Strategic Innovation Program Phase III

Building Smart Mobility Platforms

Building smart districts with advanced mobility systems

March 2024

Tokai National Higher Education and Research System

NAGOYA UNIVERSITY

Contents

1. Purpose

The purpose of this R&D project is to usher in an ideal future for urban spaces and mobility services, creating **communities that are free of mobility divides and where people, things, and services can move with freedom, independence, safety, and comfort—all while being friendly to the environment, to people, and to the surrounding communities**.

Our mission as we move towards this purpose is to build a smart mobility platform that makes movement safe, eco-friendly, fair, and seamless for the people, things, and services being moved. This means dynamically integrating the hard and soft infrastructure needed to power new modes of transport with existing public transport, private and commercial vehicles, and a wide variety of other mobility resources, as well as with the communities and regions providing the backdrop for it all.

2. Overview

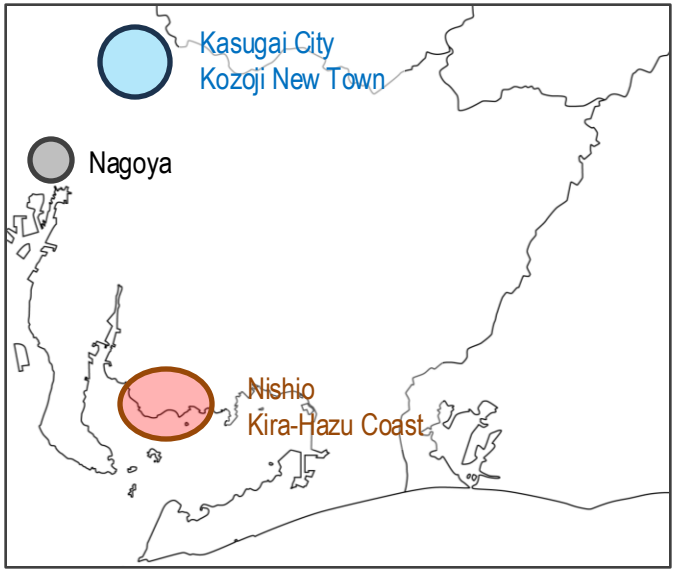
Background: With the future of public transportation at risk, the auxiliary transport systems that support local mobility and feed key transport routes are in crisis

Proposed solution: Set up "smart districts" to serve as hubs for smart, local mobility solutions to local transport needs

Demonstrate at "Model District" in two locations in Aichi prefecture

- **Theme #18**: Development and proposal of **accessibility assessment** index to urban functions by public transport
- **Theme #11**: Provision of smart local mobility services by building MaaS connected to **mobility hubs**.
- **Theme #12**: Development and proposal of **automated vehicle prototype** which supports smart local mobility services
- **Theme #13**: Proposal of measures **for social systemization of automated vehicles** in smart districts

- **Theme #17**
  - Promoting development through international cooperation
  - Addressing international standardization of specifications, etc.



Source: https://www.freemap.jp/itemFreeDlPage.php?b=aichi&s=aichi

3. Timetable

事業項目	2023年度				2024年度				2025年度				2026年度				2027年度			
	第1四半期	第2四半期	第3四半期	第4四半期	第1四半期	第2四半期	第3四半期	第4四半期	第1四半期	第2四半期	第3四半期	第4四半期	第1四半期	第2四半期	第3四半期	第4四半期	第1四半期	第2四半期	第3四半期	第4四半期
■研究課題11																				
＜愛知県春日井市　高蔵寺ニュータウン＞																				
①全体設計の深化およびモデル・ディストリクト関係者との認識共有深化			→	→																
②高蔵寺ニュータウンでの実証実験の企画				→	→	→	→	→												
③受容性や運行頻度の評価									→	→	→	→								
④モビリティマネジメントの高度化				→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
＜愛知県西尾市　吉良・幡豆海岸＞																				
⑤現地体制の強化、深化と関係者との認識共有深化			→	→																
⑥吉良・幡豆海岸での実証実験の設計および調整				→	→	→	→	→												
⑦吉良・幡豆海岸での実証実験の実施									→	→	→	→								
⑧実証実験の整理と取りまとめ													→	→	→	→	→	→	→	→
■研究課題12																				
⑨車両要件の整理及び試験車の設計開発			→	→	→	→	→	→												
⑩車両要件の充足の検証および受容性の検証									→	→	→	→								
⑪標準型自動運転車両の提案													→	→	→	→	→	→	→	→
■研究課題13																				
⑫自動運転レベルの影響分析			→	→	→	→	→	→												
⑬自動運転の社会実装における社会システムの設計			→	→	→	→	→	→												
⑭社会システムの評価									→	→	→	→								
⑮手順書の整備													→	→	→	→	→	→	→	→
■研究課題17																				
⑯国際連携の推進			→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
■研究課題18																				
⑰公共交通利便性指標のツールの開発			→	→																
⑱ツール拡張とツールの活用					→	→	→	→	→	→	→	→								
⑲指標の構築													→	→	→	→	→	→	→	→

4. Objectives

Theme #11

Kozoji New Town, Kasugai, Aichi

Make mobility management more sophisticated, utilizing both MaaS apps and mobility hubs to provide information that leverages nudge insights and is in the context of travel behavior.

Kira-Hazu Coast, Nishio, Aichi

Combine measures to reduce the influx of personal vehicles and provide secondary transportation to people who come by train, conducting verification testing of mobility services and personal identification/nudges at transportation nodes in order to identify installation feasibility, potential for rollout in other areas, systematic/technical problems, and more.

Theme #12, Research Project #13

List up the requirements that self-driving vehicles need to meet to serve as secondary and tertiary means of transportation. Put together SOPs for designing operational design domain (ODD) requirements based on tests.

Use the results of system discussions from the JSCE's Research Subcommittee on Public Platforms for Smart, Local Mobility to propose a standard self-driving vehicle along with use cases, including it in the system design as a way to actually introduce self-driving mobility services.

4. Objectives

Theme #17

Identify partners for joint research and sign MOUs/NDAs to create collaborative research frameworks. Work with partners to obtain research budgets to fund on-site R&D.

Theme #18

Develop tools for assessing the convenience of public transport and use them to verify the results of testing (of on-demand transportation services in model districts, for example). Create metrics to indicate whether public transportation is serving the needs of the community—not just in terms of the amount of mobility services but also whether the quality of those services is sufficient to support daily life in the area.

5.1 Theme #11: Development of mobility-enabled services on urban OS
(a) Kozoji New Town

Current status of Kozoji New Town in Kasugai

NOW

- In 2016, the City of Kasugai issued the **"Kozoji ReNew Town" government plan** in an effort to address the aging and declining population of the area, which in October 2023 had 40,000 residents, 38% of whom were 65 or over
- In 2018 the city participated in the Nagoya University COI and discussed its vision, which in 2021 led to the signing of **a broader collaboration agreement** between the two
- Industry-academic-government collaboration supports testing under a variety of national and other projects, with some social implementation already complete

Bus routes and frequency(Source: Kozoji Smart City Execution Plan

MOBILITY BLEND

- Identify **community-led efforts** to create additional ways of **getting around the area** (to medical facilities, community centers, bus stops, etc.)
  - Example: **Slocal Self Driving System** (volunteer transport)
- Make full use of existing city buses and taxis while also identifying **new rideshare services** that target areas or times with limited mobility options
  - Example: **AI On-demand Transport**
- Conduct ongoing activities aimed at **transforming mobility** behavior by engaging in project tie-ups with **social services** (e.g. community inclusive care projects) and other fields
  - Examples: **Mobility management, MaaS app use**

■ Using mobility hubs to take MaaS to the next level

Testing mobility hub MaaS solutions

- January through mid-February 2024: MLIT Promotion and Support Project for Japanese MaaS, Aichi Smart City Project
- **Mid-February through March 2024: Strategic Innovation Program**

Kozoji Smart City Advisory Committee: (Kasugai City, Nagoya University, Urban Renaissance Agency, Nagoya Railroad (Meitetsu), Dai Nippon Printing, Institute of Behavioral Sciences, Mirai Share, Kozoji New Town Center Development)

- **Dai Nippon Printing mobility boards are up and running across Kozoji New Town!**

1. サンマルシェアピタ館（モビリティセンター）
   - 32インチ×2面新型MPサイネージ　• バス時刻表
   - デマンドタクシー　• シェアサイクル • 防災速報メール

2. 藤山台診療所横（モビリティスポット）
   - 55型屋外MPサイネージ
   - デマンドタクシー　• シェアサイクル　• 電動車イス

Note: Wheelchairs through mid-Feb

3. グルッポふじとう（モビリティスポット）
   - 55型屋外MPサイネージ
   - デマンドタクシー　• シェアサイクル

4. 東海記念病院（屋内）　*Note: Through mid-Feb*
   - 21.5型タブレット　• デマンドタクシー

5. 名古屋徳洲会総合病院（屋内）　*Note: Through mid-Feb*
   - 21.5型タブレット　• デマンドタクシー

6. 高蔵寺駅地下通路市民コーナー前（半屋外）
   - 55型屋内MPサイネージ　• シェアサイクル　• 電動車いす
   - バス時刻表・のりば案内・経路検索

Note: Wheelchairs through mid-Feb

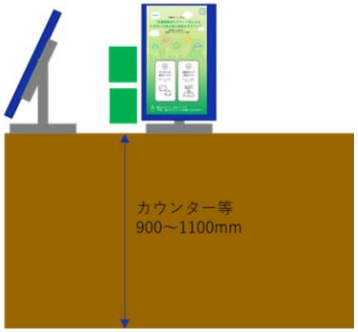
5.1 Theme #11: Development of mobility-enabled services on urban OS
(a) Kozoji New Town

Apita Building at Sun Marché

Above: Bus schedule, disaster safety notices
Below: Demand-based rideshare taxis
Bike share
Sightseeing map

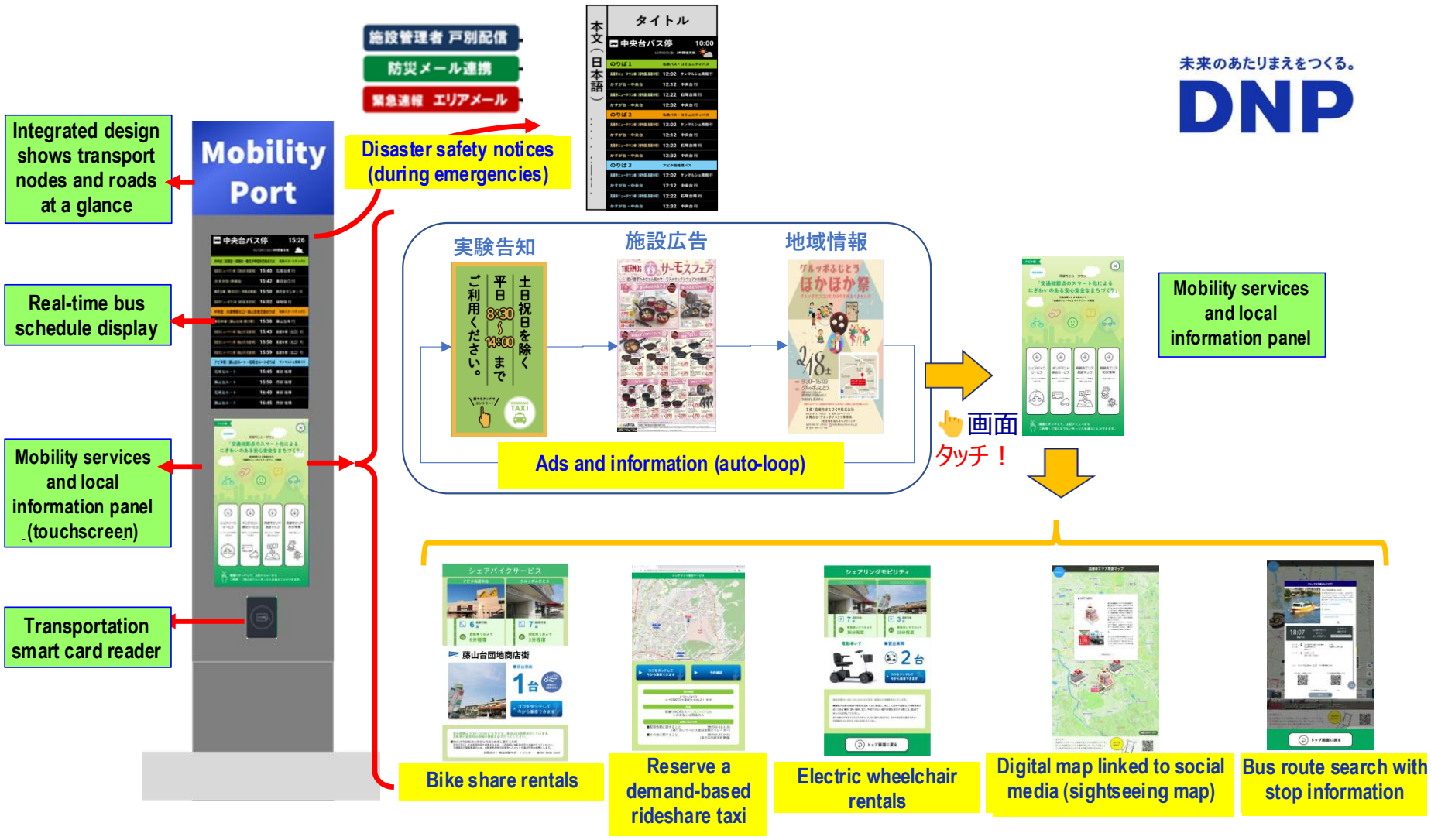
Next to Fujiyamadai Clinic
Gruppo Fujito
Demand-based rideshare taxis
Bike share
Electric wheelchairs (Fujiyamadai only)
Sightseeing map

Community information area in an underground passageway at Kozoji Station
Bus schedule (not a touchscreen)
Rideshare bicycles, electric wheelchairs
Bus route search (including stop information)
Sightseeing map



Tokai Memorial Hospital
Nagoya Tokushukai General Hospital
Demand-based rideshare taxis
Sightseeing map

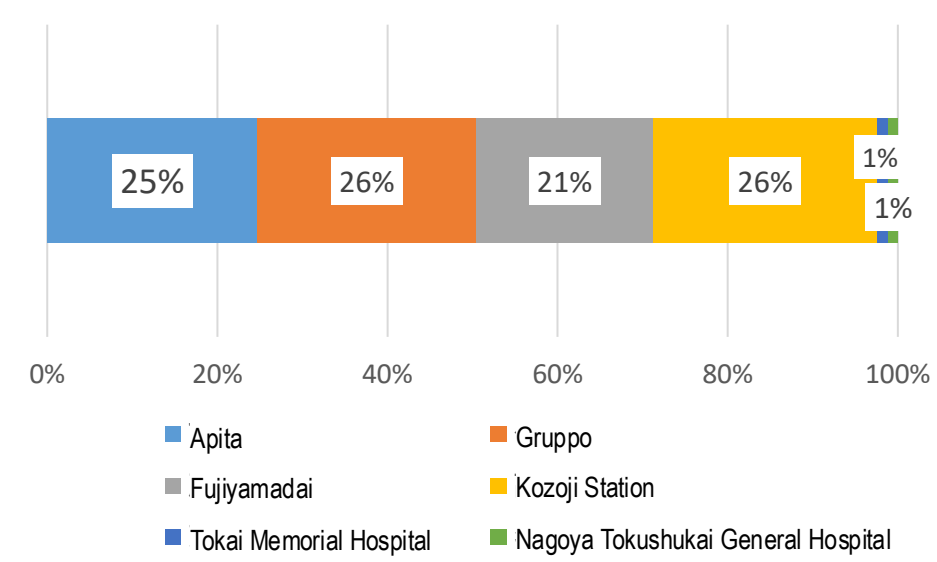
5.1 Theme #11: Development of mobility-enabled services on urban OS
(a) Kozoji New Town

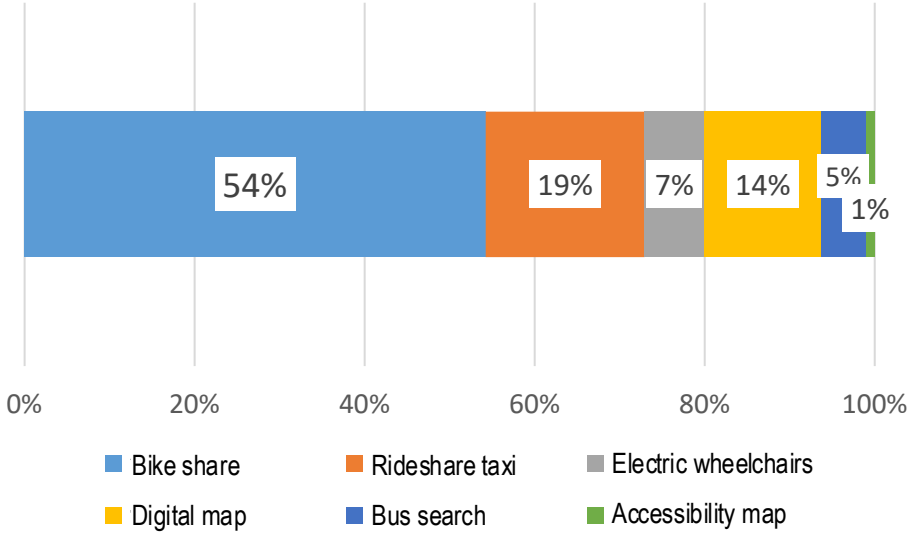


- People can use their transportation smart cards to easily take advantage of mobility services (this personalized information can also be collected)

Mobility hub MaaS testing

- 8,576 uses (touches) recorded at mobility ports (between January 9 and April 14)
- The Apita Building, Gruppo Fujito, and Kozoji Station all had around 2,200 uses each
- More than half of these were related to bike shares, followed by rideshare taxis
- However, rideshare taxis were only actually used eight times, meaning that many people touched without using them





Mobility hub MaaS testing

- Bike shares (free) were used 1,425 times, with the most rentals from the Apita Building and Kozoji Station
- Most people returned them, but some bikes were abandoned (January 9–February 9 data)
- Individual usage frequencies can be tracked from transportation smart cards (January 9–February 9 data)
- Electric wheelchairs were used 84 times (January 9–February 9 data)

■シェアバイク

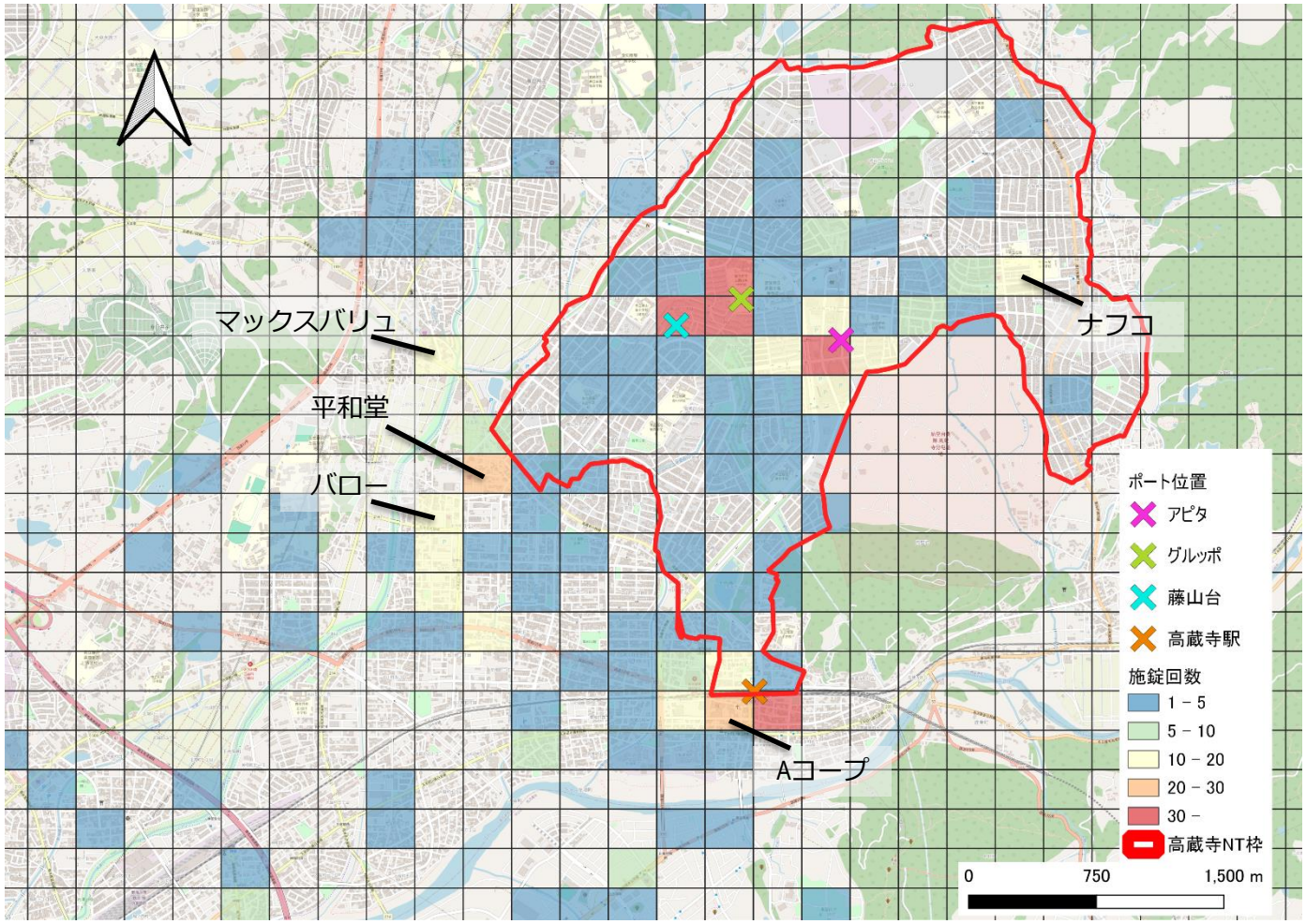
貸出＼返却	アピタ高蔵寺店	グルッポふじとう	藤山台診療所横	高蔵寺駅 市民コーナー	ポート外返却 ※乗り捨て	総計
アピタ高蔵寺店	110	11	5	42	3	171
グルッポふじとう	16	98	7	8	1	130
藤山台診療所横	7	11	69	12	2	101
高蔵寺駅　市民コーナー	38	22	6	98	1	165
総計	171	142	87	160	7	567

■利用回数（個人ごと）

	シェアバイク	電動車いす
20回以上	2	0
10回～19回	8	2
5回～9回	20	0
2回～4回	64	13
1回	106	27
計（個人数）	200	42
最大利用回数	30	17

Mobility hub MaaS testing

- Free bike share lock (abandonment) locations were concentrated around Kozoji Station and the Apita Building (January 9–February 9 data)



Note: The bikes always lock when they're returned, so the most abandonments were near the port grid

Mobility hub MaaS testing

- Interviews with mobility port installation managers (MLIT project members) revealed that although there were some issues with running costs, there was still potential for data-driven monetization

Looking at where the wheelchairs traveled, I was happy to see that people really stayed on designated pedestrian decks and pedways. Pedways are a distinctive feature of New Town and we've been trying to find ways to get people to use them. Permanently installing mobility ports in the residential complex is a bit of a chicken-and-egg issue, as it will take money to provide the kinds of services that people will agree to being funded by their CAMs.

People showed interest, but getting them to actually touch the devices seemed like a big challenge. They'll do it if there's someone there to guide them, but I think it will take a lot to get older people to engage on their own. They're likely worried about whether they're allowed to touch it or what will happen if they do. Getting them to engage the first time will be a challenge.

I was delighted to see more people coming into the store, and I'd be happy to support any measure that facilitates that. It's wonderful that we're able to collect behavioral data (like bicycle positioning). If we can pair it with age or other demographic information, we can get a lot more units out there, analyze it, and use it for marketing. You'll probably need to get more signage or address the difficulties older people have with using apps. If you're targeting them, analog is the way to go.

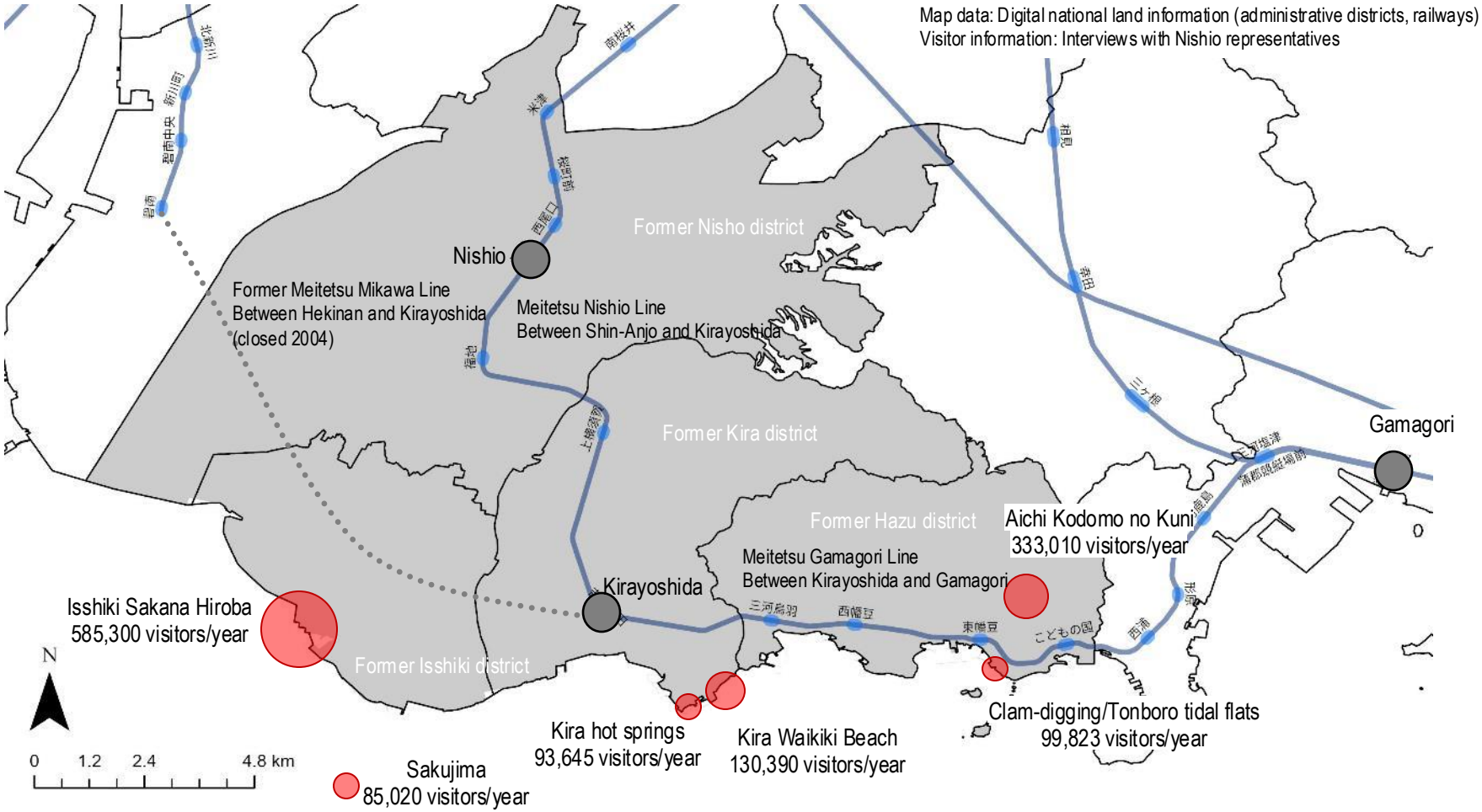
If we can find a way to get people to use the wheelchairs, I think they'll really make getting around easier for the older residents. They're a great way to link key points in the complex.

Current summary and future direction

- Mobility hub MaaS tests were conducted, resulting in the collection of data on current conditions
- There was more bike share use than expected, but the situation needs to be better understood using data from the project extension (through the end of May) and monetization issues (including reallocation and bike maintenance) need to be addressed
- Issues such as how share service usage data is to be used (commercial marketing), the results of promoting movement with map information (e.g. coupons or other data tie-ups), and business models (not just advertising) for installing and operating mobility hubs still need further consideration
- In looking at ticketing issues, a decision was made to collect information via user and project member interviews during the project extension (through May 2024)

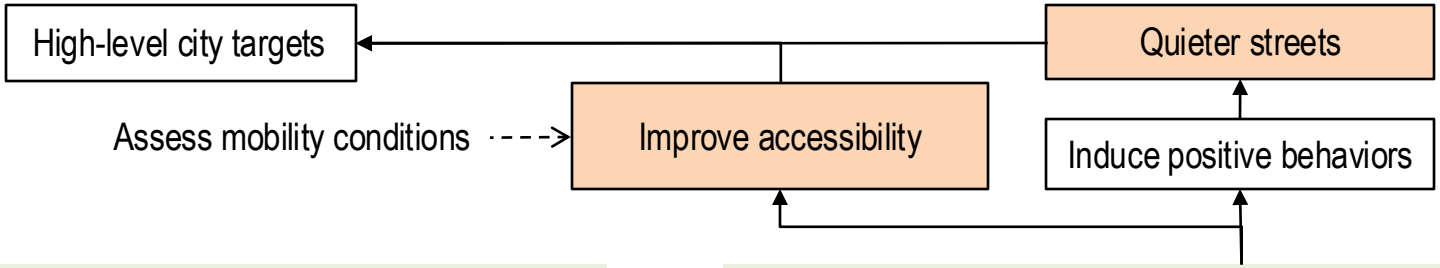
5.1 Theme #11: Development of mobility-enabled services on urban OS
(b) Kira-Hazu Coast

- In 2011, the former municipalities of Nishio, Isshiki, Kira, and Hazu merged to form the City of Nishio in Aichi Prefecture
- The area is a suburb of a major metropolitan area that includes both residential and tourist districts
- The Meitetsu-Gamagori Line is at risk of closure, and the area is also having problems with mobility services that support transportation from railway terminals and local routes
- There are several popular tourist attractions in the area, but most people visit by car and there are concerns about negative externalities



Approach to activities

Design comprehensive mobility solutions that bring together mobility services, parking, fees, information services, local tie-ups and more along with the digital platforms and research knowledge to support them



Digital platform

SIP Japan Mobility Data Space

Behavioral mechanism

Monitor flows of people and vehicles within the area

Nodes: Digital (MaaS)

Mobility services

Self-driving technology

Improve/enhance mobility services

Existing services (Meitetsu, buses, etc.) → Make local transport more sustainable

Enhance terminal and local transport → Smart, local mobility services

Fees: Fee schedules, ticketing

Parking: Information, fees, fringe parking, etc.

Nodes: Physical spaces (mobility hubs)

Isshiki Sakana Hiroba

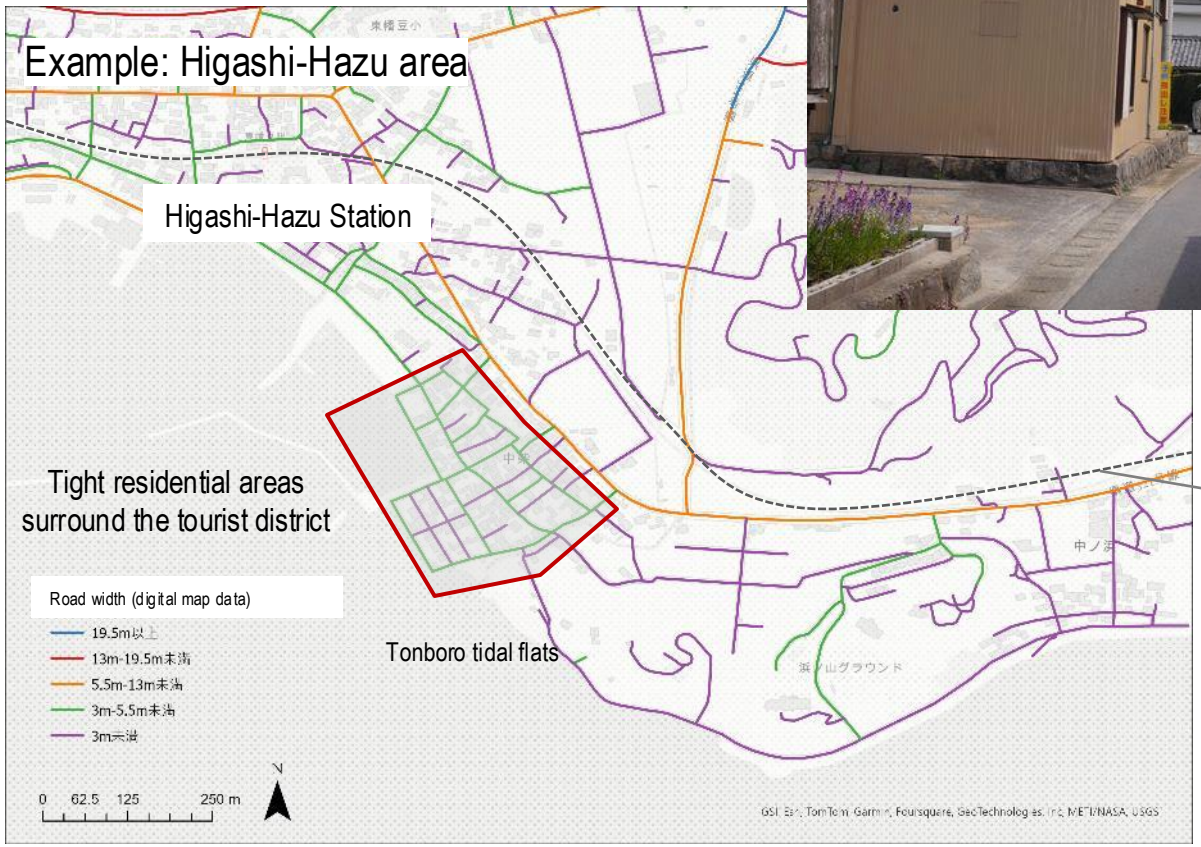

Clam-digging in Higashi-Hazu


Sakujima


Higashi-Hazu Tonboro (Maejima)

Tourism demand and residential streets

While the area is popular with tourists, visitors **tend to come by car**, creating **negative externalities** in an area characterized by **narrow residential streets**



5.1 Theme #11: Development of mobility-enabled services on urban OS (b) Kira-Hazu Coast

FY2023

- Build/deepen systems
- Diagnose current regional conditions

FY2024

- Build/design systems that measure visitor vehicle traffic flow
- Design rail terminal mobility services and those that facilitate getting around locally

FY2025

- Test behavior inducements that help keep residential streets quiet (comprehensive solutions that include parking, fees/ticketing, and new mobility services)

FY2026

- Continue testing based on FY2025 results
- Prep for implementation by identifying system/tech issues along with solutions

FY2027

- Identify rollout feasibility in other regions

Build/deepen systems

- City of Nishio, AZAPA Engineering, and Nagoya University sign a tripartite project agreement
- Initiative plans are presented both at the Nagoya University kickoff symposium and various public announcement venues as appropriate

Diagnose current regional conditions

- Survey local residents in the Kira-Hazu Coast area (current mobility conditions and issues, thoughts on potential measures, etc.)
- Survey visitors to the main tourist attractions in the area (current mobility conditions and issues, thoughts on potential measures, etc.)
- Select/design equipment for the traffic flow measurement planned for FY2024 along with areas to measure

Resident and visitor surveys

Visitor survey

Conducted February 2024

Target/method

- Handed out in Nishio tourist areas, collected by mail
  - Aichi Kodomo no Kuni skating rink
  - Isshiki Sakana Hiroba

Scope

- Distributed: 3,000
- Returned: 607

Content

- What they did that day
- Past use of the Meitetsu-Gamagori Line
- Thoughts on anticipated measures and how their behavior might change (park and ride, all-you-can-ride tickets, rail terminal services, buses between districts, circular buses)
- Thoughts on tourism in Nishio
- Demographics

Resident survey

Conducted February–March 2024

Target/method

- Mailed to all households in the former Kira district (Yoshida-Shirahama Elementary district) and Hazu district
- Surveys could be mailed back or answered online

Scope

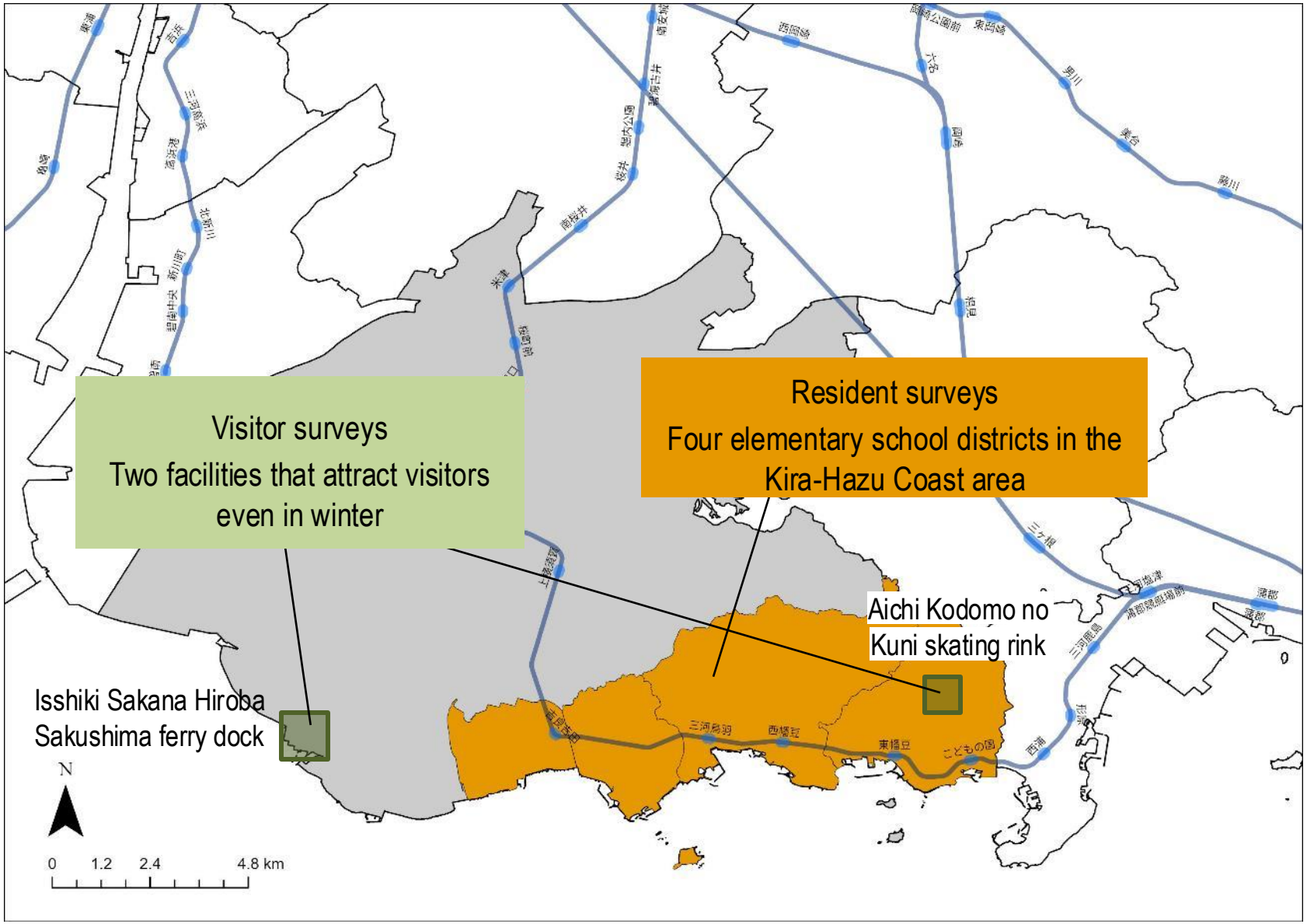
- Distributed: 7,744 (two per household)
- Individual returns: 2,140 (1,593 by mail, 547 online) (as of April 19, 2024)

Content

- Meitetsu-Gamagori line usage (for what, how often)
- Everyday travel (medical, shopping, pickups/drop-offs)
- Best things about the Hazu area and problems/issues
- Thoughts on anticipated measures and intent to support them (rail discounts, project to encourage visitors to come by train, using stations for interactions)
- Thoughts on the local community
- Intent to participate in panel surveys
- Demographics

Resident and visitor surveys

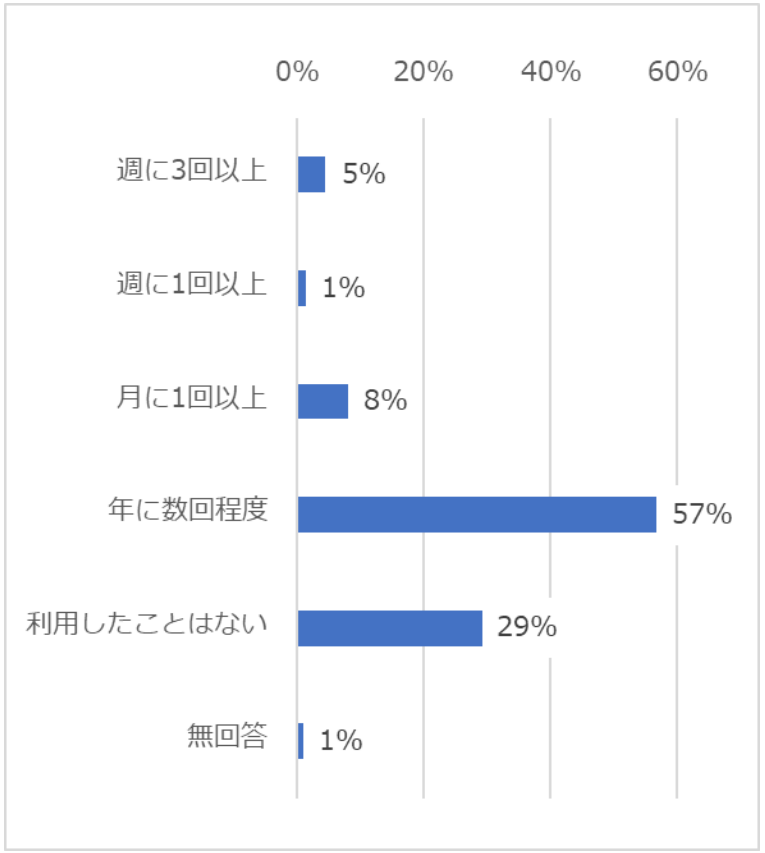
Target areas



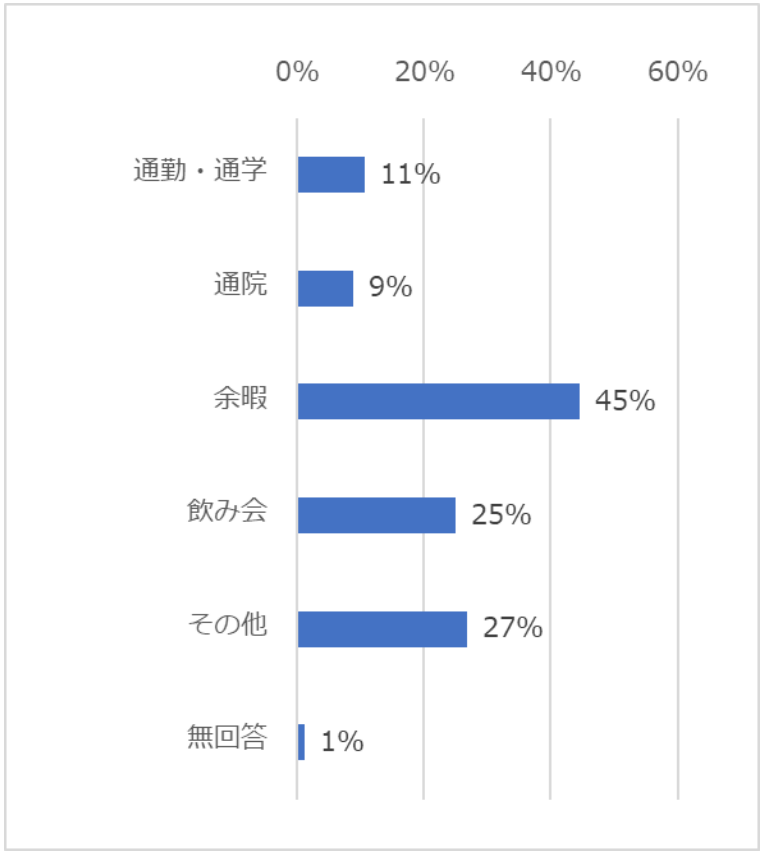
Resident survey results (1)

Meitetsu-Gamagori Line: Frequency and purpose of use

Over half of respondents said that they used the Meitetsu-Gamagori line “a few times a year”. Around 30% of local residents had never ridden it. The most common reason was “leisure” (nearly half), followed by “drinking parties” (around 25%).



n=2,135

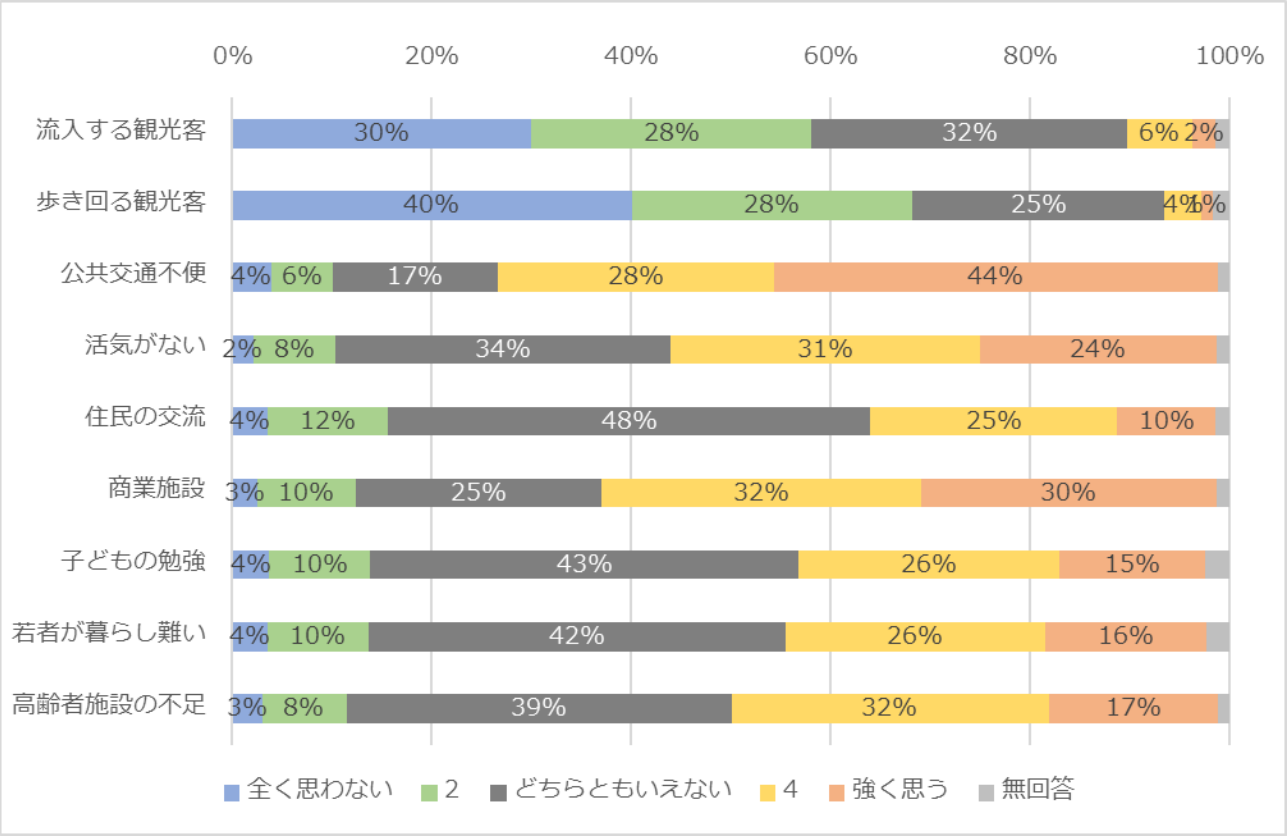


n=1,497

Resident survey results (2)

Local issues

Common responses included “public transportation in the area is inconvenient” and “there aren’t enough commercial facilities in the area for shopping and eating out”.

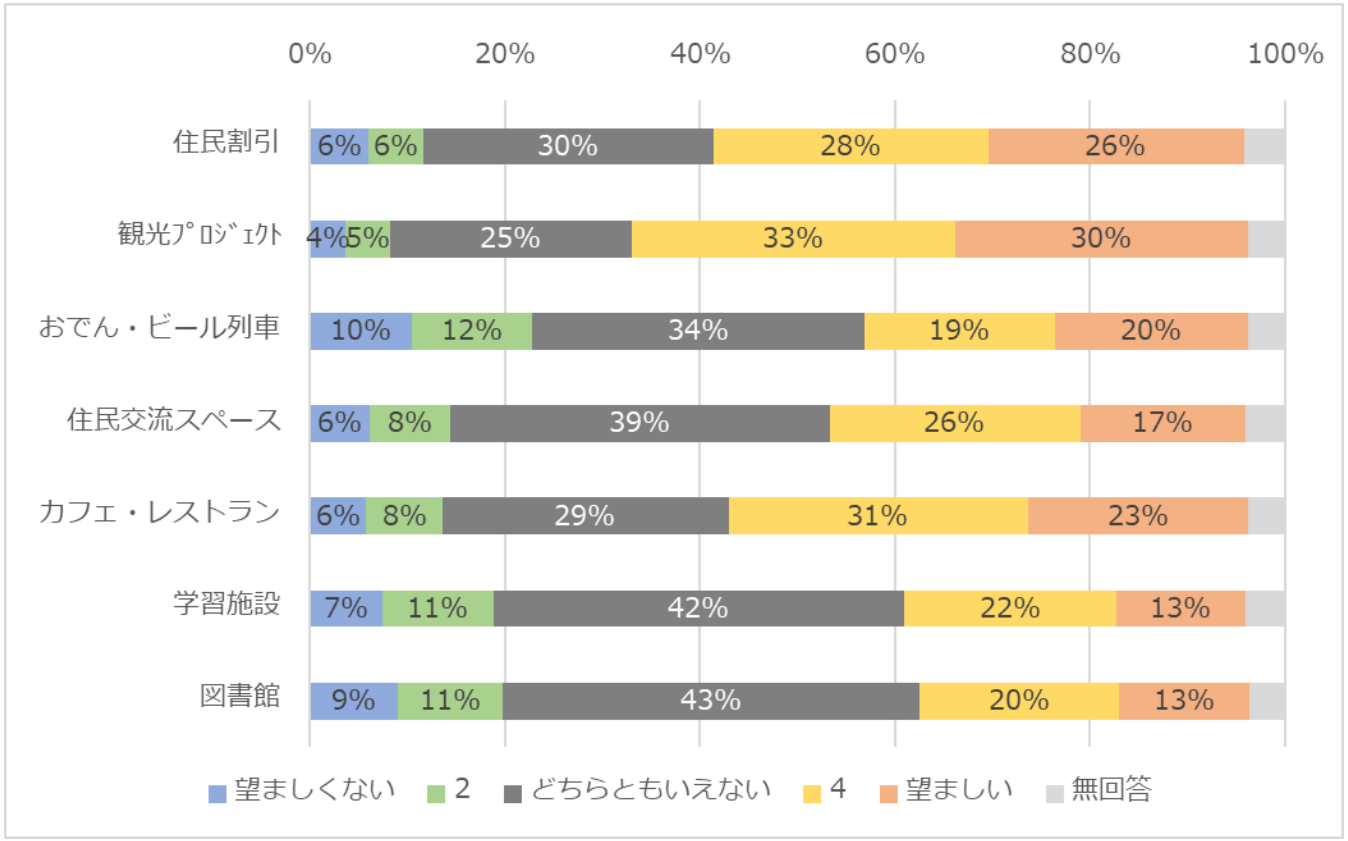


n=2,135

Resident survey results (3)

Revitalizing the Gamagori Line

Many people were interested in ”tourism projects” and “resident discounts”.

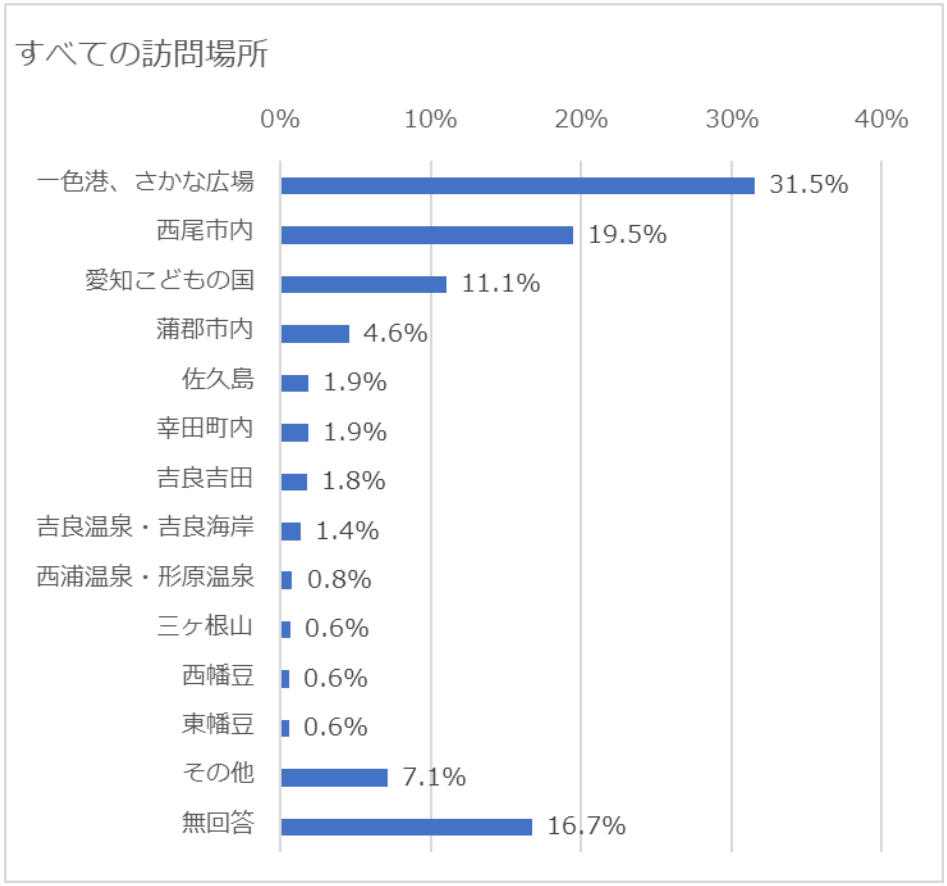


n=2,135

Visitor survey results (1)

Where tourists go in the area

Responses varied by survey location, but the most popular destinations were Sakana Hiroba at Isshiki Port, and Nishio City.



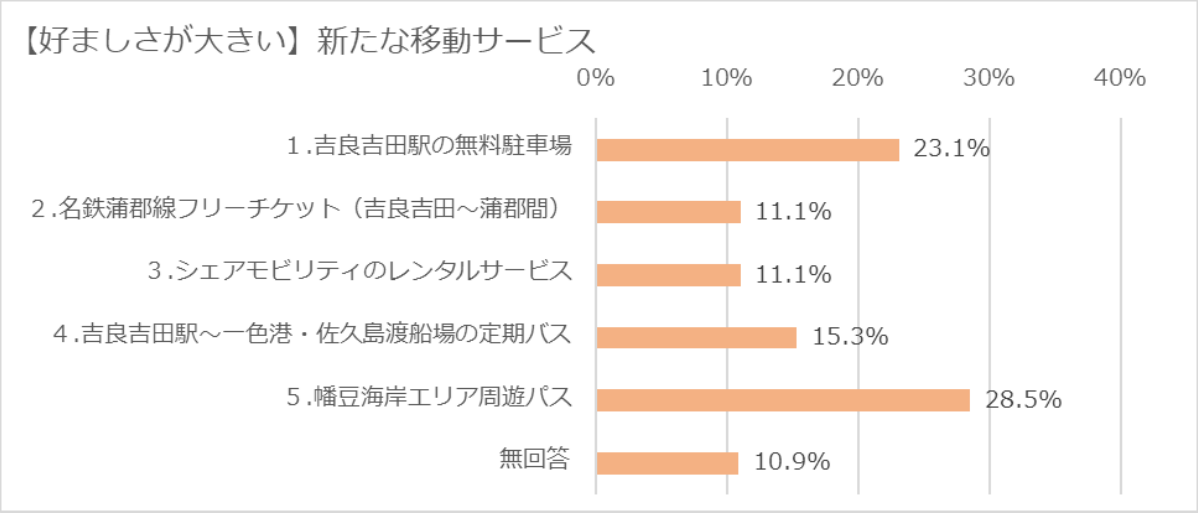
n=1,247

Visitor survey results (2)

New mobility services

People found local bus routes in the Hazu Coast area and free parking the most desirable.

Rental services for shared mobility solutions and free parking were rated undesirable.



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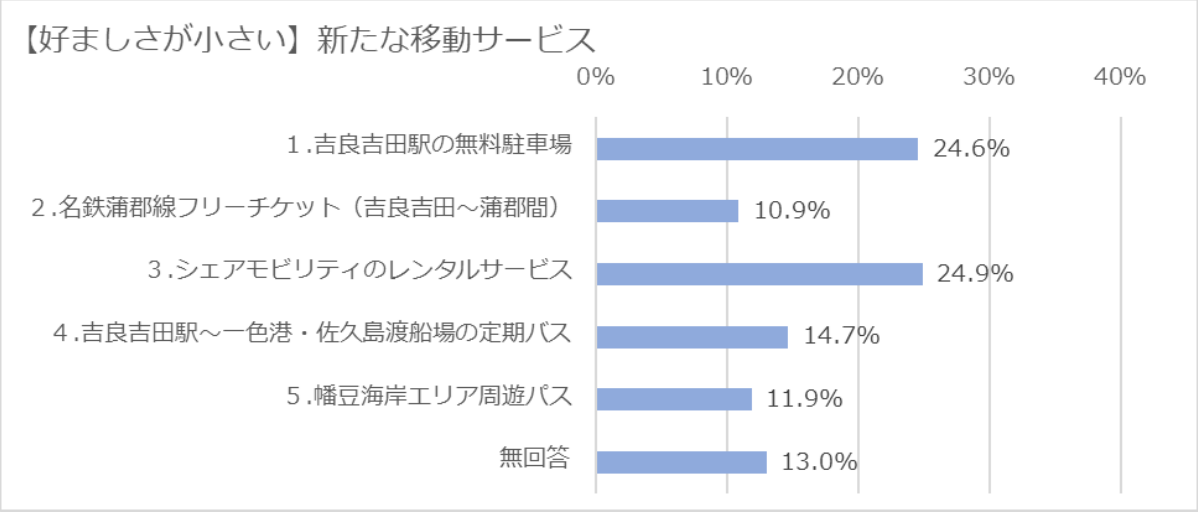


n=606

Developing a self-driving vehicle prototype

Model selection

- Small enough to navigate the tight roads in the Kozoji/Nishio area
- Based on a regular production car for easy maintenance
- Easy for people to get in and out of
- Electric vehicle well-suited to self-driving systems

The commercially available EV3 light was chosen as a base model
(Bids were submitted from three Japanese automakers)

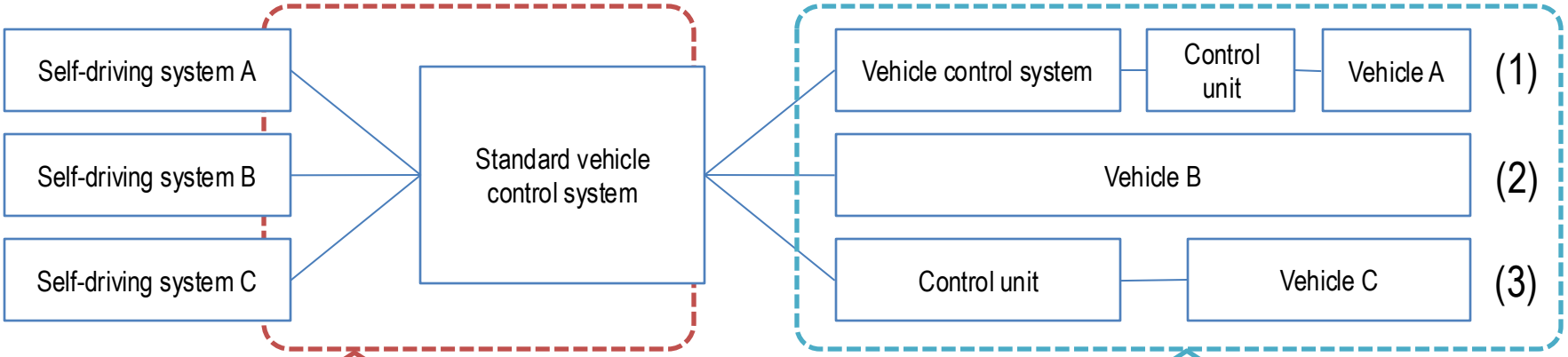
Design

■ Capacity
Three passengers plus a driver/monitor

■ Self-driving features
Automatic acceleration, braking, steering, etc. (controlled externally)

- **Control specifications and feature standardization for self-driving vehicles**

  Communication specifications were designed to allow centralized control of multiple self-driving vehicles at once, including the prototype



Standardize specifications

A central self-driving system allows all vehicles to be controlled with the same control specifications

Vehicle control options

1) Wrap vehicles with existing control units that enable self-driving
2) Link the system to vehicles that can already self-drive
3) Make the control unit compatible with the system

Standardizing specifications: Overview

(1) Install an access control system

Introducing an authentication process for assigning access controls, encryption keys, and the like for the core control system will help make the self-driving system safer

(2) Communicate control specifications

Designing a mechanism whereby a vehicle's control unit can communicate the control functions it can receive will make it possible to develop an all-purpose communications program on the self-driving system side

(3) Variable-length/variable-unit command values

Control command values must be designed defined all-purpose value sizes/units so that they can handle different control commands for each vehicle

Reference: Communications format for standard control specifications (excerpt)

All-purpose, variable-length control commands can be sent to the vehicle
Flexible design can be adapted to vehicle functions

通信ヘッダ

内容	データ型	サイズ
データタイプ	byte	1
データ件数	byte	1
誤り検出情報	byte	1
データサイズ	unsigned short	2

情報/制御データ列に用いる汎用データ型

内容	データ型	サイズ
種別	byte	1
型	byte	1
単位	byte	1
値	Byte[]	型・単位により変動

送信データ全体

内容	データ型	サイズ
ヘッダ部	車両情報ヘッダ	5
データ列	汎用データ型配列	可変

データ種別	ID	内容
データヘッダ	ー	送受信データの種別、サイズ等
車両情報	1	車両やアクチュエータ等に関連する現在状態
車両制御	2	車両制御を行うための指示値
制御装置情報	3	車両制御装置の動作状態
制御装置設定	4	車両制御装置の動作設定変更
制御機能情報	5	車両制御装置が対応している制御機能

Reference: Communications format for standard control specifications (excerpt)

Design defines a wide range of standard specifications for vehicle control values (steering wheel angle, speed, etc.) while allowing users to add control values for specific vehicles

内容	データ型	データ
データタイプ	byte	5
データ件数	byte	4
誤り検出情報	byte	-
データサイズ	unsigned short	8
種別1	byte	1:ContorlMode
単位1	byte	0:none
種別2	byte	10:Speed
単位2	byte	3:km/h
種別3	byte	14:TireAngle_Front
単位3	byte	8:degree
種別4	byte	31:Blinker
単位4	byte	0:none

制御モード

種別	ID
ContorlMode	1
ErrorCode	2

制御指示/状態

種別	ID
Speed	10
Acceleration	11
Throttle	12
BrakePedal	13
TireAngle_Front	14
TireAngle_Rear	15
SteerAngle	16
SteeringForce	17

運動量

種別	ID
LinearAccelerationX	20
LinearAccelerationY	21
LinearAaccelerationZ	22
RollRate	23
PitchRate	24
YawRate	25

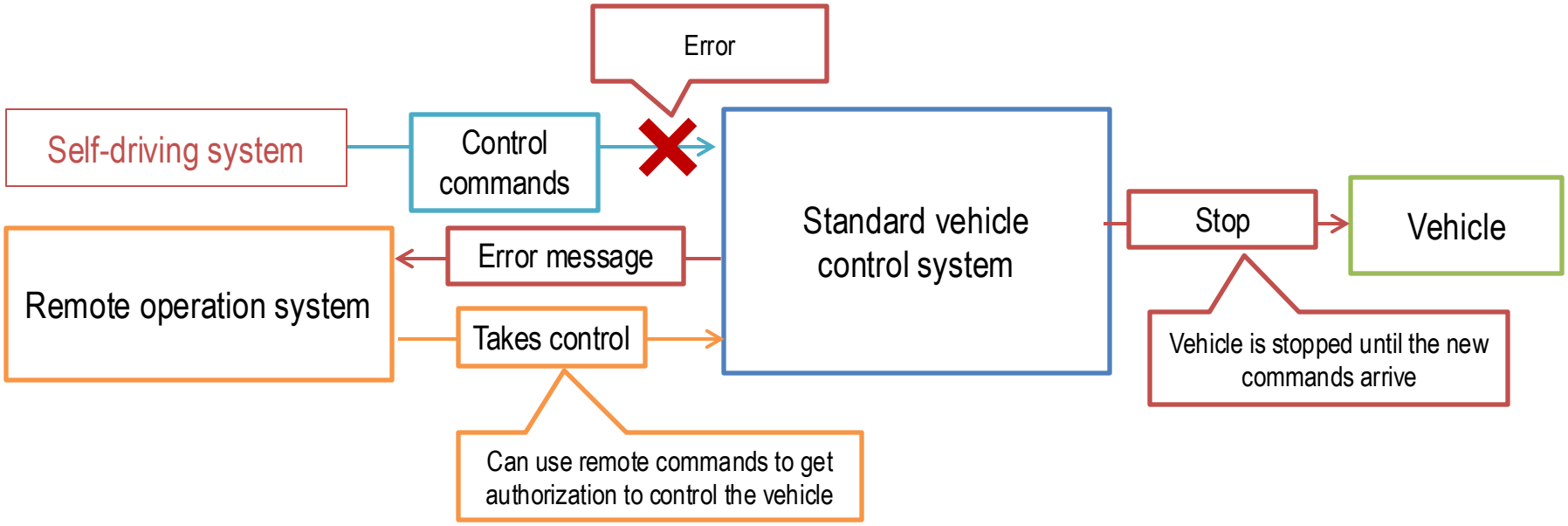
アクセサリ

種別	ID
Gear	30
Blinker	31
ParkingBrake	32
Horn	33
Headlight	34
Wiper	35
BatteryLevel	36

単位	ID
none	0
s	1
m	2
km/h	3
m/s	4
m/s^2	5
radian	6
radian/s	7
degree	8
degree/s	9
percent	10
V	11
A	12
N	13
℃	14

Standard control specifications and remote operation

Remote operation or other systems can get authorization to control the vehicle when the sensors or self-driving system isn't working properly



Build an ODD model for switching self-driving levels at the right time

Actually getting to sophisticated self-driving technology that can be used in all urban areas (Level 3/4) would require massive safety tests, so it's better to use a system that can only drive certain roads under certain conditions, with a driver or remote operator taking control as needed.

Countries that have introduced driverless vehicles in urban environments have always installed the ability to issue remote driving instructions.

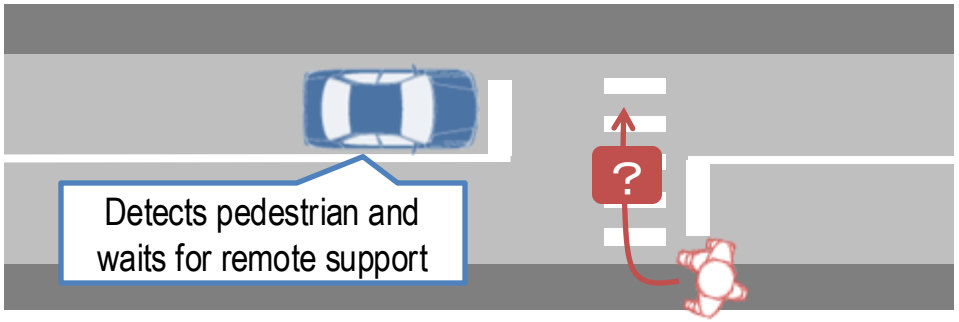
Source: D. Majstorovic et al, "Survey on teleoperation concepts for automated vehicles," IEEE SM), 2022, pp. 1290–1296.

Collect information on human-backup scenarios

Create an environment where instances where driver support was needed can be extracted and analyzed from tests conducted in the Kozoji area (Level 2) and elsewhere.

- Build algorithms to automatically extract support scenarios from self-driving vehicle log data
- Use image processing to discern surroundings (pedestrians, parked cars, etc.)
- 168 human-backup instances were extracted from tests conducted in February 2024

Example of self-driving level switching



The car detected a pedestrian near a crosswalk and requested remote support while slowing to a stop

A remote command was issued to pass over the crosswalk (corresponds to a Level 3 fallback)

Types of support based on self-driving conditions

Conditions	Ensuring safety while waiting	Type of support	Usage scenario
Error	Automatically run MRM (e.g. emergency stop)	Remote operation	Sensor failure, accident
Waiting for support	Stay within the ODD by slowing/stopping	Remote command to continue, how to avoid, etc. (driving controlled remotely)	Crosswalks, intersections with poor visibility, parked cars, construction
Automatic start	Wait for command to start		Stopped locations
Autonomous driving	—		Driving past pedestrians, emergency vehicles

Example of a command UI prototype

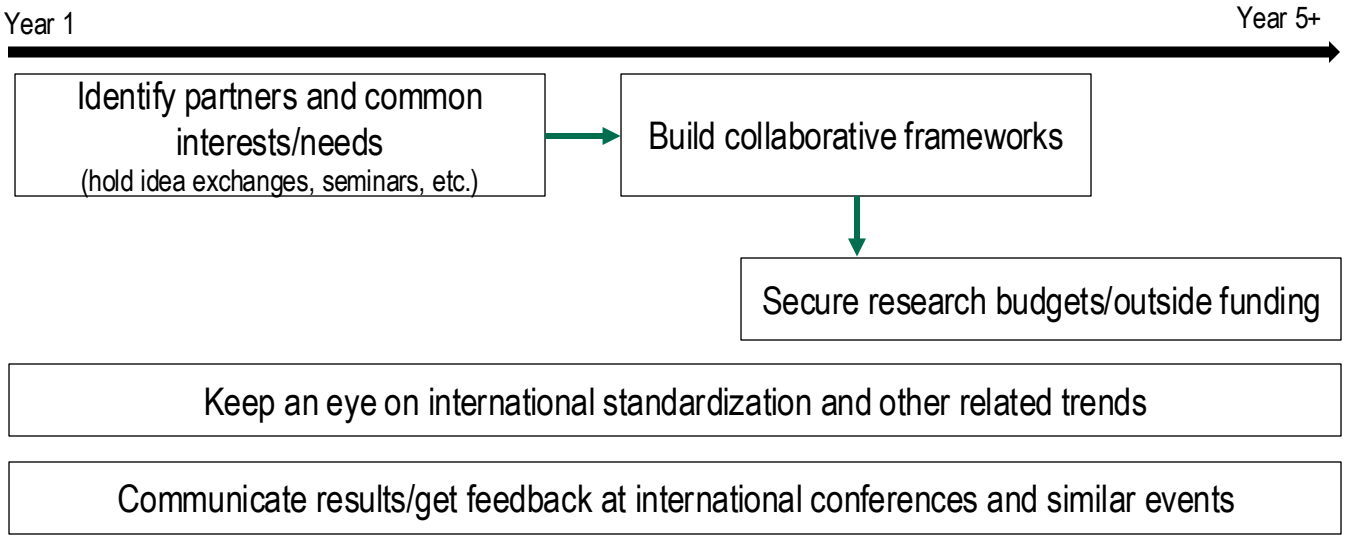
5.4 Theme #17: Promoting international collaboration

Background

- Seek out collaboration in ASEAN and elsewhere based on results from other research projects in this program
  - **Identify/shortlist potential partners** (leverage existing NU networks—see next slide)
  - Sign MOUs/NDAs with partners to **create collaborative research frameworks**
  - Make the frameworks sustainable by **moving to secure research budgets** to fund on-site R&D
  - Keep an eye on **related trends** and project outputs/inputs
- Also consider using overseas initiatives and environments to move development in Japan forward, while rolling out projects from Japan to other countries (build relationships where lessons are **shared in both directions**)

Initiatives

- We expect to be able to support ASEAN countries with these project results:
  - ✓ MaaS for mobility hubs (Project #11)
  - ✓ Vehicle specifications for redesign efforts (Project #12)
  - ✓ Approaches to standardized ODD decision-making (Project #13)
  - ✓ Indicators for accessibilty to urban functions to support classification (Project #18)



Cross-consortium/international collaboration in FY2023

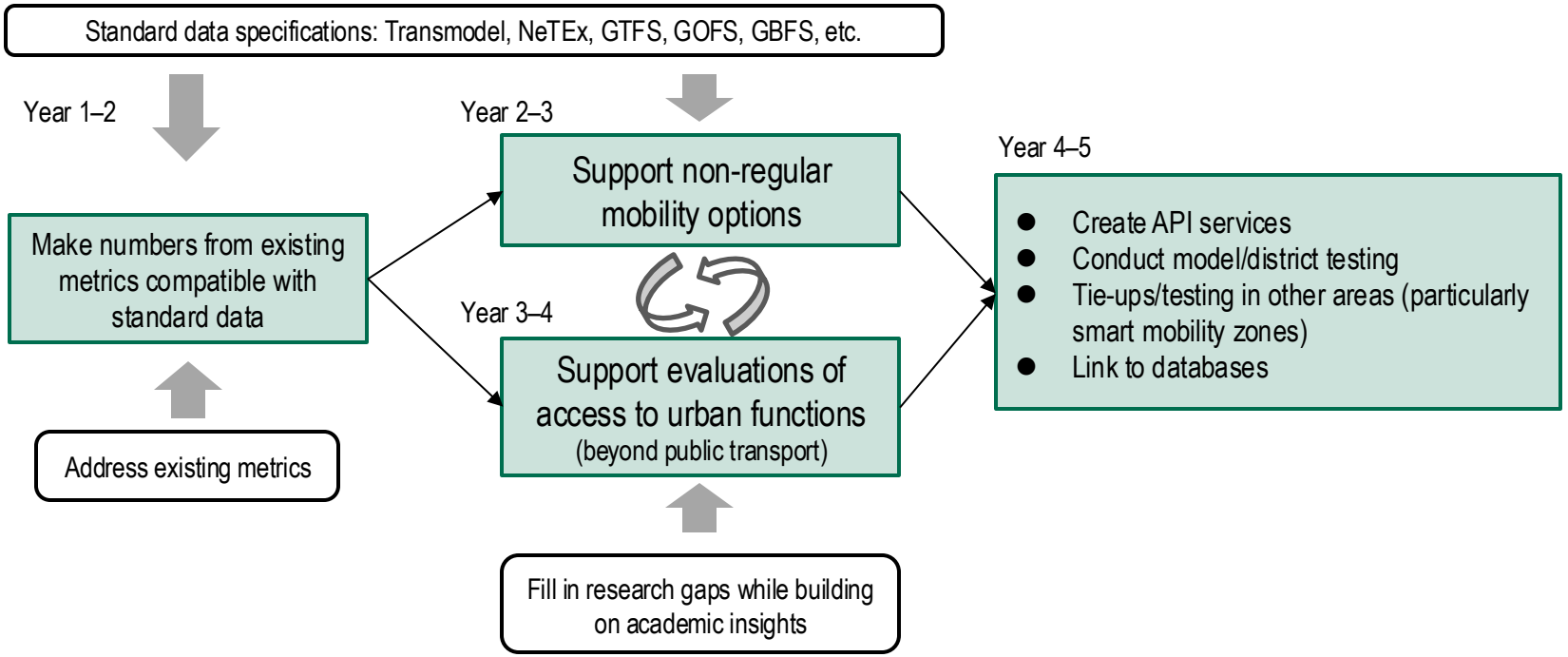
Japan	Dec 15, 2023	**Nagoya University Consortium Kickoff symposium**	• Jointly held with the NU COI-next symposium • Introduced NU Consortium idea and had Ishida PD (HINT Series professor) speak
Overseas	Dec 26, 2023	**University of Tokyo/MIAJ/international Kickoff symposium**	• Spoke at an international consortium, introduced NU Consortium idea
Overseas	Jan 15, 2024	**National University of Singapore Visit and discussion**	• Visited the Centre for Transportation Research and introduced the NU Consortium idea, discussed topics of interest to the faculty
Japan	Jan 26, 2024	**Hiroshima University Consortium HINT Series Symposium**	• Spoke at the HINT Series Consortium • Introduced NU Consortium idea
Overseas	Late Jan, 2024	**Curitiba, Brazil Visits and discussions at various institutions**	• Visited local universities, urban planning research centers, bus companies, mayors, etc. • Reached baseline agreement for future collaboration

5.5 Theme #18 Practical surveys (action research) and dissemination development activities to typify and identify areas utilizing local mobility resources

Background

- Public transport and other **mobility data is becoming more standardized** (GTFS, NeTEx, GOFS, GBFS, etc.)
  - It is still not sophisticated enough to use for mobility diagnostics or evaluating the results of measures
- There is greater and more diversified need for on-demand transport and other **non-regular mobility options**
- Practically speaking, people have always assessed mobility primarily on the basis of area coverage
  - Metrics that assess **access to urban functions** are needed as a way to look at derived demand
    - Example: Properly evaluating situations where services are infrequent but sufficient to support everyday activities
  - Academic progress is important, but there is also a need to make the program more sustainable(e.g. calculation load) through stronger tie-ins to R&D and practical tasks

Initiatives



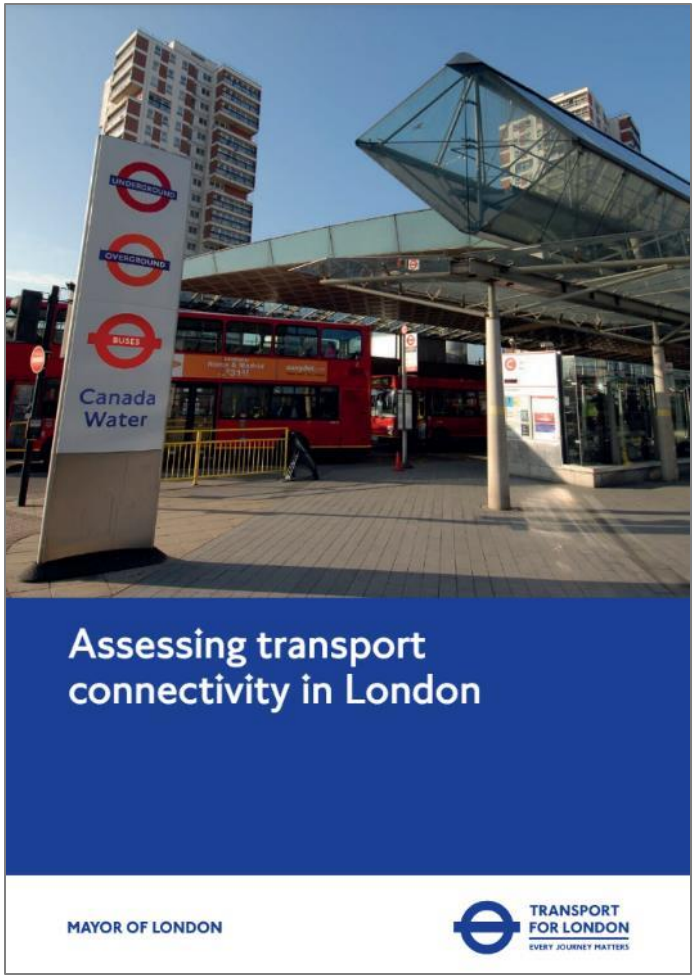
Combine data standardization, open source tools, and accessibility metrics to design better (more practical/usable) accessibility evaluations

Reference metrics

- Public Transport Accessibility Level (PTAL) by TfL
  - Shows public transport accessibility as a function of walking times and expected wait times
  - Planning and academic research has been done outside the UK as well
  - In the UK, some advocate for the Greater Manchester Accessibility Level (GMAL) as an expanded metric that includes on-demand mobility services
  - Access to Opportunities and Services (ATOS) is an existing metric that also includes accessibility to urban functions

Reference tools

- Open Trip Planner is an open-source route-finding tool that is compatible with standardized data specifications
  - In recent years, tools have been proposed/developed that also support on-demand transport and other non-regular mobility options



https://data.london.gov.uk/dataset/public-transport-accessibility-levels

Sample calculations from a pilot district

- Built a tool to calculate GMAL assessment values using GTFS data for Nishio city bus routes
  - Some routes were excluded from the calculations as GTFS data was not yet ready
  - Currently assessing service level in areas around certain points
  - Future plans include steadily expanding to include transportation methods/mobility options targeted in development plans and to evaluations of accessibility to urban functions