GIS IN TRANSIT CONFERENCE, WASHINGTON, DC

ANALYSING NETWORK AND RIDERSHIP DATA OF WASHINGTON SUBWAY WITH PTV VISUM

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PTV - A SOFTWARE COMPANY DEVELOPING SOLUTIONS IN TRANSPORTATION PLANNING & OPTIMIZATION

PTV Headquarters, Karlsruhe

- Founded: 1979
- Headquarters: Karlsruhe, Germany
- Offices: 5 continents, 12 countries
- Employees: 650 worldwide
- Turnover: €82.1 million

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AGENDA

1. Background and Objective
2. Network and Timetable Data
3. Ridership Data
4. Use for Transit Planning
BACKGROUND AND OBJECTIVE

- The Washington Metropolitan Area Transit Authority (WMATA) was created … in 1967 to plan, develop, build, finance and operate a balanced regional transportation system in the national capital area.
  http://www.wmata.com/about_metro/?forcedesktop=1

- PTV Group offers state-of-the-art software solutions for
  - Private and public transport planning
  - with a wide range of public transport dedicated functions

- PlanItMetro, Metro’s Planning Blog, invites to play around with ridership data provided, therefore PTV wanted to demonstrate how to use PTV Visum for analysing and presenting all data available
AGENDA

1. Background and Objective
2. Network and Timetable Data
   • 2.1 Data source
   • 2.2 Public Transport Objects in Modelling
   • 2.3 Examples of Analysis
3. Ridership Data
4. Use for Transit Planning
5. Summary
WMATA’s network and timetable data is found in GTFS format under [http://www.wmata.com/developer_resources.cfm](http://www.wmata.com/developer_resources.cfm). This data was imported into PTV Visum via a standard interface.
NETWORK AND TIMETABLE DATA – MODELLING MULTIMODAL NETWORKS

- All relevant public transport network data can be handled in PTV Visum
  - Basic network elements such as nodes and links
  - Public transport specific data such as stops, line routes, time profiles, timetable, including valid days, vehicle types with capacity and cost and a lot more …
  - Background maps

- A network modelled can be displayed, edited and analysed in many different ways, for example
  - Lines routes including stops
  - Number of services (trains) for selected time intervals
  - Travel times and number of transfers from selected start points, i.e. accessibility and reachability
NETWORK AND TIMETABLE DATA – EXAMPLES OF ANALYSIS

Number of services per line on an average weekday or per user defined analysis interval
NETWORK AND TIMETABLE DATA – EXAMPLES OF ANALYSIS

Graphical timetable of Orange Line with service trip marked and displayed on map
Isochrones: Travel time and transfers from a selected station to all others
AGENDA
1. Background and Objective
2. Network and Timetable Data
3. Ridership data
   3.1 Sources and Options of Processing
   3.2 Examples of analysis
4. Use for Planning
RIDERSHIP DATA – SOURCES AND OPTIONS OF PROCESSING

Three different options to process ridership data

- Matrix for a period & distribution over time
- Set of k matrices for 15min intervals
- Records of single passenger trips
RIDERSHIP DATA – EXAMPLES OF ANALYSIS

Overview

- Share of direct trips and transfers in weekday AM Peak
- Largest numbers of transfers between lines
RIDERSHIP DATA – EXAMPLES OF ANALYSIS

Passenger trips in detail after the assignment: list “synchronised” with map – trip from boarding (entry) stop via transfer stop to alighting (exit) stop
RIDERSHIP DATA – EXAMPLES OF ANALYSIS

Passenger Volume, displayed per link and per line route and direction, here per time period
RIDERSHIP DATA – EXAMPLES OF ANALYSIS

Passenger Volume, displayed per link and direction, per user-defined analysis interval
RIDERSHIP DATA – EXAMPLES OF ANALYSIS

Passenger Volume, displayed for selected links, for all user-defined analysis intervals
RIDERSHIP DATA – EXAMPLES OF ANALYSIS

Volume-capacity ratio per link and direction, per analysis interval, displayed in user defined classes, based on vehicle deployment defined in the timetable
RIDERSHIP DATA – EXAMPLES OF ANALYSIS

Passenger volume per train from station to station in graphical timetable
RIDERSHIP DATA – EXAMPLES OF ANALYSIS

Flow Bundle (selected link and stop) analysis
277 of 291 Passengers starting at Woodley Park & transferring at Metro Center ride till Crystal City, 66 thereof go further
RIDERSHIP DATA – EXAMPLES OF ANALYSIS

Desire lines: O-D relations to Washington Metro Station in the AM Peak
RIDERSHIP DATA – EXAMPLES OF ANALYSIS

Trains arriving and departing at L’Enfant Plaza between 6.30 and 7.00 am and the passengers transferring between these trains
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USE FOR TRANSIT PLANNING

Passenger volumes can be analysed and used for more planning tasks

- Fare systems can be modelled to check their impact on passenger route choice and to estimate the fare revenue

- Powerful Line Blocking (vehicle scheduling) procedures are available to estimate the number of vehicles required, taking into account passenger volume to select a suitable vehicle (train) type

- Costs, revenue and costs recovery can be calculated by transport system (branch) and by line, broken down by user defined territories
USE FOR TRANSIT PLANNING

Strategic vehicle scheduling to calculate costs minimising fleet size and structure, taking into account passenger volumes.

Passenger volumes are taken into account.

Higher capacities are assigned to service trips with larger volumes.
USE FOR TRANSIT PLANNING - SUMMARY

GIS and transit specific features support the planner in:

- Designing and evaluating scenarios of complex transit system in terms of stops, routes, timetable and vehicle types
- Designing specific elements such as right of way, transfer hubs and priority schemes
- Improving cost recovery by estimating costs and fare revenue by line or branch
- Getting a better understanding of the transport market
  - analysing impacts of service quality and fare on demand
  - comparing indicators of private and public transport
  - identifying potentials for transit
Thank you for your kind attention!