Trapeze at a Glance

40 years of experience has made us your preferred partner for public transit projects.

- 2,500+ customers worldwide, public and private transport companies

- Headquartered in Toronto, Canada, more than 30 offices across North America, Europe and Asia Pacific

- Trapeze Europe (European headquarters in Neuhausen, Switzerland)

- 10 offices in Denmark, Finland, Germany, Holland, Poland, Sweden, Switzerland, UK

- Projectoffice in South Africa
Trapeze: Scope of Solutions

**Back-Office Technologies**
- Scheduling & Planning
- Driver & Vehicle Rostering
- Demand Responsive Transport
- ITCS Systems
- Asset Management
- Reporting and Analysis (BI)
- Eco-Driving & Driver Training

**In-Vehicle Technologies**
- Vehicle communication
- Driver touchscreens
- Passenger Information
- Passenger Counting
- CCTV and lane enforcement
- Vehicle monitoring
- Data up- and download

**Communication and Mobile**
- Mass Data Synchronizations
- Voice & Data Technologies
- Network Management
- Multi-Media

**Passenger Information**
- Journey Planning
- SMS and Web Interfaces
- Reservations
- Schedule Look-up
- IVR Systems

**On-Street Technologies**
- Bus Priority at Junctions
- Bus Stop Signs
- Multimedia Displays

**Fare collection Technologies**
- On-vehicle ticket machines
- Ticket Validators
- Ticket vending machines
- Mobile ticketing
- Smartcard systems
Projects in South Africa
Johannesburg

APTMS Solution for the ‘Reya Vaya’ Bus Service

- Vehicle location, fleet control and passenger information system to enhance quality of public transport service for the 2010 Soccer WC
- Control Center controls new Bus Rapid Transit System planned for 1300 buses, 150 stations, eight bus terminals and six depots
- Integrated on-bus and station video surveillance
- 450,000 passengers daily
Cape Town

Trapeze Solution for Integrated Rapid Transit (IRT) System in Cape Town

- Vehicle location & control system enhances quality of public transport service
- Control center controls new Bus Rapid Transit System with some 300 (→ 700) express buses and numerous feeder lines, 30 (→ +50) stations, two bus terminals and two depots
- Almost 300,000 passengers daily
- Control centre solution for passenger information, fleet management and operations control

Multi Agency bus monitoring and dispatching system
- KPI-based performance measurement and reporting
Other key projects
Multi Agency System – London, UK

LBSL Solution by Trapeze

- AVM for one of the world’s largest bus networks
- Every day 6 million passengers are carried on > 8,500 vehicles along 700 routes
- 20 operators work with 150 dispatcher workplaces in 90 garages
- Emergency Control Centre with fallback location and 20 Workstations
- Redundant server farm with clustered servers providing a very highly available solution
- Integrated Voice Radio and AVL solution
- Sophisticated business reporting system providing detailed business management information for LBSL
Multi Agency System – Zurich, Switzerland

Outstanding Solution for Switzerland’s Largest Transport Association

- One system for both urban and rural services for greater Zurich area
- Covering 6 independent transit authorities
- For more than 1000 vehicles (buses and trams)
- Over 300 bus stop displays
- Realtime passenger information included supported connections available in every single vehicle via the multi-functional display (MFD)
- Passenger information data exchange with Swiss National Railways
Multi Modal Operations
Frankfurt/Main, Germany

Several Transport Systems in one Solution

• AVM system for a mixed mode transportation system: bus, tram and metro – in total over 600 vehicles
• Integrated passenger information at over 100 stops
• Highly developed radio infrastructure for surface and underground, combining analogue and digital radio (DAB)
• Operating a system which combines equipment from 1984 (!) through to the latest generation with continuous system availability
Innovation: same platform used in all these different system environments

Benefits

• Customers benefit from standardised core platform approach
• All customers can benefit from all system enhancement
• Core platform approach supports high degree of flexibility for operational or technical changes >> future proof !
• Lower cost and higher efficiency for development of new features and functionality
Progress through innovations ......

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# Innovations on different levels

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<td>- Passenger counting</td>
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<td>- Improving GUI design</td>
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<td>- CAN interface</td>
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Innovations: product level

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Products: on-board computer evolution

Conventional on-board computer

Driver touch screen terminal,

Mobile data terminal

GSM/GPRS communication module

„All in one“ on-board computer concept
Products: on-board displays evolution

From simple LED passenger information displays in the vehicle........
Products: on-board displays evolution

......to more advanced graphical information displays
Products: on AFC components
Innovations : System level

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System: Driver Navigation
System: Smart VLU = Driver «console» on Smartphone

Vehicle in Service

Android Smartphone

Traveler Information
## Smart VLU - Features

### System functionality
- Full integration with Trapeze OCC platform
- Views: vehicle table, route diagram, GIS

### Easy to install
- Based on standard market devices
- Configuration through downloadable apps

### Communication
- Voice: individual GSM/UMTS call setup
- Data: send individual instruction to vehicle
- Data: receive driver message from vehicle
System: EMV (PayWave PayPass)

- Genesis Framework UI SOAP Interface
- External Kernel Library SmartSoft, Abrantix (Level 2 certified)
- FEIG Reader (Level 1 certified)
System : dynamic route changes
System: Reporting geographic referencing of events
Innovation: functional level

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Functional: Ticketing Systems

On street vending machines

Validators for bus + light rail

On bus ticketing machines
ComfoAccess®: Ticketing solution

- Ticketing system based on presence detection technology (Be-in/Be-out)
- Cashless travelling
- No knowledge about fares needed
- One chip card for using all means of transport
- EMV ready
ComfoAccess®: How it works

**Stage 1: Activation**
Activation when boarding

**Stage 2: Registration**
Presence detection after trip has started

**Fare attributes selection**
Before the trip, an app allows attributes such as 1st/2nd class and activation/deactivation to be selected

**Ticket inspection**
Checking via ISO14443 interface

Patented two-stage presence detection system of Trapeze

Fare attribute selection and ticket inspection
Functional: Control centre
Control Centre: Tools for UTC, Incident Management and APTMS
Control Centre: Tools for fleet management
Functional: Incident and Workflow Management

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Incident and Workflow based Dispatching

**Forms, checklists, workflow and status automation**

- Efficient workflow-based incidence management based on pre-defined action sequences / priorities
- Forms and checklists support dispatchers and related staff in reacting correctly and efficiently especially “under pressure”
- Provides reports about actions taken based on existing system data
- Customizable comprehensive forms can be proceeds by multiple staff in parallel
- Helps to improves workflow and quality of service in all departments involved
- All involved staff can concentrate on the task to be performed

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Incident Console

Tool bar from new LIO Client

Incidents – generated based on rules framework

Object Details: LIO Client

Action plan for an incident selected

Form for incident selected
Intelligent Decision Support

- **Toolbar for Dispatcher Workstation**
- **Incidents – automatically generated from «Rules Engine»**
- **Actionplan for selected incidents**
- **Live information for dispatchers, fully integrated with LIO Client**
Functional: INOVAS – Eco Driving

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<table>
<thead>
<tr>
<th>Incident Analysis</th>
<th>Performance Analysis</th>
<th>Route Training &amp; Testing</th>
<th>Driver Training &amp; Evaluation</th>
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<td>• Capture and re-play vehicle performance data related to an accident or incident</td>
<td>• Determine driver and vehicle trends over time</td>
<td>• Classroom and kiosk applications</td>
<td>• Improve driving skills</td>
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<td>• Determine safety and efficiency</td>
<td>• Video-based training</td>
<td>• Improve safety and efficiency of operations</td>
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<td>• Reports based on operational data</td>
<td>• Driver assessment</td>
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</table>

**INOVAS Scope**
Functional principle

- Vehicle leaves garage
- Starts collecting data (every second)

OBU stores data:
- Speed, acceleration,
- Deceleration, CAN-data

Creating reports:
- based on statistically relevant data (!)

Data download in the depot via WLAN
INOVAS Samples: Driver Training
Route Training Screen
Incident Analysis
Functional: Reporting based on Business Intelligence
The Aims of Business Intelligence

Data sources (paper, documents, databases, WWW)

Structured data collection in databases

Reporting, data analysis

Data mining (non-obvious connections)

Visualization of the data

Decisions

Potential of decisions
LIO BI - Overview

Data source
- Control Centre
- Planning data (LIO-Data)
- Vehicle (IBISplus)
- Radio data (TTL)

Database
- BI-Database
- Datamarts Cubes

Evaluation
- BI-Standard Reports
- Report-Packages for several topics
- Customer specific evaluations
- External systems
Available Planning Data (Selection)

- Base version
- Schedules
- Stop plan
- Vehicle
- Route direction
- Day type
- Route
- Pattern
- Stopping point
- Stop
- Depot
- Operator
- ...

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Available Vehicle Data (Selection)

- Kilometer data
- GPS data
- Door
- Field strength
- Stops
- Position correction
- Passenger changeover
- Stop zone
- Traffic jam
- Traffic light pre-emption
- ...

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Data Mining: Creation of an (even) deeper data view, discovery of systematic causes

![Data Mining Diagram](image)

**Fig. 135: Setting Standards**

The results table:

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<tr>
<th>Route</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
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Reporting example: Schedule deviation per route

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Future Outlook ??

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Outlook – what to expect short-term?

• Increased use of apps for passengers and transport professionals
• Standardised interfaces for higher cost efficiencies and improved integration
• Data mining will technologies lead to improved service and decision support
• Raising passenger comfort through improved information and services (Wifi on board buses/trains...)

• BUT : what really counts is to have a powerfull and smart set of tools to ensure better and more reliable results !!
Thank You Very Much!

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