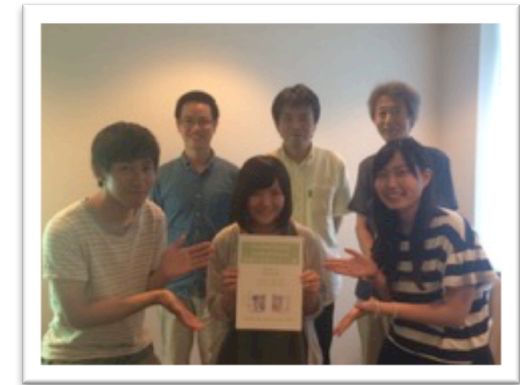
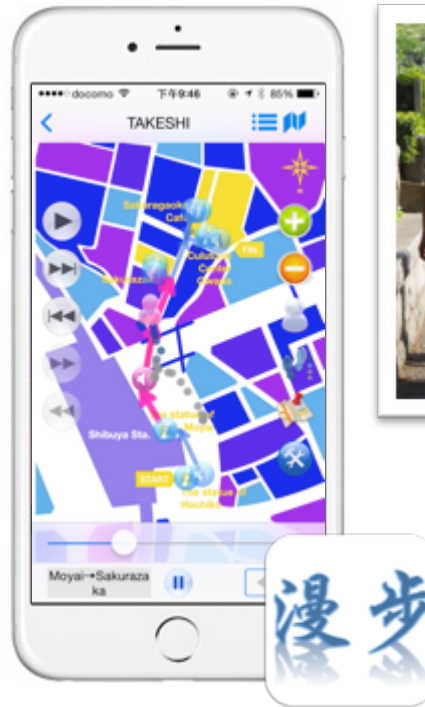


# Classes for Creating Location-Based Audio Tour Content: A Case of User-Generated LBS Education to University Students



**Min LU<sup>1</sup>, Masatoshi ARIKAWA<sup>1</sup> and Atsuyuki OKABE<sup>2</sup>**

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<sup>2</sup> School of Global Studies and Collaboration, Aoyama Gakuin University, Japan

{lu, arikawa, atsu}@csis.u-Tokyo.ac.jp

# Background

## ▶ Seminar of Culture Studies (文化演習)

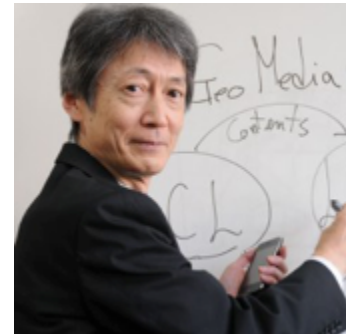
▶ In April to July, ... 2013, 2014 & 2015



**Okabe Lab.**



**Arikawa Lab.**



Prof. Atsuyuki OKABE



Prof. Masatoshi ARIKAWA

# Purpose

## ► Students:

- Undergraduate students (Grade 2 & 3) from **School of Cultural and Creative Studies, Aoyama Gakuin University** (in Tokyo, Japan)
  - Little background knowledge on Geography, Cartography, GIS, etc.

## ► Knowledge

- Basic knowledge about spatial information, positioning, LBS, UGC, etc.
- Diversity of maps and spatial information representation designs
- The areas surrounding their campus

## ► Experience

- Creating **hand-drawn maps** and audio **tour guides** for certain topics/stories
- **Georeferencing** maps and content for mobile LBS applications
- Teamwork and cooperation in creating the content
- *Using English to introduce the interesting places and tell stories*

# Schedule (in 2015, 90min for each class)

1. **April 21:** Introduction of the class
2. **April 28:** Try *Manpo* (seniors' works) off campus, questionnaires
3. **May 12:** Fundamentals of Location-based Services and *Manpo*
4. **May 19:** Template of scenario design, discussion of subjects

*Lectures*

5. **May 26:** Discussion on the details of content in groups
6. **June 2:** Decision of details - map drawing, scripts, role division
7. **June 9:** Materials collecting, audio recording (indoor/onsite)

*Discussions,  
fieldworks &  
material repARATION*

8. **June 16:** Content making, test and modification
9. **June 23:** Assemble content with *Manpo*, make georeferences
10. **June 30:** Test on site, refine and finish *Manpo Content*

*Content making  
& testing*

11. **July 7:** Experience and compare the results with other groups
12. **July 14:** Finalize and submit *Manpo Content* and final reports
13. **July 21: Final presentation**

*Finalizing,  
experiencing &  
conclusion*



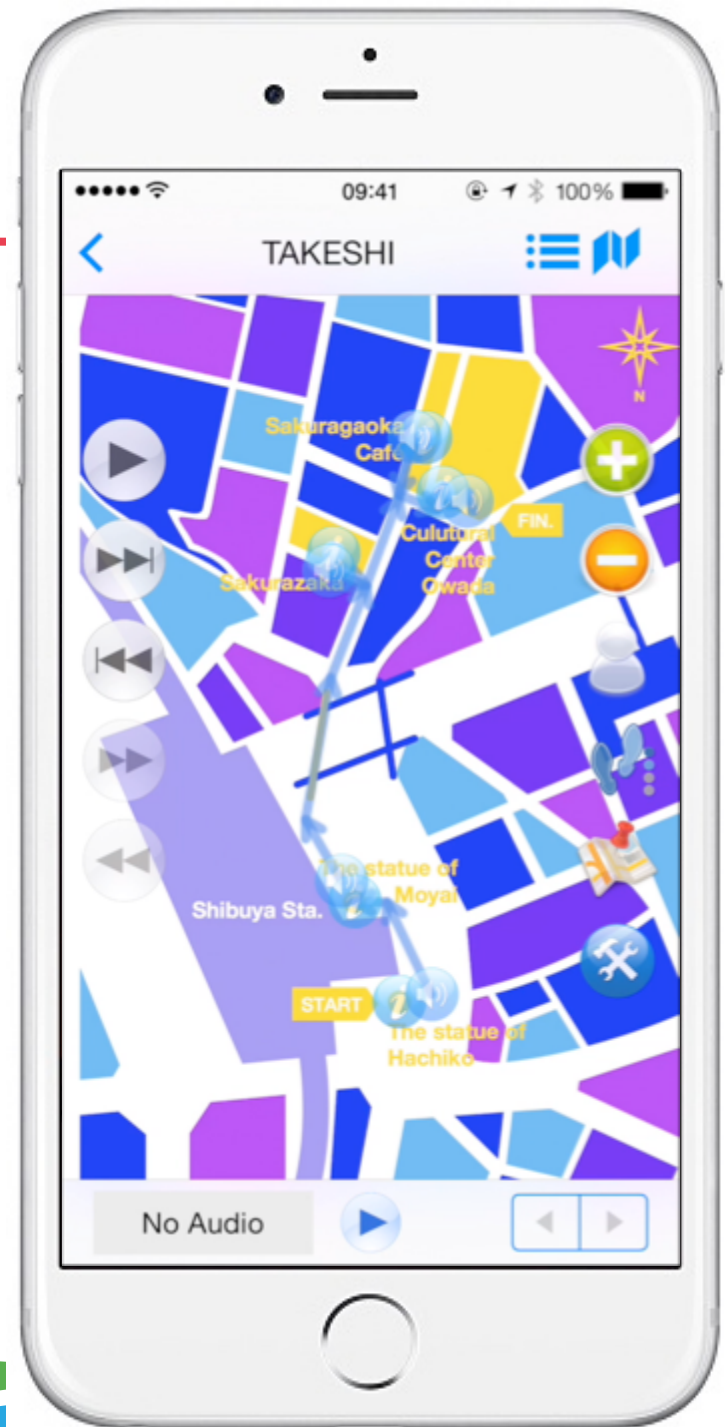
# Results

## ► Manpo



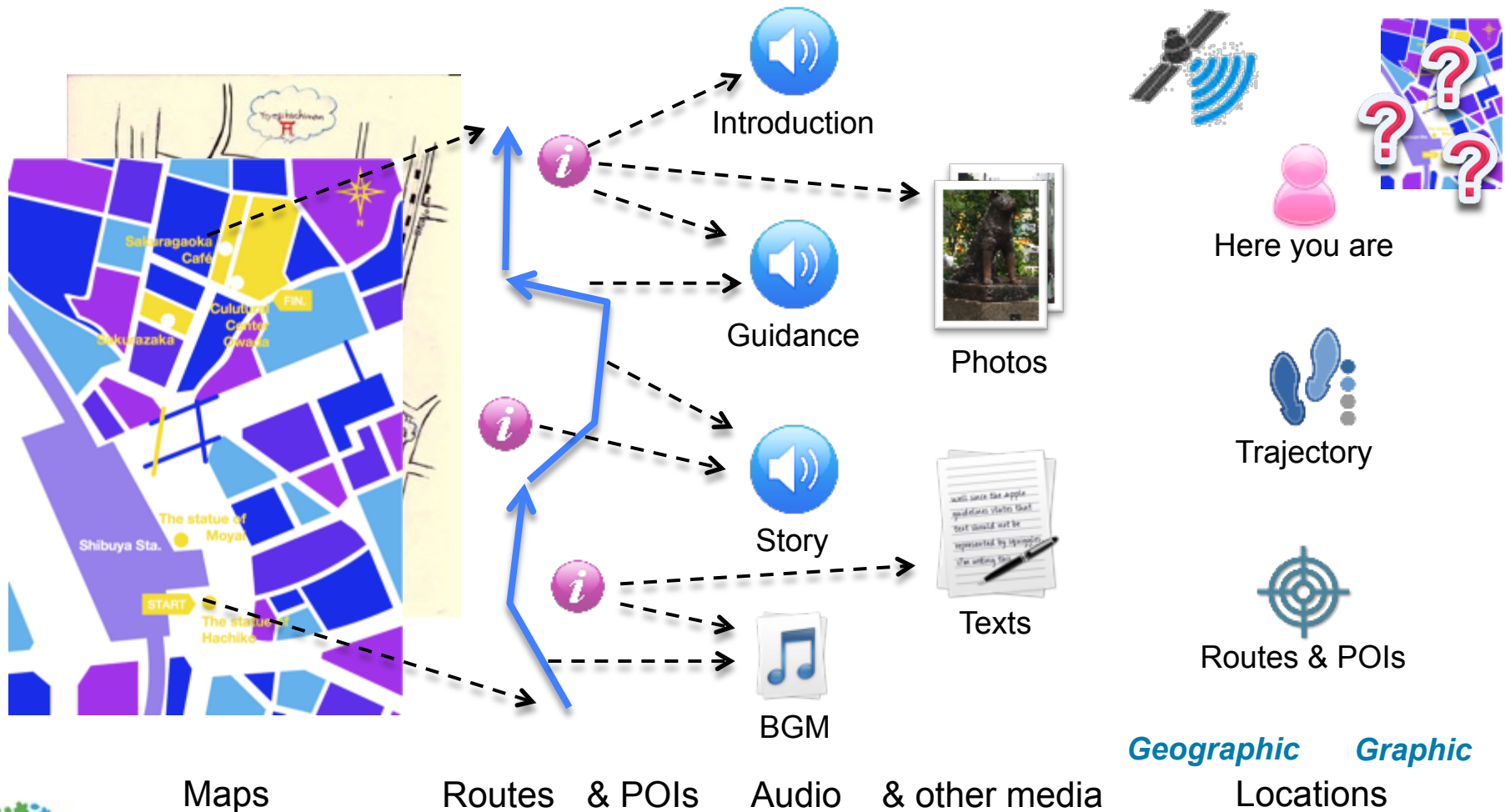
- iOS application (prototype)
- Location-based tour guide on iPhone/iPad with positioning on georeferenced hand-drawn maps
- Simple edit functions for creating such content with ease

*Content created by  
a group of students in 2015*



# Components of Location-based Audio Tour Content

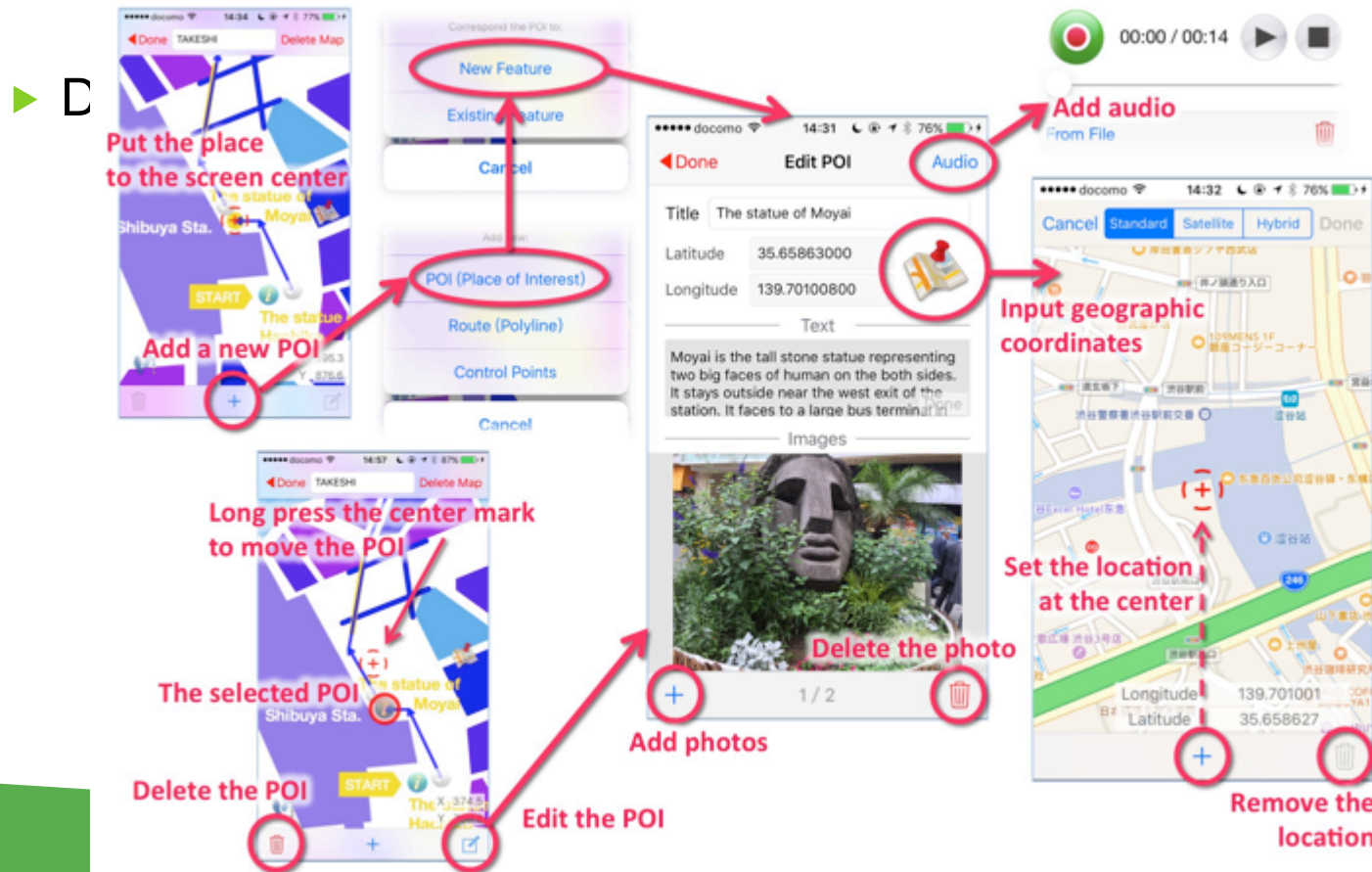
CSIS



**Geographic** **Graphic**  
Locations

# Tools for the Seminar

- ▶ **Manpo** – iOS mobile application
  - ▶ Developed by Arikawa Lab. in CSIS of the University of Tokyo
  - ▶ Edit functions for creating location-based audio tour on hand-drawn maps



# Group Work

## ► Grouping

	Students	Female	Male	Grade
Team 1	4	2	2	2
Team 2	3	2	1	2
Team 3	3	2	1	2
<b>Team 5</b>	<b>3</b>	<b>0</b>	<b>3</b>	<b>3</b>

(2015)





# Role/Task Division

- ▶ **Overall coordination**
  - ▶ Producer, director
- ▶ **Voice casting**
  - ▶ Main/supporting character, narrator
- ▶ **Map drawing**
  - ▶ Mapmaker
- ▶ **Content organizing**
  - ▶ Designer, scriptwriter
- ▶ **Media editing**
  - ▶ Audio editor, visual editor, photographer
- ▶ **Manpo editing**
  - ▶ Manpo editor (assembles all materials)
  - ▶ Tester (indoor/onsite)





# Hand-drawn Maps (2013 & 2014)

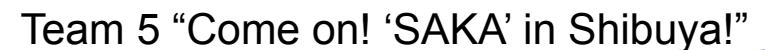
2013:



2014:



**Csis**



# Hand-drawn Maps



(2014)



# Hand-drawn Maps



Team 5 "Come on! 'SAKA' in Shibuya!" (2015)

# Scripts

- ▶ Title
- ▶ Theme
  - ▶ Nature / history / culture / art / famous person / ...
- ▶ Purpose
  - ▶ Target users: foreign visitors (e.g. for Olympics 2020) / new foreign students
  - ▶ Focus (e.g., the charm of the slope streets in Shibuya)
- ▶ Ranges
  - ▶ Spatial/geographic region
    - ▶ Near the campus of Aoyama Gakuin University
    - ▶ (Minimum Boundary Box in latitude and longitude)
  - ▶ Temporal range
    - ▶ Duration of the tour (30~60 min)
    - ▶ Content's period in history (Edo / Meiji / Taisho / Showa era, present age, ...)

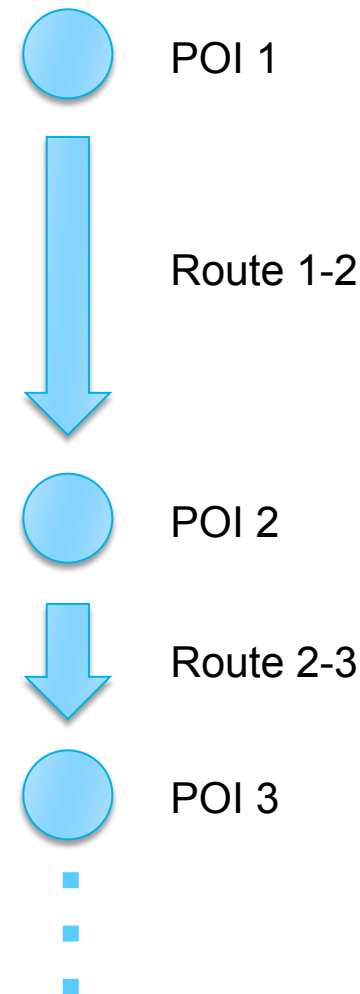


Google Maps



# Scripts

- ▶ Starting Point (POI 1)
  - ▶ **Title**, description, duration, **photos**
  - ▶ **Location** (longitude & latitude, X & Y)
  - ▶ **Dialogues / lines** for the characters / narrator
- ▶ Route 1-2 (POI 1 → POI 2)
  - ▶ **Locations** (as a **polyline**), landmarks
  - ▶ Duration / distance
  - ▶ **Dialogues / lines** for the roles / narrator
- ▶ POI 2
- ▶ Route 2-3
- ▶ ...
- ▶ Route [N-1]-[N]
- ▶ Ending Point (POI N,  $N \geq 5$ )



# Audio Recording & Edit

- ▶ **Dialogues** is better than just reading out introductions
- ▶ **Communication** with the user
- ▶ **Background music** can develop certain **atmosphere**
  - ▶ Good for walking
- ▶ Record indoor / outdoor
  - ▶ **Quality** of the audio vs. Sense of **immediacy**
  - ▶ **Match** the duration of the audio to the time for walking

POI3: **Oriental Bazaar**

**Team 3 (2015)**

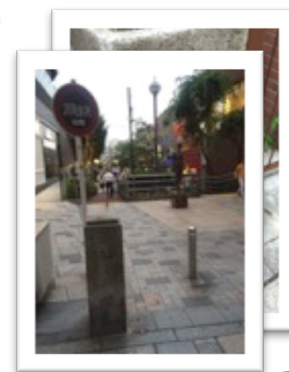
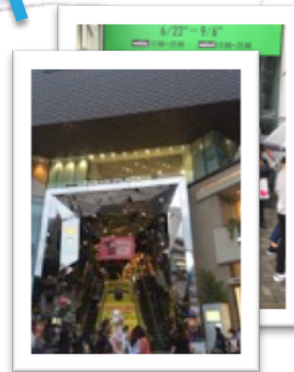
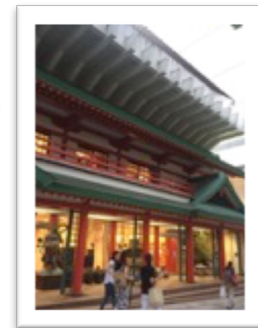
**Person3:** *What is this building?*

**Person1:** *This building is Oriental Bazaar and sells many Japanese souvenirs.*

**Person2:** *Oh! On basement floor, there are traditional Japanese wear - Kimonos, t-shirts, miscellaneous goods and books. On the first floor, Japanese tableware and miscellaneous goods are sold. On the second floor, we can find antiques, furniture and kimonos. Let's go to the basement floor! ....*

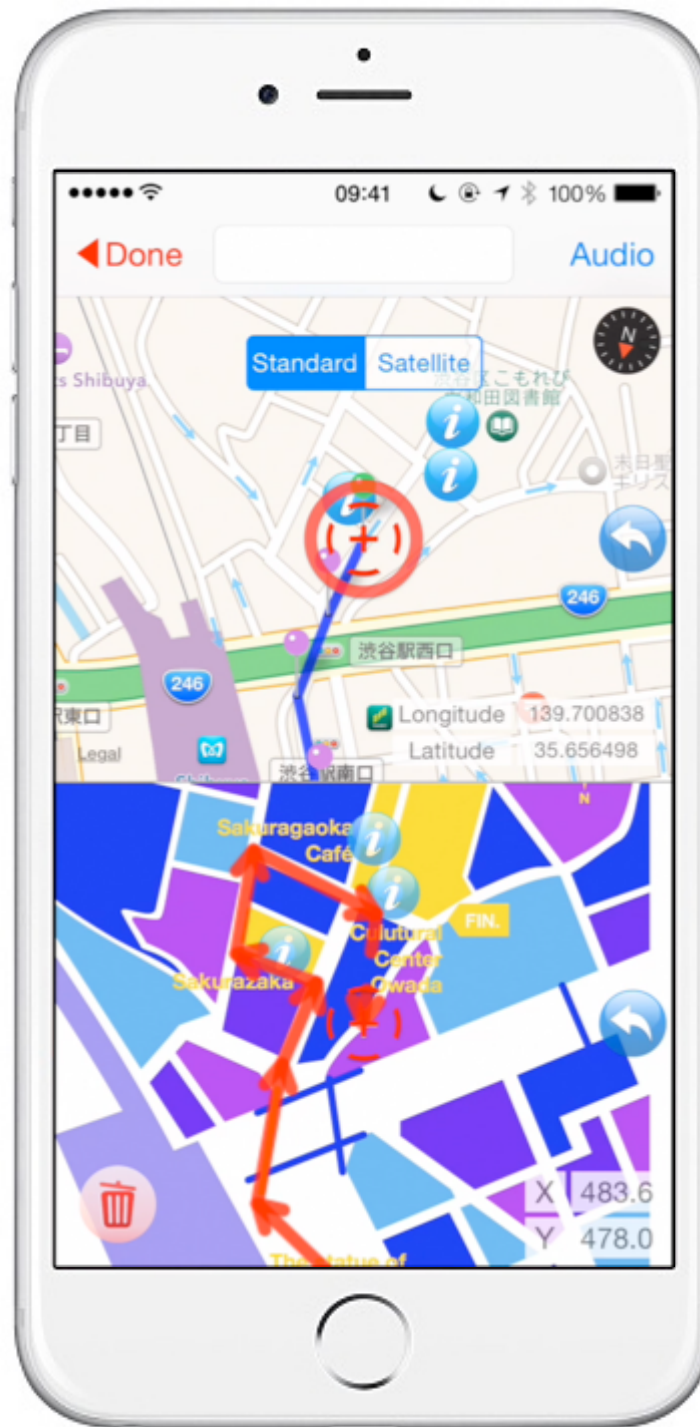


**Csis**

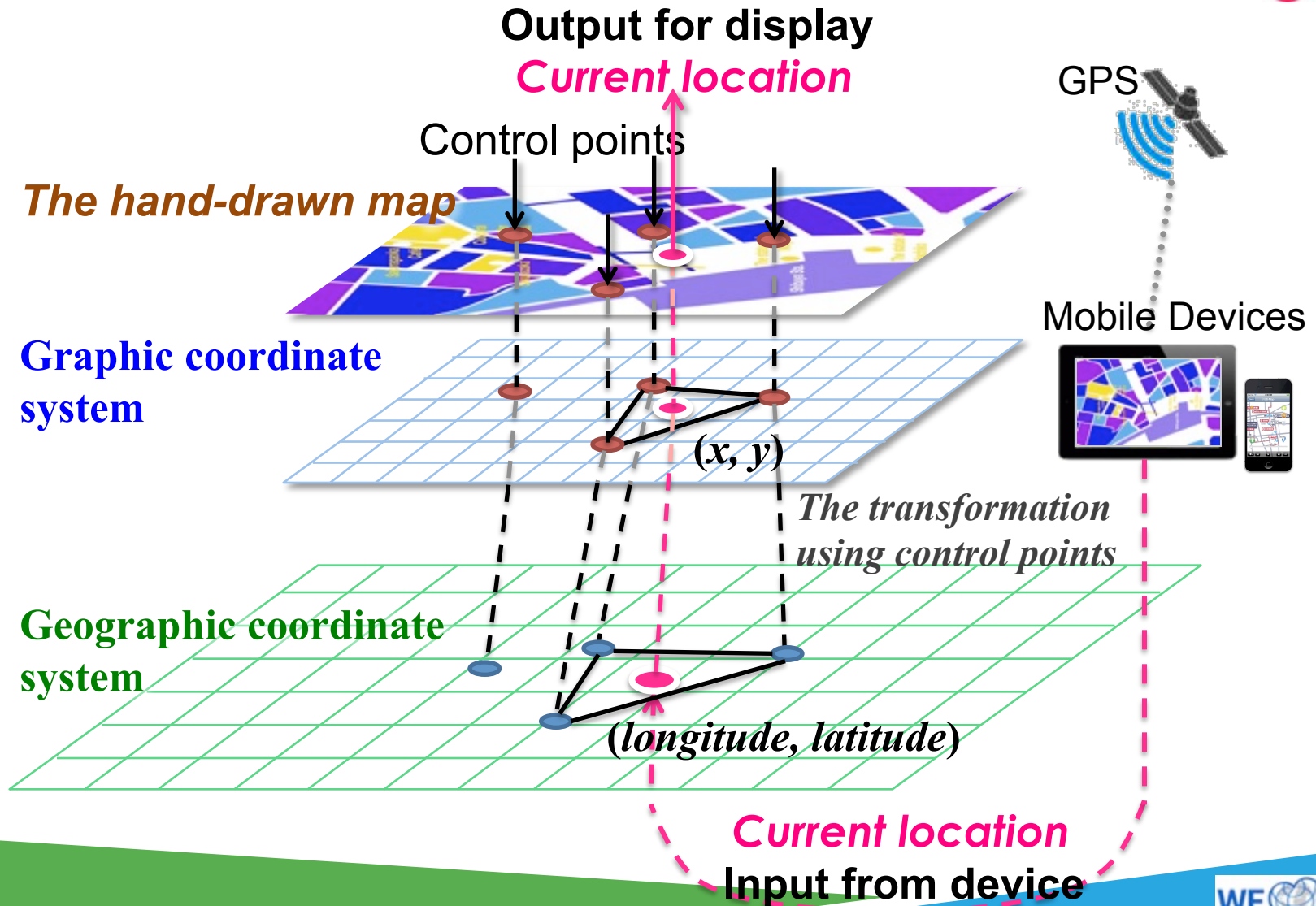


# Assemble

CSIS



# Positioning in Manpo





# Positioning is not easy

- ▶ Map drawing should avoid obvious mistakes



○ → みゆき通り depicted in the Map is actually 外苑西通り

○ → Actual location of みゆき通り

○ 岡本太郎記念館

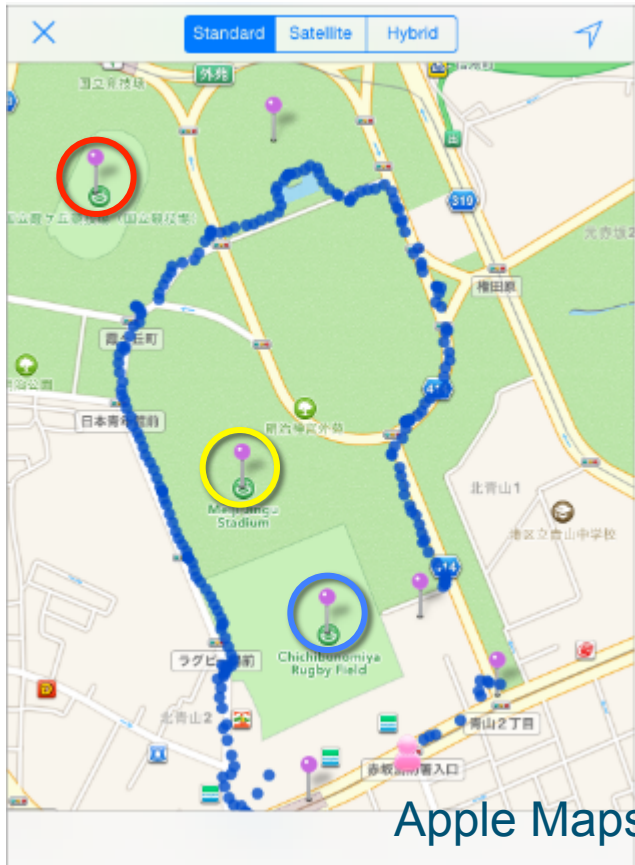
○ 根津美術館

○ Disappeared area

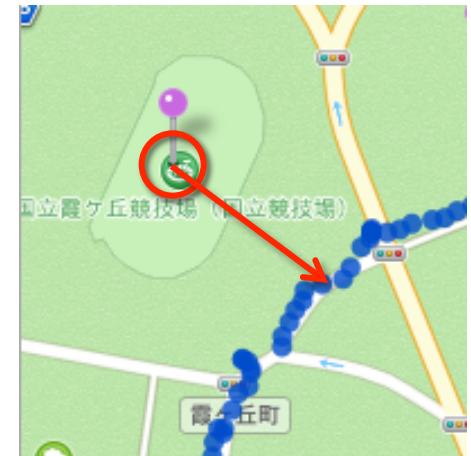
(2013)

# Positioning is not easy

- Deployment of POIs / control points needs more experience



Apple Maps



(2014)

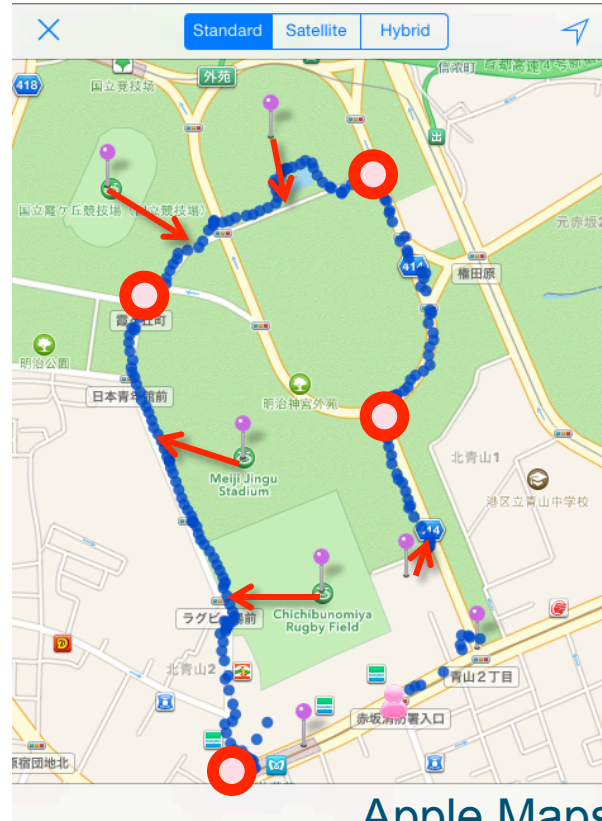


# Positioning is not easy

- Deployment of POIs / control points needs more experience



Original



Apple Maps



Modified

(2014)

# Positioning is not easy

- GPS is not always reliable



Original



Modified



(Team 5, 2015)



# Positioning is not easy

- ▶ GPS is not always reliable



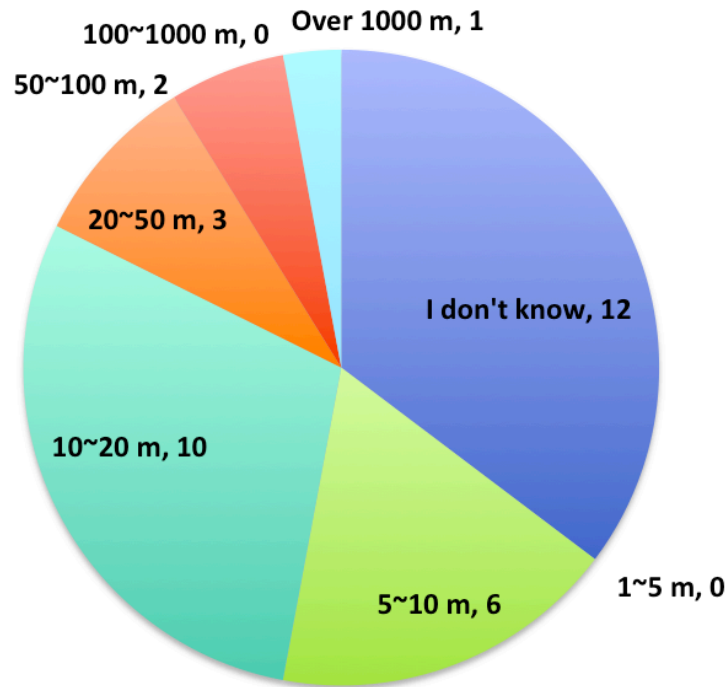
Shibuya, Tokyo



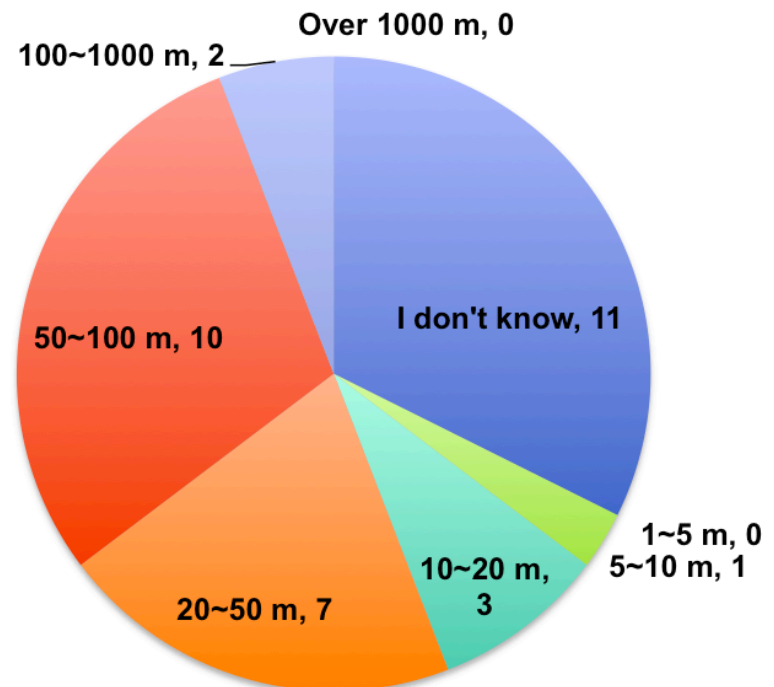


# Positioning is not easy

- Results of questionnaires on the awareness of the accuracy of smartphones' location information to the students in 2014.



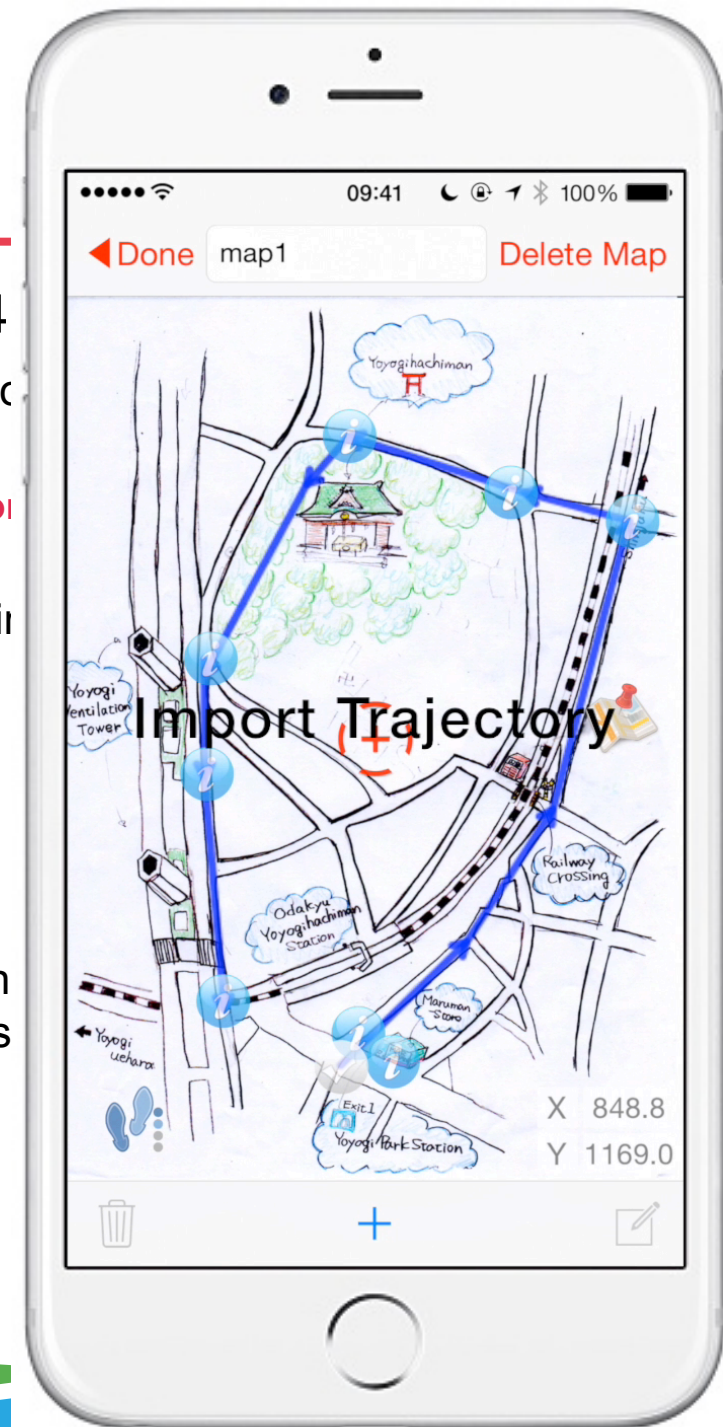
Q1: the best accuracy when the smartphone is in a good circumstance.



Q2: the worst accuracy when the smartphone is in a very bad circumstance

# Testing is important

- ▶ Students ignored testing in 2013 & 2014
  - ▶ The importance of **their input** of the POIs' / cc positioning accuracy is not emphasized.
    - ▶ They did not aware how the **deployment of cc** positioning.
  - ▶ More attention has been paid to audio recording
  - ▶ The field is a bit far from the classroom.
- ▶ New testing functions from 2015:
  - ▶ Display the walking trajectory while editing
  - ▶ Real-time change of trajectory on hand-drawn maps when modifying POIs and control points
  - ▶ Create simulated moving trajectory without going outdoor



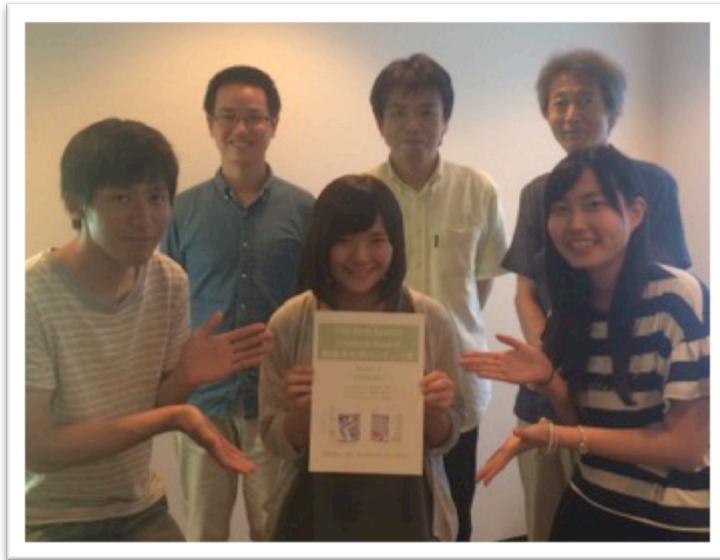
# Final Presentation



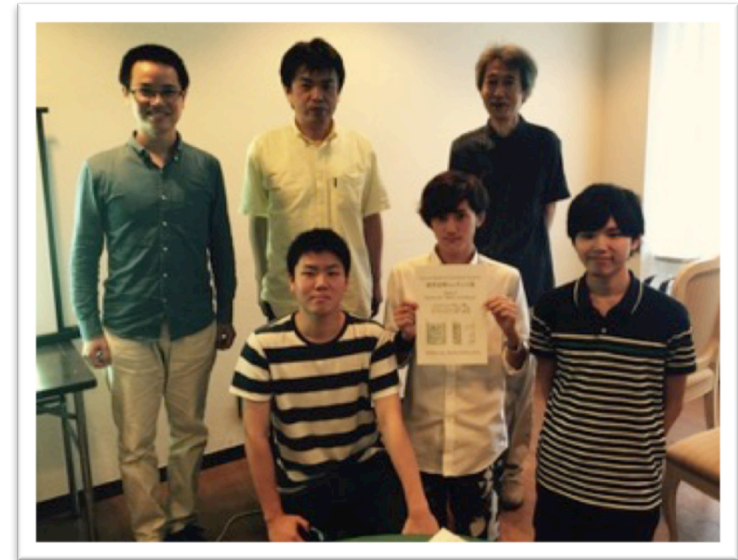


# Awards (in 2005)

- ▶ **The Best Spatial Content Award – Team 2**
- ▶ **Good Spatial Content Award – Team 5**
- ▶ The Best Presentation Award – Team 1
- ▶ Participation Award – Team 3



Team 2 The Best Spatial Content Award



Team 5 Good Spatial Content Award



# Awards (in 2005)

- Prizes – customized mugs for each student



Team 1

Team 5

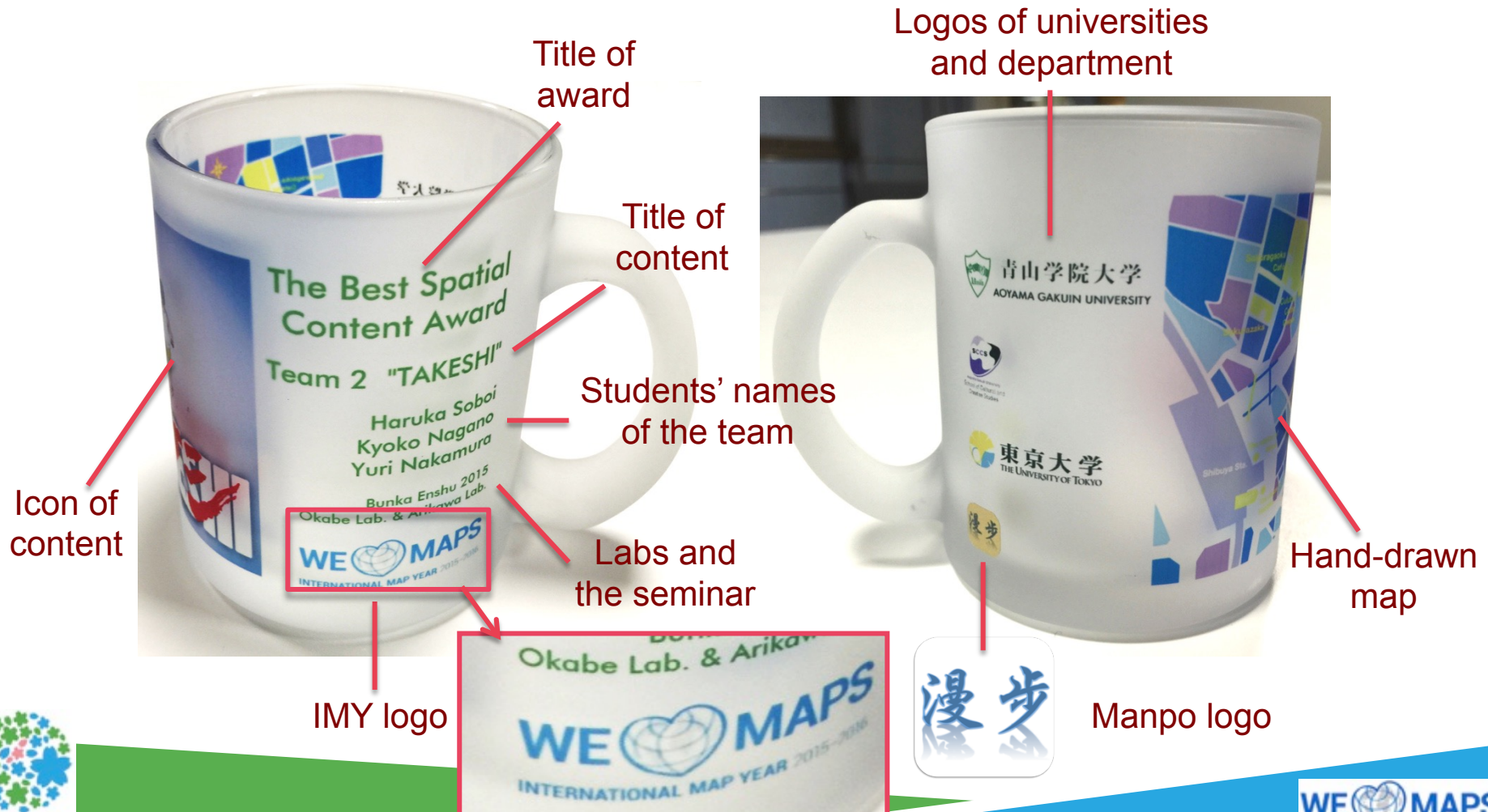
Team 3

Team 2



# Awards (in 2005)

- Prizes – customized mugs for each student



# Apps of Students' Works

## ► Available in App Store

Come on! "SAKA" in Shibuya!

[View More by This Developer](#)

### TAKESHI

[View More by This Developer](#)

By 東京大学空間情報科学研究センター

Open iTunes to buy and download apps.



#### Description

\*\*\* Introduction \*\*\*

Enjoy the urban legend with maps in the local places of Shibuya in Tokyo, which you may never find in the tourist guidebooks.

[東京大学空間情報科学研究センター Web Site](#) ▶ [TAKESHI Support](#) ▶

[...More](#)

[View in iTunes](#)

⊕ This app is designed for both iPhone and iPad

Free

Category: [Travel](#)

Released: Apr 04, 2016

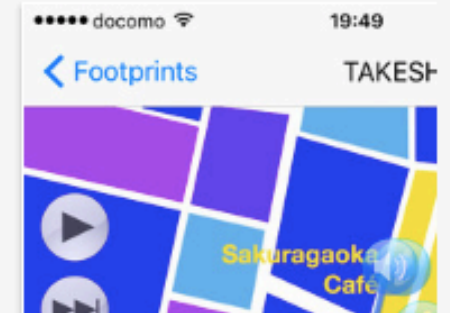
Version: 1.0.0

Size: 55.9 MB

Language: English

#### Screenshots

[iPhone](#) | [iPad](#)





# Manpo Project



<http://ubimap.csis.u-tokyo.ac.jp/ManpoProject/>

HOME

Introduction

Members

APPS

TAKESHI

Come on! "SAKA" in  
Shibuya!

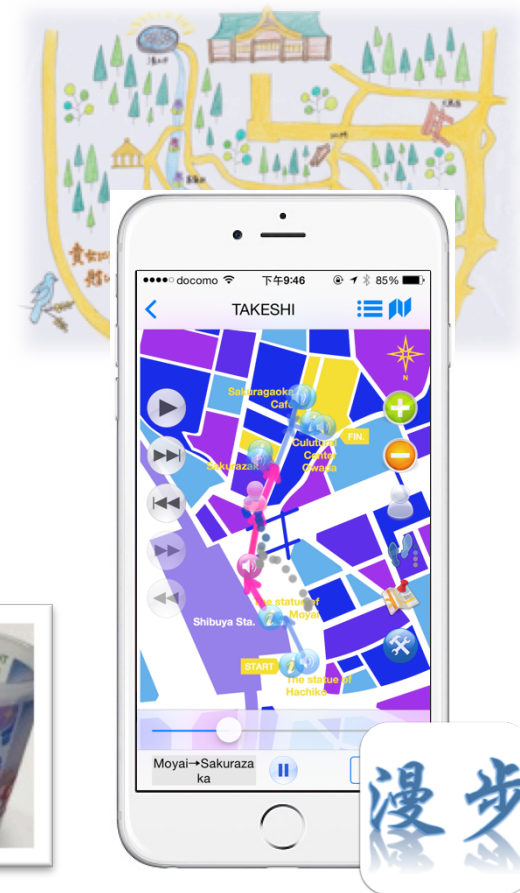
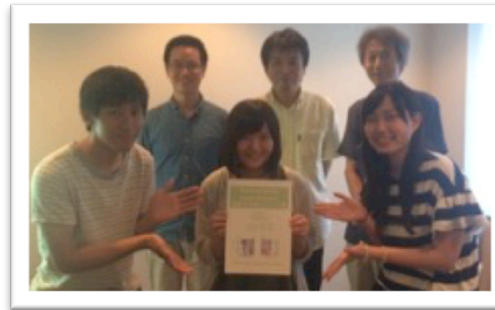
Bunkyo Manpo

Todai Kashiwa Rally

## APPS BY MANPO PROJECT







# Thank you!



**Min LU<sup>1</sup>, Masatoshi ARIKAWA<sup>1</sup> and Atsuyuki OKABE<sup>2</sup>**

<sup>1</sup> Center for Spatial Information Science, The University of Tokyo, Japan

<sup>2</sup> School of Global Studies and Collaboration, Aoyama Gakuin University, Japan

{lu, arikawa, atsu}@csis.u-Tokyo.ac.jp



Made with Manpo

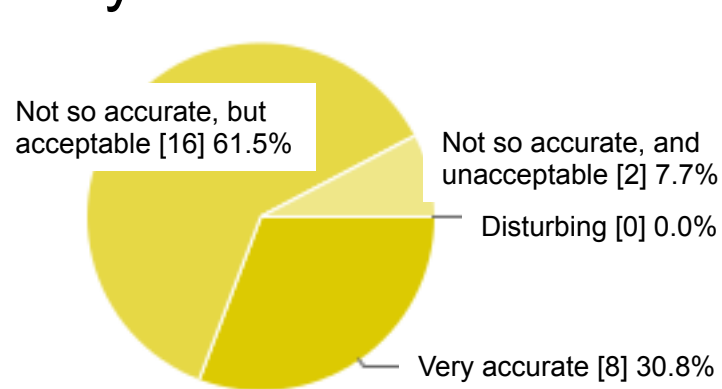
Promotional Video made by Team 1

# Storytelling is important

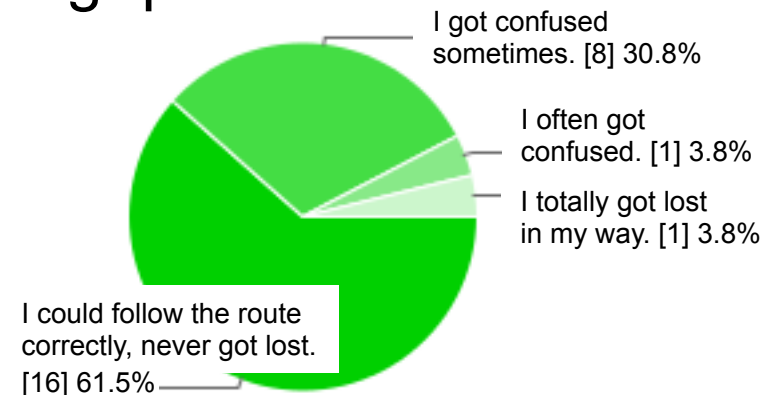
- ▶ Story is always an efficient way for human to convey knowledge
  - ▶ Connect the isolated events / information using **sequence** or **causal link**
  - ▶ Connect **the unknown** to **existing knowledge**
  - ▶ Stimulate the **curiosity** to further exploration
  - ▶ Easy to **memorize**
- ▶ Storytelling in audio tours
  - ▶ Tell / imply a story by **connecting the POIs**
  - ▶ Embed the **facts / description of the places / environment** into a story
  - ▶ Connect **the current real places** to the **events / persons** in **history / legends**
- ▶ Storytelling in map drawings
  - ▶ **Sequence** the POIs with **walking routes**
  - ▶ Connect **the destinations** to **current location**
  - ▶ **Exaggerations and simplifications**

# User experiments of Manpo

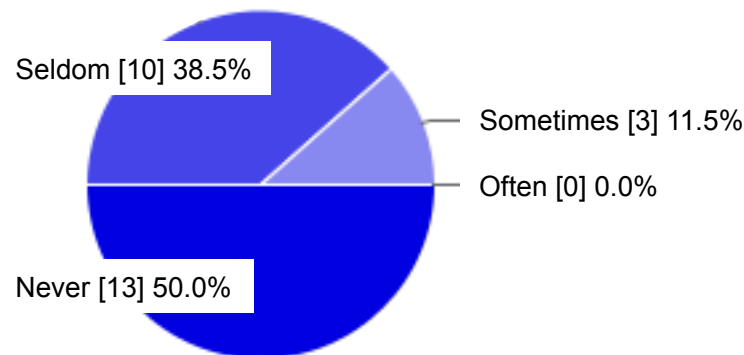
## A survey of users' satisfaction using questionnaires



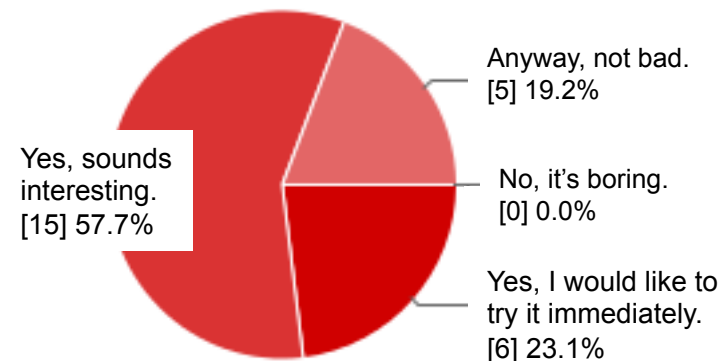
Question 1: How do you think about the **accuracy** of positioning on the analog maps?



Question 2: Did you follow the route?  
Have you ever **get lost**?



Question 3: Do you often **turn to web map** when you are using the content?



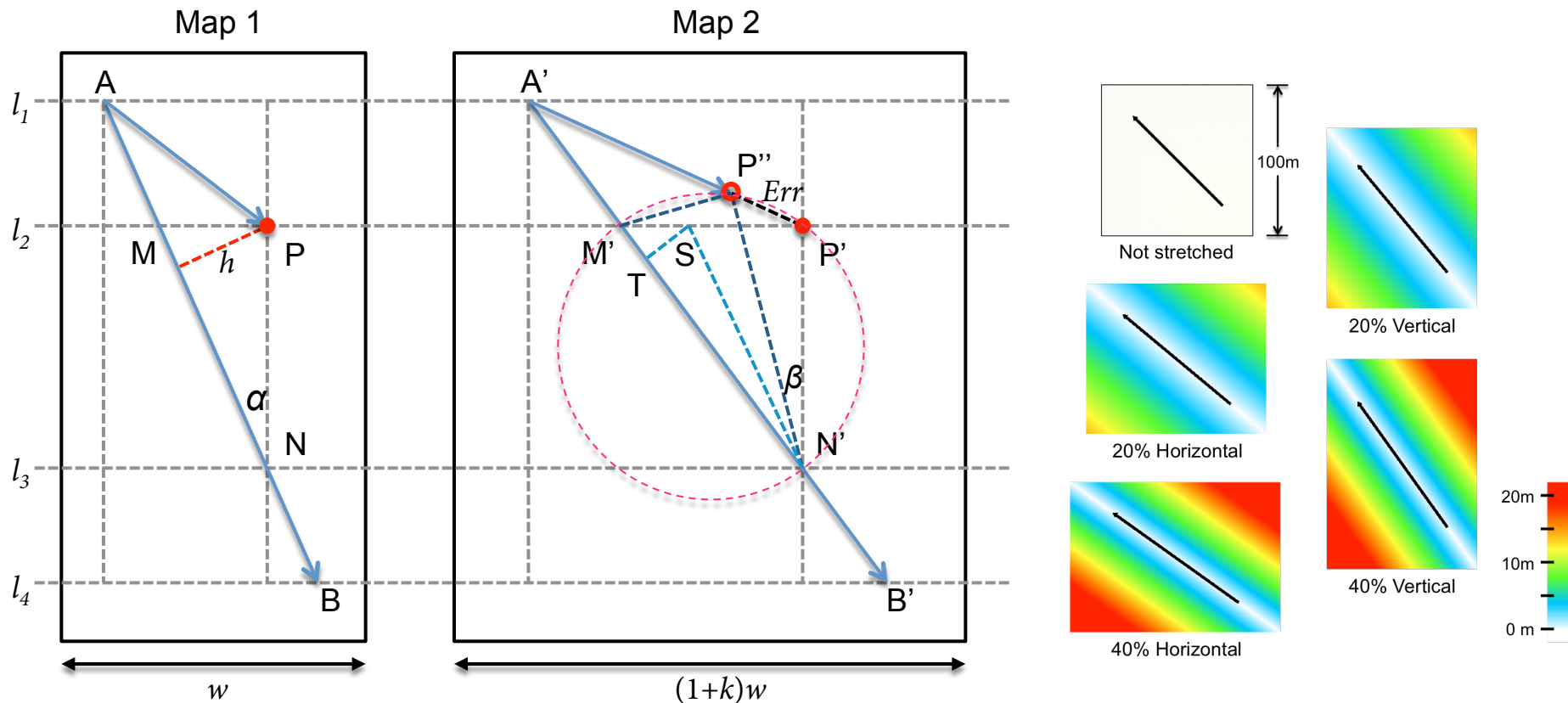
Question 4: Do you want **to make such and better contents** by yourself and **share** with your friends?



# Positioning methods on HC-maps

## Two-point based positioning

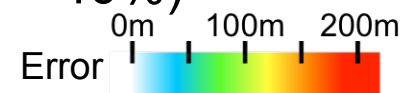
- $Err = k * h$  ( $k$ : rate of stretching,  $h$ : distance to the line of control points)



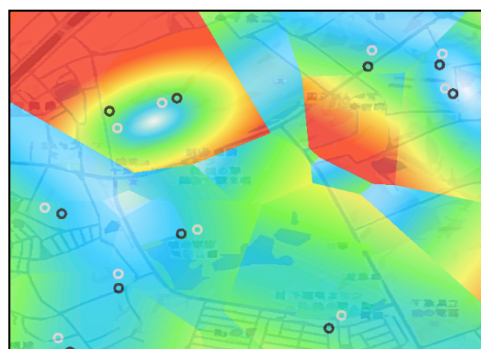
# Errors of positioning

## Error of two-point based positioning

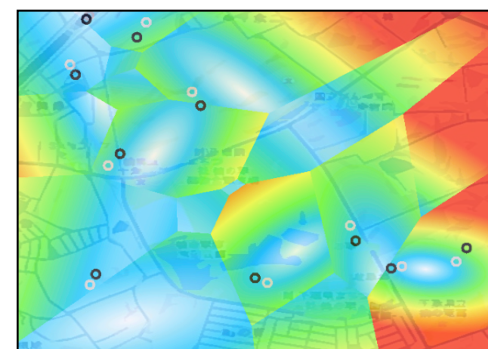
- Error and density of control points (rate of stretching  $k = 40\%$ )
- With randomized error of control points ( $\leq 50\text{m}$ )



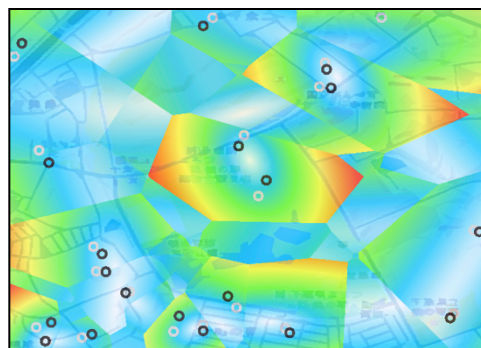
Count = 10



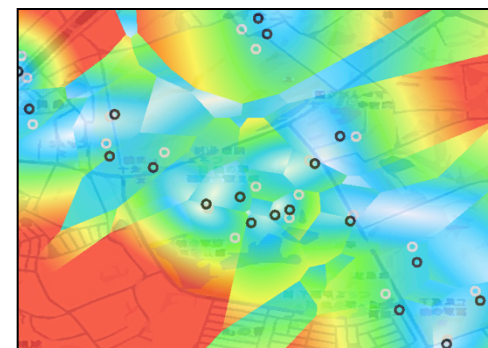
Count = 10



Count = 20



Count = 20

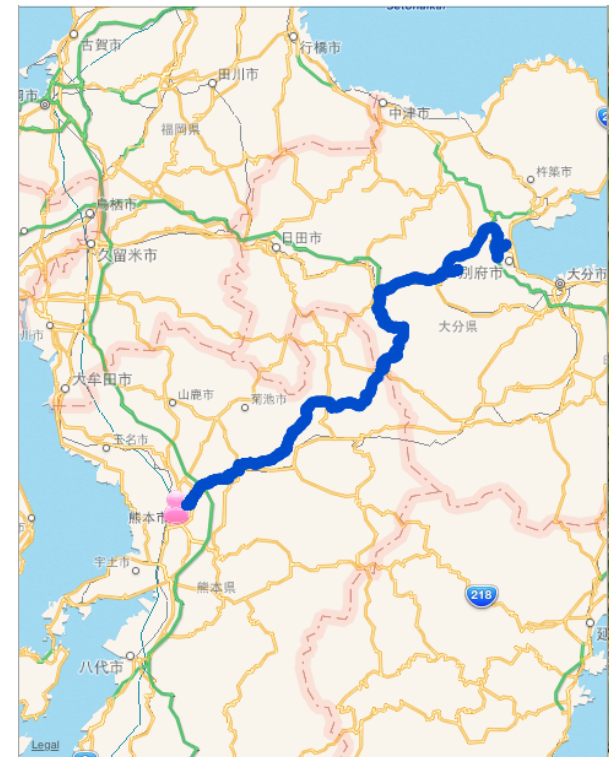


# Positioning on distorted maps

- Three-point based affine transformation:  
↓ Using railway stations as control points



日本鳥瞰九州大圖繪 by 吉田初三郎



Apple Maps