Web-based Trip Planner Options for Transit Agencies

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Overview of Webinar

• Available web-based transit trip planning options

• Importance of Open Data

• How to Assess Trip Planner Options

• Open Data Implementation Plan
Context

• This presentation is based on project funded by FDOT “SunRail Electronic Trip Planning Study”

• SunRail (http://www.sunrail.com) is new rail service for central Florida coming Spring 2014

• FDOT wanted information on options to make online trip planning services available to riders
  – Including possible connections to LYNX in Orlando and VoTran in Daytona Beach
Is the Google Maps Trip Planner all you need?
WEB-BASED TRIP PLANNING OPTIONS
Online Trip Planner Options

Proprietary Vendor-based Solutions

Third-Party Applications (based on Open GTFS Data)

Open-Source Solutions

Hosting Options for Proprietary & Open-source Solutions
- Self-hosted – agency maintains software in-house
- Third-party hosted – agency outsources software hosting to third party

Integration Options
- With 511 system
- With other regional agencies
Online Trip Planner Options

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- Third-Party Applications (based on Open GTFS Data)
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In a Land Before Time – pre-2005 & GTFS/Google Transit

- Vendor-supplied trip planners
- Routing engines fed from proprietary schedule data software packages
- Limited set of options, closed architecture
- Reliant on GIS street networks that were still ‘in development’
  - Few companies sold/maintained this data
  - Expensive licenses
  - Data came from address ranges maintained by the postal service
  - Often wrong, one company wanted customers to identify problems send them changes to improve quality
Proprietary Products Can Still Be Found In Use

Proprietary Product Advantages:

- Turnkey system (Mostly – may require customization funded by agency)
- Provided high level of functionality (for its time)
- Capitalized on existing transit schedule software

Proprietary Product Disadvantages:

- High cost to procure and maintain
- Technical issues with deployments – reliance on single vendor to fix
- Vendor lock-in
- Difficult to maintain over time

Image: Ann Arbor Transit's Trip Planner
- First Multimodal Trip Planner

• 2004 – ‘goroo’ (http://www.goroo.com/) - Chicago RTA
• FTA-funded $1.35 million project to create a state of the art, door to door, proof-of-concept multimodal trip planning system

• **Goals:**
  – Integrate transit, driving, walking, bicycling and rideshare transportation in a single end to end trip for users
  – To use Transit Communications Interface Profiles (TCIP) standards

• **Downsides:**
  – Same limitations of traditional vendor-based solution
  – Costly
  – Software not open-source
  – Proprietary data formats
Interface & Expenditures

Goroo Market Research Costs:

Focus Group - $40,000
User Research Study - $100,000
Search Engine Optimization - $48,000

Anticipated Costs per Goroo website visit:

23 cents per visit over 10 years

Source: 2010 DOT Evaluation Study
Lessons Learned – RTA & USDOT

• Local control over the trip planner and its evolution is needed, which can grow to meet the needs specific to its ridership base.
• Implement features at its own pace and discretion, accelerating certain functions such as car and bike sharing, which is not a priority feature of competing products.
• Dynamic trip planning which responds to environmental conditions
• Risk of technology becoming outdated is high vs.: – Third party web hosted trip planning services – Open-source trip planning solutions
Online Trip Planner Options

(1) Proprietary Vendor-based Solutions

(2) Third-Party Applications (based on Open GTFS Data)

(3) Open-Source Solutions

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Integration Options
- State 511 system
- With other regional agencies
511 Systems

• Real-time roadway information on major corridors with road closures, accidents, incidents and traffic.
• In locations where transit is a viable alternative to personal auto travel, being able to compare the road and transit network side-by-side can help travelers make informed decisions about mobility.
511 Transit Trip Planning
Online Trip Planner Options

1. Proprietary Vendor-based Solutions
2. Third-Party Applications (based on Open GTFS Data)
3. Open-Source Solutions

Progression of industry
What is open data?

• Transit data that is shared with the public
  – Typically shared via website/FTP site/web services
    • No login should be required (may use API key)
  – Should be updated regularly, with any changes in schedule/routes/stops
Why is open data important?

• Allows public to contribute services that are cost/time-prohibitive for the public sector
  – e.g., many mobile platforms

• Vendors are unpredictable
  – Some agencies have shared data only with Google
  – When Apple dropped Google Maps, iPhone users lost transit directions in major map solution for 2.5 months
  – Apple relied on 3rd party apps to fill the gap – only possible if open data was available
General Transit Feed Specification (GTFS)

• Created by TriMet and Google in 2005
• Has become a *de facto* standard for static transit schedule/route/stop data

GTFS data consists of multiple text files

GTFS data powers Google Transit and other apps
General Transit Feed Specification (GTFS)

- Over 500 agencies worldwide have transit data in GTFS format
  - 49 of top 50 largest U.S. transit agencies share GTFS data, over 227 total
  - At least 20 Canadian agencies share open data
- In early stages, most agencies created GTFS data for Google Transit
  - But, GTFS is open data format used by mobile apps, OpenTripPlanner, OneBusAway, etc.
- See “GTFS Data Exchange” for list of agencies with GTFS data
  - Or, ask your local agency
Recommendations for Creating & Disseminating GTFS data

1. Understand the GTFS format, and determine how your data will fit into this format.

2. Determine if you will create and maintain the GTFS data in-house, or whether you will depend on external organizations for this service.
   - Major transit software packages, other tools, can prepare GTFS
   - Estimated cost for putting data in GTFS format using consultant is $200-500 per route
   - Coordinate with other regional stakeholders, if possible

3. Create a “Terms of Use” license – see other agency examples[1-5]

4. Maximize exposure of GTFS data
   - Share via agency website, GTFS-Data-Exchange, regional sites
   - Create relationship with developers (hack-a-thons, meetups, etc.)

5. Share a list of third-party transit application using GTFS data with the general public

3rd party apps - Google Transit

- Includes:
  - stop locations
  - departure times
  - estimated travel time
  - fare amounts

Available for 800 cities across more than 25 countries around the world
Other 3rd Party Apps

- Numerous local apps specific to regions also available
- See APTA TransITech presentation (http://bit.ly/Z8VWJZ) for more details on GTFS-powered apps
Downsides of relying on 3\textsuperscript{rd} party Apps

- Lack of control over services to users
  - 3\textsuperscript{rd} party service may be discontinued at any time, leaving agency without solution (e.g., iOS 6 and transit = 2.5 month service gap)

- 3\textsuperscript{rd} party apps may not fill particular needs
  - Multimodal (bike/walk/etc)
  - Bike/car sharing
  - Apps for particular mobile interfaces (e.g., SMS)
  - Regional integration

- Agencies may need to supplement 3\textsuperscript{rd} party offerings
  - What do your riders need?
Online Trip Planner Options

1. Proprietary Vendor-based Solutions
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Progression of industry
Open-Source Software

• Open-source solutions provide opportunity for shared investment into a core set of transit information services that anyone can use

• Uses open data (GTFS)

• Today, exciting developments in the world of open-source customer-facing transit software
  – OpenTripPlanner – Multimodal trip planner, with API
  – OneBusAway – Real-time transit info, with API

Development spearheaded by TriMet in Portland, with OpenPlans (2009-present)

Available for anyone to download, install, modify
  - (and, with approval, contribute back)

Vendors can provide installation, customization, maintenance support
  - e.g., Conveyal ([http://www.conveyal.com/](http://www.conveyal.com/), formerly OpenPlans)
  - See [http://opentripplanner.com](http://opentripplanner.com)

**OpenTripPlanner Deployments**

*In Production:*
- Portland, OR, USA (TriMet)
- Valencia, Spain
- Poznan, Poland
- Lublin, Poland

*Tech Demo:*
- New York City
- Tampa, FL
- Chattanooga, TN
- The Netherlands
- Ottawa, CA
- Pune, India
- Spain
- Bilboa, Granada, Gipuzkoa - Spain
- Budapest, Hungary
- Hamakor, Tel Aviv - Israel
- Athens, Greece
- South Africa
- London, UK
- Canberra, Australia
- Singapore
TriMet – Portland, OR

• Primary motivation was to merge separate transit and bike trip planners – http://rtp.trimet.org

• Launched beta version Oct. 2011

• Switched to OTP Summer 2012
OpenTripPlanner – Tampa demo

USF’s OTP Demo for Tampa, Fl - [http://opentripplanner.usf.edu](http://opentripplanner.usf.edu)

– Truly multimodal. Example above is: Bike->Bus->Bike->Bus->Bike
Can Add New Transit Systems

HART

USF Bull Runner
Bike Routing Options

- OTP bike routing supports mix of multiple options:
  - Time (fastest)
  - Hills (flatest)
  - Safety (dedicated bike lanes)

- Still open research area
OpenTripPlanner – Mobile Apps

- OTP provides API so that anyone can create mobile apps
- Examples using OTP:
  - The Transit App
  - Moovit
- “Seed” source code:
  - iPhone tech demo OTP app
    - Source code on Github
  - Android tech demo OTP app
    - Source code on Github
    - Demo app on Google Play
What trip planner is right for you?

ASSESSING TRIP PLANNER OPTIONS
Scenarios Where a Proprietary Vendor-Furnished Trip Planner May be Preferred:

• When control over the methods of delivery of transit information are a greater priority than cost and effort to maintain the system.

• When interoperability with other current and planned transit information systems and dissemination methods (e.g., mobile apps, SMS, mobile phone payment) is not a priority to the agency.

• When the agency is comfortable with the risk that comes with an investment in a proprietary product that can only be maintained by a single vendor.

• When the agency has an existing relationship with a specific vendor and the proprietary trip planner is a marginal cost as part of a larger software purchase.

• When a vendor offers a proprietary trip planning product at little to no cost to the agency (e.g., in return for an opportunity to monetize the trip planner through ads).
Scenarios Where Third Party Web Hosted Trip Planners May Be Preferred:

• When the agency seeks a large saturation in the open marketplace of mobile apps and other services.

• When insufficient resources (staff and money) are available to implement a self-sustained product across many different platforms (e.g., Web, SMS, iPhone, Android, Windows Phone)

• When the agency is comfortable ceding responsibility to third parties for trip planner aesthetics, functionality, availability, usability and development.
Scenarios Where an Open-Source Trip Planner May Be Preferred:

• When there is functionality required of the trip planner that is not currently found in commercial third party services.
  – Examples include multimodal (e.g., transit, bike, and walk) directions within a single trip, as well as car and bike-sharing.

• When the agency wants to control trip planner aesthetics, functionality, availability, usability and development.

• When the agency wants to avoid the risk of “vendor lock-in” that can come with proprietary products.

• When the freedom of choice to either internally manage or outsource management to any willing software developers/vendors to maintain and improve the system is important to the agency.

• When interoperability with other current and planned transit information systems and dissemination methods (e.g., mobile apps, SMS, mobile phone payment) is a high priority to the agency.

• When there is a desire for tight coordination with other regional entities, and a desire for control over how a trip planner suggests how passengers should transfer from one service to another.

• When there is a desire to either build a product user information database or monetize the web planner and its accessibility.
Best practices for open data

OPEN DATA IMPLEMENTATION PLAN
Context for Report Recommendations

• FDOT “SunRail Electronic Trip Planning Study”

• Assumptions for recommendations:
  – Currently **no** internal initiatives for SunRail to pursue its own trip planner
  – Funding **not available** to build a trip planning solution for launch

• **Recommendation** – open data with initial reliance on 3rd party apps

• **When future funding is available** – open-source trip planner (OpenTripPlanner.org)
Open Data Implementation

Begin immediately
- Create a policy and procedures for generating GTFS data
- Coordinate with regional transit partners on goals and technical issues

6 to 9 months prior to launch
- Create a developer webpage that links to the GTFS data and user agreement

4 months prior to launch
- Draft and approve a user agreement to accompany the data

2 to 3 months prior to launch
- Create and share a web address that contains SunRail's GTFS data and user agreement
- Use email blasts to notify third party service providers and the transit developers Google group

1 month prior to launch
- Verify that the GTFS data is publicly available on GTFS Data Exchange, and that Lynx is removed from the CityGoRound list of agencies not publicly sharing data

SunRail launch

Post SunRail launch
- Conduct feedback surveys
- Create a SunRail ‘app’ center
- Establish an inter-agency Trip Planning and Applications Tech Group
- Public awareness campaign pronouncing a virtual Regional Trip Planning Center
Step 1: Create a Policy and Procedures for Generating GTFS Data

• Adopt an internal policy and set of procedures to generate GTFS data. As an example, many transit agencies choose to generate their GTFS data at the same time they are processing schedule changes.

• Ensures GTFS data generation becomes as engrained to agency operation as any other mission critical task.

• Language to require GTFS data generation of a third party contractor.
Step 2: Coordinate with Regional Transit Partners on Goal Setting and Technical Issues

• An opportunity to build logical connections to its partner agency data

• Coordinated release, reduce the effort required for developers to create a seamless network of regional transit travel planning
Step 3: Draft and Approve a User Agreement that Accompanies the Data

Based on existing examples from industry[^1-5], licenses typically contain the following content:

- The agency reserves the rights to its logo and all trademarks. These marks should be an indicator used for official information from the agency only.
- The data is provided without warranties.
- No availability guarantees are expressed or implied
- The agency retains full rights to the data

[^2]: BART (SF Bay Area) - http://www.bart.gov/dev/schedules/license.htm
[^3]: Corona, CA - http://www.discovercorona.com/City-Departments/Public-Works/Transportation/GTFS.aspx
[^4]: PSTA (Clearwater, FL) - http://www.psta.net/developers/License%20Agreement%20for%20App%20Devs.pdf
[^5]: HART (Tampa, FL) - http://www.gohart.org/developers/terms_of_use.html
Policy & Administration

Data Dissemination

Performance Monitoring & Feedback
Step 4: Create a Publicly Accessible Web Address that Contains GTFS Data

- Host GTFS data (e.g., google_transit.zip file) on a publicly-accessible web server
- The URL to the GTFS data that is shared with the public should always point to the most recent GTFS dataset

Tables in our feed

We currently include the following tables in the Pace GTFS Feed (links point to more detailed information on Google Code):

- agency.txt - basic agency information
- stops.txt - list of stop locations for bus and train, also includes parent station info for trains
- routes.txt - route list with unique identifiers
- trips.txt - has information about each trip taken by a Pace vehicle
- stop_times.txt - scheduled arrival/departure times for each stop on each trip
- calendar.txt - defines which service IDs operate on which days
- license_terms.txt - Pace’s Limited License Agreement and Terms of Use

Data File

The GTFS file is for schedules that begin on April 01, 2013. Please send an email to customer.service@vta.org if you need the GTFS for current schedules (which ends on March 31, 2013).

Click here for the Google Data in .zip Format
Step 4a: Create a Developer Webpage that Links to the GTFS Data and User Agreement

- Consider creating a developer webpage that contains links to the GTFS data, Terms of Service agreement (if any), and any application programming interface (APIs) information.

- An API increases the likelihood that the local community would create apps that incorporate GTFS data.
Step 5: Use Email Blasts to Notify Third Party Service Providers and the Transit Developers Google group

First visit the Transit Developers Google Group page (https://groups.google.com/forum/?fromgroups#!forum/transit-developers) and the Google Transit Data Feed Google Group page (https://groups.google.com/forum/?fromgroups#!forum/googletransitdatafeed) and join each group,

Second, directly contact the third party providers listed in the table above to inform them that GTFS data is available and that you would like to be added to their service.

<table>
<thead>
<tr>
<th>Trip Planner Contact List</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third Party Service</td>
</tr>
<tr>
<td>Google Maps</td>
</tr>
<tr>
<td>Open Trip Planner Transit App</td>
</tr>
<tr>
<td>The Transit App for iPhone</td>
</tr>
<tr>
<td>Routeshout</td>
</tr>
<tr>
<td>HopStop</td>
</tr>
<tr>
<td>Bing Maps</td>
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<tr>
<td>MapQuest</td>
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<tr>
<td>Mapnificent</td>
</tr>
<tr>
<td>Walkscore</td>
</tr>
</tbody>
</table>
Step 6: Verify that the GTFS data is publicly available on GTFS Data Exchange

- It is preferable to be added to the site automatically by developers, as they have an automated tool that will constantly keep the data at GTFS Data Exchange in sync with the most recent GTFS data to your site. If you manually upload the data instead, then it must repeat this manual process each time a new GTFS file is generated.
  - www.gtfs-data-exchange.com
Step 7: Create an ‘App Center’

Step 8: Conduct Feedback Surveys

- Gauge satisfaction in the performance of existing trip planning tools and solicit ideas for improvement and future capabilities.
- Builds awareness in the ridership community of the existence of apps.

Q.2b Did you seek directions from another website?
- Yes (GO TO Q.2c)
- No (GO TO Q.2d)

Q.2c What website did you use for directions?
- RTA’s original transit trip planner (tripsweb.rtachicago.com)
- Google
- MapQuest
- Yahoo
- Microsoft Bing Maps
- Hopstop
- Other
Step 9: Establish an Interagency Trip Planning and Technology Group

• A technology centered group (or subgroup) would discuss developments in the trip planning industry and ensure compatibility should any of the agencies’ IT infrastructure change.
Step 10: Conduct a Public Awareness Campaign

- Essential to create trip planning product awareness and adoption
- May be accomplished through existing communications channels but may benefit from a campaign dedicated to these tools
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SunRail Electronic Trip Planning Report