

The Use of Analytics in Fleet Management

22 February 2017 / Wei Ping Ong

Conduent Public Sector Transportation Services

Conduent (Cŏn´- dū - ĕnt)



We're changing the way businesses and governments interact with their customers, employees and constituents creating client value by modernizing the constituent experience.

Making a difference every day in the lives of those we touch.

Driving value for our clients by providing a great experience to the constituents that they serve be they patients, shoppers, commuters, citizens, benefit recipients, customers, or employees. We are an extension of our clients, creating long term value:

- improved constituent satisfaction and loyalty
- increased operational efficiency
- contemporary, digital experiences
- outcome-based business model

We touch million of lives each day:

- 67% of all U.S. insured patients
- 8.9M travelers daily
- 43% of all child support payments
- Delivering customer care for 3 of the top 5 U.S. mobile phone providers

World's largest

multi-service Business Process Services company.

76% of Fortune 100

Servicing 76 companies of Fortune 100 and 500+ government entities for over 3 decades.

93,000+ employees

in 43 countries.

Leader



Acclaimed leader in Customer Care, Learning, Finance and Accounting, Workers Compensation, HR Services, Population Health and Care Management.

30 years of experience

benefiting from years as part of Xerox, and long-standing experience in business process management

18 industries

Providing services for over 18 industries in Transportation, Healthcare, Public and Commercial Sectors.

\$6.5 Billion

global business with the most diversified Business Process portfolio.



A company embedded into the operations of thousands of clients.

Making a difference everyday in the lives of millions of people.

27 countries

use our solutions in transportation

#1 provider

of parking solutions in the U.S. with award-winning innovation

8.9 million

people estimated to travel through Conduent - managed toll systems daily 46%

of U.S. electronic toll collection market served

40%

of U.S. commercial vehicle operations market served



Global Concept

- The position of the vehicle is sent in "real" time to the central system.
- The information and all calculations (early/late predictions, ...) are processed by the central system, sent back to the vehicle driver console, onboard signs and made available to fleet management tools and third party Passenger Information Systems.



Passenger Informations Services



Real-Time Passenger Information Concept

The core technology in the Atlas[®] fleet management tool is its powerful schedule **predictive engine** hosted in the central system.

For its computation, it uses input data such as: schedule data planned (scheduled arrival and departure times), vehicle position updated in real time but also historical data of the passages from the preceding vehicles, trip histories on similar days (ie: week-end, holiday period, ...) and external factors such as traffic or weather conditions.





Passenger Information & Fleet Monitoring Modules

Common Base: Performed vs Planned

- Import of topology and schedules common to ticketing system
- Periodic transmission of Location Pulses (GPS)
- Checking compliance of service with schedule (Early/Late calculation, etc)
- Estimated Time of Arrivals calculation according to heuristic algorithm

Reast Tinger Who for the Fleet

- · Localization on the map
- Route & Schedule Adherence Management
- Technical incidents management
- Fleet status views



- Leaving information available for third parties (Web site, mobile applications, SMS, etc) according to standardized protocols (SIRI)
- Panels at stops/in stations



Database of Performed Services

- Replay
- Statistics analysis through Business Objects reports





Dispatch-Assistant & Datamining Modules

Driver Interactions

- Send predefined messages from driver
- Text message from control center (predefined or dispatcher keyed-in) to driver (with priorities and acknowledgment features)
- Voice call initiated from central system/requested by driver
- Emergency alarm button generating a voice call immediately managed by control center with silent listening of the vehicle

Additional Bundctiands Equipisgeattcher

- Linear view and headway management (detection of gapping/bunching situations)
- Line assignments to ensure all requests from driver are managed by one dispatcher
- Service summary: quick view of the status of all the lines

- Cellular communication managed directly by the driver console
- External speaker and microphone for the driver

Develop Performed Services Analysis

Datamining: statistical analysis of all data produced by the system and advanced visualization



Technologies

Trip Planning/Building

- Standard GTFS interface
- Can interface with major scheduling tools like Hastus, as those tools can export in GTFS.
- Also possible to adapt import process of Atlas Fleet&Info to specific protocol
- Conduent can also propose as part of its offer several cost efficient scheduling tools

Cartography

- Standard ESRI shapefiles management
- Other formats supported: KML, etc
- Maps usually supplied by the customer who already has them for other GIS purposes





22 February 2017



Interactivity Functions to Support Driver

Text Messages

- Text Messages to driver: either predefined messages or messages entered in dispatcher workstation
- Text messages from driver: Configured from central system on a vehicle base, organized in categories



Voice Features

- Voice call initiated from dispatcher to driver
- Voice call request from driver (either standard or priority).
- Emergency alarm button: signaled with priority to dispatcher

 initiates silent listening of the vehicle



22 February 2017

1) Automatic Vehicle Location

- Display vehicles location on a map, with option to zoom.
- A vehicle is represented by different icons & color according to its status (on/off route, on/off schedule, ...) and its type (bus, tramway, ...).
- Filters to select routes and vehicles.
- Possibility to display journeys, scheduled times at stop, ... for a vehicle by clicking on its icon.



2) Anomalies Management

 Anomalies such as: vehicle too early/late (possibility to define thresholds), Out of Route, not having moved for a configurable time, .. are recorded in a database and can be either displayed in real time or used to build reports on quality of service.

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3) Route and Schedule Adherence

- Vehicles status summary refreshed in real time.
- The display provides one line per vehicle with its status (easily identifiable by a color), route, early/late information, last/next stop, last stop scheduled time and actual time.
- Filters and sorting capacities for easier analysis.

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4) Linear View and Headway Management

- Allow to focus on one or more lines to analyze specific situations.
- Display of the current headway compared to scheduled one.
- Detection of bumping/gapping situations.
- Direct access from linear view to same functions related to vehicles as from the cartography.



- 5) Messaging from Control Center to Vehicle
- Possibilities to send text messages (predefined or keyed) to the driver.
- Messages can be sent to a selected vehicle or a list of vehicles and require or not an acknowledgement from the driver.



- 6) Messaging from Control Center to Vehicle
- Possibility for the drivers to send predefined messages to the control center (Traffic jammed, mechanical incident on the bus, accident, ...) with the onboard driver console.
- Messages can require or not an acknowledgement from the control center.





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7) Play Back

- Use the registered data in order to replay passed situation.
- The play back is concentrated on one vehicle.



22 February 2017

8) Reporting

Powerful reporting tool allowing analysis capabilities in all the domains:

- Current status of operations (ie: statistics on status of services and anomalies refresh hourly, ...).
- Quality of services (ie : comparisons between scheduled and effective services, ...).





On Board Console Screens

Driver touch screen MMI

- Possibility to open/close service
- Selection of text
 messages to be sent
- List of received messages
- Call request (either normal or priority)
- Toolbox





Integration with Ticketing



Passenger Information

The information from the fleet monitoring system is available for third party systems through SIRI web services standard interface.

So, passenger information systems can be easily interfaced with:

- SMS service
- Interactive Voice Response (IVR)
- Signs at station or stop
- Website
- Mobile applications

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For Further Information



Wei Ping Ong

Vice President and Managing Director Public Sector, Asia Conduent weiping.ong@conduent.com



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