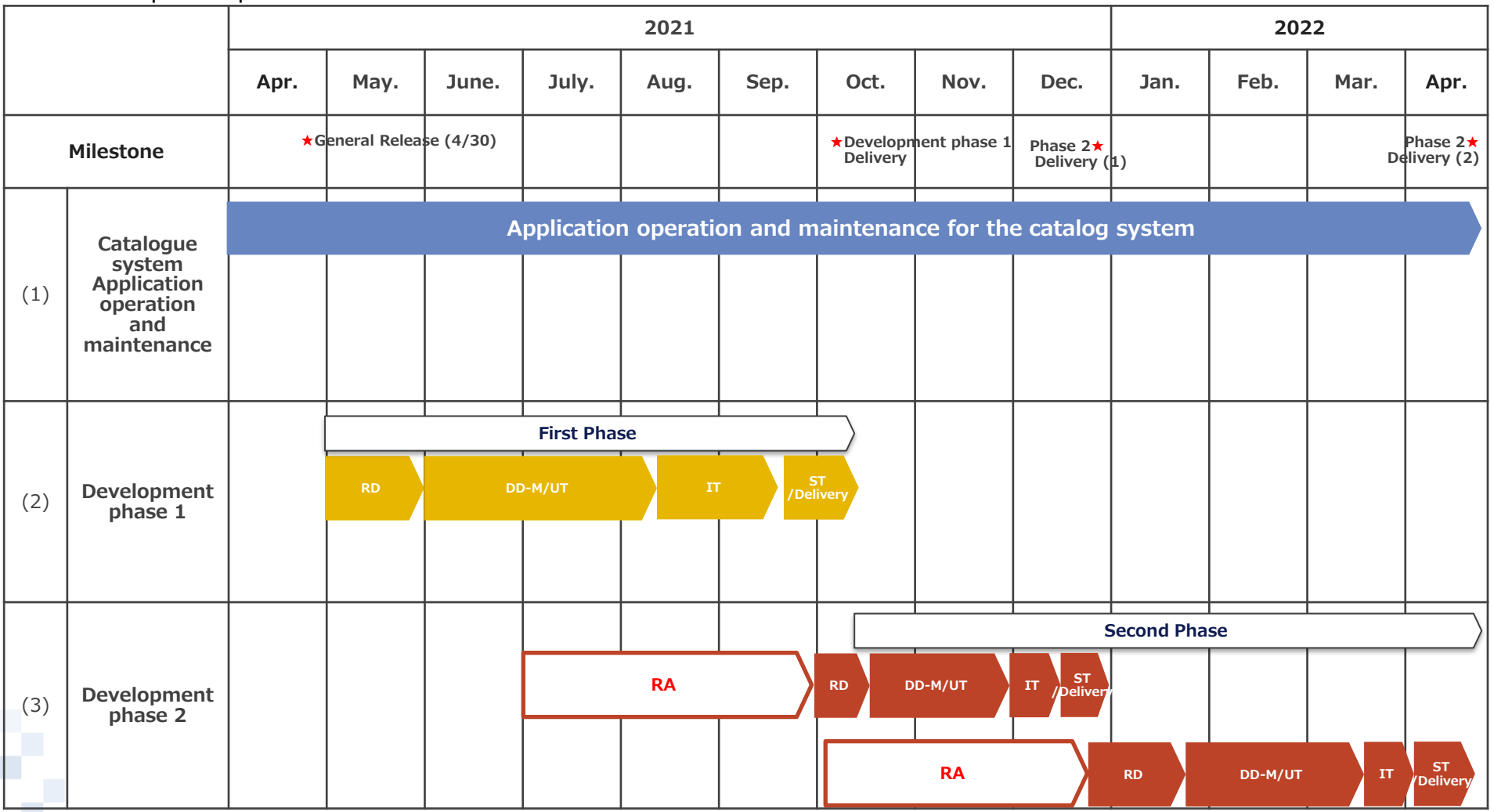
■ In response to the development policy set, the following items were developed in this fiscal year

Development items of this year's MD communet

Item No.	development item	corresponding development policy		
-	Items to be developed in the first half of this fiscal year	UI/UX improvements	data expansion	matching promotion
1	Push notification function on the communication screen	○		
2	individual message function	○		○
3	PV of self-published data and browsing function of history	○		○
4	Recommendation Engine Modification			○
5	association support function for search terms			○
6	Responding to requests after publication (restriction of publication and removal of thumbnail requirement at registration)	○		
-	Development items for the second half of this fiscal year	UI/UX improvements	data expansion	matching promotion
7	Modifying Metadata Items	○	○	
8	Automatic completion of area information	○	○	
9	Improvement of data registration disclosure function	○		
10	Data processing tool registration		○	○
11	company profile page		○	○
12	Nice list.	○		
13	Follow function	○		

1.2 Portal site development(FY2021) Implementation items and schedule

■ While conducting operation and maintenance after the general release, we implemented development with two development phases



1.2 Portal site development(first half of FY2021) List of development items

■ We implemented improvements to enhance matching functions that use search or machine learning, as well as UI/UX improvements based on operational issues and interviews with contest winners held in February 2021.

MD communet Development Items (First Half of 2021)

Number	Development	Action and response
1	Push notification buttons on the communication screen	UI/UX improvements based on user/operation feedback
2	Settings for making comments public or private	UI/UX improvements based on user/operation feedback
3	Viewing functions for the PVs and history of users listed data	UI/UX improvements based on user/operation feedback
4	Improvements to the recommendation engine	Enhancement of matching (people and data)
5	Support functions for search term association	Enhancement of matching (people and data)
6	Response to post-publication requests (removal of publication restrictions and the requirement for thumbnails when registering)	UI/UX improvements based on user/operation feedback

1.2 Portal site development(first half of FY2021) Main Developments(overview)

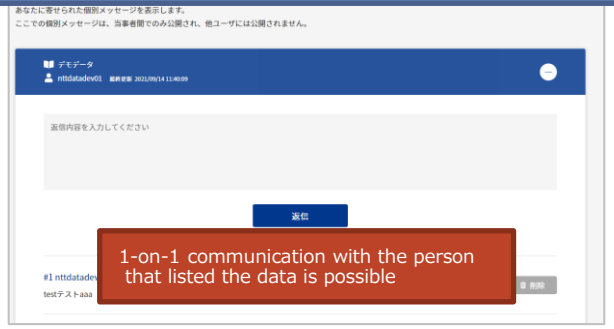
- In the first half of FY2021, in addition to improving functions based on user/operation feedback, we added and made improvements to the recommendation functions that use RDF and machine learning
- We created a new architecture that uses outside RDF resources and machine learning for support functions for the search term association

Main developments in the first half of FY2021

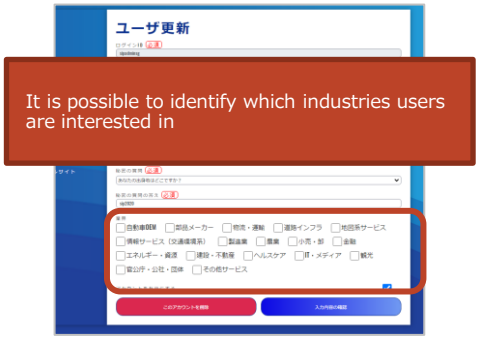
(1) Support functions for search term association (in collaboration with DBpedia)

(2) Chances to the recommendation engine and incorporating viewing history

(3) Personal message functions



(4) Addition of industry information/display number of PVs



1.2 Portal site development(first half of FY2021)
Main developments: Support functions for search term association, use of DBpedia (http://ja.dbpedia.org)

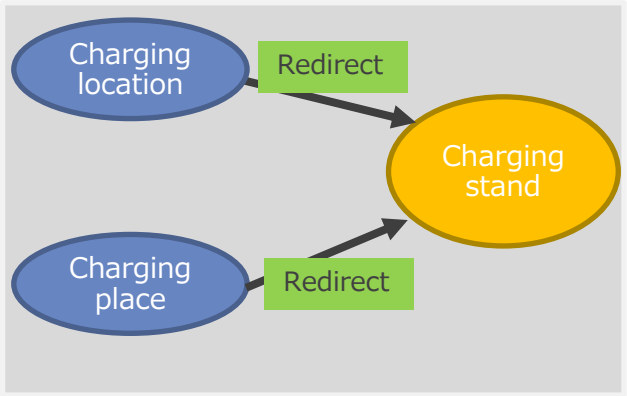
■ The enormous amount of information in Wikipedia can be regarded as an external dictionary (corpus). Since it is converted to RDF and is open to the public, it is possible to easily obtain other keywords defined as “related terms,” “similar words/synonyms,” etc., for specific keywords.

Main developments in the first half of FY2021 (overview of support functions for the search term association)

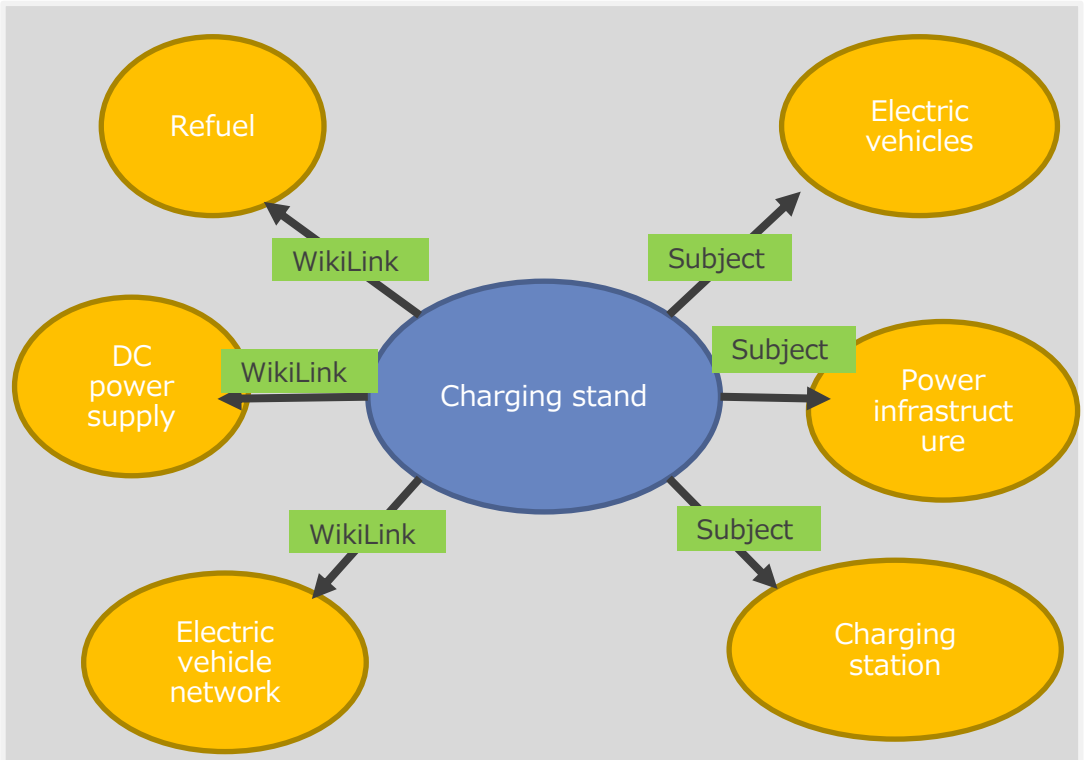
Overview of the Japanese version of DBpedia

- Japanese Wikipedia converted into RDF and made available to the public
- All data is described in the order of subject, predicate, and object.

Parallel concepts → synonym search



Related concepts → related keyword search



Note: You can also request the subject from the object

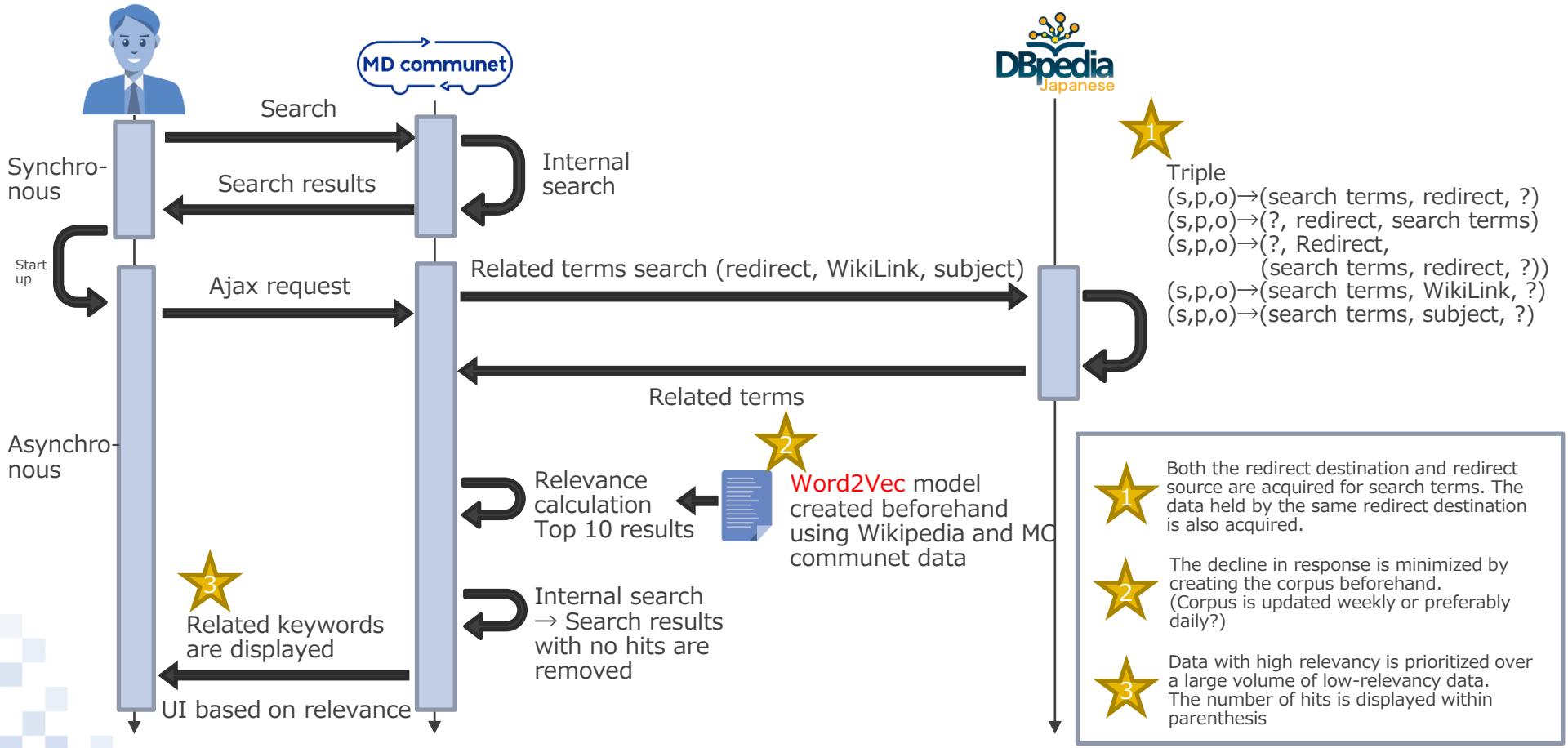
Main developments in the first half of FY2021 (Main points of association support for search terms)

■ Main points of this function

- Uses an external RDF resource
  - ✓ Preparation of related term dictionary is not required
  - ✓ There is an increasing trend in external RDF (LOD) resources
- Items are displayed in order of relevance
  - ✓ Uses existing machine learning functions
  - ✓ It is possible to calculate relevance unique to the system
- Ease of horizontal development to other projects
  - ✓ By just changing the linkage destination, it is possible to display keywords related to that system

Main developments in the first half of FY2021 (Sequence diagram for support functions for search term association)

- We have implemented a filter function using machine learning techniques at the user presentation stage to address the issue of unrelated words sometimes being mixed in when extracting related words from Dbpedia. Additionally, we processed the data by cutting it out to prevent it from affecting the response of the search result screen.



1.2 Portal site development(second half of FY2021) List of development items

- The schedule was changed following the 4/25 release date for information on the Kyoto Contest
- Also, we secured slots for 4Q development and responded flexibly depending on the situation as we made adjustments for external collaborations, questionnaires, and consultation that were in progress at the time.

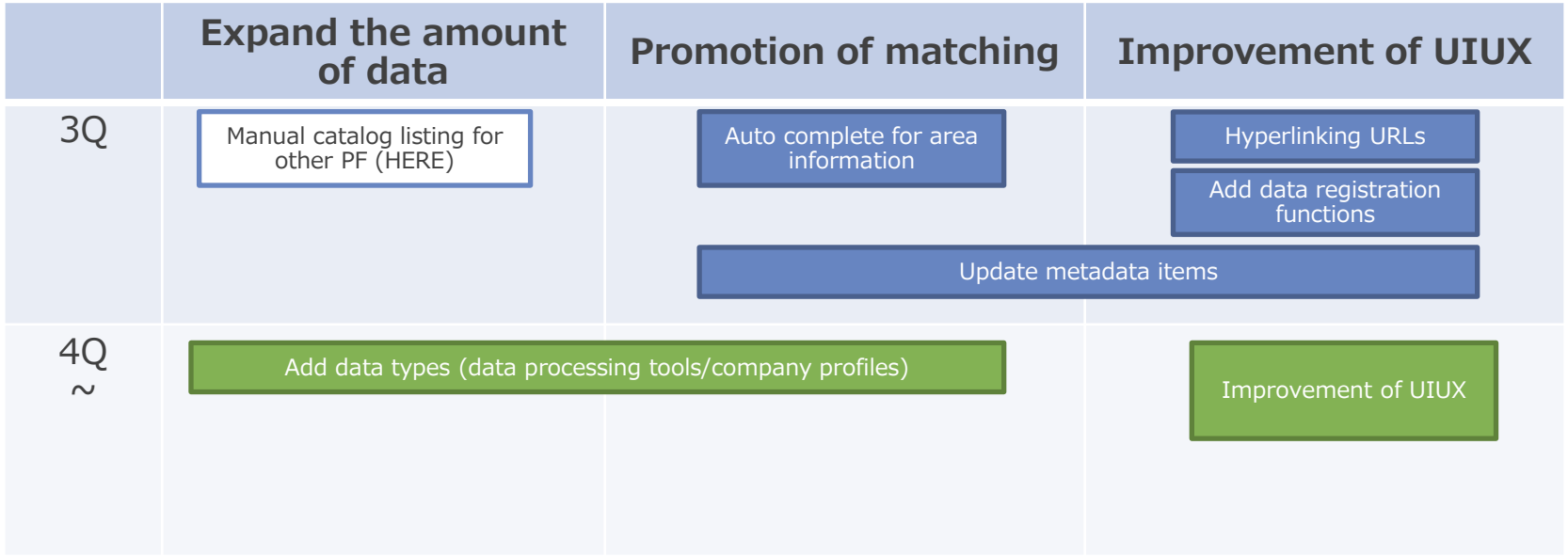
MD communet development items (second half of 2021)

Number	Time	Item name	Overview
1	3Q	Metadata items are updated	Items for use cases are added, and hyperlinks are given to URL items
2	3Q	Auto complete for area information	If a string that matches the prefecture municipality match exists, then the metadata for that area can be set automatically
3	End of Q4	Improvement of publication functions for data registration	Functions added for private settings, saving drafts, and preview
4	End of Q4	**Registration of data processing tools**	A new data format was added, in addition to registered data and data requests. Promote matching between data processors and data holders.
5	End of Q4	**Company profile page**	A new data format was added, in addition to registered data and data requests. Allow company overview, services, and related data to be displayed
6	End of Q4	**List of "likes"**	**Users can confirm who liked their listed data** **Users can confirm which data they liked**
7	End of Q4	**Follow functions**	**By following company profiles, users will be informed each time there is an update**
We will investigate incorporating the below items in FY2022, while considering the balance with initiatives to improve UIUX.			
8	Undecided	Automatic collection of questionnaires	Add questionnaire function. Will appear automatically when viewing the catalog site. Controls will be put in places such as using cookies so that it does not appear when the user has already answered the questionnaire.
9	Undecided	User action log acquisition function	User activity logs (clicks) are obtained, and this is used as input information to promote matching further.
10	Undecided	Response to user feedback	We will identify and address problems through questionnaires, user consultations, and analysis of access logs.
11	Undecided	External integration	HERE/SIP cross-sector data integration platforms/ support for external collaboration with entities such as Jordan, etc.
12	Undecided	Improvement of regular collection functions	Make it so that data published after collection can be chosen (searched).
13	Undecided	Registration of data generation tools	For the implementation period, we will review priority, with particular attention to the suitability of the period when questionnaires are conducted

1.2 Portal site development(second half of FY2021) Development policy

- Development was centered on the three perspectives of UI/UX improvement, expanding the amount of data, and promoting matching. For Q4, we worked on UI/UX improvement as a top priority
- We also conducted additional development to expand the amount of data and promote matching
  - UI/UX improvement: We reviewed the entire dissemination/catalog site again to identify points for improvement, set priority, and implement improvements
  - Expanding the amount of data: We promoted expansion in the amount of data by increasing the amount of data subject to storage
  - Matching promotion: We separately developed input information acquisition and information dissemination to promote matching

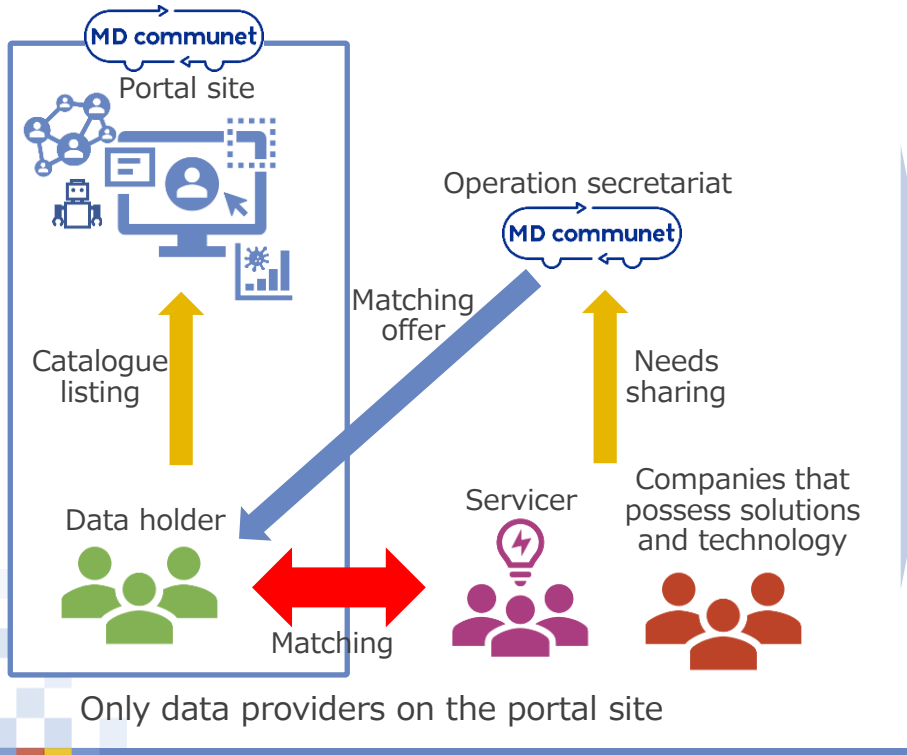
MD communet Development Policy (Second Half of 2021)

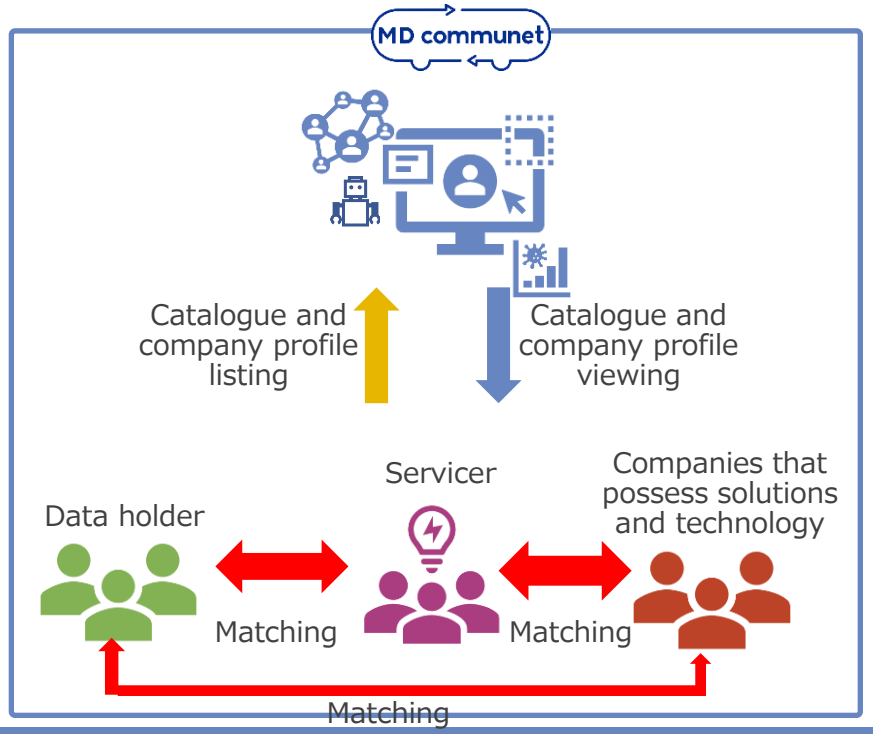


1.2 Portal site development(second half of FY2021)
Main Developments: Enhance matching by improving company profiles

- Of the stakeholders for the service creation process, only those who have registered can be seen on MD communet. Therefore, despite matching occurring offline, it is not occurring online as stakeholders who have not registered data cannot be seen on MD communet.
- Also, in the data catalog, there is no place for companies that possess solutions or technology to register on MD communet. Communication with companies other than those that own data catalogs is only possible through the secretariat.
- Therefore, we aimed to improve matching by setting up new company profile functions as a place for members to get to know one another, communicate, and learn about companies.

Main developments in the second half of FY2021 (company profile)

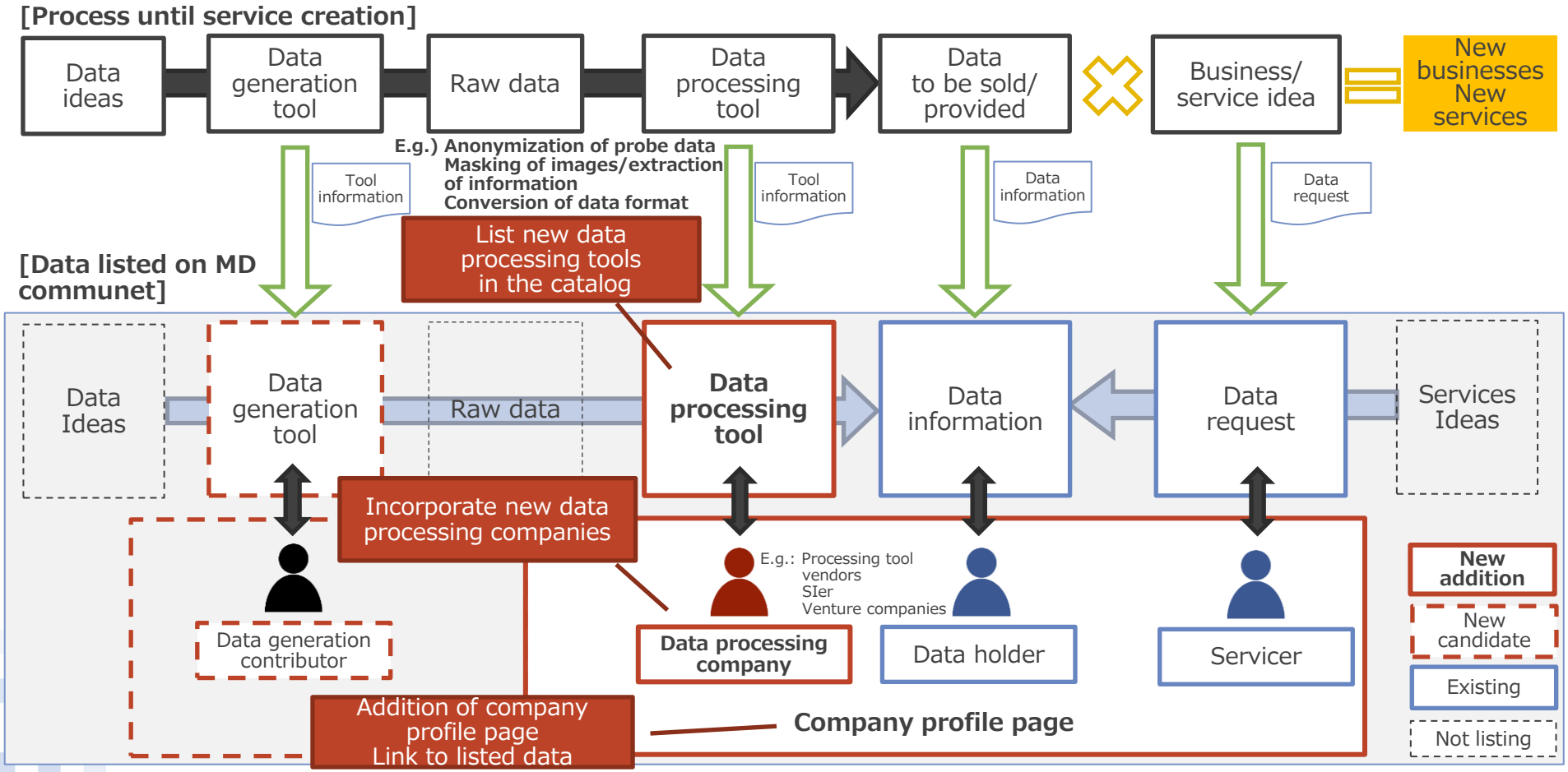




1.2 Portal site development(second half of FY2021)
Main developments: Support for service creation

■ By incorporating new data processing companies from stakeholders related to the flow of service creation, we support the conversion of source material information into sellable data and further promote the creation of new services

Main developments in the second half of FY2021 (support for service creation)



1.2.4 Portal site development (FY2022)

1.2 Portal site development(FY2022) Development policy

- We developed and released the portal site made public at the end of April 2021 in line with the below policy.
  - ✓ UI/UX improvements based on user/operation feedback
  - ✓ Enhancement of matching (people and data)
  - ✓ Expand the amount of data

MD communet development policy for FY2022

Development in the second half of FY2021 (end of April 2022 release)

- UI/UX improvement in unison with dissemination promotion
- Addition of functions for company profiles

Development in the first half of FY2022 (released in October 2022)

- RDF support
- Added acquisition function for user activity log
- Verification of functions that utilize CADDE connectors (verification environment only)

(CADDE connector: A connector being worked on in the cross-domain data sharing infrastructure for SIP cyberspace technology. From hereafter "CADDE." Development and evaluation of MD communet by utilizing CADDE on the side of SIP-automated driving were conducted)

Development in the second half of FY2022 (December 2022, February 2023 release)

- Improvement of UIUX
- SEO measures
- Recommend functions added
- Verification of CADDE connector for application in a live environment

(Development and evaluation of MD communet by utilizing CADDE on the side of SIP-automated driving were conducted)

Data catalogue site

1.2 Portal site development(FY2022) List of development items

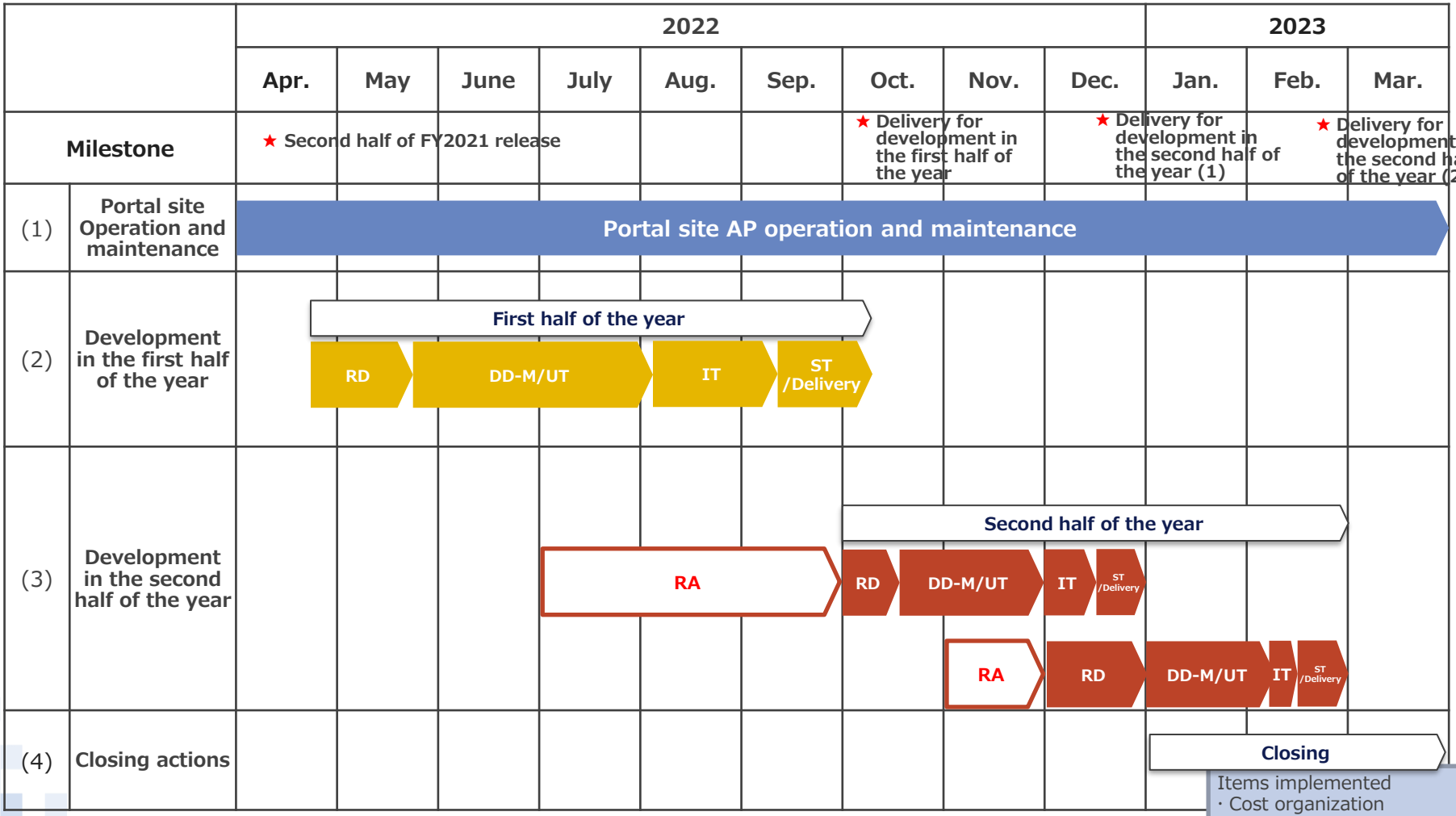
■ We conducted development for the below items in FY2022 in accordance with the set development policy

MD communet development items for FY2022

Number	Development items	Corresponding development policy		
-	Development items for the first half of FY2022	Improvement of UIUX	Expand the amount of data	Promotion of matching
1	RDF support			○
2	Verification of functions that utilize CADDE connectors		○	○
3	Acquisition function for user activity log			○
-	Development items for the second half of FY2022	Improvement of UIUX	Expand the amount of data	Promotion of matching
4	Improvement of UIUX	○		
5	SEO measures	○		○
6	Recommend functions added			○
7	Verification of CADDE connector for application in a live environment		○	○

1.2 Portal site development(FY2022)
FY2022 implementation items and schedule

- While conducting operation and maintenance after the general release, we implemented development with two development phases
- As the final fiscal year of SIP Phase 2, operation and maintenance for the next fiscal year (cost organization and systematization) were carried out in all four quarters of the year.



1.2 Portal site development (first half of FY2022) List of development items

- We constructed core functions focusing on future expansion in functions and increased catalog integration partners.
- As RDF is the common global protocol for data integration and is being developed in all fields, we envision that we will be able to integrate with systems in various fields and overseas.

FY2022 MD communet development items (First Half)

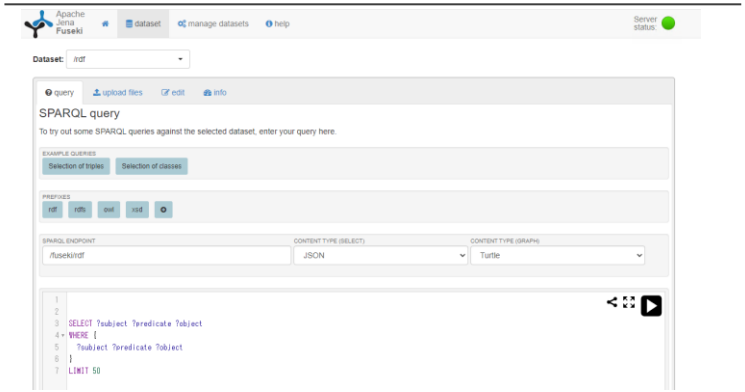
Number	Development items	Development overview
-	Development items for the first half of FY2022	
1	RDF support	We created an RDF store in preparation for handing the data registered on MD communet in RDF format and the increase in recommendations and future catalog integration partners.
2	Verification of CADDE mounting	We verified the installation of CADDE connectors created by SIP cross-domain integration and catalog data acquisition to a cross-searching system.
3	Acquisition function for user activity log	By making it possible to integrate logged-in users' actions with Google Analytics, we developed a system to be used as a source of information for the promotion of both online and offline matching.

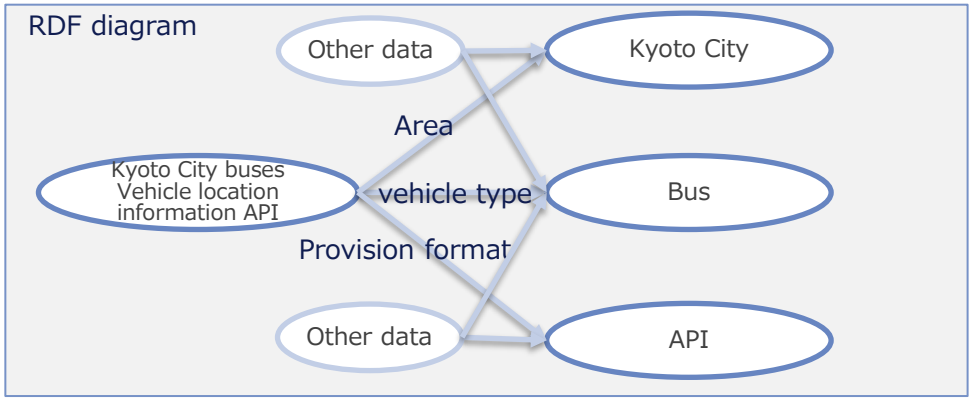
1.2 Portal site development (first half of FY2022) Main Developments (overview)

- In the first half of the year, we conducted activity log acquisition, RDF support, and verification for CADDE connectors.
- Regarding activity log acquisition and RDF support, we created an infrastructure that connects member activity logs and catalog data by RDF, enabling recommendations and other functions.

Main developments in the first half of FY2022 (overview)

1) RDF support





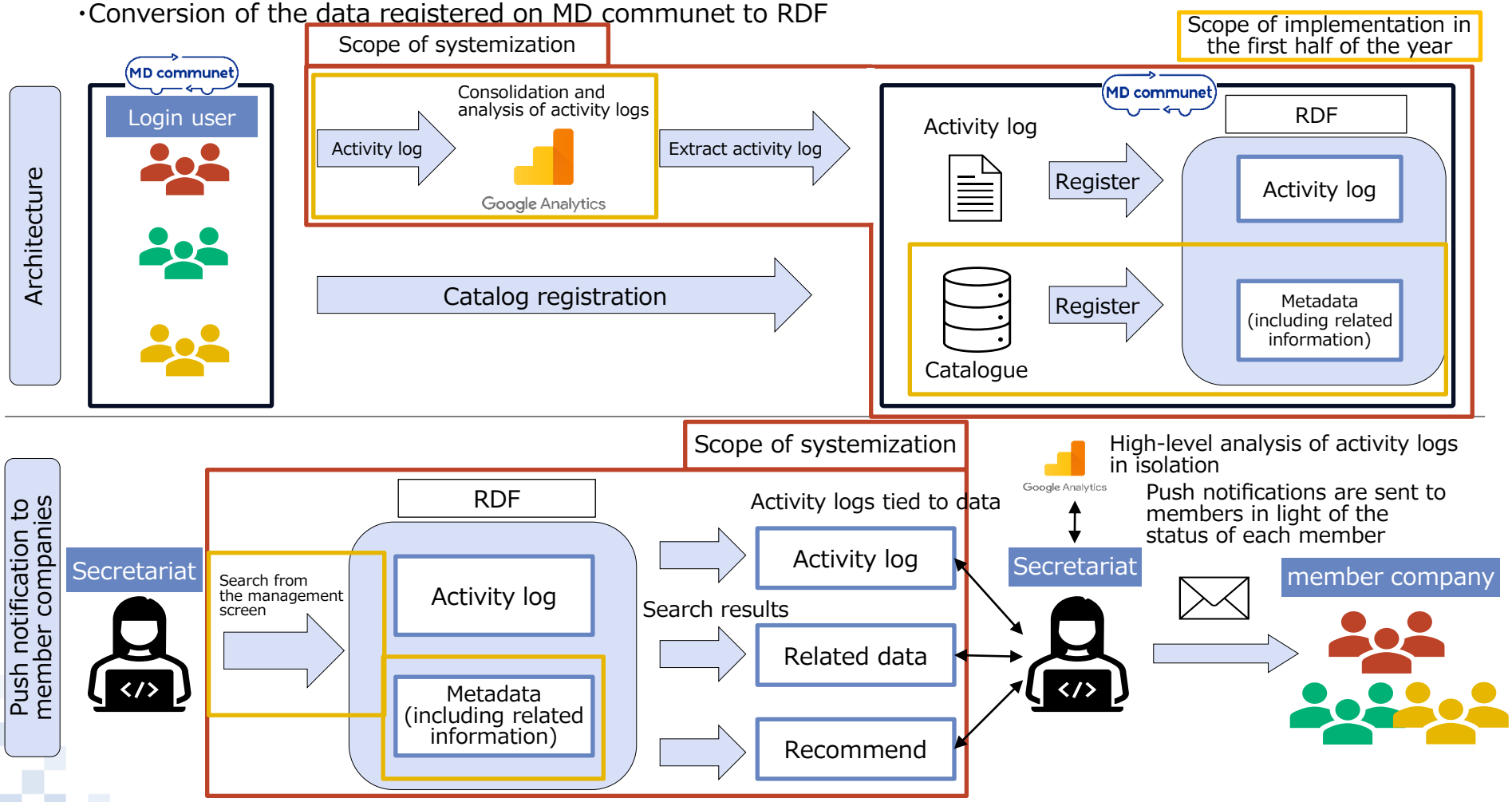
2) Verification of CADDE mounting

3) User activity log acquisition function

1.2 Portal site development (first half of FY2022)
Main development content: Activity log acquisition and RDF conversion

■ In the first half of the year, we implemented backend functions to implement a catalog data recommend function derived from activity logs.

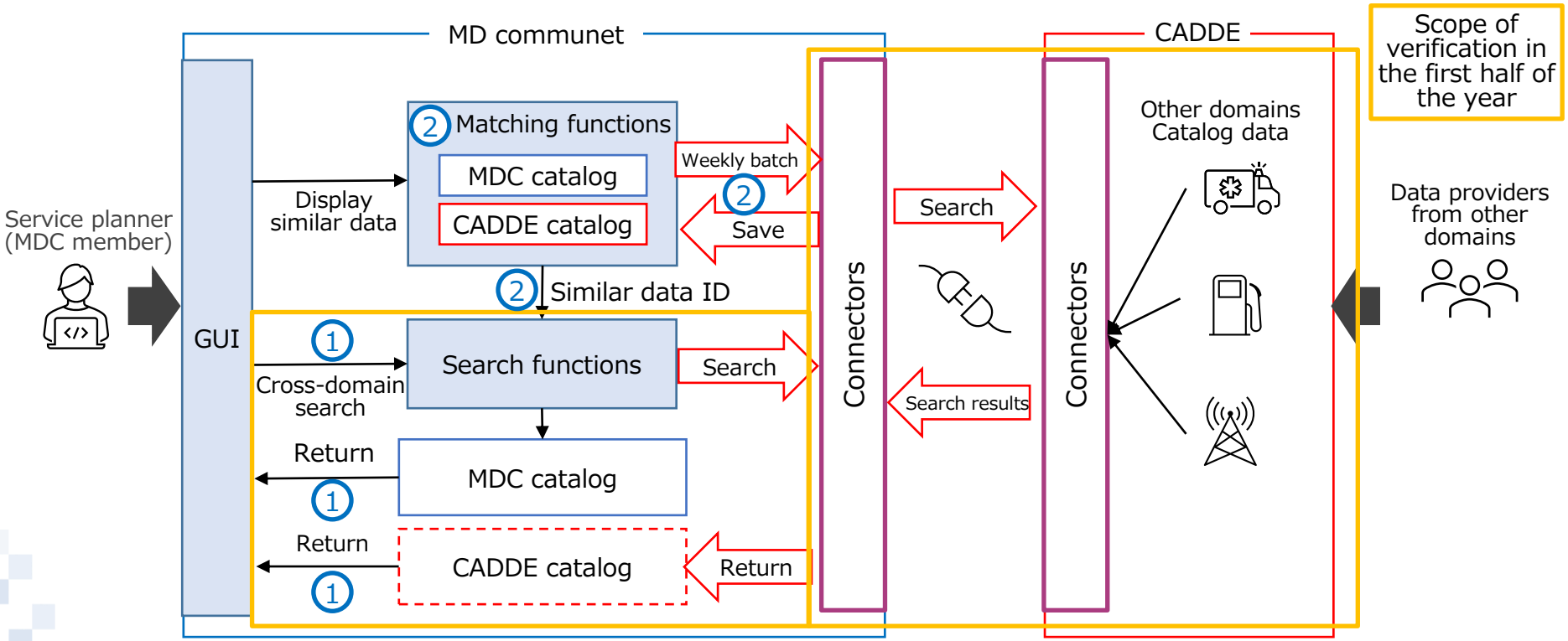
・Consolidation of activity logs to Google Analytics
・Conversion of the data registered on MD communet to RDF



1.2 Portal site development (first half of FY2022)
Main developments: Verification of CADDE mounting

- In the first half of the year, we verified a cross-searching system being worked on in the cross-domain data-sharing infrastructure for SIP cyberspace technology. We also demonstrated the feasibility of cross-domain search systems using CADDE.
  - ・Investigation of the expansion in functions on the MD communet side that utilize CADDE connectors
    1) Cross-domain search using CADDE connectors
    2) Extract similar data of the cross-domain search results

Diagram of expanded functions of MD communet using CADDE connectors



1.2 Portal site development (second half of FY2022) List of development items

- As some functions became complex as we continued adding functions to enhance functionality, we optimized UI/UX and SEO again for operation from the next fiscal year onwards. We implemented improvement measures using methods implemented by experts, such as Human Centered Design and Search Engine Optimization.
- We investigated the implementation of recommended functions based on activity logs and CADDE connectors continuing from the first half of the year.

MD communet development items (second half of 2022)

Number	Development items	Development overview
-	Development items for the second half of FY2022	
4	Improvement of UIUX	We incorporated suggestions and requests from operation staff, users, and UI/UX experts in order of priority
5	SEO measures	From the perspective of dissemination promotion, we implemented SEO measures in unison with the dissemination promotion website.
6	Recommend functions added	We combined user activity logs with RDF, enabling new recommendations to be extracted.
7	Verification of CADDE connector for application in a live environment	We implemented technical verification of CADDE connectors for application in a live environment.

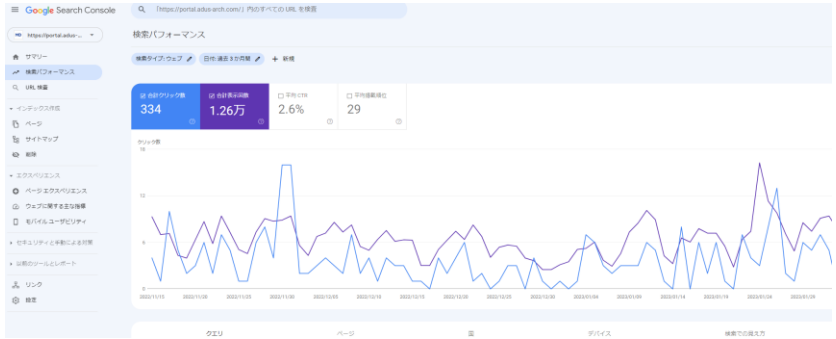
1.2 Portal site development (second half of FY2022) Main Developments (overview)

- In the second half of the year, we improved UI/UX and SEO measures, added recommend functions, and conducted a technical verification of CADDE connectors for application in a live environment.
- Implementing UI/UX improvement and SEO measures in unison with the dissemination promotion website contributed to the promotion of matching due to increased access and an increase in the amount of data through member acquisition.

Main developments in the second half of FY2022 (overview)

1) Improvement of UIUX

2) SEO measures



3) Adding of recommend functions

4) Verification of CADDE connector for application in a live environment

1.2 Portal site development (second half of FY2022) Main developments: UI/UX improvement and SEO measures

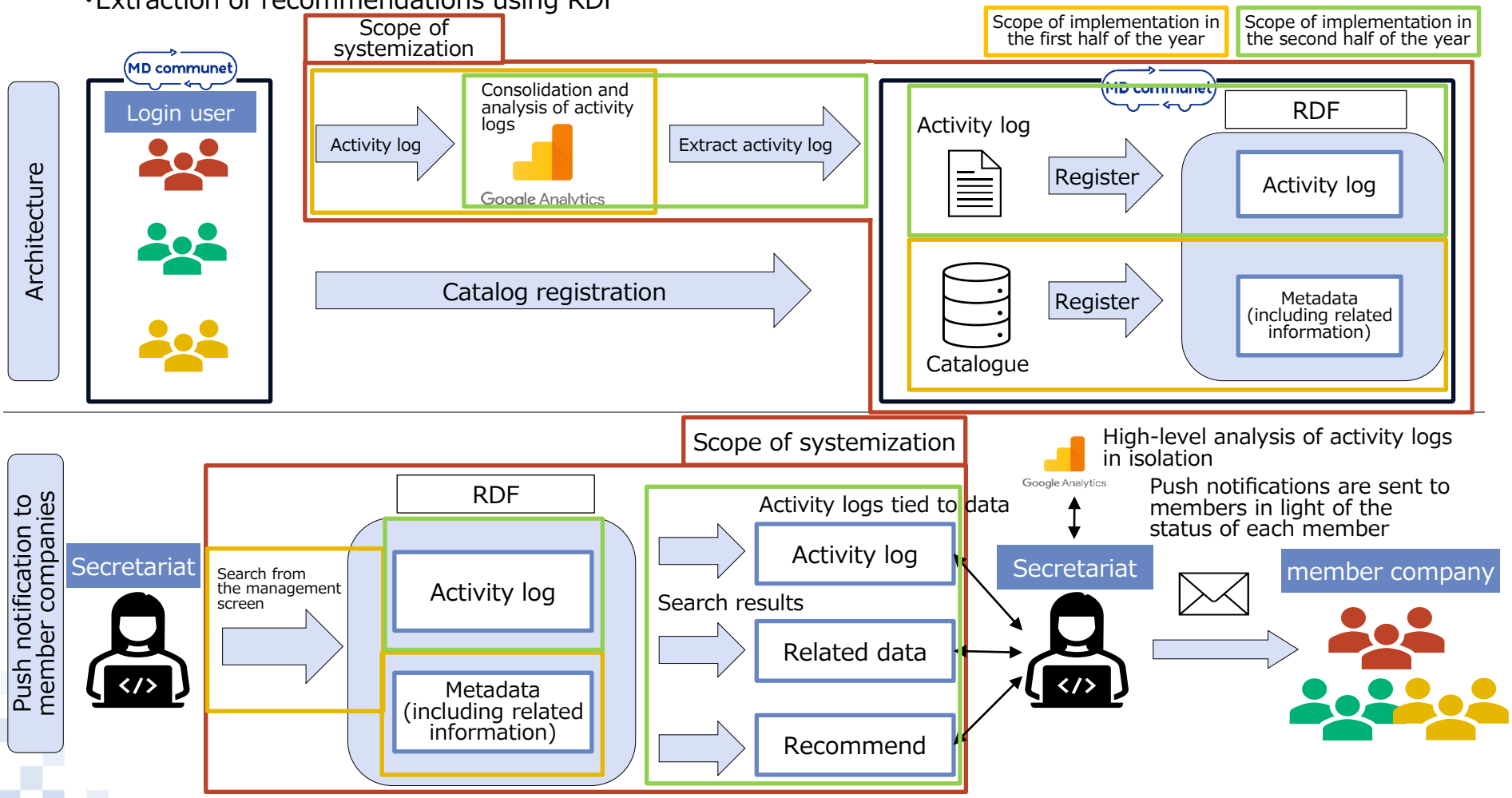
- We incorporated suggestions and requests from operation staff, users, and UI/UX experts starting from those with the highest priority.
- From the perspective of dissemination promotion, we implemented SEO measures in unison with the dissemination promotion website.

Main develop in the second half of FY2022 (UI/UX and SEO improvements)

No.	Expected impact	Policy	Policy details
1	Measures for laws related to the protection of personal information	Implementation of cookie-use notification	・We made it so a notification about the use of cookies related to personal information is displayed on the bottom of the screen
2	UI/UX	Improved common headers	・Installed a button for member registration (moves users to the dissemination promotion website) ・We changed common headers to a format that follows user scrolling
3	UI/UX	Installed a CV point on the data details page	・We installed a new member registration/log in button on the data details page so that we can measure the impact of SEO improvements
4	UI/UX and SEO	Added related links	・We added related links to the details page to improve navigation on the website
5	UI/UX and SEO	Added a site map	・We added a site map to the common footer to improve navigation on the website
6	SEO	Adjusted the titles descriptions and heading tags (TDH) of existing content	・Provided detailed information to search engines (Google, etc.) and made modifications so that it is easier to get hits
7	SEO	Index controls for pages that do not require hits in search engines	・Added canonical tags to search results pages with changed sorting and number of results displayed ・Added noindex tags to pages with zero search result hits on the internal website search results ・Added noindex tags to list pages with multiple categories/tags selected
10	Operation improvement and SEO	Data modification with administrator privileges	・We made it possible to modify the data of other accounts with administrator privileges
11	Operation improvement and UI/UX	Changed publication restrictions	・We made changes so that only effective functions are shown in publication restriction functions
13	UI/UX	Modified homepage layout	・Made the homepage layout more appropriate
14	SEO	Search Console	・Installed Google Search Console so that we can measure the impact of SEO improvements.

1.2 Portal site development (second half of FY2022)
Main developments: Recommend functions for catalog data from activity logs

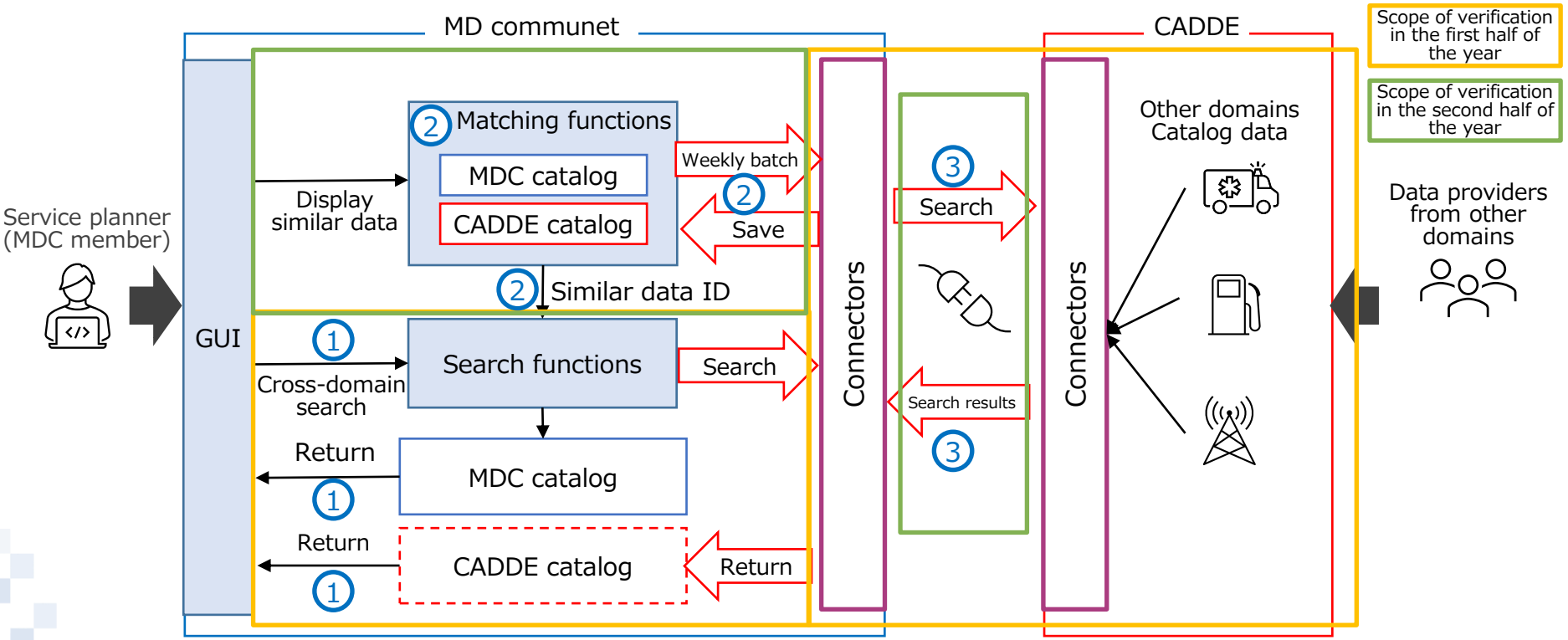
- We connected the functions we implemented in the first half of the year and implemented recommend functions derived from activity logs.
  - ・Convert activity logs to RDF
  - ・Extraction of recommendations using RDF



1.2 Portal Site Development (second half of FY2021)
Main developments: Verification of CADDE connector for application in a live environment

- It became clear that simply importing large amounts of data from cross-domain search results verified in the first half of the year would lead to searches getting hits for unrelated catalogs. Therefore in the second half of the year, we also verified effective filtering methods for MD communet.
  - ・Investigation of the expansion in functions on the MD communet side that utilize CADDE connectors
    1) Cross-domain search using CADDE connectors (implemented in the first half of the year)
    2) Extract similar data of the cross-domain search results
    3) Investigation of effective filtering methods for cross-domain search

Diagram of expanded functions of MD communet using CADDE connectors



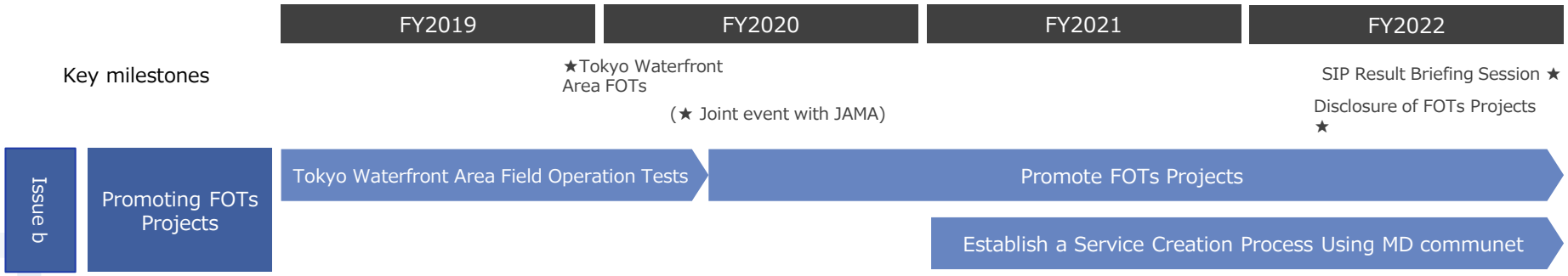
2. Promotion of FOTs projects

2. Promotion of FOTs projects
Milestones in the promotion of FOTs projects

Summary of FOTs Project Promotion

- From FY2019 to FY2020, in SIP-Automated Driving "Tokyo Waterfront Area Field Operation Tests", with services and applications developed based on the provided data, we mapped services and applications to reference architecture and conducted service usability evaluation.
- Towards the utilization and collaboration of collaborative data in logistics field which leads to the solution of social issues common to the industry, we extracted data candidates, which have the potential to be used in collaborative domains and relate to the approaches and challenges of logistics operators, based on the investigation of the issues faced by the logistics industry.
- From FY2021 onward, to enhance the possibility of service creation using MD communet data, operational side examined multiple service planning and use cases from the viewpoint of data users.
- Finally, we conducted demonstraction of service planning and use cases, which had been examined, using private companies and local governments as fields. To promote the use of data, we published FOTs cases on the MD communet portal site.

Milestones and Tasks



2.1 Research to organize and develop geographic data and traffic data for the "Verification experiments at the Tokyo Waterfront Area“ (Theme B)

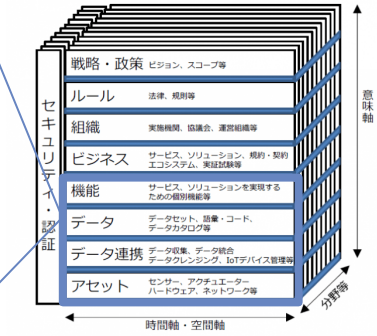
NTT DATA

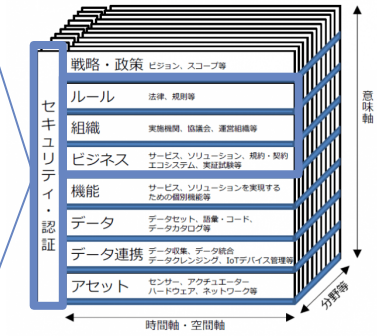
2.1.1 Promotion of FOTs projects (FY2019)

2.1.1 Research for Theme B and measures

- For the assumed cases of using data on the portal site developed in Theme A, we researched the "Logistics-company-oriented service" and "End-to-end multi-modal navigation service" and proved that it is possible to develop services whereby valuable data in the automotive field is linked with data in other fields.

1. Study of usage cases and verification items	Based on the outcomes from SIP Phase I, study the usage cases of the "Logistics-company-oriented service" and "End-to-end multi-modal navigation service" and matters to be verified, taking account of social issues and the purposes of SIP.
2. Map functions, data, and assets for usage cases	Map functions, data, and assets for usage cases in layers of the reference architecture model to determine their functionalities in the user cases.
3. Determination of data to be standardized, and systems and rules to be organized	Determine the data to be standardized (of traffic, logistics, and facilities) and systems and rules to be organized (systems/rules/ related laws and regulations for data transfer, sharing, and utilization between private companies).
4. Study of outcomes of the verification experiments and conduct interview research	Study the outcomes of some selected verification experiments and conduct interview research for applications developed for the experiments.





2.1.1 (1) Study of usage cases and verification items
Determine the social issues to be solved

- We determined the usage cases "Logistics-company-oriented service" and "End-to-end multi-modal navigation service" to solve the social issues identified from the results of the SIP Phase I projects.

Usage cases/Social issues to be solved

Logistics-company-oriented service

- Allow truck drivers to **ensure safe and secure driving conditions**
  - Need to avoid dangerous routes for safe driving
- Improve the working conditions of truck drivers
  - Need to reduce risks of compensation for an accident or delivery delay

	Experiments
1	A. Route navigation with information about the carry-in port (location/cargo to be loaded) and legal rest time
2	A. Route selection according to road information (road width/vehicle height limit) B. Driving reminder based on traffic signs
3	A. Route selection and driving reminder based on drivable road data B. Storage and utilization of drivable road data through data exchange
4	A. Route selection to avoid dangerous roads and areas in case of a disaster B. Data sharing through linkage with data in other fields

End-to-end multi-modal navigation service

- Implement **stress-free mobility services** based on more personalized mobility technologies (e.g., automated driving)
  - Demand for transportation and route navigation according to changes of weather and traffic congestion and matching user attributes

	Experiments
1	・Routing in spare time
2	A. Update of the traveling route with dynamic data and information (e.g., about traffic, detours, and weather) B. Provision of information about methods of transportation available for the last mile (e.g., automated driving, taxi, cycle sharing, and walking (including barrier-free information))
3	・Provision of information about influence of an event on train schedules ・Provision of information about methods of transportation available for the last mile ・Reduction of congestion in terms of time and space
4	A. Provision of information matching user attributes ・Improvement of the accuracy of provided data through data exchange

2.1.1 (1) Study of usage cases and verification items
Experiments for the logistics-company-oriented service

- For the "Logistics-company-oriented service," we conducted experiments assuming implementation of the service, using data gathered through the portal site in connection with Theme A, in an area where dynamic maps are already available.

Limits on roads (example)

A. Vehicle width: Ariake Wharf

B. Vehicle height: Aomi Boulevard

C. No drive data: Aomi Boulevard

D. Flood risk: Wangan Underpass

E. Vehicle restrictions: Rainbow Bridge

Traffic signs (example)

F. Regulatory sign: 1. Speed limit

2. Slow

3. Stop

Near-miss incident (example)

G. Abrupt slowdown: In front of Daiba Station

	Experiment	Evaluation
1	A. Route navigation with information about the carry-in port (location/cargo to be loaded) and legal rest time	・Prove that **route navigation with information about the carry-in port (location/cargo to be loaded) and legal rest time helps to improve working conditions** in a field arranged for logistics companies to allow them to collaborate together.
2	A. Route selection according to road information (road width/vehicle height limit) B. Driving reminder based on traffic signs	・Prove that **route selection with vehicle width and height limits taken into account according to road information** on high-precision 3D maps helps to **ensure safe and secure driving**. ・Prove that a **driving reminder based on traffic signs** plotted on high-precision 3D maps helps to **ensure safe and secure driving**.
3	A. Route selection and driving reminder based on drivable road data B. Storage and utilization of drivable road data through data exchange	・Prove that **route selection and driving reminders based on drivable road data helps to ensure safe and secure driving**. ・Prove that **data about drivable roads gathered through probe information on vehicles by size can be used for various purposes through data exchange**.
4	A. Route selection to avoid dangerous roads and areas in case of a disaster B. Data sharing through linkage with data in other fields	・Prove that **adaptive route selection to avoid dangerous roads and areas in case of a disaster helps to ensure safe and secure driving.** ・Check for **linkage with data platforms (SIP4D) in other fields** with respect to information about disasters and data about drivable roads.

2.1.1 (1) Study of usage cases and verification items
End-to-end multi-modal navigation service

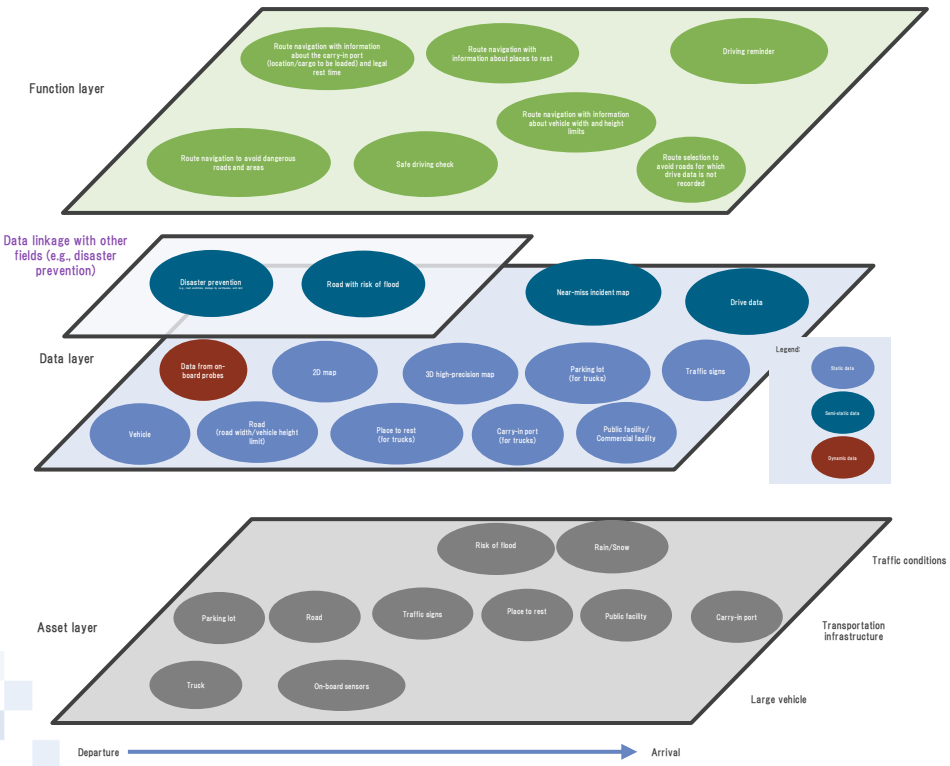
- For the "End-to-end multi-modal navigation service," we checked whether we can achieve more personalized and stress-free navigation with data gathered through Theme A.

	Experiment	Evaluation
1	・Routing in spare time	・Prove that routing in spare time allows users to acquire information about places they can visit within their spare time and **easily plan routes to them**.
2	**A.** Update of the traveling route with dynamic data and information (e.g., about traffic, detours, and weather) **B.** Provision of information about methods of transportation available for the last mile (e.g., automated driving, taxi, cycle sharing, and walking (including barrier-free information))	・Prove that **alternative routes or methods of transportation are made available in case of severe weather conditions or stoppage of train services** with dynamic data and information about various modes of transportation. ・Publicize its expandability with an automated driving option as a method of transportation using dummy data.
3	・Provision of information about influence of an event on train schedules ・Provision of information about methods of transportation available for the last mile ・Reduction of congestion in terms of time and space	・Prove that **traffic congestion is reduced** by offering information about congestion before/after an event and information about methods of transportation **in terms of time and space**.
4	A. Provision of information matching user attributes ・Improvement of the accuracy of provided data through data exchange	・Prove that user attributes are associated with facilities through **data exchange** and that facility data can gain added value. ・Prove that **locations and methods of transportation matching user attributes are recommended** through exchanging value-added facility data which is kept up to date.

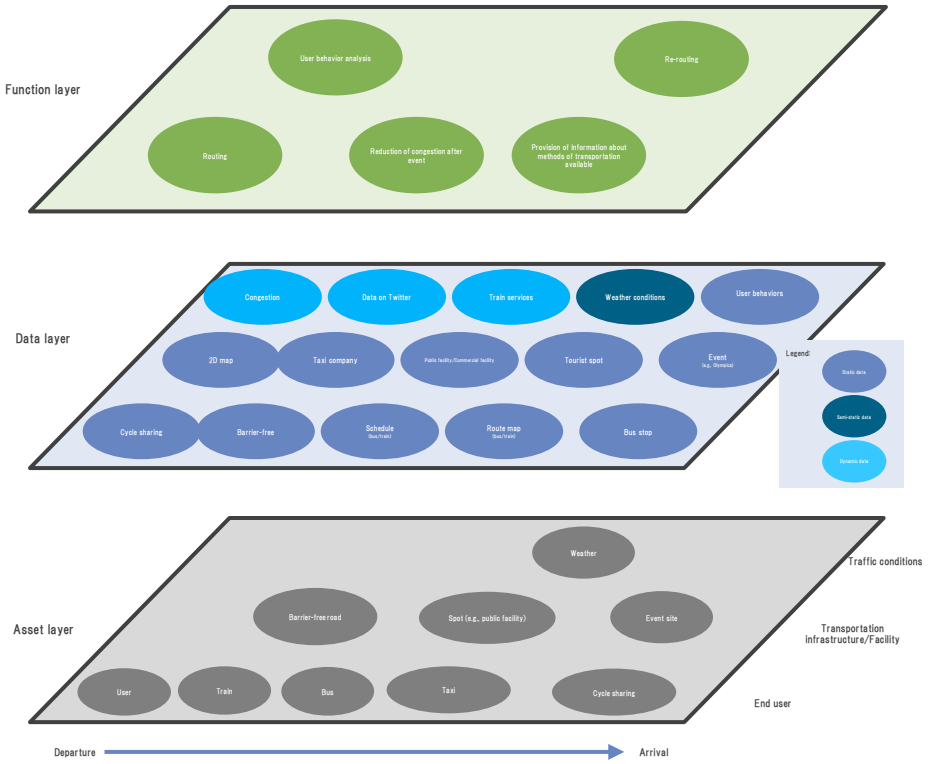
2.1.1 (2) Map functions, data, and assets for usage cases

- For the cases of "Logistics-company-oriented service" and "End-to-end multi-modal navigation service," objects are plotted at the bottom of the reference architecture model in the "function layer," "data layer," and "asset layer" as illustrated below. Note that the objects on the function layer are plotted taking account of their relationship with objects in other fields.

Logistics-company-oriented service



End-to-end multi-modal navigation service



2.1.1 (3) Determination of data to be standardized, systems and rules to be organized Establish systems for gathering and utilizing data

■ We developed processes (processing, editing, conversion) and APIs for data formats and items to establish systems for data gathering that can be implemented in the systems used for the experiments. The systems are designed to be compatible with the portal site developed in Theme A for the data configurations, properties, API specifications, and operation policies.

Static data

- We edited the formats of the collected data to suitable formats for the usage case, taking account of 3D high-precision maps and other relevant applications, and developed APIs for the following types of data.

Logistics	• Road (road width/vehicle height limit) • Traffic signs • Carry-in port for truck • Parking lot for truck • Place to rest for truck • Road with risk of flood
E2E	• Spot

Dynamic data

- Reflecting the opinions from data providers and data users who participated in the verification experiments, we developed APIs to obtain the following types of data.

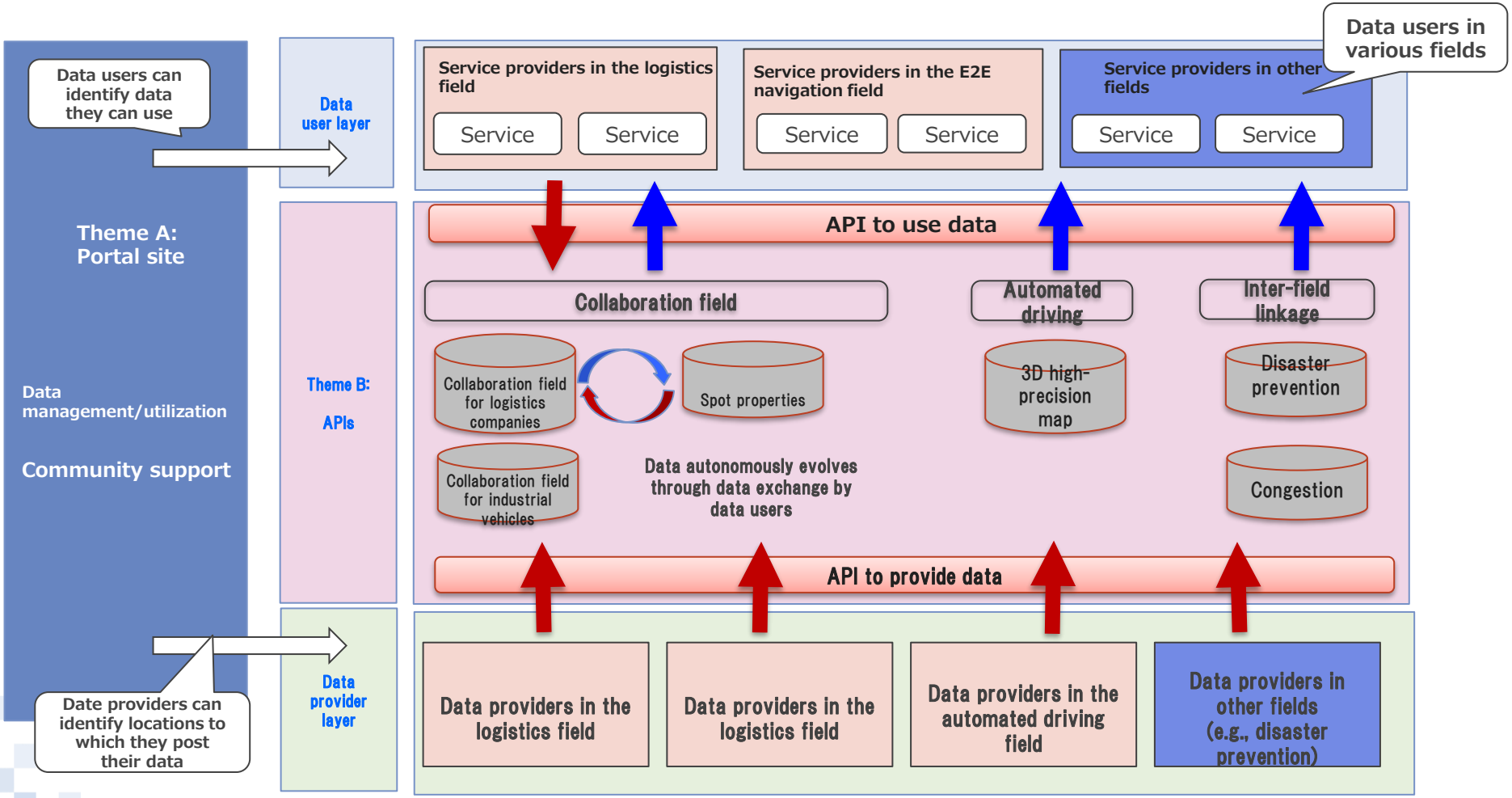
Logistics	• Drivable road • *Road conditions in case of disaster* • *Rain warning for disaster prevention* • *Earthquake warning for disaster prevention*
E2E	• Congestion

Delivered from SIP Disaster Prevention

We determined data specifications for data users. In addition, **we created yaml files in which the APIs are coded with compatibility with the OpenAPI format to allow data users to understand and easily use the APIs**.

2.1.1 (4) Study of outcomes of the verification experiments and conduct interview research API implementation in the systems for the verification experiments

- We developed general-purpose APIs for data provision and utilization to allow portal site users to use data in a cross-sectoral manner. We also developed data exchange functions to make data in collaboration fields autonomously evolve in semi-closed areas.



2.1.1 (4) Study of outcomes of the verification experiments and conduct interview research
Development and operation of systems for the verification experiments

- We developed systems for the verification experiments and applications for the systems, and checked the operation of the systems and some evaluation issues together with end users.

Screens on the applications and how the applications are used

Logistics-company-oriented service

利用者が自車の車両属性情報を登録

ドライバーに車両情報を登録してもらうことで、ドライバーの属性情報として蓄積する。

配送先の搬入口までのナビとルート付近の休憩スポットの表示

配送先までのルートに加えて、休憩スポットの地点が表示される。
(ルートは車両属性に合わせた幅員を考慮)

注意喚起の通知を受ける

交通標識の手前や通行実績がない道路を走行の際に注意喚起が行われる。

End-to-end multi-modal navigation service

ユーザ情報の登録

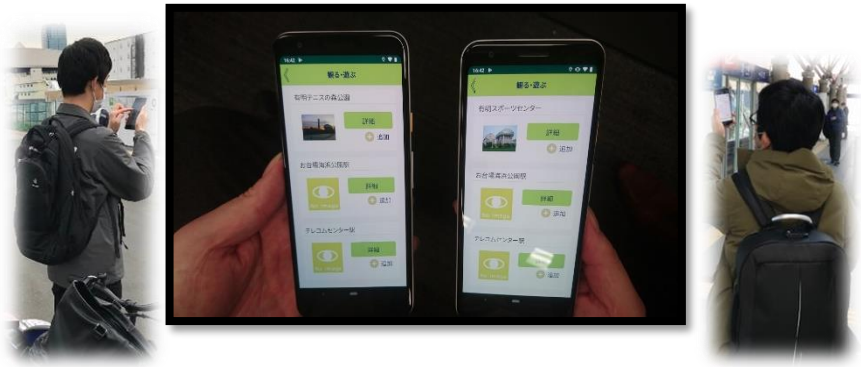
ユーザに性別や人数、興味があるジャンルについて登録してもらうことで、個人の属性情報として蓄積する。

旅行スポットの登録

個人の属性情報に合わせ、人気があったり、利用しやすいスポットが優先的にレコメンドされる。

動的情報のキャッチアップ

気象情報・運行情報・Twitterから集計した混雑度合などの動的情報をキャッチアップし、ユーザにより快適なスポット情報を通知する。



2.1.1 (4) Outcomes of the verification experiments: Logistics-company-oriented service

■ Concerning the experiments for the "Logistics-company-oriented service," we demonstrated applications to allow users to provide and use geographic data for traffic data in collaboration with users. In the demonstration, we interviewed truck drivers, transportation control managers who have experience as a truck driver, and staff of traffic data service providers to solicit their comments.

Purpose of the verification experiments and evaluation of the experiments by users

To confirm the value of the services we can offer, e.g., to ensure safe and secure driving conditions, and to improve working conditions, by allowing data users to use the portal site and its new traffic/transportation data in various new ways.

Evaluation	Achievement	Observation
Value of the data on the portal site for ensuring safe and secure driving conditions	◆ Ensuring safe and secure driving conditions for truck drivers • Dynamic/static data from on-board probes, real-time traffic data, and disaster prevention data helps to ensure safe navigation. ◆ Improvement of the working conditions of truck drivers • Route navigation with static data about carry-in ports, places to rest, road regulations, traffic signs, and other matters is implemented.	◆ We could implement services for commercial/industrial vehicles in which valuable traffic data is linked with data for disaster prevention, and showed that the services are applicable to the logistics field and other fields. ◆ The realization of a service for business vehicles that links data of high importance in other applications and data in the field of disaster prevention has enabled us to identify the possibility of expanding into services for businesses in areas other than logistics. ◆ With respect to inter-field dynamic data linkage, there will be challenges to secure temporal consistency in data linkage and update timing for data in fields other than disaster prevention.
Whether data gathered in collaboration fields on the portal site (traffic/transportation data) is valuable	◆ Usefulness of data in collaboration fields • Data applicable for public use (e.g., rationalization or disaster prevention) is data in a collaboration field. ◆ **Scope of data that can be shared** • In some cases, data is more valuable if shared with others than used only internally.	

2.1.1 (4) End-to-end multi-modal navigation service Outcomes

■ For the "End-to-end multi-modal navigation service," we experienced all services implemented in the verification experiments according to their scenarios together with people concerned, and evaluated the service functions and identified problems.

Purpose of the verification experiments and their evaluation

To confirm that dynamic data helps to provide stress-free mobility services based on more personalized mobility technologies (e.g., automated driving), by allowing data users to use the portal site and new traffic/transportation data in various new ways.

Evaluation	Achievement	Observation
How much data available on the portal site helps to provide stress-free mobility services based on more personalized mobility technologies (e.g., automated driving)	◆ Implementation of stress-free mobility services based on more personalized mobility technologies (e.g., automated driving) • We successfully implemented transportation navigation functions and routing functions according to changes of dynamic information about weather and traffic congestion, and according to end user attributes.	◆ Through the experiments, we successfully implemented more personalized services by using dynamic data that users do not know, and showed that new services can be created by enabling users to easily search various gathered data. ◆ With respect to dynamic data utilization, we found that it is important to examine rules and technologies for anonymity, taking account of the general versatility and granularity of data about user attributes and user behaviors gathered (data about locations they visited), by application type.
Whether data gathered in collaboration fields on the portal site (traffic/transportation data) is valuable	◆ Applicability of exchanged data about behaviors and dwell time • Data about behaviors, dwell time, and other such data collected through the application may be useful for marketing. We showed that such data exchanged through the portal site is valuable and applicable in other collaboration fields.	

2.1.2 Promotion of FOTs projects (FY2020)

2.1.2 Outline of implementation Overview

- For the purpose of the utilization and collaboration on collaborative data in the logistics sector that will result in solving cross-industry societal issues, we extracted possible data candidates for collaboration fields related to the initiatives and issues of logistics companies, based on investigations into the issues that the logistics industry is facing.
- Based on discussions regarding studies and verification of the optimization of logistics based on an architecture that utilizes vehicle information such as SIP probes (hereafter, SIP logistics optimization), we investigated service creation concepts that utilize the portal site taking into account issues and the direction of the solutions for issues related to the usability and availability of the above data candidates.

Investigations into data candidates that can be made available for collaboration fields

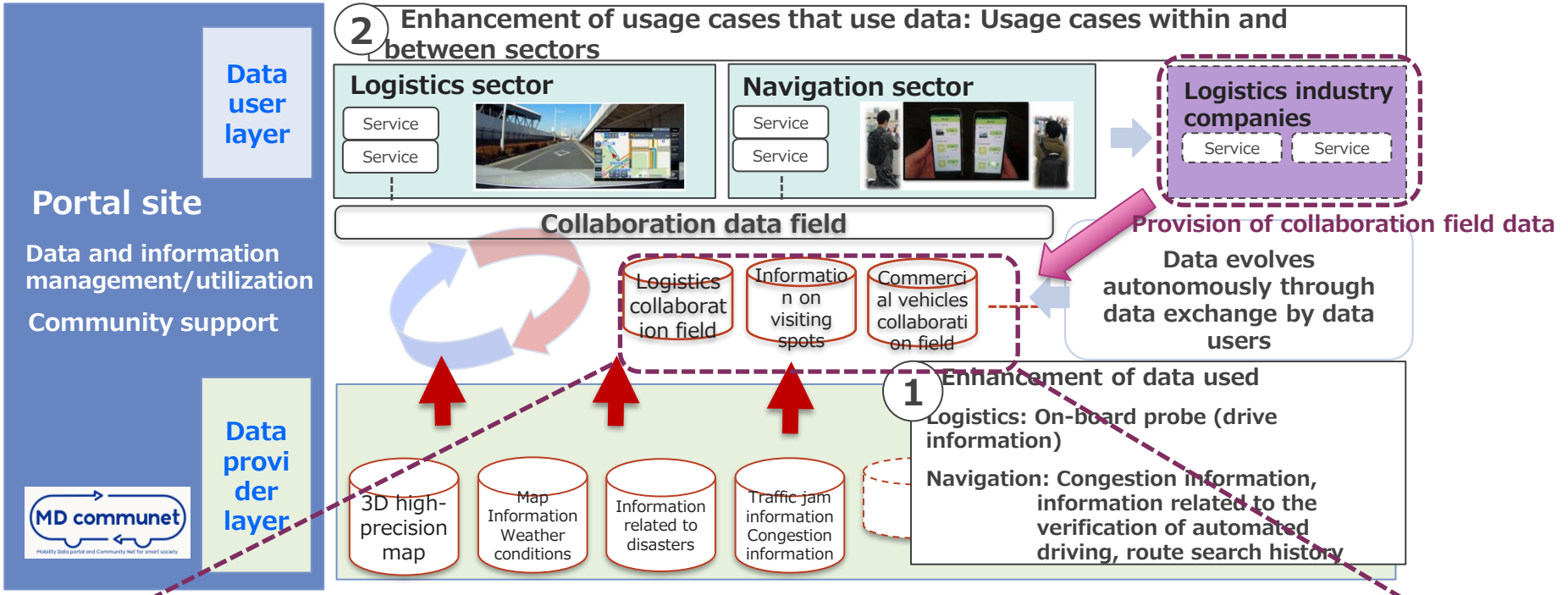
Organize data that is also expected to be used in other sectors	Initiatives in the logistics sector	Extract and generate data that can be made available for collaboration fields between logistics and other sectors
• Identify keywords of the logistics industry from the initiatives and issues of logistics companies • Extract data candidates tied to keywords	• Obtain a data provision list from SIP logistics optimization companies	• Match data candidates related to keywords with the list of provided data presented by the logistics sector • Extract data that can be made available for collaborative fields in the logistics sector

Investigations into the usability and availability of data for collaboration fields

Select usage cases based on data that can be made available for collaboration fields	Identify issues related to data usability and availability for each usage case	Investigations of the orientation and the concept of service creation for solving issues
• Identify usage cases related to important keywords that are linked to data that can be made available for collaboration fields in the logistics sector • We based the usage cases on the usage cases investigated in FY2019	• Identify issues related to the usability and availability of data handled in usage cases with SIP logistics optimization companies • To improve data availability (for collaboration fields), while referring to the reference architecture for Society5.0, we assumed issues from the three perspectives of rules, business, and technical and studied potential approaches.	• Investigations of issues regarding making data available for collaboration fields that were identified based on discussions with SIP logistics optimization companies and investigations into concepts for the creation of services based on the orientation of solutions

2.1.2 Survey and research content and procedures (summary)

- For this fiscal year, for collaboration data candidates that will solve cross-industry issues, we identified issues in achieving the provision of collaboration field data so that the specific data generated in the logistics industry can be utilized and used on the portal site.



Implementation process

1. Study enhanced data

Investigate the architecture for utilizing on-board probes
Reorganize candidates for collaboration fields

2. Study usage cases within and between sectors

Verification for SIP logistics optimization companies/ confirmation of verification data

Reconfirm usability

Confirm availability

Organize issues
Study the flow of data provision

Theoretical testing with sample data

Investigate technical processing specifications

Investigate the specification when data is provided

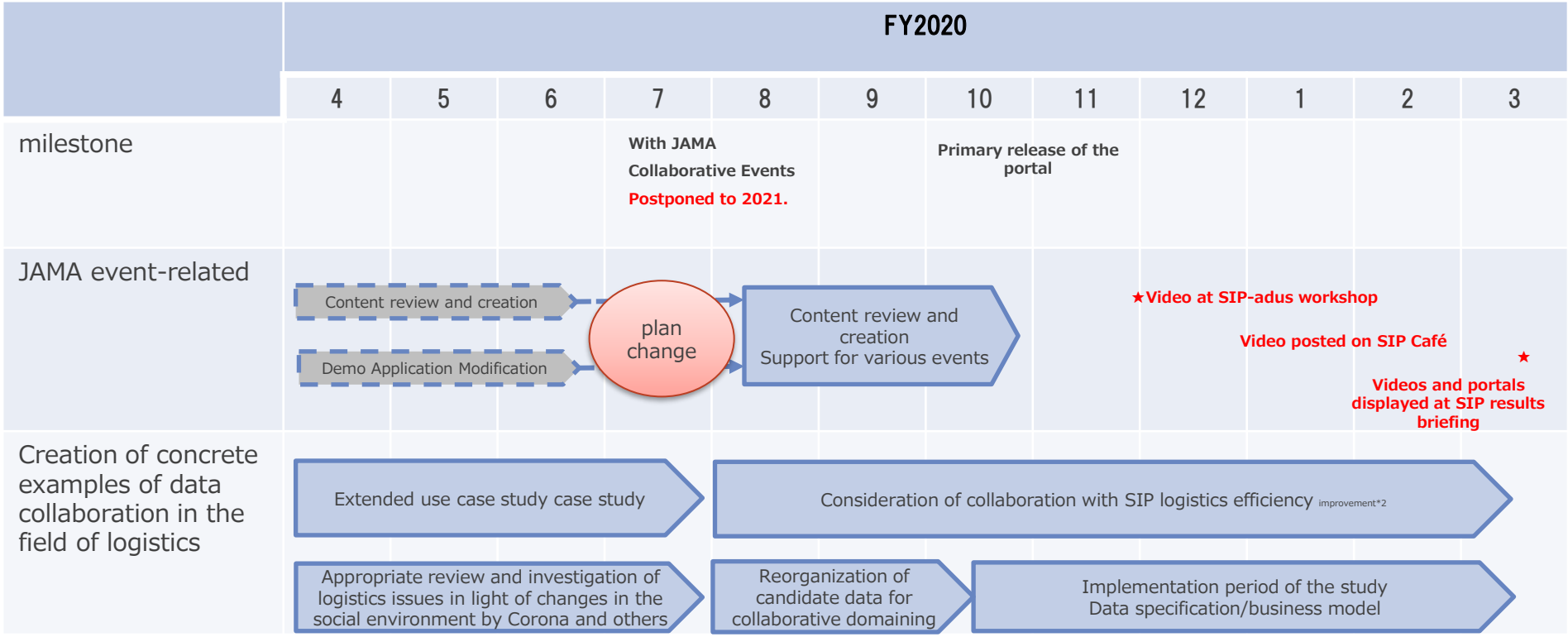
Specification review during collection/generation

Draft data specification for collaboration fields

Draw up detailed plans for FY2021's verification (Utilization verification for other sectors)

2.1.2 Survey and research content and procedures (overall schedule)

- Since the collaboration event with JAMA was postponed, we made a video introducing MD communet and released it at promotional events such as SIP-adus workshop, SIP-Café*1 and interim results presentation.
- Promoted the creation of data linkage cases at the level of specific data items in cooperation with the contractor of SIP Logistics Efficiency Improvement*2.



1 SIP café article: https://sip-cafe.media/info/5449/ SIP café onTube: https://youtu.be/F6sOBwkFwIU
2 the second phase of Cross-ministerial Strategic Innovation Promotion Program (SIP) / Automated Driving for Universal Services Research and FOTs for Improving Logistics Efficiency Based on Architecture Using Vehicle Information such as Probes

2.1.2 Details and procedures of the research and study (study policy for the cooperative domain data candidates)

- In order to explore the possibility of generating and providing candidate data for the cooperative domain in the logistics field that can be used in other fields, we confirmed the types of data and the data specifications of the data targeted in the FOTs of the logistics service measures for SIP-adus.

Data Request candidate	**Collaboration field data list (data that is also expected to be used in other sectors)** Driving behavior related/carry-in port /drive information by vehicle type/ Load/unload waiting status/place to rest
Study details	**Extract and generate possible data for collaboration fields between logistics and other sectors** Example of data to be generated: Vehicle attributes x break time x location information=place to rest where large vehicles can stop
SIP logistics efficiency improvement side business Implementation details	Acquire information that will help confirm daily inspection items / Acquisition of information that helps to ascertain load weight / Grasp the actual condition based on analysis of operation data and share the information
	Vehicle senor information / Load weight gage / Digital tachometer/location information Tablet operation

2.1.2 Contents and procedures of the research and study (study of data processing methods for the cooperative domain)
List of cooperative domain data (which are expected to be used in other fields)

■ We identified keywords from FY2019 interviews with logistics companies, guidelines related to logistics, initiatives that are considered beneficial or have gained attention from a CSR perspective, and we set investigations into data candidates which are expected to be used in the logistic sector as a foundation.

Keyword	Overview (Opinion of logistics companies regarding keywords, CSR information, information for various guidelines)
Carry-in port information	- It is rare to conduct a new delivery to a building with a carry-in port. However, this information is useful for first-time deliveries. - When using a trailer, you want to know the route to the carry-in port. However, as of present, information to the carry-in port (including the route) is not shared.
Load/unload waiting information	The sharing of the load/unload waiting information is currently only carried out on an individual level among drivers, so efficiency can be improved by sharing this information. Furthermore, since the time to receive loads is highly related to delivery volume, it will also be necessary to share this information.
Place to rest information	This is useful because it takes time to search for rest stops when delivering to new locations. However, it will be necessary to pay attention to parking lot vacancies.
Information on vehicle width and height	- This has a high usage value in pre-departure route setting. This is useful as commercially available navigation systems do not include information on vehicle height - It would be beneficial if information was included on whether it was possible to turn. This is theoretically possible if vehicle length is added.
Drive information	- This has a high usage value in pre-departure route setting. It would be useful to respond to dynamic information and to link this with width and height information. - Efficiency can be achieved if traffic-related information that is shared between drivers is made available. Also, drivers do not consider this competitive field information.
Information on road construction	Because information is not centrally managed by the police, Ministry of Land, Infrastructure, Transport and Tourism, local authorities, and construction companies, etc.
Information on collapsed structures	During disaster relief, as road conditions are sometimes confirmed by phoning facilities such as hospitals by phone to check road conditions, it would be useful to have information on collapsed structures.
Service Area/Parking Area Information	The issue of there not being many rest areas for trailers at service and parking issues is significant. It would be beneficial if information regarding vacancies at service and parking was shared.
On-board devices with an on-board communication function that combines a drive recorder and a digital tachograph	- In addition to the parking location and speed information that was previously collected using digital tachographs, we will gradually install integrated on-board devices to all delivery vehicles that collect operation data such as travel paths created from driving video collected by drive recorders and information gained from GPS antennas - Automate the registration of locations where near-misses were experienced, and set drive start and end
White Logistics	In support of the "White Logistics Movement," an initiative from enterprises involved in logistics, we are working on improving logistics with mutual understanding and cooperation from stakeholders, including business partners, to bring about high-productivity logistics and work style reform. (Ministry of Land, Infrastructure, Transport and Tourism, Ministry of Economy, Trade and Industry, Ministry of Agriculture, Forestry and Fisheries)
List of White Logistics initiatives	Of the participating enterprises, which initiatives are being thoroughly implemented? - Specific implementation efforts are not clearly stated.
Guidelines aimed at improving long working hours and the trading environment through cooperation between consignors and transport companies	Guidelines that describe specific measures for the improvement of the logistics industry - Since these guidelines were developed jointly by the government and the private sector, we decided there was no issue in assuming that logistics companies are promoting their initiatives based on these guidelines. (Ministry of Land, Infrastructure, Transport and Tourism, Ministry of Health, Labour and Welfare, Japan Trucking Association)
Pallet information	As pallets are often lost, if location information is shared about where each pallet is located, efficiency can be achieved by one company collecting them all without having to collect them individually.
Congestion information	As this is an initiative to plan deliveries avoiding congested times, congestion information is returned as statistical information to improve accuracy.

2.1.2 Contents and procedures of the research and study (study of data processing methods for the cooperative domain)
List of cooperative domain data (which are expected to be used in other fields)

■ Of the data extracted from usage cases investigated up until FY2019, we defined usages cases for this fiscal year from keywords applicable to data that can be made available for collaboration fields presented by SIP logistics optimization companies.

Data categories identified as useful in use cases considered through FY2019.	data-name	Keywords.	Relationship with vehicle information, which is a candidate for data utilization on the SIP logistics efficiency side
Map Information	2D map	Information on loading docks, waiting areas, resting spots, vehicle width and height, and Passage performance information	–
Driving behavior (probe information)	Position	Information on loading docks, waiting lists, resting spots, and traffic records	○
	Speed	Waiting information and traffic performance information	○
	Emergency brake	Passage performance information	○
	Sudden acceleration	Passage performance information	○
	Sharp turn	Passage performance information	○
Probe information (truck)	Position (immediate)	Passage performance information	○
Probe information (construction vehicles)	Position (immediate)	Passage performance information	–
Probe information (bus)	Position (immediate)	Passage performance information	–
Advanced probe information	–	Passage performance information	–
Road Information	breadth	Vehicle width and height information	–
	Height	Vehicle width and height information	–
	Traffic record	Passage performance information	○
Traffic Information	Vehicle control	Road construction information	–
	Traffic control	Road construction information	–
	Congestion (e.g. traffic)	Congestion Information	–
Public facilities information	Position	Loading port information, waiting information	–
	Exit and entrance	Loading entrance information	–
	Rest Spot	Information on rest spots, SA/PA information	–
Public Restroom Information	Position	Rest Spot Information	–
Disaster Prevention Information	Road conditions	Collapse Information	–
	Earthquake	Collapse Information	–
	Rainfall	Collapse Information	–
Congestion Information	–	Congestion Information	–

Usages cases for FY2020

- **Generate place to rest information**
- **Generation of drive information**
- **Generation of carry-in port information**

We left out load/unload waiting information as it would be the same data processing process as places to rest and carry-in ports.

- (1) Data distribution using vehicle information as an asset, which is a candidate for data utilization in the SIP logistics efficiency improvement side, and (2) Issues related to the utilization of data extracted from the asset were examined by setting up use cases.
- In selecting use cases, from among the use cases for data use in each field (logistics, local government, construction, navigation, automobile, and infrastructure) studied up to the last fiscal year, those that are considered to be capable of cross-sectoral utilization for operations that handle vehicles are selected.

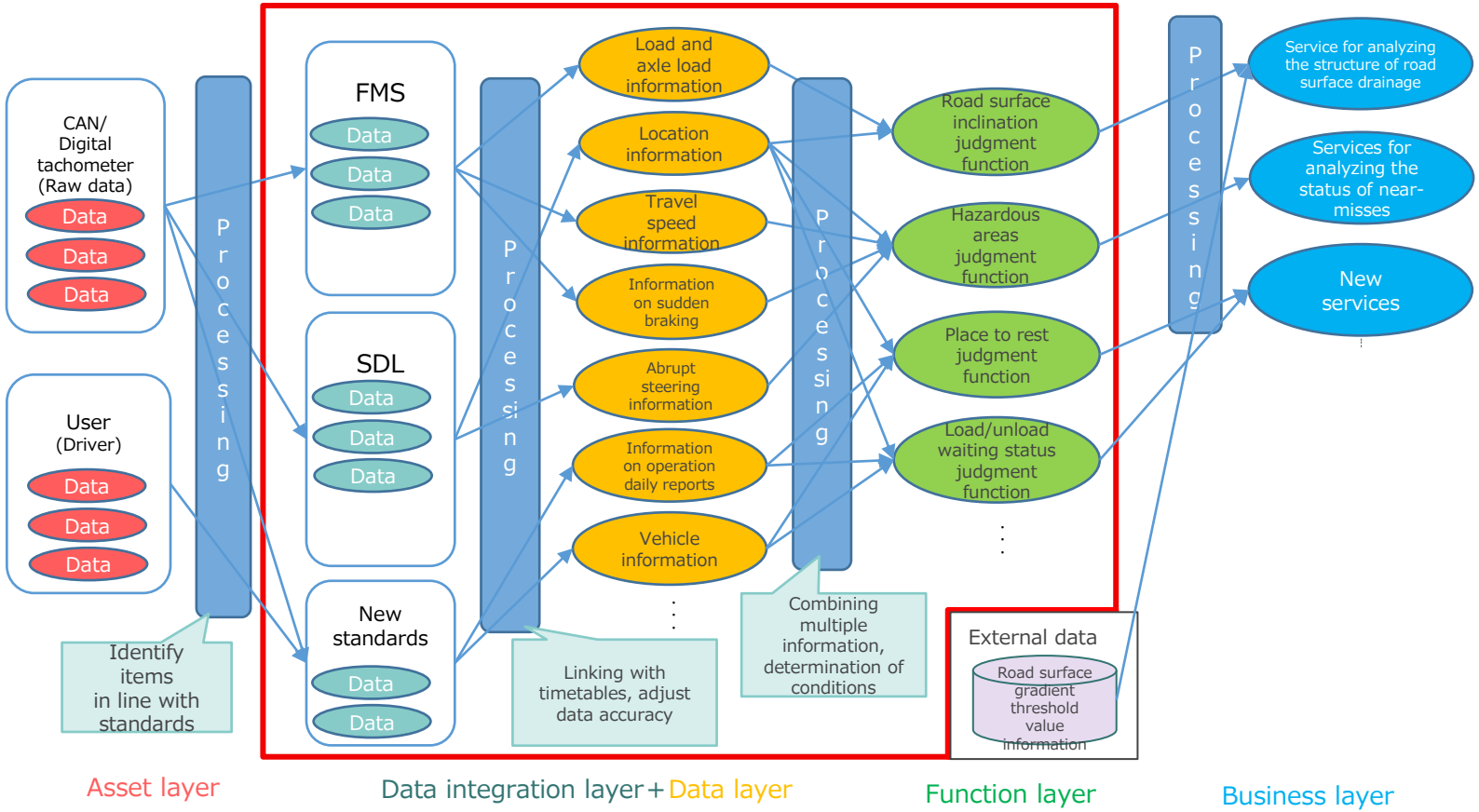
Defined usage cases

No.	Usage cases	Outline
1	Generation of rest spot information	We will identify places to rest that can be used by trucks by linking the GPS of digital tachometers and spot information
2	Generation of drive data	We will identify drive data by car type by linking the GPS of car navigation systems and the direction of travel with road link information
3	Generation of carry-in port data	We will identify spot (delivery location) carry-in ports by linking the GPS of digital tachometers with spot information and road link information.

2.1.2 Details of implementation (hypothesis building for the collaborative domain of data) Study of data processing and combination methods

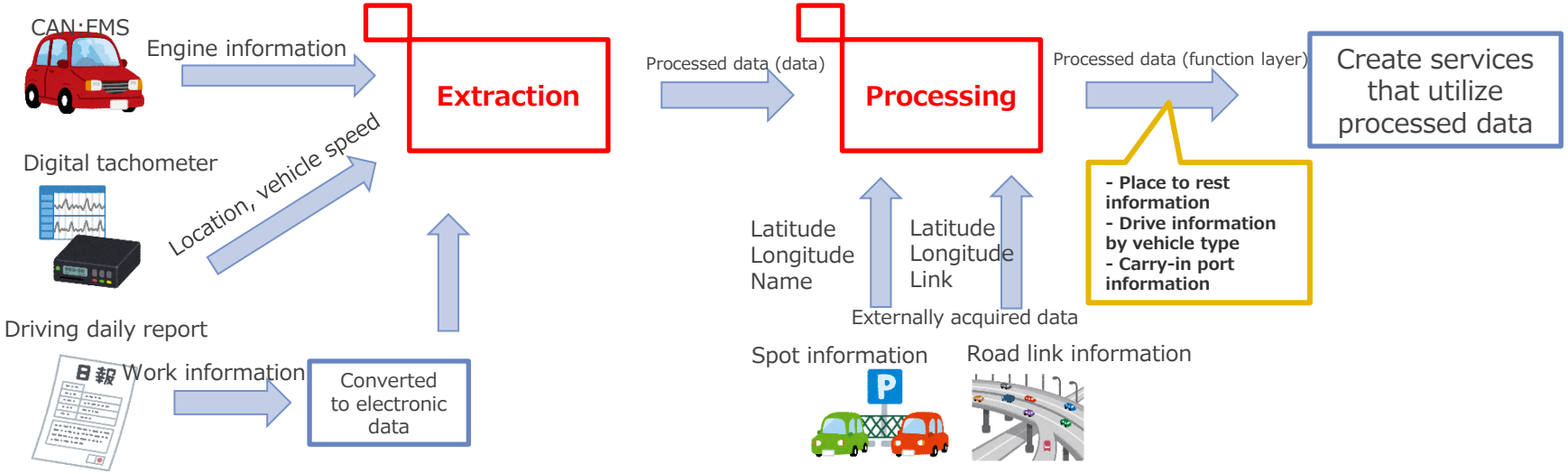
- The vehicle probe data that is actually acquired is difficult to handle in its original state due to the privacy information it contains and the huge amount of data items and data volume.
- Therefore, we assumed that by processing and matching with other data, we could explore the possibility of providing data and increase the value of data use

Flow of processing and combining information from on-board probes



- The overview of data processing was investigated by extracting data from assets, processing it, and creating services through using processed data as a series of flows. We assumed that the extraction process would conduct searches and bind asset data, and the processing process generates valuable data by combining processed data with data obtained externally.

Data extraction and processing flow



- Based on the list of data items of "available vehicle information" provided by SIP logistics optimization companies, we investigated the usability and availability of data handled in usage cases up until now.
- To improve data availability (for collaboration fields), while referring to the reference architecture for Society5.0, we estimated issues from the three perspectives of rules, business, and technical, and studied potential approaches.

The three perspectives for making data available for collaborative field

Rules

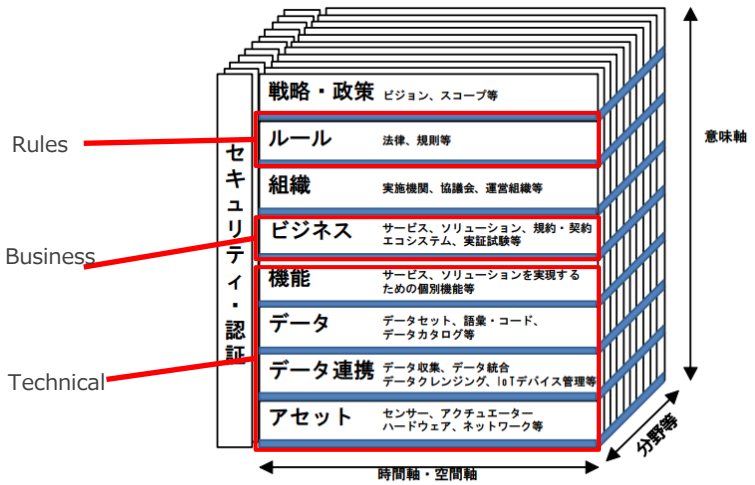
Laws, regulations (E.g., Personal Information Protection Act, trade secrets)

Business

Services, terms, and agreements, business practices

Technical

Data utilization and processing for each usage case



Society 5.0 リファレンスアーキテクチャ（内閣府資料より）

- Regarding the asset level data used for the usage cases set (provision of place to rest information drive information, carry-in port information), after deciding an extraction strategy, we constructed a hypothesis pertaining to issues and initiatives aimed at making data available for collaboration fields and held discussions with SIP logistics optimization companies.

Issues and initiatives aimed at making the set data available for collaboration fields for each usage case

Usage cases	Asset level data to be used	Extraction method	Issues and initiatives for making data available for collaborative fields					
			Rule aspects	Addressing issues	Business aspects	Addressing issues	Technical aspects	Addressing issues
Provision of information on places to rest	Vehicle current location, speed, status	During rest, only location information is used For speed, only 0 km/h used	1.Necessary to make sure that individuals cannot be identified (adherence to the Personal Information Protection Act and the Unfair Competition Prevention Act)	1. Anonymize intermediate data 1-1. Delete vehicle ID 1-2. Truncate time information by the hour	1.Need to make identifying driver's total rest time and rest frequency impossible	1.Only information of the location where the driver is in rest status is provided	1.Improve the accuracy of location data 2.Determine that the vehicle is stopped 3.Digitalization of driving operation records	Conduct data processing in line with data specifications
	Drive time, duty time, rest time, break time (daily, biweekly, monthly, annually)	Only rest time information used						
	Driving operation record	Information when the shift lever is in P used						
Drive data	Vehicle number	Used to link data between assets			1. Need to make linking carriers and consignors impossible 2. Need to make the analysis of a sequence of driver traveling status impossible	1.Anonymize intermediate data 1-1.Delete vehicle ID 1-2.Truncate time information by the hour 2.Delete vehicle ID	1.Improve the accuracy of location information 2.Link multiple assets of the same vehicle (navigation system, digital tachometer, etc.) 3.Method for acquiring travel direction	
	Vehicle current location, speed, status	Used to ascertain vehicle travel status						
Carry-in port	Vehicle current location, speed, status	Information from five minutes before the vehicle has stopped used						
	Driving operation record	Information of the ignition switch turning to "OFF" used					1.Improve the accuracy of location information 2.Method for acquiring ignition data	

2.1.2 Details of Implementation (hypothesis testing for data collaboration domain)

- New issues for business and technical aspects were identified through discussions with SIP logistics optimization companies.
- From the FY2021 onward, after investigating methods for solving these issues, we will proceed with creating data specification proposals for collaboration fields and verification of data collaboration between different sectors.

Results of hypothesis verifications based on discussions with SIP logistics optimization companies

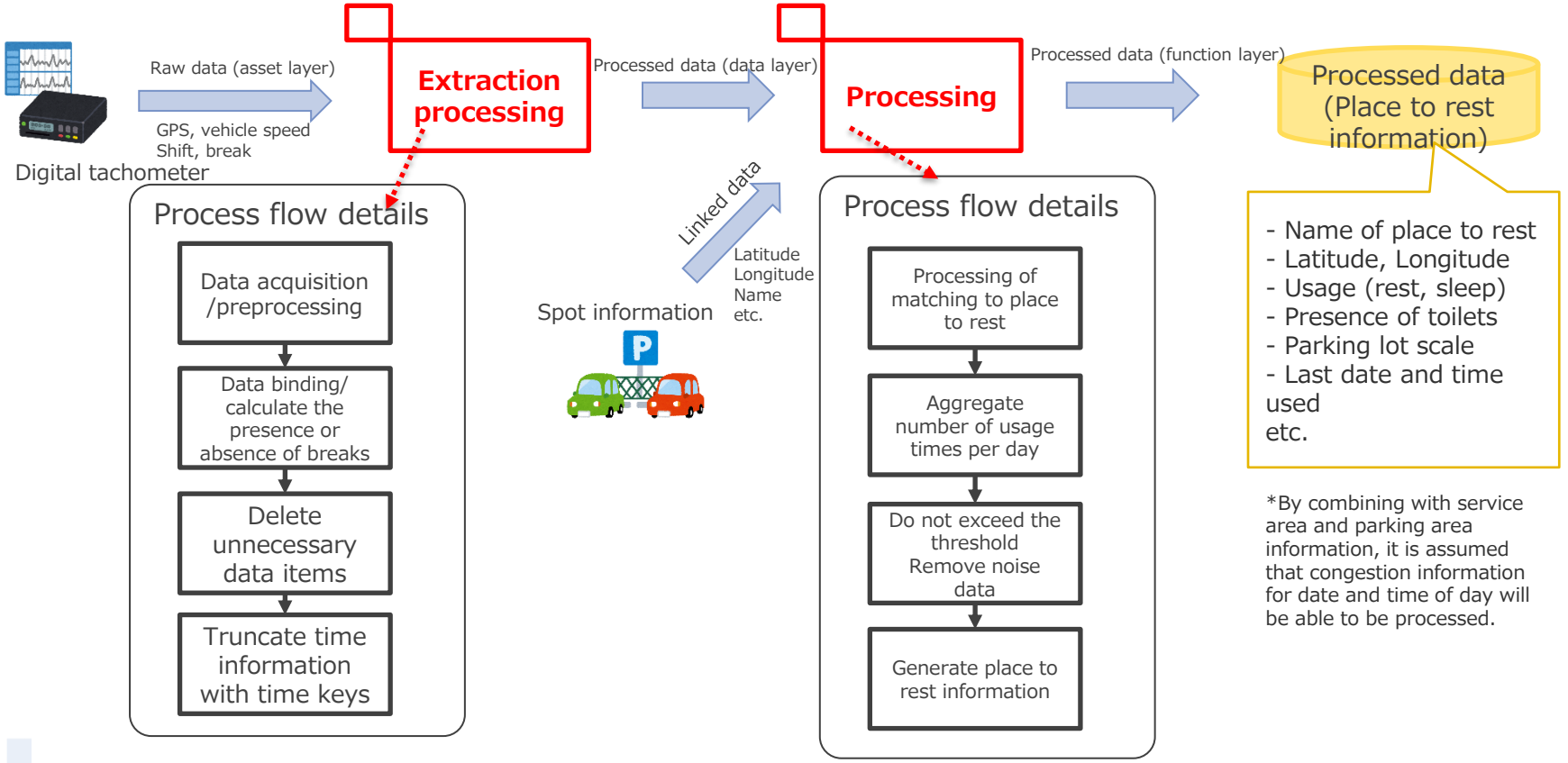
*Red text represents the new issues identified from discussions.

	Issues	Initiatives towards issues	Specific discussions on the issues
Rules	• Compliance with the Personal Information Protection Act, Unfair Competition Prevention Act (trade secrets) • There are currently no special circumstances or requirements for the logistics industry.	• **Anonymize intermediate data**	Business aspect issues Places to rest **should be defined as legal and safe places where drivers can rest**, such as convenience stores, truck stations, services areas, parking areas, and car parks.
Business	• It is necessary to define places to rest regarding usage cases for places to rest. • It is necessary to investigate solutions to link carry-in port information and consignor information.	• **Clarify the definition of a place to rest** • **Anonymize intermediate data**	Needs to solve the issue
Technical	• The data processing method depends on data specifications. • The definition of data and data granularity and format differ depending on asset type. • New issues were identified regarding the inaccuracy of data (such as distinguishing and classifying situations where the vehicle has just stopped, and it is not a break).	• **Process data according to data specifications** • **Identify cases where the connotations differ even amongst data of the same specification and define the classification method**	In the truck industry, data for places to rest (including parking lots) have not been cleansed, however **many people hold the opinion that it would be good if a parking lot sharing service could be created using data**

2.1.2 Details of implementation (hypothesis testing for the collaborative domain of data) Use case 1: Generation of rest spot information

- We investigated usage cases that will help to solve the issue of not sharing information on places to rest where a truck can be parked.
- Information on places to rest used daily by drivers in the logistics industry such as roadside stations, convenience stores, and gas stations is generated using data from digital tachometers.
- As a result, we predict it will be possible to search for nearby places to rest using the navigation system and to incorporate places to rest onto the route in advance.

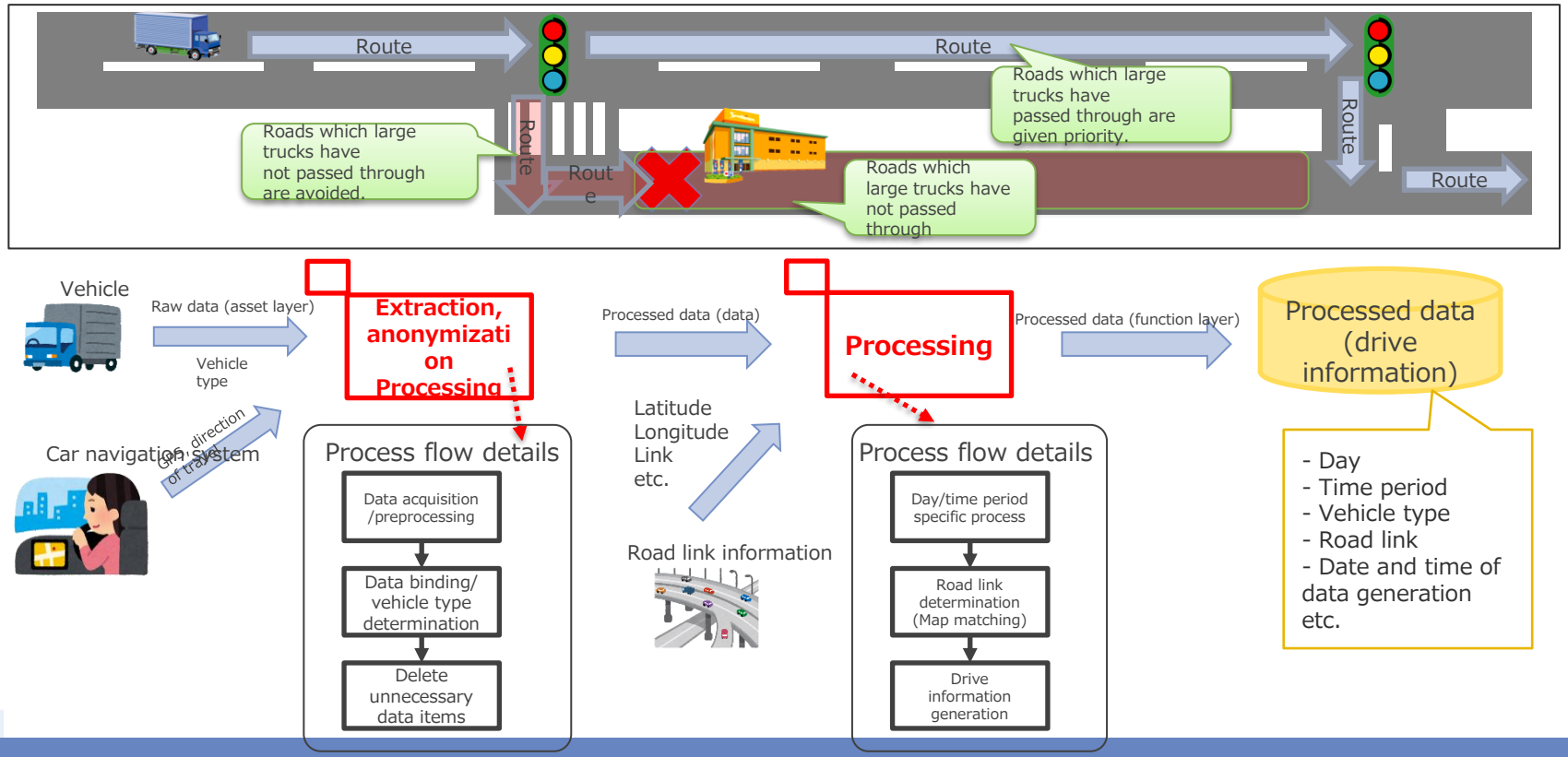
Process for generating information on rest spot



2.1.2 Details of implementation (hypothesis testing for the collaborative domain of data) Use case 2: Generation of drive data

- We investigated usage cases that contribute to solving problems such as stress caused by driving on unfamiliar roads and an increase in the risk of accidents caused by entering roads that are difficult to pass in areas for deliveries to areas that truck drivers do not know well.
- Drive information by vehicle type that shows roads that have been passed by vehicle type such as large and medium-sized vehicles is generated by using navigation systems and vehicle data.
- As a result, we expect it will be possible to set routes that have been driven by drivers of the same vehicle type.

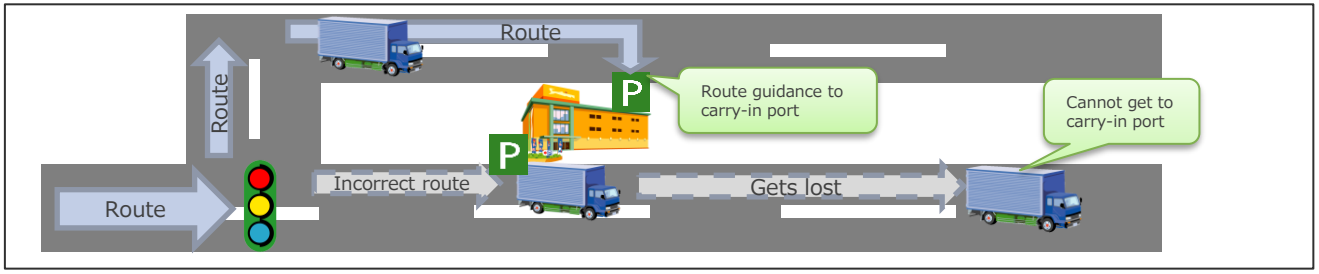
Process for generating drive information

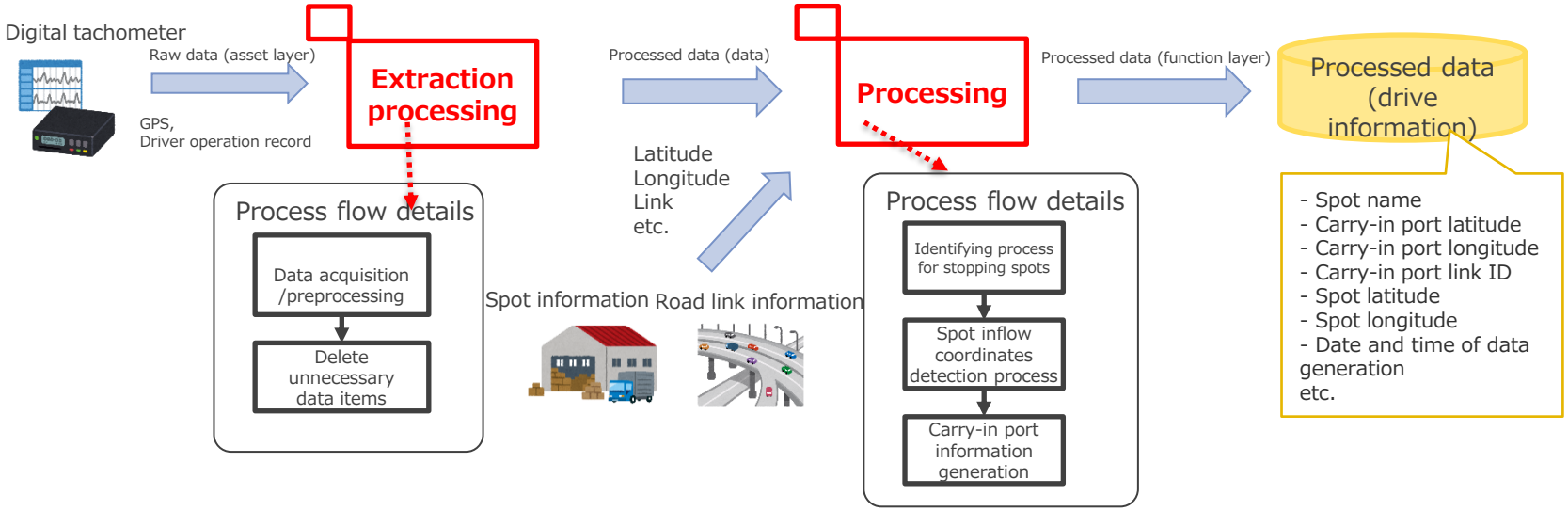


2.1.2 Details of implementation (hypothesis testing for the collaborative domain of data) Use case 3: Generation of carry-in port data

- We investigated a usage case to help solve the issue of truck drivers getting lost on nearby roads when the route to the carry-in port is not clear for deliveries to areas that they do not know well. Carry-in port information that shows the exact carry-in port is generated using data from the digital tachometer.
- As a result, we expect this to make it possible for drivers to travel to their destination without getting lost and lead to improvements in the efficiency of delivery services

Process for generating carry-in port information

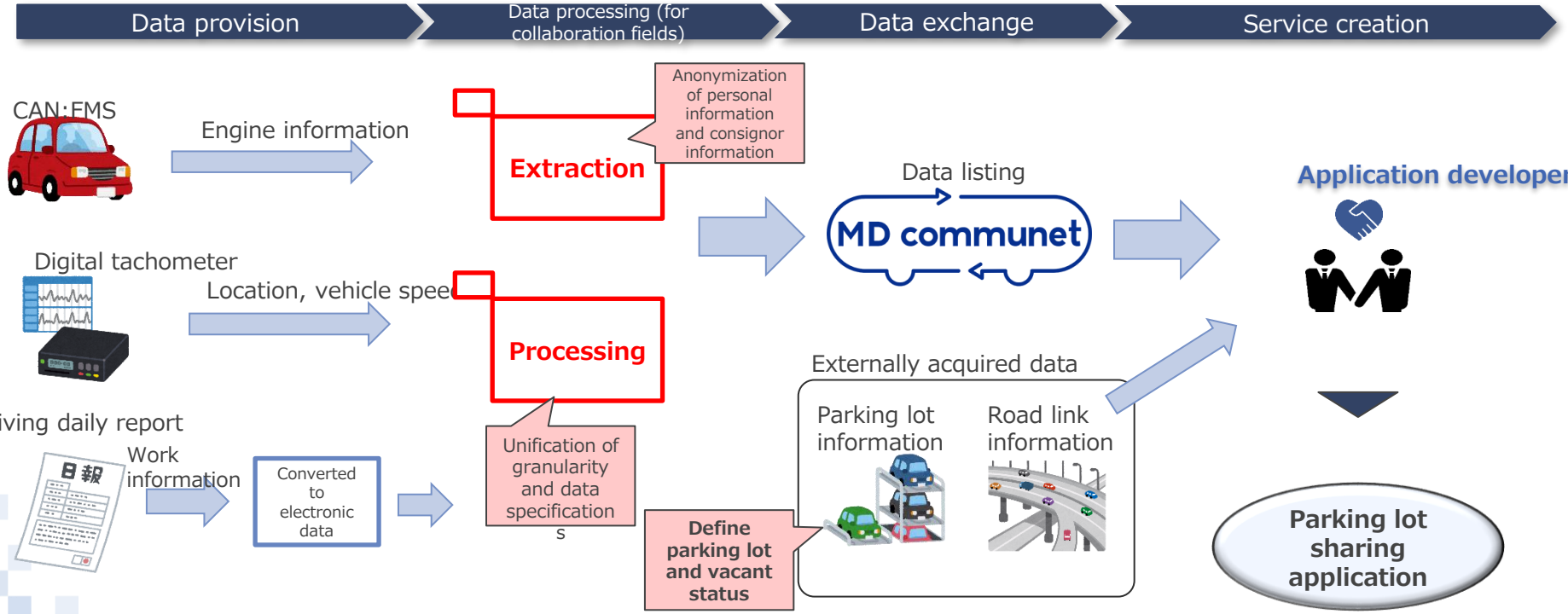




2.1.2 Details of implementation (hypothesis testing for the collaborative domain of data)

- Investigations of issues regarding making data available for collaboration fields that were identified based on discussions with SIP logistics optimization companies and investigations into concepts for the creation of services based on the direction of solutions.
- According to the above companies, there is a need in the truck industry for a parking lot sharing service that uses real-time parking lot vacancy information, so we investigated the concept of creating a service that uses MD communet.
- In the FY2021 and beyond, we plan to work on other use cases based on the realization of the above use case.

Service creation concept based on the direction of solutions to issues identified for rules, business, and technical aspects



2.2 Promotion of FOTs projects (Theme a)

2.2.1 Promotion of FOTs projects (FY2021)

2.2.1 Formulation of FY2021 implementation program Overview: FY2021 Implementation Policy

- In this fiscal year, issues related to data utilization were sorted out in order to establish a service creation process using MD communet, while consulting with local governments and businesses interested in data utilization, based on the results of fiscal 2020.
- Examined and demonstrated schemes for creating services with the theme of solving social issues
- Through FOTs, MD communet support menu necessary for data utilization was organized.

FY2021 Implementation policy

Issues identified through verification in FY2020

- For the utilization and integration of collaborative data in the logistics sector that will lead to the solution of cross-industry societal issues, we extracted possible data candidates for collaboration fields related to the initiatives and issues of logistics companies based on investigations into the logistics industry's issues.
- We investigated service creation concepts that utilize the portal site taking into account issues and the orientation of the solutions for issues related to the usability and availability of the above data candidates. This was based on discussions regarding studies and FOTs of logistics optimization based on an architecture that utilizes vehicle information such as SIP probes (hereafter, SIP logistics optimization).

Implementation policy for FY2021

We will formulate detailed service creation plans by organizing issues and investigating various specifications for the realization of the service creation concepts that utilize MD communet data

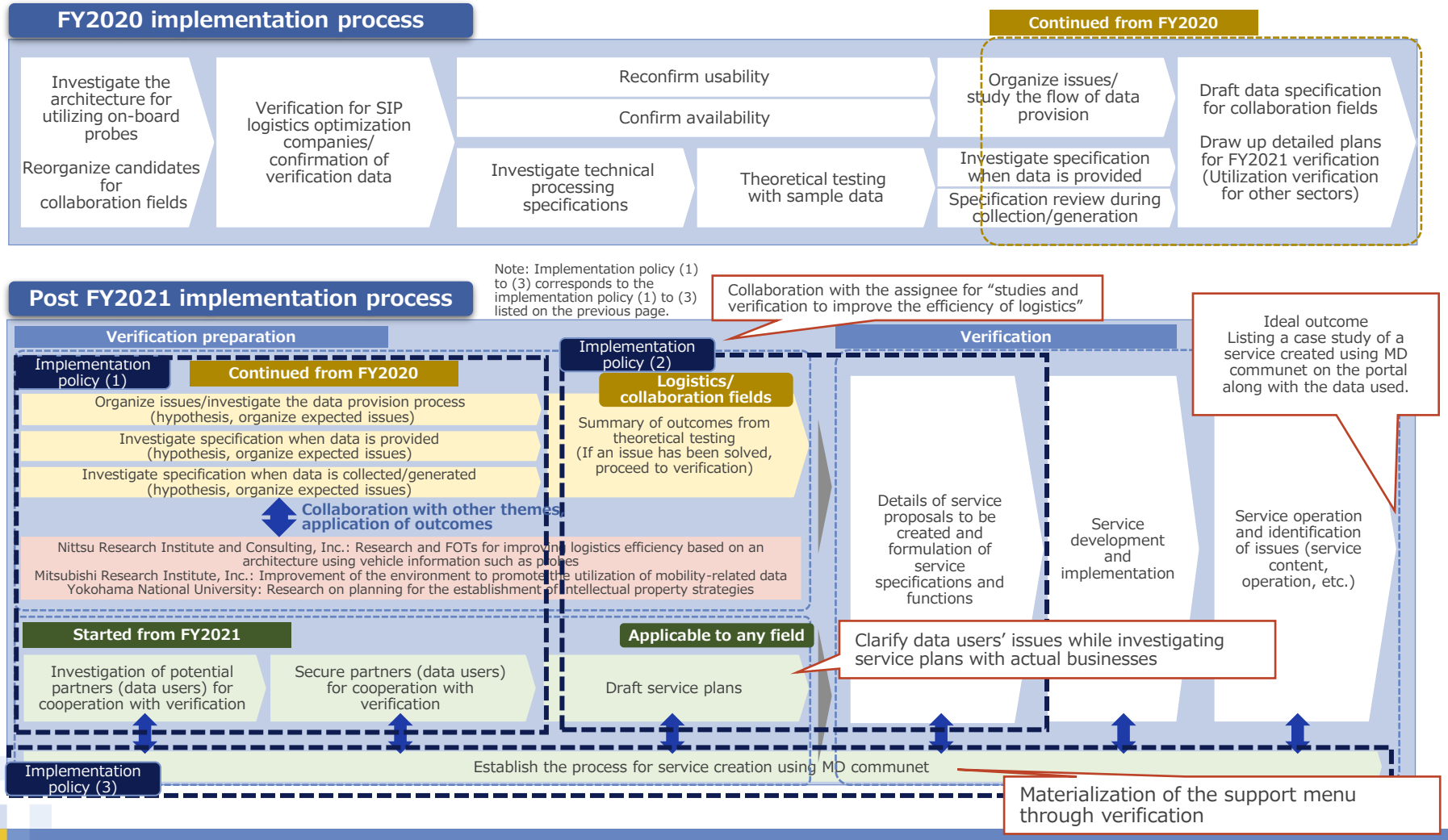
(1) Investigation into the orientation of unique and symbolic MD communet service creation (utilization of data from on-board probes, etc.)

(2) Formulation of business topics (in line with the intent of the SIP project) that can be developed into services and solve social and corporate issues

(3) Materialization of the MD communet support menu

2.2.1 Overview of verification promotion Implementation Process (Overview)

- To increase the possibility of service creation that utilizes MD communet data, we examined several service plans from the users' perspective at the operating entity
- We clarified the issues that occur when creating services and examined the materialization of the MD communet support menu



2.2.1 Verification results (1): Investigation into the orientation of unique and symbolic MD communet service creation Overview

- For FY2021, to create symbolic services that are realized through MD communet, in addition to the issues we identified in FY2020 (issues with the availability of data), we set a hypothesis for the supposed user and examined proposals for verification that incorporated actual users, along with conducting discussions and investigations with local governments and sharing service and logistics operators.
- As a result, cost-effectiveness for service creation and data acquisition and obtaining desired data were identified as issues.
- In response to this, we selected verification themes that consider serviceability, availability, and compatibility of data and whether the service utilizes the characteristics of mobility data. We also identified issues that we will face while examining plans and investigated the orientation of solutions to these issues.

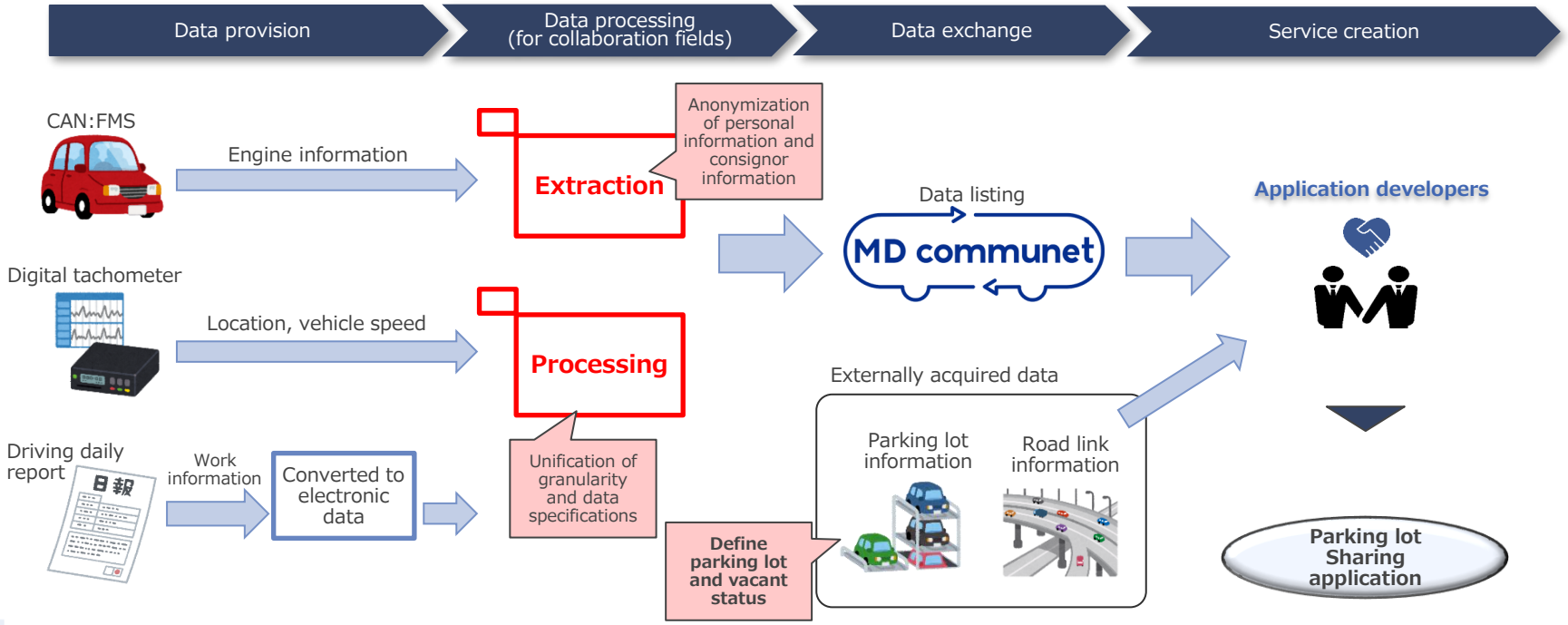
Issues identified in FY2020 (Results of hypothesis verifications based on discussions with SIP logistics optimization companies)

	Issues	Initiatives to address the issues	Specific discussions on the issues
Rule aspects	• Compliance with the Personal Information Protection Act, Unfair Competition Prevention Act (trade secrets) • There are currently no special circumstances or requirements for the logistics industry	• **Anonymize intermediate data**	**Business issues** Places to rest **should be defined as legal and safe places where** drivers can rest, such as convenience stores, truck stations, services areas, parking areas, and car parks.
Business aspects	• It is necessary to define places to rest regarding usage cases for places to rest • It is necessary to investigate solutions to link carry-in port information and consignor information	• **Clarify the definition of a place to rest** • **Anonymize intermediate data**	**Needs to solve the issue** Data for places to rest (including parking lots) have not been organized in the truck industry. However, **many people hold the opinion that it would be good if a parking lot sharing service could be created** using data
Technical aspects	• The data processing method depends on data specifications • The definition of data and data granularity and format differ depending on asset type • New issues were identified regarding the inaccuracy of data (such as distinguishing and classifying situations where the vehicle has just stopped, and the driver is not taking a break)	• **Process data according to data specifications** • **Identify cases where the connotations differ even amongst data of the same specification and define the classification method**	

2.2.1 Verification results (1): Investigation into the orientation of unique and symbolic MD communet service creation
Hypothesis for the process for service creation based on the orientation of the solution of issues identified in FY2020

- In FY2020, we investigated issues regarding making data available for collaboration fields identified based on discussions with SIP logistics optimization companies and concepts for the creation of services based on the orientation of solutions.
- It became clear that there is a need in the truck industry for a parking lot sharing service that uses real-time parking lot vacancy information
- Based on the above, we hypothesized a process for service creation concept in light of the orientation of solutions to issues identified for rules, business, and technical aspects

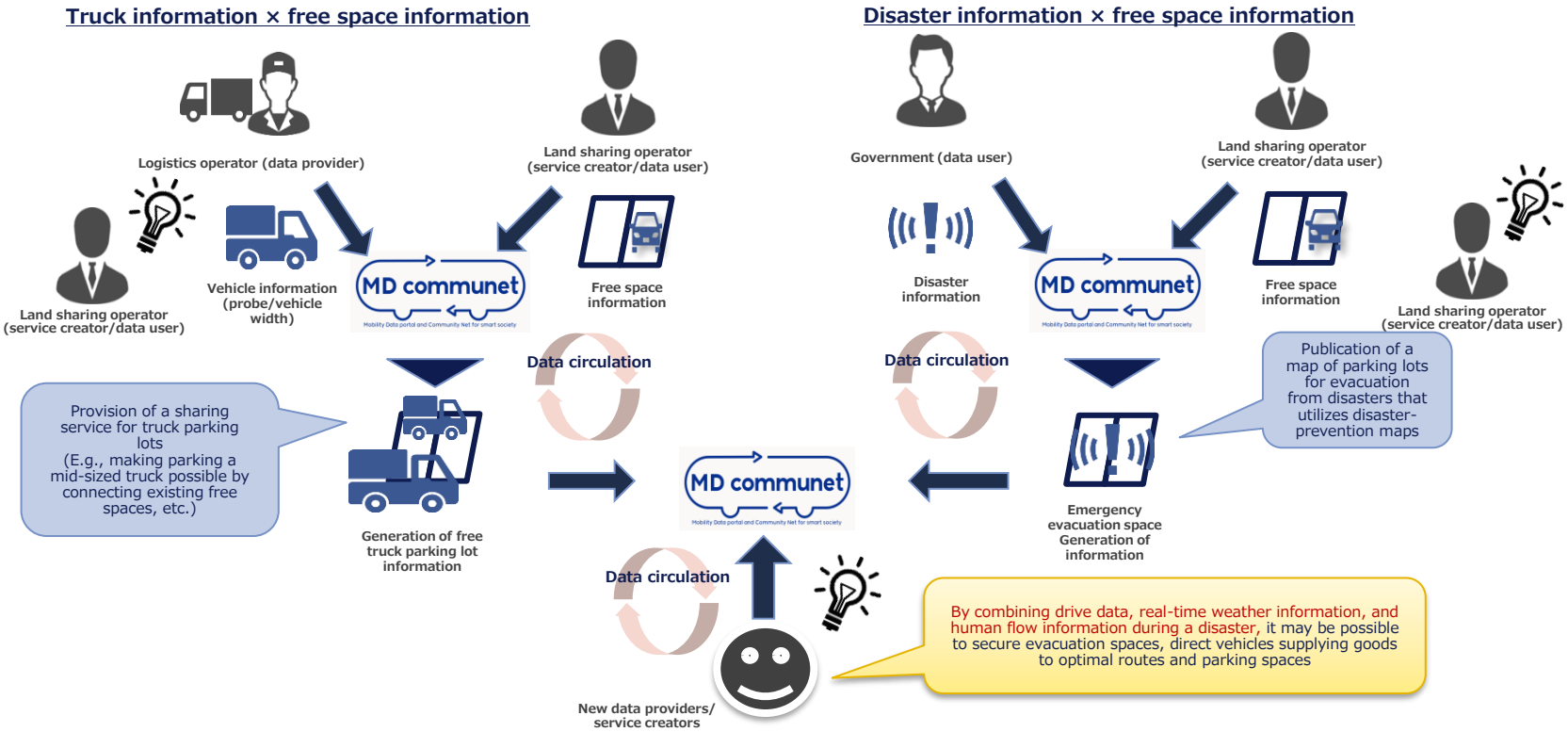
Process for service creation concept based on the orientation of solutions to issues identified for rules, business, and technical aspects (hypothesis)



2.2.1 Verification results (1): Investigation into the orientation of unique and symbolic MD communet service creation
Concept for data circulation and continued service creation

- We investigated draft service plans at the operating entity that use data listed (or planned to be listed) on MD communet for data circulation and continued service creation based on the hypothesis for the process of service creation
- We prepared a scheme proposal necessary to realize services and identified what issues exist when creating new services by involving business operators and holding consultations with the expected stakeholders of the use case.

Concept for data circulation and continued creation of new services through MD communet



2.2.1 Verification results (1): Investigation into the orientation of unique and symbolic MD communet service creation
Outcomes of Consultation Held with Operators and Identification of Issues

- The cost-efficiency of data utilization was the common issue identified in discussions with the stakeholders of the two verification plans
- Services will continue after the SIP verification. In creating a mechanism for increasing the number of service stakeholders (providers and users), the operation side will take a balanced approach and increase the success rate by creating more use cases. It is also necessary to investigate a mechanism for determining cost-effectiveness at an early stage.

Orientation of unique and symbolic MD communet service creation based on consultations held with operators

Verification case	Issues	Orientation of solutions
Development of a public transportation network in the Ishikari Bay New Port Area	• Compared to existing transportation studies, a simple replacement will be difficult without displaying new added value (such as real-time capabilities, self-generating capabilities, etc.) • Investigation of methods to prevent **the cost of obtaining and processing data for utilization from exceeding the costs of traditional study approaches**	• People who can determine the cost-effectiveness of data utilization are those from the business department of the business user company or organization. • So that they can imagine the impact of data utilization, it may be necessary **to identify use cases and their associated costs at an earlier stage on MD communet.** It is currently focused on information for developers.
Creation of a sharing service for truck parking lots	• There are few idle spaces in urban areas where there is demand for truck parking. • Companies are interested in using the service to utilize vehicle probe data. However, they cannot see how exactly they will use the service, **and as the cost-effectiveness is unknown, they have not been able to utilize the service.**	• We will search for data providers by considering use cases (hotels along main roads, etc.) where we are likely to find data (land) with unexpected use-value. • **It is necessary to investigate an effective way to register needs** to ensure data completeness. • It is also necessary to **clearly indicate the use concept and feeling of value on MD communet.**

By investigating plans for several cases, we will clarify the role and function of MD communet based on specific issues in each process, from data acquisition/generation to the creation of data utilization services.

2.2.1 Verification results (2): Formulation of business themes that solve social issues/company issues and have serviceability Overview

- Based on the direction toward the creation of a symbolic service unique to MD communet, we worked on the formulation of multiple use cases to solve specific business issues faced by service users.
- In designing use cases, we are focusing on solving social issues and utilizing vehicle probe data in accordance with the objective and purpose of this project, and we are currently working with trading companies and logistics companies to examine and verify use cases as specific use cases.

Implementation process: Formulation of business themes that solve social issues/company issues and have serviceability

Approach to use case selection (set after FY2019)	
Service areas for logistics companies	◆ Providing a safe and secure driving environment for truck drivers (Need to avoid dangerous routes when taking into account safe driving) ◆ Improving truck driver's working environment (Need to reduce the risk of compensation and delayed deliveries caused by accidents)
End-to-end multi-modal navigation service field	◆ Stress-free transportation support in combination with modes of transport that are more personalized (including automated driving) than traditional transportation (demand for transportation and route guidance that matches user attributes and responds dynamically to changes in weather and congestion)

Overview of use cases

Use case 1: Directions for routes to free pay-by-the-hour parking lots using store chart information

This use case addresses the issue of re-parking, congestion caused by drivers searching for parking spots, and parking violations. This is achieved by maintaining store charts (availability of parking and parking method at delivery destination, etc.) from **probe information**, and providing route guidance to vacant pay-by-the-hour parking lots.

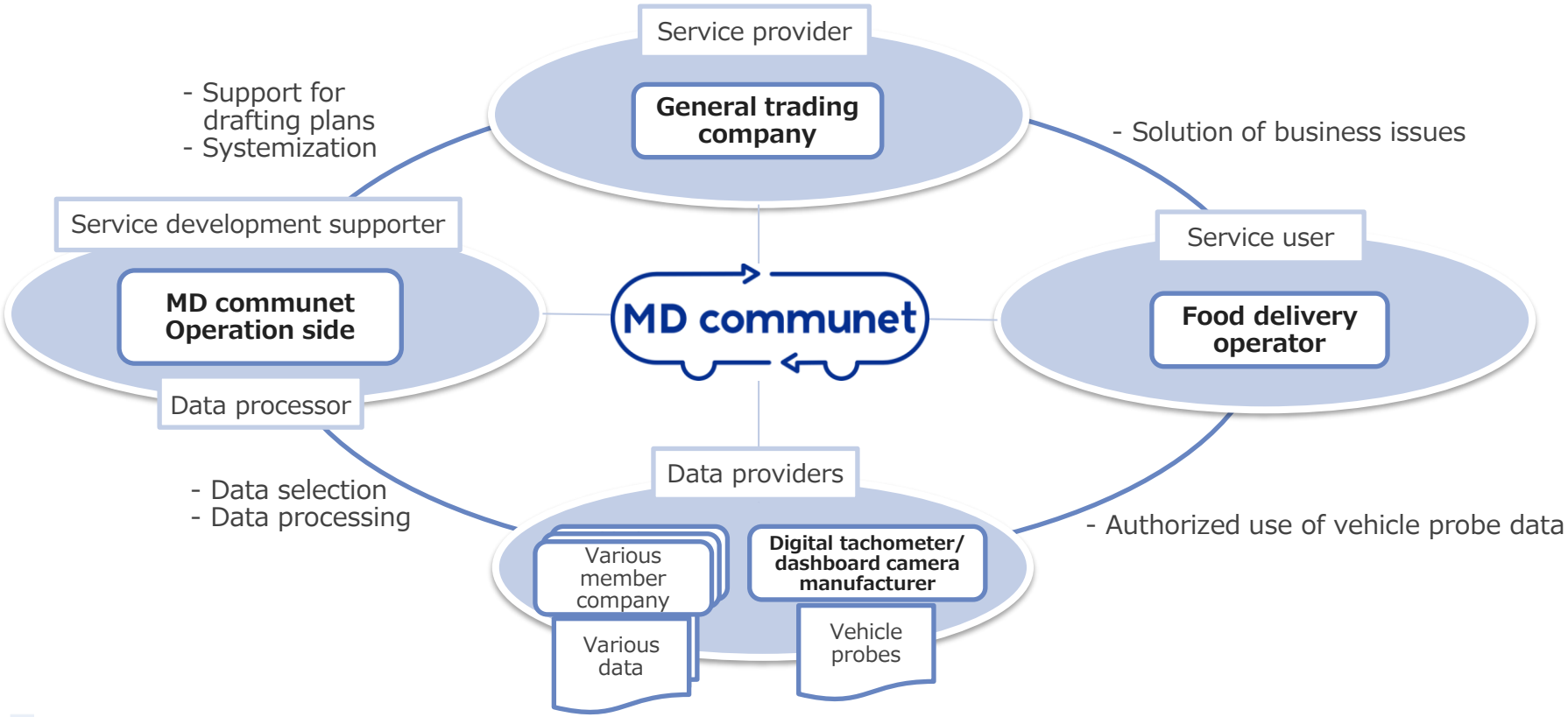
Use case 2: Proposing routes to ensure safe transportation in situations where a disaster is predicted

Proposes alternative routes for operation managers to ensure safe transportation when a disaster is predicted. This is achieved through calculating transit risk by superimposing past statistical information over current information/forecast information, executing route searches based on the traffic risk by linking it to the road network and using real-time image data and **probe information** on the route to make route proposals.

2.2.1 Verification results (2): Formulation of business themes that solve social issues/company issues and have serviceability Creation of a scheme that is necessary for service creation

- There was an issue with the availability of vehicle data. However, we created a scheme necessary for service creation that encompasses manufacturers of the digital tachometers that produce vehicle probe data, trading companies that plan service creation, and service users who have business issues and who are also owners of data.
- Based on the scheme, we drafted several use cases that solve actual business issues faced by users

Creation of a scheme that is necessary for service creation

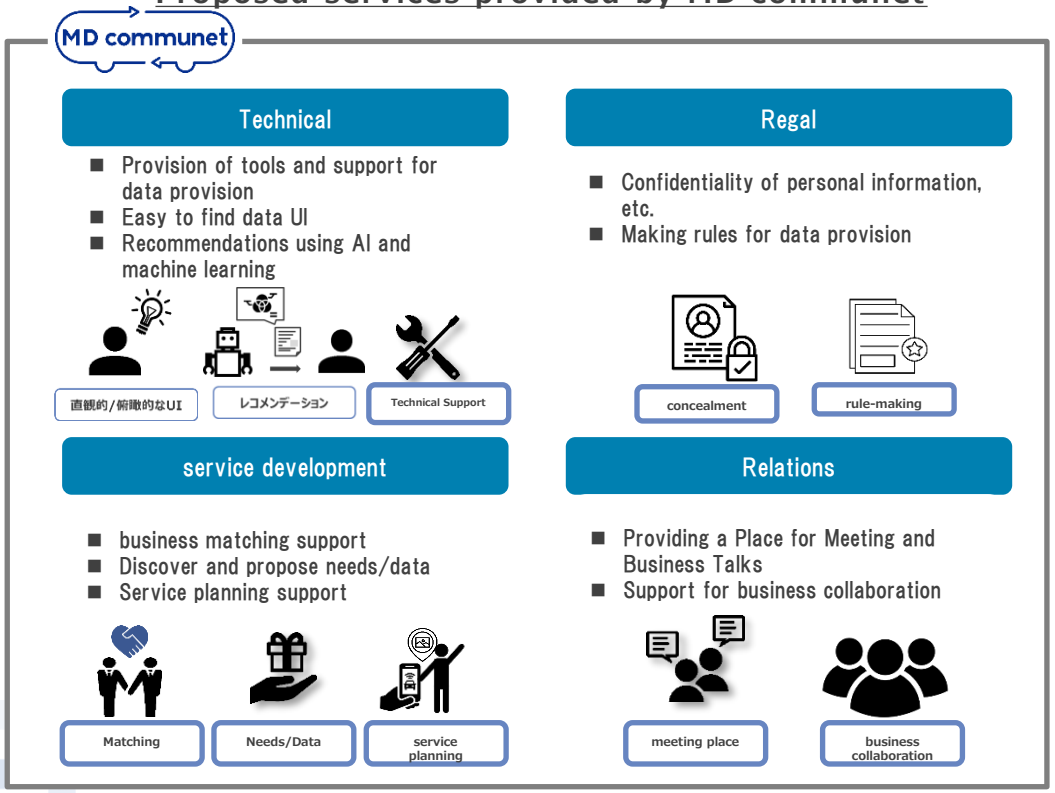


2.2.1 Verification Results (3): Materialization of the MD communet support menu Overview

- Through the activities set forth in (1) and (2) of the Implementation Policy, we worked to flesh out the support menu necessary for creating services through data utilization.
- Data Multiplication Technical Assistance worked to develop design templates that could be applied to a variety of use cases

Items to be implemented and verified in this fiscal year to establish the MD communet service

Proposed services provided by MD communet



Implementation and verification in the MD communet

① Arrangement of data to be kept secret

Supporting the establishment of rules for establishing a framework for data utilization and the arrangement of data to be kept secret

② Introduction of data utilization use cases

Introduce use cases for data utilization developed in this project and promote initiatives to have them used in service planning

③ Technical support for data matching

Consider supporting technological elements such as data linking and real-time linkage that are necessary for combining and utilizing multiple data

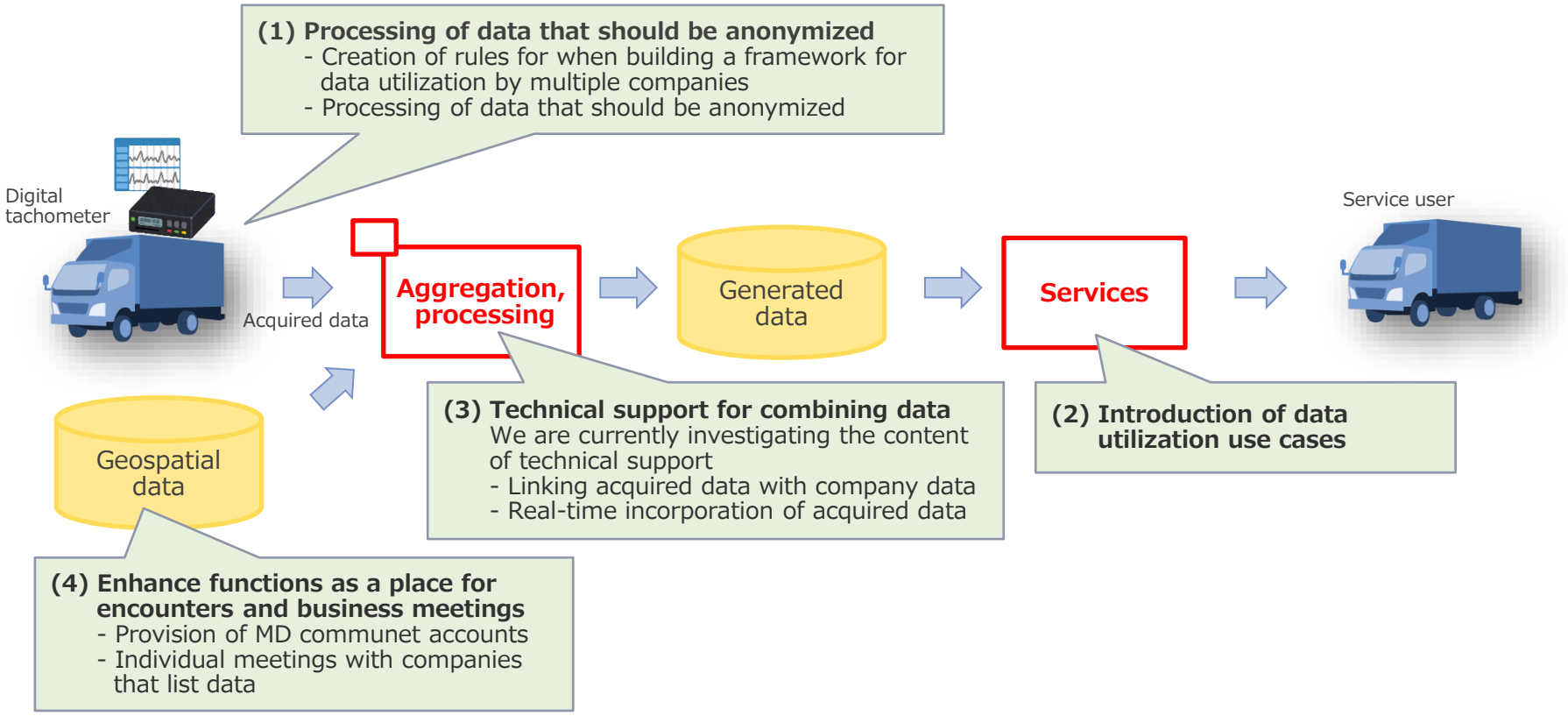
④ Strengthen functions as a place for meeting and business negotiations

By registering an account on MD communet, members can register and view data and register needs and seeds. Coordination of individual meetings among member companies

2.2.1 Verification Results (3): Materialization of the MD communet support menu Status of investigations into the MD communet service menu

- Based on the service creation scheme, we are reviewing a support program that covers the following:
  1) The generation of probe data
  2) The generation of valuable data by combining and processing data acquired from on-board probes with other geospatial data
  3) The utilization of the above generated data in services

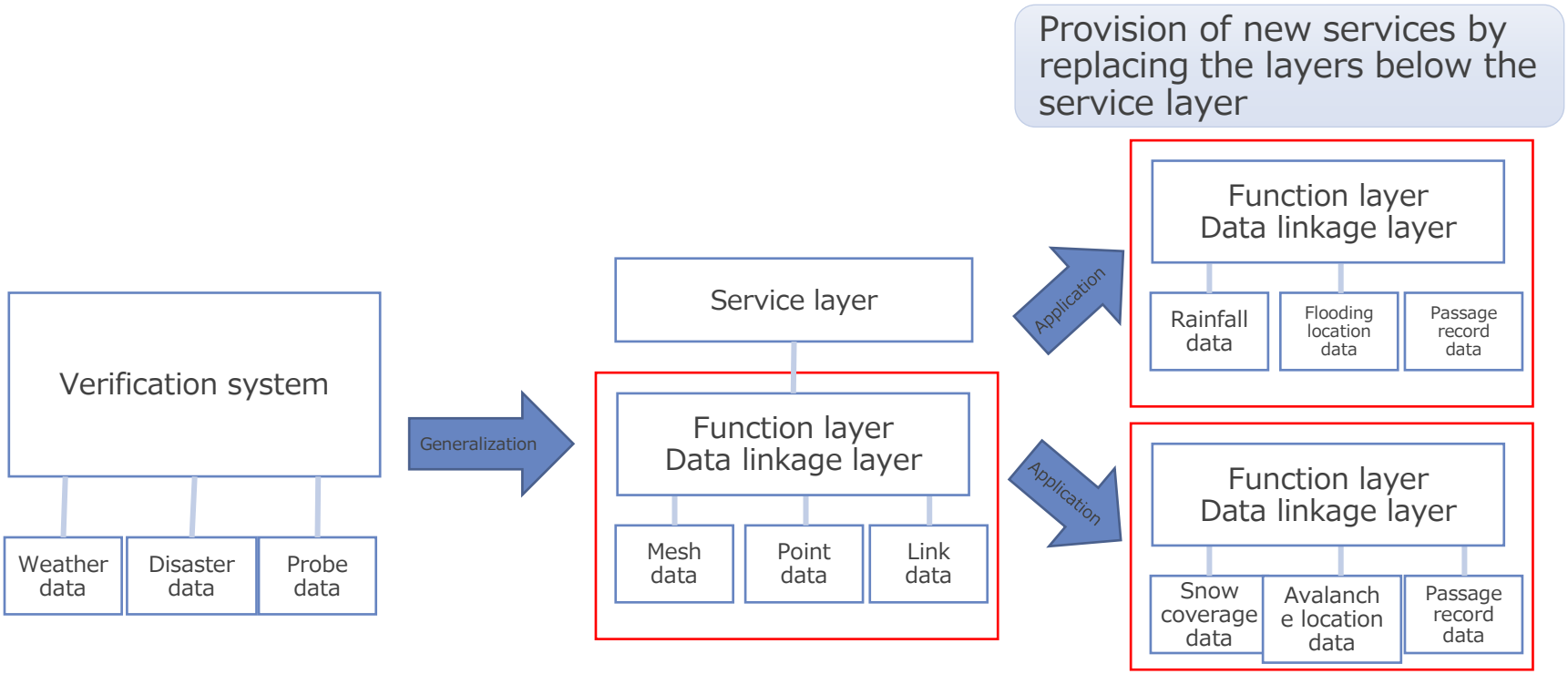
Investigations into the MD communet Service Menu



2.2.1 Verification Results (3): Materialization of the MD communet support menu
Materialization of the support menu, design template

- During investigations into the MD communet service menu, we created a design template for the support menu based on the hypothesis that we can expect various services to be created by combining multiple types of geospatial data.
- We worked on a design template to lower the threshold for service developers as technical expertise is necessary to handle geospatial data with different formats at the same time.

Design template for the MD communet support menu (Draft)



2.2.2 Promotion of FOTs projects (FY2022)

2.2.2 Plans for new services utilizing vehicle probes (digital tachometers) for logistics vehicles
Context and purpose

- In the logistics business, there are transportation rules (profile information), such as carry-in ports, parking lots, and possible delivery hours for each delivery store.
- In contrast, at logistics companies, profile information is often the tacit information of veteran drivers.
  - Logistics companies are facing the issue of creating driving routes with an awareness of transportation safety, observance with laws,
  - and operational efficiency and creating a database for parking locations at each delivery store, along with training costs for new and mid-career employees.
- In this FOTs, we aimed to solve the above problem by creating profile information for each store from actual vehicle probe data and developing a service that provides route guidance based on the created profile information.

Current situation logistics companies are facing: dealing with different rules for each delivery location

Drivers' (logistics companies') concerns
- ✓ I don't know the carry-in port
- ✓ I don't know where I can park
- ✓ I cannot deal with the different requests of each store

etc.

→ Leads drivers to reattempt parking or search for a parking spot

Delivery to a small store with a parking lot

Requests from stores
- ✓ Designate the carry-in port
- ✓ Designate the parking space
- ✓ Designate the parking orientation
- ✓ Designate the delivery time

etc.

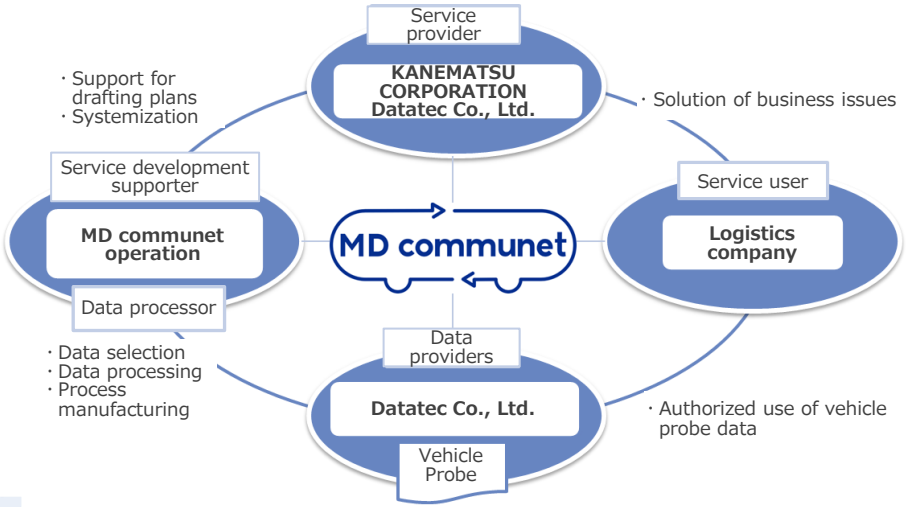
→ Notices for each store

It's hard to find the carry-in port
It's hard to find the parking lot
etc.

2.2.2 Plans for new services utilizing vehicle probes (digital tachometers) for logistics vehicles
Overview

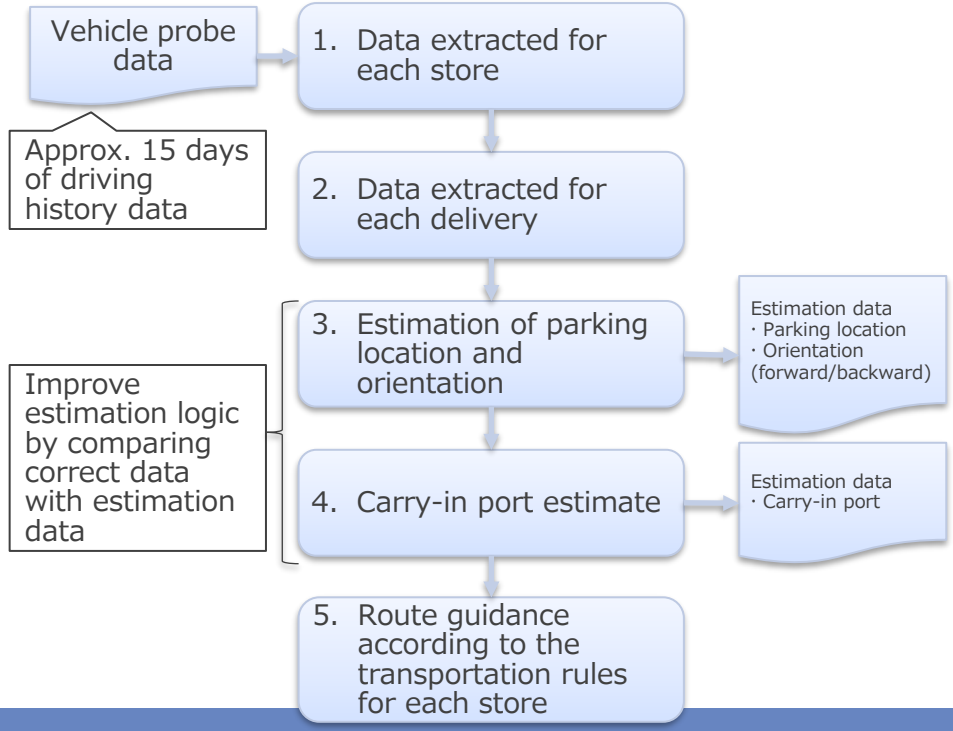
- This FOTs was implemented by KANEMATSU CORPORATION, which implements the planning of service creation working with Datatec Co., Ltd., a manufacturer of digital tachometers which generate vehicle probe data borrowing vehicle probe data of a logistics company that is also a customer of Datatec Co., Ltd.
- In the operation of the MD communet, while providing planning and verification promotion support as a service development supporter, as a data processor, vehicle probe data is processed, designed and manufactured. Through this support, we aimed to organize the scope and content of support as an MD communet operation in nnew service planning.
- In the data processing, at MD communet, we estimated the location information for carry-in ports, parking lot information, and parking orientation information for each delivery store. This was done by processing driving history data in the vicinity of the delivery store taken from the digital tachometer of commercial vehicles. Also, the accuracy of estimation logic was improved by comparing the results of estimations with correct data prepared in advance.

FOTs implementation structure



Implementation system created in FY2021

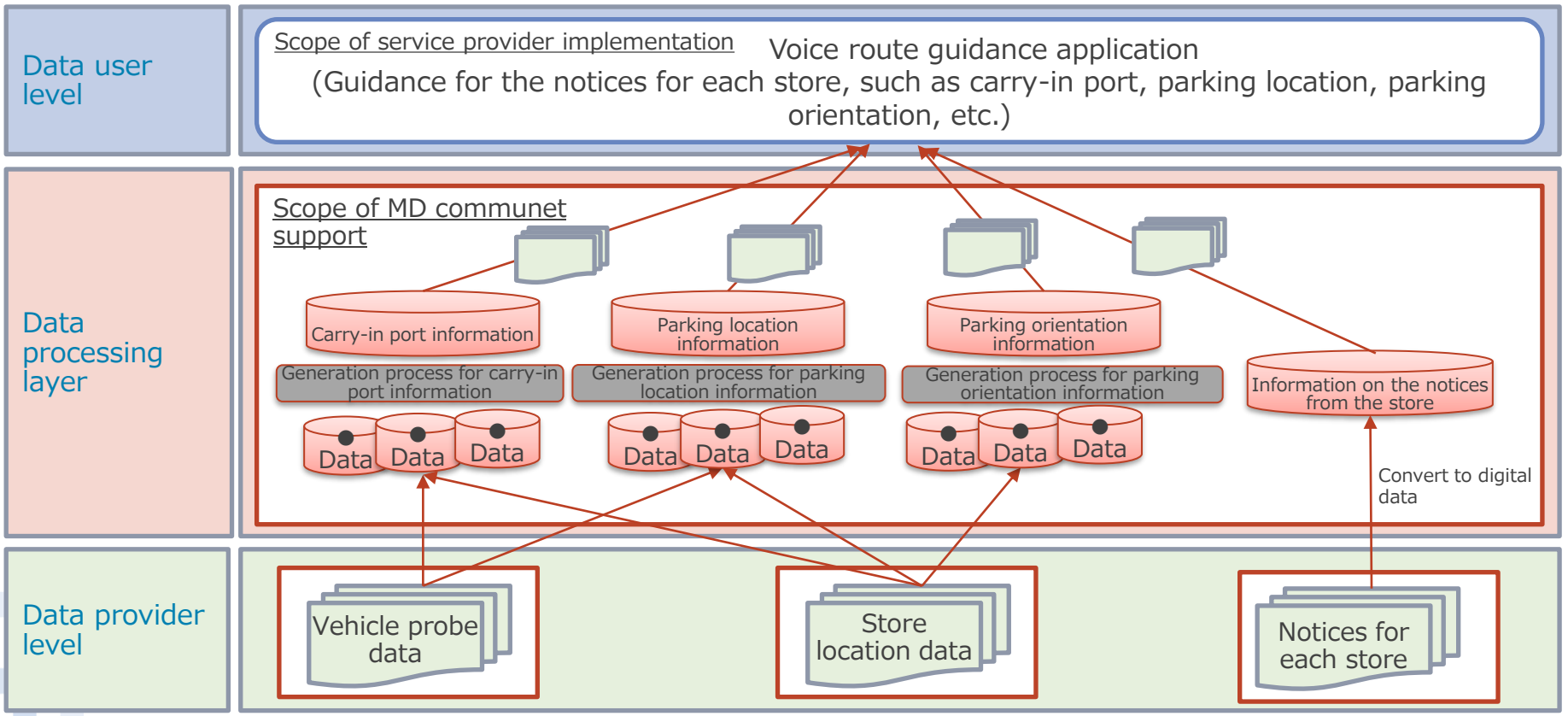
Implementation process



2.2.2 Plans for new services utilizing vehicle probes (digital tachometers) for logistics vehicles
Verification results (processing of vehicle probe data)

- We developed a voice route guidance service based on a creation program for the delivery destination profile information and the created profile information.
- At MD communet, we set vehicle probe data and store location (location information) as input data, and we generated profile information for each store, such as carry-in port and parking rules, by extracting and processing the data.
- The service providers aligned the voice functions of the digital tachograph with the generated data and the notices for each store.

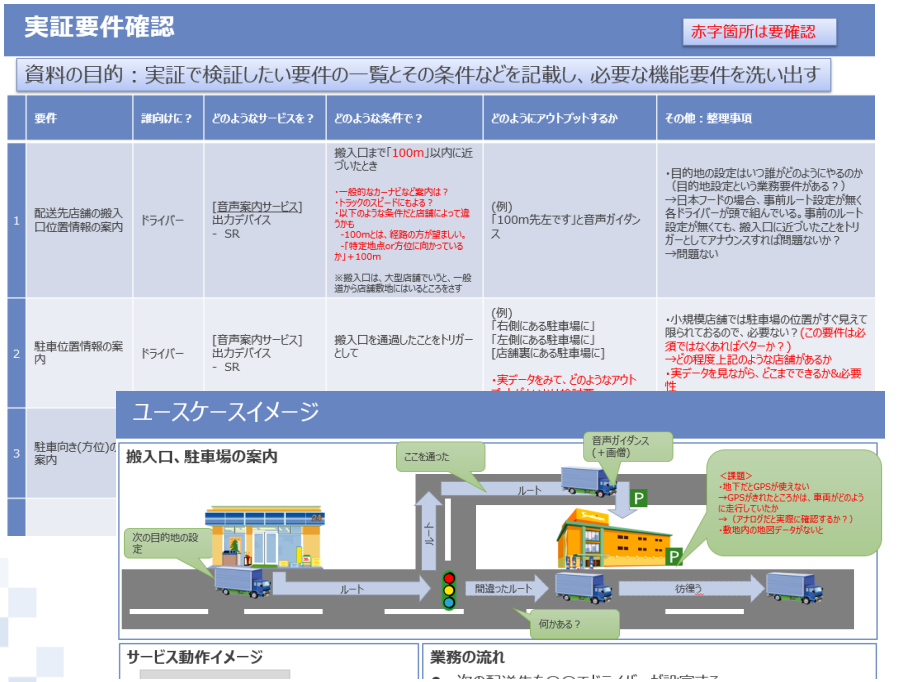
Data processing flow



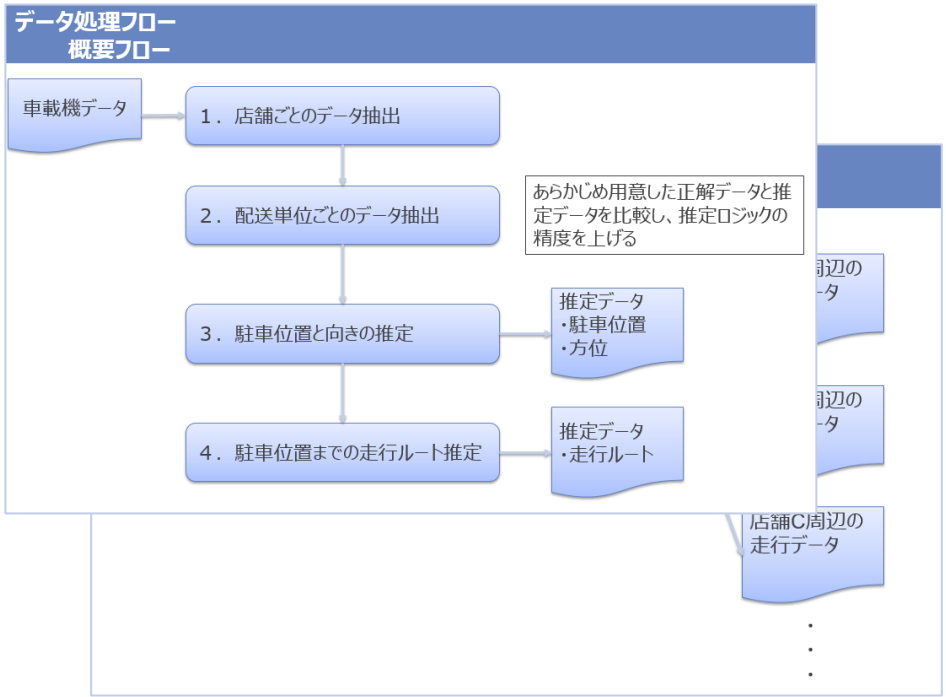
2.2.2 Plans for new services utilizing vehicle probes (digital tachometers) for logistics vehicles
Verification results (support activities for new service planning)

- In new service planning, as the role of MD communet, we provided support for service development and data processing, and organized the range of required support. Organizing service requirements and fleshing out use cases are necessary for any service planning; therefore, we created an organized format.
- Through this support, we were able to confirm from the companies we worked with that our support were helpful. The companies resolved their difficulties in handling vehicle probe data that had large amount of data and their unfamiliarities with conducting planning and FOTs promotions involving system development.

Clarification of FOTs requirements (service development supporters)



Design of process (data processors)



2.2.2 Plans for new services utilizing vehicle probes (digital tachometers) for logistics vehicles
FOTs results and future initiatives

- We released the voice route guidance service we created in this FOTs as a guidance service for delivery destination information named “Misenabi™.”
- It was confirmed that the support activities as MD communet operation were effective in planning new services.
- Based on these results, we will analyze more varied driving data to contribute to solving problems facing the logistics industry, such as the “2024 Problem*.”

FOTs results and future initiatives

FOTs results

Misenabi™

- Create a database of delivery location profile information by analyzing past driving data for delivery destinations
- Profile information guidance and warnings for drivers using digital tachometer voice functions

The results of this FOTs project were listed as a use case on MD communet
The companies participating in the FOTs also put out news releases

Future policy

We will contribute to solving issues in the logistics industry, such as the lack of human resources and logistics streamlining,
by analyzing various driving data.

Examples of future developments:
- Optimization of voice guidance timing and alert content for each store
- Reduce delivery errors through coordination with the delivery route system
- (Especially for large stores) Route guidance from the carry-in port to the parking lot inside the premises
- Route guidance for easy-to-drive and safe routes

*2024 Problem
The various problems that will arise as a result of restrictions limiting the annual working hours of automobile driving work to 960 hours coming into place after April 1, 2024
For example, drivers who work longer than 960 hours a year will not be able to work more than this and lose a source of income, and operators will also face the problem of driver shortages. On the other hand, the transport volume is increasing due to the rapid expansion of the e-commerce market. Therefore, securing human resources, including drivers without experience, and making logistics more efficient are pressing issues for logistics companies.

2.2.2 Service planning regarding snow removal at a local government (Yokote City) Context and purpose

- In areas with heavy snowfall, there are problems related to the burden of patrols and standby for decisions on whether or not to dispatch snow removal teams and the accuracy of these decisions for snow removal operations on roads in the winter. The challenge is to reduce the burden of patrols and other activities and improve the accuracy of dispatch decisions.
- The purpose of this FOT is to verify whether we could obtain information that would help improve snow removal operations by using MD communet data in an area with heavy snowfall, Yokote City, Akita Prefecture, and explore ways to improve the service so that we can deploy a complete version of the service to other local governments in the future.

Current status and issues

	(1) Patrol burden	(2) Dispatch decision accuracy
Current status	For snow-clearing activities on roads, there is the burden of late-night road patrols so that teams can be dispatched before light and the standby of teams as they wait for a decision to be made on dispatch.	Decisions on whether or not to dispatch snow removal teams do not always match the actual road surface conditions (decisions are not always correct).
What is aimed for	A reduction in the burden of standby and patrols	To be able to make more accurate decisions on dispatch.
Issues	To obtain the same or similar information to road patrols by means other than road patrols (search for a supplemental or alternative method to road patrols)	Find variables that significantly and immediately impact the need for snow removal by referring to the actual results with the need for snow removal.

2.2.2 Service planning regarding snow removal at a local government (Yokote City) Overview

- A problem in regional areas is that there is little traffic data that can be acquired due to the low amount of traffic. In this FOT, we used multiple data sources to supplement the data shortage with traffic data alone.
- We verified whether it was possible to use data such as images and videos from cameras and vehicle probe data, to replace or improve the accuracy of surveys of road conditions by road patrols and dispatch decisions in road snow removal operations.

Data used in verification and verification method

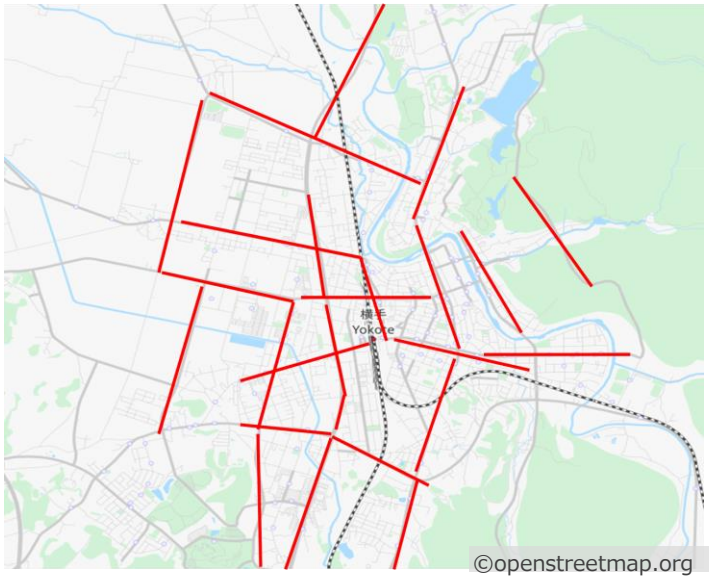
Verification data	Data used	Verification method	Verification perspective
1. Fixed-point image by camera	• Pioneer Smartloop eye	• A fixed-point image taken from a vehicle passing the Yokote Junction evaluated by a member of the snow removal team (interview)	• Image quality (evaluation of image quality, resolution, brightness, and angle of view by time of day and weather conditions) • Evaluation of the amount of imagery (installation locations) required to make snow removal decisions
2. Dashcam video	• Alps Alpine Drive Sensor data	• Videos from eight dashcams attached to local government vehicles and taxis were evaluated by a member of the snow removal team (interview)	• Image quality (evaluation of image quality, resolution, brightness, and angle of view by time of day and weather conditions) • Evaluation of the amount of video footage (installation locations) required to make snow removal decisions
3. Probe data	• HERE Technologies Map Attributes API	• Detect changes in average speed • Compare changes in average speed with road surface conditions (video, weather)	• Possibility to detect changes in average speed • Relationship between average speed, weather data, and image data
4. Acceleration sensor	• Shenzhen Everbest Machinery Industry (CEM) Vibration datalogger (DT-178A)	• Detect vehicle acceleration speed by attaching an acceleration sensor to vehicles • Compare driving journals with video from the dashcam attached to the same vehicle	• Possibility to detect the below road surface conditions (sensor effectiveness) • 1) uneven sections, 2) splashing caused by water or snow, 3) ice, etc.
5. Weather information	• Halex Corporation HalexSmart!	• Comparison with errors in dispatch decisions (detect situations where dispatch was unnecessary or necessary due to sudden weather changes or other matters)	* Weather information is used in comparison with the above data rather than being used alone to determine the validity of dispatch decisions

2.2.2 Service planning regarding snow removal at a local government (Yokote City) Data collection and display

- We collected and displayed camera images and videos, vehicle probe data (average speed data), and weather data for central Yokote City from the data registered on MD communet. The purpose is to verify the orientation of data utilization that contributes to the alternative possibilities to road patrols and improve the accuracy of dispatch decisions.
- Also, in addition to the above data registered on MD communet, we attempted to identify the uneven sections of the road surface and skidding that can not be identified with the above data by acquiring data from acceleration sensors.

FOTs duration and scope

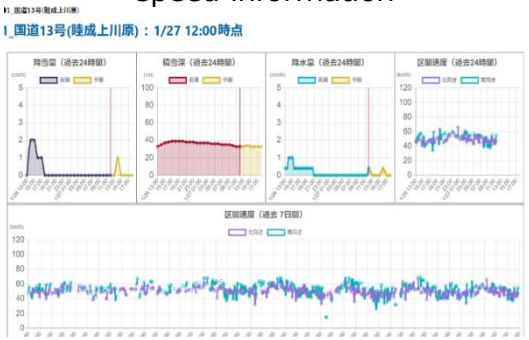
Duration Jan. 16, 2023 to Feb. 17



We collected data with central Yokote City as the scope for the FOTs
We created a system where dashcam footage would be automatically uploaded when cars with dashcams installed passed through the red-lined areas on the map

Display of collected data

Weather information, vehicle speed information



We created a dashboard by collecting snowfall, snow depth,
rainfall data from multiple locations in the city, along with vehicle speed data

Fixed-point image by camera

Continued collection of road surface images at the same location under various weather conditions

Linking with real-time dashcam footage

When cars pass through the red-lined areas on the map on the left, the location, time, and footage are uploaded in near real-time

Note: The above images and video were not published and were only used for this FOT

2.2.2 Service planning regarding snow removal at a local government (Yokote City) Verification results (1): interview results from local government staff

- Interviews were conducted with local government to determine whether the collected･visualized data can replace road patrols and whether it can be used to make snow removal decisions.
- We also conducted interviews to find out what improvements could be made in using the data in actual operations.

Interview results（Alternative road patrols･possibility of utilization for snow removal decisions and required improvements)

Verification data	Usability	Required improvements
Fixed-point image by camera	✓ It is possible to judge the road surface condition from the image (There is no problem with the image quality) ✓ It is difficult to get videos from dashcam, it is useful for areas where few cars pass	✓ Adjustable viewing angle and zoom magnification
Dashcam video	✓ It is possible to judge the road surface condition from the video (There is no problem with the image quality) ✓ It is possible to replace patrol by large amount of video data over a wide area ✓ It is possible that the amount of new snow on the roadside after snow removal could be used to make early morning dispatch decision	✓ Increase the number of installations (especially at night) ✓ Can be operated at low cost ✓ Real-time viewing from smartphone
Probe data	✓ Can be used as a trigger to narrow down the images and videos that are needed to be checked	✓ Identification and data acquisition of locations where vehicles congestion happen frequently due to snow accumulation ※ It should be noted that dispatch decisions are often made based on the expected snow accumulation in the future, and it is not able to make dispatch decisions based only on the data up to the time of decision
Acceleration sensor	✓ Can be used as a trigger to narrow down the images･videos that are needed to be checked	✓ Understand the nature of uneven road surfaces such as ruts and tire chain marks ※ It should be noted that dispatch decisions are often made based on the expected snow accumulation in the future, and it is not able to make dispatch decisions based only on the data up to the time of decision

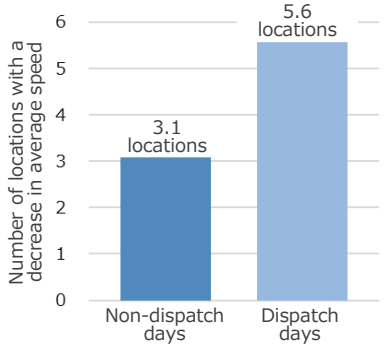
2.2.2 Service planning regarding snow removal at a local government (Yokote City) Verification results (2): result verification by each data set

- Based on the interview results and the collected data, we verified the possibility of alternatives and accuracy improvement to road surface condition surveys by road patrols and dispatch decisions.
- We found out that each data set could be used on its own to make certain determinations.
- On the other hand, the results suggested that it was necessary to combine data to further improve accuracy.

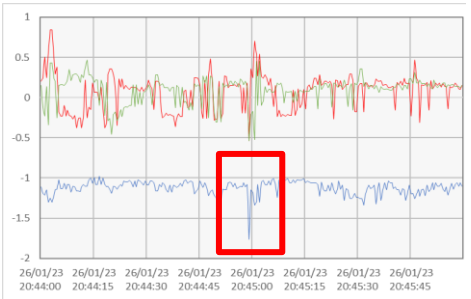
Result verification by each data set

Verification data	Result verification by each data set
1. Fixed-point image by camera	• The condition of the road surface can largely be determined, and staff with some knowledge can make detailed decisions to a certain extent • Fixed-point images alone were insufficient as the angle could not be adjusted, and they did not cover the entire city
2. Dashcam video	• Staff with some knowledge can determine not only the road surface conditions but also roadside snow accumulation • Quantitative determination of snow depth and roadside snow accumulation from the videos is required for automatic decision making • While dashcam video can not be used alone for decision-making as driving is necessary and it is difficult to acquire data at night, the results suggested that dashcam video may help collect information from a technical standpoint
3. Probe data	• A trend was observed for snow removal dispatch when the average speed dropped significantly* compared to normal times at several locations • We observed a drop in speed due to the road surface also freezing on non-dispatch days. However, we could not ascertain details about the type of snow.
4. Acceleration sensor	• Changes in acceleration in the vertical direction(unevenness) could be detected, and matched the driving sensation, while the detailed characteristics of the unevenness could not be detected • The results suggested that using the acceleration sensor data as a trigger may allow for the efficient searching of dashcam video
5. Weather information	• While snowfall generally correlated with weather forecasts, that was a significant discrepancy in the amount of snowfall per hour • Weather information was insufficient when subtle decisions needed to be made

*We set a drop of one standard deviation as the benchmark



3. Probe data
Locations are counted where the average daily section speed is one standard deviation lower than the average speed for the period



4. Acceleration sensor
The red, green, and blue lines represent horizontal, longitudinal, and vertical acceleration, respectively
A strong vertical jolt was detected at the red frame in the image

2.2.2 Service planning regarding snow removal at a local government (Yokote City)
Verification results (3): verification results from combining multiple data sets

- As the result of verification into the effectiveness of combining several sets of data, we believe that the two below combinations are effective.
  1) Dashcams and acceleration sensors
     - Use to screen what parts of the dashcam video should be observed
  2) Probe data, dashcams, and weather data
     - When speed decreases are observed at many locations, what type of traffic disruption is occurring can be determined from dashcams and weather information

Verification results from combining multiple data sets

	Combination method	Verification results with data combination
Pattern 1 **Dashcam** ✖ **Acceleration sensor**	Search for dashcam video at the point when significant vertical fluctuation is detected in acceleration data and confirm the cause of the fluctuation in acceleration (vertical vibration) in the video	• The results suggested that watching dashcam video around the times there are significant changes in vertical acceleration values is useful in effectively screening for the location of uneven sections of road surfaces from large amounts of video data
Pattern 2 **Probe data** ✖ **Dashcam** ✖ **Weather information**	• Measure the number of locations where the speed of the most recent vehicle is below a certain level (e.g., one standard deviation) compared to the average past vehicle speeds at the same location at the same time • If the number of locations calculated above has increased, ascertain snow accumulation and road surface freezing from dashcam video and weather information (amount of snowfall/rainfall, temperature)	• We were able to detect snow accumulation and deteriorating road surface conditions remotely through dashcam video as the cause of vehicle speed dropping at several locations in the city • It was suggested that the appropriate selection of places to observe the speed would increase the possibility of utilization in making assisting decisions • We also observed snowfall and the average temperature falling below 0℃ from the weather information

2.2.2 Service planning regarding snow removal at a local government (Yokote City) Results of the FOT and future outlook

- In addition to the fact that each of the data sets used in this FOT can be used alone to make certain determinations, the results suggest that the usefulness of the data can be further increased by combining several data sets.
- In the future, we will increase the accuracy of support for determining road surface conditions and the need for dispatch by collecting data from various regions and situations.

FOTs results and future initiatives

FY2022 Results

1) Verification results from each data set

- We found that all of the data sets used in the FOTs contributed to determining road surface conditions and the need for dispatch to a certain degree.

2) Verification results from combining multiple data sets

- The results suggested that it was possible to increase the accuracy in ascertaining road surface conditions and dispatch decisions.

Combination example:

1. Dashcams and acceleration sensors
   - ➢ Efficient searching for situations where a visual judgment needs to be made on dashcam video by detecting uneven sections of road surface based on the magnitude of vertical vibrations from the acceleration sensor
2. Probe data and dashcam video
   - ➢ Remote detection of the occurrence of traffic disruption by observing snow accumulation and deteriorating road surface conditions through dashcam video when vehicle speed is dropping at several locations in the city

Future outlook

1) Improvement of support accuracy

- We will be able to support decisions in various patterns by accumulating data at more locations under various weather locations.
- In particular, we will be able to ascertain road surface slipperiness directly related to traffic disruption. We believe this will make it possible to estimate the weather and road surface conditions where the need for the dispatch of snow removal teams increases.
- Example of road surface slipperiness data:
  - ➢ Sensing Core (Sumitomo Rubber Industries) Detects slippery road surfaces from on-board sensors

We also believe it will be possible to detect minute shaking of the vehicle by increasing the frame rate of dashboard cameras.

2) Expansion to other local governments

- The theme of this FOT, reducing the burden of snow removal operations, is considered a universal issue in northern Japan, where there is a lot of snowfall and snow accumulation. Therefore there is significant meaning in promoting expansion to other local governments.
- However, we need to keep in mind that the response to snow removal is based on subtle decisions according to snow accumulation and weather conditions.

2.2.2 Understanding the current situation and verifying the effectiveness of traffic policies at a local government (Kyoto City) Context and purpose

- When investigating measures for traffic issues, it is important for local governments to implement the below cycle while utilizing quantitative data:
  1) ascertain the occurrence of traffic congestion and analyze its causes,
  2) investigate and implement measures,
  3) verify the effectiveness of measures.
- In this FOT, we used MD communet's mobility data to 1) ascertain congestion in Kyoto and 3) verify the effectiveness of measures against illegal parking.

Process of investigations into traffic measures

	1) Ascertain the occurrence of the problem Cause analysis	2) Investigate and implement measures	3) Verify the effectiveness of measures
Traffic measures Investigation process	• Ascertain quantitatively when, where, and to what extent traffic congestion occurs • Estimate the cause of traffic congestion	• Investigate and implement measures in response to the cause identified in 1)	• Quantitative analysis of the extent to which the implemented measures were effective
The issue for this FOT	**Issue 1) Measures against traffic congestion Visualize congestion hot spots in central Kyoto**		**Issue 2) Measures against illegal parking Analyze the impact that measures against illegal parking had on improving the traffic conditions**

2.2.2 Understanding the current situation and verifying the effectiveness of traffic policies at a local government (Kyoto City) Context and purpose

■ The context of the two issues this initiative is targeting is stated below.

1) In Kyoto, traffic congestion in the city center caused by many tourists traveling to the city by car has become a significant problem. In investigating countermeasures, it was essential to quantitatively ascertain the occurrence of traffic congestion.

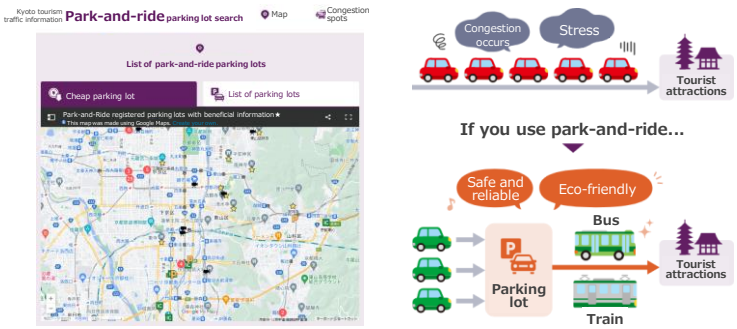
2) Also, illegal parking by taxis was commonplace in the city, blocking the arrival and departure of public buses and causing traffic congestion. That is why Kyoto City implemented nudging* as a new measure in FY2021, which was effective in reducing the frequency of illegal parking. However, we were not able to confirm the impact of the intervention on traffic.

*A behavioral change method that uses behavioral change findings in behavioral science

Issue 1) Frequent traffic congestion due to the influx of private vehicles

Many tourists visiting Kyoto by car causes traffic congestion. Kyoto City is implementing measures such as park-and-ride.

Traffic measures using park-and-ride



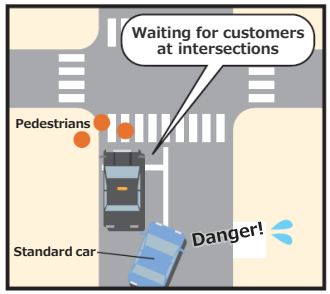
Source: Kyoto City
https://www2.city.kyoto.lg.jp/tokei/trafficpolicy/kankochi/index.html

For continued investigation of measures, it was important to regularly and quantitatively ascertain the occurrence of traffic congestion.

Issue 2) Illegal parking by taxis

Illegal parking by taxis near intersections and other areas is commonplace. This blocks the arrival and departure of public buses and causes traffic congestion. That is why Kyoto City implemented nudging as a new measure in FY2021.

Taxis waiting for customers in illegal places is common



Installation of nudging signs

Source: NTT DATA INSTITUTE OF MANAGEMENT CONSULTING, Inc.

We confirmed that nudging reduces illegal parking by 90%. However, we were not able to confirm the impact of the intervention on traffic.

2.2.2 Understanding the current situation and verifying the effectiveness of traffic policies at a local government (Kyoto City) Overview

■ In light of the context mentioned on the previous page, we used MD communet vehicle probe data to 1) identify congestion hot spots and 2) analyze the impact of nudging on the speed of passing vehicles.

Overview of the two implemented themes

No.	Theme	Overview	Data and tools used	Target areas	Duration
1	**Identification of congestion hot spots**	Using a map, we identified spots where congestion often occurred during this year's autumn season to provide a reference for considering measures against congestion	• HERE TechnologiesMapAttributesAPI	Central Kyoto	11/26/2022 to 12/4/2022 (Autumn tourism season)
2	**Analysis of the impact of nudging on the speed of passing vehicles**	We compared the average speed of vehicles before and after the intervention on a fixed section of road near the location where the intervention was carried out to confirm the impact of nudging on traffic.	• GeoTechnologies, Inc. Estimation data for vehicle traffic	■Intervention point Southeast corner of Shijo Kawaramachi intersection (Southbound lane) ■Reference point Kawaramachi Street (Southbound lane towards Ichinocho)	■Before intervention: 2/1/2022 to 2/13/2022 ■During intervention: 2/15/2022 to 2/28/2022

2.2.2 Understanding the current situation and verifying the effectiveness of traffic policies at a local government (Kyoto City) Verification results (1) Identification of congestion hot spots

- We set central Kyoto during the autumn season, where the influx of tourists traveling by car for sightseeing often causes congestion as the target area and time.
- We extracted data with speed of 20 km/h* or slower and data reliability of 0.7 or higher from the linked travel time data for the target area. We then counted the number of applicable data sets by link and identified the links with the highest number of traffic congestion occurrences.
- We used Here Technologies' MapAttributesAPI to make the links with the most traffic congestion occurrences visible on a map.

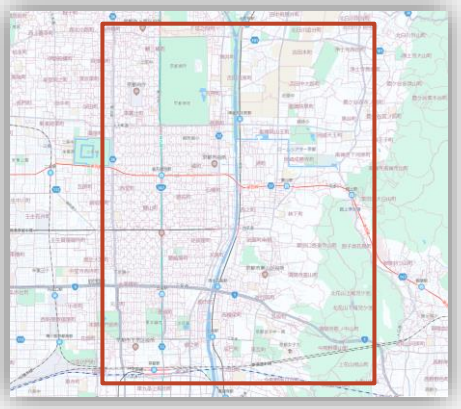
* Speed slower than 20km/h is defined as an occurrence of traffic congestion

Process for identifying congestion hot spots

1) Set target period and area

■**Target period**
11/26/2022 to 12/04/2022
(Autumn tourism season)

■**Target area**
Central Kyoto (the area within the red box on the map below)



Source: Here Technologies

2) Identification of congestion hot spots

■**Content to be implemented**
We extracted data with speed of 20 km/h or slower and data reliability of 0.7 or higher from the linked travel time data for the target area and counted the number of applicable data sets by link (number of traffic congestion occurrences)

■**Data used**
HERE Technologies: MapAttributesAPI

日付	時刻	LINK_ID	SP	SU	FF	JF	CN
2022/11/19	0:00:00	24931054592	18.19	18.19	20	0.82409	0.72
2022/11/19	0:00:00	24933923840	19.26	19.26	20	0.33433	0.71
2022/11/19	0:00:00	24942066688	18.19	18.19	20	0.82409	0.72
2022/11/19	0:00:00	24946948096	18.27	18.27	40	6.29665	0.71
2022/11/19	0:00:00	24951453696	18.19	18.19	20	0.82409	0.72
2022/11/19	0:00:00	25025583106	19.72	19.72	40	5.48968	0.86
2022/11/19	0:00:00	25025829888	19.72	19.72	40	5.48968	0.86
2022/11/19	0:00:00	25026917376					
2022/11/19	0:00:00	25026917377					
2022/11/19	0:00:00	25026917378					
2022/11/19	0:00:00	25028362240	16.59	16.59	40	7.22608	0.88
2022/11/19	0:00:00	25028474880	19.72	19.72	40	5.48968	0.86
2022/11/19	0:00:00	25029451776	19.72	19.72	40	5.48968	0.86

3) Identification of congestion hot spots

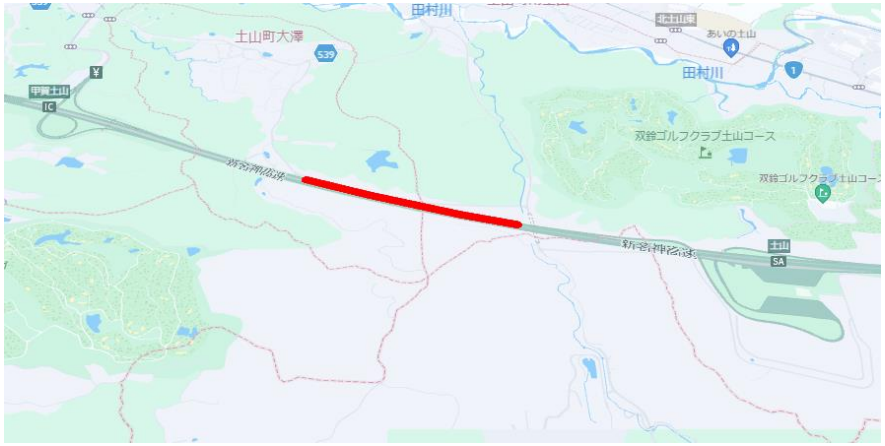
■**Content to be implemented**
We made the location of links with the most traffic congestion occurrences visible on a map using Here Technologies' MapAttributesAPI

■**Tools used**
HERE Technologies: Here Technical Support Demo Suite

2.2.2 Understanding the current situation and verifying the effectiveness of traffic policies at a local government (Kyoto City) Verification results (1) Identification of congestion hot spots

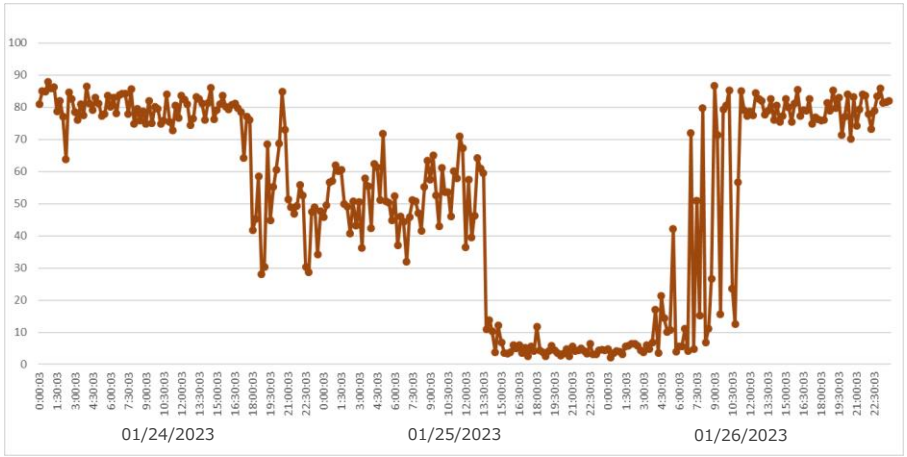
- Due to heavy snowfall from January 24, 2023, there were standstills on the westbound carriage of the Shin-Meishin Expressway between the Komono IC and the Koga-Tsuchiyama IC from January 25 to 26, 2023.
- Using visualization tools created through this FOT, we were also able to visualize details regarding the occurrence of traffic congestion for the relevant location in near real time.

Location for congestion visualization: The vicinity of Koga-Tsuchiyama IC on the Shin-Meishin Expressway



Source: Here Technologies

Change in the speed of passing vehicles at the relevant location



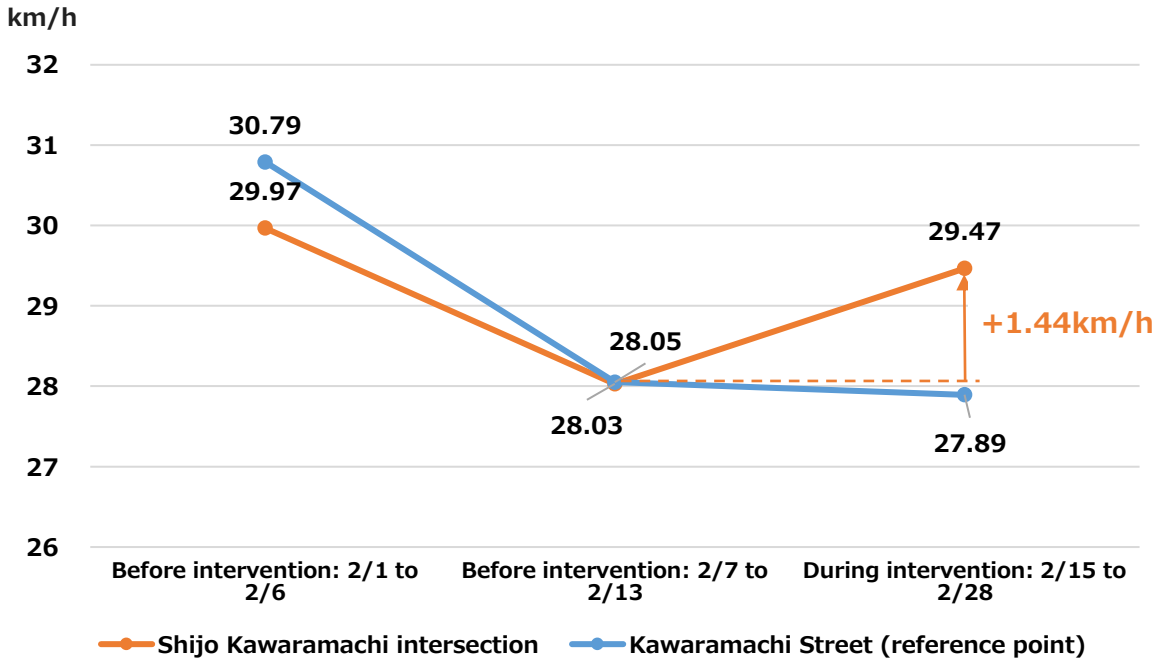
2.2.2 Understanding the current situation and verifying the effectiveness of traffic policies at a local government (Kyoto City)
Verification results (1) Analysis of the impact of nudging on the speed of passing vehicles

- We used GeoTechnologies' automatic vehicle traffic data to calculate and compare the average speed of southbound vehicles at the Shijo Kawaramachi intersection (at busy times between 13:00 to 19:00) before and after the intervention.
- As a result, we were able to confirm that the post-intervention average speed increased by 1.44km/h compared to the pre-intervention average speed in the previous week. On the other hand, the average speed at the reference point fell by 0.16km/h after the intervention, suggesting that the intervention at the Shiji-Kawaramachi intersection may have impacted increasing traffic speed.

Analyzed point

Source: Here Technologies

Analysis results



2.2.2 Understanding the current situation and verifying the effectiveness of traffic policies at a local government (Kyoto City) Results and future outlook

- By using vehicle probe data, we verified the effectiveness of traffic measures and understood the current situation, which forms the basis for policy formulation.
- Through MD communet , we will continue to plan and communicate ideas for data utilization regarding themes highly sought after by local governments to disseminate the use of mobility data at local governments.

Results and future initiatives

FY2022 Results

1) Identification of congestion hot spots

- Through the visualization in this FOT, we could secure quantitative evidence regarding the frequent occurrence of traffic congestion at locations where city officials felt that congestion was frequent but lacked evidence to support this.
- We also found new congestion hot spots using visualization that city officials were unaware of.

2) Analysis of the impact of nudging on the speed of passing vehicles:

- From the results of the data analysis, we were able to confirm that the reduction of illegal parking due to nudging may also impact the improvement of the speed of passing vehicles.

Future outlook

Visualization of vehicle type

- In discussions with Kyoto City, we received the opinion that the ability to visualize the type (private, commercial) and number plate registration area of passing vehicles would be useful in understanding the causes of congestion and considering the direction of congestion measures.
- Probe data is also registered on MD communet by vehicle type. We believe it is possible to meet the above demand by using this data.
- Example of probe data by vehicle type
  - Private cars: Honda Drive Data Service (Honda Motor Co., Ltd.)
  - Commercial vehicles: commercial vehicle probe data (Yazaki Energy System Corporation)

For the dissemination of the use of mobility data at local governments

- Through MD communet , we will continue to plan and communicate ideas for data utilization regarding themes highly sought after by local governments to disseminate the use of mobility data at local governments.

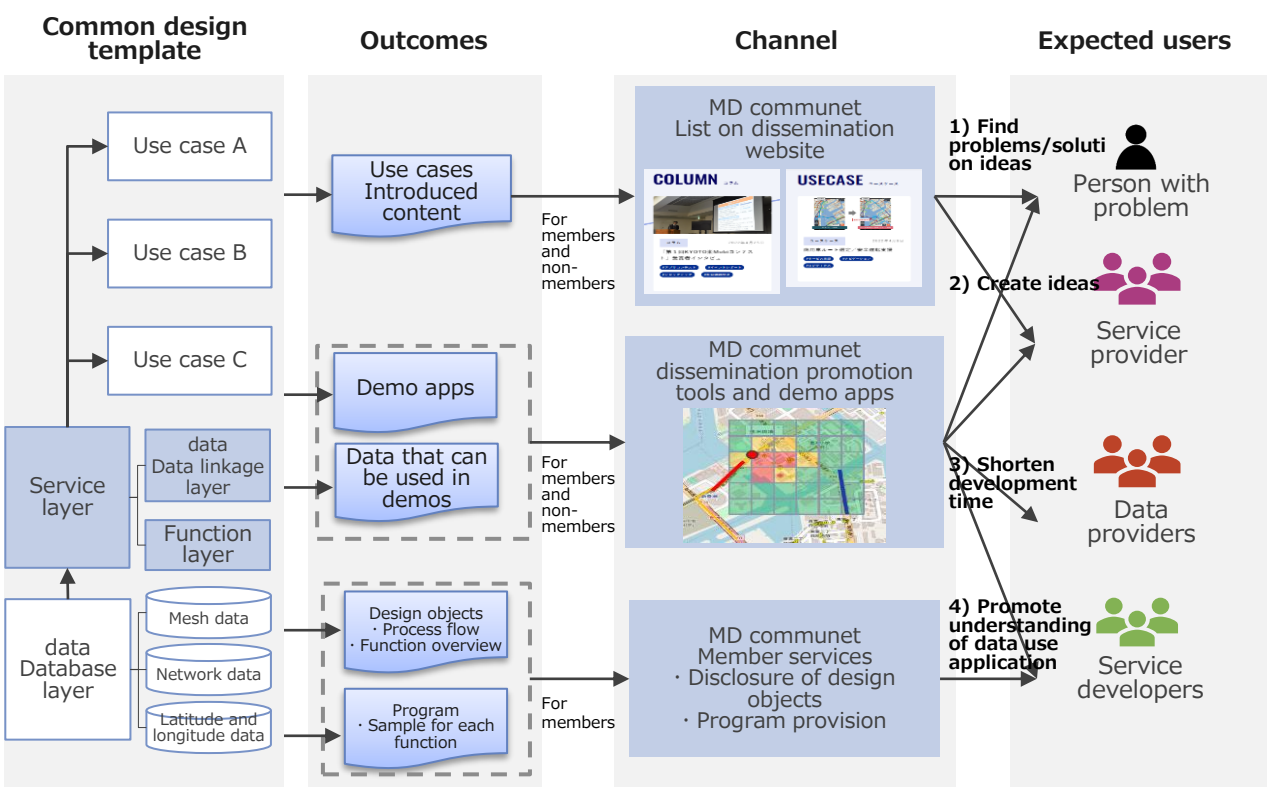
2.2.2 Maeterialization of the support menu, common design template
Contxt and purpose

- MD communet has aimed to disseminate the use of data to businesses by enhancing the data catalog and introducing use cases. This initiative is part of these efforts and aims to promote data usage by eliminating the barriers that obstruct data usage.
- A significant barrier to data usage was the need for technical expertise to handle various forms of data and the workload of investigations and other tasks. Therefore, by creating a common design template, we aimed to promote the use of data by encouraging expected users to 1) discover issues/ideas, 2) create ideas, 3) shorten development time, and 4) understand data use applications.

The obstacles that we aim to eliminate by creating a design template and the impact of its introduction

Obstructions to data use	Impact of common design template creation
Cannot envision a solution to the problem	Find an idea to solve the problem
Do not know what can be realized by combining data	Can envision value that can be realized by combining data
Significant workload is required to investigate ways to process and combine data with different formats	Can shorten time spent investigating data processing methods
Do not know what we can use our company's data for	Gain a deeper understanding of the use value of our company's data

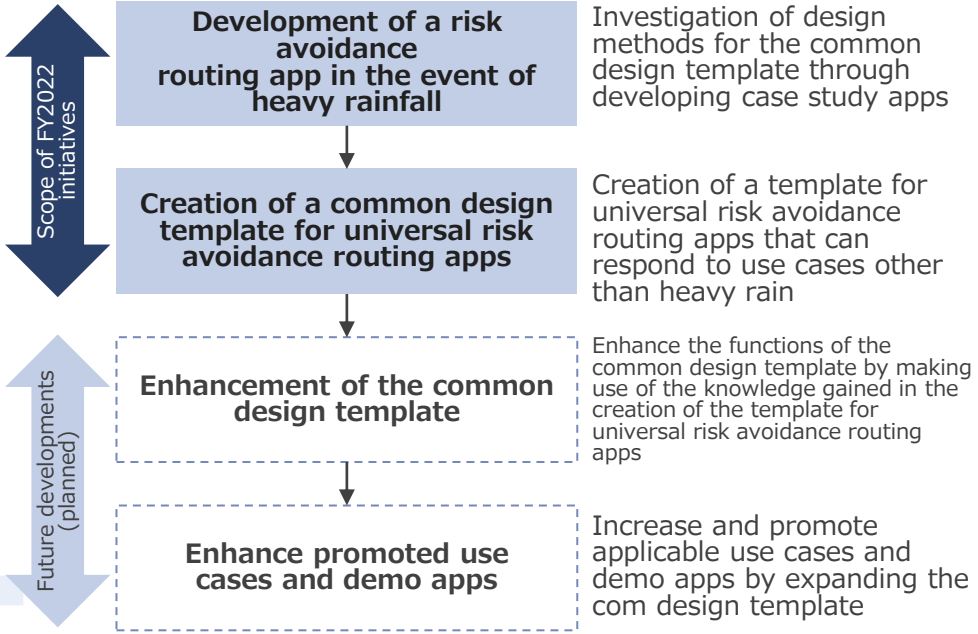
Ways to approach expected users of MD communet using the common design template



2.2.2 Materialization of the support menu, common design template Overview

- As one of the user case studies to create the common design template, we set “risk avoidance routing in the event of heavy rainfall” as the subject and created a route guidance app.
- Through the design and creation of this app, we established a common design template for universal risk avoidance routing apps by designing it in a way that can be reused in other use cases that require the same functions as this use case (risk avoidance routing in the event of heavy snowfall or landslides).
- Based on these results, we will further enhance the common design template and promote additional data use by communicating the results of its use.

A scenario to promote the use of data utilization using the common design template and the scope of implementation in FY2022



Implementation stages from app design to creation

Stage	Schedule
1. Investigation of functions and data survey	Jun. Jul. Aug. Sep. Oct.
2. Processing infrastructure and functional design	
3. Processing infrastructure and functional production	

2.2.2 Materialization of the support menu, common design template Verification results (1) Investigation of functions and data survey

- In the investigations of functions, we defined the necessary functions under the categories of application layer, processing infrastructure layer, pre-processing layer, and data layer based on the outcomes of interviews with logistics companies that are the expected users of this use case.
- In the data survey, we selected data that could be used in this use case from the data registered on the MD communet data catalog. We procured data that we lacked from external sources using desktop research and other means.

Function investigation results

We defined the necessary functions under the categories of application layer, processing infrastructure layer, pre-processing layer, and data layer based on demands regarding truck navigation systems in interviews with logistics companies that are the expected users of this use case.

Category	Function
Application layer	• Function for acquiring roads subject to risk • Function for uploading to route searching API • Function for searching for diversion routes
Processing infrastructure layer	• Function for processing the detection of risk locations • Function for linking road network information with risk locations
Pre-processing layer	• A function to convert point data, mesh data, and link data to GeoJSON format • Function to upload GeoJSON to the processing infrastructure
Data layer	• Function for storing data for risk calculations

Data survey results

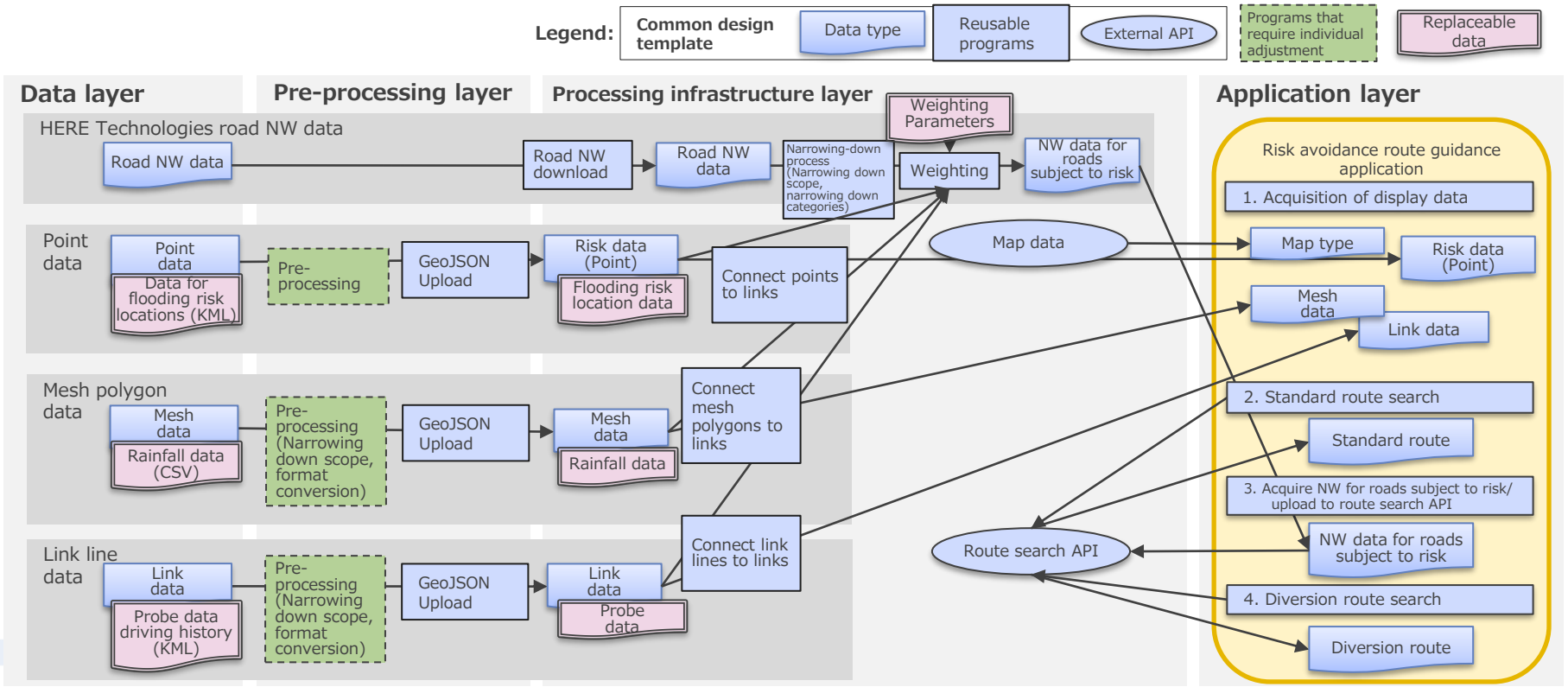
After identifying the data necessary to realize this use case, we selected data that could be used in this use case from the data registered on the MD communet data catalog. Also, we procured data that we lacked from external sources.

Necessary data	Listed on MD communet	Data name	Owner	Data type
Road network	Yes	Road network data	HERE Technologies	Node-link
Traffic records	Yes	Traffic record data (probe data)	Pioneer	Line
Amount of rainfall	No	1km-mesh analysis rainfall GPV	SIP4D	1km-mesh
Previously flooded locations	No	Expected road flooding location	MILT Regional Development Bureau	Point

2.2.2 Materialization of the support menu, common design template Verification results (2) Processing infrastructure and functional design

- The three programs in the pre-processing layer are the programs that had to be developed specifically for this application (elements with dashed line border and green background). Other programs and APIs were made part of the common design template (solid-line border and blue backgrounds), so they can be used as separate applications by replacing data (elements with double-lined borders and pink backgrounds).
- By using this design, we can expect significant reductions in design and construction workload when creating other applications in the future.

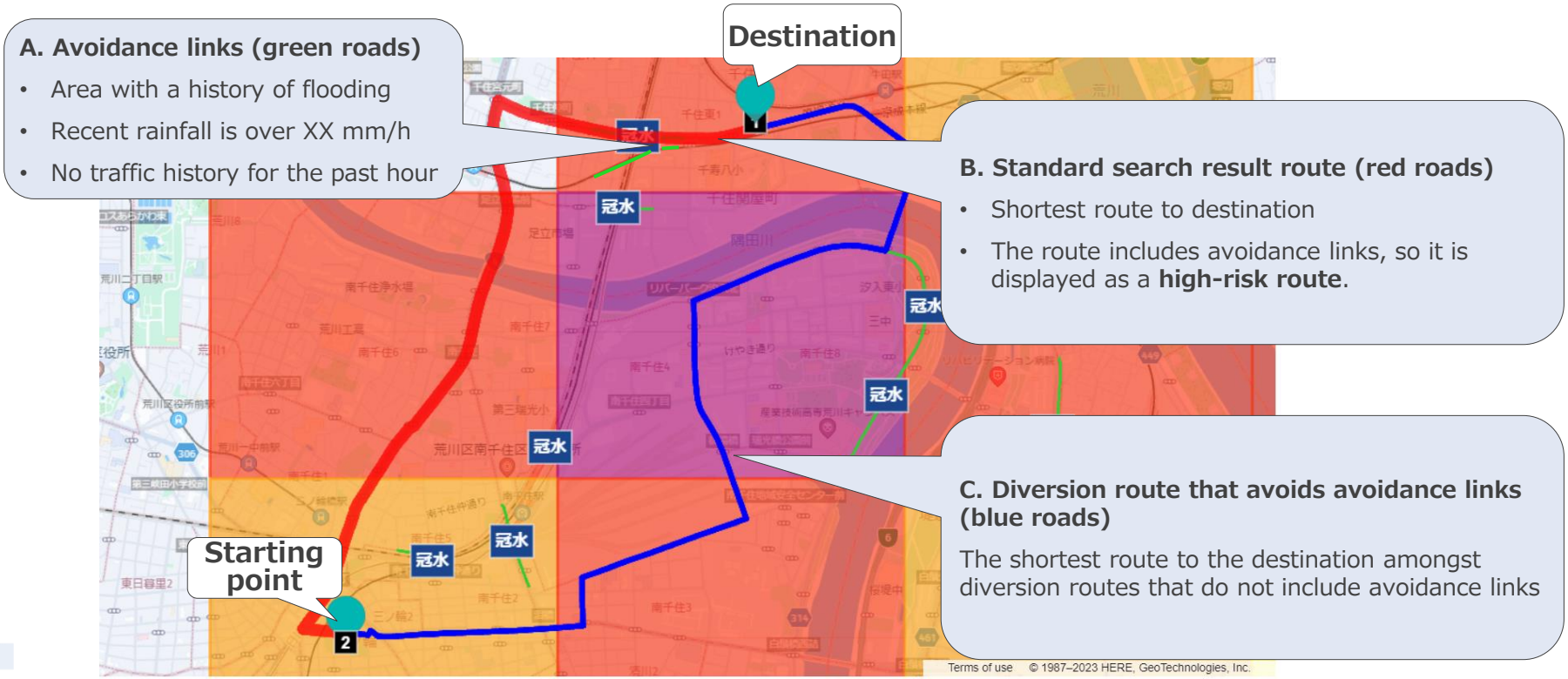
Relationship between the common design template and risk avoidance routing apps in the event of heavy rainfall



2.2.2 Materialization of the support menu, common design template Verification results (3) Processing infrastructure and functional production

- We created a risk avoidance routing app for heavy rainfall based on the design in verification results (2).
- This app combines estimated flooding locations, rainfall data, and traffic records for the past hour to calculate routes and display avoidance links (A). Also, a standard search result route (B) and a diversion route that avoids avoided road links (C) can also be displayed on the screen.

Diagram of the risk avoidance route output



Note: The display is in the development stage, and we envision that we will change the specifications based on the user's needs for actual use.

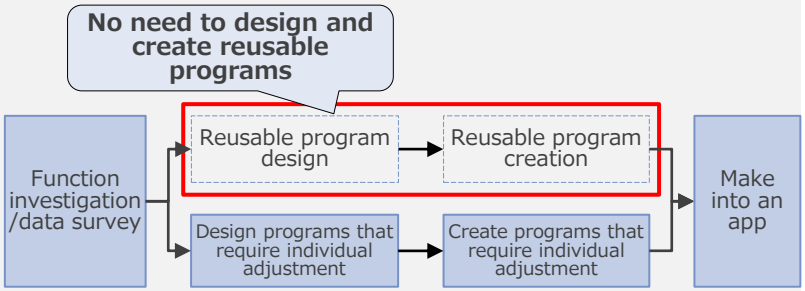
2.2.2 Materialization of the support menu, common design template Results and future outlook

- Through this initiative, we were able to establish a common design template that eliminates the need to design and create the majority of programs required for application development. As a result, we were able to create applications that can be used for multiple use cases by replacing data.
- In light of these results, we will continue to enhance the common design template and promote the use of data by disseminating use cases, demo apps, design products, and other outcomes generated from the common design template.

Outcomes of FY2022 initiatives

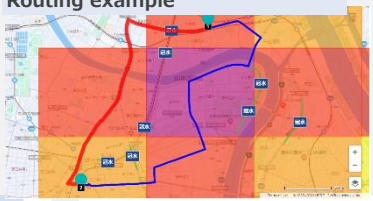
By using the common design template, it is possible to eliminate design and production work for reusable programs.

- Development flow when using the common design template



We confirmed that it is possible to easily replace data used by using the common design template and create apps that can be used in multiple use cases

Routing example for avoidance of flooding during torrential rain
Routing example



for crucial logistics during landslides
Routing example

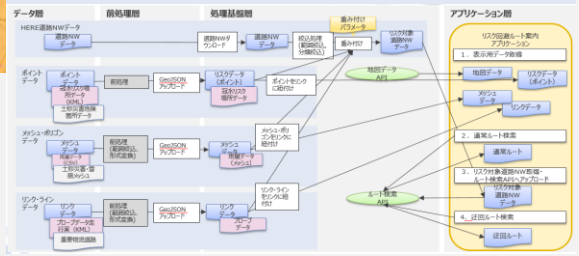
Outlook for initiatives in FY2023 and beyond

Promote the further use of user data through expanding use cases, demo app,s design objects, and programs

Expansion of use cases

Expand demo apps

Expand design objects and programs



2.2.2 Collaboration with other SIP themes for the dissemination of the use of mobility data Context and implementation overview

- In the dissemination of the use of mobility data it is important to promote various use cases to make it easier for potential users to envisage the use of mobility data.
- That is why this year we collaborated with NX Logistics Research Institute and Consulting, Inc.(hereafter, NXLRIC), the company entrusted with the “research and FOTs for improving logistics efficiency based on an architecture using vehicle information such as probes” project, and promoted NXLRIC’s use case on MD Communet.

Context

Both entities considering data use and those considering data provision are facing bottlenecks regarding the lack of clarity in data use

Data user

- What can we do by using data?
- By using exactly what type can this be realized?
- What companies should we cooperate with?

- We don’t know how our company’s data can be useful
- What type of data do people need?

Data providers

Entities that are considering data must use become able to gain a more precise image of how to use data and the value to be gained

Overview

In collaboration with NXLRIC, to encourage the dissemination of data use by promoting NXLRIC’s use case on MD communet

NIPPON EXPRESS
株式会社ＮＸ総合研究所

MD communet

Promote the dissemination of data use by communicating use cases in collaboration with partners

NTT DATA

2.2.2 Collaboration with other SIP themes for the dissemination of the use of mobility data Verification results and future outlook

- We promoted the two initiatives implemented by NXLRIC, “identifying the occurrence of cargo waiting times and sharing with related parties” and “measurement of load weight,” by listing both the use case introduction page on the MD communet portal site.
- For this promotion, we envisioned the questions and concerns felt by entities considering data use and organized and introduced the use case in a way that responds to these questions and concerns.
- We will cooperate with various entities and communicate information for the dissemination of data use.

Example of listed use case

Note: The below may differ from the actual listed information

Using axel load to measure load weight

A simple introduction of “what can be done”

MD communet

Service overview | Data catalog | Information

TOP › Use case > In-vehicle delivery destination information service, “Misenabi™”

Use cases XX, XX, 2023 XX, XX, 2023

Using axel load to measure load weight

#サービス実証 #ロジティクス #業務効率化

A system was created to determine the weight when freight is loaded during actual operation for large trucks used by freight companies. The load weight, total vehicle weight, and the axel weight of each axel are measured using axel weight sensors (LI sensors) attached to each axel. The driver can confirm the weight immediately using a tablet device. Also, the tablet device has functions that allow the results to be sent to an email address specified by the sales office administrator or other authority. Information collaboration is also possible by the driver pressing a button on the tablet that ends the measurement and then sends the results by email.

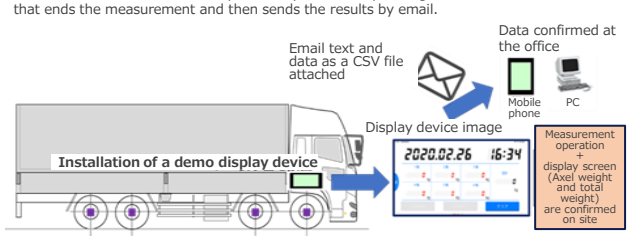


Diagram of the FOTs

Features and value offered

Freight companies will be able to avoid overloading, thereby contributing to the safe operations and the preservation of social infrastructure, if they can determine load weight and total vehicle weight when loading cargo at the delivery destination and keep records of the results.

Value produced by data utilization

MD communet

Service overview | Data catalog | Information

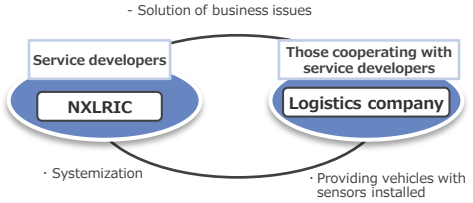
Ideas for data utilization

Sensor × Logistics = Prevention of overloading, safe operations

- Data collection
  - Attach axel weight sensors (LI sensors) to each axel of large trucks
- Process output data (output data)
  - The below data can be confirmed on the driver's tablet. Also, the measurement results are sent in the text of the email and as a CSV file to the specified mail address.
    - Vehicle number
    - Date and time of the start and finish of measurement
    - Address
    - Load weight (total and axel weight)
    - Cumulative gross weight (total and axel weight)

Specifically, what type of data and methods are used

Members involved in this use case



Cooperating with who and in what way made this possible?

NTT DATA

3. Surveys and research for the cleansing and development of geographic data, such as traffic information in urban areas, for the coordination of transport and logistics services

3.1 The 1st KYOTO Raku Mobi Contest

NTT DATA

3.1.1 The 1st KYOTO Raku Mobi Contest (FY2019)

NTT DATA

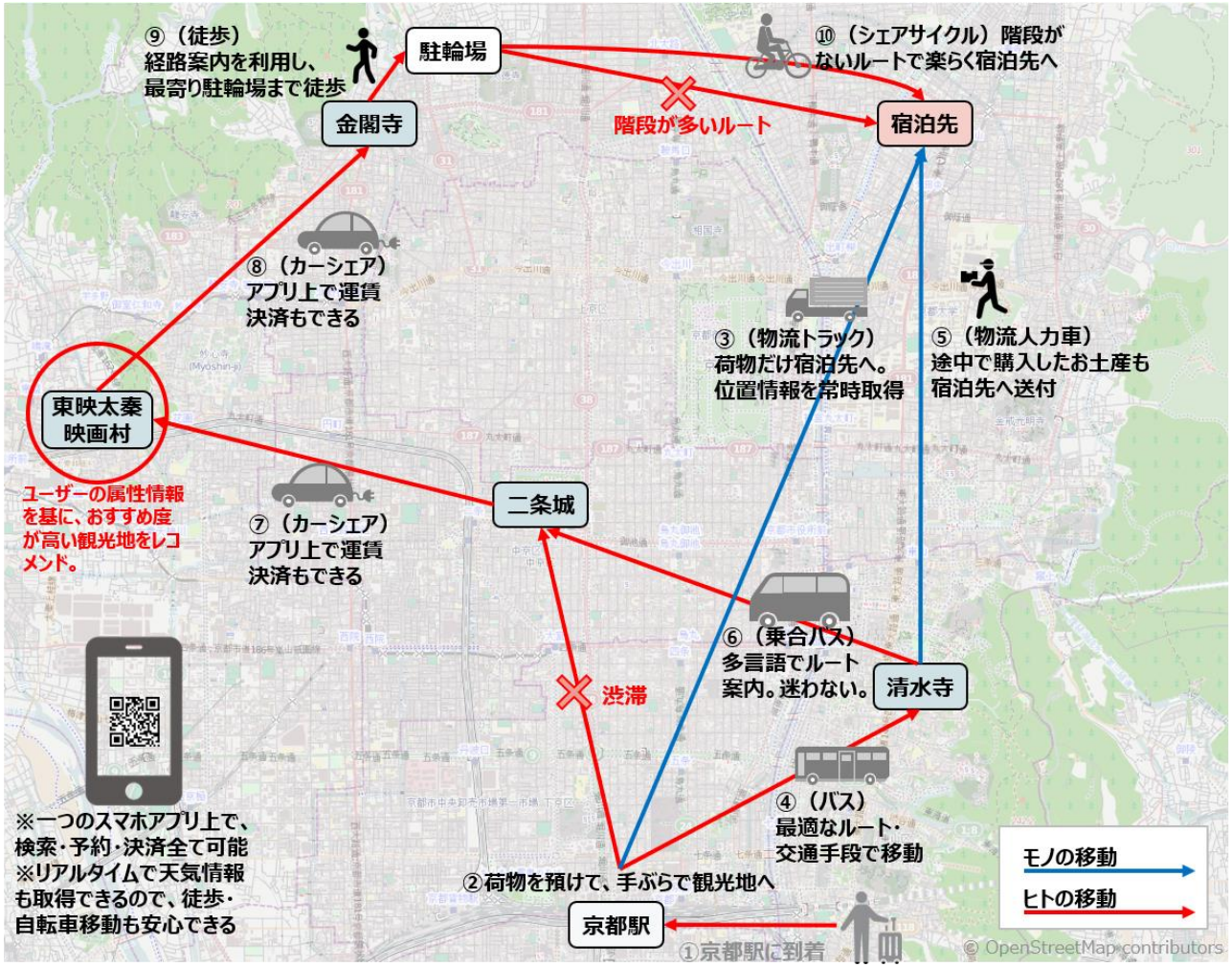
3.1.1.1 Survey, research content and procedures

- We assumed several use cases for solving mobility and logistics issues in urban areas, and we mapped use cases to each layer of reference architecture model. Besides, we conducted briefing session and built consensus with stakeholders, obtained required data, established mechanisms for data acquisition and provision, planned the app contest and started the operation of app contest for Kyoto, a tourist city.

Study of use case	Study the usage case for urban mobility/logistics.
Mapping to each layer of reference architectural model	Map functions, data, and assets for usage cases in layers of the reference architecture model to determine their functionalities in the usage cases.
Briefing session and consensus building with stakeholders Procurement of required data	Explain the contest to relevant parties in Kyoto, a tourist city, to gain their understanding of it and gather required data.
Establishing mechanisms for data acquisition and provision	Explain the contest to relevant parties in Kyoto, a tourist city, to gain their understanding of it and gather required data.
Planning and holding the contest	Plan the contest and start to organize it (this process will be done by June 2020).

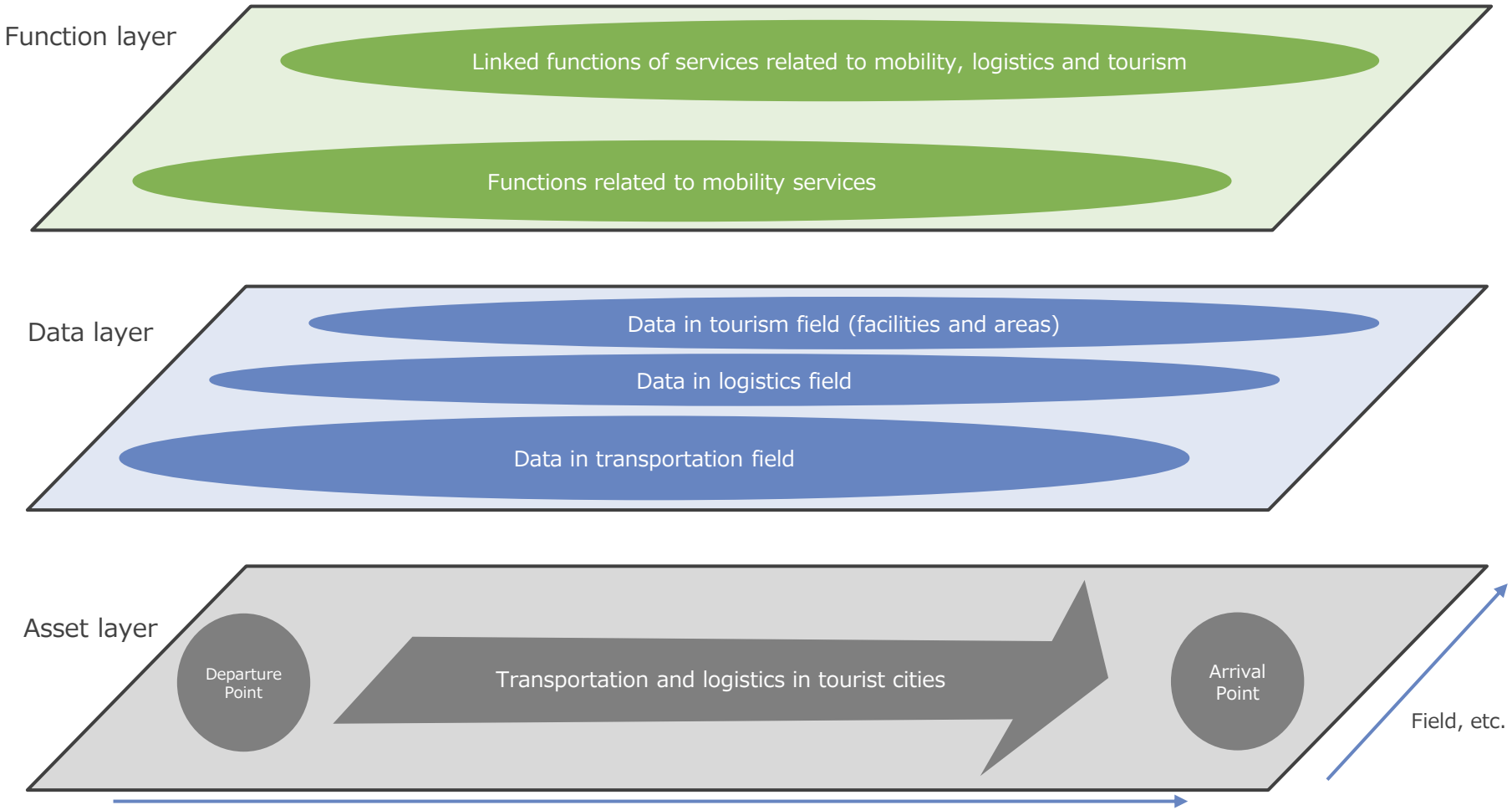
3.1.1.2 Use case study and feasibility study
Assumption of use cases

- For use cases of services related to transportation and logistics in urban areas, we assumed and considered subjects of various attributes (residents, tourists, government and transportation operators, etc.). The use case for tourists is shown in the figure below.



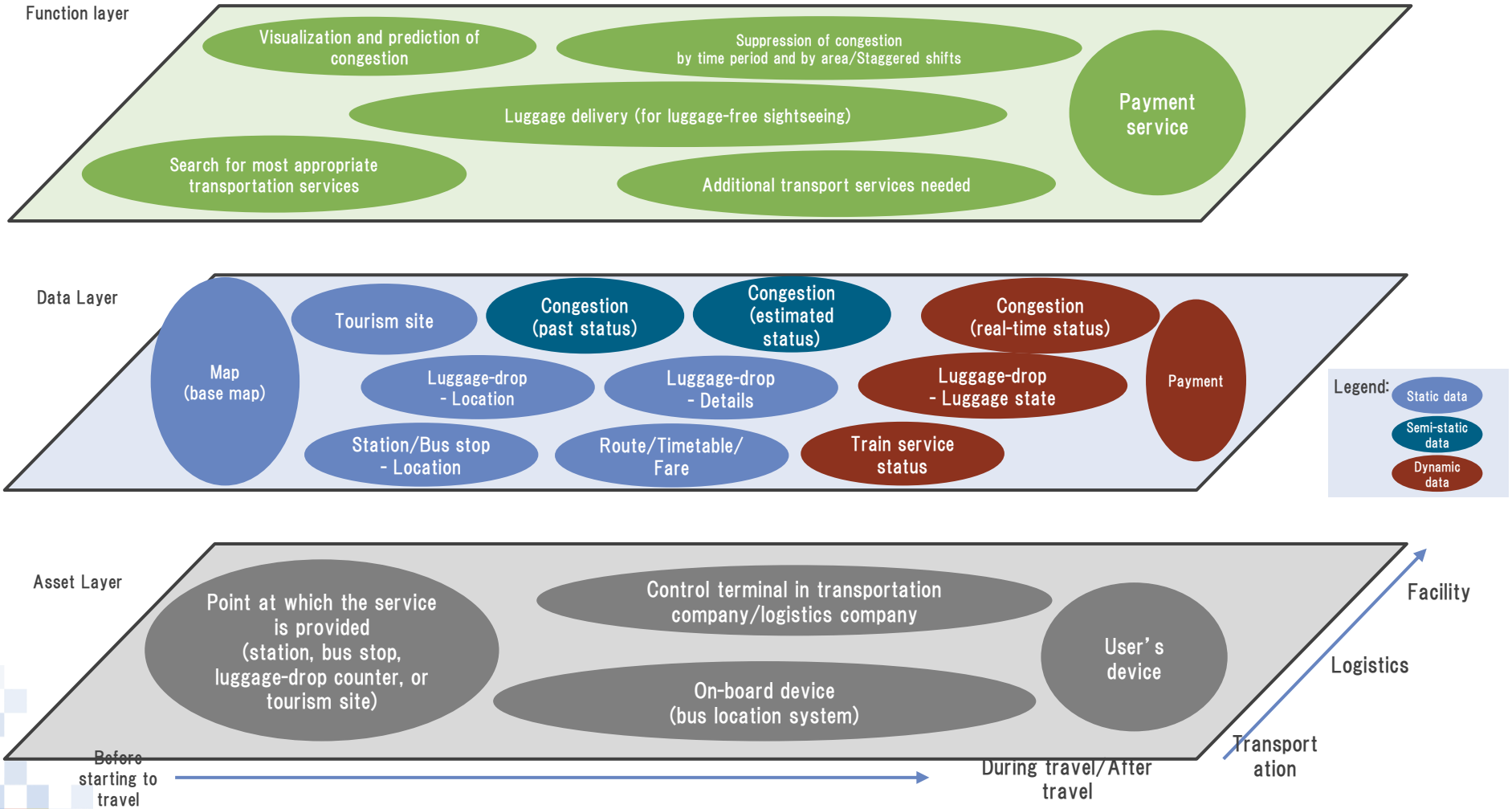
3.1.1.2 Use case study and feasibility study Mapping to reference architecture

- As in Theme b, we performed mapping to reference architecture model based on the layer structure of “function“, ”data“, and ”asset“ for each use case to check excess or deficiency and duplication of each item.



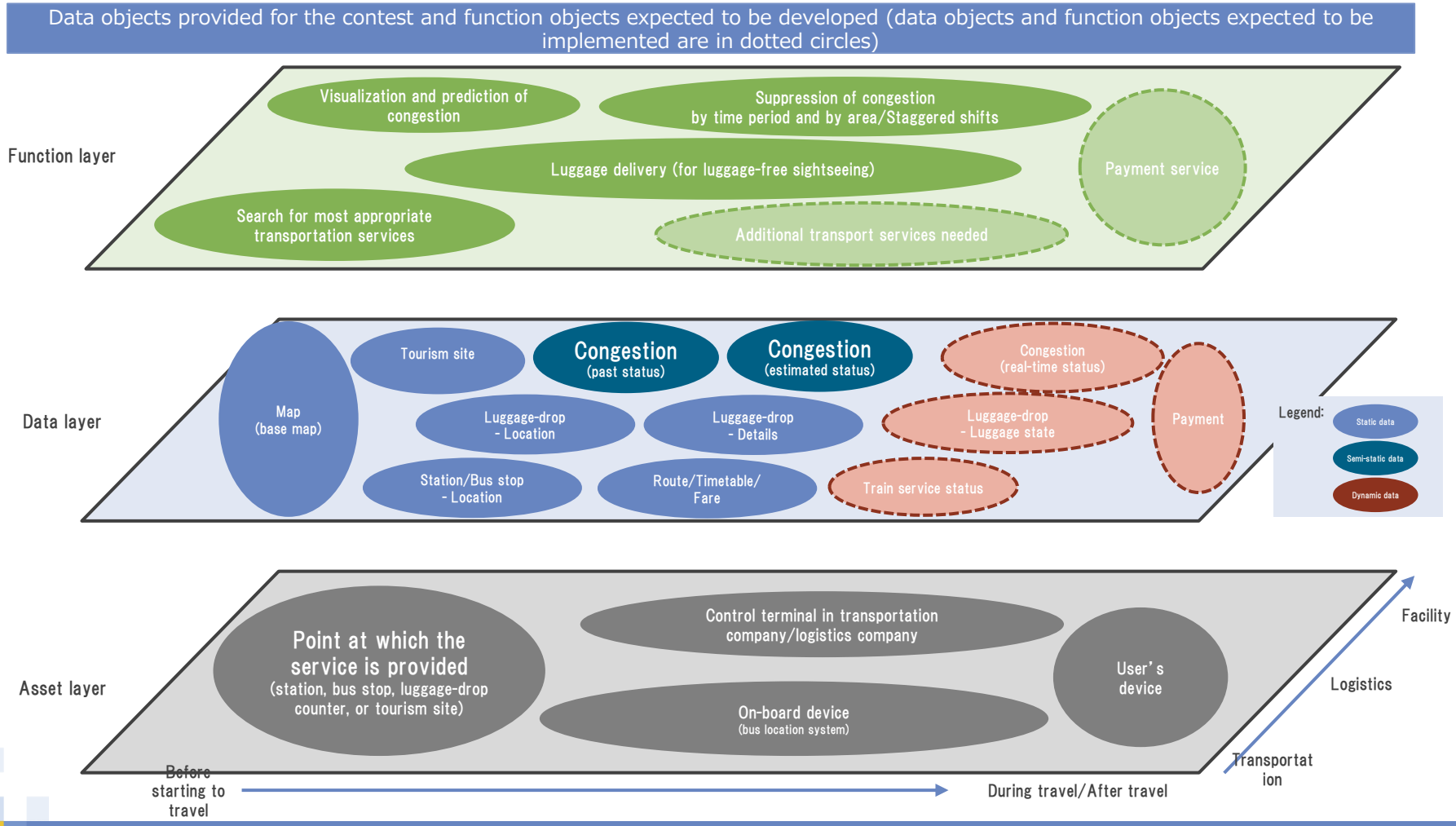
3.1.1.2 Use case study and feasibility study Mapping to reference architecture

- We have considered several use cases in Issue c, and here we present an example of mapping to use cases for tourists. The figure below also shows functions and services that are planned to introduce in the future and includes those that were not implemented in FY2019 and FY2020.



3.1.1.3 Map functions, data, and assets for usage cases

- We mapped objects assumed for the usage cases in the function, data, and asset layers of the reference architecture model to check for missing and redundant objects.



3.1.1.3 Determination of data to be standardized, systems and rules to be organized Procurement of required data

- Based on the study of usage cases, we classified various data required to solve mobility/logistics problems in Kyoto into the three categories of "Transportation," "Logistics," and "Facility," explained the data to relevant parties, and asked them to provide the necessary data.
- For data about bus transportation, we decided to organize and provide it in the GTFS-JP format whenever applicable to standardize it for route navigation services.

Data types in the categories

Category	Data provider (candidate)	Static object (candidate)	Semi-static/Semi-dynamic/Dynamic object (candidate)
Transportation	• Railway company/Bus company (members of the Kyoto City public transportation network conference)	• Route map • Schedule • Fare table/Distance • Location of station/bus stop	• Service status • Vehicle location
Logistics	• Delivery service company/agent • Locker service provider	• Information about locations of service facilities	• Luggage delivery status • Information on lockers available
Facility	• Kyoto City • Kyoto City Tourism Association	• Location and outline of a tourist site	• Expected congestion/Statistics logs for congestion in an area

3.1.1.3 Determination of data to be standardized, systems and rules to be organized Procurement of required data

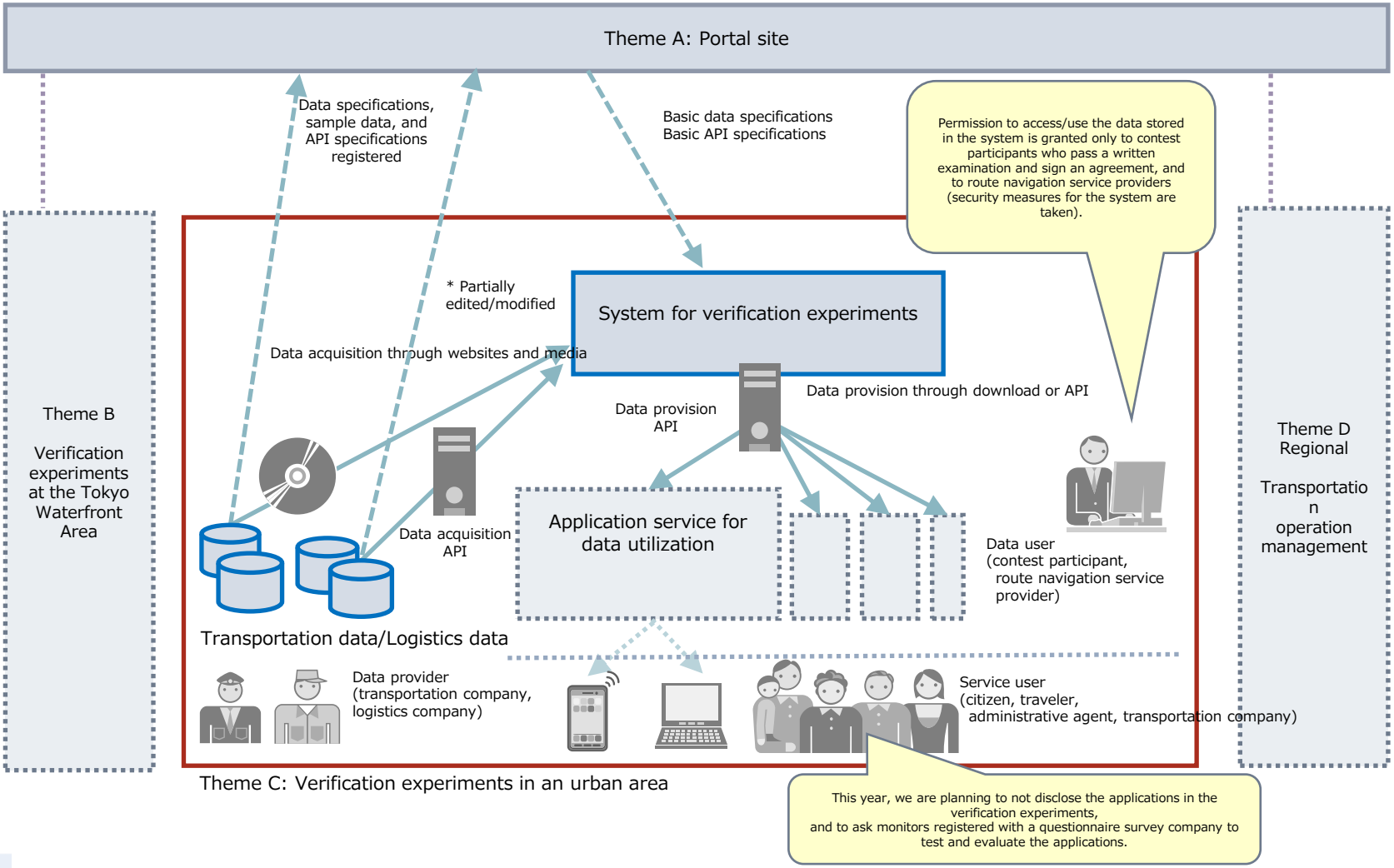
■ The contest secretariat will provide the following types of data to contest participants:

Category	Data	Data provider	Description	Format
Transportation	Kyoto City Bus: bus stops, routes, timetables, fares	Kyoto Municipal Transportation Bureau	Transit bus services operated by Kyoto Municipal Transportation Bureau (Kyoto City Bus): bus stops, routes, timetables, fares	GTFS-JP
	Kyoto Municipal Subway: stations, timetables, fares		Subway services operated by Kyoto Municipal Transportation Bureau: stations, routes, timetables, fares	GTFS
	Kyoto Bus: bus stops, routes, timetables, fares	Kyoto Bus	Kyoto Bus: bus stops, routes, timetables, fares	GTFS-JP
	Yasaka Bus: bus stops, routes, timetables, fares	Yasaka Bus	Yasaka Bus: bus stops, routes, timetables, fares	GTFS-JP
Logistics	Facility providing luggage-free sightseeing service	Logistics company (under negotiation)	Facility providing luggage-free sightseeing service: location and service details	-
Facility	Prediction of congestion in Kyoto City	Yahoo Japan Corporation	Prediction on 5-grade scale by date and by weather	tsv
	Prediction of congestion in tourist seasons in specific areas of Kyoto City (for limited periods only)		Prediction on 5-grade scale by area, by date, and by weather	tsv
	Tourist spot in Kyoto City	Kyoto City Tourism Association	Summary of tourist spots in Kyoto City published on the Kyoto City Official Travel website administered by Kyoto City Tourism Association	xlsx

* In addition to the above, we plan to provide the following types of data/API.
  Transportation: Timetables and fares of other railway companies and bus companies, and location logs of city buses
  Facility: Statistics logs for congestion
  Others: Maps and route navigation functions

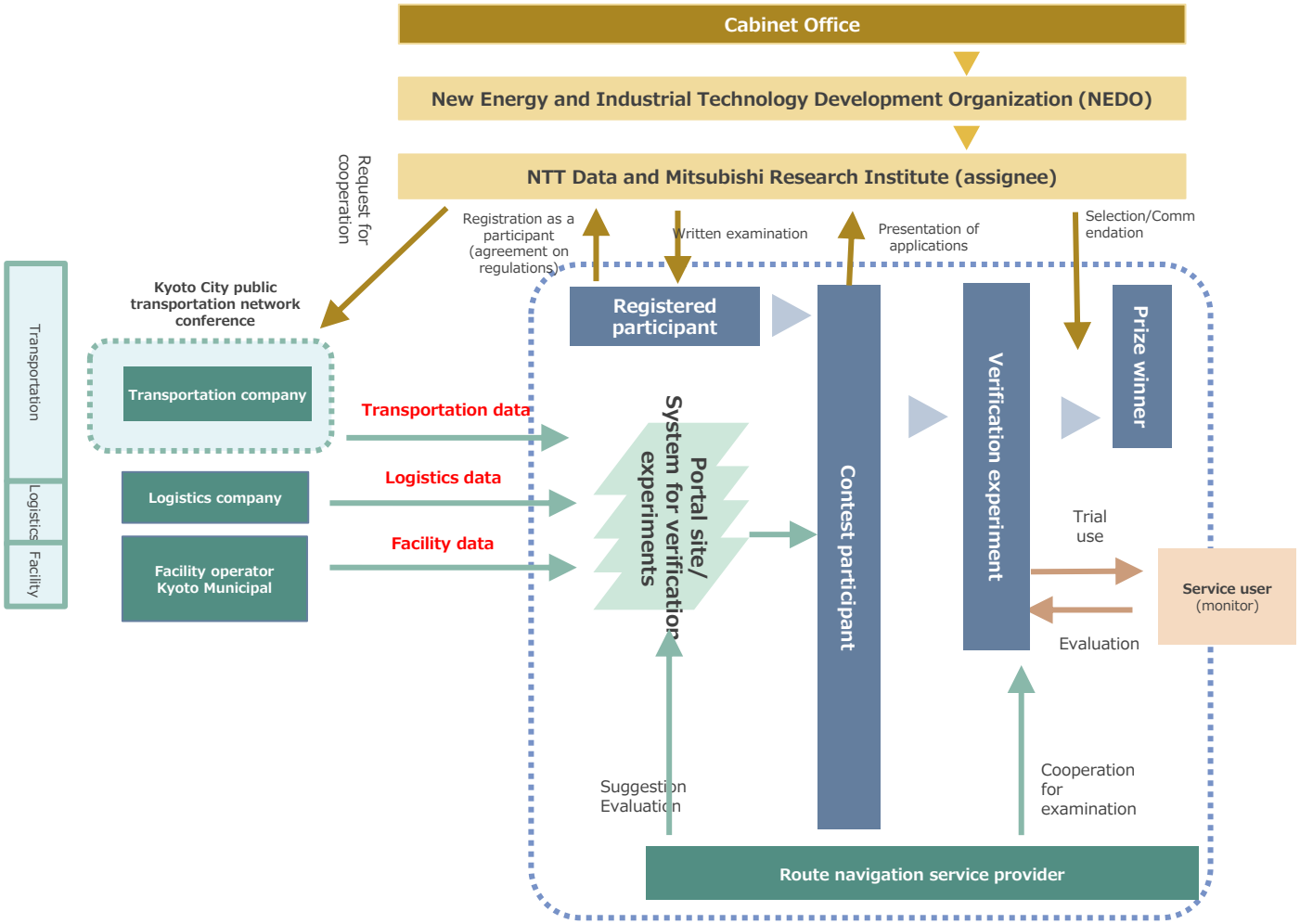
3.1.1.4 Determination of data to be standardized, systems and rules to be organized Establish systems for gathering and utilizing data

■ We developed and introduced a system for the verification experiment in urban areas, as shown schematically below.



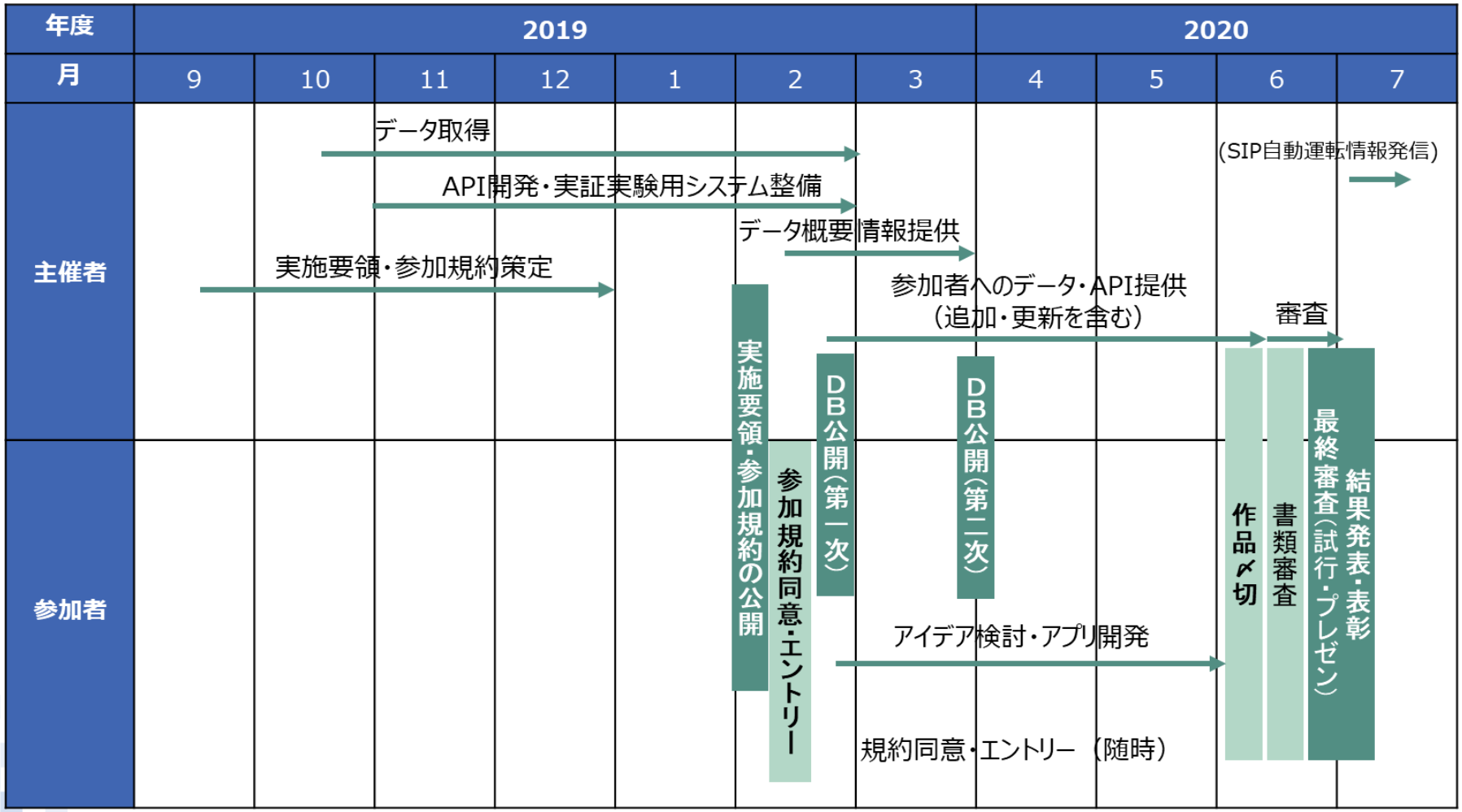
3.1.1.5 Planning and holding the contest

■ Based on the studies described in the previous sections, to solicit applications and ideas on solving overtourism and transportation problems in Kyoto City, we decided to organize a contest and hold it from February 2020 to June 2020, as shown schematically below.



3.1.1.5 Planning and holding the contest
Implementation schedule

- The implementation schedule of app contest is shown below.
- In the original schedule, the final screening was scheduled to take place in June 2020 as follows, but in consideration of the impact of the spread of the novel coronavirus, the final screening was extended to October 2020 in order to allow sufficient time for consideration and development of applicants.



3.1.1.5 Planning and holding the contest

■ We issued a press release on February 14, 2020, and launched the contest website on February 25, 2020, as outlined below.

Item	Description
Title	Contest to solve overtourism and transportation problems in Kyoto (Alias: KYOTO Raku Mobi Contest)
Problems to be solved	• Conflicts between routes used by citizens and routes used by tourists (route navigation to avoid routes used by citizens) • Concentration of tourists at specific spots (suggestion of tourist sites with information about congestion) • Luggage carried by tourists into transportation (promotion of "luggage-free sightseeing") • Information about congestion and delays not matching actual circumstances (transportation guidance with information about expected congestion and traffic conditions)
Category	“Application development” and “Application idea”
Usable data	Timetables of transportations (bus/train) Assumed measurements of congestion in Kyoto City Information about tourist sites in Kyoto City
Schedule	Entry: February 14, 2020 (Friday) to August 14, 2020 (Friday) Usable data provision (development period: February 25, 2020 (Tuesday) to September 11, 2020 (Friday) Closing date: September 9, 2020 (Wednesday), Final review: October 17, 2020 (Saturday)

Source: Cabinet Office, Press Release
https://www8.cao.go.jp/cstp/stmain/20200214kyotoapri.html

3.1.1.5 Planning and holding the contest

■ (Reference) Website announcing and outlining the contest

Source: "KYOTO Raku Mobi Contest" website - https://web.contest.adus-arch.com/

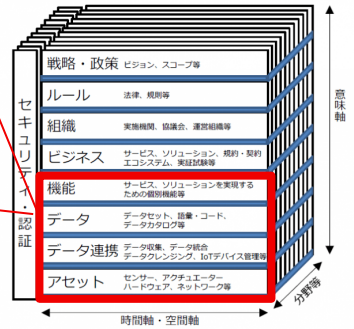
3.1.2 The 1st KYOTO Raku Mobi Contest (FY2020)

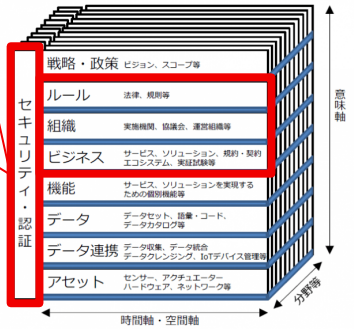
NTT DATA

3.1.2.1 Survey and research content and procedures

- We assumed some usage cases to solve problems of urban mobility/logistics and started to plan a contest for solving overtourism problems by using information about traffic conditions, transportation timetables, estimation of congestion, and tourist sites in Kyoto where overtourism causes disruption (the contest is scheduled to be held in June 2020).

1. Study of usage cases (Conducted in FY2019)	Study the usage case for urban mobility/logistics.
2. Map functions, data, and assets for usage cases (conducted in FY2019)	Map functions, data, and assets for usage cases in layers of the reference architecture model to determine their functionalities in the usage cases.
3. Determination of data to be standardized and systems and rules to be organized	Explain the contest to relevant parties in Kyoto, a tourist city, to gain their understanding of it and gather required data.
4. Planning and holding the contest	Plan the contest and start to organize it (the contest will be held until June 2020).
5. Confirmation of data specifications and rules	We continued development and held consultations for the social implementation of the winning applications for "Arukumachi Kyoto." We confirmed the conditions for the continued provision of data with the contest's data providers.





3.1.2.2 Extraction of data, systems, and rules to be developed and standardized Procurement of necessary data

- The contest secretariat provided the following types of data to contest participants: When obtaining data, we went through the process of first explaining in person or through email about the data we wanted to be provided. Then we had the actual data provided after exchanging agreements with companies that set forth matters such as provision duration, conditions for provisions, and costs.

Category	Content of data	Providing company
Transportation	Kyoto Municipal Subway: Stations, routes, timetables, fares	Kyoto Municipal Transportation Bureau
	Eizan Electric Railway: Stations, routes, timetables, fares	Eizan Electric Railway Co., Ltd.
	Keifuku Electric Railroad: Stations, routes, timetables, fares	Keifuku Electric Railroad Co., Ltd.
	Kyoto City Bus: Bus stops, routes, timetables, fares	Kyoto Municipal Transportation Bureau
	〃	Jorudan Co., Ltd.
	Kyoto City Bus: Vehicle location data	"Arukumachi Kyoto" System/consortium on providing bus/train transfer information
	Kyoto City Bus: Vehicle location API	Jorudan Co., Ltd.
	Kyoto Bus: Bus stops, routes, timetables, fares	Kyoto Bus
	Yasaka Bus: Bus stops, routes, timetables, fares	Yasaka Bus
	Hankyu Bus: Bus stops, routes, timetables, fares	Jorudan Co., Ltd.
	Kyoto City Park and Ride: Parking lot data	Kyoto City Municipal Planning Bureau
Logistics	Data for stores and services for sending and temporary storage of luggage	“KYOTO Raku Mobi Contest” secretariat
Facility	Prediction of congestion in Kyoto City	Yahoo Japan Corporation
	Prediction of congestion in tourist seasons in specific areas of Kyoto City (for limited periods only)	Yahoo Japan Corporation
	Tourist spot in Kyoto City	Kyoto City Tourism Association
	API for center introduction services	Zenrin CO., LTD.
	Statistics logs for congestion ®data	Zenrin CO., LTD.

3.1.2.2 Procurement of necessary data
Efforts and challenges in data procurement

Efforts and challenges in data procurement are as follows.

Items	Efforts	Challenges
Prior briefing regarding to data provision	• Supported by local government, we got opportunity to explain the initiative to local businesses. • We visited businesses that have potential to cooperate directly and provided detailed explanations with documents.	• It took time for businesses that needed to check with multiple internal departments and partner companies regarding data provision to make decisions.
Establish data policy	• We established data policy with reference to existing data usage terms and conditions in ongoing contests. • We sent a template prior to each visit, and verified and explained any unclear points during "Prior briefing regarding to data provision“.	• It took time for each company to check data usage terms and conditions. • Secretariat decided the data accountability sharing since the scope of data utilization was limited in this contest. The organization of this perspective becomes more important when it comes to practical use.
Negotiate in data provision	• We organized the information that we would like to receive in advance and requested. • Adjustments were made so that data containing the above information could be provided in the format maintained by each company.	• Some companies had outsourced the digitization and utilization of their data to a third party, and negotiations with that third party on data provision took time.
Provide catalog data (metadata)	• Secretariat prepared a template using expected data as reference and requested businesses to check data.	• We were not able to adjust the contents of the catalog data and release schedule as planned, and requests were made on an occasional basis, which caused confusion and burden to the data providers.
Data provision	• When it was difficult to decipher the data, we received a lecture on the data from data provider. • Secretariat created format for types of data which are not defined in general data formats such as GTFS.	• When business operator did not have the expected data, it was necessary for the secretariat to obtain new data. • When there is a data update, such as a schedule revision, updating can be simplified if the difference is clearly shown.
Follow-up after data provision	• We asked contest participants to answer questionnaire about the prepared data and shared feedbacks to business operators. • We invited lecturers to give lectures on methods for creating and utilizing data.	• Due to Covid19, feedback of contest result and lectures were conducted online. It is highly possible that we could have obtained better feedback if face-to-face sessions were also used in order to fully grasp business operator's feelings.

3.1.2.3 Planning and implementation of application contests

■ On February 14, 2020, we held a press release and launched the "Kyoto Raku Mobi Contest."

Description	Duration
Entry deadline	**Application development category: Friday, August 21, 2020** **Application idea category: Friday, August 28, 2020**
Traffic environment information disclosure	Until the contest is over
Pre-event (Explanation of the issues Kyoto is facing and the traffic environment information)	First event: Saturday, June 13, 2020 Second event: Saturday, July 18, 2020 Mentoring subsequently held for applicants as necessary
Deadline for presentation of applications	**Application development category: Wednesday, September 9, 2020** **Application idea category: Friday, September 11, 2020**
Preliminary screening/verification experiment	From September 2020 to October
Final review (final review meeting, screening committee meeting) *Kyoto and online meeting	**Saturday, October 17, 2020** **13:00 to 18:00**
Award Ceremony *Kyoto and online meeting	**Saturday, November 7, 2020** **10:30 to 12:00**

*Verification experiment: Contest applications that pass the initial screening will be evaluated using a monitor prepared by the secretariat.

*Final review: Applicants who pass the initial screening will give a presentation to the screening committee.

3.1.2.3 Planning and implementation of application contests

- The contest is comprised of the two categories below, and we solicited applications and ideas that contribute to solving the issues Kyoto is facing, and that must have used the data related to transportation and facilities provided by the secretariat (traffic environment information).

A) Application development category

With an awareness of implementation and utilizing the data provided by the secretariat, entrants develop **android applications that will solve the issues faced by Kyoto,** and compete on the level of data utilization, level of contribution to solving the issues, and ease of use.

B) Application idea category

With an awareness of implementation and utilizing the data provided by the secretariat, applicants **come up with and submit ideas to solve the issues faced by Kyoto,** and compete on the level of data utilization and the level of contribution to solving the issues.

3.1.2.3 Planning and implementation of application contests

- The contest took the form of entrants submitting applications that will realize an ideal situation and solve the issues faced by Kyoto, such as those below.
- In anticipation of the effects of the novel coronavirus and issues for Kyoto, once the pandemic has come to an end, we also made possible the submission of applications that solve these issues.

Conflicts between routes used by citizens and routes used by tourists	A large number of tourists get on public transportation (e.g., transit buses) running on routes to famous tourist sites, and there are conflicts between routes used by citizens and routes used by tourists. Route navigation to avoid routes used by citizens is needed.
Concentration of tourists at specific spots	"Overtourism," or perceived congestion or overcrowding due to too many tourists, is a major problem. Measures such as suggesting tourist sites with information about congestion are needed.
Large luggage carried by tourists into transportation	Tourists carrying large luggage make crowding worse in buses. Measures to promote "luggage-free sightseeing" are needed to ease the crowding by changing the attitude of tourists who think they must always carry their luggage while traveling.
Information about congestion and delays not matching actual circumstances	Tourists often make complaints such as "the routes of public transportation are complicated, and bus routes are hard to understand" and "I got on the wrong bus"; this indicates that the current transportation guidance is not satisfactory for tourists. Also, transportation guidance with information about expected congestion and traffic conditions or solutions are needed.

3.1.2.3 Planning and implementation of application contests

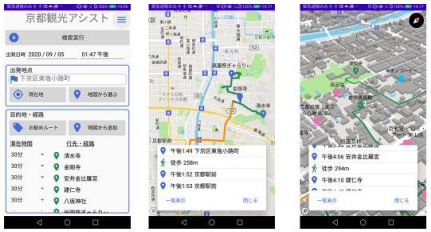
- We held the final review on Saturday, October 17, 2020 and award ceremony on Saturday, November 7, 2020, and gave out seven awards. The first prize for the application development category, "Arukumachi Kyoto Award," was given to an application that utilizes traffic environment information to aid sightseeing, and the first prize for the application idea category "SIP-adus Award" was given to the application that provides new value when waking empty-handed.

Award Ceremony

Prize winners and their applications

Arukumachi Kyoto Award (Application development category, first prize)	Teruki Matsuoka	(Temporary name) Kyoto Tourism Assistance
SIP-adus award (Application idea category, first prize)	Advanced Institute of Industrial Technology Eriko Musashi, Daisuke Kawanishi NTT Data Frontier Corporation Yuya Hatanaka	An application that makes you want to walk empty-handed -Teburan-
Award for improvement in congestion of transportation (Sponsored by NAVITIME)	Asakura Laboratory, School of Environment and Society, Tokyo Institute of Technology, Yuki Yamashita	Tekuteku Kyoto Tour
Transportation guide improvement award (Sponsored by Val Laboratory Corporation)	Nippon Information and Communication Corporation	Yoritabi Tourist information application optimized for transit routes
Award for improvement in area congestion (Sponsored by Yahoo)	System Science Co., Ltd.	Komikomi Spot
Handsfree sightseeing promotion award (Sponsored by Kyoto City Tourism Association)	Denso Corporation	Etrip
Monitor award	Nippon Information and Communication Corporation	Yoritabi Tourist information application optimized for transit routes

Application development category, first prize application



Application idea category, first prize application

※(Teburanサポーター含む)

Main Function

- Based on luggage storage services, the app recommends "hidden sightseeing spots" from location information of tourist attractions and statistical congestion data.
- You can use the app as a citizen user or supporter.

3.1.2.3 Planning and implementation of the application contest (Reference) Outline of the winning entries

■ (Reference) Overview of the winning application

Application development category, first prize application

(Temporary name) Kyoto Tourism Assistance, Teruki Matsuoka

Application overview: By entering your departure location and time, the sightseeing spots you will visit and the time you will spend at each spot, bus and train transfer times, along with walking routes, are displayed. Users who haven't decided their route can also create sightseeing plants from "Recommended Routes." An application that reduces tourist concentration through controlling sightseeing routes, access time, and recommended routes.

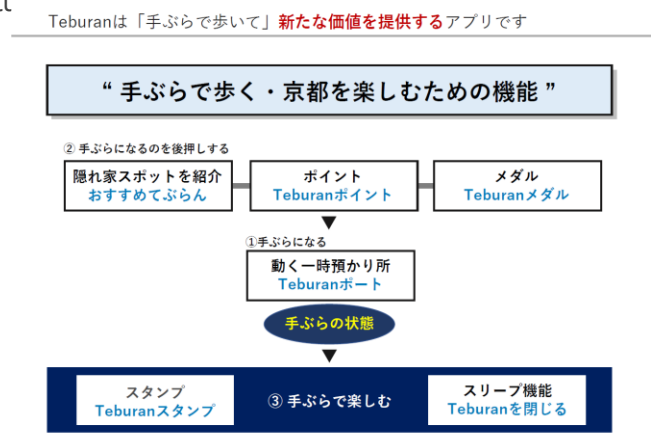
Source: "Kyoto Tourism Assistance" presentation materials, Teruki Matsuoka

Application idea category, first prize application

An application that makes you want to walk empty-handed -Teburan-

Advanced Institute of Industrial Technology, NTT Data Frontier Corporation, Eriko Musashi, Daisuke Kawanishi, Yuya Hatanaka

Idea overview: Based on a luggage storage service, the application reduces congestion at popular sightseeing spots and encourages the discovery of new tourist attractions using unique location information and statistical congestion data. Also, by making it possible to use the application as a citizen user or supporter, the application also encourages participation in tourism volunteering, micro tourism, and the discovery of local att ..



Source: "An application that makes you want to walk empty-handed -Teburan-" presentation materials
Eriko Musashi, Daisuke Kawanishi, Yuya Hatanaka

■ (Reference) Overview of the winning application

Award for improvement in congestion of transportation (Sponsored by NAVITIME)

Tekuteku Kyoto Tour
Asakura Laboratory, School of Environment and Society, Tokyo Institute of Technology, Yuki Yamashita

Idea overview: Based on congestion information, guides tourists to avoid concentration and routes used by citizens and suggests routes that incorporate walking as much as possible. The app raises tourist's awareness of Kyoto further by providing information on shopping districts and detailed information on the areas around famous tourist areas according to the route. The application will recommend nearby luggage storage and delivery services for people with large luggage.

ツアー検索画面　ルート表示画面　設定画面

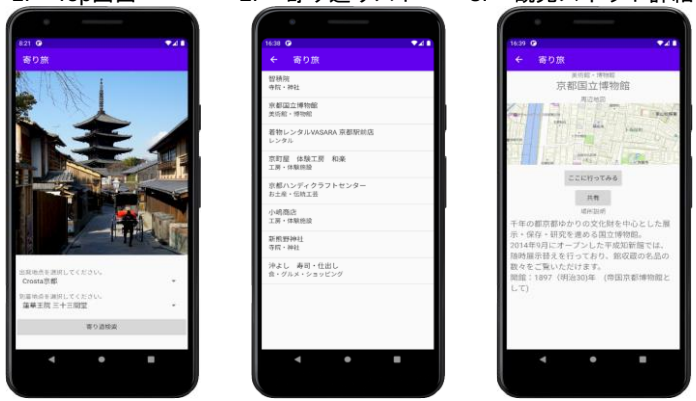
Source: "Tekuteku Kyoto Tour" presentation materials, Yuki Yamashita

Transportation guide improvement award (Sponsored by Val Laboratory Corporation), Monitor award

Yoritabi: Tourist information application optimized for transit routes
Nippon Information and Communication Corporation (Yohei Harada)

Application overview: By users entering their location and destination, the application introduces attractive sightseeing spots and stores along the route and recommends detours to the user. The app makes possible attractive initiatives such as store owners issuing discount coupons to customers who are likely to visit their store. The app provides opportunities for the discovery of new attractions and enables the acquisition of returning customers.

1. Top画面　2. 寄り道リスト　3. 観光スポット詳細



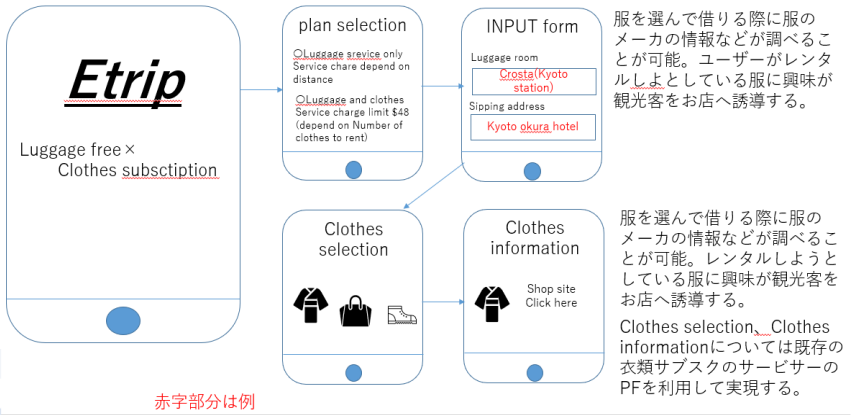
Source: "Yoritabi: Tourist information application optimized for transit routes" presentation materials
Nippon Information and Communication Corporation (Yohei Harada)

■ (Reference) Overview of the winning application

"Handsfree sightseeing" promotion award (Sponsored by Kyoto City Tourism Association)

Etrip: Denso Corporation
Idea overview: Reduce the expensive image of Crosta (luggage storage service) by adding a clothing subscription service. An app that provides the new value proposition of combining sightseeing with fashion, where tourists enjoy fashion, is tailored to the tourist area, while at the same time solving the issues related to tourism with overnight stays (extra luggage caused by bringing extra change in clothing and washing clothes at the accommodation). The application also enables users to purchase clothing they want to keep.

タビマエ（アプリ画面）



Source: Etrip presentation materials, Denso Corporation

Award for improvement in area congestion (Sponsored by Yahoo)

Komikomi Spot: System Science Co., Ltd.
Application overview: Based on AI predictions, the application displays how you can take photos in five stages at photo spots in each sightseeing area. Users visually confirm the congestion at the place they want to go beforehand, and the application contributes to solving congestion and tourist concentration by enticing users to avoid congestion as they can search for other recommended areas and times that are not crowded.

Source: Komikomi Spot, presentation materials, System Science Co., Ltd.

3.1.2.4 Confirmation of data specifications and rules

- Regarding the API and data investigated and verified this time, from the perspective of coordination with data provision companies, we did not put in place an API for integration on the system, and we took the policy of placing the static data in the verification experiment environment.

SIP phase one results	Items that require special attention	Response for this investigation and research
Data specification (Service platform format edition)	- Format unification (provide common headers) - Data format (CSV format)	- We did not set up an information provision API and took the policy of placing the static data in the verification experiment environment. - For transportation data, we cleansed data based on adherence to (GTFS-JP) standard bus information format set forth by MLIT. - We did not covert data when it was provided in a format outside of CSV format (TSV format). - It is conceivable that going forward, we will collect opinions through interviews and questionnaires with contest participants and route navigation service providers regarding data format.
Information provisioning API data specification	- Request format - Response format - Divided transmission of data - Error code	- From the perspective of coordination with data provision companies, we did not put in place an information provision API and instead took the policy of placing the static data in the verification experiment environment.
Information acquisition API data specification	- Request format - Response format - Divided transmission of data - Error code	- We put in place an information acquisition API for some data. - The specification sent data in JSON format not CSV format.

*Regarding the provision of data to contest participants, we set up and provided an API on a trial basis. However, as a result of investigations, it turned out that one part of the specification differed from the SIP Phase one investigation results.

3.1.2.4 Confirmation of data specifications and rules Issues related to data creation (1/2)

- Of the data provided by data providers, data relating to public transportation was processed into GTFS-JP at the contest secretariat and provided to contest participants.
- There were various issues when processing the data to GTFS-JP data, and solving these issues could lead to the constant provision of public transportation data.

Issues related to data	• The data we received was system data or in PDF format, so analysis, decomposing, and organization took time. • Some of the kana readings for bus stops were missing. • It is difficult to decipher route codes. • Understanding the definition of depots (whether there is passenger embarkation or not) • Discrepancies in the representation of stop names in timetable data, fare table data and stop data. Timetable data: XX-Mae Fare table data: XX-Mae (XX) Stop data: XX-Mae(XX) • When linking the timetable and fare table, when the fare table is divided by each branch number even for the same route, linking is necessary.

3.1.2.4 Confirmation of data specifications and rules Issues related to data creation (2/2)

■ (Continued from previous section)

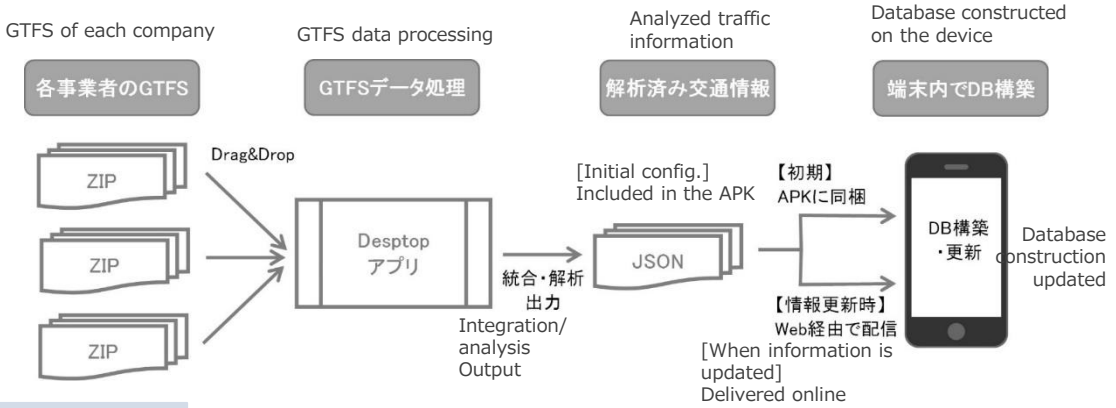
Issues related to information that has not been digitalized	• Latitude and longitude information was insufficient. (We purchased information from map makers and made multiple markers for central points (e.g., longitude and latitude of the area of the median strip of roads and the center of crossroads) • To handle stations as one piece of information, there is the need to decide rules regarding where to place the representative point for longitude and latitude. • When route maps (actual routes for operation) differ from official routes, there needs to be a GTFS rule for representation. • It would be possible to provide more accurate information if arrival and departure platforms are linked with schedules.
Issues with practical initiatives	• The discount for transferring when using an IC card cannot be set.
Issues if data is to be provided after the contest	• Share expertise regarding how to cleanse and handle GTFS-JP data between companies. • Divide costs and roles for routine maintenance when schedules are revised, etc. • Share responsibilities when there is inadequate data. • Cleanse insufficient data for the cleansing of GTFS-JP data. • Coordination between companies related to the data cleansing and maintenance for interconnected direct operation lines.

3.1.2.5 Confirmation of data specifications and rules

- We held discussions with the creators of the winning applications for Arukumachi Kyoto, and we outsourced operations from consultation to application development for the social implementation of the application. The developed application is shown below.

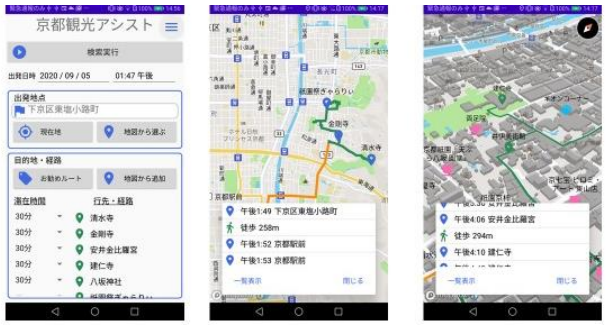
GTFS data processing (desktop application)

We compiled JSON files that have analyzed and integrated GTFS beforehand on the initial start-up, and we built a transportation information database on an android device.



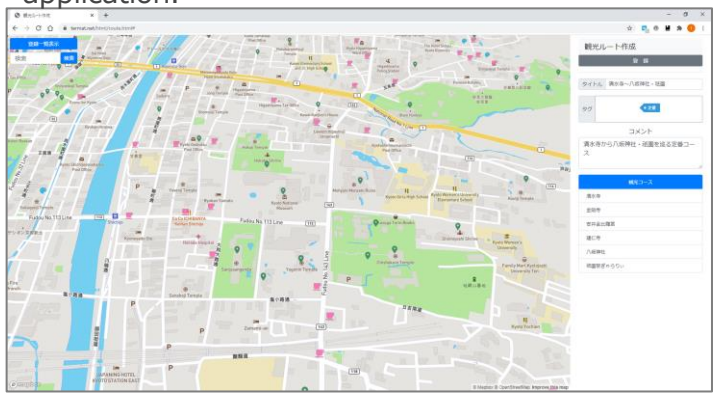
(Temporary name) Kyoto Tourism Assistance (android application)

For the android application, as a smartphone application to assist travel and tourism within Kyoto, we implemented functions that show map and environment information, functions that show transportation routes and timetables, and search functions for travel routes (sightseeing routes).



Sightseeing route creation (web application)

We created a web application for registering and editing "Recommended Routes" used on the Andriod application.



3.1.2.5 Confirmation of data specifications and rules

- We confirmed the conditions for the ongoing provision with the data providers for the contest, including transportation companies.

Direction	Results of negotiations
KYOTO Raku Mobi Contest Data used by the winning application	• We held individual negotiations with the provider of the relevant data, and we extended the contract duration of the agreement that was concluded for the purpose of using data in the contest until March 2021 (the contract duration of this project). As a result, we made adjustments so that data could be used for the continued application development of the winning application.
Ongoing data use after the contest	• Transportation companies, in particular, were of the opinion that it was not an issue to provide materials to the secretariat regarding schedule data at a certain point of time, like this time. However, this was on the assumption that in this situation, information is only being released to contest participants and the secretariat taking responsibility for information quality. • With regard to the sharing of costs and workload, it was suggested that transportation companies would potentially cooperate with contest opportunities if they were in line with the direction of the GTFS response and other measures being considered by individual companies in the future.

3.1.3 The 2nd KYOTO Raku Mobi Contest (FY2021)

3.1.3.1 Overview of initiatives for the 2nd Kyoto Raku Mobi Contest Orientation of initiatives (Overview diagram)

■ The diagram below shows the initiatives in consideration of their positioning in the project. In terms of the orientation of initiatives, we focus on the four points below.
(1) Encouraging contest participants to use MD communet (2) Collection and provision of traffic information
(3) Promoting data providers and participants to use MD communet (4) Framework for continued development

Orientation of initiatives for the 2nd Kyoto Raku Mobi Contest (Overview diagram)

Purpose of constructing an architecture for SIP-adus

For SIP-adus, to realize an automated driving society, we are working on generating and distributing **traffic environment information** essential for automated driving. We will construct **an ecosystem to promote matching between those who own information and those who use it** so that a wide range of users can use traffic environment information for various services.

Development orientation of the portal site (MD communet) — **Entity responsible: NTT Data**

By the end of SIP phase two (FY2022), **we will develop a portal site that can conduct searching and matching of traffic environment information (MD communet＝MD communet)** and proceed with its application

(1) Develop functions such as data search/matching.	(2) Collect traffic environment information to be utilized with MD communet and expand the amount of data and APIs provided.	(3) Conduct wide-ranging dissemination promotion of MD communet towards related parties.	(4) Develop a sustainable MD communet operation scheme even after the conclusion of SIP.

Orientation of continued initiatives in Kyoto (contests, etc.) — **Entity responsible: Mitsubishi Research Institute**

With solving regional issues using traffic environment information as one example, through a contest that promotes data utilization using MD communet, we will develop an **ecosystem for the provision and utilization of data in specific regions.**

(In addition to the initiatives of the first contest, **we will promote exchange between data providers, MD communet, and participants, and we will aim to involve organizations in Kyoto.**)

(1) Have participants use MD communet and provide accurate data.	(2) Collect traffic environment information in Kyoto, and provide this on MD communet.	(3) Encourage Kyoto data providers, participants, and local authorities to use MD communet.	(4) Aim to develop a data provision and utilization scheme that is sustainable even after the conclusion of SIP.
- MD communet utilization support for KYOTO Raku Mobi contest participants	- Data provided from the 1st contest - GTFS-RT (including demo data) - SIP-adus logistics data, etc.		- Continuous provision of traffic environment information - Participation by local government, etc. - Expand the entities that utilize MD communet

3.1.3.2 Outcomes of the review into the 2nd Kyoto Raku Mobi Contest Achievements and challenges of the 1st contest and objective of the 2nd contest

■ In light of the achievements and challenges of the Kyoto Raku Mobi Contest (hereinafter, Contest) held from FY2019 to FY2020, regarding tasks for FY2021, we will organize the content of the 2nd Contest, organize requirements related to the provided data and APIs and the portal site, conduct requests, and negotiations, and coordination to stakeholders. This will be implemented to formulate the implementation plan of the 2nd Contest and prepare for implementation and operation.

Establishing challenges and objectives for the 2nd Kyoto Raku Mobi Contest

Main achievements of the 1st Contest	● A framework targeting a specific region (Kyoto) was created and trialed to collect, process, and provide transportation information (data related to transportation, logistics, and facilities). ● We were able to trial and confirm a sequence where companies, universities, and individuals using the provided transportation information, led to the investigation and development of new applications and services. ● We were able to identify problems that may arise in the above process and review our response policies. ● By adopting a contest format, we communicated initiatives regarding transportation information to many different sectors.
Main challenges of the 1st Contest	● We used a temporary/trial website and system for contest promotion, recruitment, and data provision. ● Mainly in the transportation field, data collection and processing were carried out by the secretariat rather than the transportation operators themselves. ● The data provided was almost all static, with only part of the data being dynamic. ● The secretariat in Tokyo mainly organized the operation system of the contest, and we did not sufficiently involve entities in Kyoto.
Main objectives of the 2nd Contest	● Conduct contest promotion, recruitment, and data provision on the transportation information portal site, MD communet. ● To implement initiatives that lead to the continuous development and provision of data by transportation operators, mainly regarding the data in the standard format for the transportation industry (GFTS-JP). ● Mainly in the transportation industry, work towards the creation, provision, and trial use of dynamic data (GTFS-RT, etc.) ● To try to involve local entities as much as possible in operations and make this the start of continued project development into the future. ● To create a model for horizontal development to other regions by forming a series of data collection, processing, and provision packages in a specific region (Kyoto).

3.1.3.2 Orientation of Initiatives for the 2nd Kyoto Raku Mobi Contest Implementation items based on the orientation of initiatives

■ We organized the correspondence between the orientation of the four initiatives shown on the previous page with the implementation items for this project (for FY2021)

Orientation of initiatives for the 2nd Kyoto Raku Mobi Contest (Correspondence with FY2022 implementation items)

Implementation Items		Orientation of initiatives			
		(1) Have participants use MD communet and provide accurate data.	(2) Collect traffic environment information in Kyoto, and provide this on MD communet.	(3) Encourage Kyoto data providers, participants, and local authorities to use MD communet.	(4) Aim to develop a data provision and utilization scheme that is sustainable even after the conclusion of SIP.
FY2021					
1. Formulation of the contest implementation plan	(1) Organization of content to be implemented (draft)	● Provision of data under the assumption of MD communet utilization ● Setting a theme that will contribute to the solution of local issues	● Appeal to data holders in Kyoto to list data on MD communet	● Appeal to related organizations in Kyoto to use MD communet	● Discuss with organizations in Kyoto about continuous data frameworks
	(2) Requests, negotiation, and coordination regarding data and APIs	—	● Requests, negotiation, and coordination that assumes data will be listed on MD communet	—	● Post-Contest negotiations for continued data provision
	(3) Investigation of the functions/operational requirements of the portal site	● Measures to increase motivation for participation/ utilization while using MD communet	● Data provision system that is correctly integrated with MD communet	—	● Investigation of frameworks that will continue to utilize MD communet after the contest ends
	(4) Formulation of implementation plans	(same as above)	(same as above)	(same as above)	(same as above)
2. Contest Hosting/ Operation (FY2021)	(1) Procurement of the data and API provided at the contest (FY2021)	(Executed based on the implementation plan)	(Executed based on the implementation plan)	(Executed based on the implementation plan)	(Executed based on the implementation plan)
	(2) Contest implementation (FY2021)	● Appeal to participants through press releases, events, etc.	● Adjusted according to the wishes and circumstances of data holders	● Communication focused on related organizations in Kyoto	● Continued communication with organizations in Kyoto
3. Reports at conferences, etc.		—	—	—	—

3.1.3.2 Orientation of Initiatives for the 2nd Kyoto Raku Mobi Contest Implementation items based on the orientation of initiatives

■ We organized the correspondence between the orientation of the four initiatives shown on the previous page with the implementation items for this project (for FY2022)

Orientation of initiatives for the 2nd Kyoto Raku Mobi Contest (Correspondence with FY2022 implementation items)

Implementation Items		Orientation of initiatives			
		(1) Have participants use MD communet and provide accurate data.	(2) Collect traffic environment information in Kyoto, and provide this on MD communet.	(3) Encourage Kyoto data providers, participants, and local authorities to use MD communet.	(4) Aim to develop a data provision and utilization scheme that is sustainable even after the conclusion of SIP.
FY2022 (planned)					
1. Contest Hosting/ Operation (FY2022)	(1) Procurement of the data and API provided at the contest (FY2022)	(Executed based on the implementation plan)	(Executed based on the implementation plan)	(Executed based on the implementation plan)	(Executed based on the implementation plan)
	(2) Contest implementation (FY2022)	● Appeal to participants through press releases, events, etc.	● Adjusted according to the wishes and circumstances of data holders	● Communication focused on related organizations in Kyoto	● Continued communication with organizations in Kyoto
2. Contest outcomes and organization of issues		● Gather contests participants' assessments, opinions, and suggestions regarding the outcomes and issues	● Gather stakeholders' assessments, opinions, and suggestions regarding the outcomes and issues	● Gather organizations in Kyoto's assessments, opinions, and suggestions regarding the outcomes and issues	● Discussion and investigations into developing continuous frameworks in light of contest outcomes
3. Investigations into the promotion of data exchange and utilization using the portal site		● Investigate the state and required functions of data provision that uses MD communet in light of the opinions of contest participants	● Investigate the state of data provision that uses MD communet in light of the opinions of stakeholders	● Organize the requirements demanded of MD communet from the perspective of regional data provision and utilization	● Investigate the state of continuous data provision and utilization that uses MD communet
4. Reports at conferences, etc.		—	—	—	—

3.1.3.3 Outcomes of the review into the 2nd Kyoto Raku Mobi Contest
Orientation of theme setting related to 2nd Kyoto Raku Mobi Contest

■ In the 1st Contest, we primarily focused on ToC, and set the central theme as the solution of issues related to transportation for tourism and living in Kyoto. In the 2nd Contest, we will add the solution to issues related to ToB (logistics operators) and ToB/ToG (transportation operators and local government). We will work on this under the policy of soliciting wide-ranging ideas and applications.

Orientation of theme setting in the 2nd Contest

Contest participants can apply to either the **"App Development Division" or the "App Idea Division."**
Participants select one theme or more from the below (social issues), materialize the issues for the theme, and propose an app to solve the issue. ("App" is not limited to smartphone applications and can also include web, system, or other applications.)

Themes (social issues) (examples)	[App Development Division]	[App Idea Division]
[ToC] Solution of transportation/ logistics issues faced by **residents and tourists**	To develop an app that assumes an end-user (tourists, residents) and will solve tourism, transportation, and logistics issues. ✓ (E.g.) An app that uses real-time train and bus information to assist residents with the use of transportation ✓ (E.g) In light of the COVID-19 pandemic, an app that support tourists with travel plans that take into account congestion	
[ToB] Solution of **logistic operator's** business issues	To propose an app that reduces the burden of issues that occur in the business of a logistics operator. ✓ (E.g.) An app that supports the work of truck drivers by using truck probe information and congestion information, etc.	
[ToB/ToG] Solving the business issues of **transportation operators and local government**, and promoting the use of data	To propose an app that reduces the burden of issues in the business of entities related to transportation or tourism (transportation operator, local government, etc.). ✓ (E.g.) An app that supports transport operators with organizing and transmitting their data (support for organizing and transmitting GTFS) ✓ (E.g.) An app that uses data analysis and utilization to support the drafting of transportation policies for local government, etc.	

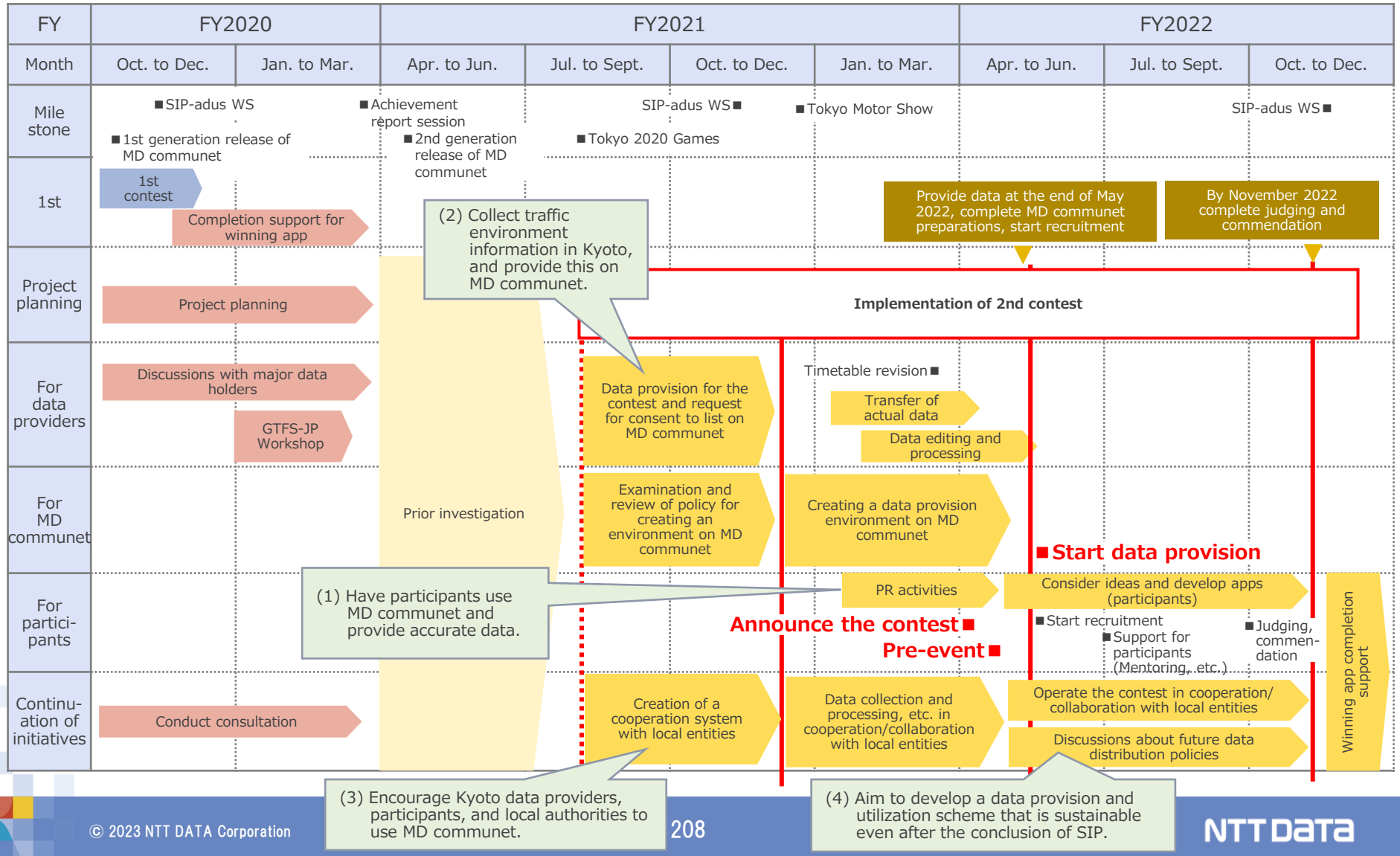
Note: We are currently reviewing the exact content of the themes

Each participant materializes the issues for the theme they choose and proposes an app to solve these issues

3.1.3.3 Outcomes of the review into the 2nd Kyoto Raku Mobi Contest
Implementation Schedule for the 2nd Kyoto Raku Mobi Contest

■ As a major milestone, we plan to announce the contest and hold a pre-event in April 2022, and we will start providing data in May

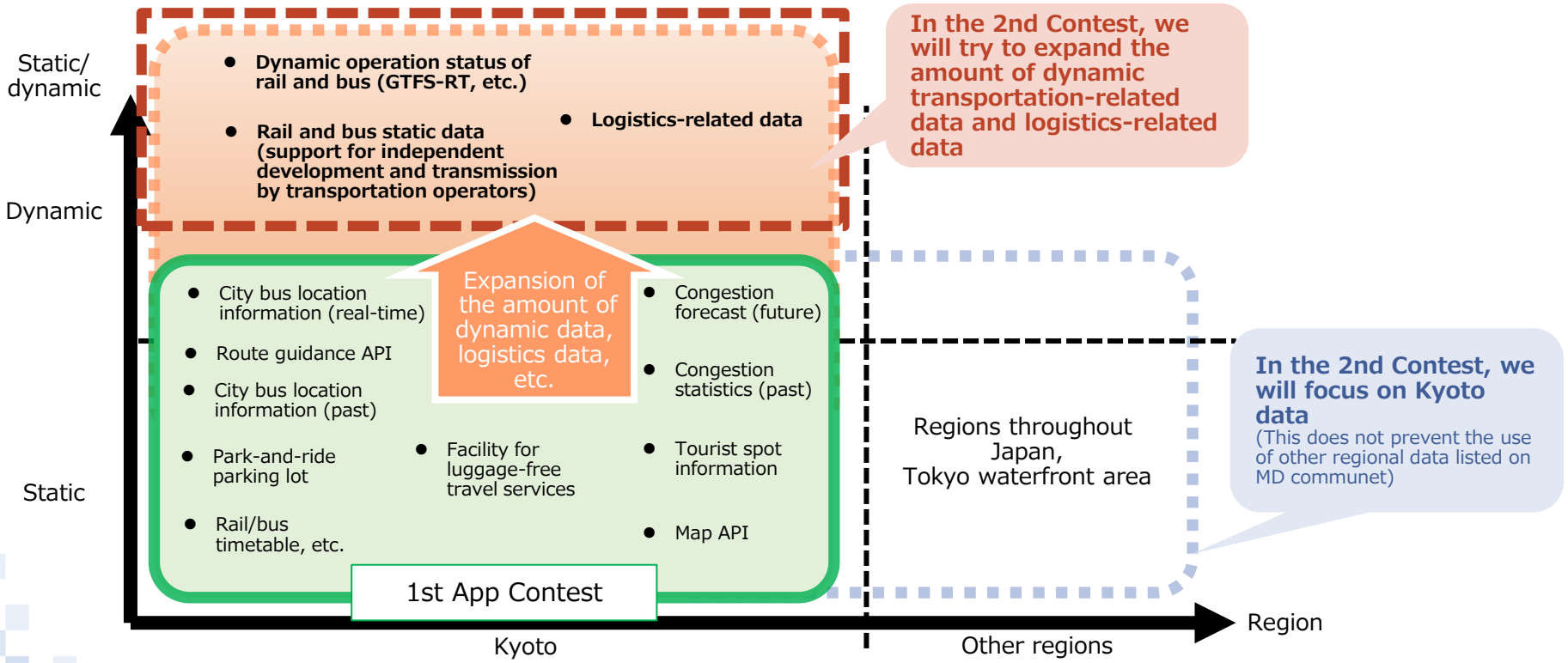
Implementation Schedule for the 2nd Contest



3.1.3.3 Outcomes of the review into the 2nd Kyoto Raku Mobi Contest
Expanding the amount of provided data for the 2nd Kyoto Raku Mobi Contest

- We will promote the use of a wide range of data in addition to data provided by the secretariat as the orientation for expansion of the amount of data provided for the 2nd Contest.
- Also, we predict that we will expand the amount of dynamic rail and bus data and logistics-related data provided by the secretariat
- We will support initiatives of traffic operators for independent development and transmission of the static rail and bus information, which was provided in the 1st Contest.

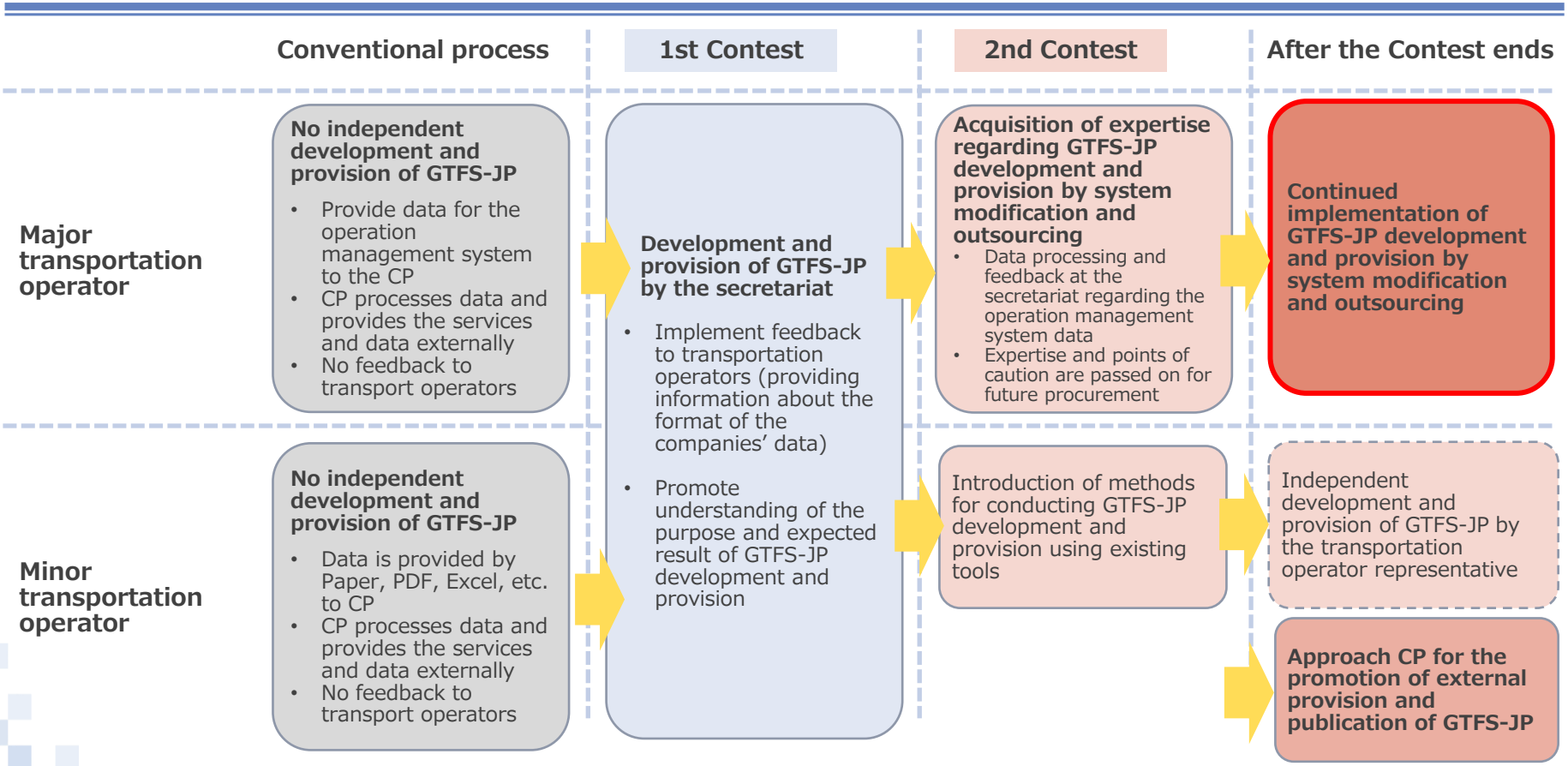
Orientation of the expansion of the amount of provided data in the 2nd Contest



3.1.3.3 Outcomes of the review into the 2nd Kyoto Raku Mobi Contest Roadmap for GTFS-JP data organization and provision through the involvement of transportation operators (Draft)

■ The project is designed to promote standardization, development, and upgrading of traffic data through the independent involvement of traffic operators. Specialist operators conventionally handle data organization and provision. However, in the 1st Contest, we explored the possibilities of development and provision by the secretariat. In the 2nd Contest, we want to expand the involvement of transportation operators. We envision a roadmap that will promote the development, updating, and provision of data through the independent involvement of transportation operators after the Contest ends.

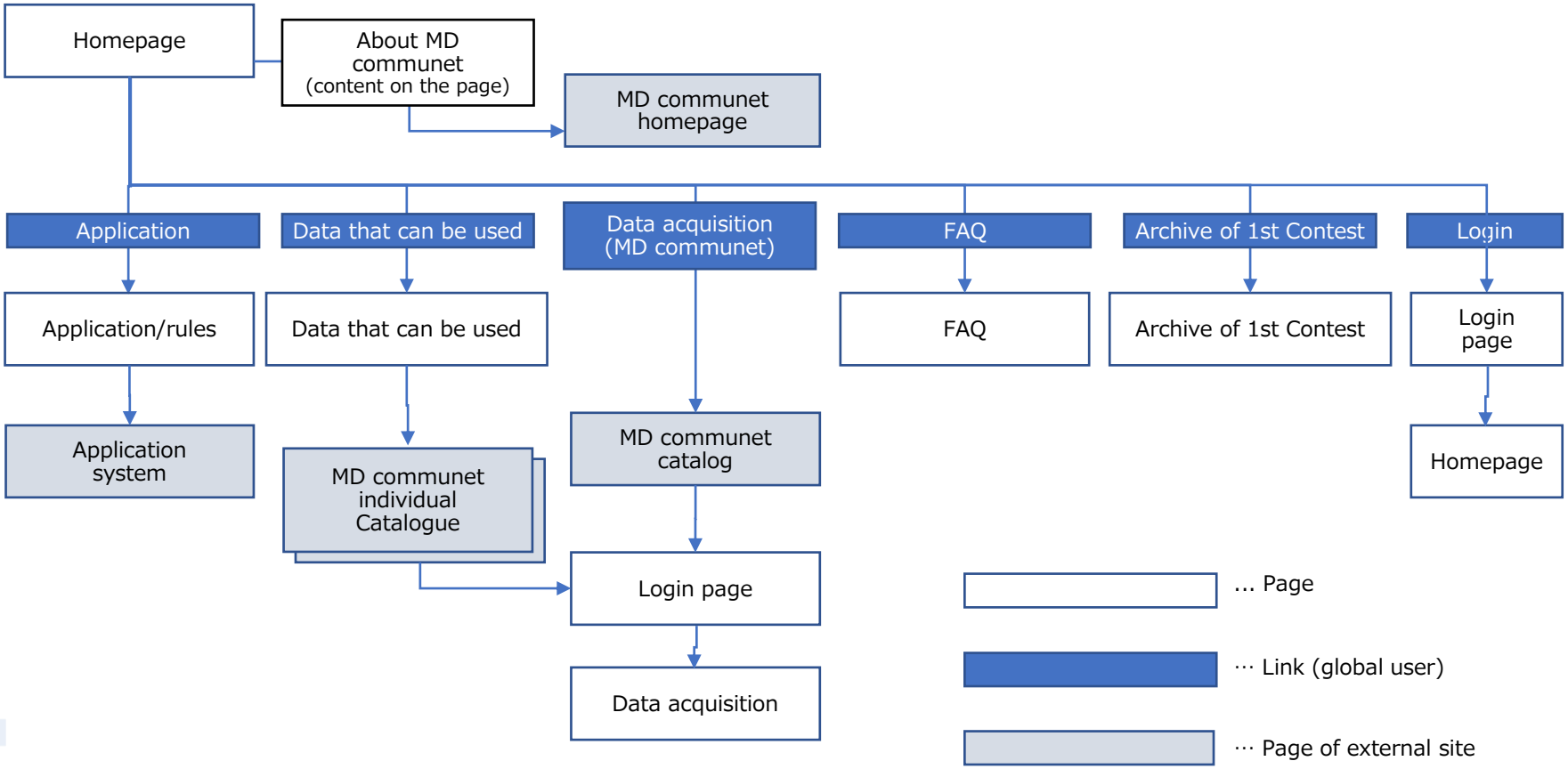
Roadmap for GTFS-JP data organization and provision (Draft)



3.1.3.3 Outcomes of the review into the 2nd Kyoto Raku Mobi Contest Preparation of the Contest Site for Holding the Contest

■ While the maintaining its main approach of acting as a portal and catalog site, we examined and organized the site structure to achieve effortless navigation to Contest-related content or sites that provide data

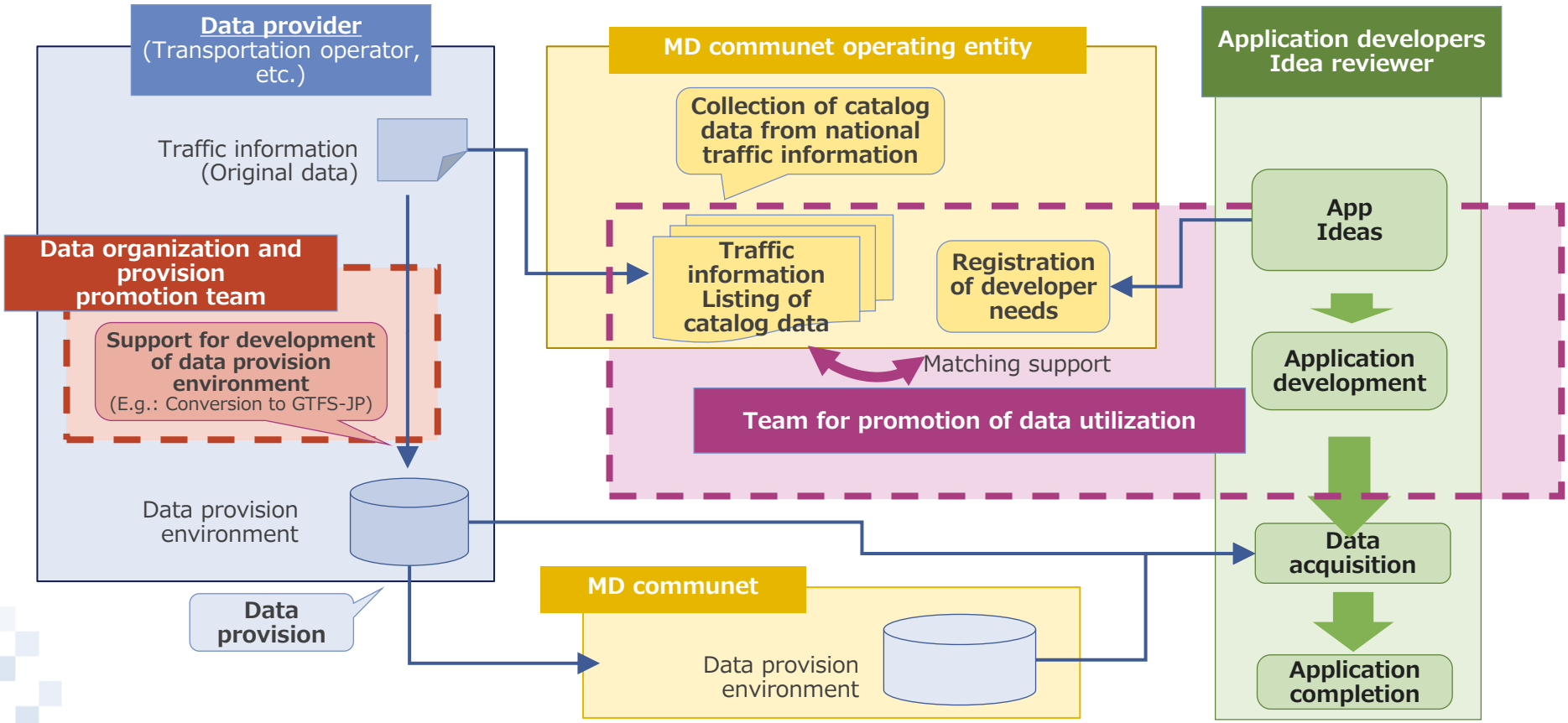
Proposed configuration for linking the contest site with MD communet



3.1.3.3 Outcomes of the review into the 2nd Kyoto Raku Mobi Contest Post-Contest local operation structure (Draft)

- We will hold discussions and investigations with local entities about creating a framework where the MD communet operating entity, local data provision entities, data utilizing entities, and local government can coordinate appropriately and share responsibilities while developing, updating, and distributing traffic information.

Results of the investigations into a possible proposal regarding the post-contest local management system



3.1.3.4 Outcomes of the review into the 2nd Kyoto Raku Mobi Contest Achievements of FY2021 initiatives and planned initiatives for FY2022

■ Below is an overview of FY2021 achievements and planned initiatives for FY2022

Overview of FY2021 achievements and planned initiatives for FY2022

Initiatives	FY2021 achievements	Planned initiatives for FY2022
Project planning	● We planned and proposed the Contest as an opportunity to investigate the following matters for the 2nd Contest and also look ahead to post-Contest development: Data collection, processing, listing on the portal site, distribution, and utilization.	● — (Initiatives will be implemented in line with the project plan drafted in FY2021)
Initiatives for data providers (Data collection, listing on MD communet)	● While following the initiatives of the 1st Contest, we promoted coordination and negotiation with stakeholders based on the policy of transport operators independently organizing their data and an expansion in the amount of logistics and dynamic data. ● Of the three sectors of transportation, logistics, and facilities, we came to a general agreement on transportation (static data), logistics, and facilities.	● We will construct a framework to acquire and process data obtained from requests and negotiations in FY2021, then provide the data by listing it on the portal site (around May 2022) ● We will decide on the specific targets and content of traffic data (dynamic data) and construct a distribution framework (around June 2022)
Initiatives for MD communet (System investigation/construction)	● We implemented the design and construction of a dedicated Contest site linked to MD communet and a data provision system.	● Start operation of the dedicated Contest site (planned for April 2022) ● Start construction of the data provision system and data listing (May 2022)
Initiatives for participants (Contest hosting and operation)	● We investigated the attributes of potential target participants (region, expertise, etc.) ● We reviewed PR strategy in discussions with related organizations regarding the primary target (entities in Kyoto, ICT-related entities).	● We will appeal to potential participants through press releases, e-mail newsletters, etc. ● We will promote initiatives to encourage participation and improve the quality of submission through pre-events (explanation sessions, ideathons) and continuous mentoring
Initiatives for the continuation and development of the project	● We held discussions with Kyoto-based related organizations (transportation, tourism, ICT, etc.) about the possibilities and challenges of continued initiatives	● In light of the FY2021 discussions, we will evaluate and coordinate frameworks for post-Contest developments, systems, and the content of initiatives

3.1.4 The 2nd KYOTO Raku Mobi Contest (FY2022)

NTT DATA

3.1.4.1 Orientation of initiatives for the 2nd KYOTO Raku Mobi Contest
Implementation items based on the orientation of initiatives

■ We organized the correspondence between the orientation of the four initiatives shown on the orientation of initiatives (overview diagram) with the implementation items for this project

Orientation of initiatives for the 2nd KYOTO Raku Mobi App Contest (Correspondence with FY2021 implementation items)

Implementation Items		Orientation of initiatives			
		(1) Have participants use MD communet and provide accurate data.	(2) Collect traffic environment information in Kyoto, and provide this on MD communet.	(3) Encourage Kyoto data providers, participants, and local authorities to use MD communet.	(4) Aim to develop a data provision and utilization scheme that is sustainable even after the conclusion of SIP.
FY2021					
1. Formulation of the contest implementation plan	(1) Organization of content to be implemented (draft)	● Provision of data under the assumption of MD communet utilization ● Setting a theme that will contribute to the solution of local issues	● Appeal to data holders in Kyoto to list data on MD communet	● Appeal to related organizations in Kyoto to use MD communet	● Discuss with organizations in Kyoto about continuous data frameworks
	(2) Requests, negotiation, and coordination regarding data and APIs	—	● Requests, negotiation, and coordination that assumes data will be listed on MD communet	—	● Post-Contest negotiations for continued data provision
	(3) Investigation of the functions/operational requirements of the portal site	● Measures to increase motivation for participation/utilization while using MD communet	● Data provision system that is correctly integrated with MD communet	—	● Investigation of frameworks that will continue to utilize MD communet after the contest ends
	(4) Formulation of implementation plans	(same as above)	(same as above)	(same as above)	(same as above)
2. Contest Hosting/Operation (FY2022)	(1) Procurement of the data and API provided at the contest (FY2022)	(Executed based on the implementation plan)	(Executed based on the implementation plan)	(Executed based on the implementation plan)	(Executed based on the implementation plan)
	(2) Contest implementation (FY2022)	● Appeal to participants through press releases, events, etc.	● Adjusted according to the wishes and circumstances of data holders	● Communication focused on related organizations in Kyoto	● Continued communication with organizations in Kyoto
3. Reports at conferences, etc.		—	—	—	—

3.1.4.1 Orientation of initiatives for the 2nd KYOTO Raku Mobi Contest
Items implemented regarding the 2nd KYOTO Raku Mobi contest (FY2022)

- In FY2022, we summarized the contest's implementation, operation achievements, and challenges and investigated developments after the contest ended.

Items implemented regarding the FY2022 KYOTO Raku Mobi content implementation

1. Contest Hosting /Operation (For the following year)	(1) Procurement of the data and API provided at the contest (FY2022)	● Based on the implementation plan, we will procure the data and API to be provided to contest participants from the data holder and make calibrations so that it can be used by contest participants in application planning, investigation, and development.
	(2) Contest implementation (FY2022)	● Based on the implementation plan, we will prepare for the implementation and operation of the contest (application, selection, commendation) conducted by the secretariat. ● For the implementation and operation of the contest, conduct sufficient discussion and coordination with the operating entity of the portal site so that information related to the contest is provided through the portal site.
2. Contest outcomes and organization of issues		● Through post-contest consultations with contest and operation participants, we will identify and organize the achievements of the contest and challenges related to portal site and contest operation. ● We will outsource the development of the winning application of the application development division to make it into an application that can withstand practical use.
3. Investigations into the promotion of data exchange and utilization using the portal site		● In light of indications we gained by holding the contest, we will identify and organize know-how and suggestions regarding the below items that make use of the portal site: Transportation data distribution (transfer, editing, processing, provision), utilization, and matching measures for needs and seeds (community creation, holding of events such as contests).
4. Reports at conferences, etc.		● We will report on the status of investigations and project implementation to the committee and working group of the Strategic Innovation Promotion Program (SIP) Phase 2/Automated Driving (expansion of system and service).

3.1.4.2 Hosting and Operation of the 2nd KYOTO Raku Mobi Contest
Overview of Contest hosting

■ We hosted the 2nd KYOTO Raku Mobi Contest in line with the policy mentioned previously. The overview of Contest hosting is as below.

Implementation Overview of the 2nd KYOTO Raku Mobi Contest

A) App Development Division

Contestants will develop an app (Android/iPhone) that solves a problem Kyoto is facing using real data provided by SIP-adus or MD communet's data catalog and search functions. They will compete on the degree of data utilization, the degree to which they solve problems in Kyoto, and the easy of use of the app.

2) App Idea Division

Contestants will propose an idea for an application or future developments (e.g., possibilities for data expansion, regional implementation methods) that solves a problem Kyoto is facing, using real data provided by SIP-adus or MD communet's data catalog and search functions. They will compete on the degree of data and ideas to solve problems in Kyoto.

Contest name	2nd App Contest to Solve Issues Related to Tourism and Transport in Kyoto (Nickname: 2nd KYOTO Raku Mobi Contest)
Host	Cabinet Office
Cooperation from	Kyoto City
Project management	Japan's New Energy and Industrial Technology Development Organization (NEDO)
Project implementation	NTT DATA Corporation
Secretariat	Mitsubishi Research Institute, Inc.
Sponsors	Aioi Nissay Dowa Insurance Co., Ltd., Val Laboratory Corporation Kyoto City Tourism Association, THE KYOTO SHINKIN BANK, Yazaki Energy System Corporation, Yahoo Japan Corporation

3.1.4.2 Hosting and Operation of the 2nd KYOTO Raku Mobi Contest
Data provision

- Contestants could refer to and use a wide range of data listed and introduced on MD communet, and we provided the below data listed on MD communet exclusively for the Contest.
- For transportation data, we promoted the providers in standard data formats such as GTFS, GTFS-JP, and GTFS-RT.

List of data provided for the 2nd KYOTO Raku Mobi Contest

Transportation

Data content	Data providers	Data format	Data provision location
Kyoto Municipal Subway: stations, lines (system), timetable, fare data, etc.	Kyoto Urban Planning Bureau	GTFS	MD communet
Eizan Electric Railway: stations, lines (system), timetable, fare data, etc.	Eizan Electric Railway Co., Ltd.	GTFS	MD communet
Eizan Electric Railway: real-time information	Eizan Electric Railway Co., Ltd.	GTFS-RT	MD communet
Keifuku Electric Railroad: stations, lines (system), timetable, fare data, etc.	JTB Corporation, Kyoto Branch	GTFS	MD communet
Keifuku Electric Railroad: Tram location data, etc.	JTB Corporation, Kyoto Branch	CSV	MD communet
Kyoto City Bus: Bus stops, lines (system), timetable, fare data, etc.	Kyoto Urban Planning Bureau	GTFS-JP	MD communet
Kyoto City Bus: Bus location data, etc.	Kyoto Pedestrianization System and Consortium for Bus and Rail Transit Information Dissemination	Binary	MD communet
Kyoto City Bus: Bus location information API	Kyoto Pedestrianization System and Consortium for Bus and Rail Transit Information Dissemination	API	MD communet
Kyoto City Bus: Bus stops, lines (system), timetable, fare data, etc.	JTB Corporation, Kyoto Branch	GTFS	MD communet
Kyoto City Bus: Bus location data, etc.	JTB Corporation, Kyoto Branch	CSV	MD communet
Yasaka Bus: Bus stops, lines (system), timetable, fare data, etc.	Yasaka Bus Co., Ltd.	GTFS-JP	MD communet
Yasaka Bus: real-time information	Yasaka Bus Co., Ltd.	GTFS-RT	MD communet
Kyoto Park and Ride: Parking lot data	Kyoto Urban Planning Bureau	CSV	Other data

Logistics

Data content	Data providers	Data format	Data provision location
Location data (point sequence data for individual vehicles) and departure and arrival location data of logistics vehicles in 100 square kilometers of the main area of Kyoto City	Yazaki Energy System Corporation	CSV	MD communet
Data for road slipperiness (2nd KYOTO Raku Mobi Contest)	Sumitomo Rubber Industries	CSV	MD communet
Vehicle driving data (statistics)	Aioi Nissay Dowa Insurance	CSV	MD communet

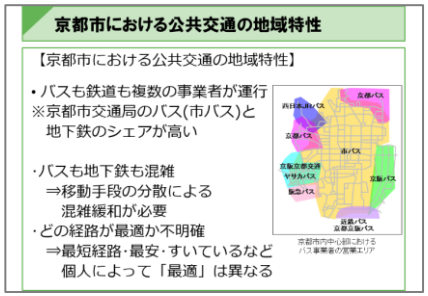
Facilities and tourism

Data content	Data providers	Data format	Data provision location
Tourist spot information within Kyoto	Kyoto City Tourism Association (DMO KYOTO)	XLSX	MD communet
Information for the estimated level of congestion around popular tourist spots	Kyoto City Tourism Association (DMO KYOTO)	XLSX	MD communet
Wi-Fi spot information within Kyoto	Kyoto City Tourism Association (DMO KYOTO)	XLSX	MD communet
Human flow data for the areas around Kyoto tourist locations (estimate) (2nd KYOTO Raku Mobi Contest)	Yahoo Japan Corporation	CSV	MD communet
Location guidance service API	Zenrin Co., Ltd.	API	Other data
HERE Vector Tile API、HERE Routing API、HERE Geocoding and Search API、HERE SDK for Flutter	HERE Technologies	API	MD communet
Data from stores for the temporary storage and delivery of luggage and coin locker spot data	2nd KYOTO Raku Mobi Contest Secretariat	CSV	Other data

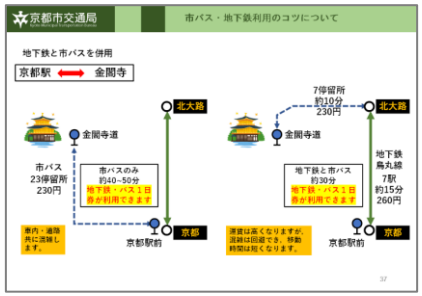
3.1.4.3 Hosting and Operation of the 2nd KYOTO Raku Mobi Contest
Identification of issues and preliminary events with the participation of Kyoto-based stakeholders

- We implemented the Contest with the participation and cooperation of Kyoto-based stakeholders in identifying issues, sponsorship, and awards.
- We held a preliminary event where academic experts, transportation companies, local governments, and other Kyoto-based stakeholders presented issues that are expected to be solved in terms of transportation concerning transportation, tourism, and daily life.
- Also, for sponsorship and awards, we had participation from Kyoto City, Kyoto Tourism Association, and Kyoto Shinkin Bank. These organizations participated in the selection and commendation of contestants from the perspective of solving issues and creating services and businesses in Kyoto.

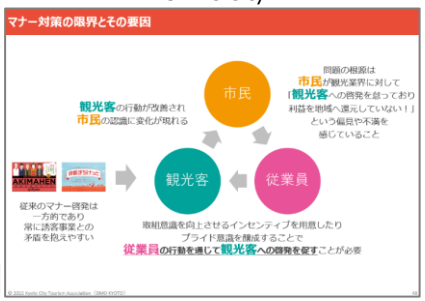
Proposal of issues that are expected to be solved by Kyoto-based stakeholders



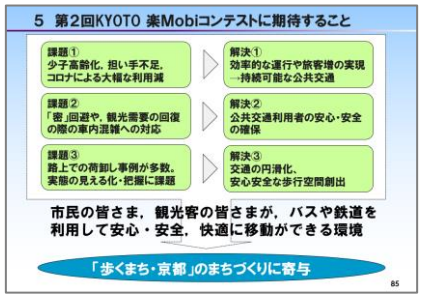
Professor Manabu Inoue, Ryukoku University



Kyoto City Transportation Bureau



Kyoto City Tourism Association



Kyoto City (Kyoto Pedestrianization Promotion Office)

Sponsorship and commendation

App Development Division Winner

Kyoto Pedestrianization Prize (Kyoto Mayor Prize)

App improvement support: up to 1 million JPY (outsourced)*1

App Idea Division Winner

SIP-adus Prize
(Cabinet Office Secretary General for Science, Technology and Innovation Policy Prize)

Prize money (100,000 JPY)

Kyoto Regional Support Award
(Sponsored by Kyoshin Question)
Usage ticket for the QUESTION Building*2

Real-time Traffic Information Utilization Award
(Sponsored by NAVITIME)
Prize money (approx. 30,000 JPY)

Prize for the analysis of interests and human flow
(Sponsored by Yahoo Japan)
Prize money (approx. 30,000 JPY)

Transportation Company Support Award
(Sponsored by Val Laboraton Corporation)
Prize money (approx. 30,000 JPY)

Award for the Support of Harmony Between Living and Tourism
(Sponsored by Kyoto City Tourism Association)
Prize money (approx. 30,000 JPY)

Logistics Company Support Award
(Sponsored by Yazaki Energy System Corporation)
Prize money (approx. 30,000 JPY)

Award for the Utilization of Road Traffic Information
(Sponsored by Aioi Nissay Dowa Insurance)
Prize money (approx. 30,000 JPY)

3.1.4.3 Hosting and Operation of the 2nd KYOTO Raku Mobi Contest Final screening and award ceremony

- There were 32 entries to the contest, and in the end, a total of 16 applications were submitted, 5 for the App Development Division and 11 for the App Idea Division. After screening by the secretariat, ten finalists were chosen, five for the App Development Division and five for the App Idea Division.
- The final screening session and award ceremony was held at Kyoto Research Park on December 11, 2023. A total of nine apps were chosen and awarded, including the winning apps for the App Development Division and App Idea Division were chosen, and seven apps were awarded division prizes.
- Also, a panel discussion was held on the development and dissemination of MD communet, which was also streamed online.

List of selected and commended apps

Award	App	Prize winner
App Development Division Winner **Kyoto Pedestrianization Prize** (Kyoto Mayor Prize)	A public transport information app that shows incorporates real-time traffic conditions to realize smart cities	B&T Yuki Ishikawa
App Idea Division Winner **SIP-adus Driving Prize** (Cabinet Office Secretary General for Science, Technology and Innovation Policy Prize)	Connected Signage	Yokohama National University Taichi Furukawa
Kyoto Regional Support Award (Sponsored by Kyoshin Question)	Kyoto Town Layer Map App	Masateru Higashi
Transportation Company Support Award (Sponsored by Val Laboratory Corporation)	Bus Update Navigator	Yokohama National University Taichi Furukawa
Real-time Traffic Information Utilization Award (Sponsored by NAVITIME)	Bus Update Navigator	Yokohama National University Taichi Furukawa
Award for the Support of Harmony Between Living and Tourism (Sponsored by Kyoto City Tourism Association)	Slow Tourism App －Suiterun－	Advanced Institute of Industrial Technology Eriko Musashi, Toru Hirono, Hirouki Maruyama, Takaaki Hosono
Award for the Utilization of Congestion Information (Sponsored by Yahoo Japan)	Kyoto Treasurebox	Qwi Inc.
Award for the Utilization of Road Traffic Information (Sponsored by Aioi Nissay Dowa Insurance)	Bus Update Navigator	Yokohama National University Taichi Furukawa

Award ceremony (finalists and judges)

App Development Division Winner Yuki Ishikawa, B&T

App Idea Division Winner Taichi Furukawa, Yokohama National University

3.1.4.3 Hosting and Operation of the 2nd KYOTO Raku Mobi Contest
Future developments

- We implemented the following regarding future developments based on the outcomes of holding the Contest twice:
  1) Support with data providers regarding the ongoing provision of data by MD communet
  2) Additional development support for the commercialization of winning apps
  3) Investigations into the promotion of ongoing data provision, sharing, and utilization of data in local areas

1) Support with data providers regarding the ongoing provision of data by MD communet

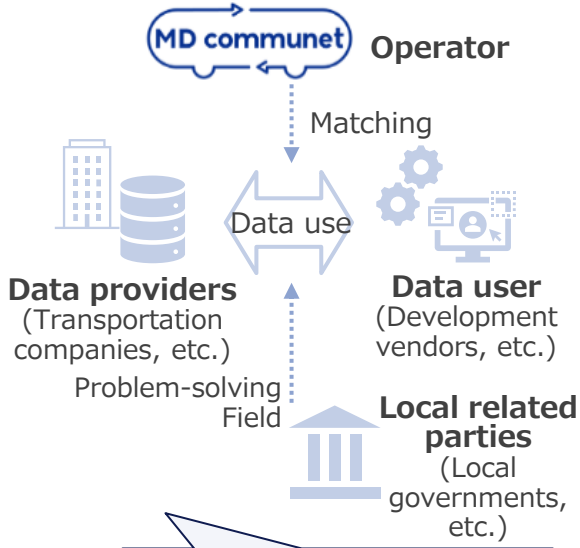
Discussions with Kyoto transportation companies and others to continue to use **MD communet** after the contest

2) Additional development support for the commercialization of winning apps

Intellectual property rights belong to the contest participants

Feedback from the judges, financial support for the completion of winning applications, **mentoring for commercialization, etc.**

3) Investigations into the promotion of ongoing data provision, sharing, and utilization of data in local areas



Discussions with Kyoto officials about coordination between the four parties

3.1.4.3 Future Developments
Achievements of the undertaking and Future Issues and Developments

■ The results, issues, and future developments of the second contest mentioned prerviously are as follows.

Direction of Initiatives	Main objectives of second contest	Results of the initiative	Remaining issues	Future developments
① Invite contestants to use MD communet and provide accurate data.	・To deploy information dissemination, recruitment and data provision on MD communet.	・Deployed information dissemination and recruitment related to the contest on MD communet while linking with a specific site. ・In principle, all data were provided by MD communet.	・Strengthen MD communet from the perspective of data users (Data lineup, guidance and matching according to user's needs).	・Improve and strengthen MD communet based on opinions and suggestions from contest participants (Lineup of posted data, search function, matching support, etc.).
② Collect traffic environment information in Kyoto and provide it through MD communet	・To develop data provision on MD communet. ・To attempt to provide dynamic data in transportation field.	・In principle, all data were provided by MD communet. ・Realized trial provision of GTFS-RT, a standard format for dynamic data in the transportation field (railway and bus company, one company each).	・Strengthen MD communet from a data provider perspective (Supporting search for utilization needs, providing information along with use cases and examples of practical use, etc.).	・Improve and strengthen MD communet based on opinions and suggestions from data providers in contests (Enhance guidance, introduction of use cases and examples of practical use, matching support, etc.).
③ Encourage data providers, participants and local governments in Kyoto to use MD communet.	・To develop information dissemination, recruitment and data provision on MD communet.	・Implemented information dissemination, recruitment and data provision about contest on MD communet. ・Held events to promote MD communet along with the final selection and award ceremony of the contest.	・Promote dissemination of MD communet to more stakeholders. ・Involve stakeholders in public transport sector.	・Dissemination of information on MD communet, events, etc. (continuously development) ・Strengthen collaboration with stakeholders in public transportation sector.
④ Aim at creating a mechanism for sustainably providing and utilizing data even after the termination of SIP.	・To make effort to ensure that data in the transportation field is continuously maintained and provided by transportation operators. ・To involve local actors in the operational structure of contest. ・To form models that can be expanded horizontally to other regions.	・Promoted provision of data in standard format (GTFS-JP, RT) by transportation operators themselves. ・Major operators plan to start providing data by themselves. ・In addition to local governments, as well as shinkin banks and other organizations were also involved in the operation, selection and discussion of contests. ・Many submission from local ventures. ・We discussed expanding the structure of the contest, which was held twice in Kyoto, to other regions horizontally as the "Kyoto Model."	・Self-data curation and provision primarily by small and medium-sized businesses. ・Continued data provision, distribution, and utilization by local stakeholders. ・Leverage the results achieved in Kyoto to expand horizontally to other regions.	・Support for data curation and provision, mainly for small and medium-sized businesses (e.g. referral of businesses). ・Continued communication with local stakeholders. ・Expand to other regions.

4. Achievements and Future Challenges

NTT DATA

4. Achievements and Future Challenges (1/3)

■ Achievements of the project and future challenges are summarized as follows.

	Achievements of the project	Future Challenges
Theme a	**Development of portal site** • The portal site was opened to the public and operated stably. • Advanced recommendation functions such as recommendation and display of similar data and related keywords were implemented. • A data-linkable platform with other fields was built. • Improvement activities and stronger linkages were carried out in conjunction with the Promotion HP, such as user flow optimization, SEO optimization, and addition of company profiles. **Dissemination promotion of portal site** • Efforts were made to enhance the attractiveness of MD communet, including the expansion of distinctive data such as probe data and regulatory information, the solicitation of data providers and users, and the implementation of events. • Through various promotional activities, we now include XXX companies and organizations as our members, and the number of data posted became XXXX. • The business model required for MD communet to be implemented in society from fiscal 2023 onward will be materialized, and the operation will continue from fiscal 2023 onward at NTT Data.	**Development of portal site** • Maintain and operate the portal site on an ongoing basis. • Conduct UI/UX improvement activities based on feedbacks from users and operations. • Promote efficient and effective collaboration with other fields. • Strengthen two-way collaboration with Promotion HP on the use cases and columns of FOTs results. **Dissemination promotion of portal site** • Continue to build friendships through ongoing promotional activities after social implementation. • Continue to promote the use and application of mobility data through member/non-member matching and case creation. • To ensure the continuous operation of the service, we will strive to build a better community by adding services and changing rules while listening to the voices of our members.

4. Achievements and Future Challenges (2/3)

■ Achievements of the project and future challenges are summarized as follows.

	Achievements of the project	Future Challenges
Theme b (including Theme a)	**Promotion of FOTs projects** • FOTs were conducted in SIP-Automated Driving "Tokyo Waterfront Area Field Operation Tests" using developed service and applications based on provided data. • In collaboration with service providers, sustainable services were developed and demonstrated. • Towards the utilization and collaboration of collaborative data in logistics field which leads to the resolution of common social issues in the industry, data candidates, which have the potential to be used in collaborative domains and relate to the approaches and challenges of logistics operators, were extracted based on the investigation of the issues faced by the logistics industry. • Symbolic service creations using data posted on MD communet were carried out to show the usefulness of data utilization. In addition, we verified the support necessary for service creation as MD communet operation team and organized effective support contents.	**Promotion of FOTs projects** • Promote the utilization and collaboration of traffic environment data by continuing to create MD communet symbolize service examples by encouraging data users and providers to use the support content organized in this project. • Promote the utilization and collaboration of traffic environment data by continuing to expand the scope of application of design template artifacts that lower the hurdle and make traffic environment information easier to handle.

4. Achievements and Future Challenges (3/3)

■ Achievements of the project and future challenges are summarized as follows.

	Achievements of the project	Future Challenges
Theme C	**KYOTO Raku Mobi Contest** • Through negotiation and coordination with various parties, we collected various traffic environment information (traffic, logistics and facilities) to be posted on the portal site. • We processed and edited the collected traffic environment information into a standard format and provided it through portal site, etc., and conducted a total of two app contests. • Through contests, we were able to obtain a variety of apps and ideas that contribute to solving local issues by using traffic environment information. • In addition, we were able to use contests as an opportunity to promote the provision and disclosure of data from data holders. • A network of various parties involved in the contest (Data holders, data users, data distribution supporters, local management-related entities, etc.) was established.	**KYOTO Raku Mobi Contest** • Continue to communicate with data holders who have cooperated with the contest and follow up on initiatives to provide and publish traffic environment information data. • Continue to communicate with local governments and follow up on promotion activities for the provision and use of data in local areas. • Continue and expand operations in Kyoto City while exploring the possibility of expanding operations horizontally to other areas.

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.