

Improve Service levels with enhanced data analysis

Scenarios for analytics on System z

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Analytics is being touted as next generation of Autonomic Computing



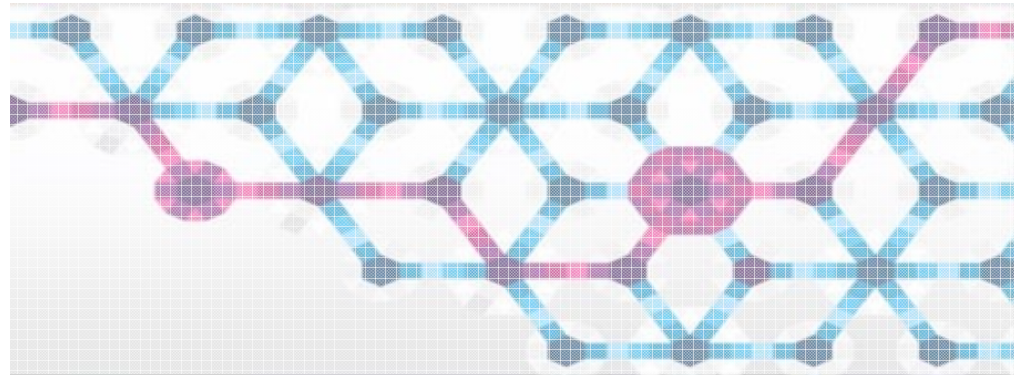
- Log Analytics requirements gaining attention and usage
 - *Processes existing log data to provide insights on problems before they happen*
 - *Vendors like Splunk emerging*
- Performance (streaming) analytics being leveraged to deal with volumes of data which are beyond human abilities
 - *Better qualities of service, advanced workload optimization, and efficient resource consolidation*
- Real-time analytics needed for decision making due to constantly changing environment
 - *Requires automation with intelligence*



Analytics has become a major driver for IBM, including acquiring a number of key companies



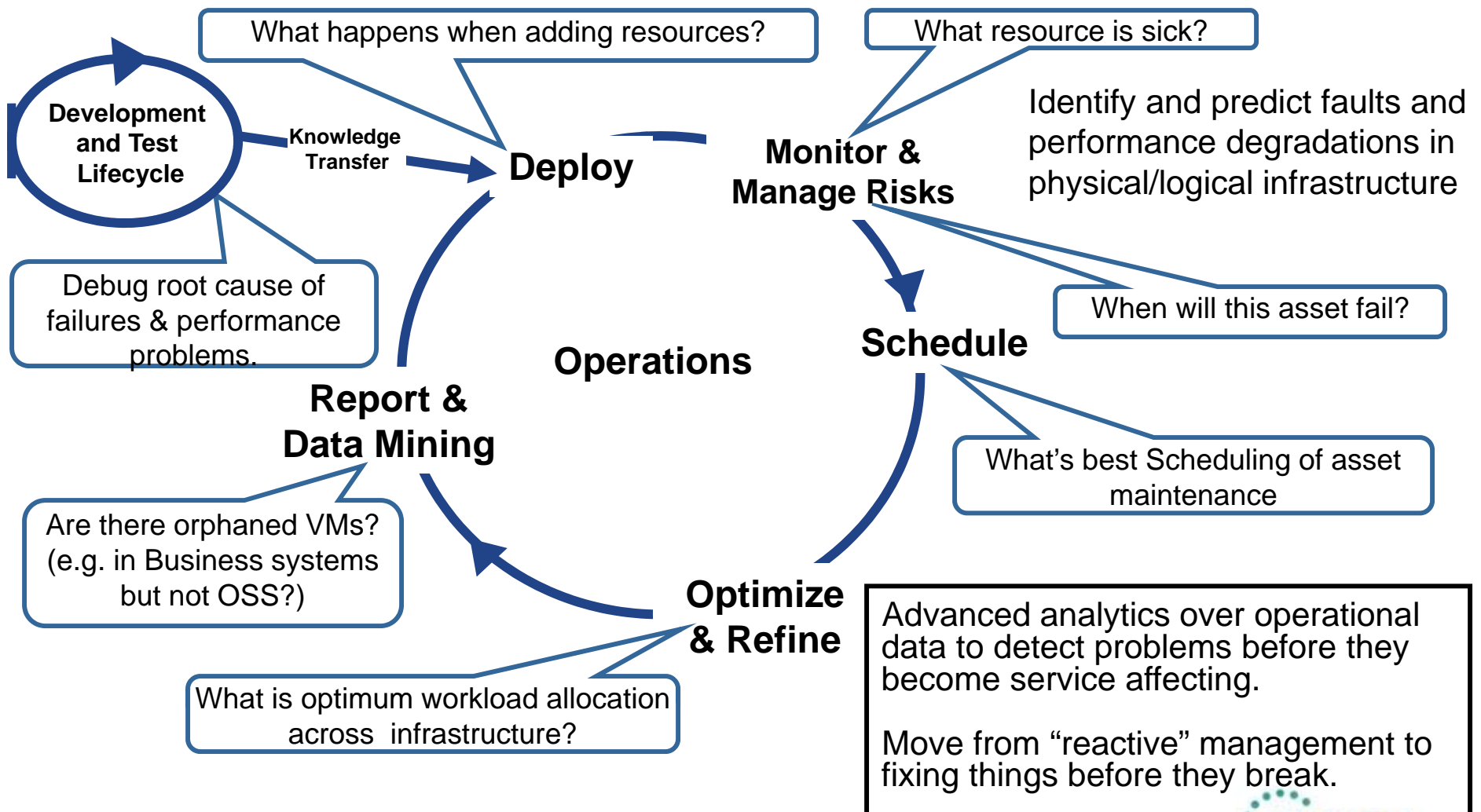
- why is this happening
- what if these trends continue
- what will happen next (that is, predict)
- what is the best that can happen (that is, optimize)



IBM is driving the future of integrated analytics through organic development, acquisitions and our strategic partnerships



Analytics can address a large number operational areas to reduce risk and decrease costs



Operations challenge: Balancing need to manage more with improved service levels & lower costs



“..multi-dimensional relationships between dynamic infrastructure and changing business services are too complex for IT staff to continue reacting to event storms and constantly tweaking static monitoring thresholds.” *

* Source: PNA, 2008

“40% of unplanned downtime due to operator error” **

** Source: Gartner, March 2009

Challenge:

- Create and maintain increasing numbers of thresholds and situations in constantly changing IT environment.
- Minimize number of alerts that operators must handle

Service Assurance Analytics approach:

Intelligent or ‘Predictive Events’ that result from speeding ability to detect abnormal trends before end users and mission critical applications impacted

Predictive Analytics enable IT organizations to move from reactive to proactive management



"Analytics leverage data in a particular functional process (or application) to enable context-specific insight that is actionable." - Gartner

Forecasting

Move sensing and alerting, and eventually actions earlier

Anomaly Detection

- Advance warning of service impact, deterioration or outage
- Realistic service baselines
- Avoidance of expensive and time-consuming false alerts
- Detection of service impacts not identified by fixed thresholds alone
- Swifter diagnosis of events and patterns
- Identification of underlying root cause to implement fixes

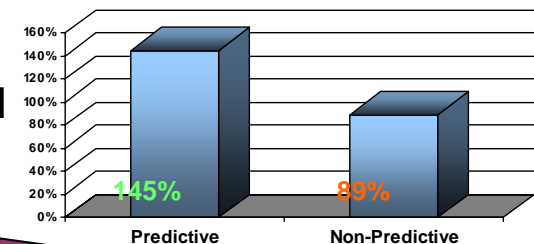
Dynamic Thresholding

IDC study: Predictive analytics initiatives show an average ROI of **145%**, in comparison to **89%** for non-predictive analytics*

Forward Trending

"After we fix the problem, then we set another threshold"

"I'd like 30 minutes warning to know when my user experience is going to deteriorate"



* Source: "Predictive Analytics and ROI: Lessons from IDC's Financial Impact Study" paper, Henry D. Morris

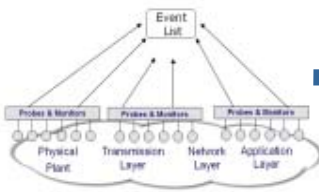
Analytics has become more tightly linked to Operational Monitoring and problem resolution



Move from just monitoring to predicting and resolving before problems become outages



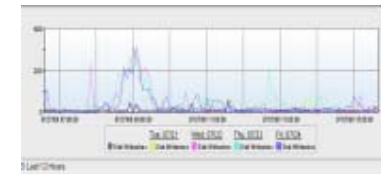
Receive trouble tickets. Fault!
React to user report



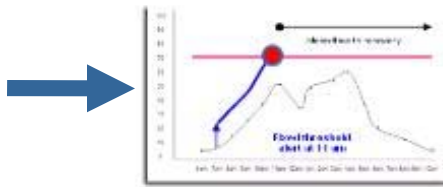
Gather alerts
React to events, before user report



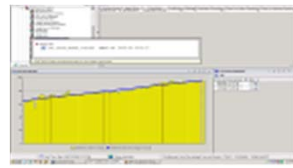
Gather & Correlate alerts
React to events, w/ improved RCA



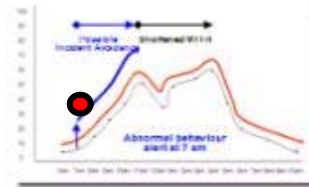
Add performance monitor
React to performance changes



Static Thresholds
Set reasonable thresholds
Create alerts when violated



Linear Forecasting
Linear prediction
One metric



Dynamic Thresholds Forecasting
Earlier Detection based on history

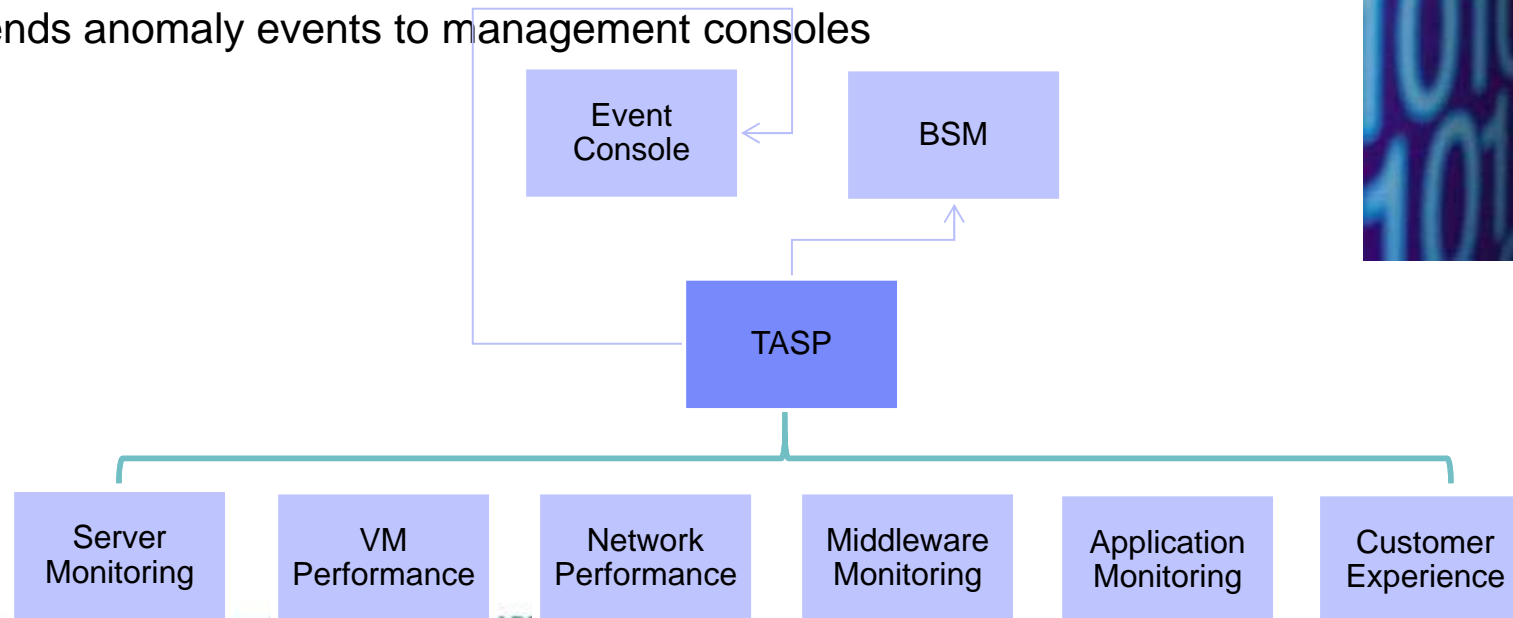


Nonlinear Forecasting
More accurate prediction of single metric

Detect problems before they impact business with Tivoli Analytics and Service Performance (TASP)



- Supplies multi-domain, agnostic analytics
 - Leverage existing monitoring systems
 - Analyzing metrics from physical and virtual environments
- Uses analytics to learn normal operational behavior across infrastructure
- Learns mathematical relationships between metrics:
 - Across physical and virtual elements of the service delivery stack,
 - Network elements, hypervisors and applications, & end user views
- Detects problems before business impacted
- Sends anomaly events to management consoles



Increase availability by replacing manual threshold management with automated TASP Analytics



Operational Benefit:

- Increased reliability
 - No more missed problems because threshold was not set or was set at suboptimal value



Financial Benefit

- Reduced labor/management cost
- Reduced number of missed problems

Factors:

- Number of resources being monitored
- Labor costs
- Number of problems due to management gaps today
- Average revenue loss due to fault

Prediction and Early detection of problems allows mitigating action before they affect service



Operational Benefit:

- Advanced warning of problems allows mitigating actions to be taken avoiding service disruption
- Early action prevents additional related problems from occurring



Financial Benefit

- Reduced revenue impact
- Reduced problem cascades

Factors:

- Number of faults
- Average time to detect today
- Average improvement in detection time with TASP
- Average revenue impact of fault

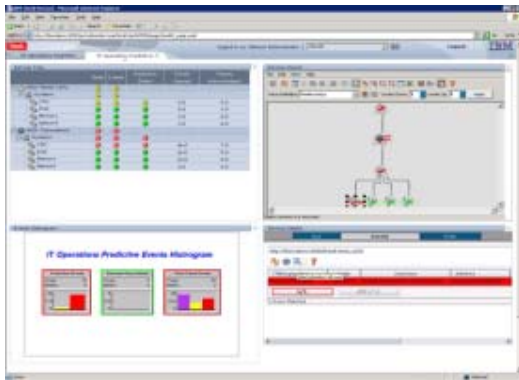
Key challenge in large z accounts addressed by analytics is “Sick but not dead”



- Relationship automatically identified between KPIs for CPU use, inbound requests and coupling I/O
- CPU usage rises while other metrics are stable. Contention!
- Alert at red triangle; operator action to recycle server shortly afterward

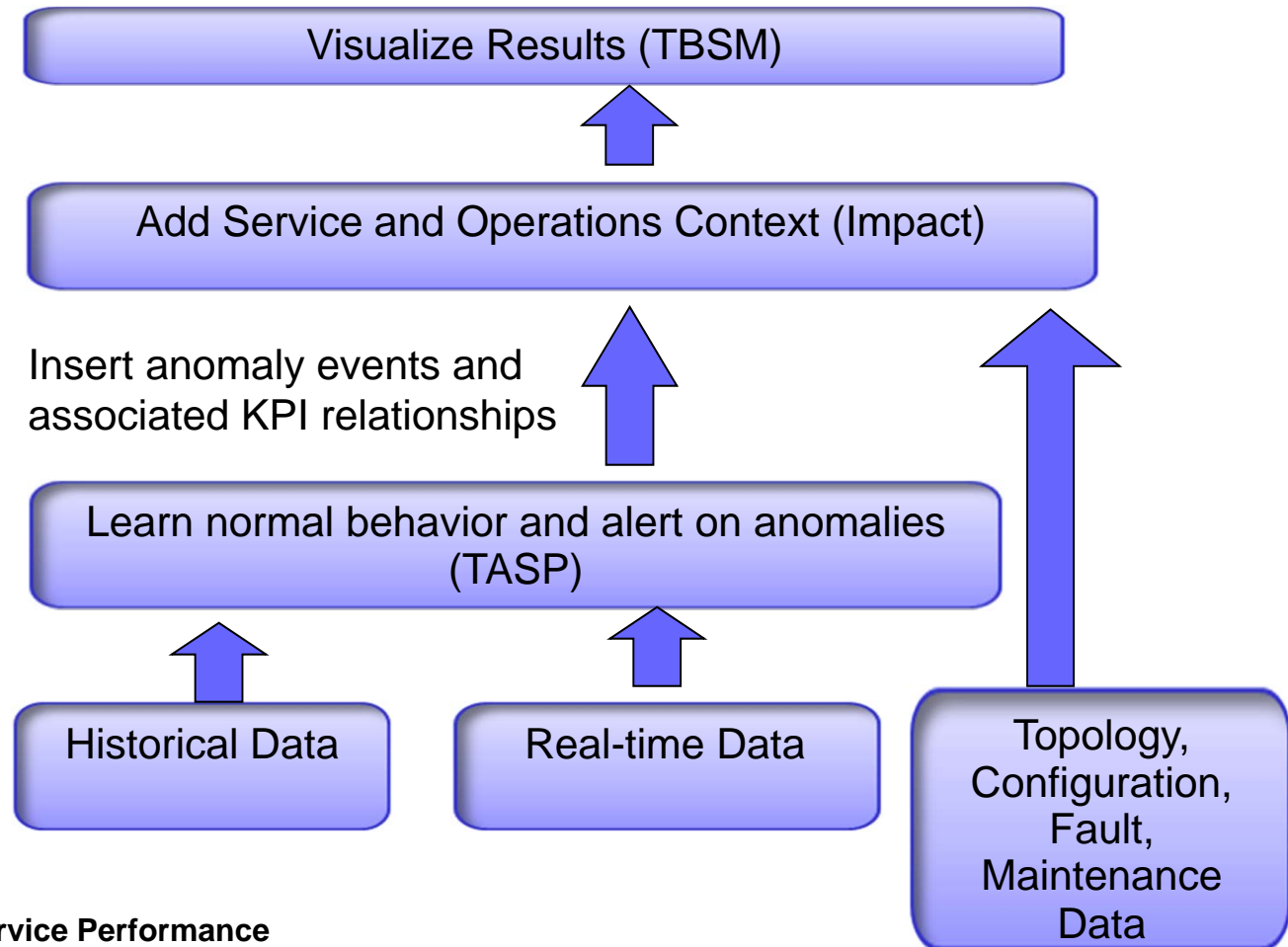


TASP works with business focused capability to provide enhanced operational visibility



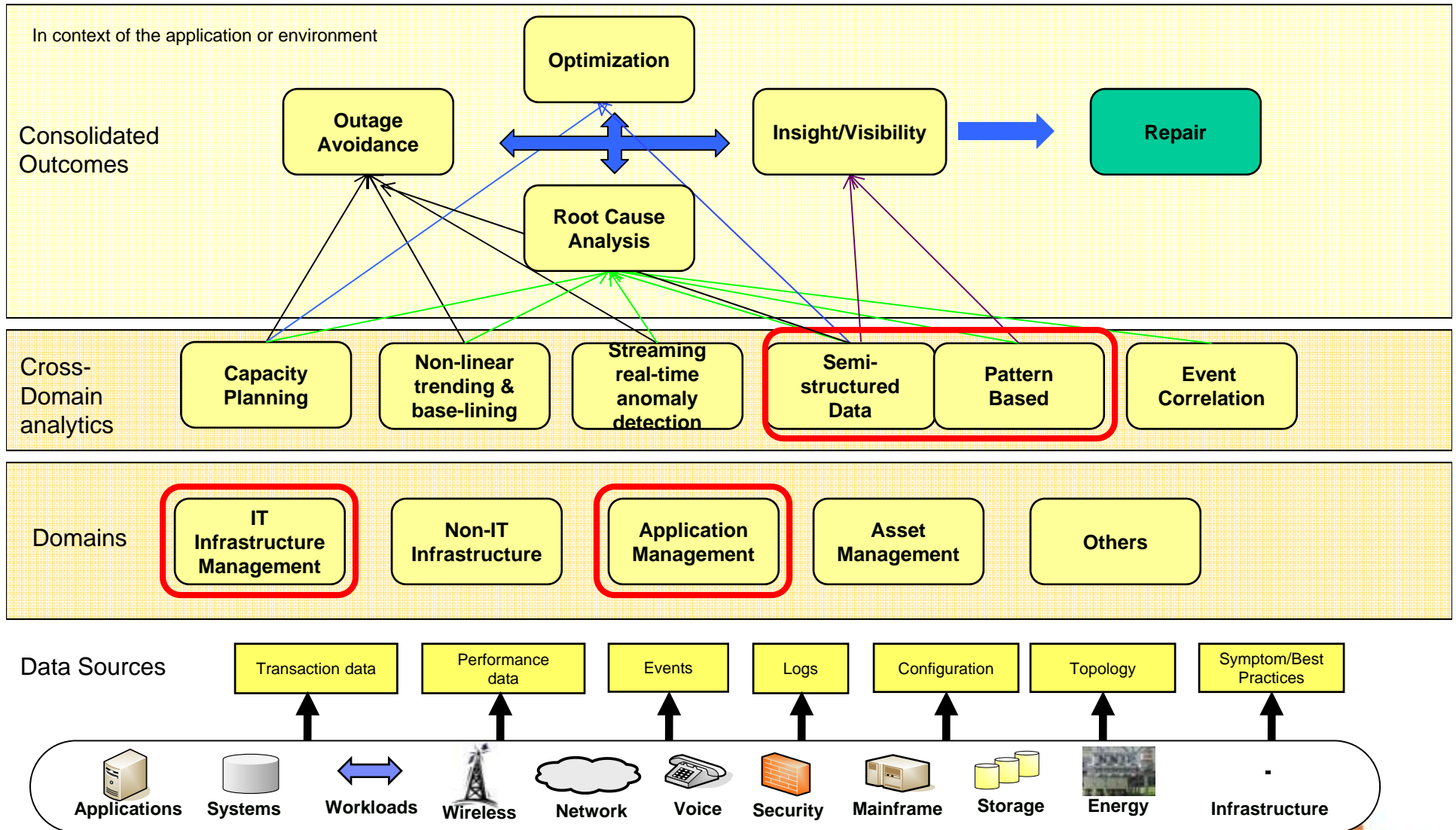
Tivoli's solutions:

- See anomalous conditions
- Prioritized for business impact
- Associated with environmental data



TASP - Tivoli Analytics and Service Performance

Tivoli provides most complete set of operational analytics capability



Analytics products need to have certain key capabilities to provide business value



- Ability to search and index massive volumes of operational unstructured data from various sources
- Out of the box correlation with structured data to get comprehensive diagnostic capabilities.
- Reduce and bound amount of data copied and indexed – easier to budget
 - Federated access to various data sources
 - Filter at source where agents are used
- Dynamic expert advice, built from support documents, and other relevant sources for quick problem resolution.
- Continuous delivery of content developed in a community model
 - Separation of content from framework to build / deliver client, industry or scenario specific use cases
 - Notification to systems administrator



Analytics data combined and analyzed based on a number of sources



- Different options for structured, unstructured and stream data
- Log data – patterns, problems, diagnostics
 - Start with syslog in many cases
- Structured data – historical trends, placement, capacity
 - Start with SMF data, Tivoli Data Warehouse
- Trends which can be detected better with analytics
 - Deviation from steady state (requires learning process)
 - Anomalies in input stream pattern (e.g. DOS attack)
 - Combination of performance and event data (e.g. Sick But Not Dead)



Analytics can provide knowledge and value to many roles within organizations



Developer

Debugs programs in distributed environment and using log messages

Subject Matter Expert

Uses expert knowledge to diagnose problems in a domain, for e.g. WebSphere performance tuning expert

Operations

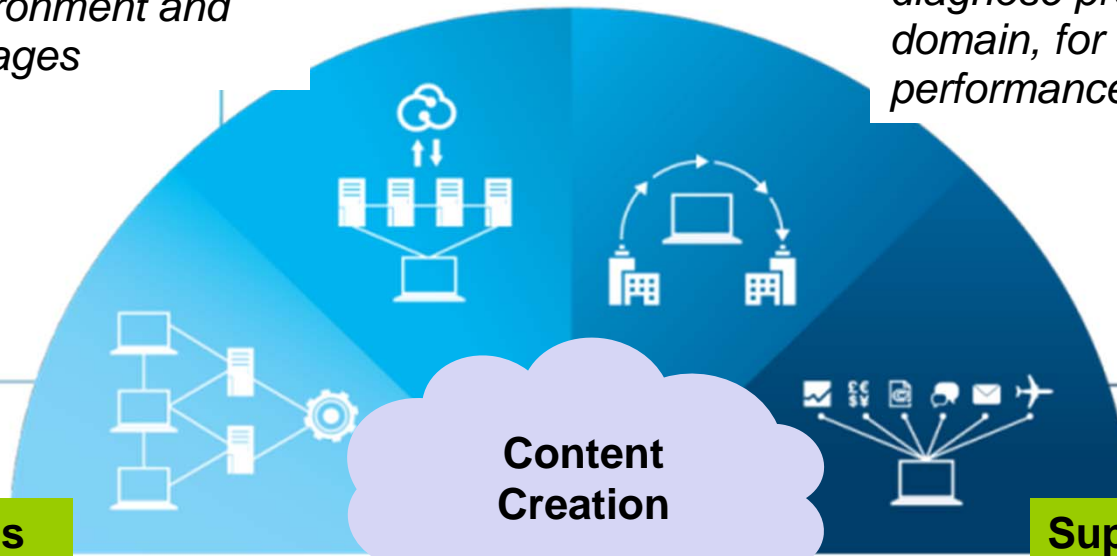
Macro level problem diagnosis using existing domain knowledge built by SMEs

Content Creation

Build content using help from developers and SMEs and available support documentation

Support Engineer

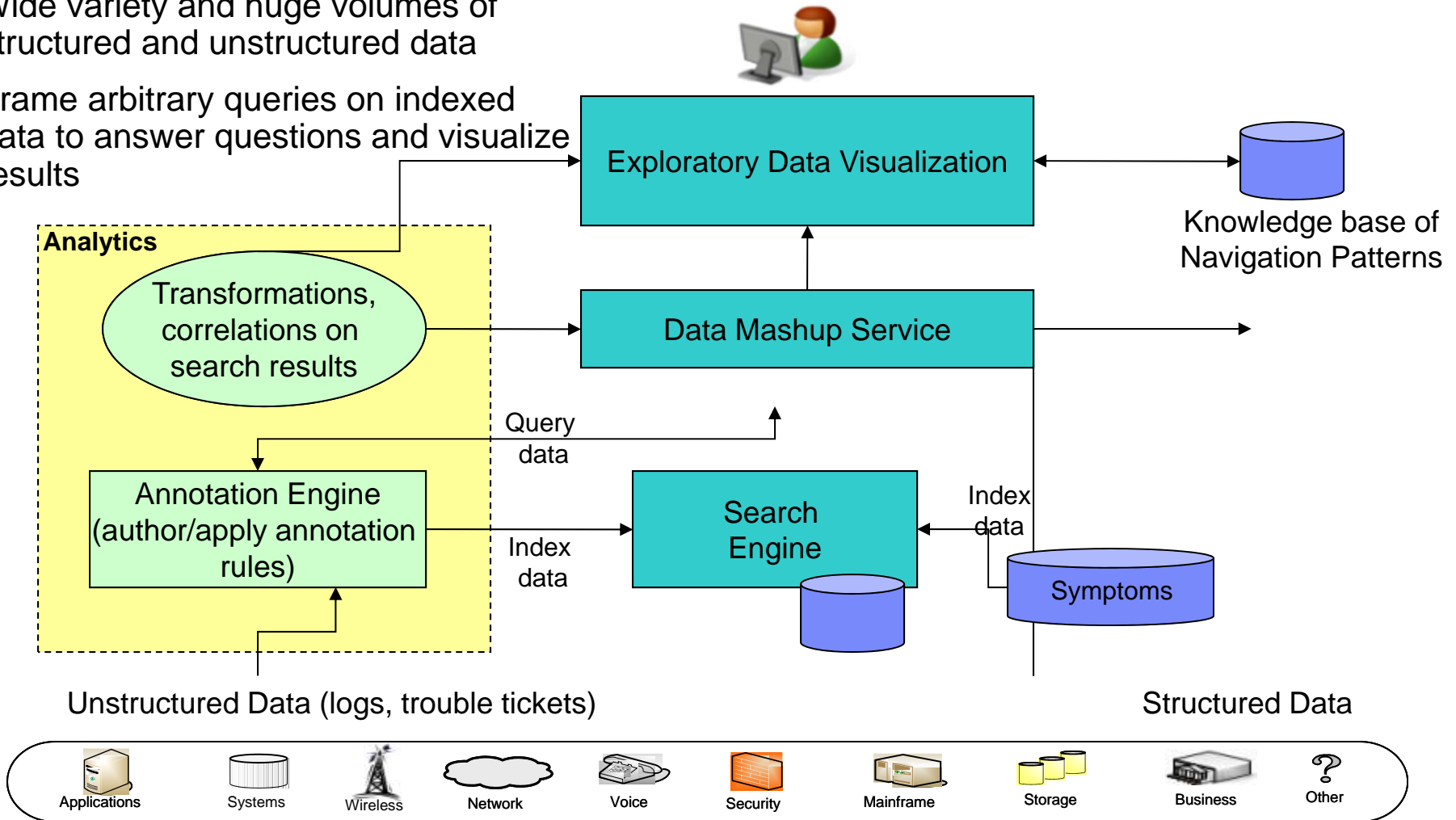
Handed specific problem from the operations team



How analytics systems are organized impacts ability to quickly find and fix problems



- Wide variety and huge volumes of structured and unstructured data
- Frame arbitrary queries on indexed data to answer questions and visualize results



Analytics content can be obtained from a number of manual and automated sources



Root cause analysis

- (a) Operations wants to manually search logs for patterns
- (b) Operations wants to search logs based on key data
 - Leveraging known structured data sources helps to narrow down and locate otherwise undetected problems in huge volumes of logs
 - Using existing topology, configuration and event data sources

Problem resolution

- Operations needs to see Expert Advice or support document links to help solve a problem observed in logs

Problem detection

- Operations or Development wants to watch for known patterns in logs
- When there is a “hit”, wants additional context from various data sources to help diagnose problem faster.



Real World Examples of where to obtain information to perform analytical analysis



- **Root Cause Analysis**

- Manually search for patterns in App Server / Database logs.
- Use event to focus on specific log entries in a time period around that event.
- Use event and topology to search specific logs within a time period to locate a error/warning category message.
- Use transaction trace to search specific App Server and DB logs during time period to show errors and warnings in context

- **Problem Resolution**

- Show doc links in Infocenter, Google, any indexed expert advice when “hits” are found in logs.

- **Problem Detection**

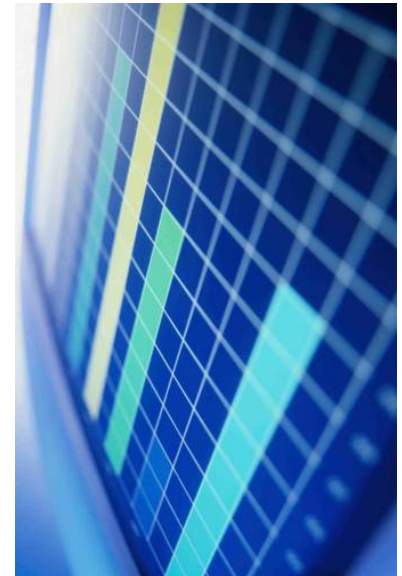
- Watch for App Server and Database error/warning messages in logs and correlate with system and middleware measurement data in Warehouse in UI to provide context.
- Application just logged a “foobar” message, show transactions that occurred in same time period.



Tivoli provides System z with significant analytics monitoring and management capability



- Log Analytics helps identify problems before they happen
 - Start identifying key data sources
- Performance (streaming) analytics lead to better qualities of service and workload/resource optimization
 - Determine who needs to see data and what decisions to make
- Real-time analytics eventual goal to support automation
 - Identify required parameters and factor in business value



Learn More:

Using Tivoli Analytics for Service Performance to improve ROI Webcast:

<http://www-01.ibm.com/software/os/systemz/telecon/oct27/>



Tivoli System z Sessions at SHARE

Monday

11:00	11207: Automating your IMSplex with System Automation for z/OS	Platinum 7
1:30	11832: What's New with Tivoli System Automation for z/OS	Elite 1
1:30	11896: Problem Solving with Consolidated Logs	Grand Salon A
3:00	11886: Improve Service Levels with Enhanced Data Analysis	Elite 1

Tuesday

9:30	11792: What's New with System z Monitoring with OMEGAMON	Elite 1
11:00	11791: Tuning Tips To Lower Costs with OMEGAMON Monitoring	Platinum 8
1:30	11900: Understanding Impact of Network on z/OS Performance	Grand Salon A

Wednesday

9:30	11835: Automated Shutdowns using either SA for z/OS or GDPS	Elite 1
Noon	12109: Maximize System Availability and Performance - Lunch & Learn	Salon 2
1:30	11479: Predictive Analytics and IT Service Management	Grand Salon E/F
1:30	11899: Top 10 Tips for Network Perf. Monitoring w/ OMEGAMON	Platinum 9
4:30	11836: Save z/OS Software License Costs with TADz	Elite 1

Thursday

8:00	11887: Learn How To Implement Cloud on System z	Grand Salon E/F
9:30	11905: Using NetView for z/OS for Enterprise-Wide Mgmt and Auto	Grand Salon A
11:00	11909: Get up and running with NetView IP Management	Grand Salon A

Friday

9:30	11630: Getting Started with URM APIs for Monitoring & Discovery	Elite 1
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Thank You