



## Tivoli Analytics for Service Performance



*Enabling Proactive Management...*

*Richard Gleeson, Tivoli Product Manager, IBM Software Group*



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## The Need For Proactive Management

- Few companies truly operate their infrastructure in a truly proactive manner.
- Most organization react to service outage or degradation after it occurs, even though the impact may be counted in the million of dollars per hour.
- Compound service degradation, that spans operational silos is, is one of the biggest challenges for management teams.
- IT and Operations Management teams are now being tasked with avoiding these problems and ensuring service continuity.

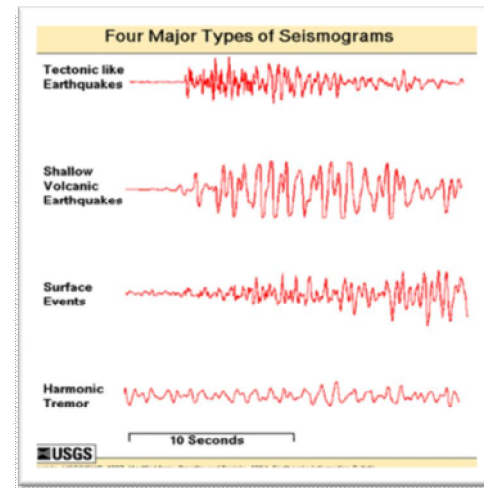


## Some Alerts Have To Be Issued Proactively...

Volcanic eruptions are predicted to mitigate the risks of disaster (such as the evacuation of cities like Naples)



Is the best strategy to **React** or **Predict**?



Eruption forecasting using seismic energy..

In order for the warning system to be successful:

- Eruptions must be detected in the emerging phase, not when already happening.
- Warnings must be accurate; too many false alerts and people ignore them

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## So Why Are So Few Operational Teams Proactive?

- Problems are not being detected in the emerging phase, before they become service impacting.
  - The manifestation of emerging problems in performance data may not be sufficient to trip traditional univariate thresholds
  - Problems may be complex, with a combination of faulty metrics compounding to contribute to a outage or service degradation.
  
- There is too much infrastructure management noise, so even if an emerging alert is produced, it is lost in the daily noise.
  - Too many performance threshold violations are produced.
  - Random threshold thrashing generate large volumes of events, that while valid, are a poor indication of actual problem conditions.
  - Many hundreds of threshold violations may be produced per problem, with many tens of problems existing concurrently.

Introducing:  
Multivariate Analytics

## Monitoring the health of a regular car engine using basic metrics

Fuel

Engine Temp

Outside Temp

Oil Pressure

Engine Revs

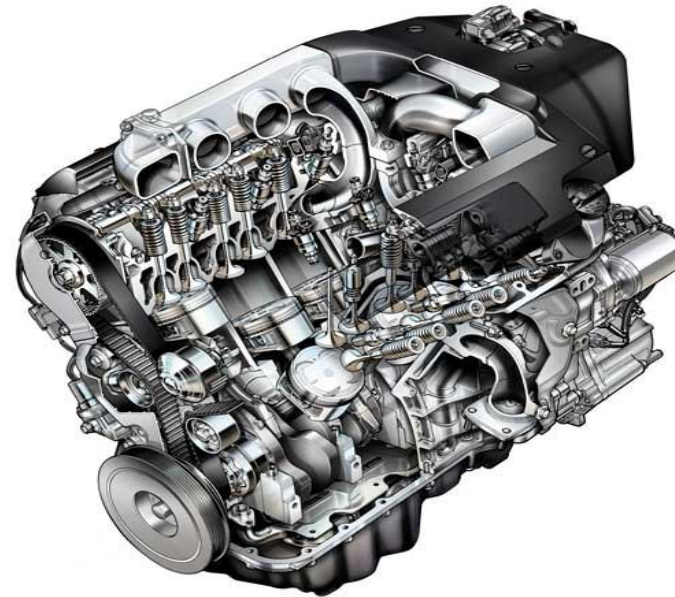
Brake Usage

Brake Fluid

Battery

Speedometer

Monitoring engine health with time series metrics

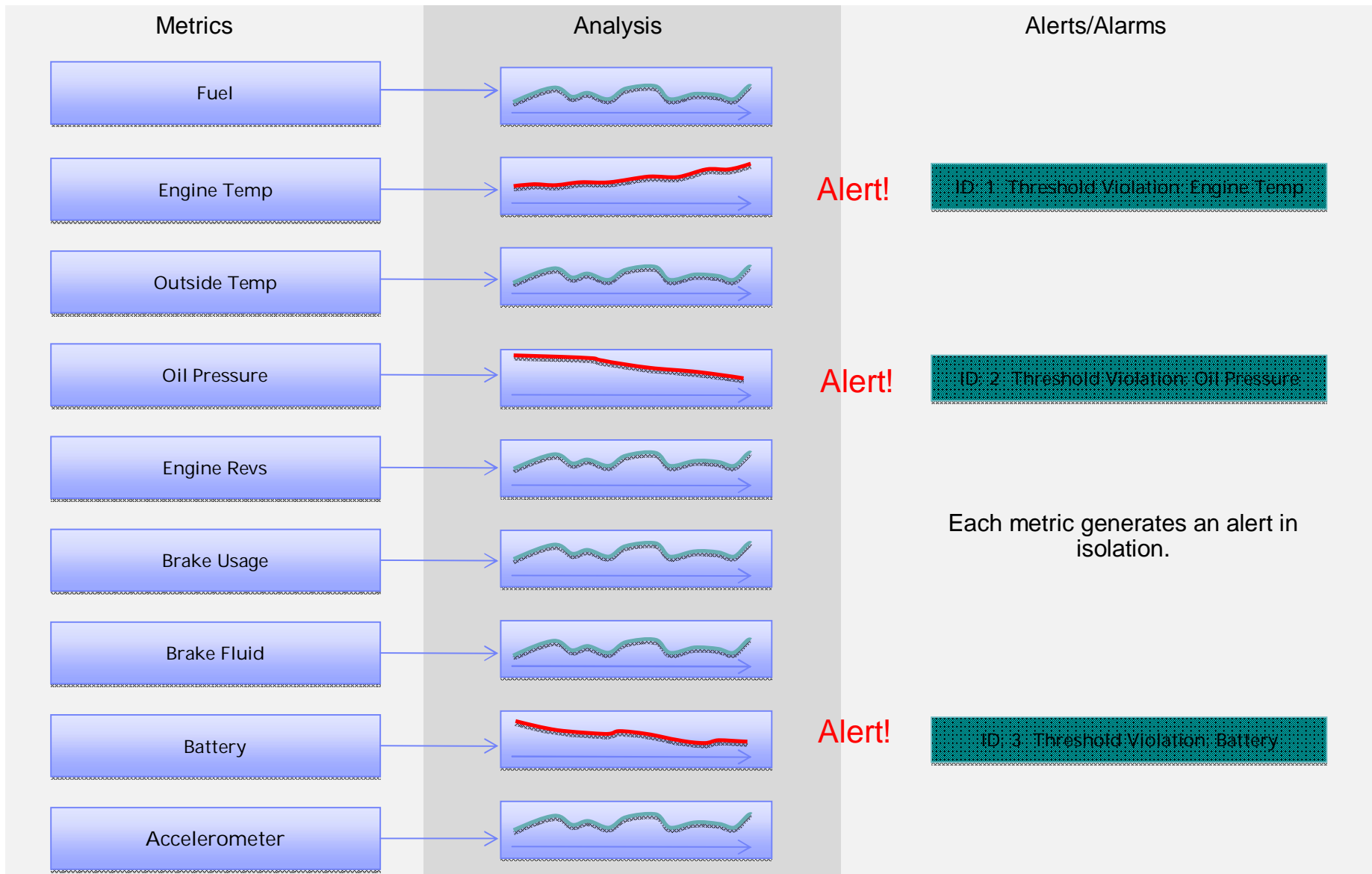


# Monitoring Engine Health, A Univariate Approach

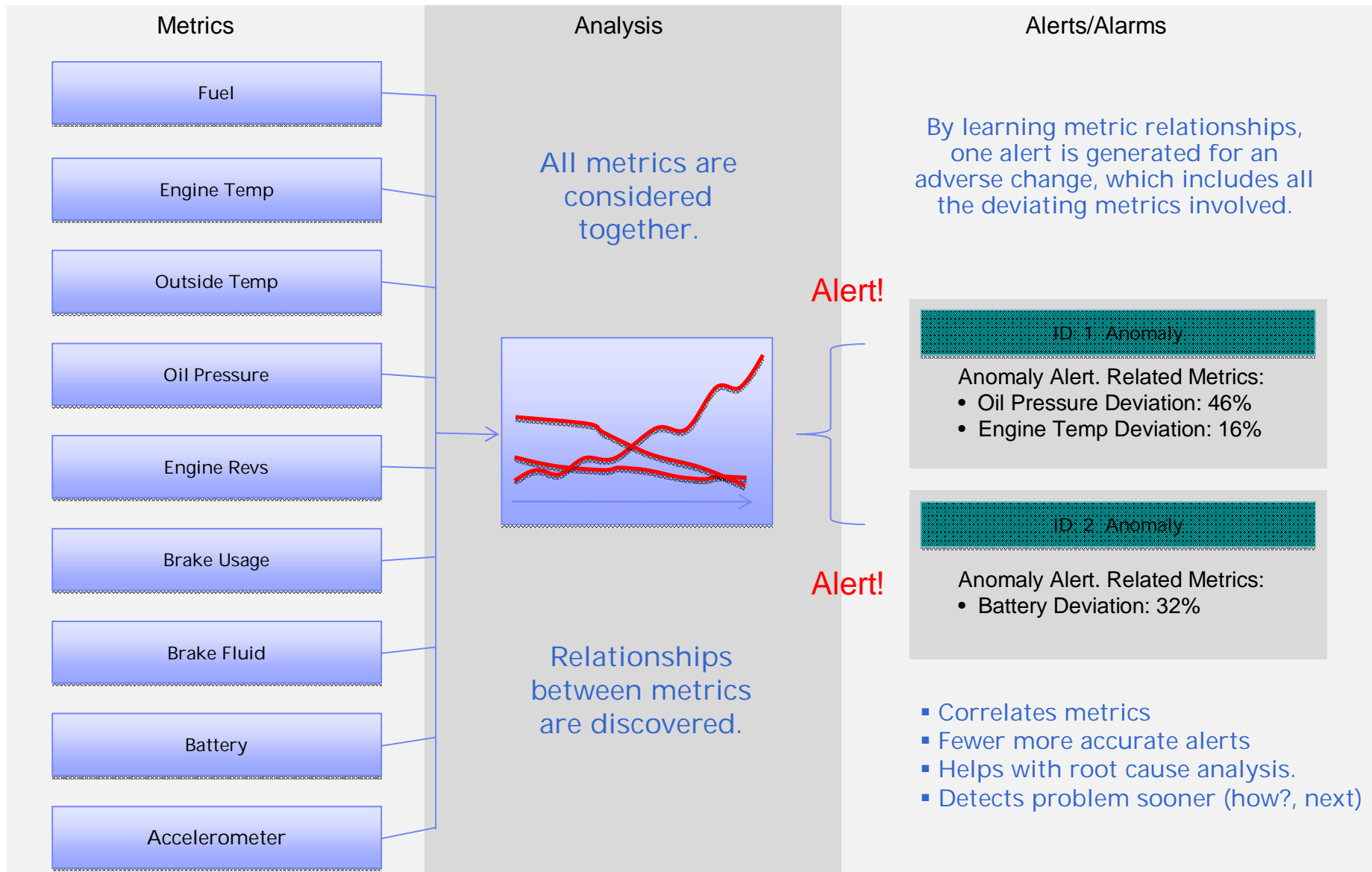




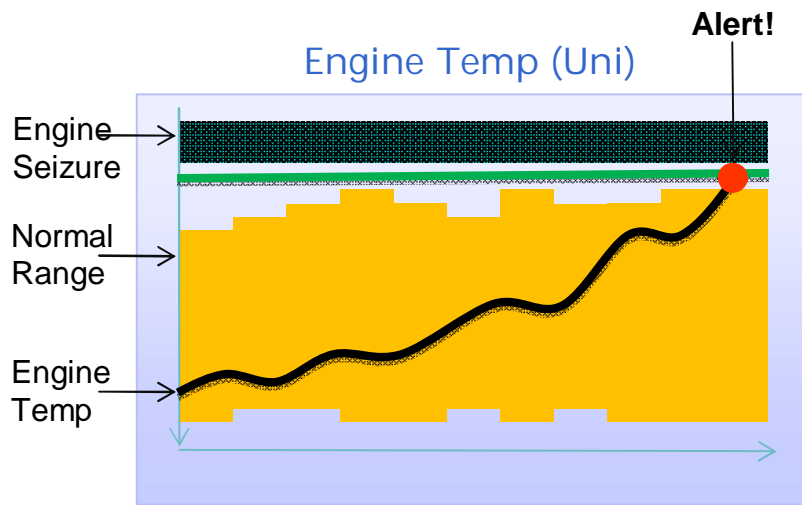
# Monitoring Engine Health, A Univariate Approach



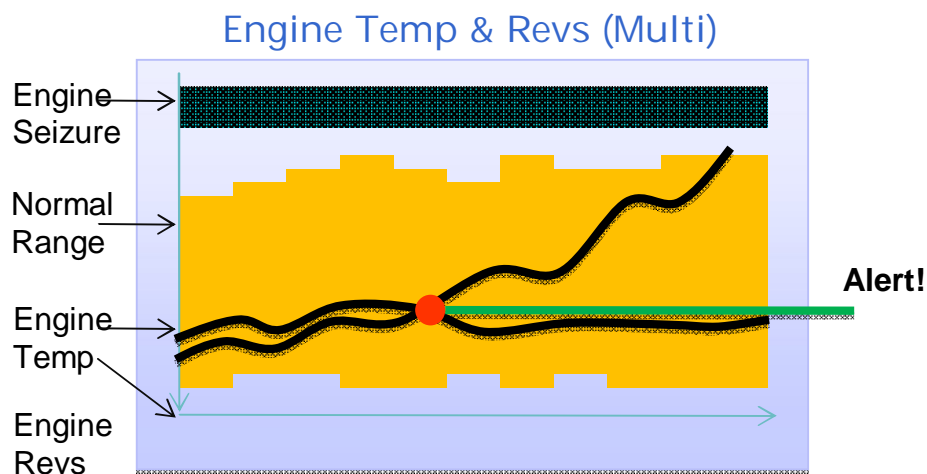
# Monitoring Engine Health, A Multivariate Approach



# How Multivariate Analytics Detect Problems Sooner?



Static Threshold = Short Warning



Multivariate = Alerts earlier on Deviation

Multivariate analytics detects problems sooner by detecting the deviation of metrics that normally move together.

For example:

- Engine temperature and engine revolutions normal move together. This is healthy system behaviour...
- But when engine temperature deviates from engine revolutions, as would happen with coolant leak, this indicates a problem and an alert is generated.
- The alert is generated much sooner than waiting for engine temperature to exceed normal operational ranges.

This advanced warning time helps you become proactive and mitigate damage before service is impacted.

- Learns normal operational behaviour across the infrastructure, including how metrics behave together.
- Maximize Advance Warning: Identifies metric relationship changes that signal a problem long before traditional thresholds
- Identifies problems before you know to look for them
- Detects service impacts that are not identifiable by fixed thresholds alone.
- Assists with root cause analysis by indicating the most offending metrics.
- Reduces expensive and time consuming false alerts.

Introducing:  
Tivoli Analytics for Service Performance

# Investment In Analytics, Organic And M&A



IBM is helping the industry by continuing on a journey of innovation. We have committed over \$23 billion to acquire and develop best-of-breed tools

IBM is driving the future of integrated analytics through acquisitions and our strategic partnerships:



**Trusted Information Platform**



**Business Analytics & Optimization Platform**

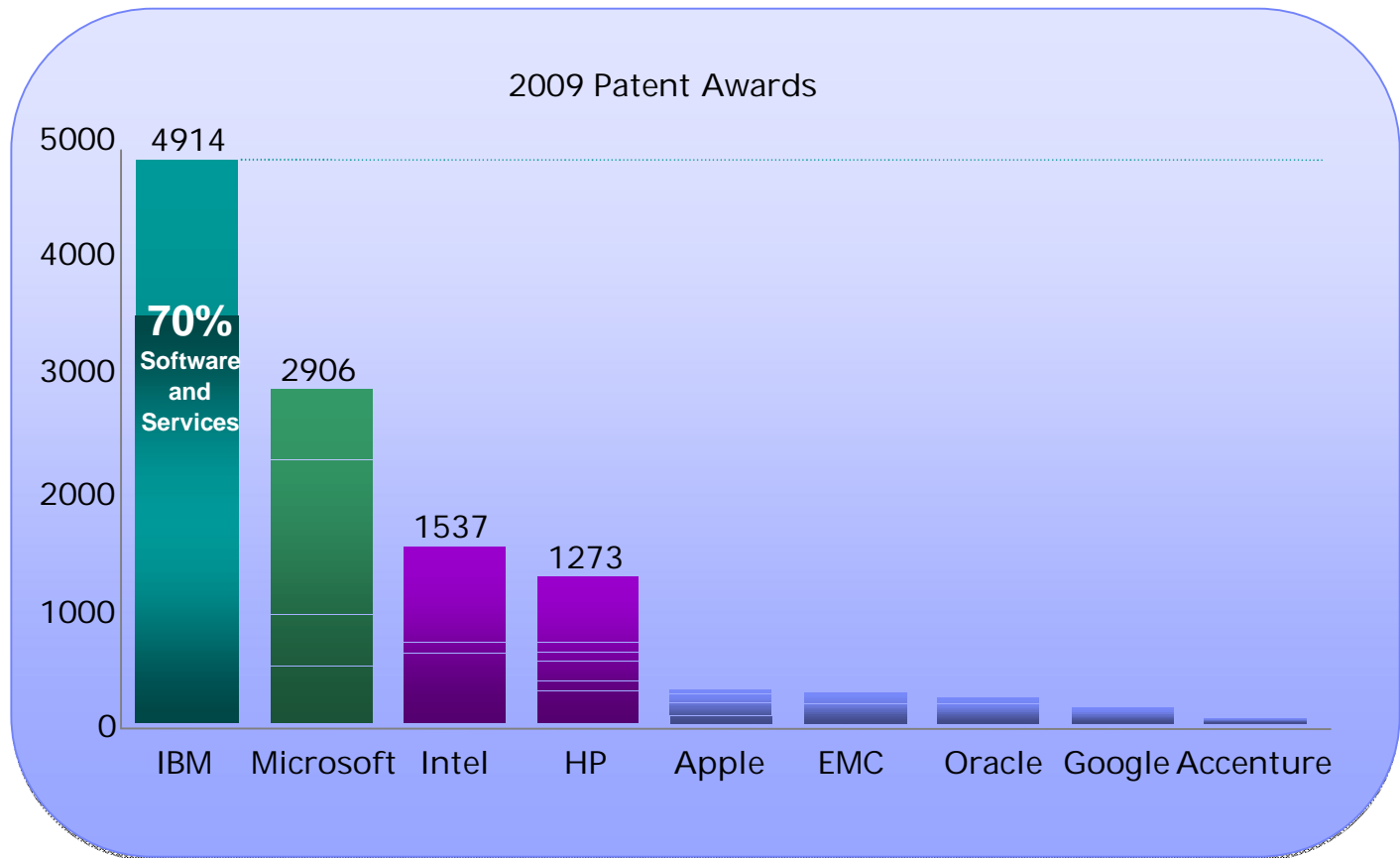


**Business Analytics & Optimization Solutions**



IBM holds more patents than any other U.S. based technology company and has eight research laboratories worldwide.

IBM employees have earned Five [Nobel Prizes](#), four [Turing Awards](#), five [National Medals of Technology](#), and five [National Medals of Science](#).



# IBM Research Business Analytics and Optimisation



- Over 200 researchers with expertise in data analytics, operations research, mathematics, and industry applications of analytics
- Hold 300 patents and have an additional 450 pending on analytics and business applications
- Support IBM's "fact-based" management and processes in sales, supply chain, and services.
- Lead in the global scientific community
  - Over 250 publications in leading conferences and journals in recent years
  - Fellows at several leading professional societies
  - Successive wins at KDD Cup and INFORMS Data Mining Competitions (premier competitions)
  - Leaders in Optimization Open Source
  - Major INFORMS prizes and awards
  - Adjunct faculty at leading universities

Improved profitability through analysis of customer networks for a major telecom customer by providing better customer targeting

Deployed operational planning and scheduling to run steel plants at several leading Asian steel manufacturers – improved productivity

Design optimal maintenance plan for a set of interconnected offshore oil platforms - improve availability of oil platforms

Analytics-Driven Solutions for Increased IBM sales force productivity – increased revenue and profitability

Improved wafer yield at the IBM 300mm semiconductor plant deploying data mining and machine learning

Creation of state-of-the-art error correction code technology that is used in main memory systems of IBM's computers

Provide analysis of operational risk loss data for 36 leading banks from 13 countries - cross enterprise secure and anonymous data sharing

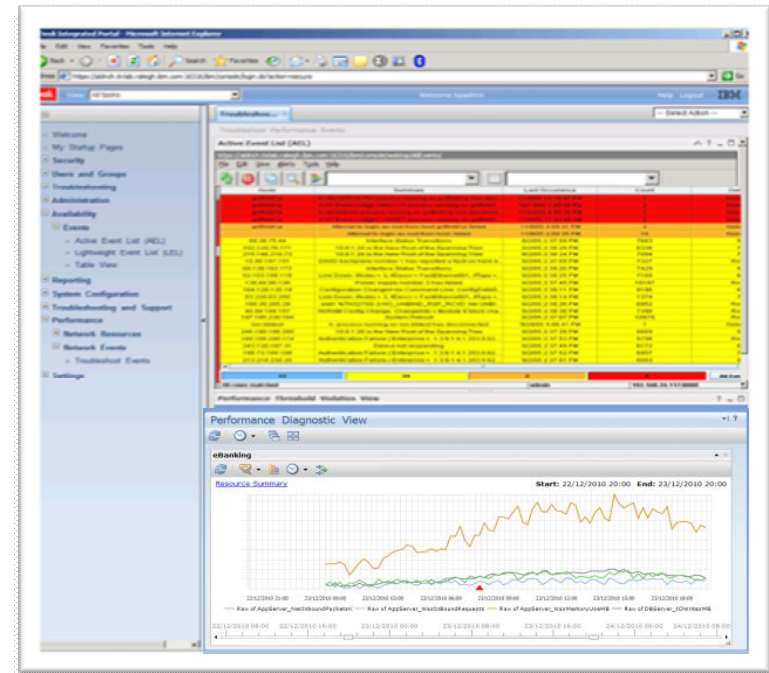
Centralized control and real-time visibility of the end-to-end supply chain for IBM supply chain – reducing inventory

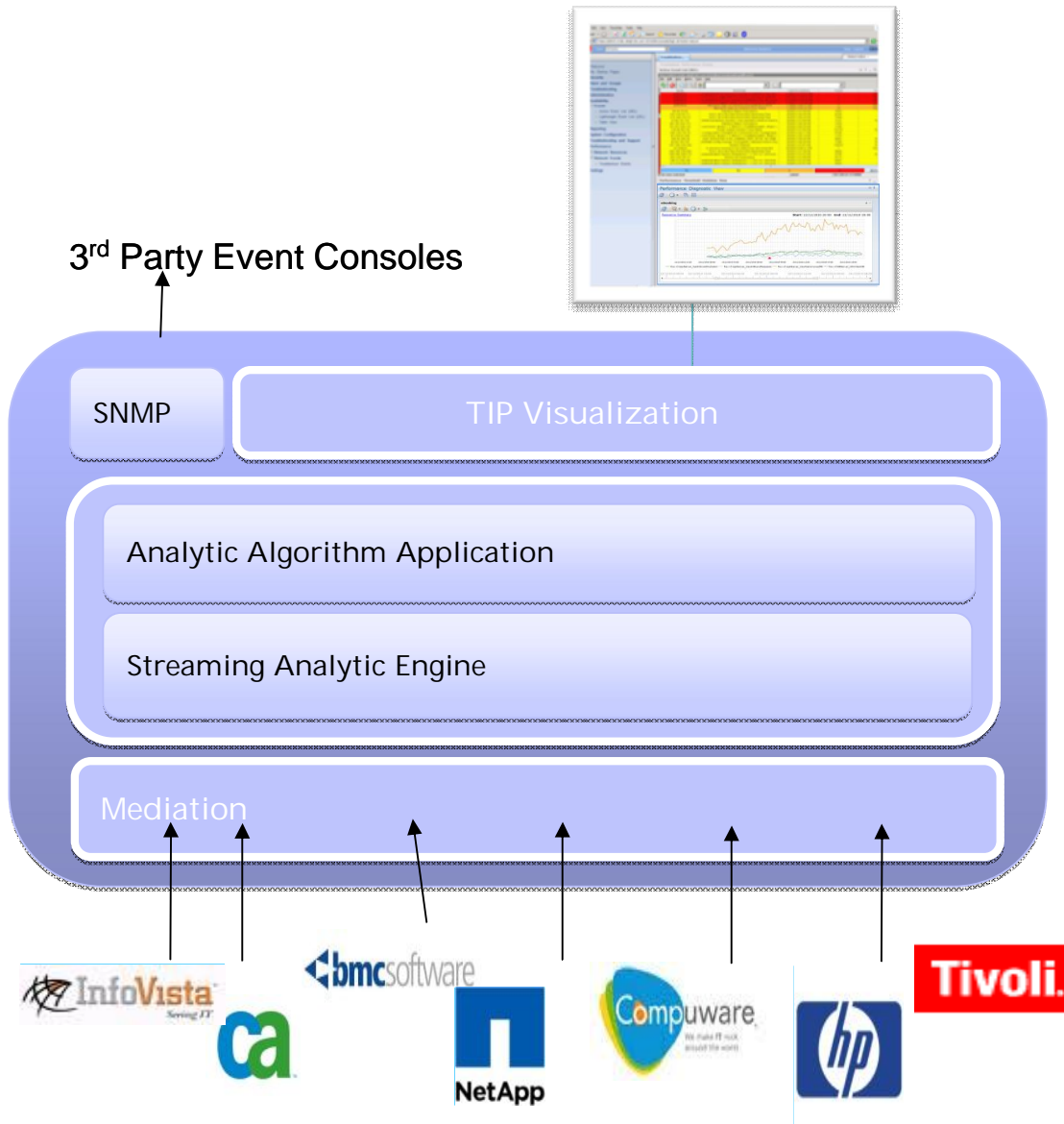


# Coming Soon: Tivoli Analytics for Service Performance

*Proactive and self-learning performance and bsm intelligence*

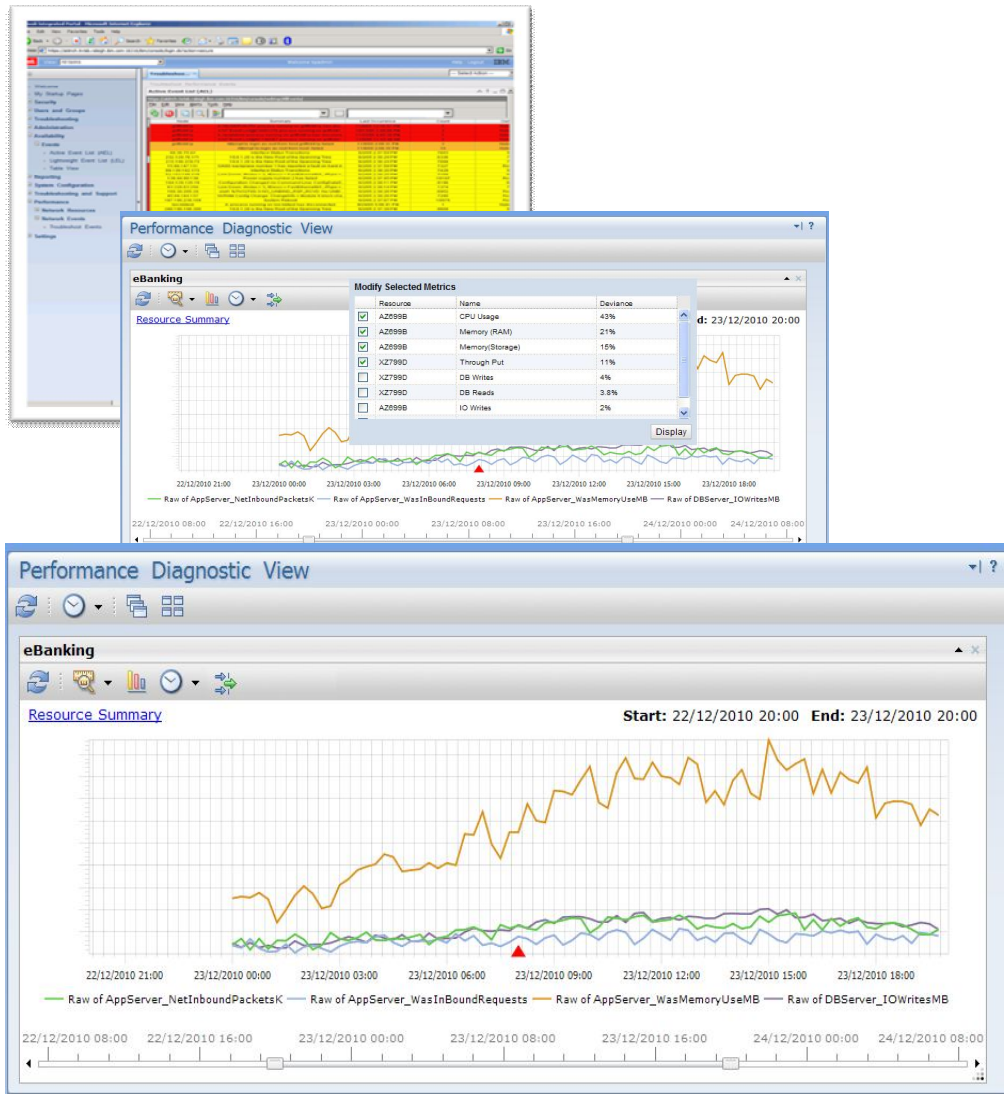
- Real-time analytics for detecting and avoiding service disruption.
- Uses advanced multivariate analytic algorithms; providing all the advantages mentioned previously.
- Correlates metric across multiple domains and heterogeneous data sources.
- Ultra scalable; analyzing massive volumes of metrics in a single multivariate instance.
- Leverages key IBM analytic engines and mediation
- Works in non-Tivoli environments, as well as integrating tightly with Tivoli suite.





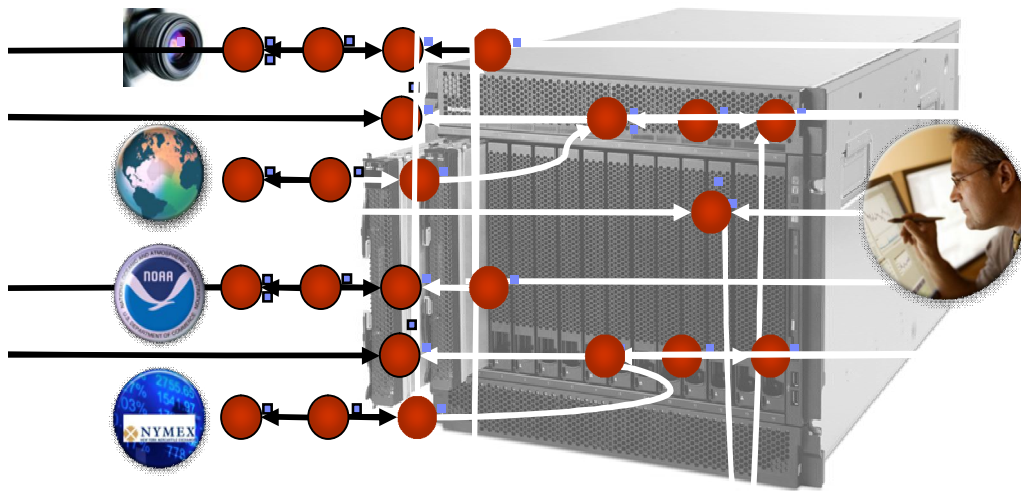
- Leverages IBM Information Management assets to fields a state-of-the-art solution:
- Highly scalable and resilient streaming analytic engine.
- Powerful analytic algorithms, combining uni & multivariate approaches, designed to leverage InfoSphere Streams engine for unlimited scalability.
- Highly scalable and flexible data mediation layer providing turn-key integrations and easily extendable capabilities.
- TIP based, native visualisation.
- SNMP and Netcool/Omnibus native predictive alerts

# Embedded Analytic Visualization:



- Modular design plugs into Tivoli environment or installs independently, quickly accepting data from any source (including Tivoli products of course)
- TIP based user & security framework.
- TIP based native WEB 2.0 visualisation
- Multiple metric chart overlay.
- Toggle display of individual metrics.
- See correlated metrics and relationships.
- Out of the Box integration with Tivoli Netcool/OMNIBus event management console.
- Easily linked to any event system that receives SNMP traps and supports HTML Launch in Context

# High Performance Streaming Engine

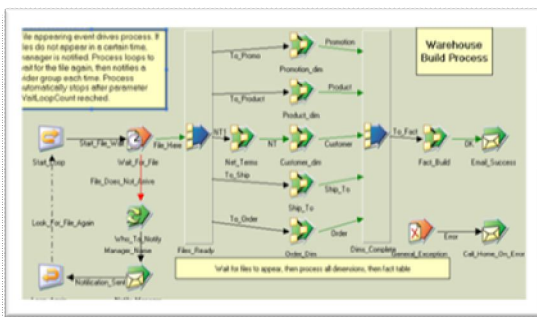
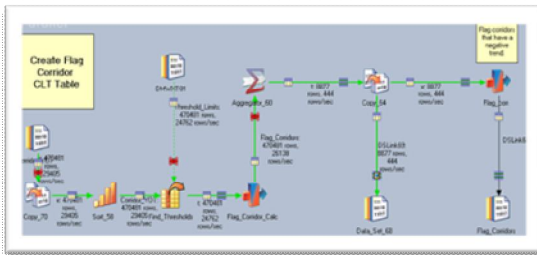
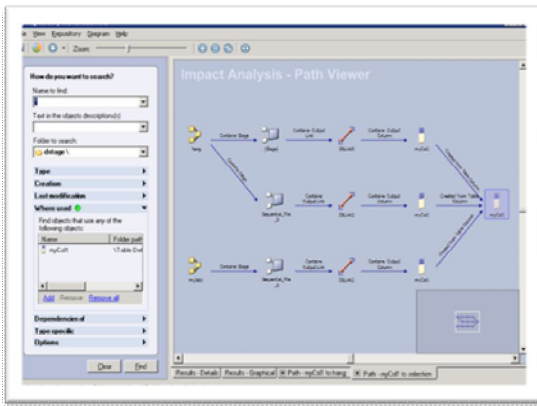


- Proven in the most unforgiving high volume low latency environments – processing 5 Million events/second with 150ms average latency
- Also deployed in finance, defence and security applications world-wide
- Core product of IBM's Smarter Planet strategy

High performance and scalability:

- Simplifies deployment setup (no splitting service metrics across multiple multivariate instances).
- Reduces human “guesswork” on which metrics to ignore or analyse
- By evaluating many metrics, the maximum value of multivariate analytics is gained.
- Allows for continuous learning configuration; one instance learning, one running; always adapting to dynamic environments.

# Under the covers: Market Leading Mediation



- Market leading mediation software, used in thousands of accounts
- Proven rapid integration with new data sources
- Platform Productivity & Collaboration (Tooling & Metadata, Reuse)
- Performance & Scalability (True Parallel Pipelining & Partitioning, Seamless Grid Support)
- Large framework of connectors available to make new integrations;
- Turn-key integrations to common performance monitoring suites...



# Large Framework of Connectors:



## RDBMS

DB2 (on Z, I, P or X series)  
Oracle  
Informix (IDS and XPS)  
Ingres  
Netezza  
Progress  
RDB  
RedBrick  
SQL/DS  
SQL Server  
Sybase (ASE & IQ)  
Teradata  
Universe  
UniData  
NonStop SQL  
InfoSphere Federation Server  
InfoSphere Classic Federation  
And more.....

## General Access

Sequential File  
Complex Flat File  
File Set  
Data Set  
Named Pipe  
iWay  
FTP  
SFTP  
Compressed / Encoded Data  
External Command Call  
Parallel/wrapped 3rd party apps  
EMC InfoMover  
Web logs

Email

## Enterprise Applications

JDE/PeopleSoft OneWorld  
Oracle Applications  
PeopleSoft  
SAS  
SAP BW  
SAP R/3  
Siebel  
Ariba  
Manugistics  
I2  
Etc...

## Standards & Real Time

WebSphere MQ  
Java Messaging Services (JMS)  
Java  
XML & XSL-T  
EBXML  
Web Services (SOAP)  
Enterprise Java Beans (EJB)  
EDI  
FIX  
SWIFT  
HIPAA

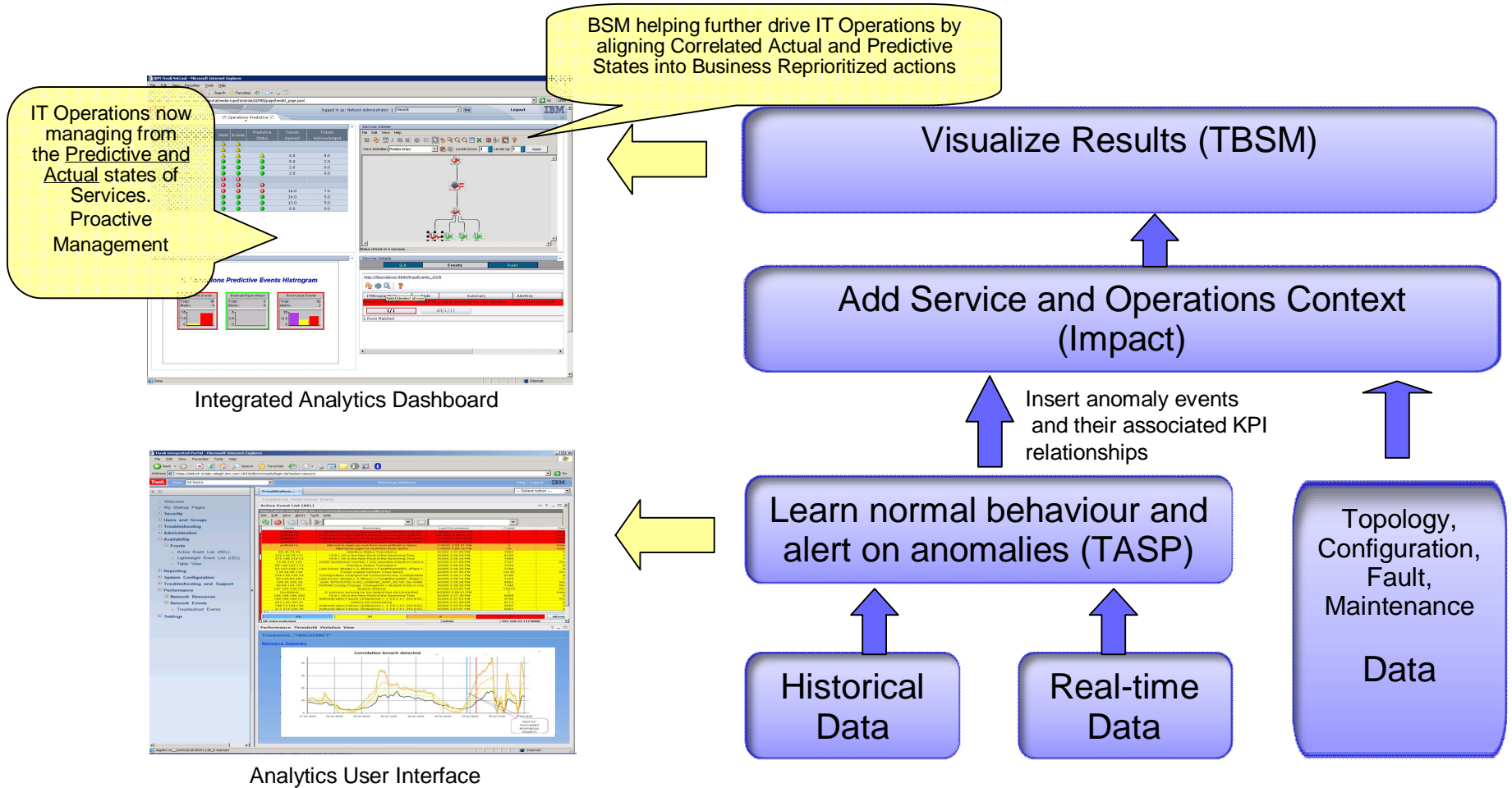
## CDC

DB2 (on Z, I, P, X series)  
Oracle  
SQL Server  
Sybase  
Informix  
IMS  
VSAM  
ADABAS  
IDMS  
Datacom

## Legacy

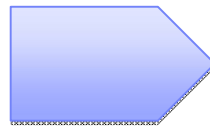
Allbase/SQL  
C-ISAM  
D-ISAM  
Datacom/DB  
DS Mumps  
Enscribe  
Essbase  
FOCUS  
IDMS/SQL  
ImageSQL  
Infoman  
KSAM  
M204  
MS Analysis  
Nomad  
Nucleus  
RMS S2000  
Supra  
TOTAL  
TurbolImage  
Unify  
And many more....

# Present Analytics Anomalies in Context



*Tivoli's solutions allows you see anomalous conditions prioritized for business impact associated with other environmental data, such as faults, configurations changes, maintenance activities, etc...*

- Learns normal operational behaviour, including how metrics behave together.
- Identifies problems before you know where to look for them (catch them the first time instead of the second)
- Accurately identifies problems, and reduces expensive and time consuming false alerts.
- Provides maximum warning of service impact, deterioration or outage.
- Detects service impacts that are not identifiable by fixed thresholds alone.
- Assists with root cause analysis by indicating most offending metrics.



- Reduce manual analysis and diagnostic processes.
- Get the best from your monitoring investments, by detecting emerging problems that would otherwise go missed.
- Reduce service outages by moving to a proactive model that minimizes service disruption.



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