Research Today to Increase Accessibility Tomorrow: The Cutting Edge of Wayfinding Technology

A Promising Practices and Solutions in Accessible Transportation Webinar

April 13, 2011
Speakers

• Mohammed Yousuf, research electronics engineer, Federal Highway Administration’s Office of Operations
• Matthew Rice, professor, Geoinformation Science, George Mason University
• Sean Barbeau, Research Associate at the University of South Florida Center for Urban Transportation Research
• Michael May, founder, Sendero Group
• Joe Cioffi, founder, ClickandGo Wayfinding Maps
• Jane Toleno, ClickandGo Wayfinding Maps user
Wayfinding Technology: 
Brief Overview & Role in Enhancing Access to Transit

Mohammed Yousuf
Office of Operations, R&D
Federal Highway Administration
Technology & Innovations…

• Convergence in technology
  – GPS, wireless, robotics, artificial intelligence
• Data Capture
  – Real-time, archived, crowd sourced
• Cloud Computing & Mobile Platforms
• Intelligent Transportation System (ITS)
Enhancing access to transit…

- ITS ConnectedX Initiative
- Smartphone Applications
- Cloud Computing
Crowdsourcing Accessibility

Matthew T. Rice
George Mason University
Background:

2008-Present:
Assistant Professor
Department of Geography and Geoinformation Science
George Mason University

Past:
Ph.D. UC Santa Barbara (2005)
MS & BS/BA/BS

Movement Barrier: GIS and Accessibility

UCSB Faculty Mentors:
  Dr. Michael Goodchild
  Dr. Reginald Golledge

Reginald Golledge:
  Print barrier
  Movement barrier

Personal Guidance System (1990-2008)
Haptic Soundscapes (1999-2005)

International Cartographic Association
AAG Cartography Specialty Group
GMU:

Campus Accessibility Map

Printed & web (pdf)
Large-format (approx. C2)
Tactile?

Buildings
Road and Walkways
Routing along ADA compliant walkways
Walkways with steep slopes (non-ADA compliant)
Stairways
Accessible entrances (assisted doors, ramps)
Handicapped Parking

Areas closed for Construction
Construction @ GMU

GMU Facilities:

Updates
Plans for accessibility & pedestrian access
Email alerts

Alert system (Broadside) “Timeliness of Mason Alert questions” (Nov. 1, 2010)

Delay in alerts
Specificity (“Student Union” = SUB I or SUB II?)

Excellent system, but insufficient for specific updates associated with accessibility and navigation through construction areas
Construction @ GMU

Pedestrian network & infrastructure change frequently:

- fencing, barricades, signage, trucks, move daily

Official updates can’t possibly keep pace with construction, **even under ideal circumstances**

Solutions for movement barrier?

**A very large embedded intelligent sensor network**

**Volunteered Geographic Information (VGI), crowd-sourcing accessibility**
VGI @ GMU

Goal:

Capture real-time VGI-derived spatial data for campus

Sources: social media, text, email, voice

Integrate & display VGI with official institutional alerts & data

Assess VGI reliability & tag accordingly
VGI @ GMU: What is needed?

Available sources of official infrastructure data

A very good, localized gazetteer

Ability to geo-parse diverse sources of information

Multi-modal data input & output
Gazetteers

Geographical dictionary or index that links a **placename** with a **location**

- GEOnet Names Server (GNS), NGA
- Geographic Names Information System (GNIS), USGS
- Getty Thesaurus of Geographic Names
- Dorling Kindersly (w/electronic atlas resource)
- TIGER gazetteer (US Census Bureau)
- U Virginia Library Gazetteer
- UCSB Alexandria Digital Library Gazetteer

- [http://geonames.nga.mil/ggmagaz/](http://geonames.nga.mil/ggmagaz/)

---

**Accessible Community**

**Transportation**

**In Our Nation**
A Localized Gazetteer

Purpose:

Translate between human world and GIS world

Provide spatial footprint for placenames in VGI

Link resources by location

Alert: Student Union

SUB I

SUB II
## Localized Gazetteer

### Building naming:
- **Official**
- **Original drawing name**
- **Abbreviated forms**
- **Vernacular forms**
- **Foreign language variants**

### + Association Characteristics

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Official Name</td>
<td>Designated official name</td>
<td>To georeference with official map data sources</td>
</tr>
<tr>
<td>Original Drawing Name</td>
<td>Text label from official map or drawing</td>
<td>To georeference with official map data sources</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Standard feature abbreviation</td>
<td>To use for linkage in the gazetteer if used as a common verbal descriptor</td>
</tr>
<tr>
<td>Vernacular1</td>
<td>Slang or informal name for feature</td>
<td>To use for linkage in the gazetteer if used as a common verbal descriptor</td>
</tr>
<tr>
<td>Vernacular2</td>
<td>Jargon or technical name for feature</td>
<td>To use for linkage in the gazetteer if used as a common verbal descriptor</td>
</tr>
<tr>
<td>Vernacular3</td>
<td>Coded or numbered name for feature</td>
<td>To use for linkage in the gazetteer if used as a common verbal descriptor</td>
</tr>
<tr>
<td>Formerly named</td>
<td>Previous feature name</td>
<td>To account for re-naming of buildings (e.g., for memorials or re-purposing)</td>
</tr>
<tr>
<td>Foreign language1-5</td>
<td>Name in foreign language</td>
<td>5 common translations based on student demographics</td>
</tr>
</tbody>
</table>
Status

Gazetteer data model near complete

Information being gathered (colloquial / abbreviated / informal / foreign language names)

Gazetteer being populated

Routing – obstacle avoidance (in process)

Geoparsing & data ingestion

Multimodal translation

Proximity alerts through mobile devices
Relevance

Search & Rescue

Emergency Management

Challenging problems

Spatiotemporal dynamics: time and position stamps of moving observers
Team

Dr. Matt Rice
w/ GGS faculty

Dr. Dan Jacobson (University of Calgary)

Curt Hammill (MS-GECA)
Sara Schwarz (MS-GECA)
Ahmad Aburizaiza (Ph.D. – ESGS)
Scott McDermott (Ph.D. – ESGS)
Brandon Shore (CERG-GIS)
Travel Assistance Device
to Help Transit Riders

Sean Barbeau
University of South Florida Center for Urban Transportation Research
TAD

• Develop first navigation app for public transportation using GPS-enabled mobile phones
  – Alert user when to get off the bus with audio, visual, and tactile prompts
  – Target simplicity, with cognitively disabled in mind
  – Uses defacto standard Google Transit Feed Specification for data
TAD Web Page – Create Trips

End Stop: Flobraska Av @ Nebraska Av

1. Select agency:
   Hillsborough Area Regional Transit
2. Select bus route:
   Route 6
3. Select trip day:
   Wednesday
4. Select trip time:
   Hour: 11 am, Minutes: 34

6. Choose segment starting bus stop by clicking in the map.
7. Choose segment ending bus stop by clicking in the map.
8. Enter segment name:
   Create Segment
   Enter trip name:
   Work to Home
   Save Trip
   Done
TAD Cell Phone Application

- Transit Rider Selects Trip That Was Planned On Website
TAD Cell Phone Application

- While waiting for bus, rider sees estimated time until arrival and headsign for bus (vibration alert w/ 5 min. left)
TAD Cell Phone Application

- When the vehicle is within ~2 minutes of arrival, "NOW ARRIVING..." shows, with vibration alert
TAD Cell Phone Application

Then the user hears: “Get Ready!”
TAD Cell Phone Application

Then: “Pull the Cord Now!”

(+Sound and Vibration)

OK

Then: “Pull the Cord Now!”
Real-time Tracking View of Riders

Transit Riders Position (updated every 15 seconds) Update Position

Transit Rider: Test1 User1
Phone Number: 555-555-555

List of Transit Riders:
- Test1 User1: Active
- Test2 User2: Inactive

To create a new trip:
1. Select a transit rider.
2a. Click on create new trip.
2b. Click on edit trip.
Availability of TAD

• For more information visit, [www.TADMobile.com](http://www.TADMobile.com)
  – Call 813-974-3120 or email barbeau@cutr.usf.edu

  – Call 813 781 2438 or email Kevin@Dajuta.com
Accessible GPS Navigation Overview

Michael May
Sendero Group
Three specialized PDAs

• BrailleNote
• BrailleSense
• Pac Mate
Three mobile options

• iPhone
• Android
• Windows Mobile
Two stand-alone options

- Breeze
- Kapten
Partially accessible commercial options

- Navigon
- AT&T Navigator
- TomTom
- And more…
Transit Data

- Growing availability
- General Transit Feed Specification
- User Generated content
White House Initiative

• Working group on accessible geo data
• GeoAccess.org
Future frontiers

- Indoor maps
- Navigation
A New and Fully Accessible Wayfinding Technology for the Blind and Deafblind Traveler

Joe Cioffi, M.Ed.

ClickAndGo Wayfinding Maps
Introduction

- Professional background
- Disability and technology
- Wayfinding
Tactile-Low Vision Maps

- Can represent any number of environments: transit, city streets, campuses, parks, floor plans, etc.

- High contrast display, permanent & portable formats

- Universal Design: everyone can use them (IF they know Braille)
Wayfinding: How Do I Get There From Here? Strategies/Options

1. Self-orientation
2. Get directions or guide support
3. Orientation & Mobility
4. GPS / RIAS & other technologies
5. Tactile maps
What is ClickAndGo?

• Technology-enabled wayfinding service… fully customized for Blind and Deafblind (but also serves other groups)

• Offers landmarking cues, slope & distance info, textural and sound cues, etc.

• Free for users, no equipment to purchase, install, or maintain
What is ClickAndGo?

• How is this data delivered to the traveler?

• How is the data compiled?

• Testimonials, Blind community response

• What is the business model?
Features of ClickAndGo Maps

1. ACCESSIBLE WALKING DIRECTIONS

- Point A to Point B directions for BOTH indoor and outdoor travel
- Choose from a list of prepared starting points and destinations
ClickAndGo Features

• 2. POINT OF INTEREST INFORMATION (POI).
  • Provides description of landmarks.

• 3. VIRTUAL TOURS
  • Conference center, airport, hotel, school/college campus, transit center, park, etc.
  • Can serve as familiarization tool
  • Can also be adapted for audio tours of historical sites, museums, etc.
ClickAndGo Features

4. BUILDING DIRECTORY ACCESS *

- Can make “inaccessible” *kiosks* fully accessible… providing directions from entry doors of buildings to indoor locations: offices, clinics, and retail stores.

- For application in university / corporate buildings, public transportation terminals, malls, medical centers, etc
ClickAndGo Features

5. MENU ACCESS

6. EMERGENCY EVACUATION / EGRESS.

- Can assist in emergency egress planning and procedures
- Familiarization to emergency fire or exit routes
Environments Where ClickAndGo Can Be Implemented

- Transit environments (bus, train, light rail)
- University and school campuses
- Hotel & conference centers
- Airports, hospitals, malls, parks, museums
- Downtown areas of cities
- Skyway and tunnel systems
In Development

- Mobile Apps for IPhone and Google

- Using GPS/GIS technology with our service

In Development

- User profiles”, sign-up procedure, blog feature

- Will have databases for cane, guide dog, DB, wheelchair, elderly, TBI, and other travelers.

- New feature involving intersection descriptions for challenging intersections (note influence of blind and deafblind traveler requests/feedback)
Summary

• Free access for users, available in every possible format

• Data easily edited and updated.

• No installation, purchase, or maintenance of equipment

• Can provide seamless outdoor to indoor route guidance and familiarization support
Summary

• All data compiled by O & M instructors

• Can be tailored to assist multiple user groups: Blind, Deafblind, TBI, elderly, low vision, wheelchair travelers

• The bottom line: Experienced blind travelers do not need a mobility instructor to travel confidently to a new environment. They need access to information.
Questions and Resources

• Telephone: 612-220-6657

• www.clickandgomaps.com

• www.intouchgraphics.com
Description of Where, When, Why & How I Travel

Jane Toleno
5 Reasons Why ClickandGo Technology is Preferred, Efficient, Practical, and Always Accessible

- Access via my own phones or online
- No new program or equipment to learn
- No large purchase costs for equipment or training
- Routes can include environmental & sensory cues
- ClickandGo technology can go inside
My life experience confirms what recent research states

- When travelers with disabilities lack route-specific information, confidence lowers.
- Rather than traveling independently, many then tend choosing alternative transportation routes or not going at all
Thank you for your participation

• A recording of the session will be available upon request in audio CD and braille formats
• Please send your request to espadistancelearning@easterseals.com
• We thank you for your commitment to accessible transportation