Tourism Informatics / 観光地理情報学特論Ⅱ 2014 #2
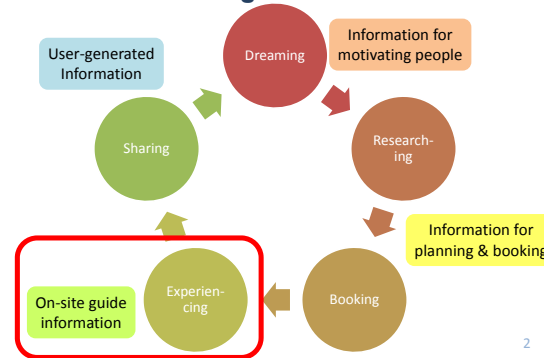
Location-based Service and Tourism

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Five Stages of Travel
（Google 2012）

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Today's Goal

Thanks to the popularization of smartphones, *location-based services* (*LBS*) become more practical and prevalent than before.

We look at some nice examples of location-based services in the tourism domain, and also learn underlying technologies such as *positioning*

Traditional LBS

Current location

Route Navigation

Facility search

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Recent LBS

Digital tour guide

Delivery / Service call

Location-based game

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These are also kinds of LBS

Location monitoring
(for children, dementing disorder, spouse…)

SNS（Check-in functions）

Geo-fencing

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What are location-based services (LBS)?

- Services based on the user's location
  - Not limited to information service
- The key is the techniques to identify the user's location in real-time, which is called
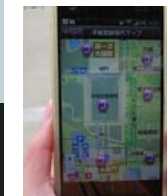

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Let's think about location-based services in the tourism domain

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Basic Location-based Service for Tourism

What are interesting spots around me?

How can I get there?

What's that?

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e-Guide #1: travelomap
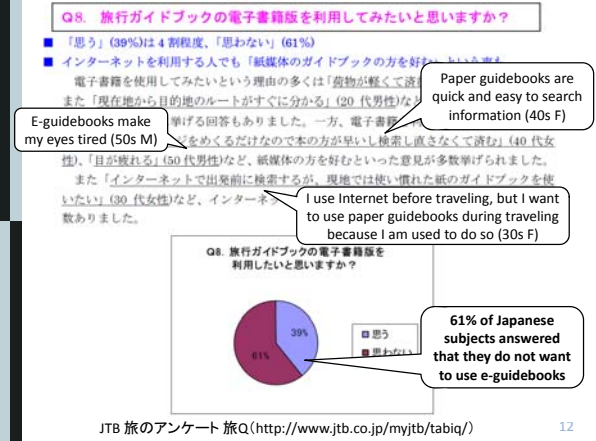

travelomap YOKOHAMA Travel Guide

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e-Guide #2: Panasonic Tabi-Navi

28,800 yen @amazon

Do you want to use such e-guidebooks?

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Paper guidebooks are quick and easy to search information (40s F)

E-guidebooks make my eyes tired (50s M)

I use Internet before traveling, but I want to use paper guidebooks during traveling because I am used to do so (30s F)

Q8. 旅行ガイドブックの電子書籍版を利用したいと思いますか？

61% of Japanese subjects answered that they do not want to use e-guidebooks

JTB 旅のアンケート 旅Q（http://www.jtb.co.jp/myjtb/tabiq/）

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Worst cases

Nice Examples #1: Mercedes Benz Museum

- Introductory Contents for each zone
- Rich On-demand Contents
- Audio-Visual Contents
- Multi-lingual

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Nice Example #2: Tokyo National Museum

- Navigation of several "highlight" courses
- Audio-Visual Contents
- Use of 360-degree viewable images

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Ideal e-Guide

- Multiple level of information detail
- Audio-visual contents
- Realtimeness
- Personalization
- Mixing word-of-mouth information
- Available at both indoor and outdoor environments

Are there any nice restaurant?

What are the favorite genres of my owner?

With whom is my owner?

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How to identify the user's location? —today's popular methods—

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Method #1：GPS

- G___ P_____ S____
- A system to identify the location of each GPS receiver using satellite signals

〇Available anytime

△Accuracy: ___m

×Unavailable at indoor locations, canyons, or near high buildings

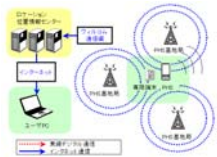×Dependence on US military

×High consumption of battery
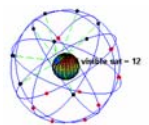
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Method #2: Cellphone Stations

- To estimate the user's location using the locations and signal levels of surrounding cellphone stations
- ○No need to turn on GPS or WiFi
- ×Accuracy: −hundred meters

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Method #3：WiFi

- To estimate the user's location using the locations and signal levels of surrounding signal-receivable WiFi spots
- Accuracy：10m～50m
- ○WiFi spots are already located densely in city areas
- ×Low accuracy at indoor environments

Method #4：Visual Marker

- To ask user's to shoot location-specific visual markers (QR-code®) by smartphone's camera
- Accuracy: very high
- ◎ Ultra low-cost
- × Work load to users
- × Easy to cheat
- △ Marker management

Kakunodate, Akita 21

Method #5：NFC (RFID)

- NFC: Near-Field Communication
- i) To ask user's to put a RFID-equipped card on location-specific receivers
  – e.g. Japanese train stations
- ii) To ask user to put their NFC-ready smartphones on location-specific RFID-equipped objects
- ○ Accuracy: very high
- × Work load to users

Inside of a RFID-equipped card

Roppongi, Japan

How to identify the user's location more clearly?
—Forthcoming methods—

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Forthcoming positioning method #1: GPS-Assisting Satellite

- Japan launched a satellite called *Michibiki*, which flies over Japan and enhances GPS's ability, and two more in near future
- Accuracy: less than 1m (1cm in future)

Forthcoming positioning method #2: IMES

- Indoor MEssaging System
- GPS-compatible signal is used for indoor positioning
- Accuracy: 1m～10m
- ○Seamless switch between indoor and outdoor navigation
- ×Need to install a modified GPS chip to devices

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Forthcoming positioning method #3: Supersonic Wave

- Positioning by location-specific patterns of supersonic wave, which people cannot recognize
- Accuracy：1cm～10cm
- ○Smartphone's microphone is applicable
- ×Privacy concern about microphone use

Application of Positioning by Supersonic Wave

Chichibu Railway Company in Saitama, Japan conduct a stamp rally event, which use YAMAHA's INFOSOUND™ technology for identifying the user's location by *station*-specific patterns of supersonic waves

Forthcoming positioning method #4: Visible Light Communication

- Positioning which use location-specific pattern of light flickering of LED light bulb, which people cannot recognize
- Accuracy：10cm～5m
- ○Existing lighting facilities can be used
- ○People can easily find "hot spots"
- ×Special sensors needed
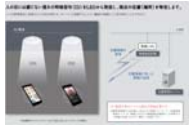
Application of Positioning by Visible Light Communication

- Boston Science Museum
  - iPad with a light sensor is lent out
  - Users can get the information about the nearby exhibitions, as well as search the museum contents and its locations
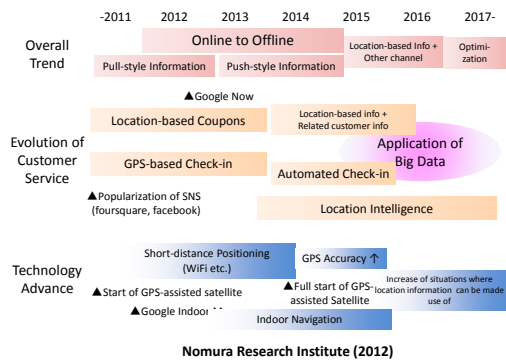

Forthcoming positioning method #5: Dead Reckoning

- Self-contained navigation, which estimates the user's location (relative to the start point) using smartphone's direction and acceleration sensors
- ○ No need to place devices in buildings
- × Error-prone

Roadmap of LBS

	-2011	2012	2013	2014	2015	2016	2017-
Overall Trend		Online to Offline			Location-based Info + Other channel		Optimi-zation
	Pull-style Information		Push-style Information				

▲Google Now

Location-based Coupons · Location-based info + Related customer info

Application of Big Data

GPS-based Check-in · Automated Check-in

▲Popularization of SNS (foursquare, facebook) · Location Intelligence

Evolution of Customer Service

Technology Advance

Short-distance Positioning (WiFi etc.) · GPS Accuracy ↑

Increase of situations where location information can be made use of

▲Start of GPS-assisted satellite · ▲Full start of GPS-assisted Satellite

▲Google Indoor · Indoor Navigation

Nomura Research Institute (2012)

Today's Keywords

- Location-based Service
- Positioning
- GPS
- WiFi positioning
- RFID
- Indoor positioning
  - IMES, Supersonic Wave, Visible Light Communication, Dead Reckoning