Operational Intelligence: Real-Time Business Analytics for Big Data

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VITRIA[®] The Operational Intelligence Company</sup>

Speakers





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Today's Agenda

- Definitions and Background
- Real-World Use Cases of
 Operational Intelligence
- Primary Capabilities of Operational Intelligence
- Drill into the Capabilities
- Recommendations



PLEASE TWEET --@pRussom, @VitriaTech, #TDWI, #RealTime, #Analytics, #BigData

Operational Intelligence

- According to Wikipedia...
- "Operational intelligence (OI)

is a form of real-time dynamic, business analytics that delivers visibility and insight into business operations [as they are happening].

- Operational intelligence solutions run query analysis against live feeds and event data to deliver real-time, actionable information.
- This real-time information can be acted upon in a variety of ways alerts can be sent or executive decisions can be made using real-time dashboards.
- The purpose of OI is to monitor business activities and identify and detect situations relating to inefficiencies, opportunities, and threats."



Operational Intelligence & Business Intelligence are similar, but have significant differences.

- Operational Intelligence (OI)
- True Real Time, all the time
- Where seconds/minutes count
- Data in motion
- Event or stream oriented
- Often in the context of a business process
- Inherently analytic
- Automatic software responses

- Business Intelligence (BI)
- Near Time, but rarely
- Where strategy can take its time
- Data at rest in database
- Historic data oriented
- Seldom a process context
- Mostly about reporting
- Human responses, after study

Use Cases for Operational Intelligence, 1

- Monitoring & Analysis in True Real Time
 - Energy utility, communication network; any grid, service, facility
 - Surveillance, cyber security, situational awareness
 - Fraud detection, risk calc
 - Logistics, truck/rail freight, mobile asset mgt



Use Cases for Operational Intelligence, 2



- Retail Optimization
 - Commodity pricing; short-term sales and bundles
 - Inventory shuffle, just-in-time inventory
- Virtual Contact Centers
- Process Visibility
 - Yield, quality, efficiency, SLA

The Four Primary Capabilities of Operational Intelligence Real Time

Big Data

Operational Intelligence

Business Operations

CHALLENGE Support *all* capabilities without

compromise

- SOLUTION Requires unique combination of special technology
- Let's drill into these capabilities

Analytics

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OI operates in True Real Time

- "Real time" originally meant milliseconds from event reception to system response
 - "Real time" now means multiple time frames, few of them subsecond in milliseconds
- OI solutions operate in "true real time."
 - Events and other incoming data are processed in milliseconds, sometimes microseconds
- True real time is required to:
 - Enable continuous monitoring of a process, network, facility, service
 - Perform well with large data volumes, complex models, streaming data
 - E.g., seconds/minutes on a rail/truck schedule matter, and they add up
- If action is required within ~15 minutes, consider OI



OI provides Visibility into Business Operations

- Visibility = Know and act on the knowledge quickly:
 - Know and correct SLA or performance problems
 - Spot and stop fraud or security breaches
 - Feel confident, knowing that "all systems are go"
- Situational Awareness = See & react accordingly:
 - See a cluster of street crimes
 - Deploy squad cars as a deterrent.
 - See a drop in unit production on manufacturing floor
 - Bring in more workers and turn on more machinery.
 - See a product recurring in abandoned shopping carts
 - Run a promotion to close more sales of that product.
 - See a social media sentiment or pattern; direct it or correct it as it evolves





OI Visualizes Business Operations

- OI user interfaces are strongly visual
 - Dashboard: visualize data, the drill into the visualization for exploration and analytics
 - Visual mash-up of internal/external data, with hot maps (visual analysis laid over a spatial representation)
 - Visualize an event's context within an ongoing business process, process model, predictive model, etc.
 - Capture events and play them back in animation for study
- OI development is also visually oriented
 - View models of relationships among data, events, and processes as you develop them

OI is inherently Analytic

- OI receives, links, and analyzes large volumes of data arriving in multiple, diverse real-time streams.
 - The point is to correlate related events and discover problems or opportunities that need immediate attention.
 - CEP functionality may be the technology creating correlations.
- An OI platform keeps a history of data values for context.
 - OI may also tap a data warehouse or equivalent database.
 - Enables multi-dimensional, time series, and trending analytics.
- OI policies and models are defined via business rules.
 - Events are evaluated by comparison to policies.
 - A match initiates an action, whether an automated response or a manual workflow.
 - OI tracks response outcomes for process improvement.



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OI excels with Big Data

- Big data in the sense of large datasets
 - A telco may process a terabyte of data daily via operational intelligence
 - A unified process view of business operations can easily top many terabytes
- Big data in the sense of many diverse data types
 - New Frontier: machine data and sensor data
 - Older Frontiers: unstructured data (human language text), multi-structured data (XML, Web logs, machine data, streams, feeds, events)
 - But still the familiar structured and relational data; record-oriented flat files
- Big data in the sense of streaming data
 - OI's real-time analytics and process monitoring depend on integration with the many sources of big data that are inherently streaming:
 - Web servers, machine data, RSS feeds, events, transactions, customer interactions
- OI excels in processing all the above to make correlations across them

OI solutions regularly include Complex Event Processing, which differs from Event Processing.

- Complex Event Processing (CEP)
- Multiple events
- Multiple sources/streams
- Multiple time frames
- Complex correlations across many events, sources, times
- May involve models for events, process, predictive analytics
- Multiple responses possible
- Rules for automated response

• Event Processing (EP)

- One event at a time
- One source at a time
- One time frame
- Simple check to see if datum is within "acceptable parameters"
- May involve models for data standards, predictive analytics
- One hard-coded response
- Alert a human, who responds

Recommendations

- Protect and enhance business operations as they occur
 - Visibility into operations requires analytics based on many sources of big data, some streaming in true real time, coupled with process modeling and event processing
 - Tools for operational intelligence provide this unique combination of advanced tech
- Recognize that true real time requires special technology
 - OI, CEP, interfaces for streaming data and events
- Embrace big data for complete visibility into many related business processes, operations, event streams
 - Traditional enterprise data, plus data from Web sites, machines, sensors, streams, social media, supply chain
- Adopt operational intelligence for monitoring apps
 - Utilities, communications networks, grids, SLAs
 - Surveillance, security, fraud detection
 - Logistics, freight, mobile assets, operational efficiency
- Adopt operational intelligence for other applications, too
 - Retail optimization, process visibility, virtual contact centers



Operational Intelligence *Real-Time Business Analytics for Big Data*

August 14, 2012

Dale Skeen CTO & Co-Founder Vitria Technology, Inc.

www.vitria.com

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Velocity of Business is Increasing













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Velocity of Business is Increasing

Time to Action is Decreasing



OI solves problems across many Industries

Operational Intelligence Solutions and Use Cases



OI Customer Success Story

Real-Time Service Assurance for Mobile Telcos

Problem: Maximizing Customer Experience for VIP Customers

- Users are in a high-speed coverage area, but receive lower-speed service.
- Difficult to correlate radio network events with customer data, equipment data, ...
- No analysis in real-time to remedy situation.
- Therefore, no insight into the impact on customers and not able to prioritize solutions.



Problem: Predicting Cellular Equipment Failures

- Cellular Equipment often provides advanced "signals" of pending failures.
- Not able to recognize these signals in time.
- Resulting in *avoidable* services outage.

Big Data in Motion:

250,000 events per second >20 Billion events per day

Service Assurance for Mobile Telco Big Data in Motion



Service Assurance OI Solution

Ingest the network events ("Big Data in Motion)

Detect anomalies and outages.

Correlate network events to customer and device data

Analyze events affecting VIP customers

Prioritize and act based on customer & financial relevancy.



Real-time Dashboards



Automated Processes

Service Assurance for Mobile Telco VIP Customer Use Case



Service Assurance for Mobile Telco Scaling to Extreme Event Rates







Automated Processes

- **3. Each project uses a CEP-based Map-Reduce design pattern.**
- 4. Reference and contextual data is loaded into memory.

Predicting Equipment Failure for Mobile Telco Synergy of Real-time OI and Hadoop





Added Hadoop for Offline Discovery of Patterns Predicting Equipment Failure

- Raw events are routed to and captured in Hadoop HDFS
- Pattern discovery jobs run offline
- Newly discovered patterns are automatically sent to OI Platform

OI Monitored New Patterns

 New Patterns were dynamically added and monitored

Customer Success Story Virtual Contact Center in the Cloud Multi-Channel Monitoring w/ Social Analytics

Business Need: 21st Century Contact Center Platform

- Multi-channel customer interactions
 - SMS, email, web, and phone as last resort
- Social media monitoring
 - Improve brand reputation
 - Increase cross-selling
 - Detect customer problems and react quickly
- Automated Processes and Reponses
- SaaS offering (in the Cloud)

Solution:

- Utilize Vitria's OI Platform as the base
- Partnered with MID Business SI for Brazil
- Embedded MID Business's technology for Natural Language Processing & Sentiment Scoring









Virtual Contact Center:



Multi-channel interactions – SMS, Web, email, social

Automated responses to direct requests

Social Media Analysis and Sentiment Analysis

- Better brand management
- Improve cross-selling
- Detect customer dissatisfaction quickly and act

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Virtual Contact Center in the Cloud

Social Activity Monitoring and Analysis



Drill-down into conversations by product type and sentiment

Join the conversation

Virtual Contact Center

Operational Intelligence with Social Analytics





Customer activity

Product trending Sentiment trending Social activity analysis Process performance

Visibility					
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Top Customers

Hot Products

Trends by product, customer type

Customer satisfaction scores

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Customer Processes

- Automated Responses
- Proactive to social comments
- Multi-channel

Virtual Contact Center

Operational Intelligence with Social Analytics



Insight	

Customer activity

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Product trending Sentiment trending Social activity analysis Process performance

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Top Customers

Hot Products

Trends by product, customer type

Customer satisfaction scores

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Customer Processes

- Automated Responses
- Proactive to social comments
- Multi-channel

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FS	Map-Reduce	HDFS			
Big Data Framework (Hadoop)					



Predictive Buying Patterns

Longer-term trends

Historical baselines

Virtual Contact Center in the Cloud

Results & Benefits

First Tenant went live in summer 2011

Ultragaz – a Brazilian LP Gas Distributor

MID Business, our partner, operates SaaS offering

Won Ventana Research's 2011 Leadership Award

Won the 2011 Futurecom Innovation Award, at Brazil's largest telecom event



Ultragaz

Problem: Rural customers in Brazil, with limited Internet access, were unable to promptly order and receive LP cooking gas canisters.

From ordering to fulfillment to payment, approximately 400 people are required for the entire process in every operation location.

Ultragaz (LP gas distributor) partnered with Oi (telecom), and Oi Paggo (payment) to provide a better approach built on the Virtual Contact Center.

Results:

- Improved customer satisfaction
- Reduced fulfillment time
- Achieve a high level of automation
- Cost-savings in personnel and in hardware (Cloud)

Summary

Operational Intelligence tackles the increasing velocity of business

- Provides continuous, real-time Visibility, Insight, and Action
- Ensures the right action at the right time, when Minutes and Seconds count

Operational Intelligence delivers real business value

- Service Assurance increased customer satisfaction with less churn
- Virtual Contact Center fundamentally better way to serve their customers

Operational Intelligence increases the utility of your Big Data

- Scales to handle Big Data in Motion
- Synergistically complements Hadoop and traditional Big Data frameworks.



Learn More About Operational Intelligence:

Vitria Technology www.vitria.com





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Questions?



Contacting Speakers

• If you have further questions or comments:

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