ATP: Run-Time Analysis & Improved Punctuality

Alain Martinais
Director of Marketing – GIRO

Forum 1: Fleet Management
April 11, 2011

www.giro.ca

About GIRO

- Industry leader with 30+ years of innovation
  - Extensive collaboration with clients and researchers
- HASTUS™: Integrated software solution
  - Scheduling and operations
  - Customer information
  - Planning and analysis
  - All modes and types

Why use HASTUS-ATP?

- Improve adherence to planned schedules
- Improve punctuality at relief & meet points
- Increase passenger satisfaction
- Minimize performance penalties (contracted services)
- Reduce operator stress
- Shorten the scheduling/run-time analysis cycle through integration with scheduling

History of ATP

- 1997: Version developed for Mulhouse in France
  - Link-by-link analysis
  - Calculations based on deviation attributes
- 2007: New algorithm developed with TMB & Professor Salicrú from University of Barcelona
  - Optimization for a complete route
  - Sophisticated evaluation of punctuality

History of ATP (cont'd)

- 2009-2011: Improvements to generalize the "Barcelona" approach
  - New version of algorithm
  - Enhanced integration and flexibility
  - Smoothing method considered
  - Comparison tools

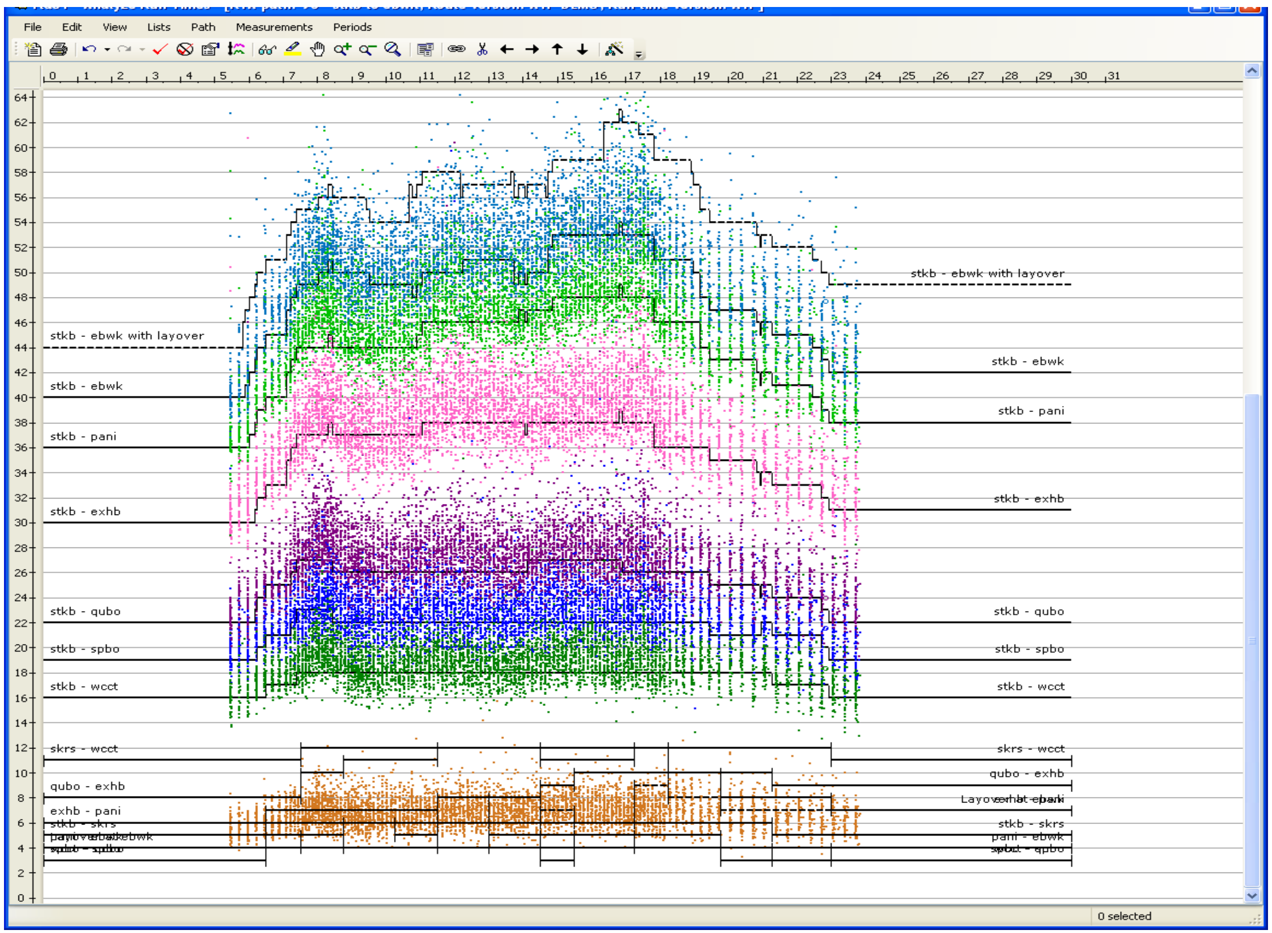
ATP Model

- Run-time analysis path
  - Sequence of timing points to analyze
- Run-time segment
  - Two consecutive timing points on path
- Run-time profiles
  - From the origin to each timing point on path
  - Allow users to evaluate punctuality

ATP Model (cont'd)

- Measurements
  - Collected from ticketing, AVL, or manually
  - Any stop can be considered in analysis
  - Contains passing time at stop, wait time, and measurement device

ATP Model (cont'd)



ATP Algorithm

- Automatically generates:
  - Periods
  - Run times
  - Minimum layovers
- Can be used to control:
  - Periods
  - Punctuality criteria
  - Minimum layover

ATP Algorithm (cont'd)

- Period control (can also be fixed)
  - Minimum length and increment
  - Minimum/maximum count
- Punctuality and minimum layover control
  - For each profile
  - Evaluation method (attribute) and ranges
  - Run-time profile: usually a range attribute (e.g. -1 + 3)
  - Layover: usually a percent below attribute (e.g. 90%)

Practical Issues

- Defining objectives is difficult
  - Passengers want punctuality and speed
  - Operators want to minimize cost
  - Organizing authorities want both
  - Drivers prefer longer layovers
- Decisions can have important impacts on:
  - Timetabling, vehicle & crew scheduling
- Quality of measurements is essential

Results

- Can be fine-tuned interactively
- Complete set of analysis tools available
- Can be saved in a new run-time version
- User can save times as network- or route-specific run times

Results (cont'd)

- Integration with HASTUS allows users to:
  - Load schedules with new run times to analyze the impact of run-time changes
  - Adjust public timetables quickly
  - Produce new vehicle & crew schedules
- The cycle time and effort required for analysis/scheduling are significantly reduced

Conclusions

- Run-time analysis is essential for well-run public transportation companies
  - Minimizes operational costs
  - Increases user satisfaction
  - Helps make operations smoother
- New ATP version is flexible and efficient
- Integration with HASTUS greatly reduces schedule production cycle times

Conclusions (cont’d)

- ATP is a key module for many clients
- 64 customers currently have this module
- ATP’s flexibility meets requirements around the world
- Much interest from public transport industry
- New installations result in rapid improvement of punctuality