Smarter Data, Accessible Cities & Mobility
Session TRN-003
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Topics

- Session Goals, Definitions, Market Context
- Open Doors Organization (ODO)
  - Who We Are, What We Do
  - Market Studies
  - Easy Access Guides (Data)
- The Bigger Picture – GeoAccess
- IBM Research & Activities
  - Industry Dialogues, Smarter Accessible Cities
  - Activity Areas
  - Examples from Client Projects
- A Call to Action, Closing
Session Goals, Definitions & Market Context
Session Goals

We hope this session helps you understand:

1. The market context for accessible transportation and mobility applications
2. How governments and organizations are working with disability organizations to harness data, offer mobility apps
3. R&D activities being undertaken by IBM and its collaborative research partners
4. Some practical considerations for organizations who want to become involved in this exciting area
Some Definitions

• **Smarter Data**
  
  • Data that has been “unlocked”, collected, aggregated and made available in an open manner to spur development of innovative I/T applications that have the potential to help people, organizations and communities better achieve their goals. Includes volumes of static and real-time data, in multiple formats, and sometimes with analytics applied to derive valuable information and insights.

• **Accessible Cities**
  
  • Cities who undertake explicit efforts – such as [Accessible Tourism](#) – to ensure their city transportation, points of interest and communities are accessible to all people, regardless of their physical limitations, disabilities or age.

• **Mobility**
  
  • The ability of individuals to move freely, independently and easily, regardless of their physical limitations, disabilities or age.
Market Context: User Needs

Tourism
Travel for recreational, leisure or business purposes... Brings in large amounts of income, opportunities for employment, and opportunities for traveler self-actualization and growth.

Travel
Movement of people using different modes of transportation between relatively distant geographical locations...

Transportation
Movement of people from one location to another... air, rail, road, water... includes public or private infrastructure, vehicles and operations

Co-Design
Full Inclusion
Access Amenities
Cost
Comfort
Convenience
Reliability
Safety & Security
Base Access
Use of mobile to enable all people to participate fully
Market Context: Industry Drivers

Public Policy & Law
UN Convention
Country policies / laws
Local policies / laws

Inclusive Tourism
Universal design
Inclusive not special
Economic models

Public-Private
Community dialogues
R&D / tech transfer
Open innovation

Demographic Shifts & Mobile Market Expectation

Population growth: aging / persons with disabilities... and fast-increasing expectation for mobile apps and mobile/location-based services.
Open Doors Organization (ODO)
ODO: Who We Are

- Chicago-based non-profit—founded in 2000
- Mission—to create a society in which persons with disabilities have equal opportunities as consumers
- Strategy—work with and educate businesses to help them do a better job of meeting the needs of their customers with disabilities
- Primary Focus—Travel, Tourism & Hospitality

ODO Director Eric Lipp
ODO: What We Do

- Staff Training—classroom, online, videos
  - Airlines, Airline Services, Airports, Cruise Lines, Rail, Bus, Hotels, Restaurants, Museums
- Conferences—Universal Access in Airports, Airline and Airline Service Symposia
- ADA Compliance—audits, consulting
- Special Programs—Inclusive Arts & Culture
- Industry Education—via assocs., DBTACs, etc.
- Consumer Education—disability orgs., rehab centers, print and online media
- Media Resource
ODO: Market Studies

- First nationwide studies of disability travel, with Harris Interactive—2002, 2005
- Market size—70% of adults w/ disabilities, $13.6 billion annual expenditure
  - 20% are frequent travelers, 6+ trips over 2 yrs.
  - 50% dine out at least once per week
- Internet use—Book online at higher rate than general population (51% v. 40%)
- Barriers to travel—84% reported obstacles w/ airlines, 82% airports, 64% restaurants, 60% hotels

Topics
- Travel frequency
- Travel spending
- Air travel
- Rail/bus/taxi
- Cruises
- Rental cars
- Assistive devices
- Hotels
- Restaurants
- Obstacles
- Info Sources
- Booking Methods
- Destinations
- Mkt. potential
ODO: Easy Access Guides Introduction

• Project Goals—reduce time/expense of travel planning; promote destination; raise awareness/accessibility
• Target Audience—all age groups w/ disabilities, seniors, travel professionals
• Models—AAA Barrier-Free Travel, Access Northern CA's San Francisco guide
• Funding—IL Dept. of Commerce & Economic Opportunity
• Method—preliminary research by phone, onsite audits
• Scope—accessible attractions, recreation, shopping, hotels, restaurants, transportation, services, resources
• Format—full online guide, abridged print guide distributed by IL Office of Tourism
ODO: Easy Access Guides Detailed Data

- Focus groups to assess what info is most/least important
- Data presented by disability type—mobility, hearing, vision
- No rating system—details enable individual to gage suitability
- General info kept to minimum
- Report only what is accessible

- Dimensions/heights/clearances based on ADA standards
- Data goes beyond ADA—bed height, chairs w/ arms, portable shower benches, etc.
- Searchable databases for hotels and restaurants
ODO: Easy Access Chicago Example

  - Online guide updated 2010
  - Full update & new print guide 2012/13
- Partners—IL DCEO, Chicago CVB, Mayor's Office, Hotel Assn (AH&LA)
- Properties selected from CVB Official Guide
- 300 site audits conducted by teams of ODO-trained inspectors, mostly w/ disabilities
- Ltd. technology—paper questionnaires, data coded and entered by hand
- Promotion by IL Dept of Tourism and ODO
**ODO: Easy Access Guides Benefits for Cities**

- **Valuable for local/regional residents as well as visitors with disabilities**
  - "Multiplier effect"—Few travel alone
  - "Wounded Warriors"—newly disabled vets
- **Aging population also served by guides**
  - 65+ pop in US projected to increase 78% (16.9 million) from 2010-30
- "**Good will effect**"—Enhances status and boosts travel by non-disabled, attracts investment
- **Site visits enhance awareness and accessibility**
- **Accessibility and access info valuable to meeting/convention business**
ODO: Easy Access Guides Practical Considerations

- **Initial Funding/Sustainability**
  - Revenue sources: govt., pvt. donors, ads

- **Detail of data**
  - Tradeoff with cost and property count

- **Property selection—setting minimum standards**

- **Data reliability**
  - Site visit v. self-audit v. crowd-sourced
  - Quality control

- **Technology for data gathering and reporting**

- **How often to update—ideal v. affordable**

- **Online v. print—do we need both?**

- **Measuring return—website visits, print guide requests, media mentions, user feedback**
The Bigger Picture – GeoAccess
The Bigger Picture: Report from GeoAccess.org

- **Background**
  - July 2010 (ADA 20th Anniversary)
  - White House / FCC / Commerce
  - ~24 technology leaders, disability advocates, government reps
  - Result: Geo-Access Challenge

- **Key Outcomes**
  - [Report on Data-Enabled Travel](#), edited by IBMer Bill Curtis-Davidson and significant contribution from Open Doors Org
  - Proof-of-Concept / ideation activities
  - Establishment of [GeoAccess.org](#)
  - Inspired [US FHWA BAA](#) on tech for wayfinding and navigation
# The Bigger Picture: GeoAccess.org Data Examples

<table>
<thead>
<tr>
<th>Static Data from Authorities</th>
<th>Public Paratransit</th>
<th>Private Transportation</th>
<th>POIs / Environment Info</th>
</tr>
</thead>
</table>
| **Mainstream Public Transit** | • GTFS Feed  
• Accessible Stations/ Stops  
• Accessible Vehicles  
• Contacts / help  
• Agency info  
• Service areas  
• Fixed routes/stops (if applicable)  
• Fares/reservations  
• Contacts / help  
• Community based transport  
• Rideshares/ carpools  
• Accessible taxis  
• Air, rail, bus, ferry stops/vehicles access  
• Wheelchair rentals | **Private Transportation** | **POIs / Environment Info** |
| **Real-Time Data from Authorities** | • Automatic Vehicle Location (AVL)  
• Elevators/escalators  
• Wheelchair lift status  
• Vehicle fullness  
• Congestion/traffic  
• Predicted arrival  
• Automatic Vehicle Location (AVL)  
• Vehicle fullness  
• Congestion/traffic  
• Predicted arrival  
• Service alerts  
• Reservation | **Private Transportation** | **POIs / Environment Info** |
| **Crowd Sourced Data** | • Vehicle fullness  
• Vehicle issues  
• Station/stop issues  
• Service issues  
• Ratings / reviews  
• Vehicle fullness  
• Vehicle issues  
• Station/stop issues  
• Service issues  
• Ratings / reviews | **Private Transportation** | **POIs / Environment Info** |
| **POIs / Environment Info** | • Accessibility info for POIs  
• Accessible municipal infrastructure | **Private Transportation** | **POIs / Environment Info** |

- GTA Feed
- Accessible Stations/Stops
- Accessible Vehicles
- Contacts / help
- Agency info
- Service areas
- Fixed routes/stops (if applicable)
- Fares/reservations
- Contacts / help
- Community based transport
- Rideshares/ carpools
- Accessible taxis
- Air, rail, bus, ferry stops/vehicles access
- Wheelchair rentals
- Automatic Vehicle Location (AVL)
- Elevators/escalators
- Wheelchair lift status
- Vehicle fullness
- Congestion/traffic
- Predicted arrival
- Service alerts
- Reservation
- New or edited POIs
- POI ratings/reviews
- User generated tags for municipal infrastructure
The Bigger Picture: GeoAccess.org Example Apps

Multi-Modal Transportation Planning & Execution
- Public & private transport options
- Filtering by disability type
- Static and real-time info/status (e.g. network, stations/stops, vehicles, elevators/escalators, lifts)
- Factoring in accessible municipal infrastructure info (e.g. crossing signals, curbs, tactile paving)
- Accessible route sharing

Regional Point of Interest (POI) Information Foraging
- Attractions
- Disability Services Organizations
- Hotels & Lodgings
- Nightclubs
- Recreation & Tours
- Restaurants & Shopping
- Accessible Municipal infrastructure (e.g. crossing signals, curbs, tactile paving)

Apps that Promote Citizen-Science & Co-Design
- Collecting rich media evidence from end users for civic advocacy
- Promoting dialog where users help design the services they use
- Additions, Editing, Ratings, Reviews for accessible transport, municipal infrastructure, and regional POIs
The Bigger Picture: Report from US DoT / FHWA

• **Background**
  - Outreach to understand requirements/ examine tech innovations
  - 1-day workshop (Feb 2011) involved experts from disability orgs, universities, industry
  - Discussed technologies, knowledge gaps and opportunities, barriers to implementation

• **Key Outcomes**
  - Sept 2011, FHWA report: “Technological Innovations in Transportation for PWDs”
  - Aims to encourage discussion, R&D in:
    - ITS/Wireless/Mobile
    - Robotics/Artificial Intelligence/Object Detect
    - Navigation/Wayfinding/Orientation/Guidance
    - Universal Design/Accessible Transport
IBM Research & Activities
IBM: A Heritage of I/T Accessibility Innovation

- 2011 marked IBM’s Centennial Year
- IBM “Icons of Progress” included
  - Accessible Workforce
  - Innovating the Self-Service Kiosk
  - Invention of Stream Computing
- IBM commitment to diversity drives innovation / differentiation
  - IBM Research – Worldwide Human Ability & Accessibility
  - Works in industry to drive discussion, help develop standards, etc.
  - Works with lines of business to develop accessible transportation solutions
IBM: Stimulating “Accessible Transport” Dialogue

- **2009**
  - IEEE/IBM “Accessing the Future” Conference
- **2010**
  - Invited participant, White House ADA Anniversary
  - ITS World Congress
- **2011**
  - Easter Seals Project ACTION, National Paratransit Dialogue
  - Invited participant, US DoT/FHWA Workshop
  - Editor, GeoAccess.org “Report on Data-Enabled Travel”
  - CSUN Session on “Accessible Travel”
  - IBM Centennial “Access My N.Y.C.” Pilot & Smarter Cities Colloquium
  - ITS World Congress & American Public Transport Association
- **2012**
  - ATIA Conference Presentation
  - CSUN Conference Presentation (forthcoming)
  - G3ict.org Expert Zone/Blog (forthcoming)
Traveler Scenario

Planning and executing a personalized accessible journey factoring in real-time data

- Traveler downloads app from transit authority, disability org, other
- Traveler has option to apply Ability Filter (mobility, vision, hearing)
- Traveler chooses point of origin (near me, address, POI)
- Traveler chooses destination (address, POI)
- System constantly gathers streams of data from multiple public and private transportation sources, municipal infrastructure, etc.
- System analyzes presents route options (filtered by Ability Filter)
- Traveler chooses route option, saves in app
- Traveler loads route; route is re-analyzed by system using real-time data
- Route options are presented if originally saved route has issues (e.g. broken elevator and traveler is mobility impaired)
- Traveler uses app to complete journey
IBM: Accessible Smarter Cities (Transport Vision)

Transit Authority Scenario

*Optimizing the traveler experience while encouraging ridership and minimizing transit authority expenses*

- Transit Authority collects, aggregates, then makes available public transit real-time data in open formats
- Disability organizations and paratransit partners ensure inclusion of access information for public transport, relevant points of interest (POIs)
- 3rd parties develop apps to support increased ridership and options
- As travelers utilize the transit network, system analyzes usage patterns (e.g. mainstream public transit, paratransit, etc.)
- System also analyzes correlations between situations and events (e.g. broken bus lift, broken elevator, etc.) and traveler choices
- Transit authority uses analytics tools/info to optimize operations
- Transit authority assets (e.g. vehicles, wheelchair lifts, on-board annunciators, etc.) managed using smart asset management tools
**IBM: Key Accessible Transportation R&D Activities**

IBM is undertaking R&D in three key areas to help our clients realize business value in three key areas as part of our Smarter Cities efforts:

<table>
<thead>
<tr>
<th>Data &amp; Analytics</th>
<th>Help define data requirements and industry data standards, and pilot new approaches for information management and business analytics and optimization</th>
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<tbody>
<tr>
<td>Traveler Applications</td>
<td>Promote development of advanced traveler applications that employ accessible smarter transportation data (web, kiosk, mobile) and which conform to accessibility standards</td>
</tr>
<tr>
<td>Asset Management</td>
<td>Help define accessible transportation asset management requirements and pilot new approaches managing assets and operations</td>
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</tbody>
</table>

**Access My NYC** is a mobile web app that was piloted in Sept & Oct 2011 during IBM's Centennial “THINK” Exhibit. It was designed to support accessible transportation and POI foraging in NYC.

The resulting asset is now being commercialized by IBM.
IBM Example: “Access My N.Y.C.” Screen Shots
IBM Example: “Access My N.Y.C.” Data Employed

**Public Transit**
- NYC Transit Bus & Subway, LIRR, Metro North RR, Long Island Bus, Bus Company
- ADA Compliance Status
- Accessible Entrances / Exits
- Real-Time Service, Elevator and Escalator Status

**POI Accessibility:**
- Hotels
- Museums
- Restaurants
- Much more…

**Private Transportation**
- Rentals (e.g. car, van, wheelchair)
- Transfers (e.g. airport, helicopter, ferry, rail/bus)

**Private Transport & Taxis**
- For-Hire Vehicles (black cars, luxury limos)
- Taxi Stands

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Transit Authority

Disabilities Agency

Taxi & Limo
IBM Example: Nettuno (Italy) Mobile App (2010)

- Regional POI Information
- Foraging App
- Pilot Android app deployed in Nettuno, Italy
- Helps people find accessibility info about city POIs, filtered by disability type
- Uses POI accessibility info from authorities, user ratings and reviews
**IBM Example: Work in Progress**

I am a public transit customer who uses a wheelchair.

- Which routes should I take that include accessible stops and buses with currently operating wheelchair access features?
- Is the wheelchair area on my bus full?
- When is my bus going to likely arrive at my stop?
- Is the elevator currently working at my rail transfer station?
- Are there accessible restaurants near my destination?
In Closing
A Call to Action

• Funding and collaborating with local disability organizations

• Developing quality data aligned to regional goals
  • Tourism, economic development, health, multimodal transportation, congestion reduction

• Making open data available for app innovation

• Collaborating with private sector to increase level of innovation

• Creating sustainable accessibility
  • Ecosystem of Smarter Data Management including accessibility information
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