Production of Bus Routes and Stop Places at Paris Region Public Transport Authority

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AGENDA

→ User case: STIF Uses GIS for Automatic Production of Bus Routes and Stop Places

→ STIF at a Glance
→ GIS a Key Component and Overview
→ Stop Places Management Tool
→ Bus Routes Management Tool
STIF decides and drives development and modernization projects for all modes of public transport in Paris Region, and outsources their operation to transport operators (RATP, SNCF, 74 private operators)

Key figures
- 8.5 million passengers per day
- 13 urban trains, 14 metro, 8 tramways, 3 funicular / express airport lines, 1,800 bus lines

The Greater Paris project: a transport revolution plan until 2030
- New, more modern trains. New metro lines (4) and tramway lines
- Bus plan (express lines, bus corridor, more bus at night, etc.)
- Increased intermodal transport to make passengers’ lives easier
- Increased (digital) services and security for passengers
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Many Uses
• Urban Mobility Plan
• Adapt transport offers based on demand
• Passenger Information
• Service Quality Analysis
• Communication with stakeholders
• Consultation or public hearing
• Open Data
• And more
GIS Overview

GIS Data
- Public transport data
  - Routes and stop places
  - Timetables
  - Real time information, validation data, OD surveys, Accessibility, etc.

Open Data Portal
- Passengers, Researchers, Third parties, Partners

Traveler Information System
- Analysts, Viewers
- All agents at STIF
- Analysis, Advanced Mapping
- Managing and exploitation of geographic info related to territory and various network referential (i.e. topology)

GIS Server
- Network Operators

Database
- MobiAnalyst
  - Bus routes and stop places management tools
- Data exchanges services using standards (NeTEx, SIRI, etc.)

Portal Web GIS
- Web Service
- Web App
- Desktop
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Bus Routes and Stop Places Management Tools

Geoprocessing tools for

- **Route geography production** with a major concept: the commercial line, such as known by travelers

- **Grouping stops** based on 3 levels
  
  - **Stop place** (a geographic zone where transfers are implicit such as Gare de Lyon)
  
  - **Stop Area / Station** (a physical structure or area that contains one or more stop)
  
  - **Stop** (i.e. Boarding, physical stop location)

Business needs

- Improve traveler information
- Better data analysis (offers and demand)
- Better interoperability / Open Data
Iterative algorithms:
- Proximity search
  - Buffer
  - Walkability
- Modal hierarchy
  - Rail->Entrance->Bus
- Naming relation

With multiple parameters
- Transfers time
- Buffer and walkability distance or time
- Topology of the territory

Stop Places Management Tool

Data input (ETL process)
- Public Transport Data
  - Bus stop (location, name, parent station)
  - Metro/railway station (centroid, or geographic zone)
  - Stop place entrance
  - Optional: Pathlink, Quay, Platform, Stair, Escalator, lift
- Additional Data
  - Streets
  - Administrative limits
  - POIs
  - Parks, rivers, natural barriers, etc.

Database

GeoProcessing Tool

Output

Stops Areas et Places (geography and stop relation)
Statistics
Logs
Stop Places Management Tool

Evaluated/improved in 12 dense, peri-urban, and rural zones

Generalized for the whole network (42 000 stops)

Examples of map results
Stop Places Management Tool

Detailed output Example (Main Railway station Gare de Lyon)

Proximity search: Buffer

Proximity search: Walkability

Modal Hierarchy: Rail + Bus
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Bus Routes Management Tool

Data input (ETL process)
- Public Transport Data
  - Bus stops
  - Bus routes and trips
  - Timetables
- Additional Data
  - Streets including bus restriction

Database
- Multimodal network

GeoProcessing Tool
- Bus stop snapping based on proximity and name
- Route calculation based on ordered stops
- Geometry simplification and fusion

Output
- Route geometry
  - Commercial Route
  - Administrative Route
  - Route based on crow fly between stops

Additional Data
- Streets including bus restriction
- Public Transport Data
  - Bus stops
  - Bus routes and trips
  - Timetables
- Multimodal network

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Bus Routes Management Tool

- Stop list per route
- Street network dataset
- Workspace (projected stops on the street element, transfer between stop location and street)
- Generated result

Example of a true geometry for a route
Tested in Paris and the whole Ile-de-France region:

- 350 bus routes in Paris (RATP), 1,500 outside Paris
Conclusions

The following challenges were addressed

- Complete and robust ETL and GIS geoprocessing tools for managing PT topology
- Quality results for a complex public transport
- Use of standards (i.e. GTFS)

Some challenges remain

- Validations still need to be done
- Use the tools/results on regular-basis
- Integration of the tools in our MobiAnalyst Platform
  - New PT network editing tool (Add-on for ArcGIS Pro)
  - Move tools On-Premise and Online
Stay in touch!

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