IBM Intelligent Transportation for Smarter Cities

Innovative leaders create opportunities from today's harsh realities

With increasing experience, best practice patterns become visible

Experienced: Traffic Management

2006 — Land Transport Authority

2009 — Queensland Motorways

2010 — Rio Prefeitura

Identified: Repeatable Patterns

- What data is most important?
- What analytics provide value?
- Which groups to coordinate?

Enhanced: Foundation for Reuse and Integration

Government Industry Framework

Integrates IBM and Partner solutions

IBM Intelligent Transportation Offering

Provides citywide traffic visibility to alleviate congestion and rapidly respond to incident response

- **Increase situational awareness** across entire transportation network and city services (eg. emergency management response)
- **Analyze traffic performance** to improve travel experience
- **Centralize monitoring** and **transit arrival prediction**

Increase situational awareness across entire transportation network

- Capture data from disparate sources to achieve citywide visibility into transportation conditions including:
  - Traffic flow (ie. average speed, volume)
  - Congestion
  - Roadwork and road closures
  - Accidents
- Integrates with IBM Intelligent Operations Center for cross agency collaboration and incident management
- Standards based integration with wide variety of instrumentation technologies and applications

Inspired by:

Queensland Motorways

The Need:

Address increasing demand on roadways with 230,000 vehicles per day and reduce motorists' time spent in traffic and vehicle emissions

IBM Solution:

The solution recommends fastest routes and avoid congestion. This helps to speed journeys, reduce congestion, and cut exhaust emissions. Drivers no longer have to stop to pay tolls, which reduces congestion, increases safety and enhances network reliability.

"The idea is to have 'a motorway that thinks' – a more intelligent solution that will give our customers a better range of options for their journeys."
- Phil Mumford, CEO of Queensland Motorways

Analyze traffic performance to improve travel experience

- Proactively manage and optimize traffic flow across the city through traffic prediction
- Enables public to receive forecast of traffic conditions so they can better plan their daily activities
- "What if" scenario analysis to understand traffic performance based on anticipated changes in traffic volume and conditions

Inspired by:

Singapore Land Transit Authority

The Need:

With Singapore's population growing, the Singapore Land Transport Authority (LTA) needed a way to head off traffic congestion and maintain its world-class business climate

IBM Solution:

Singapore LTA can forecast traffic conditions up to 60 minutes into the future to help prevent traffic congestion before it occurs.

"…use ridership data to develop more optimal routes, which ultimately will reduce congestion and make public transport more appealing."
- Silvester Prakasam, Director of Fare Systems, Singapore LTA

Land Transport Authority

Centralize monitoring and transit arrival prediction

- Identify vehicles and their current locations in real-time
- Estimate arrival time of vehicles based on current and predicted traffic conditions including:
  - Public transportation vehicles
  - Private fleets
- Vehicle and fleet performance analytics such as:
  - Number of vehicles in a route
  - Average transit time

Inspired by:

Finnish Transport Agency

The Need:

Agency is responsible for maintenance and development of Finnish Transport System. They wanted to gain a single view of road conditions, accidents and other road and traffic information

IBM Solution:

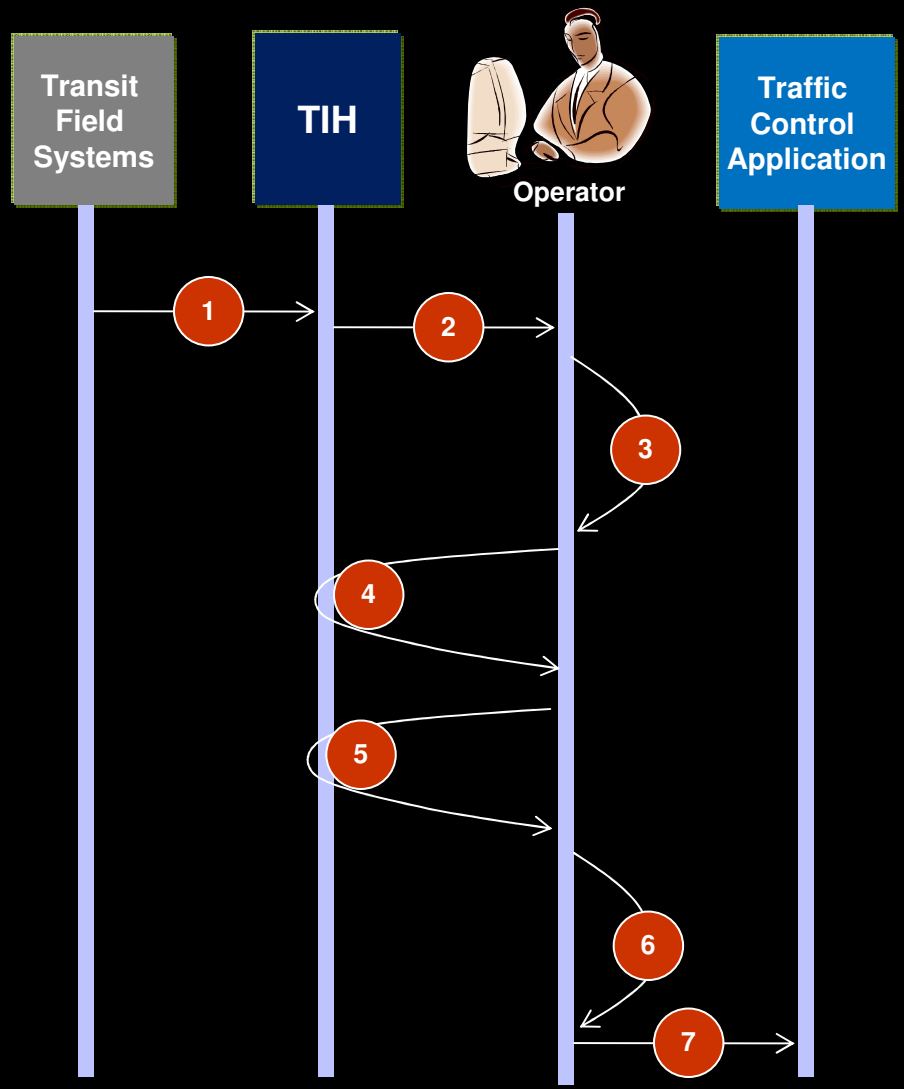
The solution has transformed 78,000 km. of roadways data into key insights helping to improve the efficiency of road management and enhance road safety and operational efficiency

"…The benefit for drivers is safer and more fluid travel, and for the Transport Agency it is more efficient operations."
- Kristiina Laakso, Finnish Transport Agency."

City Traffic Operations Use Case

Summary
City Traffic Operator performs congestion management assisted by TIH

1. Traffic measurement and condition data are received from Transit Field Systems
2. Traffic data is displayed real-time on a city geographic map to operator
3. Operator observes serious congestion on a link indicated by color coding
4. Operator uses map interaction function to observe congestion volume
5. Operator performs cause analysis to correlate the congestion with a major accident that happened minutes ago
6. Operator evaluates situation and decides on corrective measure involving redirection of traffic with highway police assistance and signal length changes on diverted routes
7. Operator turns the solution into action using traffic control applications external to TIH and manual steps as the case may be

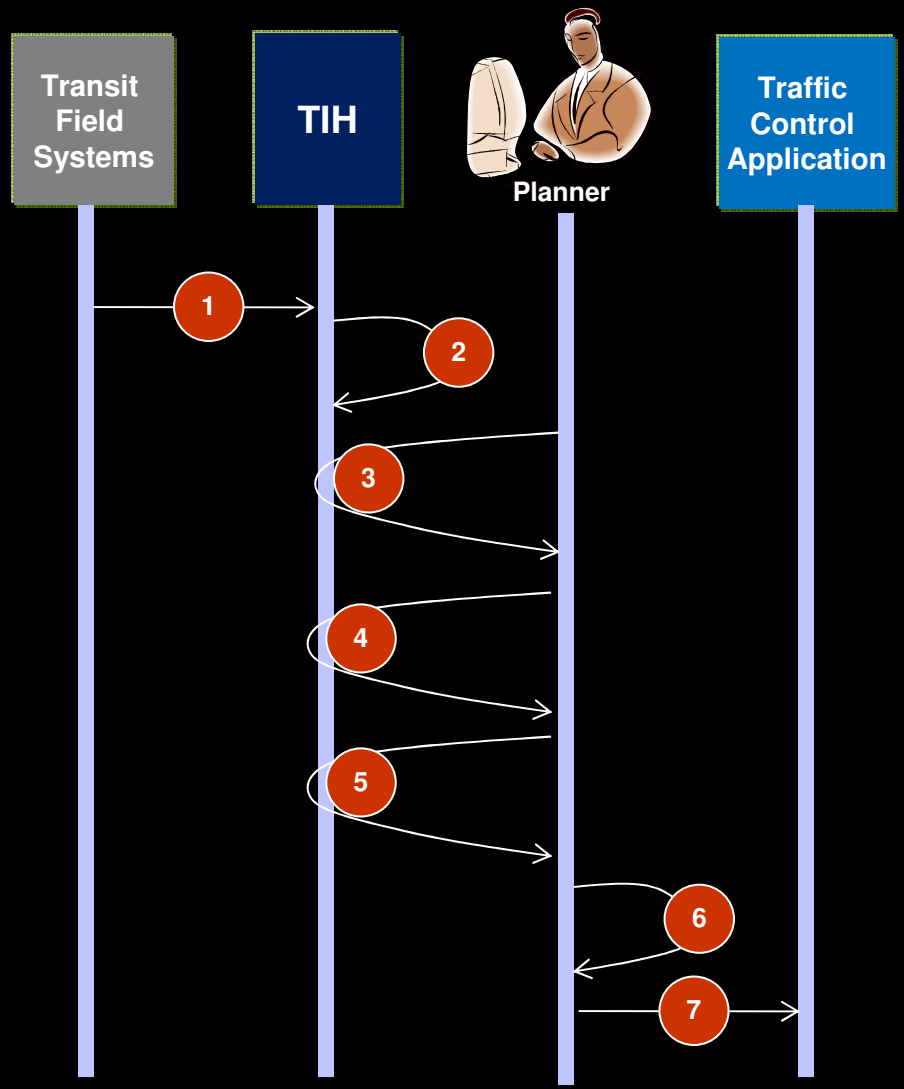


City Traffic Planning Use Case

Summary

City Traffic Planner plans traffic light change intervals & lane re-configuration schedule for a busy highway during rush hours

1. Traffic measurement and condition data are received from Transit Field Systems
2. Traffic data is transformed and stored into the Traffic Information Hub
3. Traffic Planner requests a report on historical traffic volume and speed data related to the highway and rush hour interval of interest
4. Traffic Planner expands the scope of the request to include key feeder links to the highway
5. Planner relies on TIH to provide mean values of key KPIs
6. Planner uses expertise and tools external to TIH to optimize traffic flow by adjusting traffic signal intervals & lane usage rules
7. Planner commits the new plan into action using traffic control applications external to TIH and manual steps as the case may be



Intelligent Transportation – Product Overview

Description:

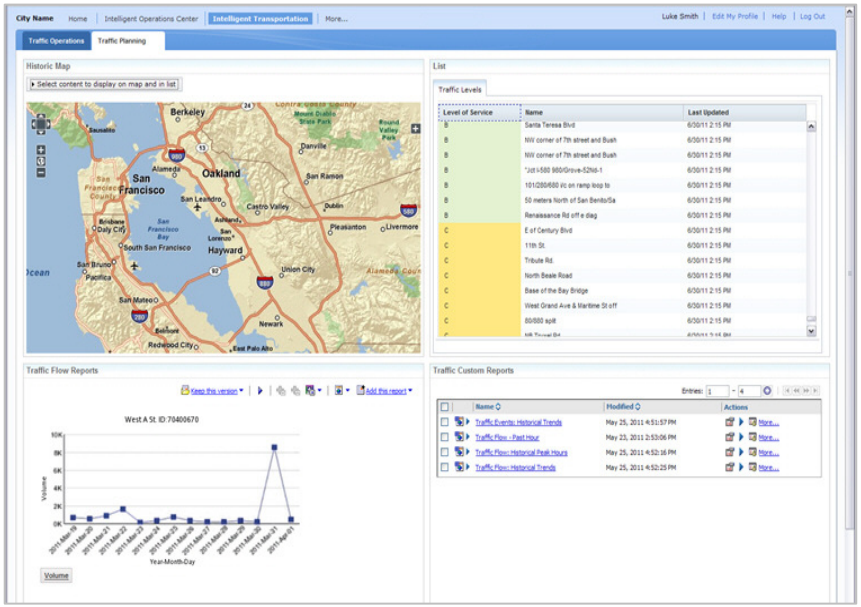
- Traffic analysis capability to allow for better management of traffic , improvement of commuter experience, reduction of pollution and improve the ability for emergency responders and public safety officials to act quickly
- Ability to aggregate information across multiple intra-city geographies/locales as well as information from a diverse set of data input source types and vendors
- A data source agnostic , standard information model on top of which vertical value applications can be created with ease and with ability to scale
- Ability to access historical and real-time information about all traffic performance, conditions, configurations and incidents

Customer pain addressed:

- Existing traffic data systems, ATMS and TMC applications each cover limited intra-city geographic/locale scope
- Integrations between traffic data systems, ATMS and TMC applications that function across the same city are either non-existent or limited
- There is a diversity of traffic data systems in terms of types, vendors and data abstraction levels which is posing a great challenge to the creation of vertical traffic applications traffic flow optimization, improving commuter experience, pollution reduction & emergency response
- There is no way to have city-wide visibility for traffic performance, conditions, configurations and incidents

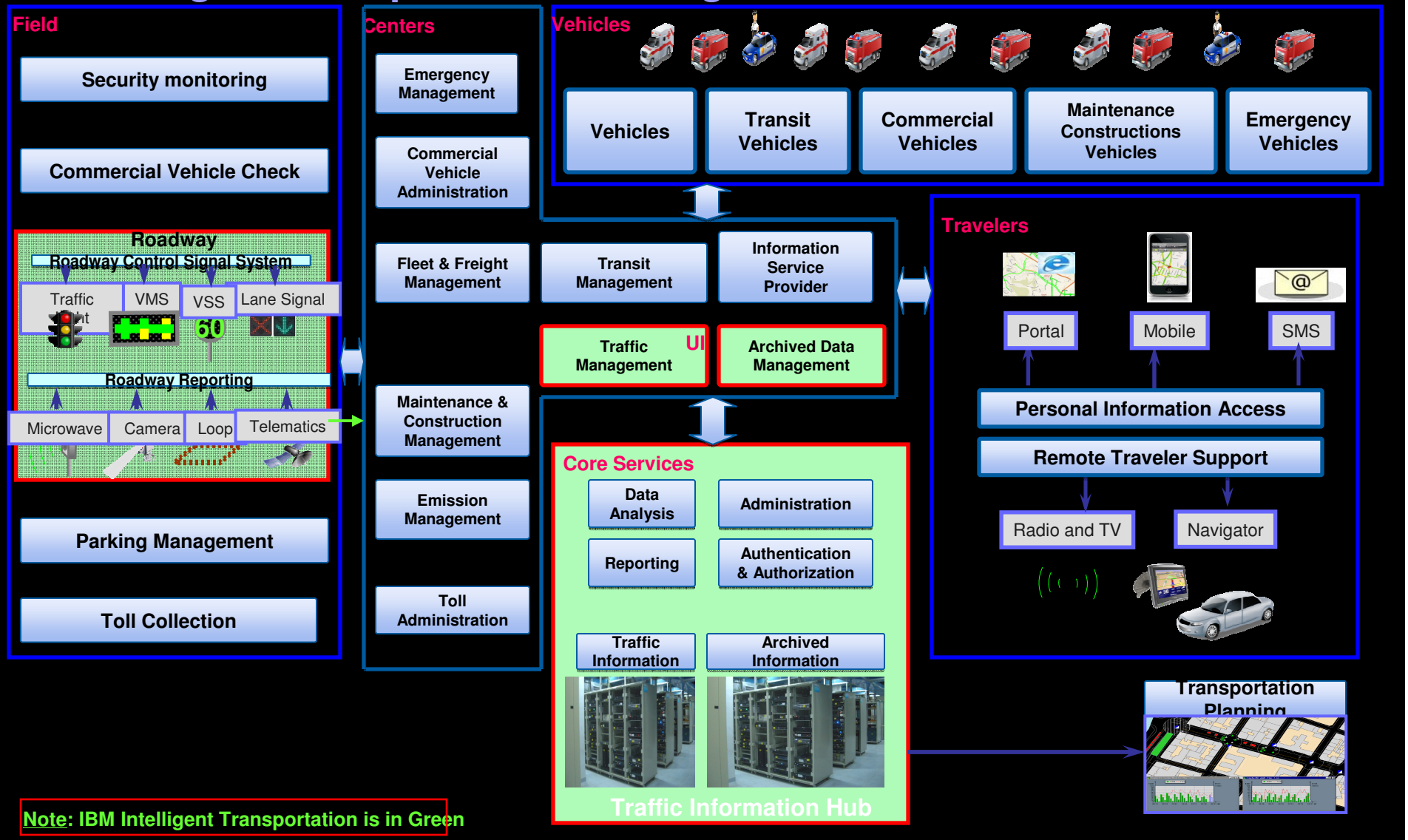
Solution Software key components:

1. **Visibility of real-time & historical, traffic & incident data though GIS, tabular & reporting interfaces**
2. **Standards based integration to data capture systems**
3. **Canonical operational data model and repository**
4. **Cloud Enablement**
5. **Integration with IBM Operation Centre Functions**



Intelligent Transportation

IBM Intelligent Transportation Offering Business Context



Note: IBM Intelligent Transportation is in Green

Intelligent Transportation – Product Detail

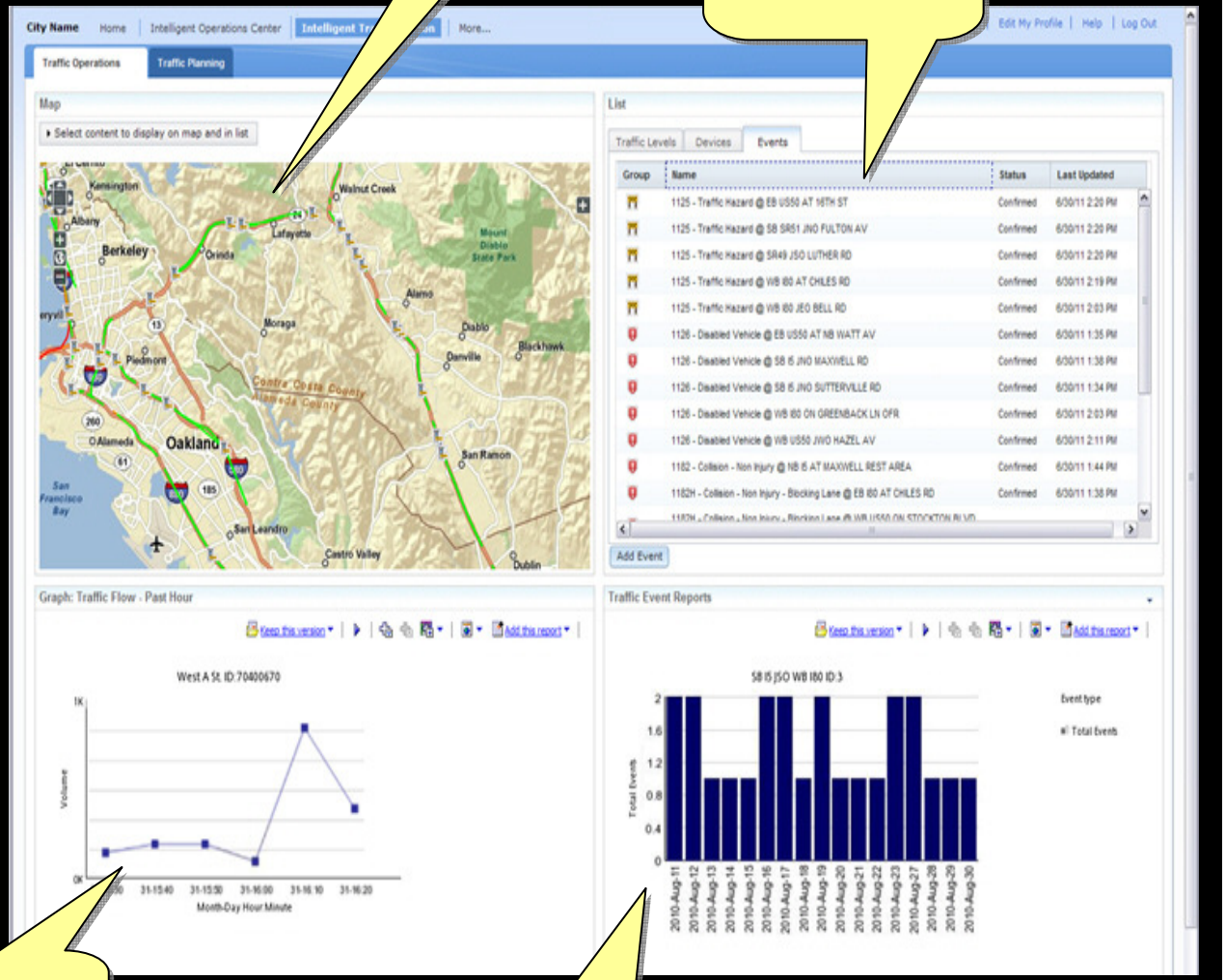
Increases situational awareness for traffic operators

Capability Offered

- Analyzing patterns of traffic conditions, traffic flow graphs and event reports

Traffic Operator gathers citywide visibility of conditions where

- Map provides visual cues
- Events identify incidents
- Reports show trends



Intelligent Transportation – Product Detail

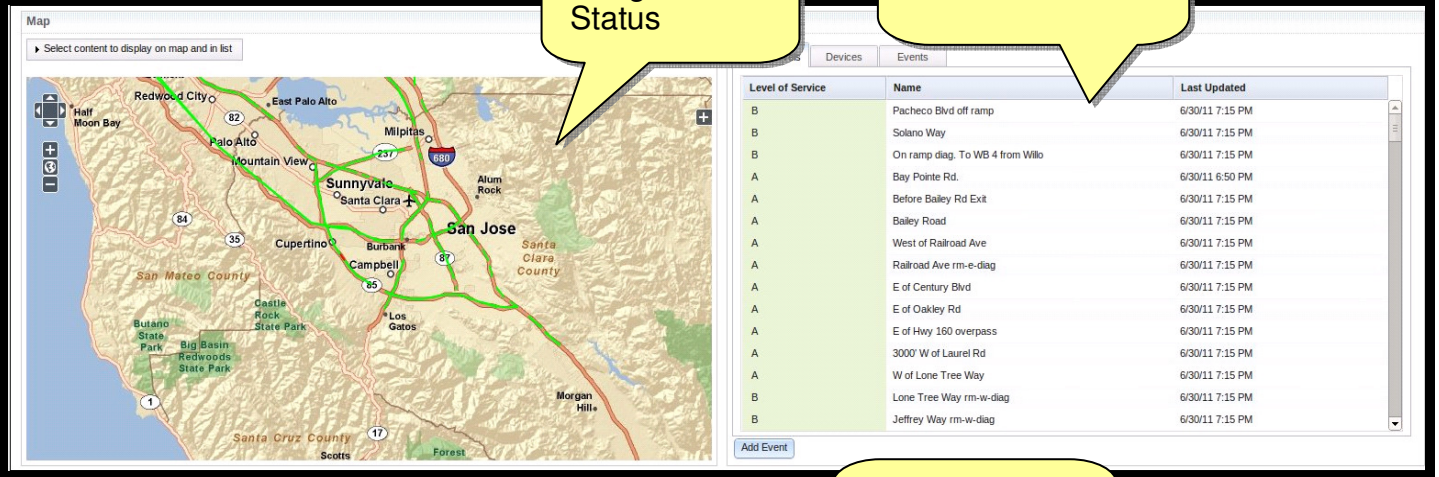
Offer Centralized monitoring capability to traffic operators

Capability Shown

- Monitor real-time state of traffic congestion along with device or event status

Traffic Operator wants to find what accidents are occurring

- Map and corresponding detailed tabular view for
  - Traffic congestion
  - Device status
  - Event status
- Tabular view can be sorted
- Retrieve details by visually selecting point on map



Intelligent Transportation – Product Detail

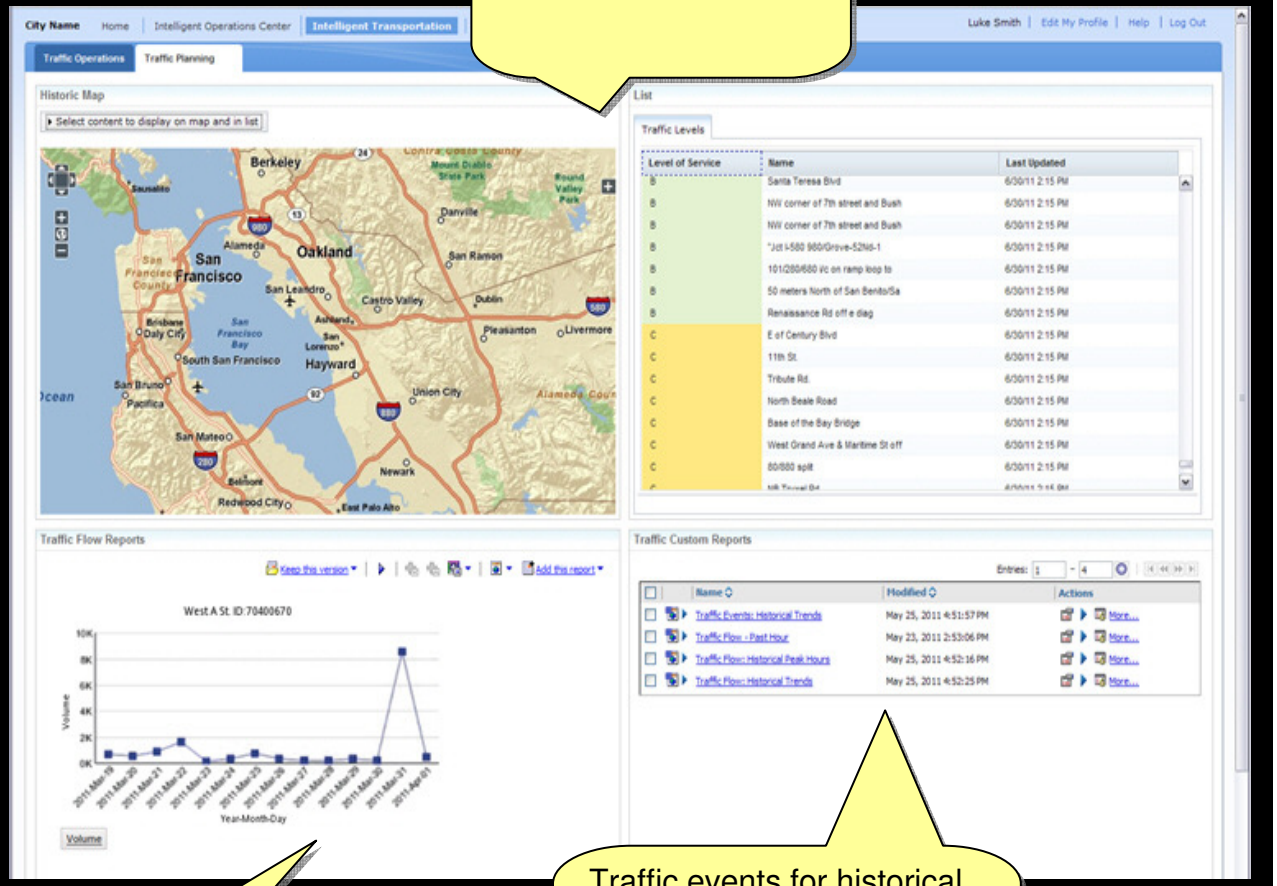
Help traffic planners analyze traffic performance, and identify improvements

Capability Offered

- Leverage historical data to help make informed decisions for future operations, maintenance road work, as well as planned and un-planned events management

Traffic Planner analyzes ways to improve traffic flow by analyzing historical data for trends that

- Map traffic data over time periods that have meaning
- Correlate traffic data with events



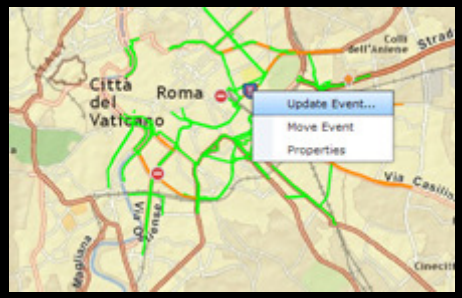
View traffic congestion for historic date and time

Traffic Flow Reports

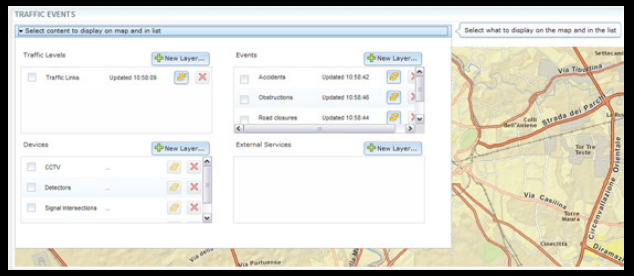
Traffic events for historical trends

Traffic flow at various granularities of time

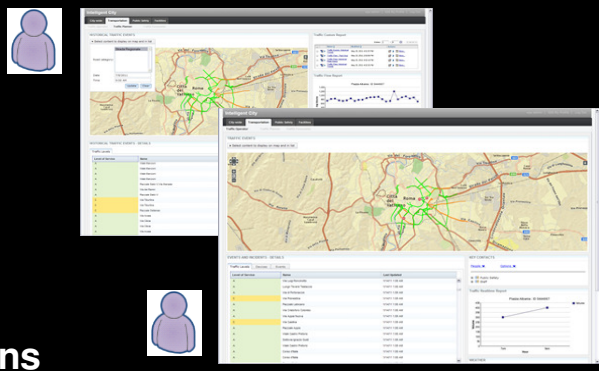
Intelligent Transportation Base Functionality



Manage Real-Time Traffic Events

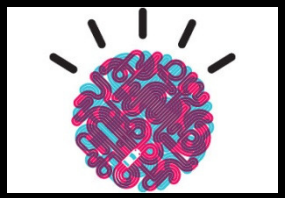


Click to Action:
Map and List Adapt Instantly to Selections



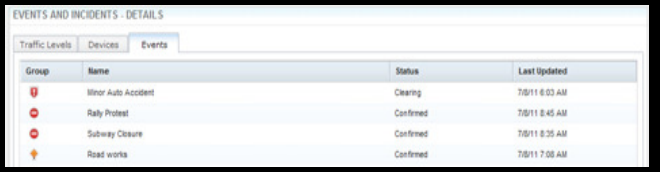
Roles & Permissions

Automatic Clustering
Based on Map Zoom Level

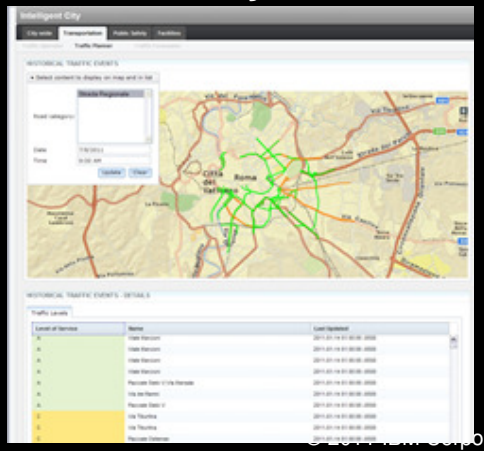


Intelligent Transportation

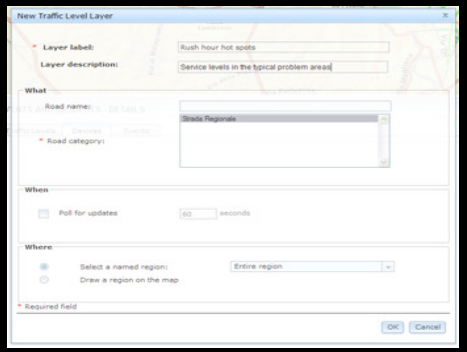
View Service Level, Event, & Device Details



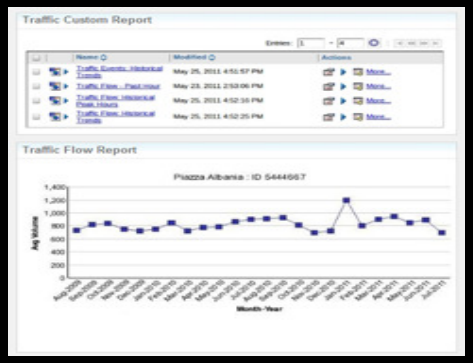
Historical Analysis & Planning



Define Custom Map Layers / Views



Real-Time and
Historical Reporting



Intelligent Transportation Solution Architecture

Bus Line Number	Time to Arrive	Bus Stop
101	5 min	A1
102	12 min	B2
103	10 min	B1

Radar

OCR

Loop Detectors

Blue-Tooth

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TMC/ATMS

Custom Databases

Adapters

End-User Application

End-User Application

End-User Application

End-User Application

End-User Application

Operations Center (alerts...)

Intelligent Transportation Management

Traffic Information Hub (data fusion, mapping...)

Traffic Prediction Tool

Traffic Optimization

Traffic Light Control

Service Provider Applications

Legend

Capture Systems

IBM User Experience

IBM Platform

Integration Solutions

3rd Party Data Sources

IBM Tools

3rd Party Applications

Multiple options help city leaders deploy technology regardless of size

On Premise:

- Build on workload optimized platforms
- Leverage infrastructure readiness services

Shared Services:

- Work together across multiple cities
- Share services using preconfigured systems

Cloud Delivery:

- Log on to your smarter city environment
- Customize interfaces, reports and data inputs

"It's about transforming the way we do business, so we can invest that money in front-line service delivery"

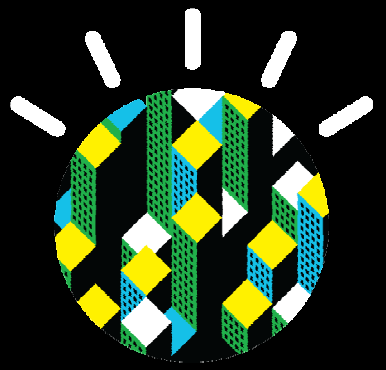
Chief Superintendent Avon & Somerset Police

Inspired By

Together we will create a planet of Smarter Cities

IBM is the right partner to help city leaders innovate to meet and exceed citizen expectations

- 100 years of experience making the world work better through the use of technology
- Real products to enable sustainable economic growth
  - *Leveraging information to make better decisions*
  - *Anticipating problems to resolve them proactively*
  - *Coordinating resources to operate effectively*
- Local solutions based on global insight from 170+ countries
- Passion for cities demonstrated by volunteers for Smarter City Challenge grants



*Over **2,000 city projects** leverage on IBM to help them transform into 21st century cities*