Integrated platform for network management.

Tivoli/Netcool suite for Network Assurance
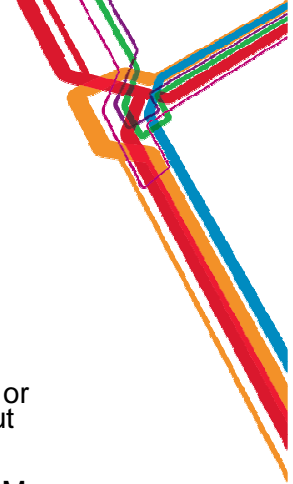
PCTY2012

Pulse Comes to You

Optimizing the World's Infrastructure
15 Maggio 2012 - Roma

Acknowledgements, disclaimers and trademarks

Agenda

- Network & Service Assurance Overview

- Fault Management Session

- Network Monitoring and Configuration Management Session

- Performance Management Session

PCTY2012

Pulse Comes to You

Agenda

- **Network & Service Assurance Overview**

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- Network Monitoring and
  Configuration Management Session

- Performance Management Session

PCTY2012

Pulse Comes to You
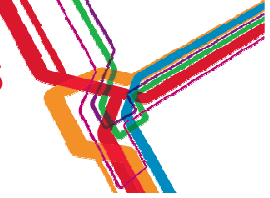
Tivoli Network and Service Assurance Portfolio – Components

Monitor service quality and prioritize work based on service impact

Portal: Business Service Management and Consolidated Operations

Automate configuration tasks, manage network change proactively, ensure compliance

Monitor KPIs, identify performance bottlenecks and remediate before they affect network service

Increase operational efficiency through event enrichment and automation

Market-leading integrated network availability management

Service Quality, SLA and Customer Experience Management

Fault/Event Management	Performance Management	Configuration Management	Enrichment & Automation

Discovery & Data Collection

Consolidated view of your entire infrastructure including configuration and dependency information

Radio Access
LTE, UMTS, GPRS,GSM, CDMA, EVDO, WiMax

Wired Access

Core
Mobile (PS,CS), Wireline, IP, NGN

VAS
Multimedia, IMS

IT Resources and Applications

…All aligned to your service management goals

Tivoli Network and Service Assurance Portfolio – Components

Portal: Business Service Management and Consolidated Operations

Tivoli Business Service Manager
Service Quality Manager
Customer Experience Manager

Tivoli Netcool Configuration Manager (formerly Intelliden)

Tivoli Netcool Performance Manager

Netcool/Impact

Service Quality, SLA and Customer Experience Management

OMNIbus and Network Manager

| Fault/Event Management | Performance Management | Configuration Management | Enrichment & Automation |

Discovery & Data Collection

Tivoli Change and Configuration Management Database

| Radio Access | Wired Access | Core | VAS | IT Resources |
| LTE, UMTS, GPRS,GSM, CDMA, EVDO, WiMax | | Mobile (PS,CS), Wireline, IP, NGN | Multimedia, IMS | and Applications |

…All aligned to <u>your</u> service management goals

Tivoli Netcool Service Assurance - Architecture

INTEGRATED VISUALIZATION

Common Reporting
Historical Reporting

Tivoli Enterprise Portal
ITM & Integrated Visualization

Tivoli Integrated Portal
• Webtop
• TBSM
• ITNM
• TNPM
Netcool & 3rd Party Content Integration

Webtop (OMNIbus Web GUI)
Web based event views

Archive DB

Security (LDAP, SSO, TIM/TAM)

OMNIbus

G Gateways

ObjectServer(s)

TSRM & 3rd Party Trouble Ticketing

Desktop

ObjectServer

TBSM/TNSQM
Business & Service Modeling

Data Fetchers
ESDAs

• Middleware
• Web Services
• Applications
• DBs
• TSRM
• etc…

DSAs

Impact
Advanced Correlation & Integration

CORRELATION

Flow Analyzer

TNPM (Wireless / Wireline)
Performance Management

Probes
• SNMP Traps
• Logs
• TCP Socket
• 3rd party APIs
• TEC
• etc…

Monitors
• HTTP
• LDAP
• SAA
• TFTP
• TCP Port
• etc…

ITM
• System
• Applications

IT Infrastructure
• Devices
• Systems & Applications
• 3rd Party EMSs / Agents
• etc…

Threshold violations

Events

Events

Synthetic Transactions

Discovery

Monitoring

Statistics, KPI, Polling

Network Manager
Network Modeling (Layer 1/2/3)
Network Root Cause Analysis

Configuration Manager
IP Configuration Management
Security & Compliance

COLLECTION

PCTY2012

Optimizing the World's Infrastructure

Agenda

- Network & Service Assurance Overview

- **Fault Management Session**

- Network Monitoring and
  Configuration Management Session
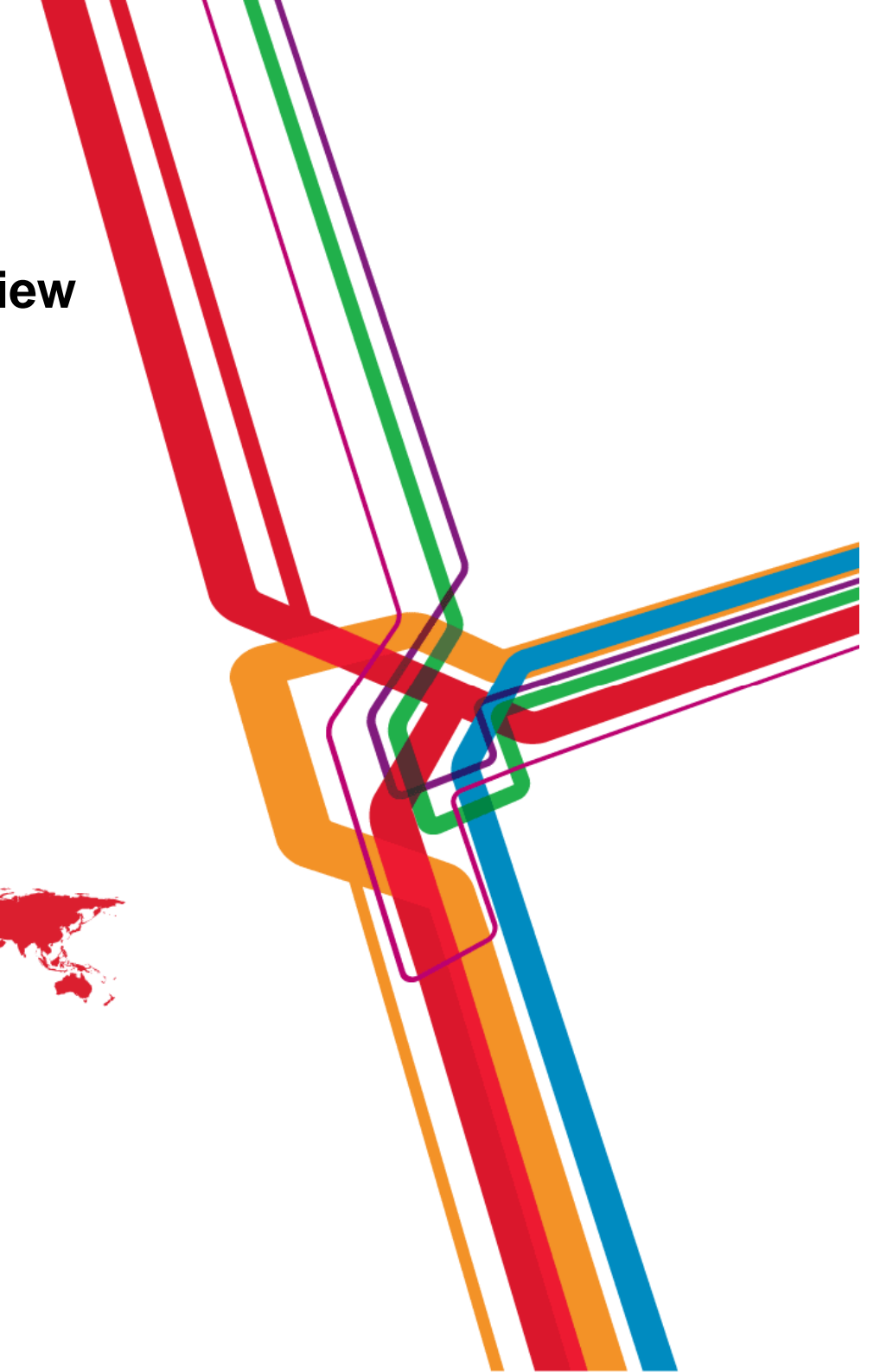
- Performance Management Session

Optimizing the
World's Infrastructure

PCTY2012

Tivoli Netcool/Omnibus

INTEGRATED VISUALIZATION
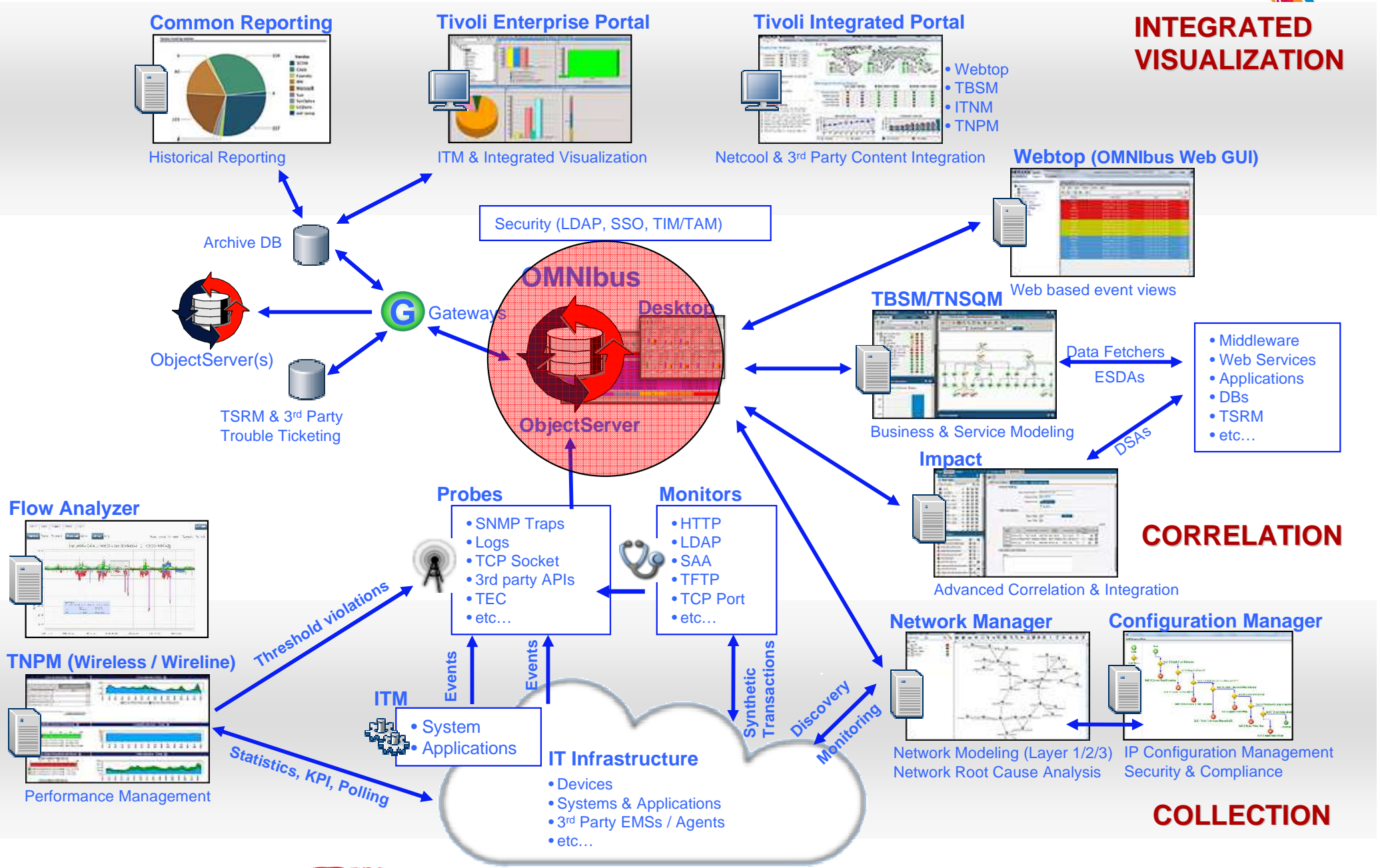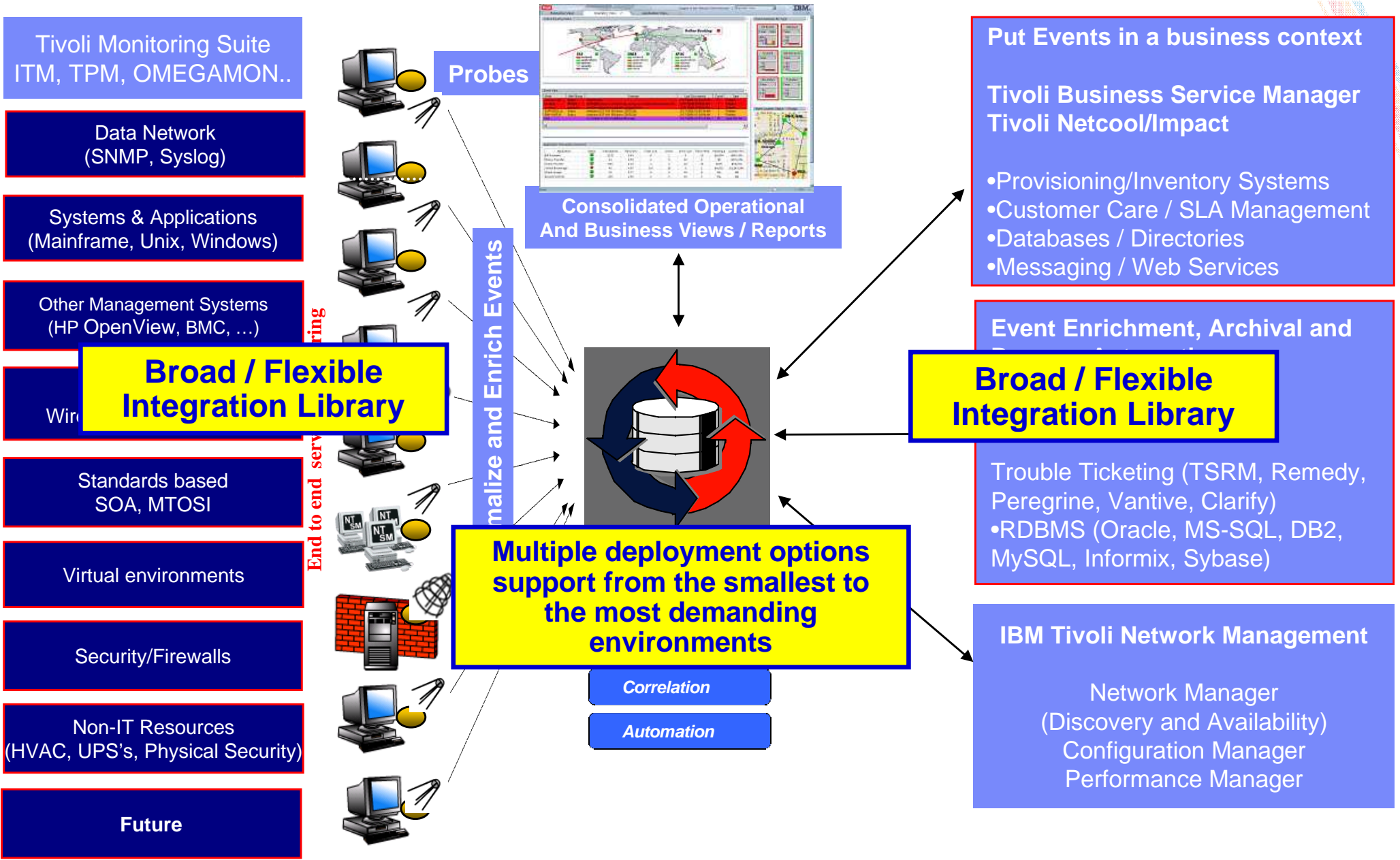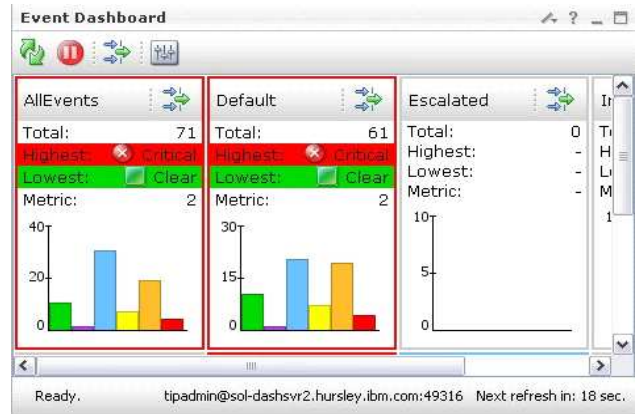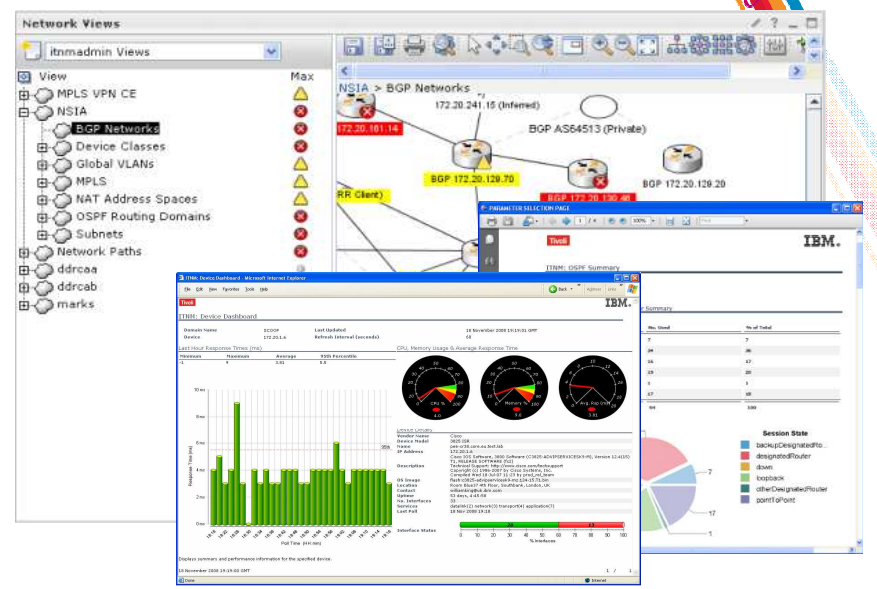
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ESDAs
DSAs

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Impact
Advanced Correlation & Integration

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Events

Events

Synthetic Transactions

Discovery
Monitoring

IT Infrastructure
• Devices
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• etc…

Network Manager
Network Modeling (Layer 1/2/3)
Network Root Cause Analysis

Configuration Manager
IP Configuration Management
Security & Compliance

COLLECTION

Tivoli Netcool/OMNIbus Solution

Tivoli Monitoring Suite
ITM, TPM, OMEGAMON..

Data Network
(SNMP, Syslog)

Systems & Applications
(Mainframe, Unix, Windows)

Other Management Systems
(HP OpenView, BMC, …)

Wir...

Standards based
SOA, MTOSI

Virtual environments

Security/Firewalls

Non-IT Resources
(HVAC, UPS's, Physical Security)

Future

Probes

**Consolidated Operational
And Business Views / Reports**

malize and Enrich Events

End to end serv...ring

Correlation

Automation

**Broad / Flexible
Integration Library**

**Multiple deployment options
support from the smallest to
the most demanding
environments**

Put Events in a business context

**Tivoli Business Service Manager
Tivoli Netcool/Impact**

•Provisioning/Inventory Systems
•Customer Care / SLA Management
•Databases / Directories
•Messaging / Web Services

Event Enrichment, Archival and ...

**Broad / Flexible
Integration Library**

Trouble Ticketing (TSRM, Remedy,
Peregrine, Vantive, Clarify)
•RDBMS (Oracle, MS-SQL, DB2,
MySQL, Informix, Sybase)

IBM Tivoli Network Management

Network Manager
(Discovery and Availability)
Configuration Manager
Performance Manager

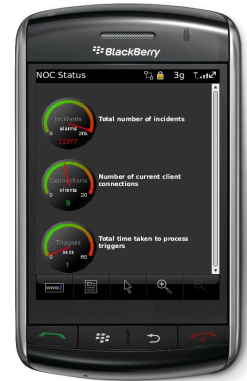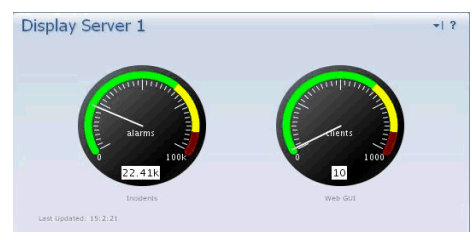# The Web GUI is more than just an Event List…

Active Event List (AEL)

Event Dashboard and Charts

+
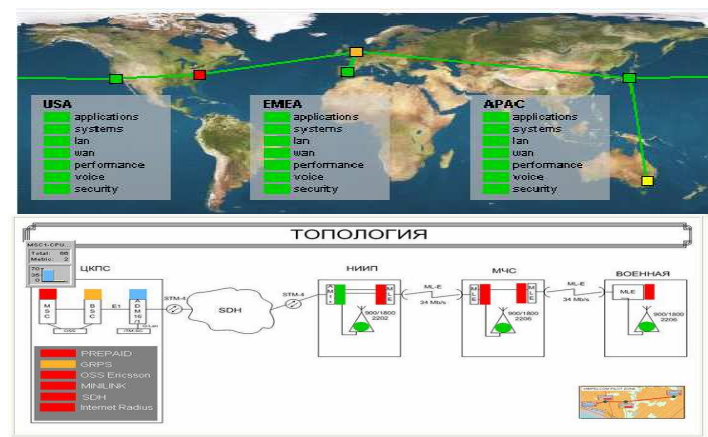
Web GUI Maps

+

Web GUI Gauges

+ a dedicated XML based API for additional flexibility (WAAPI)

Enhanced visualization with Tivoli Netcool/OMNIbus WebGUI including service views driven by event enrichment

Tivoli Integrated Portal

Common Reporting

Historical Reporting

Tivoli Enterprise Portal

ITM & Integrated Visualization

Tivoli Integrated Portal

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Netcool & 3rd Party Content Integration

INTEGRATED VISUALIZATION

Webtop (OMNIbus Web GUI)

Web based event views

Archive DB

Security (LDAP, SSO, TIM/TAM)

OMNIbus

G Gateways

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Trouble Ticketing

Desktop

ObjectServer

TBSM/TNSQM

Business & Service Modeling

Data Fetchers

ESDAs

DSAs

- Middleware
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- TSRM
- etc…

Impact

Advanced Correlation & Integration

CORRELATION

Flow Analyzer

TNPM (Wireless / Wireline)

Performance Management

Probes
- SNMP Traps
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Monitors
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- etc…

ITM
- System
- Applications

Threshold violations

Events

Events

Statistics, KPI, Polling

IT Infrastructure
- Devices
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- etc…

Synthetic Transactions

Discovery

Monitoring

Network Manager

Network Modeling (Layer 1/2/3)
Network Root Cause Analysis

Configuration Manager

IP Configuration Management
Security & Compliance
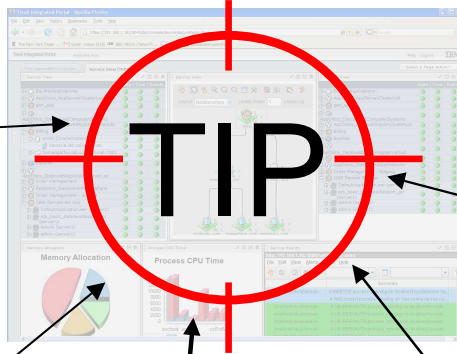
COLLECTION

Optimizing the
World's Infrastructure
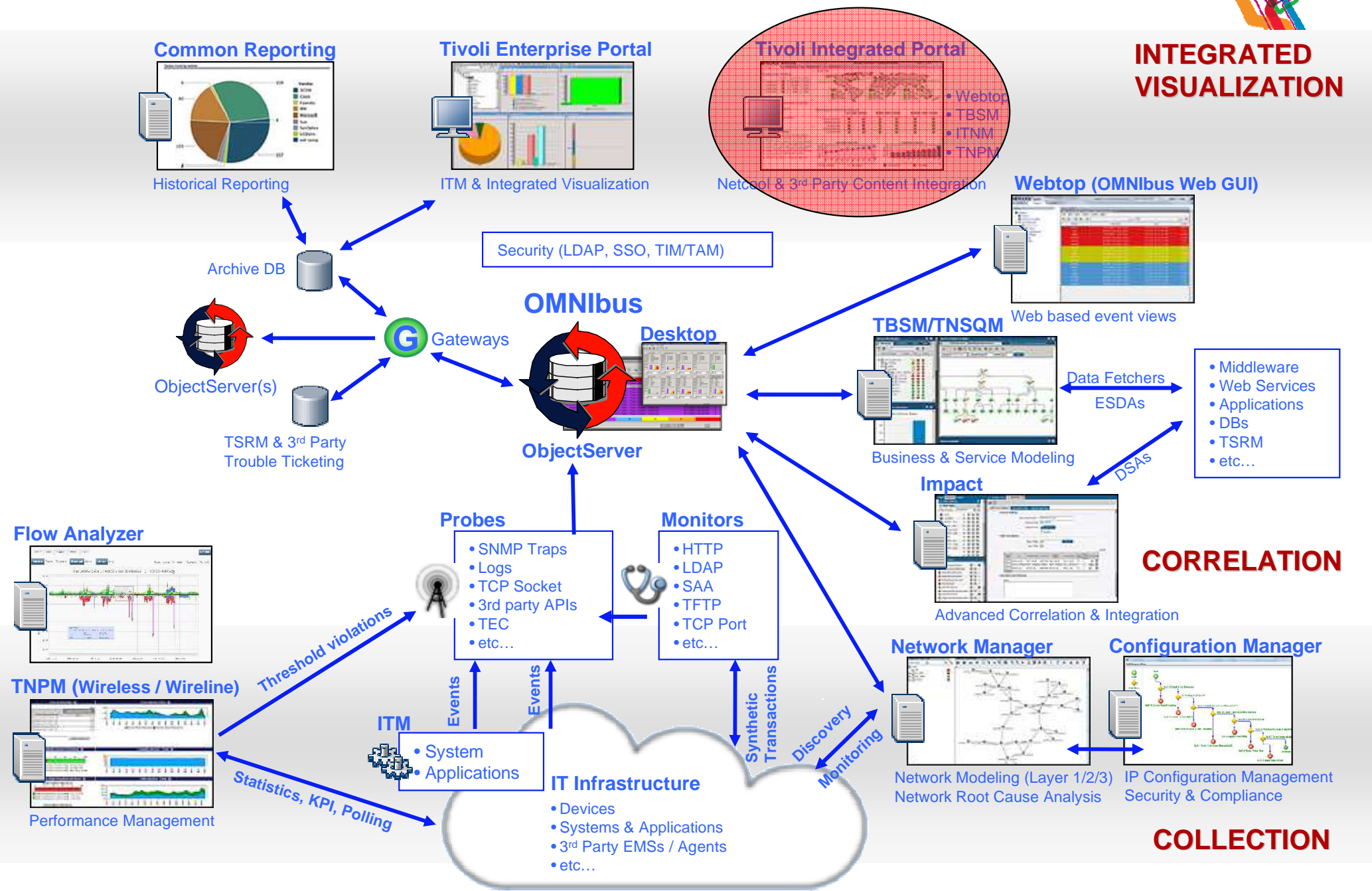
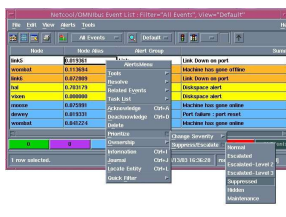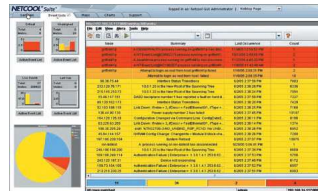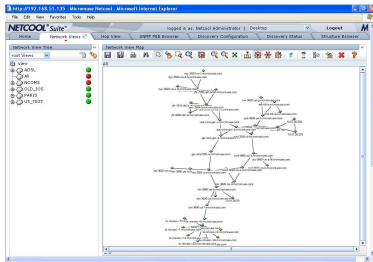# Visualization Convergence
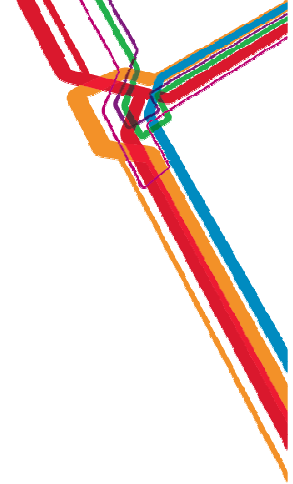
Tivoli Integrated Portal

ITM

TIP

Web Browser
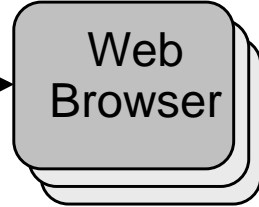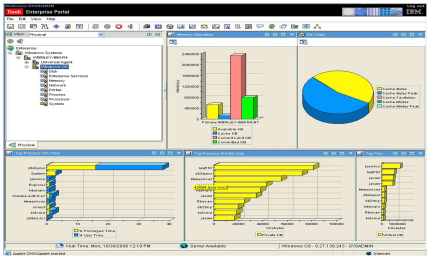
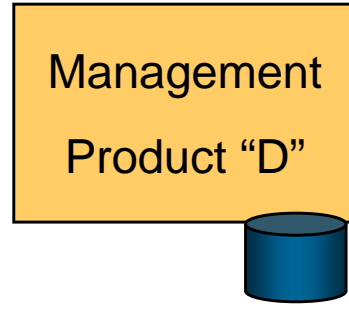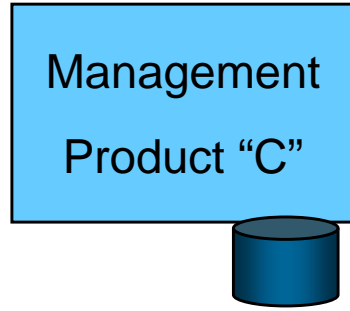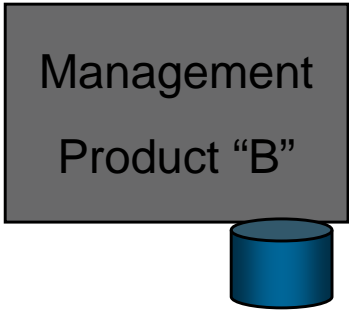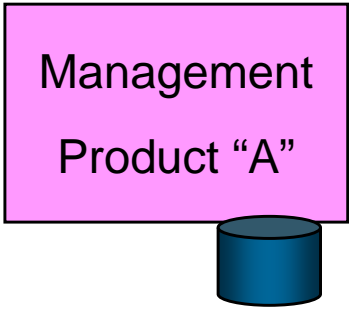TEP based

TNPM
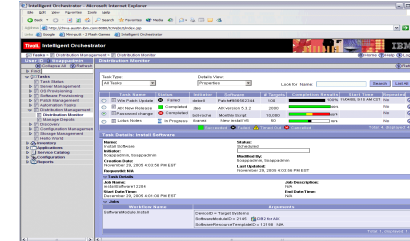
OMNIbus GUIs

ITNM

TBSM
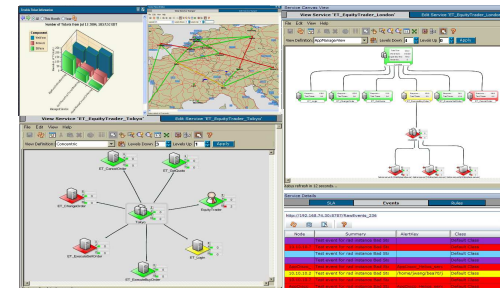
Tivoli Integrated Portal (TIP) - Web Console For Integrated User Experience

Integration through:

- Views, data and operations from multiple products interacting on a TIP page

- Actions and context shared between views and pages

- User customizable pages
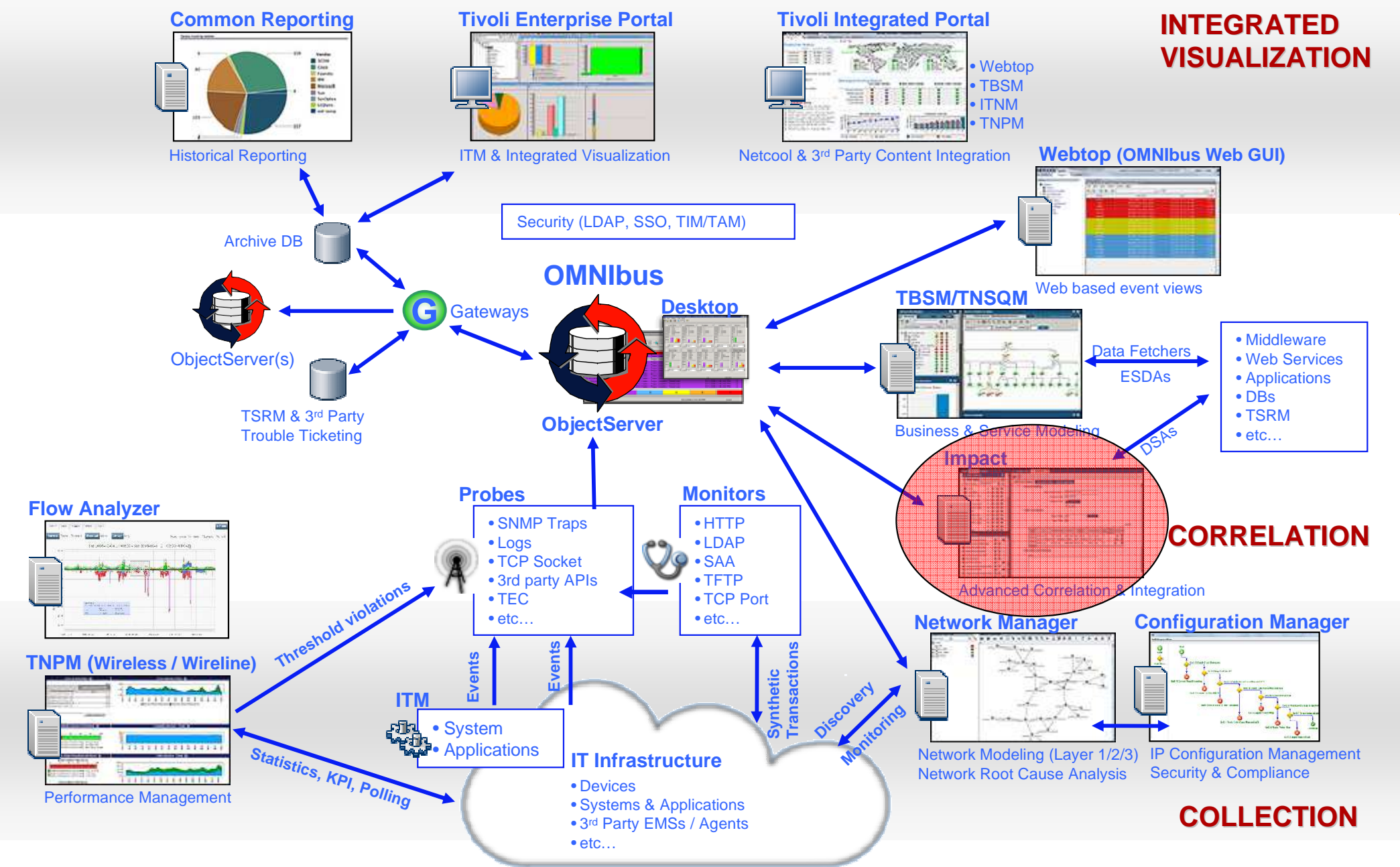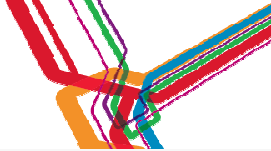
- Product boundaries eliminated for user

TIP Web Console

Management Product "A"

Management Product "B"

Management Product "C"

Management Product "D"
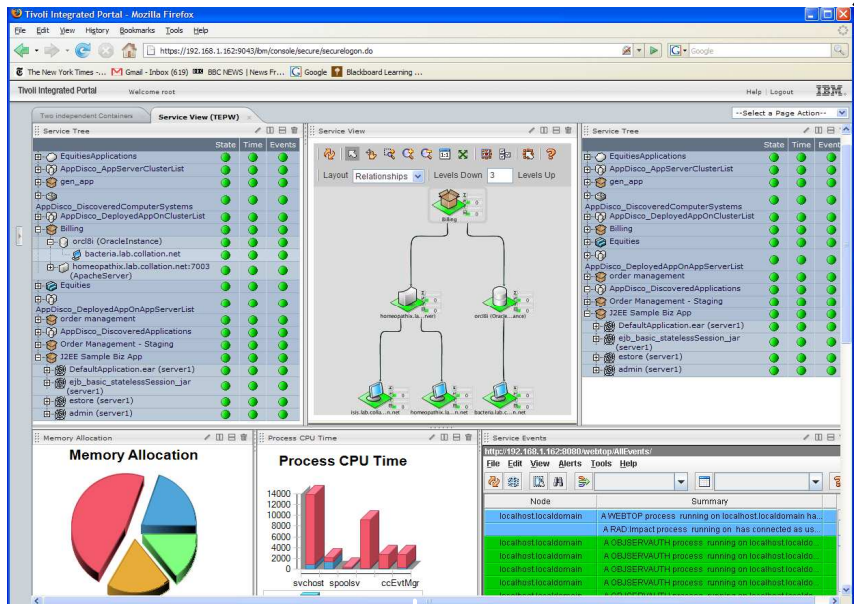
Products provide their specific functions, features and data

Netcool/Impact

Common Reporting

Historical Reporting

Tivoli Enterprise Portal

ITM & Integrated Visualization

Tivoli Integrated Portal

Netcool & 3rd Party Content Integration

- Webtop
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INTEGRATED VISUALIZATION

Archive DB

Security (LDAP, SSO, TIM/TAM)

OMNIbus

Webtop (OMNIbus Web GUI)

Web based event views

Gateways

Desktop

ObjectServer(s)

TSRM & 3rd Party
Trouble Ticketing

ObjectServer

TBSM/TNSQM

Business & Service Modeling

Data Fetchers
ESDAs

DSAs

- Middleware
- Web Services
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- TSRM
- etc…

Impact

CORRELATION

Advanced Correlation & Integration

Flow Analyzer

TNPM (Wireless / Wireline)

Performance Management

Threshold violations

Statistics, KPI, Polling

Probes
- SNMP Traps
- Logs
- TCP Socket
- 3rd party APIs
- TEC
- etc…

Monitors
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Events

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ITM
- System
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IT Infrastructure
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- etc…

Synthetic Transactions

Discovery

Monitoring

Network Manager

Network Modeling (Layer 1/2/3)
Network Root Cause Analysis

Configuration Manager

IP Configuration Management
Security & Compliance

COLLECTION
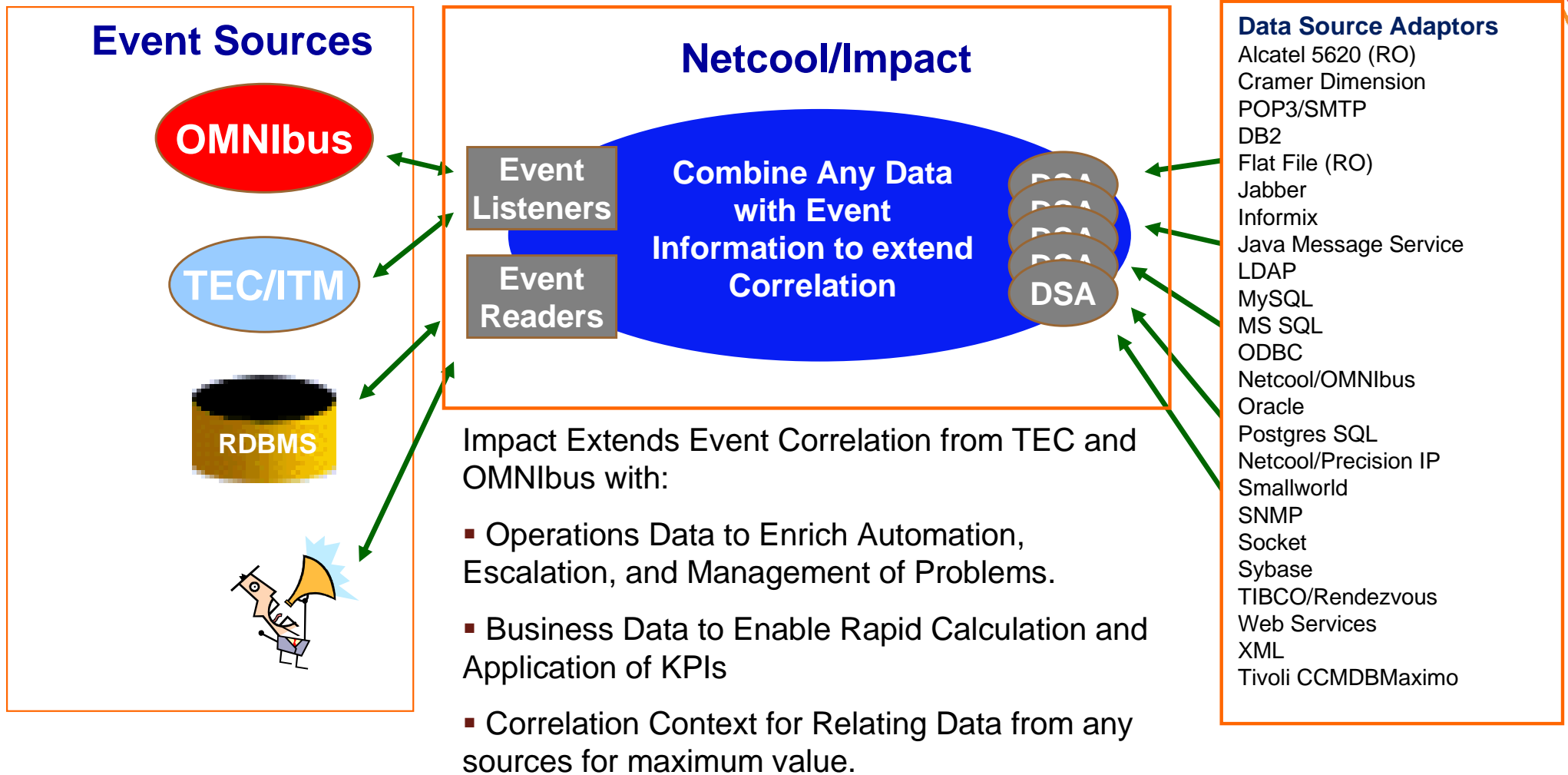
PCTY2012

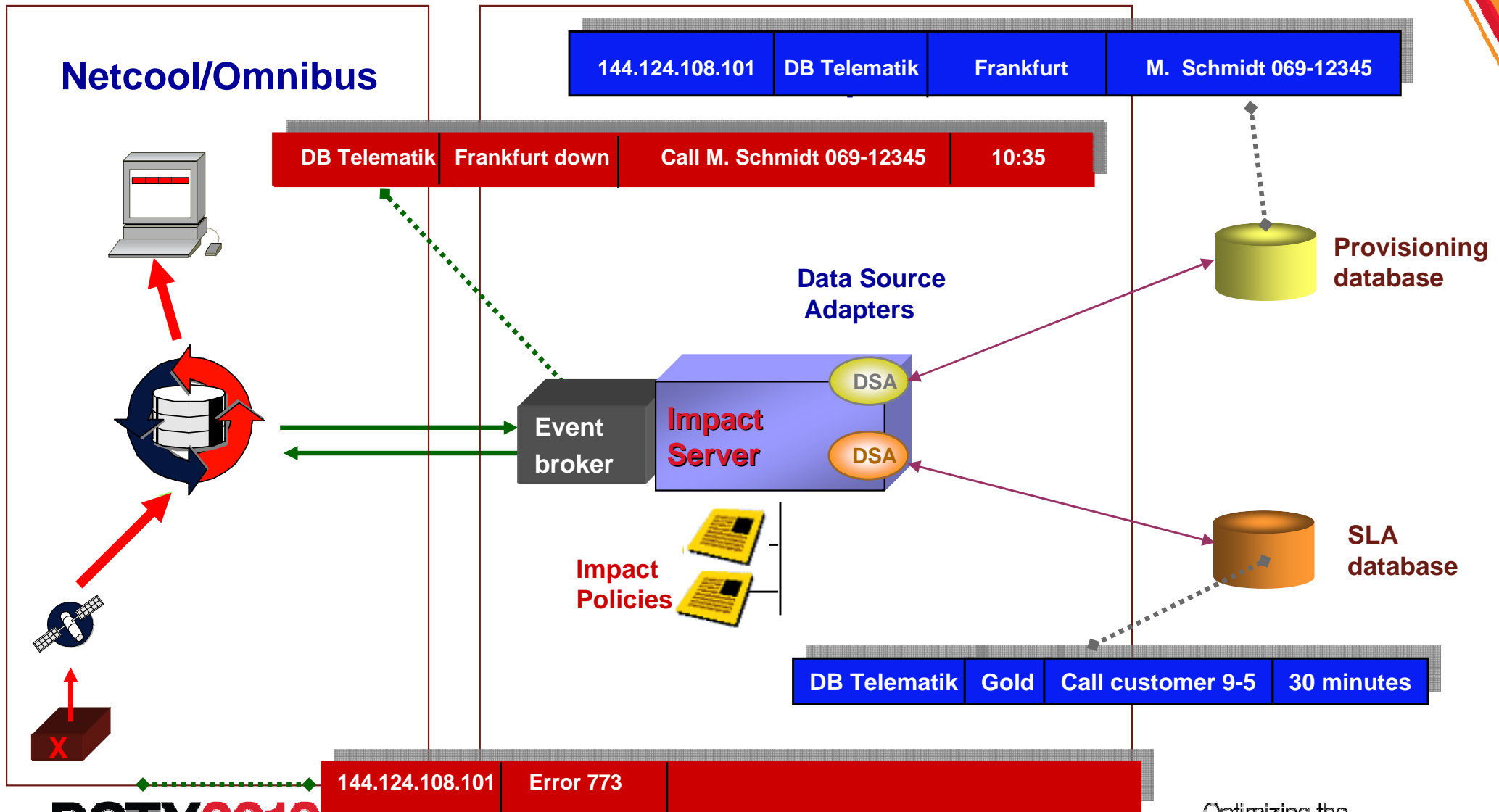Optimizing the World's Infrastructure

Typical Uses of Netcool/Impact

- Customers use Impact to process high-volume event streams and:
  - Gather additional information about an event ("enrichment")
  - Decide which events should be filtered out ("suppression")
  - Set markers in diverse data sources ("correlation")
  - Take action on devices ("auto-correction")
  - Alert staff about a high-priority condition ("notification")
  - And escalate, if none of the above actions produced the desired results ("escalation")

Netcool/Impact
Increased Correlation Value

Event Sources

OMNIbus

TEC/ITM

RDBMS

Netcool/Impact

Event Listeners

Event Readers

Combine Any Data with Event Information to extend Correlation

DSA
DSA
DSA
DSA
DSA

Data Source Adaptors
Alcatel 5620 (RO)
Cramer Dimension
POP3/SMTP
DB2
Flat File (RO)
Jabber
Informix
Java Message Service
LDAP
MySQL
MS SQL
ODBC
Netcool/OMNIbus
Oracle
Postgres SQL
Netcool/Precision IP
Smallworld
SNMP
Socket
Sybase
TIBCO/Rendezvous
Web Services
XML
Tivoli CCMDBMaximo

Impact Extends Event Correlation from TEC and OMNIbus with:

▪ Operations Data to Enrich Automation, Escalation, and Management of Problems.

▪ Business Data to Enable Rapid Calculation and Application of KPIs

▪ Correlation Context for Relating Data from any sources for maximum value.

The Event Lifecycle with Tivoli Netcool Impact

Netcool/Omnibus

144.124.108.101	DB Telematik	Frankfurt	M. Schmidt 069-12345

DB Telematik	Frankfurt down	Call M. Schmidt 069-12345	10:35

Data Source Adapters

Event broker

Impact Server

DSA

DSA

Impact Policies

Provisioning database

SLA database

DB Telematik	Gold	Call customer 9-5	30 minutes

144.124.108.101	Error 773	

X

Agenda

- Network & Service Assurance Overview

- Fault Management Session

- **Network Monitoring and Configuration Management Session**

- Performance Management Session

Optimizing the World's Infrastructure

IBM Tivoli Network Manager

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Network Manager

Network Modeling (Layer 1/2/3)
Network Root Cause Analysis

Configuration Manager

IP Configuration Management
Security & Compliance

COLLECTION

IBM Tivoli OMNIbus and Network Manager Industry-leading network availability solution

Provides the key discovery, monitoring, and root cause analysis for your network infrastructure

Scalable Flexible Network Discovery

- Layer 1, 2 and 3 network technology

- support including IPv6, MPLS and Ethernet Services

- Dynamic, always active and event driven

- Centralized Open Network Data Repository

Real time web-based Network Visualization

- Task-oriented UI helps operations staff locate, troubleshoot and resolve network problems

- Integrated fault, topology and performance views

- Launch 3rd party tools for further diagnostics

Accurate Monitoring and Root-cause Analysis

- Automatic targeting & configuration of network monitoring

- Correlation of events based upon the network connectivity

- Identification and isolation of root cause & symptom events

Unique technology advantages

- #1 Fault Management Solution fully integrated with discovery, monitoring and

- Flexible Network Discovery with broadest technology coverage

- Open standards-based Network Topology Model
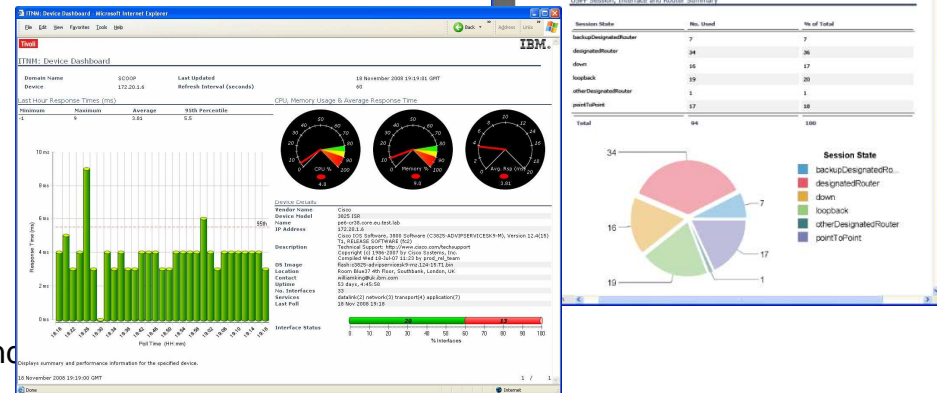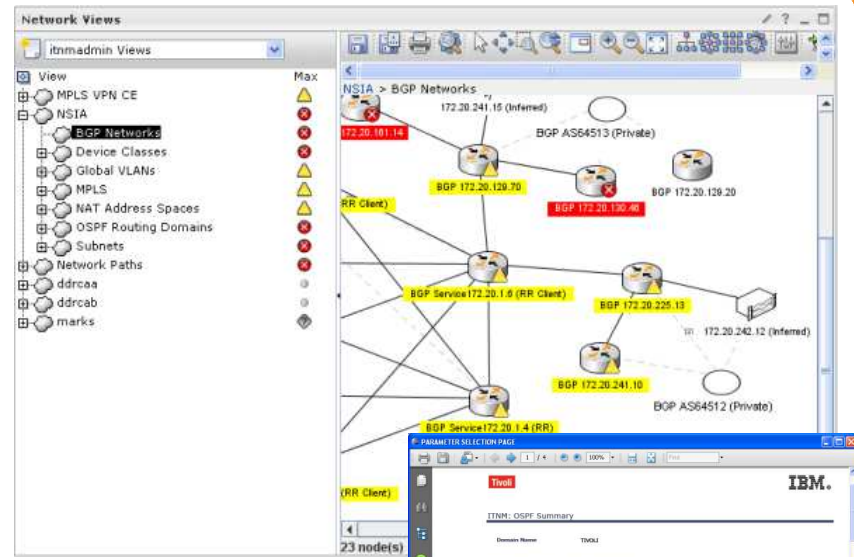
IBM Tivoli Network Manager – Root Cause Analysis

Root Cause Analysis is switched on using ITNM IP's Topology-based Event Correlation

Something fails in network – lots of devices are unreachable. No Root cause analysis is available

Root Cause Device

Symptom events showing Impacted devices
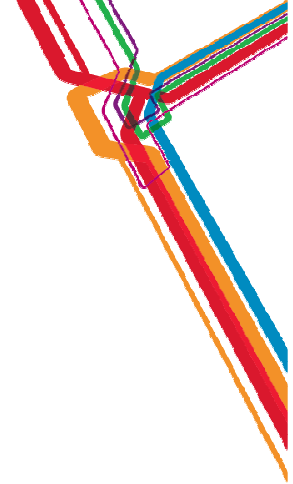
http://194.203.200.205/AllEvents/

File Edit View Alerts Tools Help

Node	Summary	CauseType	Last	
172.20.1.3	Link Down, Keepalive failed (FastEthernet1/2)	Root Cause	9/10/02 8:37:34 PM	
172.20.1.174	DVC Failed - Pings Complete: Timed out	Symptom	9/10/02 8:38:15 PM	
172.20.4.12	DVC Failed - Pings Complete: Timed out	Symptom	9/10/02 8:37:57 PM	
172.20.2.12	DVC Failed - Pings Complete: Timed out	Symptom	9/10/02 8:37:55 PM	
172.20.1.20	DVC Failed - Pings Complete: Timed out	Symptom	9/10/02 8:37:41 PM	
172.20.18.41	DVC Failed - Pings Complete: Timed out	Symptom	9/10/02 8:37:50 PM	
172.20.18.13	DVC Failed - Pings Complete: Timed out	Symptom	9/10/02 8:37:49 PM	
	s Complete: Timed out	Symptom	9/10/02 8:37:54 PM	
	s Complete: Timed out	Symptom	9/10/02 8:37:56 PM	
	s Complete: Timed out	Symptom	9/10/02 8:37:48 PM	
	s Complete: Timed out	Symptom	9/10/02 8:38:13 PM	
	s Complete: Timed out	Symptom	9/10/02 8:38:09 PM	
	s Complete: Timed out	Symptom	9/10/02 8:38:08 PM	
	s Complete: Timed out	Symptom	9/10/02 8:37:39 PM	
	s Complete: Timed out	Symptom	9/10/02 8:38:10 PM	
	s Complete: Timed out	Symptom	9/10/02 8:38:04 PM	
	s Complete: Timed out	Symptom	9/10/02 8:37:47 PM	
	s Complete: Timed out	Symptom	9/10/02 8:38:06 PM	
	s Complete: Timed out	Symptom	9/10/02 8:38:00 PM	
	s Complete: Timed out	Symptom	9/10/02 8:38:12 PM	
	s Complete: Timed out	Symptom	9/10/02 8:38:01 PM	
	s Complete: Timed out	Symptom	9/10/02 8:38:05 PM	
	s Complete: Timed out	Symptom	9/10/02 8:37:59 PM	
	s Complete: Timed out	Symptom	9/10/02 8:38:03 PM	
	s Complete: Timed out	Symptom	9/10/02 8:38:07 PM	
	s Complete: Timed out	Symptom	9/10/02 8:37:53 PM	
	s Complete: Timed out	Symptom	9/10/02 8:38:14 PM	
	s Complete: Timed out	Symptom	9/10/02 8:37:58 PM	
	s Complete: Timed out	Symptom	9/10/02 8:37:40 PM	

All Events

4.203.200.205

IBM Tivoli Network Manager
Integrated Event and Topology Views

Network Topology Maps

Filter views: user-defined or automatically created

Active Event List

PCTY2012

Optimizing the
World's Infrastructure

IBM Tivoli Network Manager
View physical and logical device structure

Device breakdown: chassis, slot, card, port/interface

Launch in context OAM tools from any component e.g. mark an interface in-maintenance

Details of the selected component

Alarm status per component

IBM Tivoli Network Manager
Network Dashboards
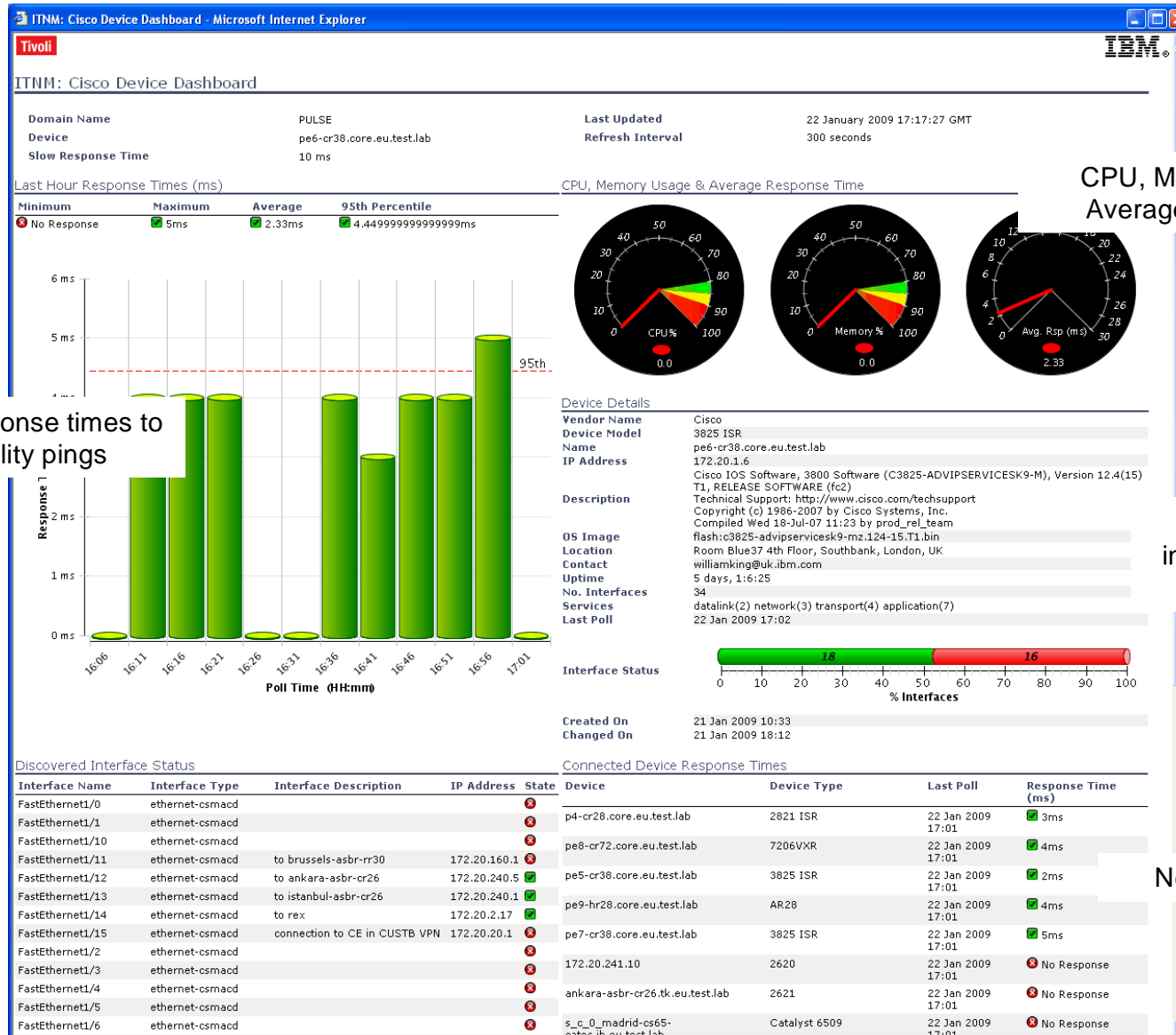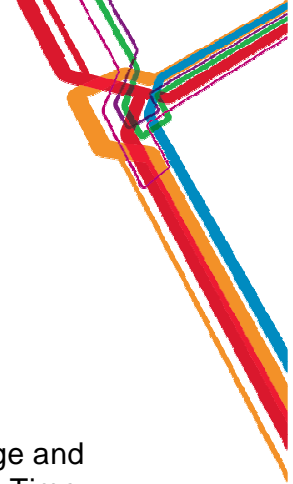
CPU, Memory Usage and
Average Response Time

Recent response times to
availability pings

Device details
including device type,
address, uptime

Neighbour Status

New network health reports
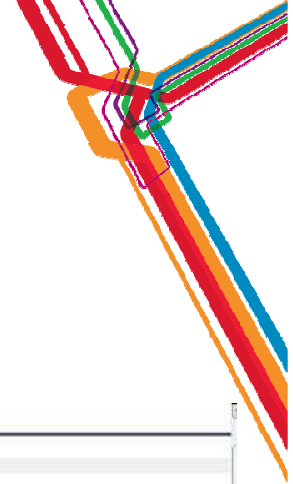
Network Operations can quickly diagnose network health and take corrective action

Launch in context

Tivoli Netcool Configuration Manager

Common Reporting
Historical Reporting

Tivoli Enterprise Portal
ITM & Integrated Visualization

Tivoli Integrated Portal
- Webtop
- TBSM
- ITNM
- TNPM

Netcool & 3rd Party Content Integration

INTEGRATED VISUALIZATION

Archive DB

Security (LDAP, SSO, TIM/TAM)

Webtop (OMNIbus Web GUI)
Web based event views

ObjectServer(s)

G Gateways

TSRM & 3rd Party Trouble Ticketing

OMNIbus
Desktop
ObjectServer

TBSM/TNSQM
Business & Service Modeling

Data Fetchers
ESDAs

- Middleware
- Web Services
- Applications
- DBs
- TSRM
- etc…

DSAs

Impact
Advanced Correlation & Integration

CORRELATION

Flow Analyzer

Probes
- SNMP Traps
- Logs
- TCP Socket
- 3rd party APIs
- TEC
- etc…

Monitors
- HTTP
- LDAP
- SAA
- TFTP
- TCP Port
- etc…

Threshold violations

TNPM (Wireless / Wireline)
Performance Management

ITM
- System
- Applications

Events

Events

Statistics, KPI, Polling

Synthetic Transactions

Discovery
Monitoring

IT Infrastructure
- Devices
- Systems & Applications
- 3rd Party EMSs / Agents
- etc…

Network Manager
Network Modeling (Layer 1/2/3)
Network Root Cause Analysis

Configuration Manager
IP Configuration Management
Security & Compliance

COLLECTION

Cost of Network Complexity

Errors largest cause of network outages	**60%** caused by manual configuration errors
Increasing impact on service revenue	**4%** of revenue lost to network problems
Network complexity outpacing scripting	**30** configuration errors per device (U.S. avg.)
Routine tasks consuming resources	**45%** of engineering time spent on manual config
Incorrect provisioning and excess inventory	**35%** of network assets lost or deployed erroneously
Inconsistent security posture open to threat	**80%** of security breaches from non-compliant devices

PCTY 2012

Optimizing the World's Infrastructure

IBM Tivoli Netcool Configuration Manager

- Automate routine configuration management task

- Understand how network changes may affect service and your customers, and proactively manage the impact of these changes

- Improve adherence to corporate and regulatory standards through ongoing network policy enforcement

- Comprehensive provisioning of networks, servers, storage and applications

Unique technology advantages

- Proven Scalability

- Revolutionary SmartModel™ Technology

- Multiple Automation Modes for different skills and needs

- Comprehensive Compliance Management

- Open APIs

INTELLIDEN®
Acquisition

Ready for
IBM. | Tivoli.
software

BT
Bell
acme packet
CBEYOND®
Juniper NETWORKS
Comcast.
Atos Origin™
Scotia Capital
CTC
Challenging Tomorrow's Changes
TELECOM ITALIA
Telefónica
opalis.
TELUS®
verizon
OPNET®
VISA

Closed Loop problem Resolution
Automate the correction of common problems

ITNM enables RCA and impact analysis of problem

ITNM

RCA

Today events come into OMNIbus and faults are localized

OMNIBUS

DETECT

Netcool Management Solutions

ITNCM

FIX

TNCM enables automated correction of common problems through automated remediation

ITNCM

Triggering traps to OMNIbus for policy breaches

Policy Compliance

Check if Network devices are compliant to best practices.
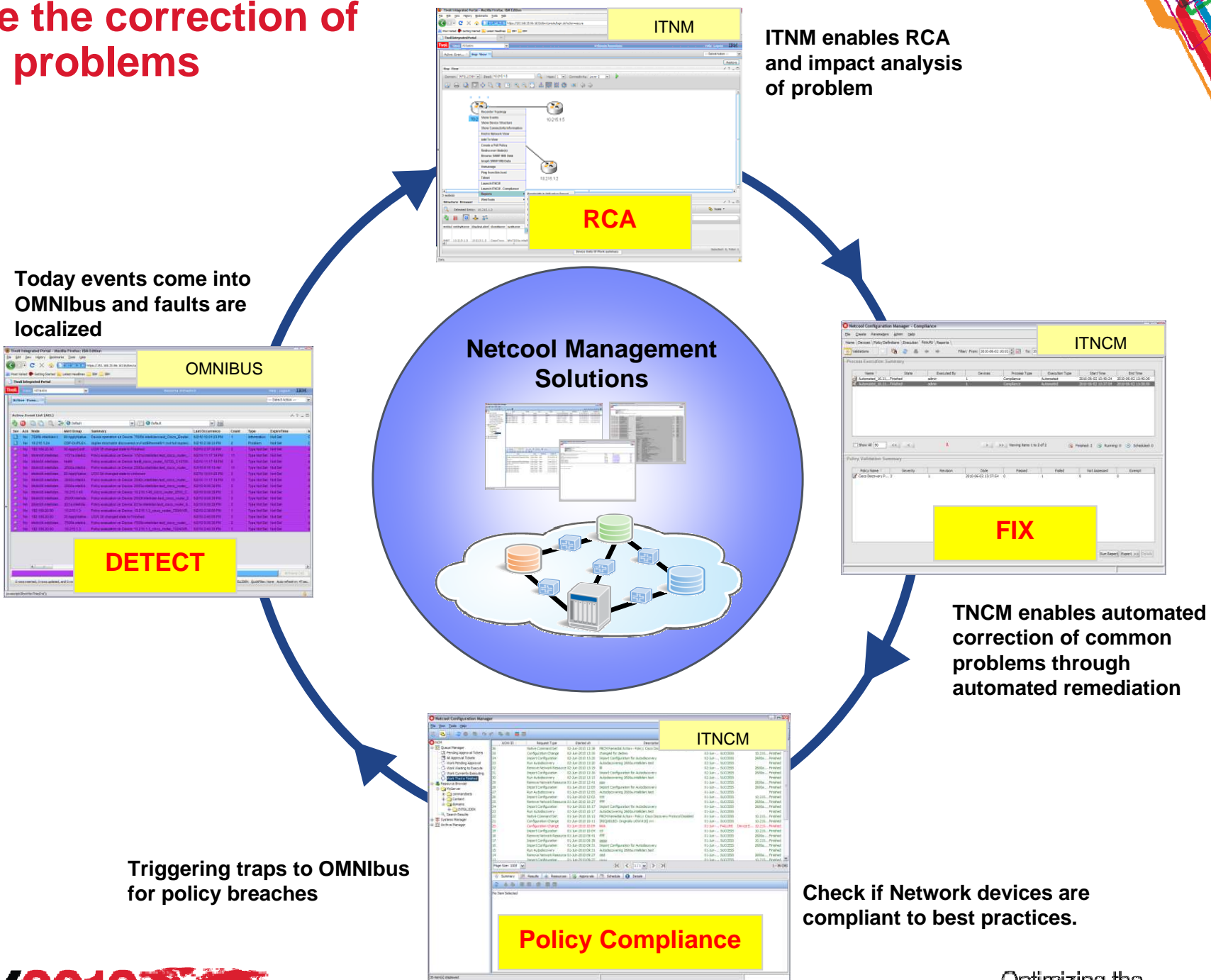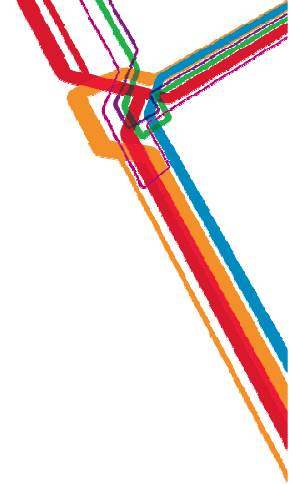
Exploiting configuration information for problem isolation

With the addition of ITNCM the problem is localized to a config change directly, identifying who made what change when?

5 Config changes identified

Control: Manage your Business

Automation: Improve your Business
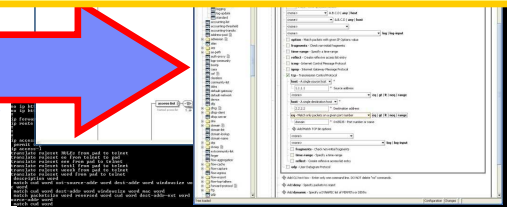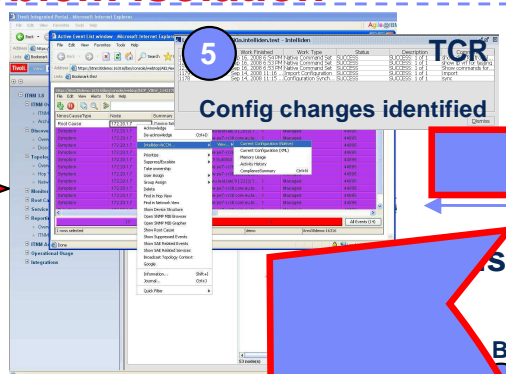
Configuration Error directly causes an impact on an end users service availability.

Operator is notified immediately

Visualization

BGP Session down

4 Config changes happened

INTELLIDEN
An IBM Company

Netcool Configuration Manager

4
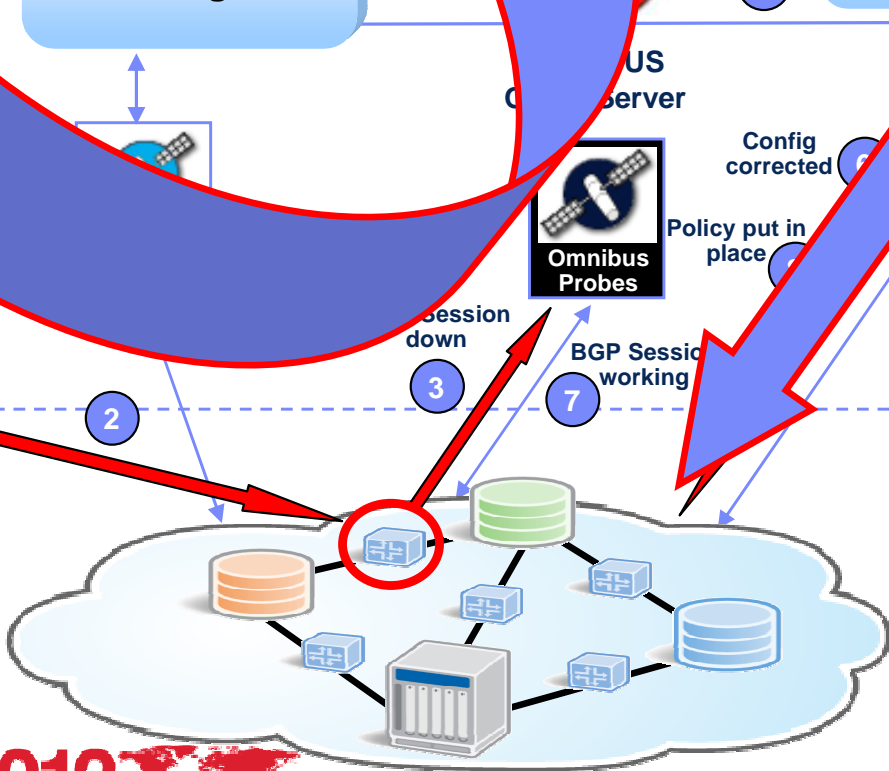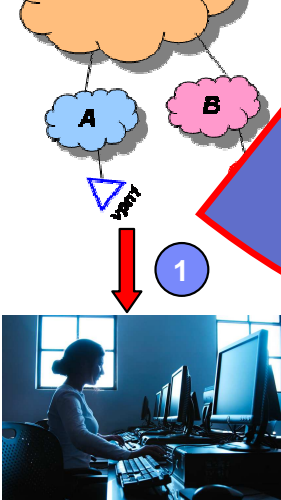
Roll back to a previous working configuration to make the service available again to the end customer.

BUS Object Server

Config corrected

Policy put in place

Omnibus Probes

Session down

BGP Session working

1

2

3

7

ITNCM accelerating problem isolation:
1. ACME, is expanding & is doing reconfigurations so they can peer with other ISPs at an Internet eXchange Point (IXP) in London
2. A configuration error on one of the routers which results in a BGP session with a peer-network not being established, impacting customer VPNs.
3. Routers in the network generate alarms identifying that the BGP session is down.
4. ITNCM detects configuration changes made to the router and generates changes events to OMNIbus.
5. The NOC operator launches the TCR reports and identifies that configuration changes have occurred on the device in question.
6. A ticket gets created for further investigation, where current and previous config's get compared, and corrects the problem.
7. The remedial actions clear re-establish the BGP session, and the alarms are cleared.
8. A policy is configured in ITNCM to ensure similar misconfigurations do not occur.

Identify who made what changes when?
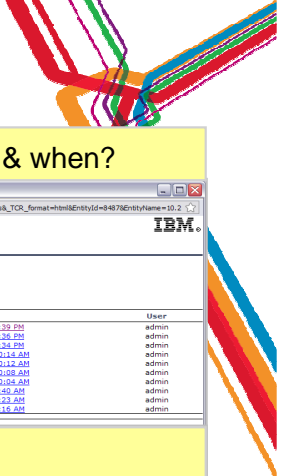
- Provides Netcool users with single-click access to ITNCM.

- Prebuilt TCR (Tivoli Common Reporting) reports which can be **launched in context** leveraging configuration data within OMNIbus and Network Manager.

- Helping to **diagnose problems quicker** resulting from configuration changes in the network.

- If permitted, Netcool users can perform configuration changes to resolve faults

OMNIBUS

Last 'n' device changes, who made the changes & when?

Configuration detail report

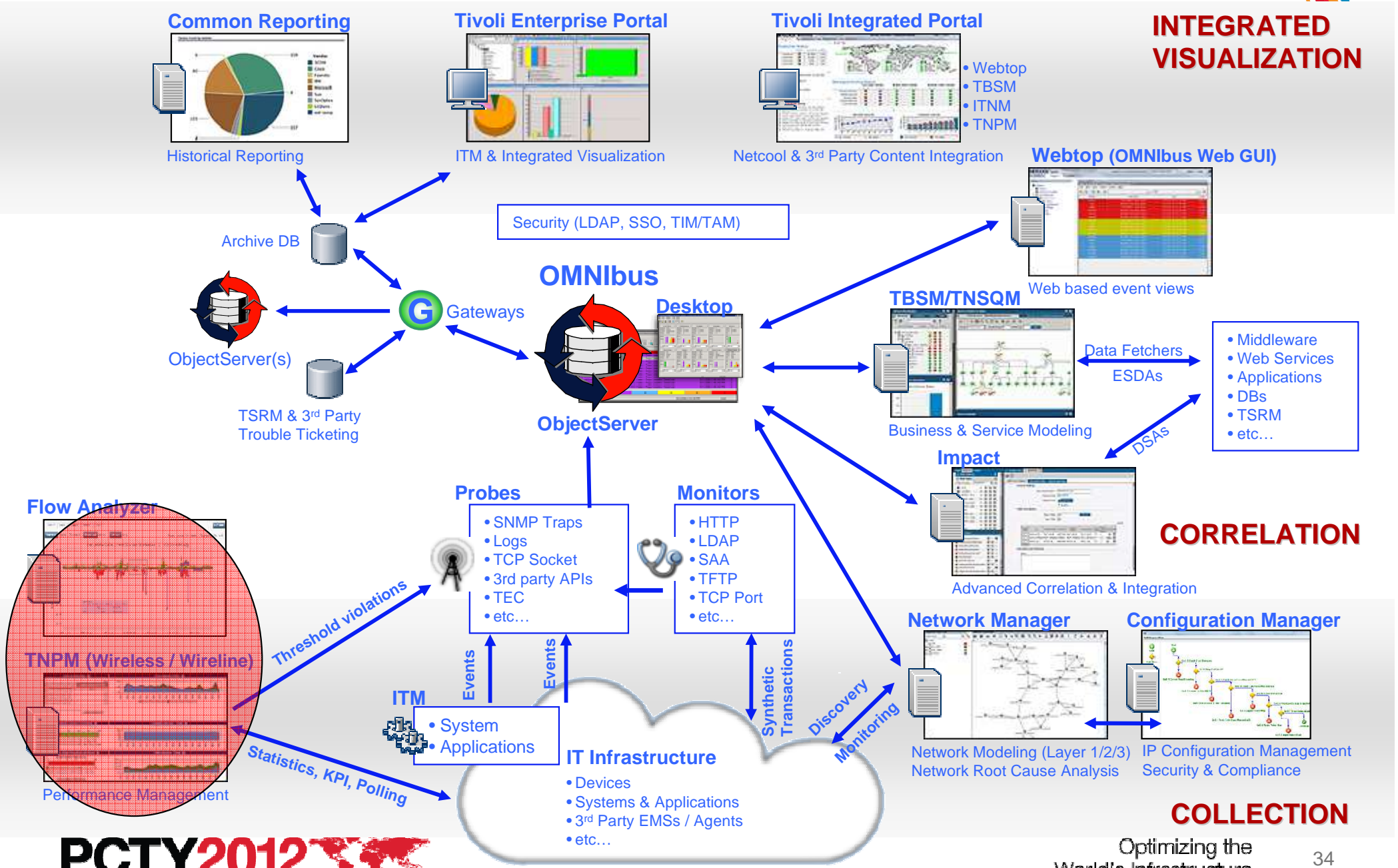Device terminal audit log

Device Unit of Work (UOW) Summary

Agenda

- Network & Service Assurance Overview

- Fault Management Session

- Network Monitoring and
  Configuration Management Session
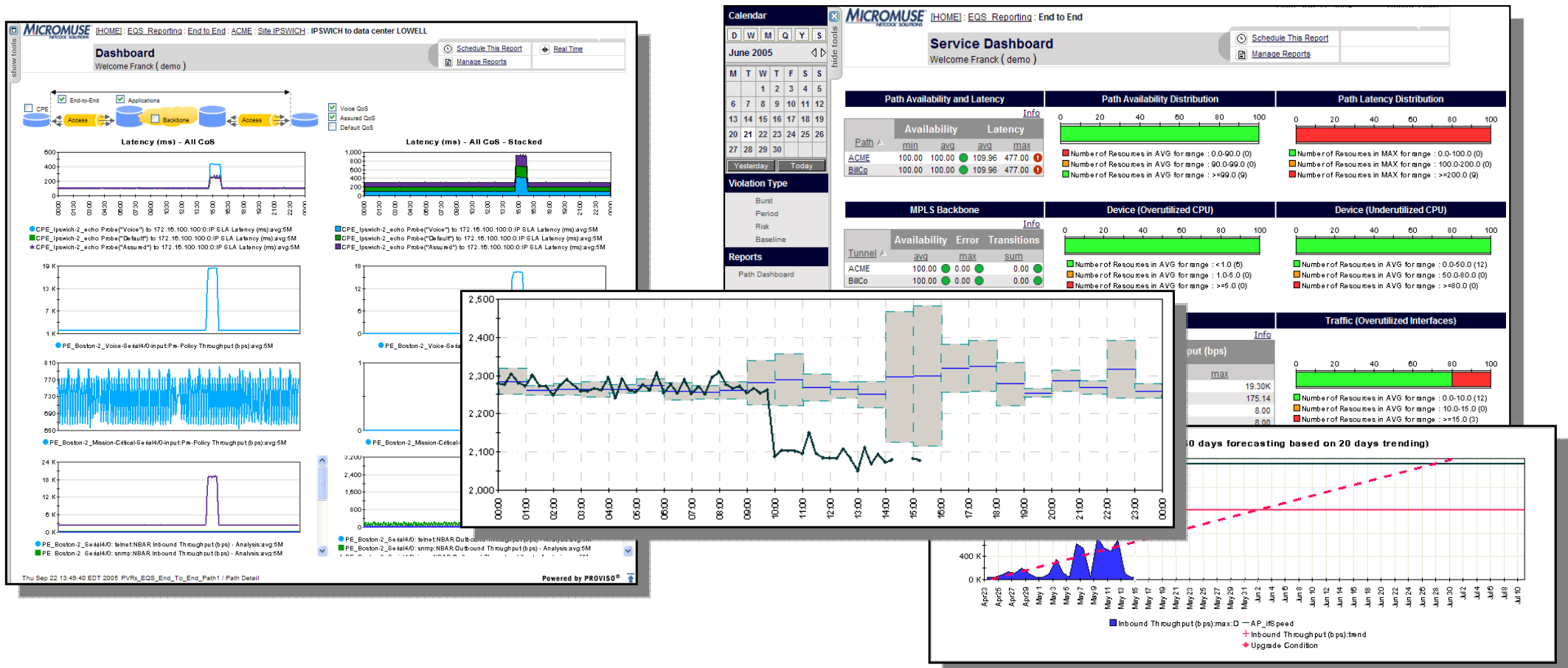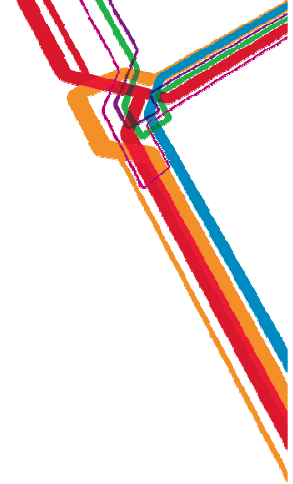
- **Performance Management Session**

Tivoli Netcool Performance Management

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Historical Reporting

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• etc…

Network Manager
Network Modeling (Layer 1/2/3)
Network Root Cause Analysis

Configuration Manager
IP Configuration Management
Security & Compliance

COLLECTION

What is Netcool/ITNPM?

- Product: Scalable Performance and Service Reporting system
- Target Market: Tier 1-2 Service Providers and Large Enterprises
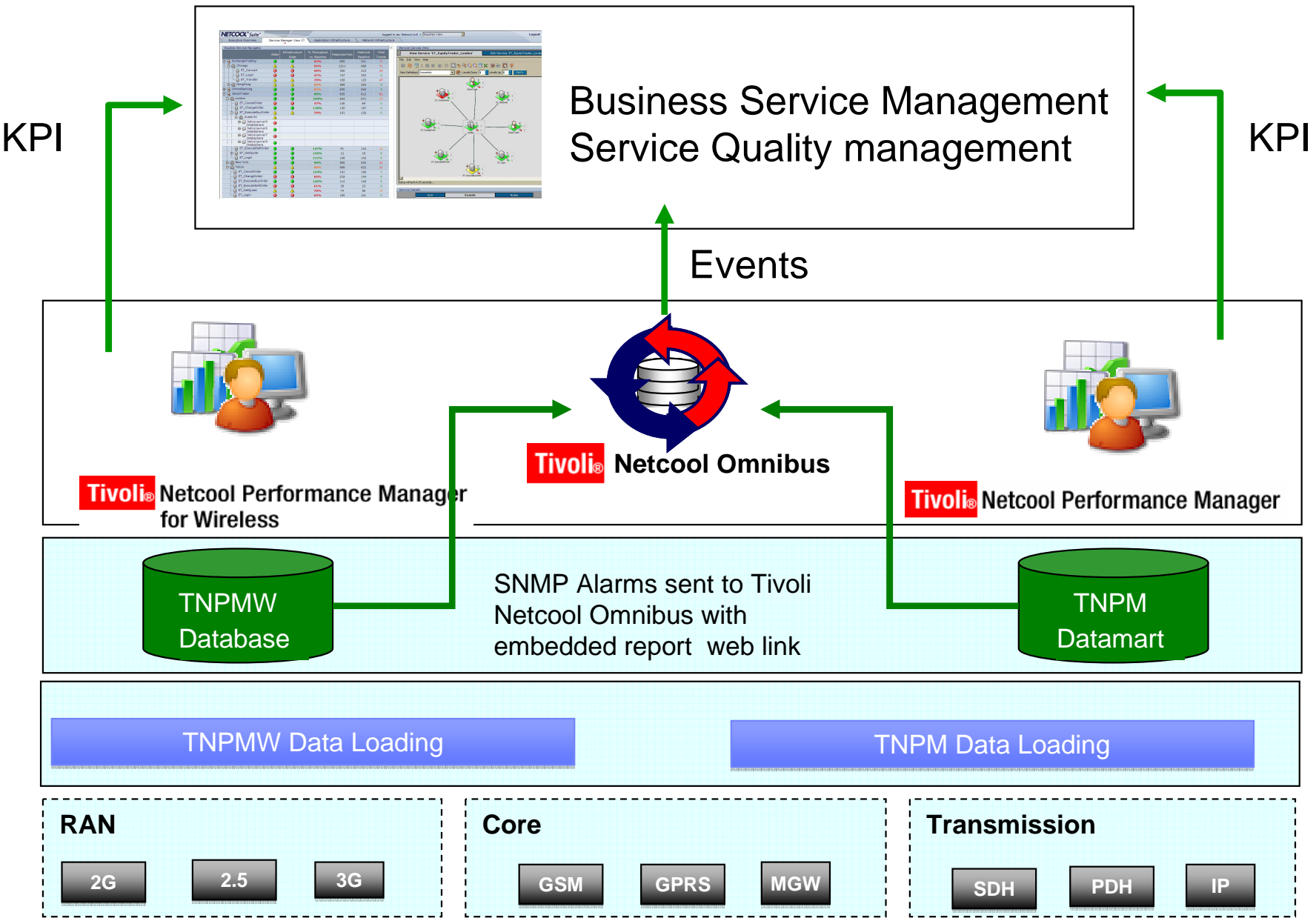
What is Performance Management?

- The ability to collect, store and report on historical data
- What is collected?
  - Periodic metrics
    - Availability, volume, traffic & error rates, usage data etc. (NOT EVENTS!!)
- What do we do with it?
  - Store and report
  - Detect real-time threshold violation
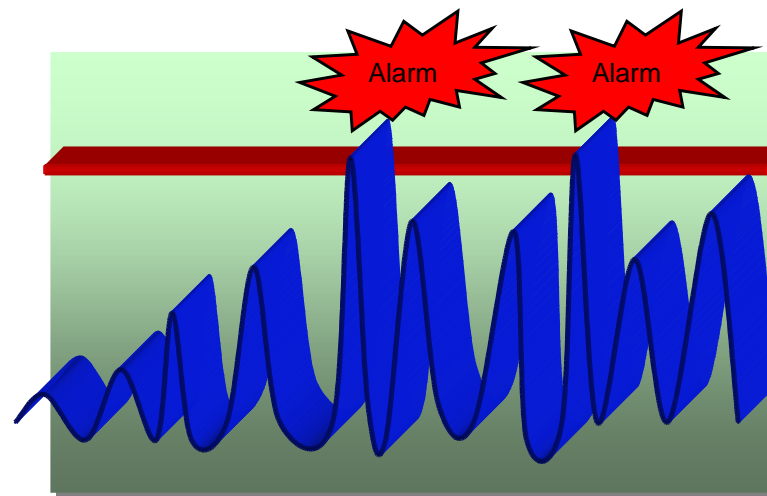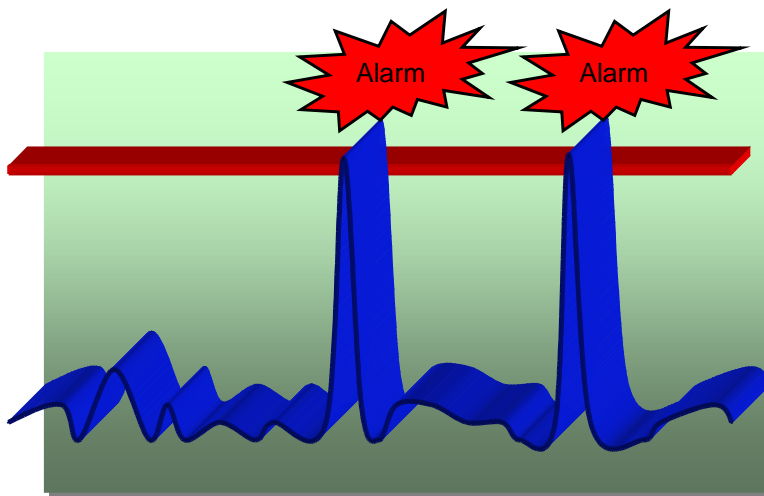
The same two traps are received…

But are the underlying problems the **same severity?**

Tivoli Netcool Performance Manager

Business Service Management
Service Quality management

KPI

KPI

Events

Tivoli® Netcool Omnibus

Tivoli® Netcool Performance Manager for Wireless

Tivoli® Netcool Performance Manager

TNPMW Database

SNMP Alarms sent to Tivoli Netcool Omnibus with embedded report web link

TNPM Datamart

TNPMW Data Loading

TNPM Data Loading

RAN

| 2G | 2.5 | 3G |

Core

| GSM | GPRS | MGW |

Transmission

| SDH | PDH | IP |

Tivoli Netcool Performance Manager
Sample reports

- Service Overview across huge network / IT
  - SLA/SLO Reports, Dashboard, Executive views
  - Single report characterizes Service, Resources and Traffic
  - On-Demand statistics (not batched)

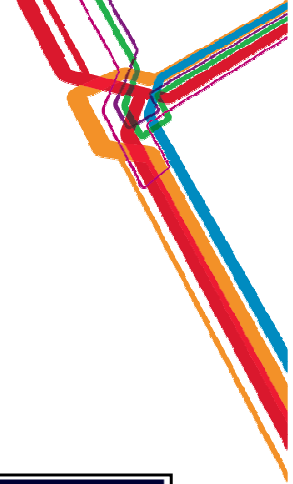# Troubleshooting degraded service
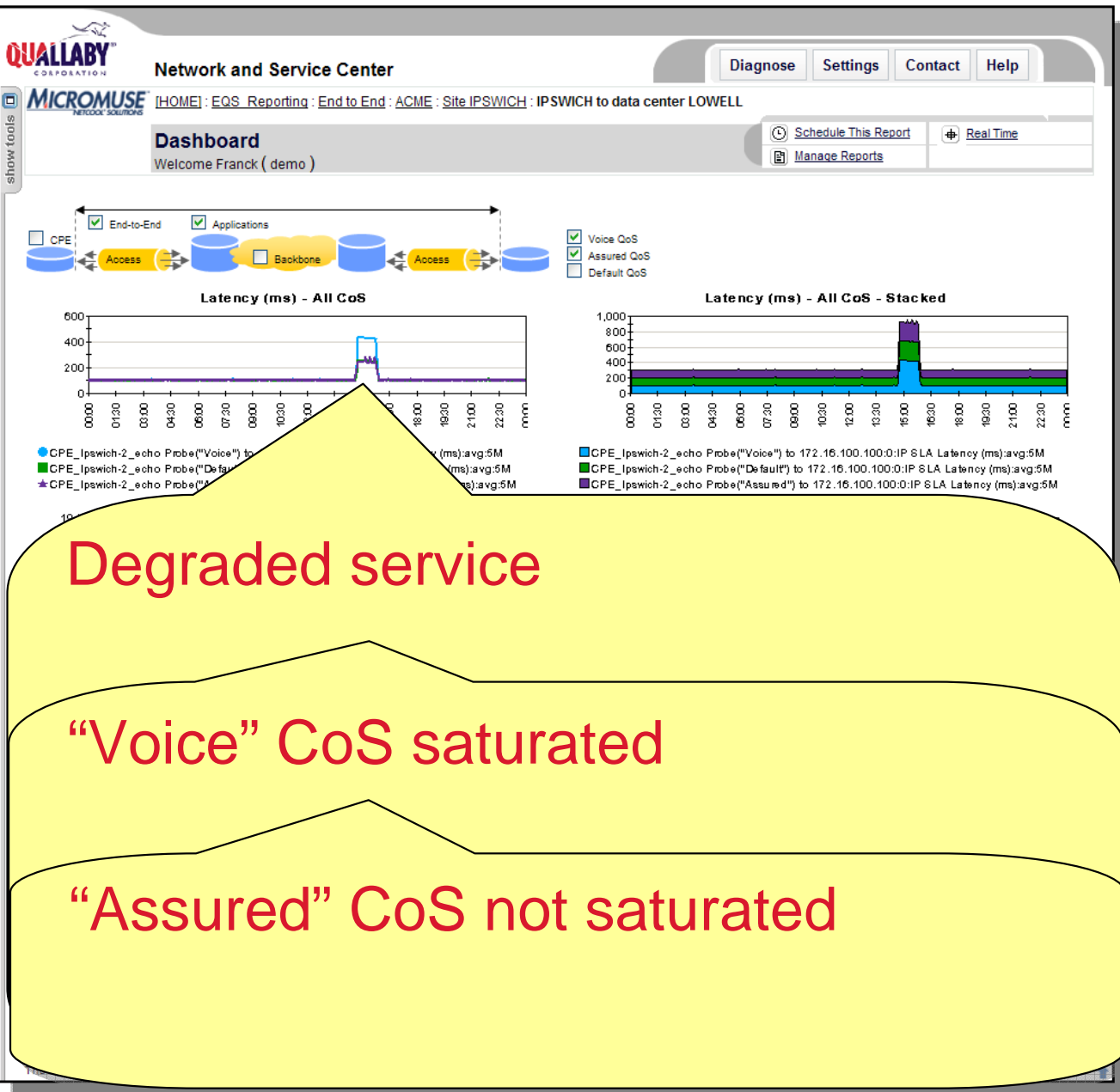
Degraded service

"Voice" CoS saturated

"Assured" CoS not saturated
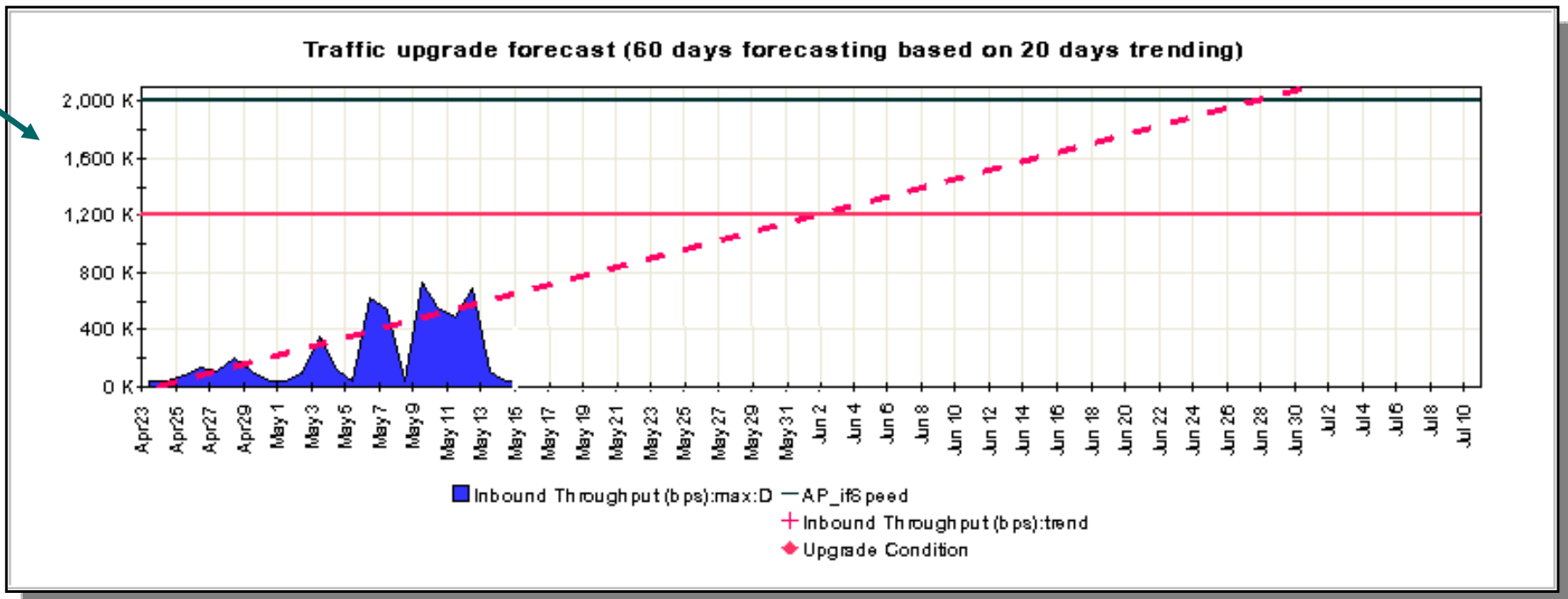
Unwanted traffic
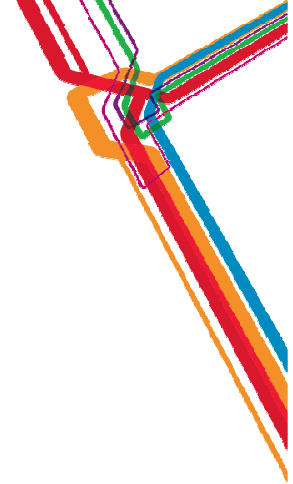
Tivoli Netcool Performance Manager
Predicting service degradation

- Performance / Service Trending and Forecasting
- Catches progressive service degradation
- SLA violation forecast or capacity planning

Inbound Traffic Upgrade Forecast						
Name	Capacity	Throughput (max)	Rate %	Saturation	Upgrade Date ▲	
training1.quallaby.com-2_IF: 2 "100 Mbps" "hme0"	100.00M	--	0.6	60.00M	05/16/05 10:21	⬆
192.168.1.3-2_IF: 5 "2 Mbps" "Tu0 "	2.00M	692.37K	0.6	1.20M	06/2/05 1:38	⬆

60 days forecasting based on 20 days trending

Outbound Traffic Upgrade Forecast						
Name	Capacity	Throughput (max)	Rate %	Saturation	Upgrade Date ▲	
PE_Boston-2_IF: 12 "9 Kbps" "Tu1 HeadEnd_LSP_Boston"	9.00K	4.65K	0.6	5.40K	05/7/05 10:19	⬇

Traffic upgrade forecast (60 days forecasting based on 20 days trending)

- Inbound Throughput (bps):max:D
- AP_ifSpeed
- Inbound Throughput (bps):trend
- Upgrade Condition

THANK YOU

Alessandro Proia

BA Client Technical Professionals

alessandro.proia@it.ibm.com