

High-accuracy Indoor Positioning Project

- Providing assistance for everyone to avoid stress to travel

March 7th, 2017

Naoya AOTO

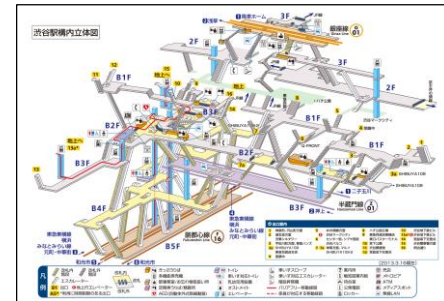
**Director, National Land Information Division,
National Spatial Planning and Regional Policy Bureau**

Welcome visitors to Tokyo with most advanced,
best-in-class services in the world

To hold the 2020 Tokyo Olympic and Paralympic Games smoothly and to broaden these services to the whole of Japan as the Legacy.

【Transportation】

- ◆ To make a smooth movement
 - In Tokyo, the public transportation and the stations (terminals) have very highly-dense network/structures.
 - Most visitors have to take the public transportation to go to each Olympic/Paralympic venue.



Four railroads enter Shibuya Station, and it is a complex structure of eight layers including ground and underground. (Tokyo Metro web site)

【Safe and Secure】

- ◆ To evacuate smoothly and properly in case of a large-scale disaster.



Shinjuku Station after² the Great East Japan Earthquake

【Sightseeing】

- ◆ To make a enjoyable tourism with easy-to-follow guidance in multiple languages instead of the way “signboard” only.

Currently, various services using GNSS provides outdoor location information with the accuracy of one to several meters.

In Japan, the development and operation of Quasi-Zenith Satellites System are currently in progress.

The Quasi-Zenith Satellites will be able to realize highly accurate positioning by complementing and improving GPS positioning.

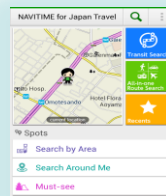
We should consider :

- to develop/confirm the seamless positioning thorough outdoor and indoor.

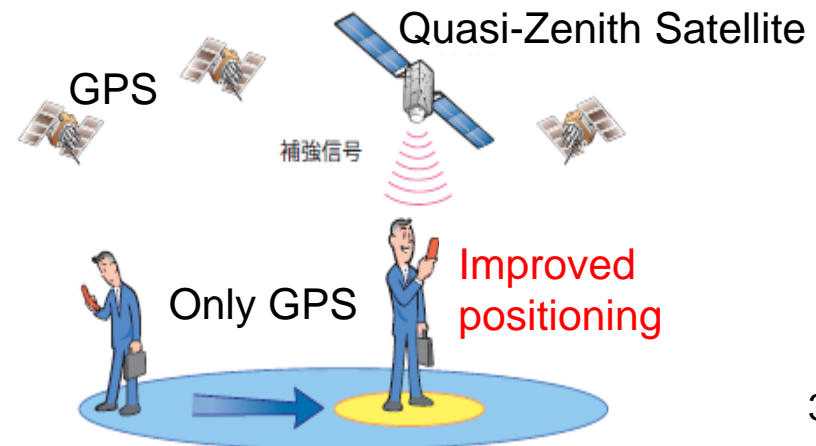
Examples of services using GNSS



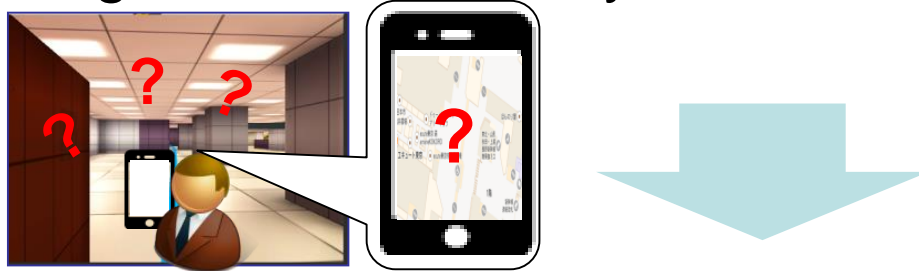
Car navigation system



Direction application for smartphone



The signal transmitted by the GNSS does not reach indoor.

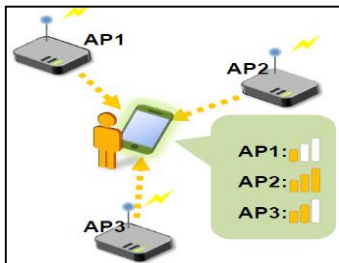


A wide variety of technologies and methods for estimating indoor position is being developed.

We should consider:

- to verify availability of these method and to make guidelines for installing/setting indoor positioning instrument.

Examples of indoor positioning methods



Wireless LAN (Wi-Fi)



Bluetooth (beacon)

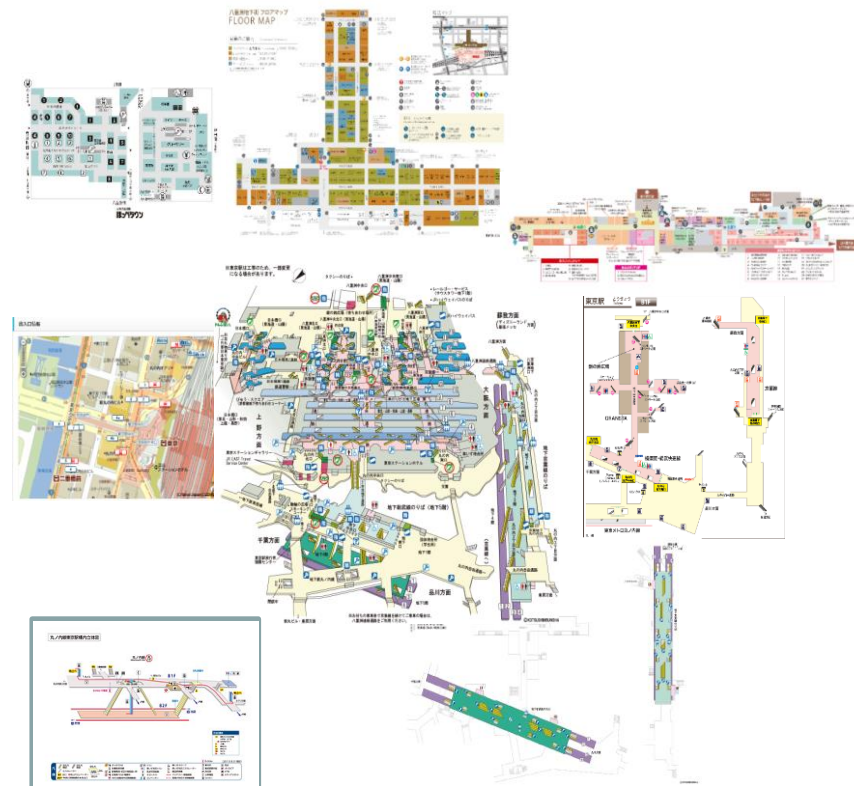


Inaudible sound (sound wave)

There are floor maps created by each indoor facility manager, but there is no common digital map covering the whole area of the underground space.

We should consider:

- to build a scheme of preparation of indoor map and to verify its availability.
- to prepare specification for 2D indoor maps & original 3D geospatial information for sharing information smoothly.



Foreign visitors and disabled persons should be able to travel smoothly to their destination even in unknown places.

Current



Searching destinations/routes in front of information boards

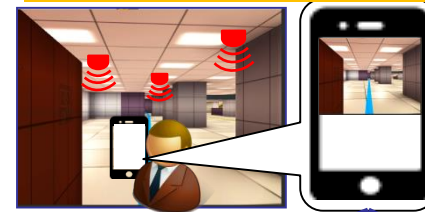
Example of service

Airport

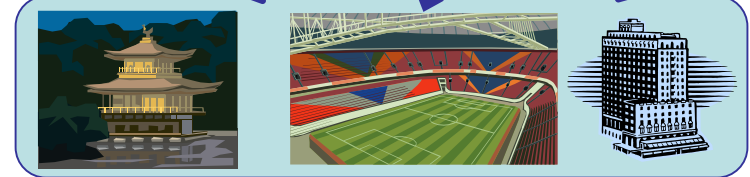


Starting applications

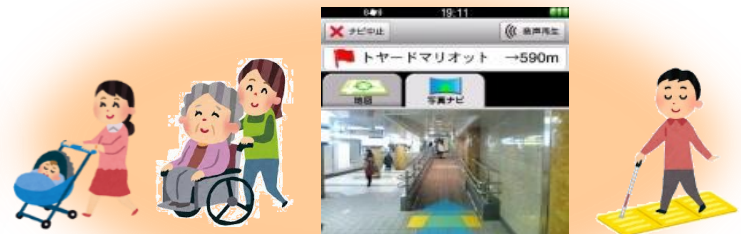
Railway terminals



Smooth moving



Services according to individuals



Accessible route/facilities

Indoor



Outdoor



Navigation by GNSS

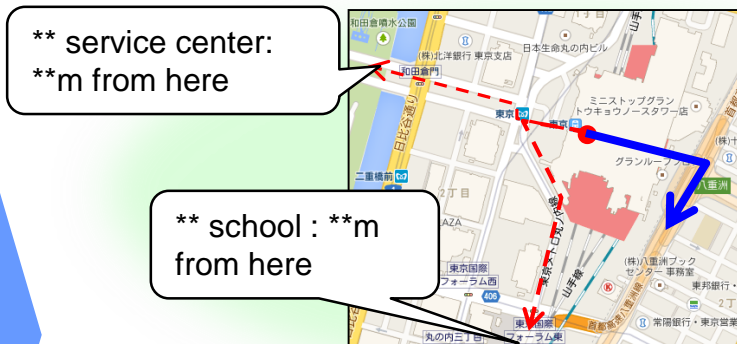
Whether people outdoor or indoor, they can receive appropriate information at the occurrence of a disaster and can evacuate to appropriate places according to their position.

Current



Airport or terminals are very crowded in case of large-scale disaster, without getting appropriate information

Example of service



Providing the location information of evacuation facilities and route to them



Guiding evacuation and supporting rescue operation

1. Considering development and utilization of Geospatial Information Infrastructure such as indoor digital maps

(1) Development of Geospatial Information Infrastructure

- Creation of an indoor digital maps at places around Tokyo Station, places around Shinjuku Station, Narita Airport and Nissan Stadium
- Construction of indoor positioning environment in these areas.
Minimizing the number of beacons installed by using PDR and existing Wi-Fi to reduce the burden of installation and maintenance of beacons

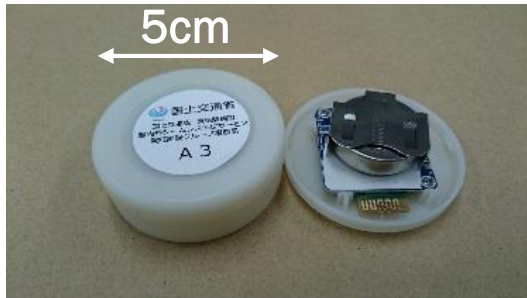
(2) Demonstration of service utilizing Geospatial Information Infrastructure

- Developing and releasing prototype of the navigation application
- Demonstrating guidance services for wheelchair users
- Creating an English version
- Corresponding to Android and iOS devices
- Demonstration of services by private application providers
- Ideathon / Hackathon

2. Considering a scheme to continuously maintain and updating Geospatial Information Infrastructure

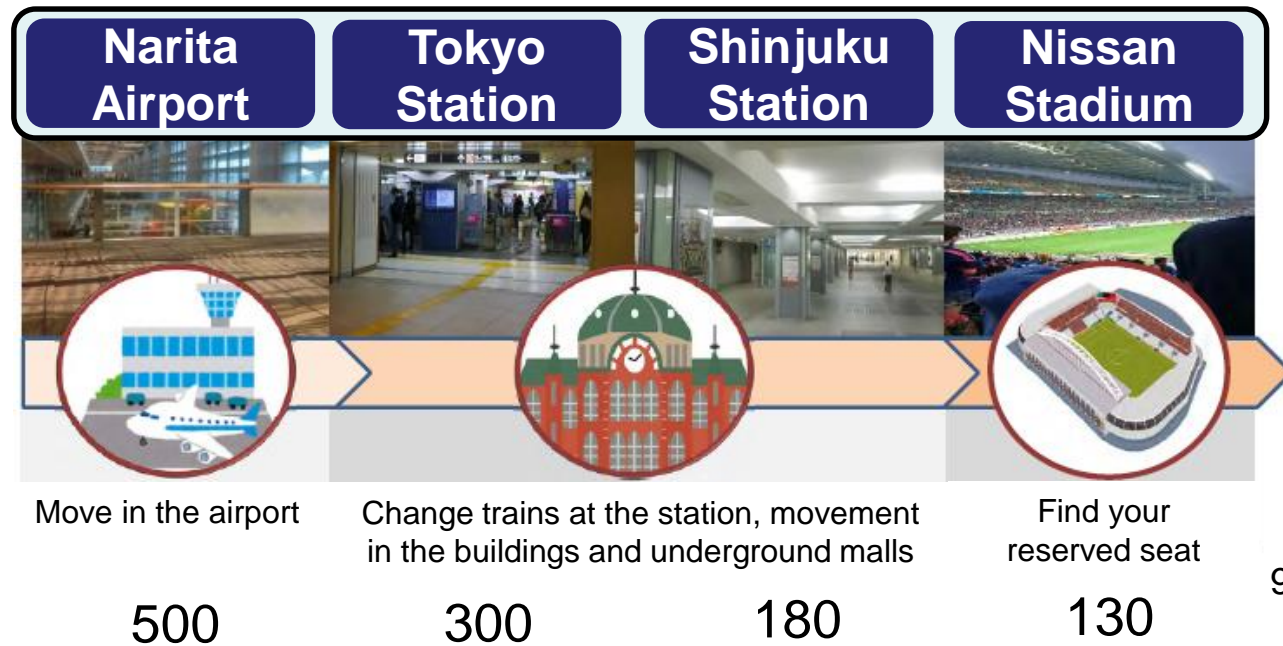
- (1) Realization of a scheme to promote maintenance, updating and distributing indoor digital maps
- (2) Study for indoor positioning equipment installation guidelines for creation of various services utilizing indoor/outdoor seamless positioning environment

Demonstration areas



Example of beacon for constructing positioning environment

Number of beacons installed each area



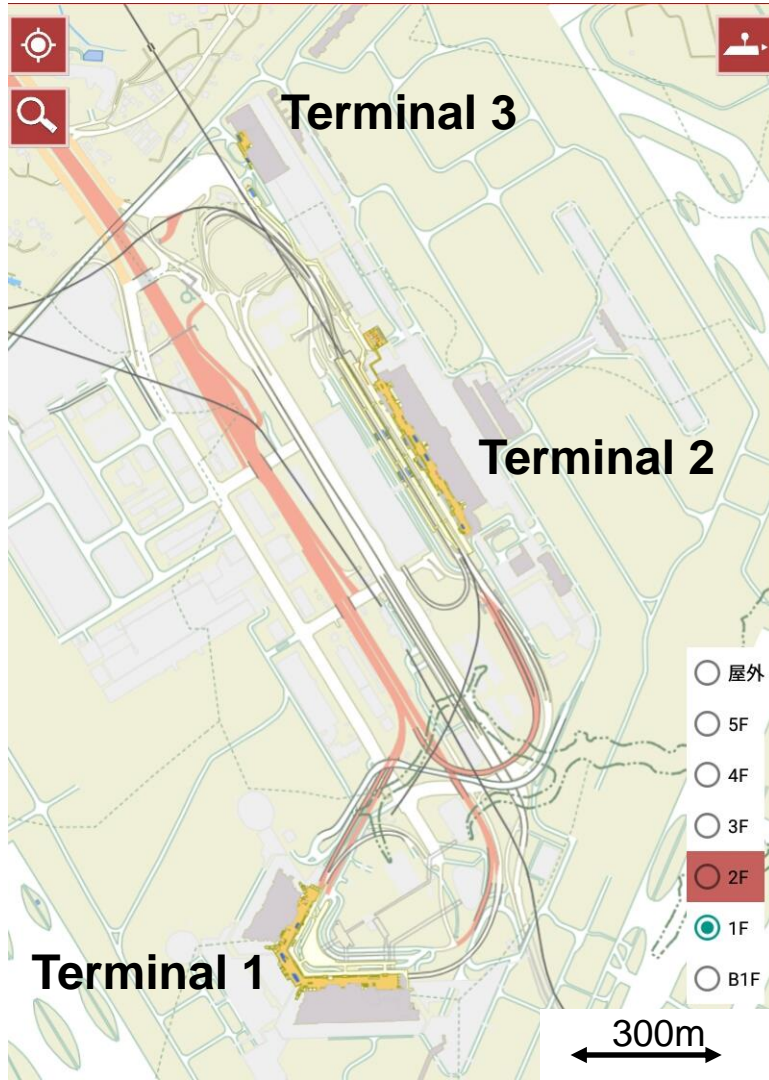
Example of indoor digital maps



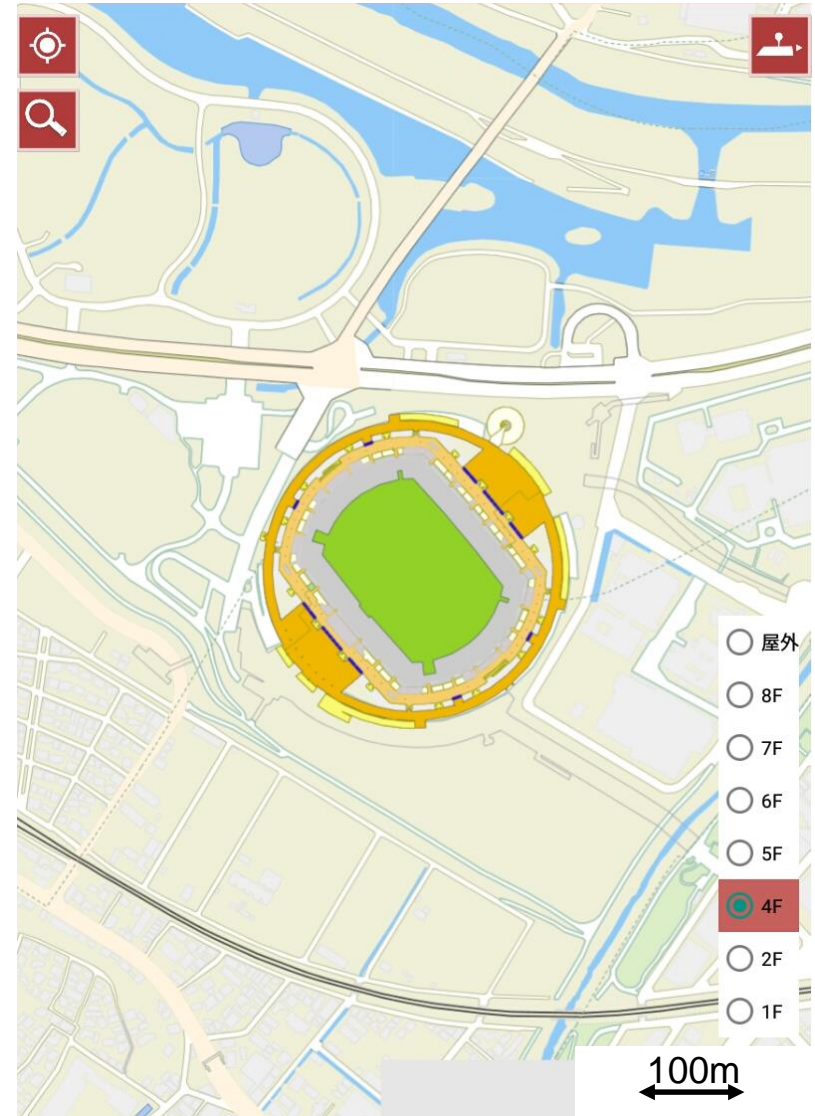
Places around Tokyo Station
(Otemachi, Marunouchi,
Yurakucho, Ginza and Yaesu)



Places around Shinjuku Station



Narita Airport
(Terminal 1, 2, 3 and station)



Nissan Stadium

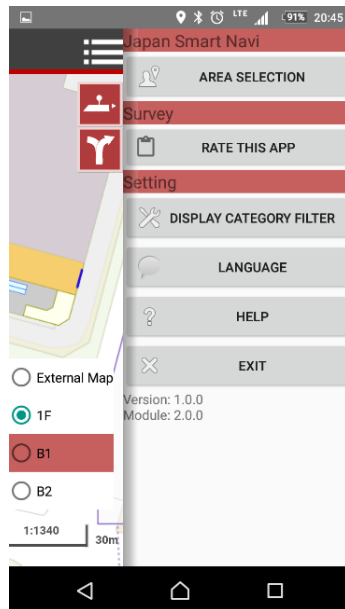
Example of prototype navigation application

Release* prototype navigation application to make people feel the convenience of the indoor digital maps and the positioning environment

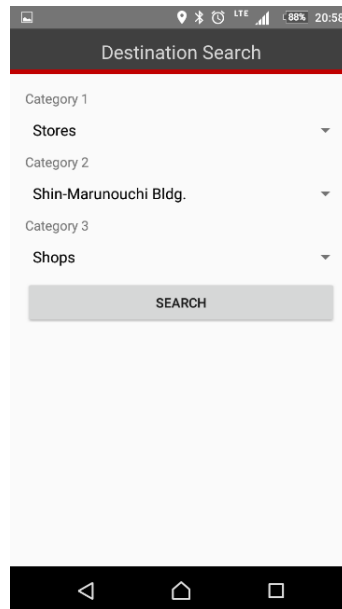
*From November 30, 2016 until February 28, 2017



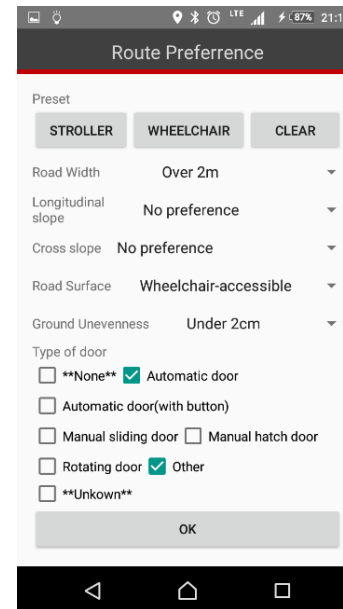
Start



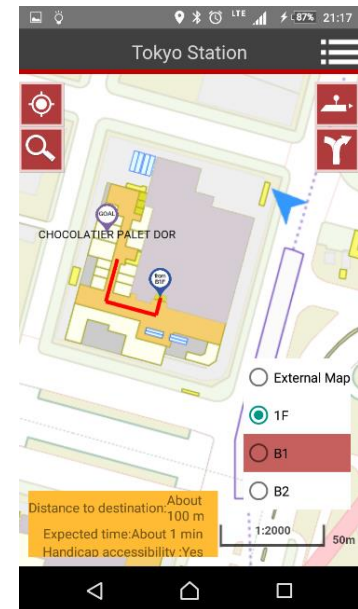
Menu



Setting



Setting



Map

FY2015	FY2016	FY2017	FY2018	FY2019	FY2020
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Heading towards implementation of high-accuracy indoor positioning system

Target area: places around Tokyo Station

Expand the target area: airports, stations, stadiums and facilities related to the Olympic Games

Cooperate with government ministries and agencies and carry out demonstrations.



Building Environment for the Private Sector Service

The best services in the world

Building a scheme for maintaining and updating indoor digital maps

<Roles of the Private Sector>

Making draft guidelines of installation of equipment for indoor positioning

- Startup of map maintenance scheme
- Application development by private companies

