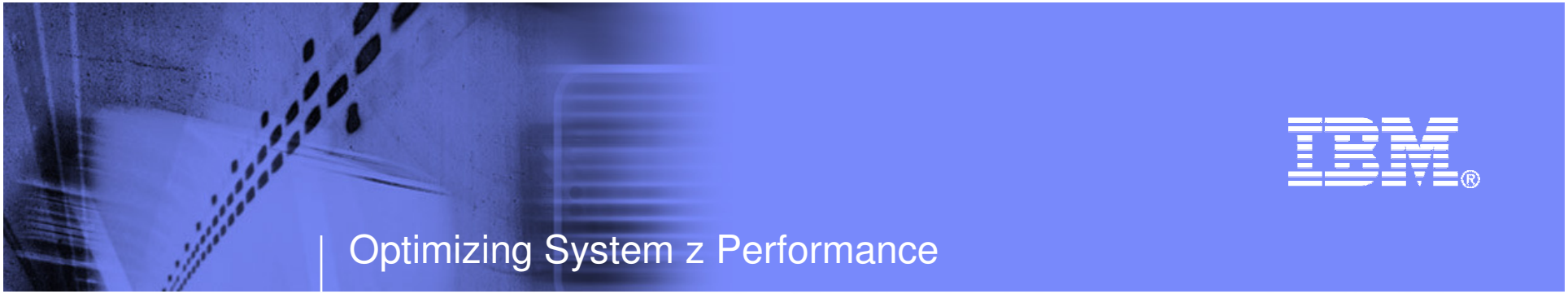


Optimizing System z Performance

Solving Mainframe Systems Management Challenges in an SOA World Using OMEGAMON

Agenda

- Building a better understanding of what SOA means
- Common performance and availability management challenges of SOA
- How to forge an effective performance and availability management strategy
- Sources of management information
- Monitoring, management and alert strategies for SOA

Service Oriented Architecture (SOA) Defined

- Service Oriented Architecture is an architectural style for creating and using computer business processes
- Service-Oriented Architectures (SOA) is a set of patterns for building distributed systems where one application that comprises a system can find another application that provides needed service and can exchange data with it

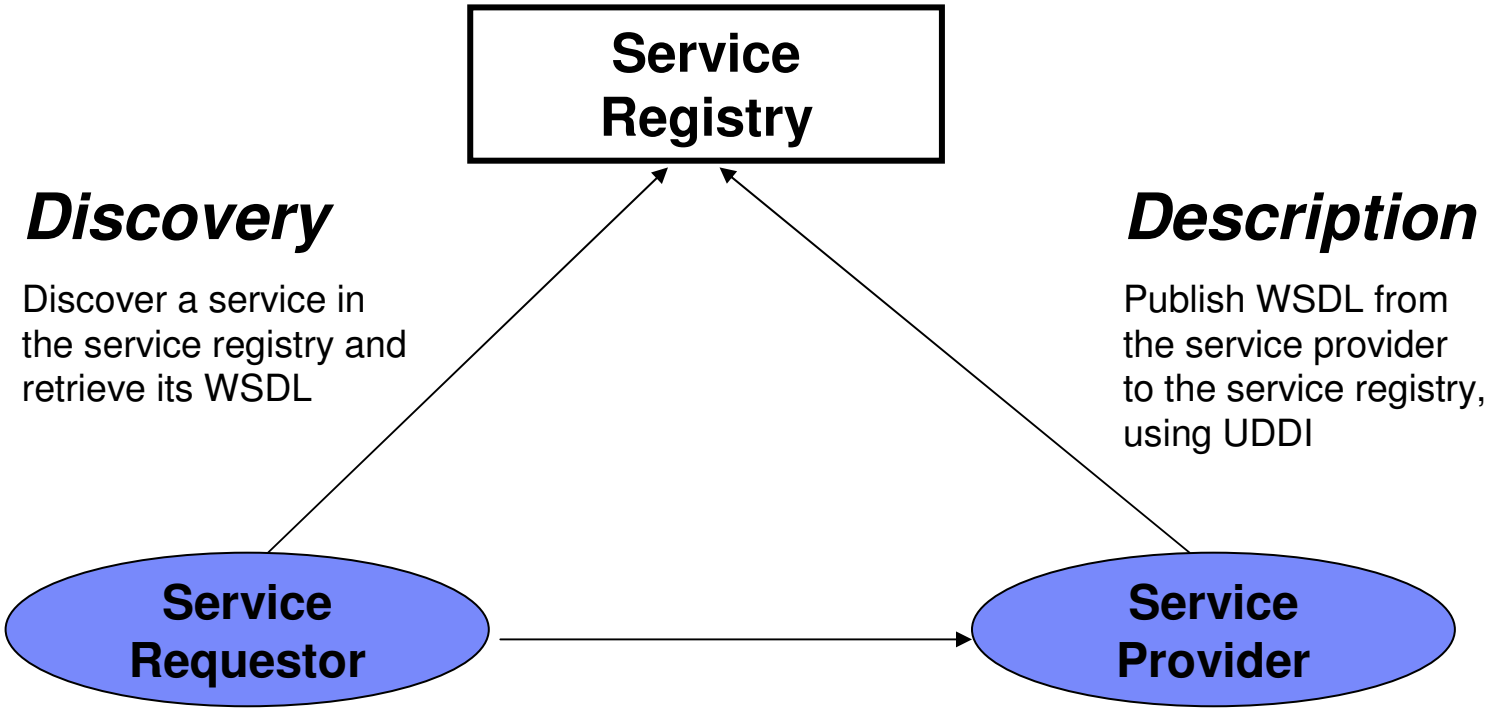
Common Characteristics Of SOA Applications

- SOA is based on a loosely coupled paradigm
  - No interdependencies between systems
  - Characterized by an abstraction from the implementation aspects of the application
  - In SOA, the interface is defined in a neutral manner independent of the hardware, operating system, and programming language
- SOA ideally reuses existing technology infrastructure
  - For example - The mainframe can be an important component
    - Many programs written decades ago still run on current IBM mainframes
- Based upon industry standards
  - Built around XML and other common industry standards
    - XML, SOAP, JDBC, Message oriented middleware

System z And Systems Oriented Architecture

- One of the key strengths of the mainframe and z/OS is transaction processing
  - Many services in SOA are business transactions
  - Process large amounts of data simultaneously
  - Flexibility with mixed workloads
- System z provides many advantages
  - High scalability, availability, reliability, and security
  - Flexibility and cost control with specialty engines
- IMS and CICS can serve transactions that cooperate directly in a service-oriented environment
  - IMS and CICS support high volume, high reliability transaction workload
  - Ideal for services today that require those same high qualities of service
- DB2 provides XML support

Web Services Invocation Model



Web Services - Useful Definitions

- WSDL is used to describe the function(s) that an application will be calling documenting in a standard way its entry points, parameters and output
  - WSDL (Web Services Description Language) is a public description of the interfaces offered by a web service. Using XML, it provides machine readable document that provides a calling application all of the information required to interact with a web service.
- XML is used to carry the values of parameters and the outputs of the function
- SOAP is used as the messaging protocol that carries content (XML) over a network transport (typically HTTP)
  - Industry standard message format for sending and receiving data between a web services consumer and a web service provider
  - SOAP messages are XML documents
- HTTP is used as the network transport layer

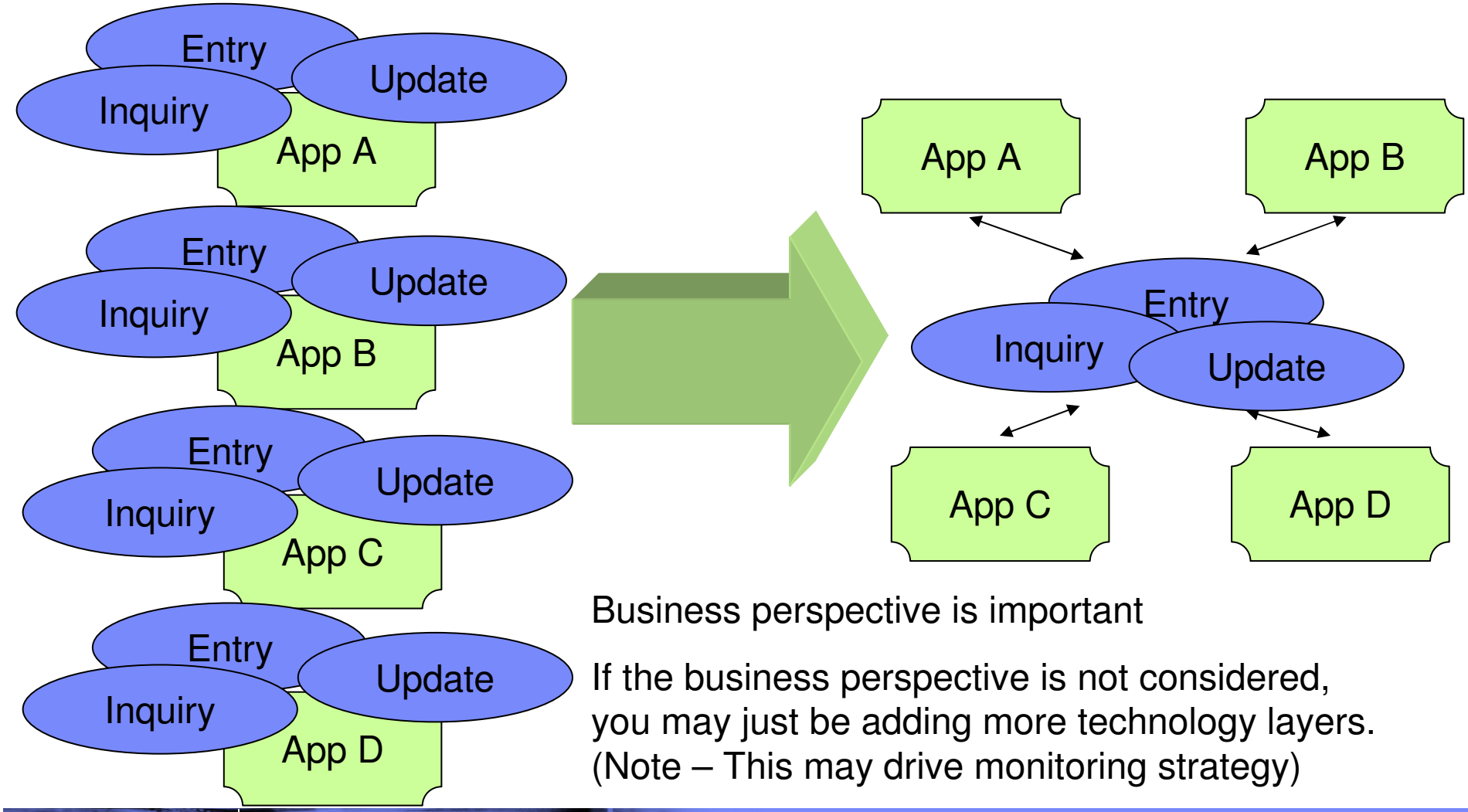
Enterprise Service Bus – ESB

- Enterprise Service Bus (ESB) is a set of patterns that can be applied to implement SOA-based systems
  - These patterns make extensive use of messaging and event notification to deliver core values
- ESB is a intermediary between the clients that consume services and various systems that provide these services
  - Instead of client talking directly to a service provider, requests are routed through a middleware system that handles the specific details
- ESB replaces RPC-like synchronous Web Service invocations with message-based and event-based interactions
- ESB enhances traditional message-based systems with discovery and self-describing characteristics typically attributed to Web Services

Common Needs And Challenges Of SOA

- Businesses look at SOA because they need
  - A way to change operational processes quickly
  - To be able to deploy automated process more quickly
- SOA addresses common challenges
  - Software processes may not be well documented
  - Key Performance Indicators (KPIs) may not be well defined
  - Complex connections may exist across multiple systems
  - Process change may be time consuming and cumbersome
  - May have limited visibility to performance

The Value Add Of The SOA Approach
The Consolidation Of Business Processes



Business perspective is important

If the business perspective is not considered, you may just be adding more technology layers. (Note – This may drive monitoring strategy)

Common Performance And Availability Management Challenges Of SOA

- The loosely coupled nature of SOA pose unique performance and availability management challenges
  - Measuring, monitoring and managing becomes more of a moving target
- Many key questions to consider when defining a strategy
  - How and what to monitor?
  - How to monitor and analyze the interactions of complex applications?
  - How to define performance and availability?
  - What is the optimal monitoring infrastructure?
    - How to aggregate monitoring information and correlate issues?
    - How to address 'islands of automation'?
  - How to be notified of issues, identify and isolate problems?
    - How to track KPIs and monitor SLAs?
    - How to drill down for detailed analysis?
- It may be important to be able to manage from a business perspective, as well as a technical infrastructure perspective

Devising A Monitoring Strategy
Monitor In Breadth And Monitor In Depth

- Monitor in breadth
  - Design a monitoring strategy that allows for an “end-to-end” analysis of the application and it’s key components
  - An integrated approach becomes key to success
    - Avoid silo approaches or “islands of automation”
  - Monitor at key touch points
    - Consider both performance and availability
    - Monitor from the end user perspective (response time and availability)
- Monitor in depth
  - Monitor and analyze the application interaction
  - Monitor underlying key technical components, platforms, and subsystems
    - Resource usage, performance, availability, issues, alerts, outages

Devising A Monitoring Strategy
Monitoring From A Business Application Perspective

- The value add of SOA revolves around an effective understanding of business processes
  - Optimize from a business process perspective to achieve savings
- In an SOA deployment it is important to include the business application perspective in the monitoring and management strategy
  - Track Key Performance Indicators
  - Take into account business application changes
  - Monitor and analyze application usage and SLAs

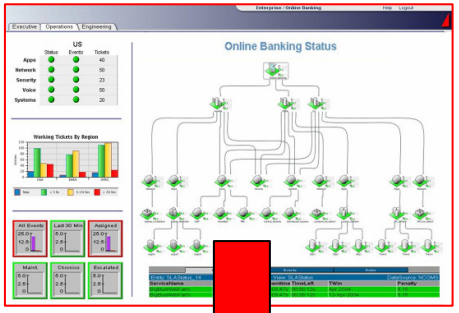
Benefits Of An Integrated End To End Technical View

- Provide the ability to integrate relevant technical information from a variety of monitoring sources
  - Provides a more complete view of performance
  - Aids with problem isolation and drill down for analysis
- Improved ability to manage composite applications
  - Integrated view of subsystems, platforms, and applications
- Reduce time to problem resolution
  - Improved event and problem isolation
  - Identify and isolate issues more rapidly
  - Superior performance analysis capabilities

Pulling Together An Integrated Methodology

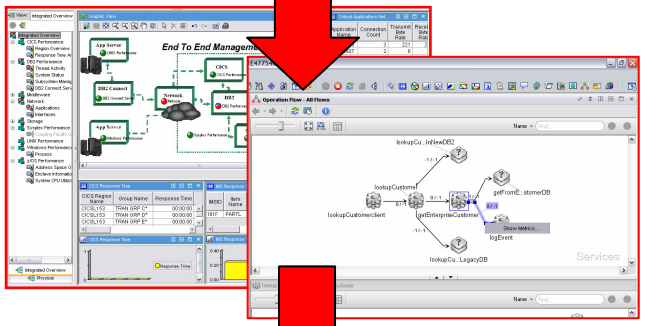
- Business level analysis
  - Integrated business application topology analysis
- Integrated technical view
  - End to end technical analysis
- Technical detail view
  - Technical deep dive analysis

Tivoli Business Service Manager TBSM



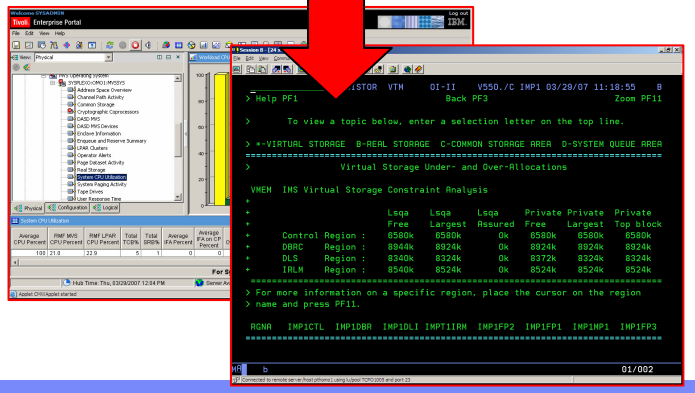
Drill down

OMEGAMON DE, OMEGAMON XE, & ITCAM



Drill down

OMEGAMON XE (TEP, 3270) & ITCAM



IBM Tivoli Business Service Manager Provides A Business Application Level View

Role-based dashboards

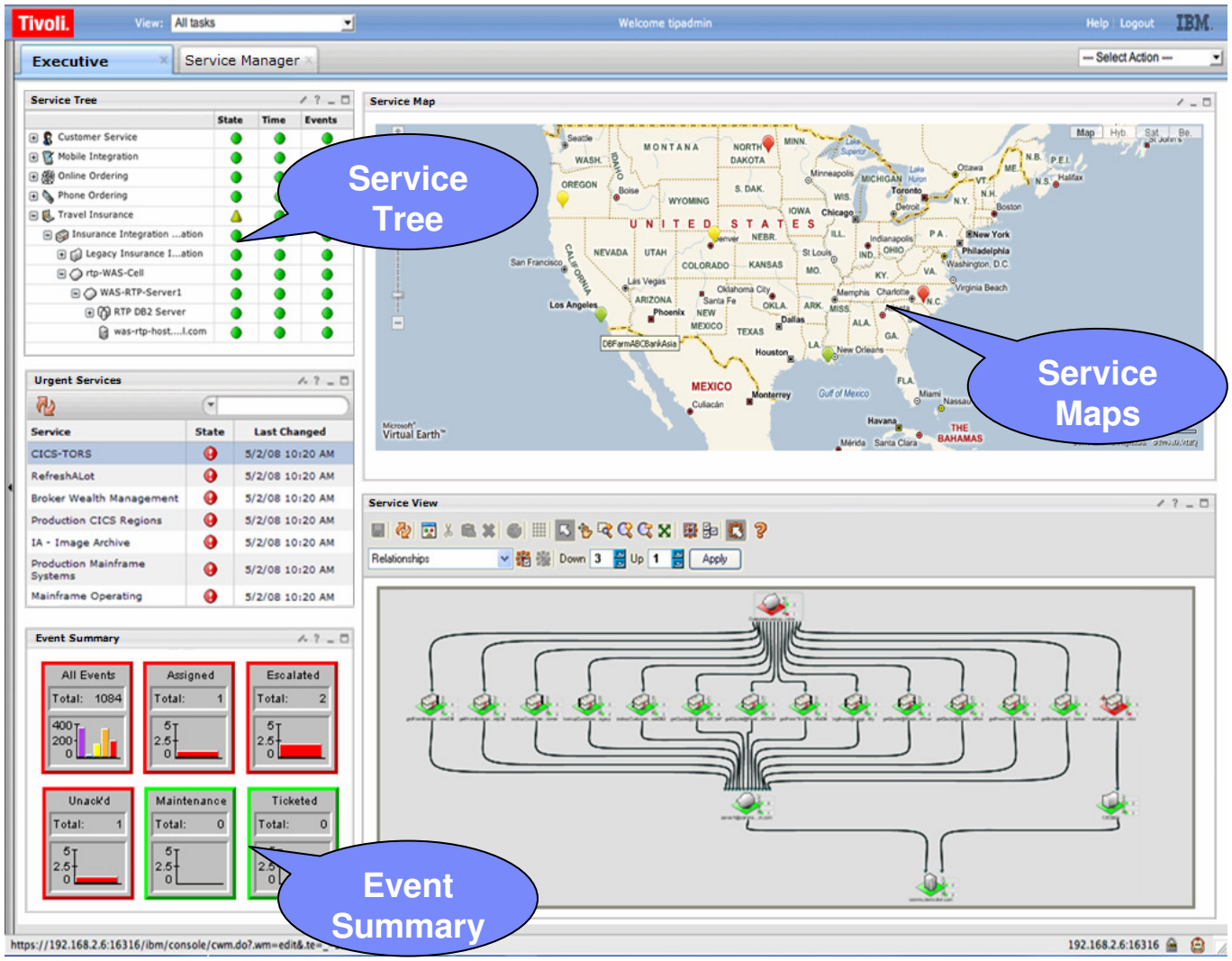
- Customizable/sharing common context
- Web 2.0/Mash-ups (IBM & 3rd party)
- Launch in context views & automations.
- Realtime & Historical reporting across KPIs, event & peformance.
- Mobile Support

Distributed & Mainframe

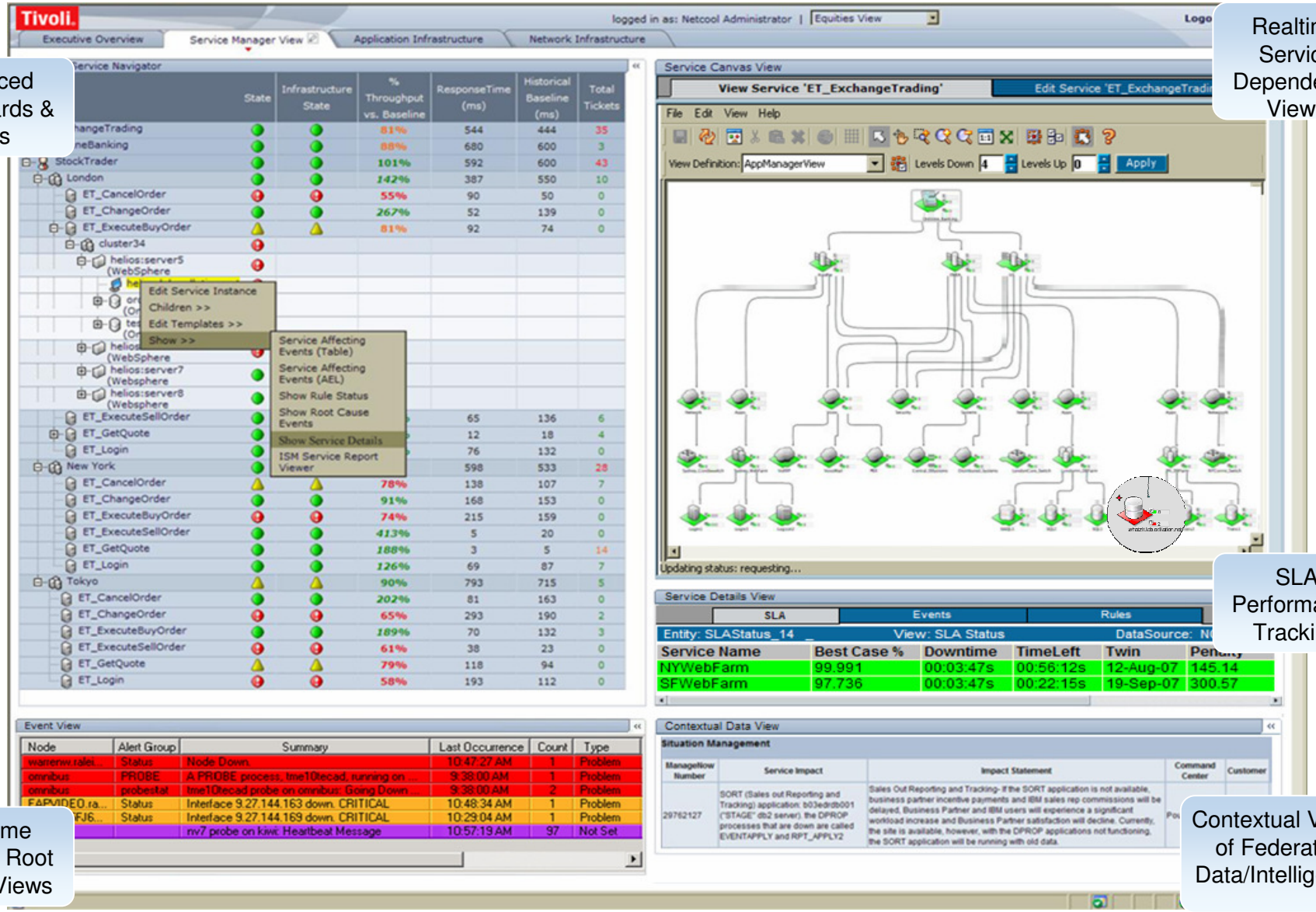
- Visibility across both
- Manage from either
- SOA & Virtualization
- Supports IPv4 & v6

High Scalability/Availability

- Split UI & Engine
- Self-monitoring
- Failover



Business Service Management – Service Details



Balanced Scorecards & KPIs

Realtime Service Dependency Views

SLA Performance Tracking

Realtime Event & Root Cause Views

Contextual Views of Federated Data/Intelligence

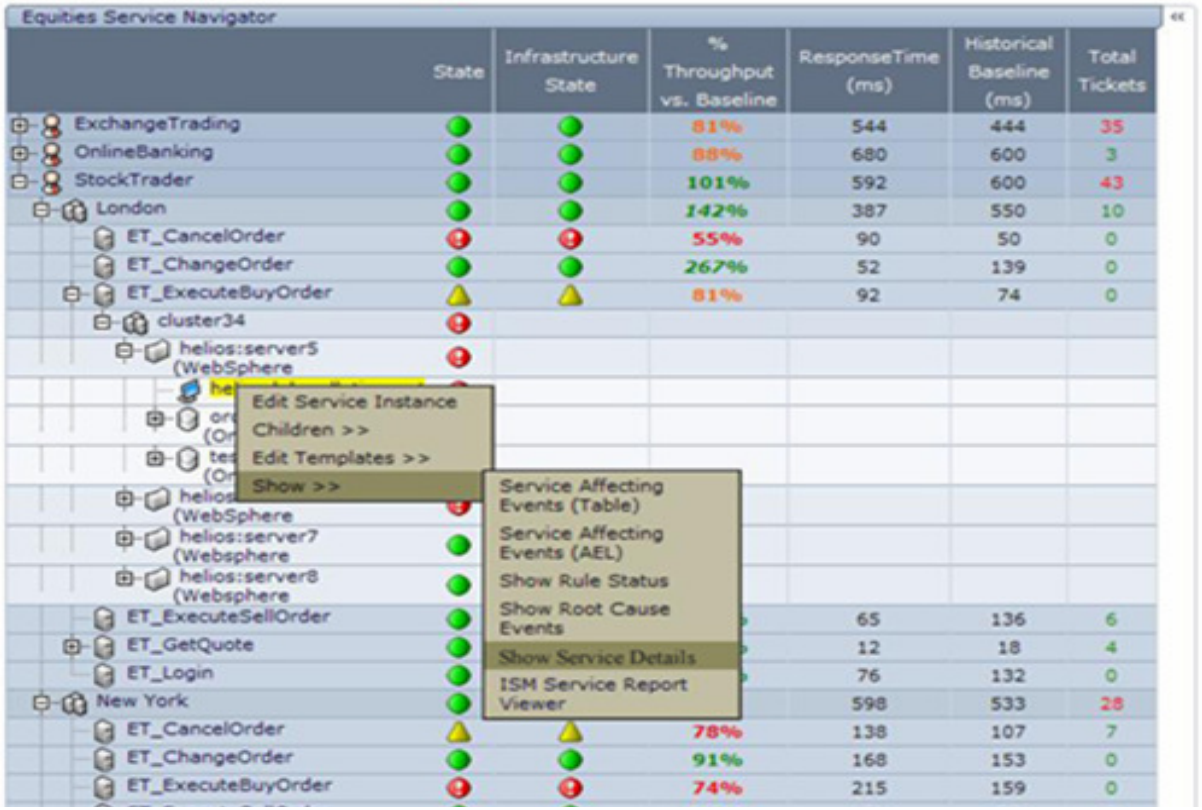
Business Service Management – Service Drill Down

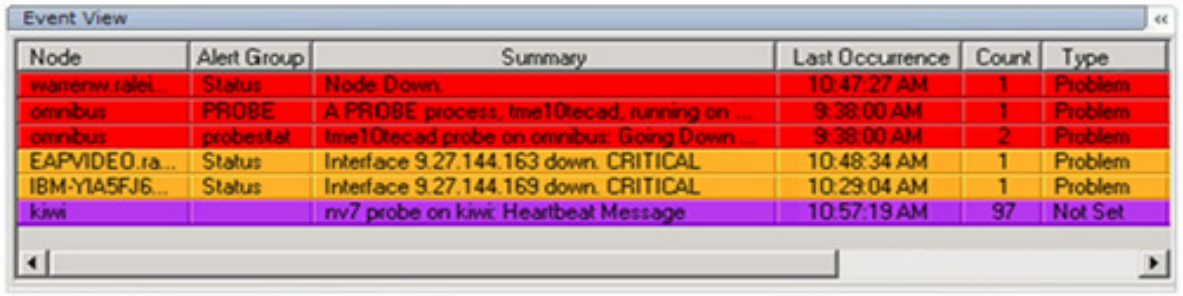
Service Navigation:

- Navigate services:
  - Tracks service, infrastructure and transaction health.
  - Realtime KPIs & balanced scorecards
  - Right-click access to other views.

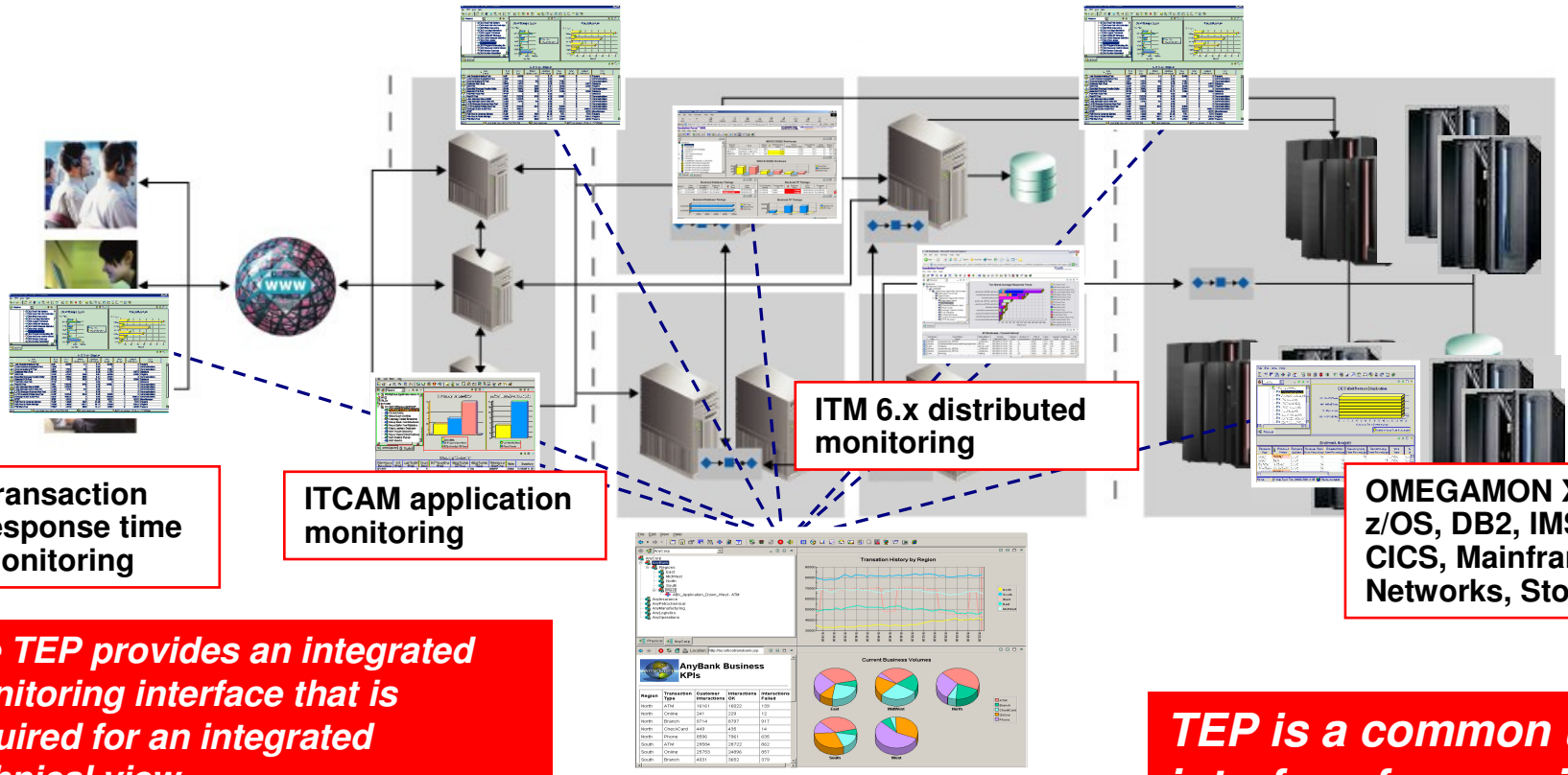
Event Views:

- View root cause & other service events.
- Enriched events with business context.
  - e.g. device location, problem owner, contact details, maintenance details, etc.





Integrated Technical View Using The TEP Tivoli Enterprise Portal



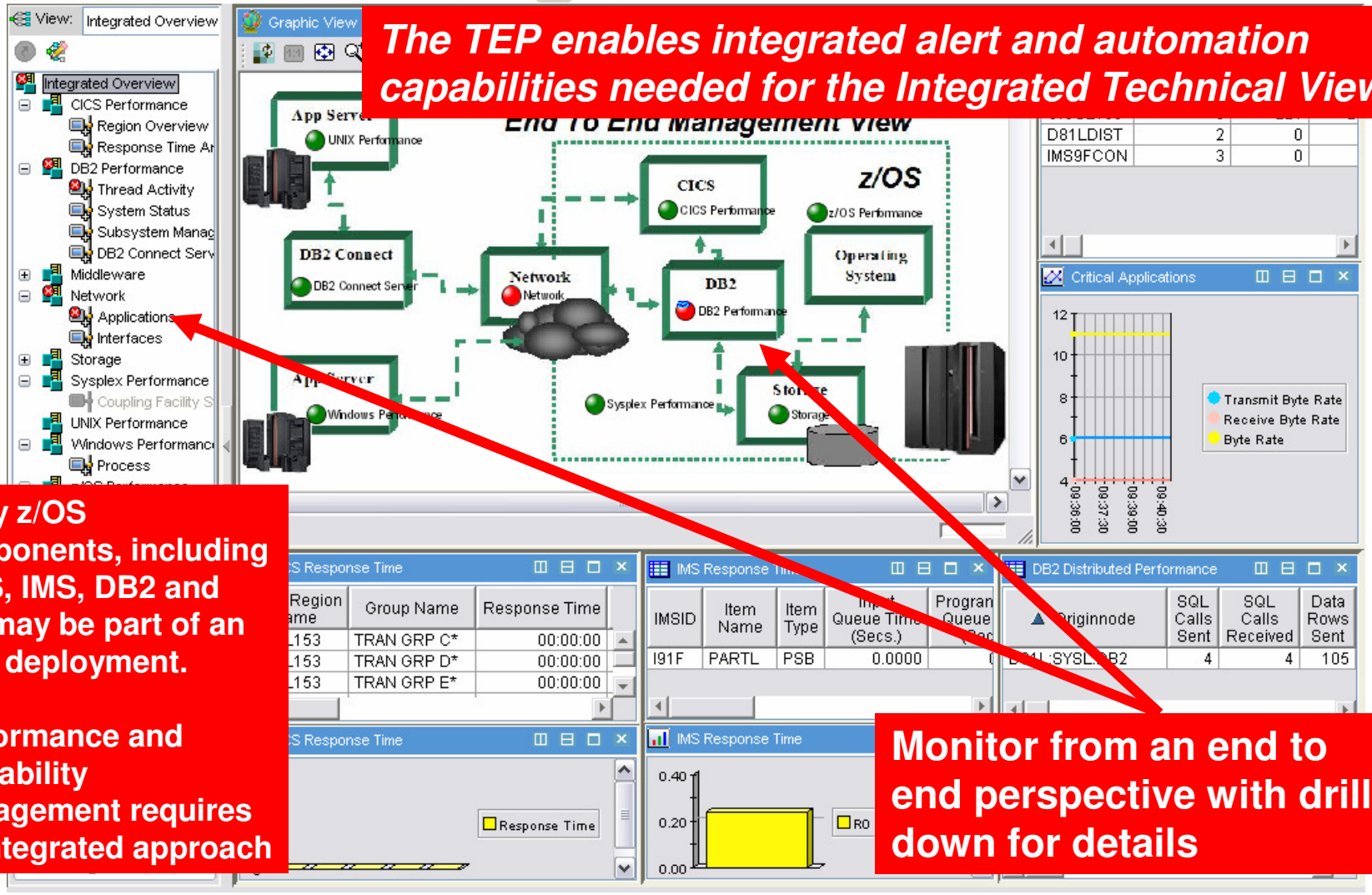
Tivoli Enterprise Portal (TEP)

The TEP provides an integrated monitoring interface that is required for an integrated technical view.

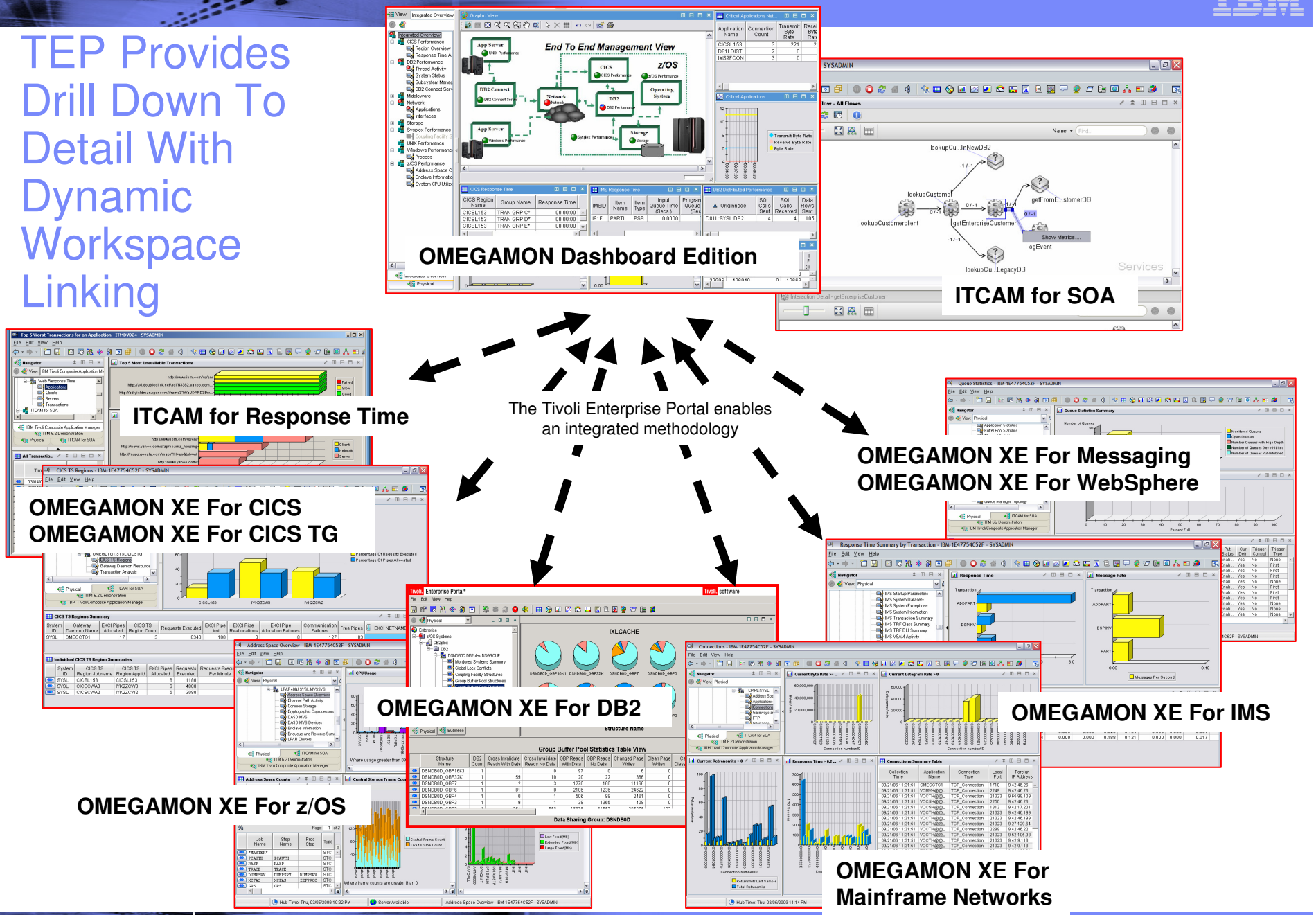
Navigation and drill down for a variety of monitoring solutions.

TEP is a common user interface for a variety of Tivoli OMEGAMON and ITM monitoring solutions

Integrated Technical View Using The TEP Tivoli Enterprise Portal



TEP Provides Drill Down To Detail With Dynamic Workspace Linking

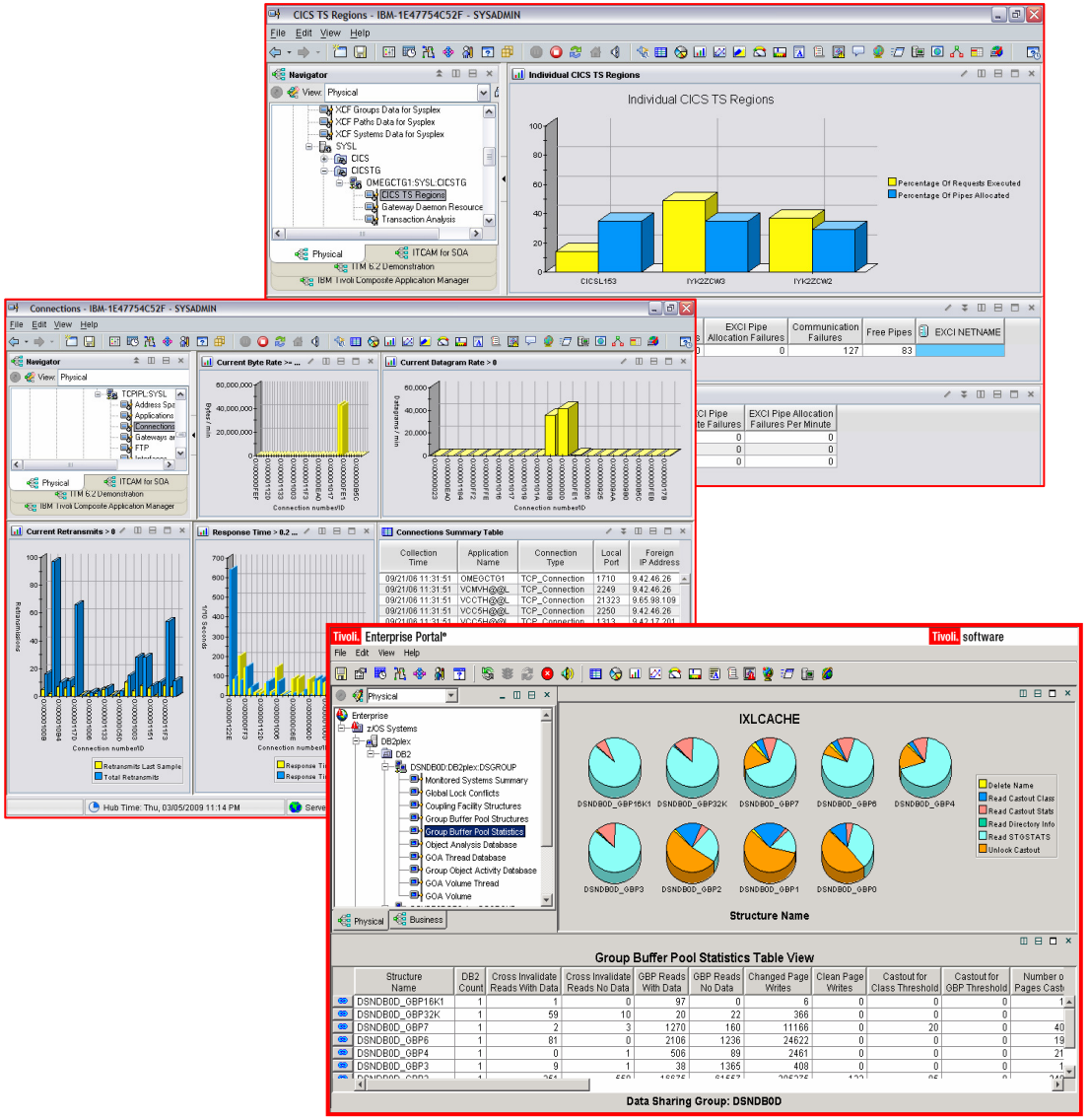


The Monitoring Components

- IT Composite Application Manager (ITCAM) For SOA
  - A view of the service-to-service topology within your environment
  - Drill down for performance detail
- OMEGAMON XE For z/OS
  - Monitor z/OS operating system
    - Workloads, WLM, Address Spaces
    - CPU, Storage, DASD, paging
    - Bottleneck and Impact Analysis
    - Enqueues/GRS & Alerts
    - Sysplex, Coupling Facility Structures and utilization
- OMEGAMON XE For CICS
  - CICS Service Level Analysis
  - Transaction, UOW, & Bottleneck Analysis
  - Journal & Logstream Analysis
  - VSAM File and Lock Analysis
  - Connections Analysis
  - Temp Storage & Transient Data Usage
  - CICS Region Overview
  - DB2 Summary and Task data

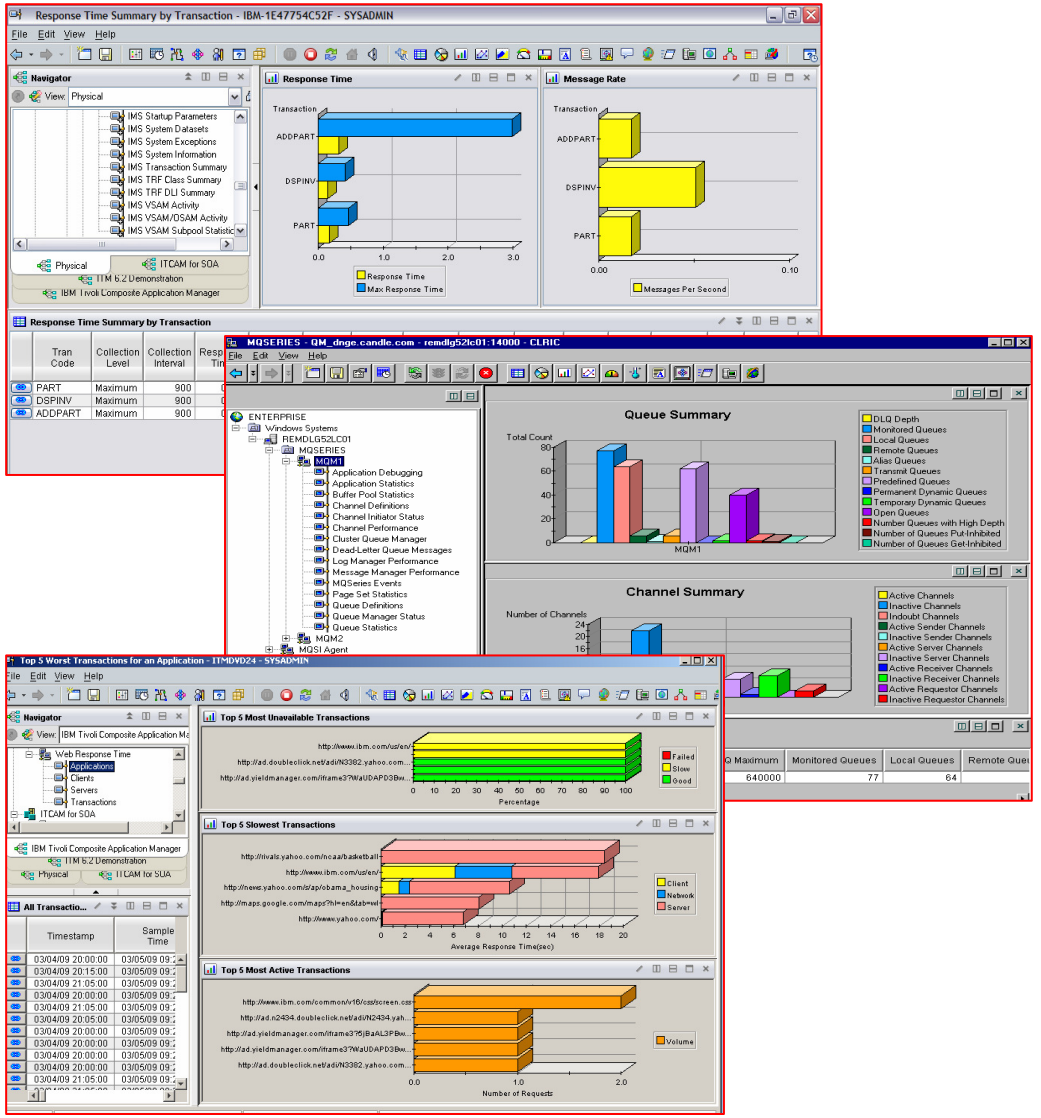
The Monitoring Components

- OMEGAMON XE For CICS Transaction Gateway
  - Collect CICS TG statistics,
  - Report CICS TS communication failures,
  - Resource waits and EXCI (External CICS Interface) pipe usage
  - Check for excessive transaction rollbacks
- OMEGAMON XE For Mainframe Networks
  - Monitor TCP/IP and SNA network resources from a common interface
  - Real time and historical monitoring capabilities
  - Monitor applications, connections
  - Monitor common network performance issues
- OMEGAMON XE For DB2
  - Real Time Thread Analysis
    - Thread detail & performance
    - Triggers, Procedures, & UDFs
  - Real Time – DB2 subsystem
    - Virtual & EDM Pool analysis
    - Locking & Logging Analysis
    - Storage Analysis



The Monitoring Components

- OMEGAMON XE For IMS
  - Real Time Monitor
    - Subsystems, regions, resources, pools, DBs, Fast path
    - IMS Connect, OTMA
  - Response Time Analysis (RTA)
    - Transaction Response time by user defined groups
  - Bottleneck Analysis
    - Workload performance and task analysis
- OMEGAMON XE For Messaging
  - Monitor MQ series queues, messages, and traffic
  - Monitor queue depth and key MQ resources
- ITCAM For Response Time
  - Track end user response time
  - Break out client, network, and server time
  - Correlate response time by server and user

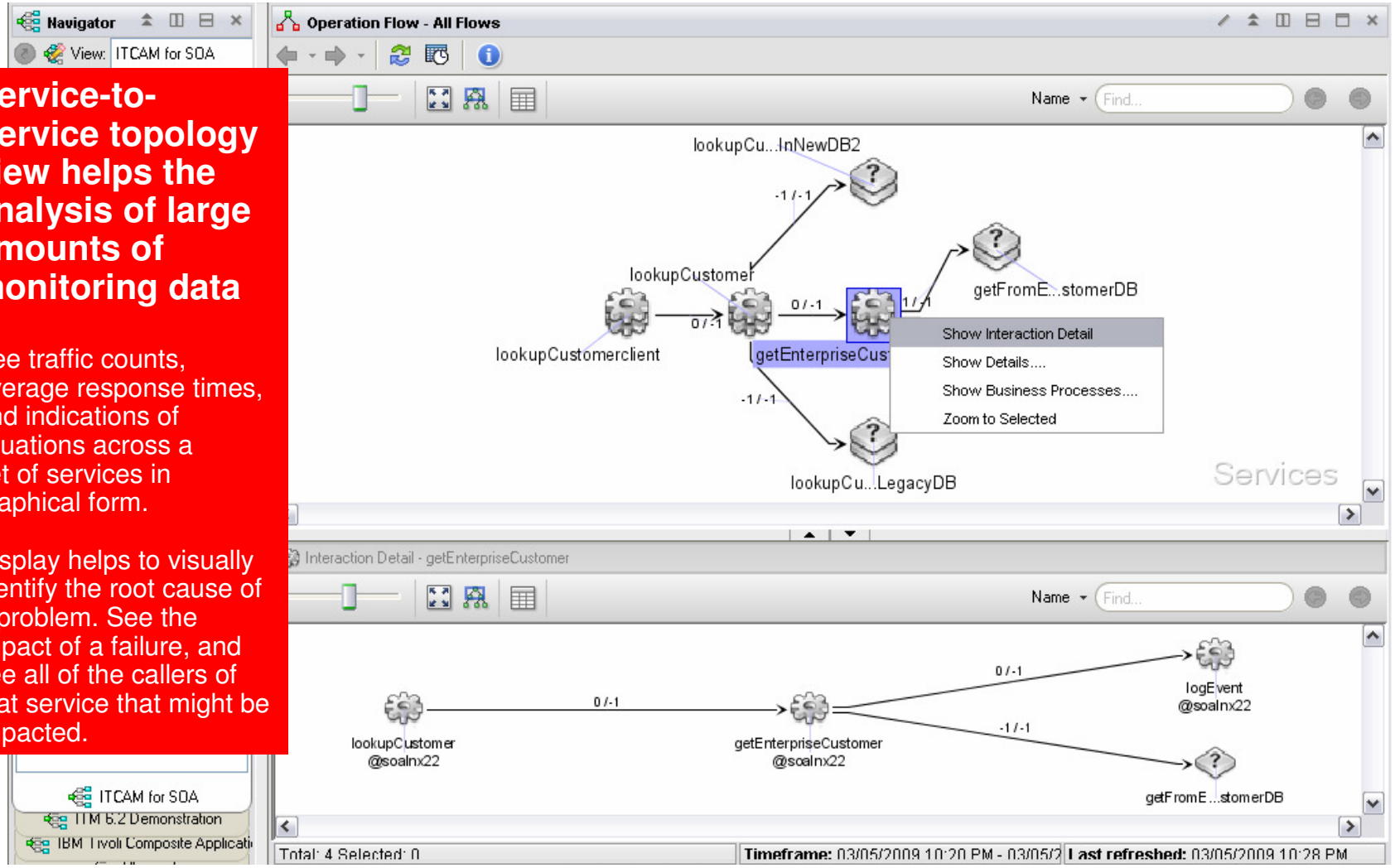


ITCAM for SOA V7.1.0
Provides A View Of The Service-to-Service Topology

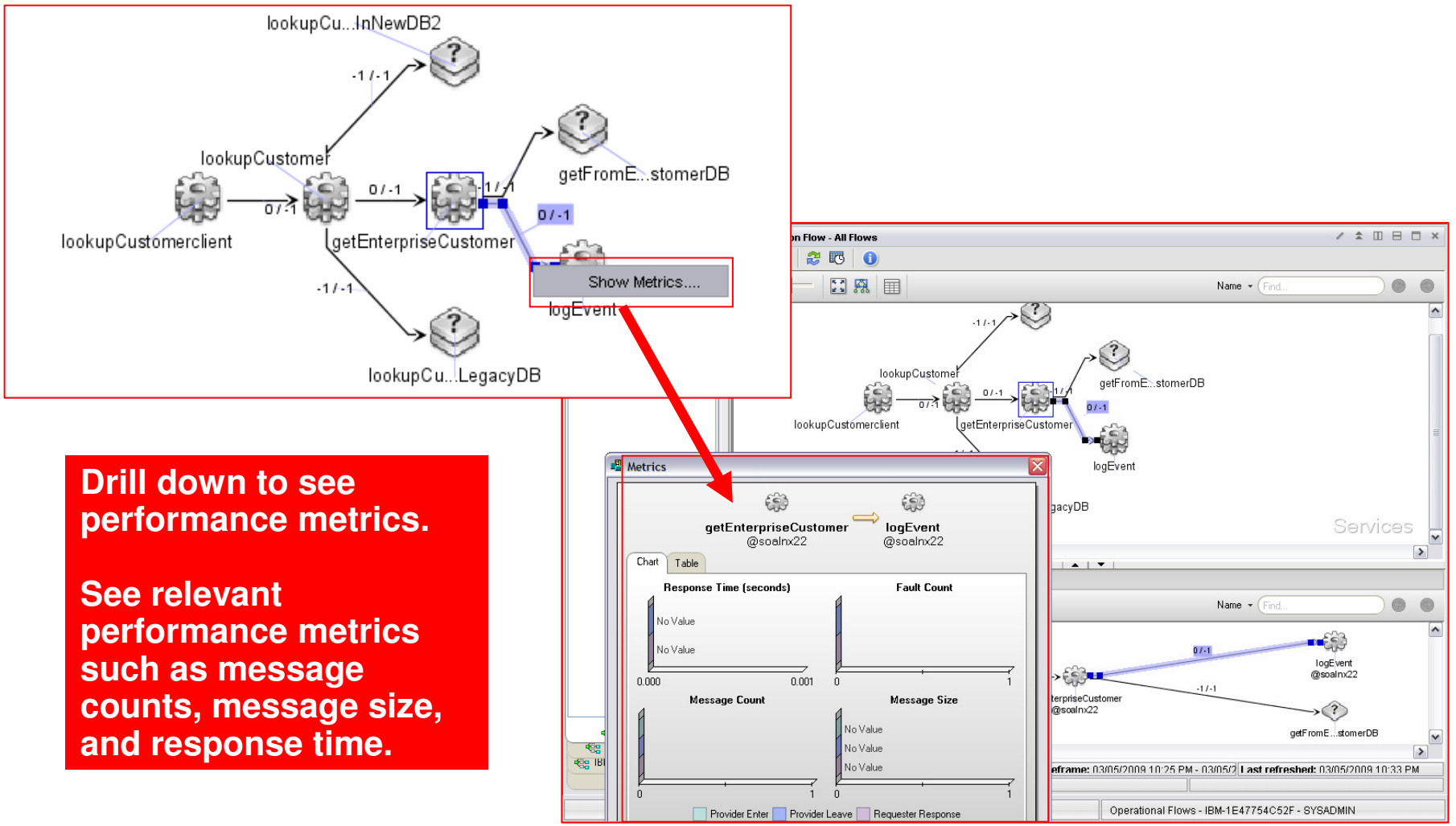
Service-to-Service topology view helps the analysis of large amounts of monitoring data

See traffic counts, average response times, and indications of situations across a set of services in graphical form.

Display helps to visually identify the root cause of a problem. See the impact of a failure, and see all of the callers of that service that might be impacted.



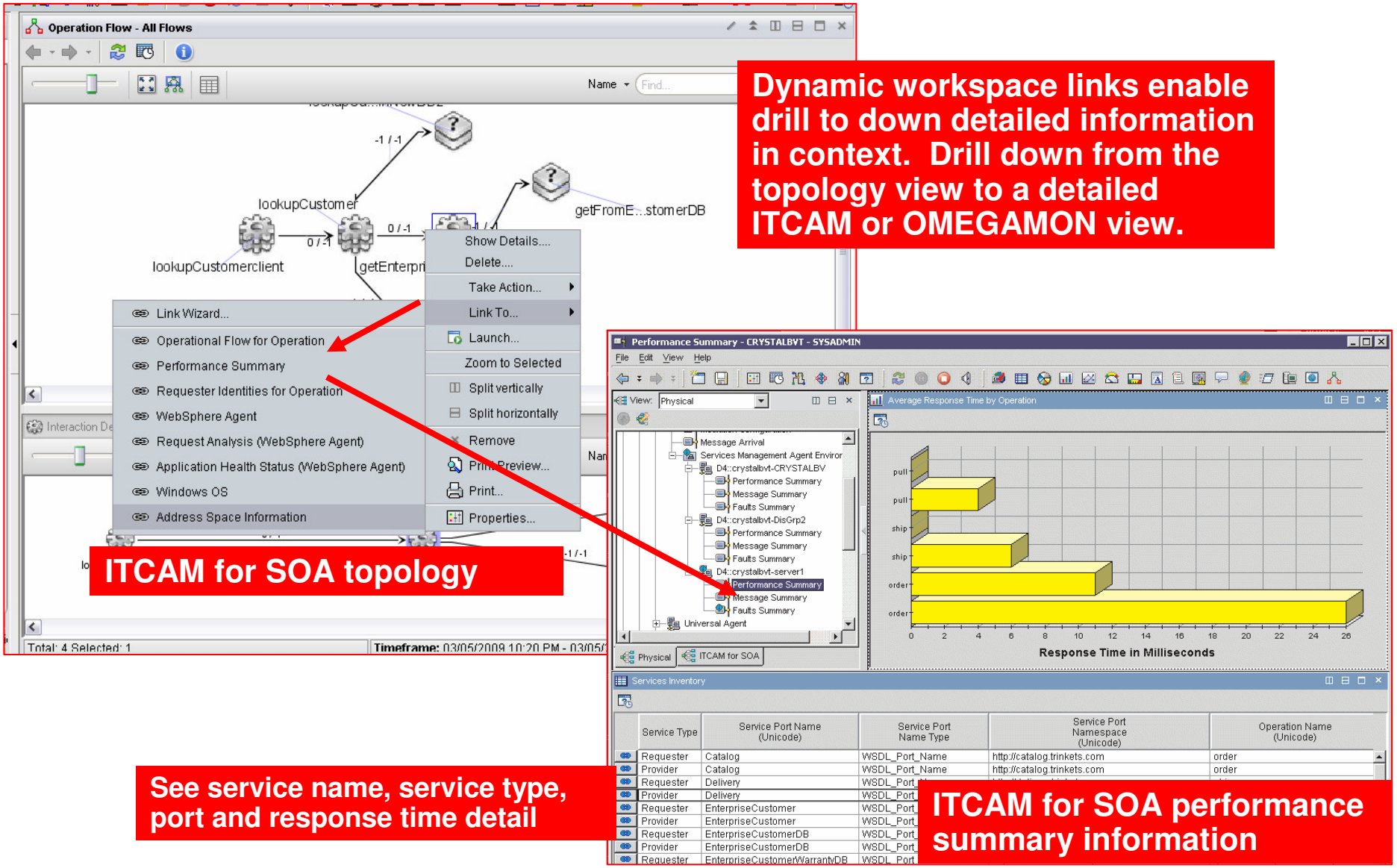
ITCAM for SOA V7.1.0
Provides A View Of Performance Metrics



Drill down to see performance metrics.

See relevant performance metrics such as message counts, message size, and response time.

Use Dynamic Workspace Links To Drill Down To Detail



Dynamic workspace links enable drill to down detailed information in context. Drill down from the topology view to a detailed ITCAM or OMEGAMON view.

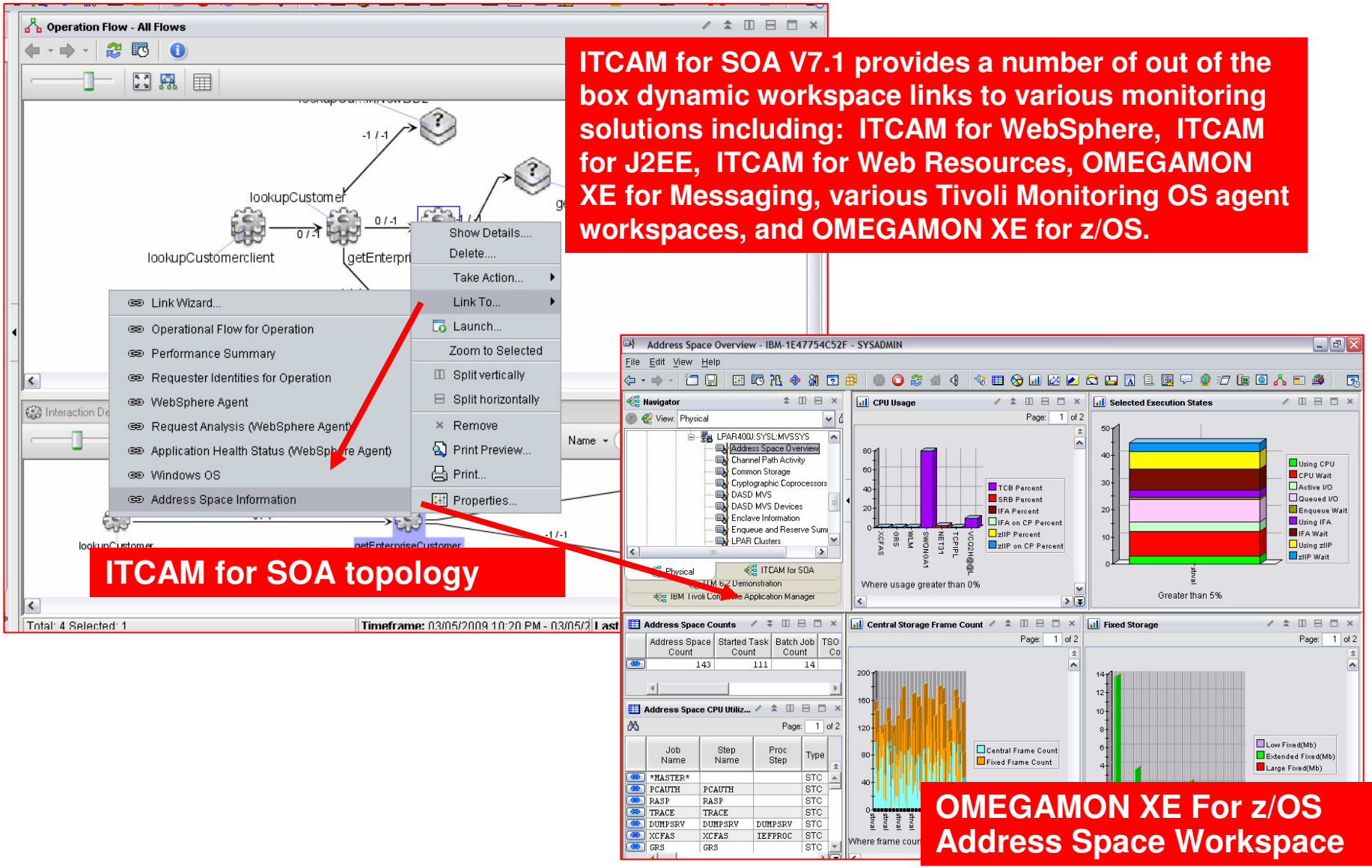
ITCAM for SOA topology

See service name, service type, port and response time detail

ITCAM for SOA performance summary information

Use Dynamic Workspace Links To Drill Down To Detail

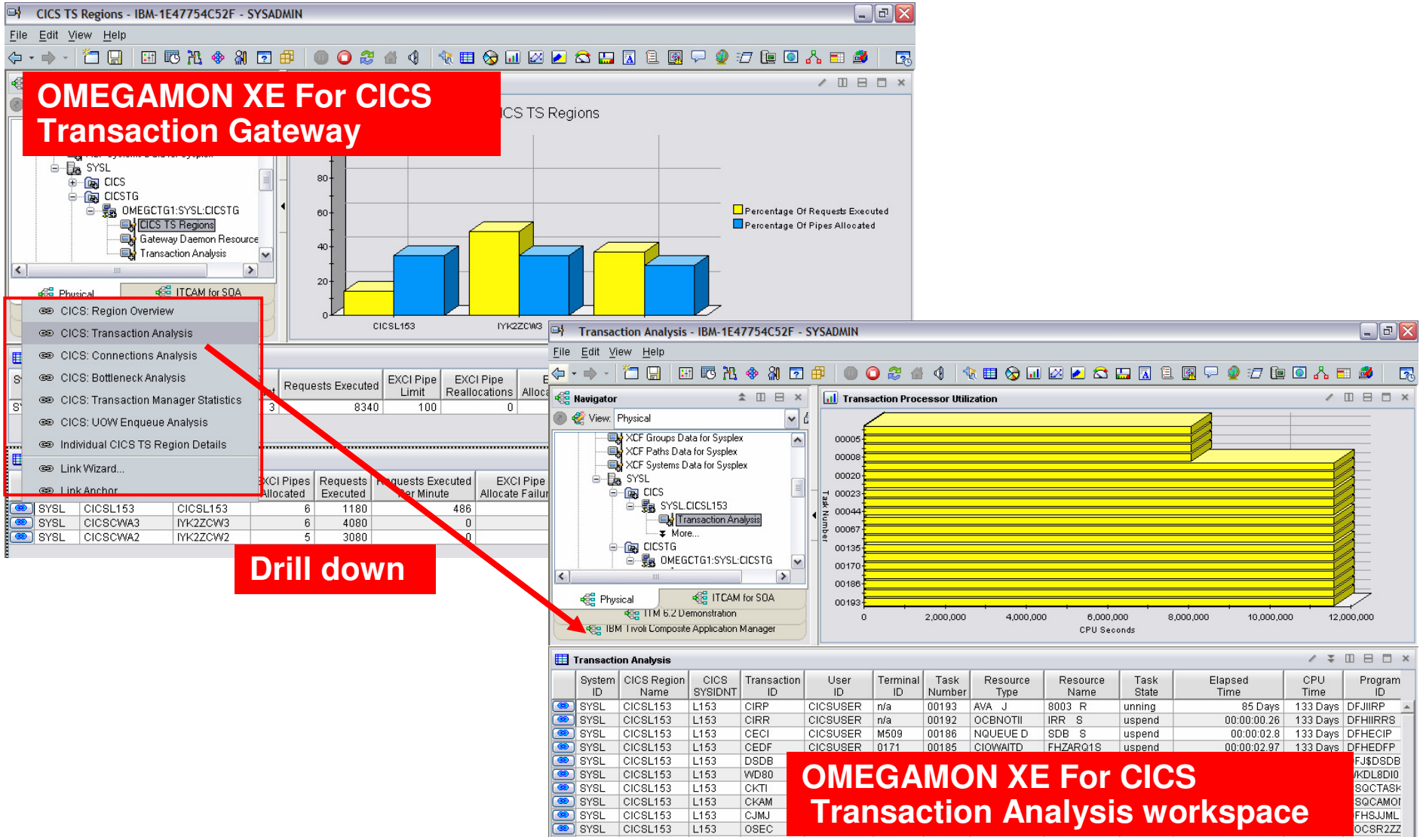
ITCAM for SOA V7.1 provides a number of out of the box dynamic workspace links to various monitoring solutions including: ITCAM for WebSphere, ITCAM for J2EE, ITCAM for Web Resources, OMEGAMON XE for Messaging, various Tivoli Monitoring OS agent workspaces, and OMEGAMON XE for z/OS.



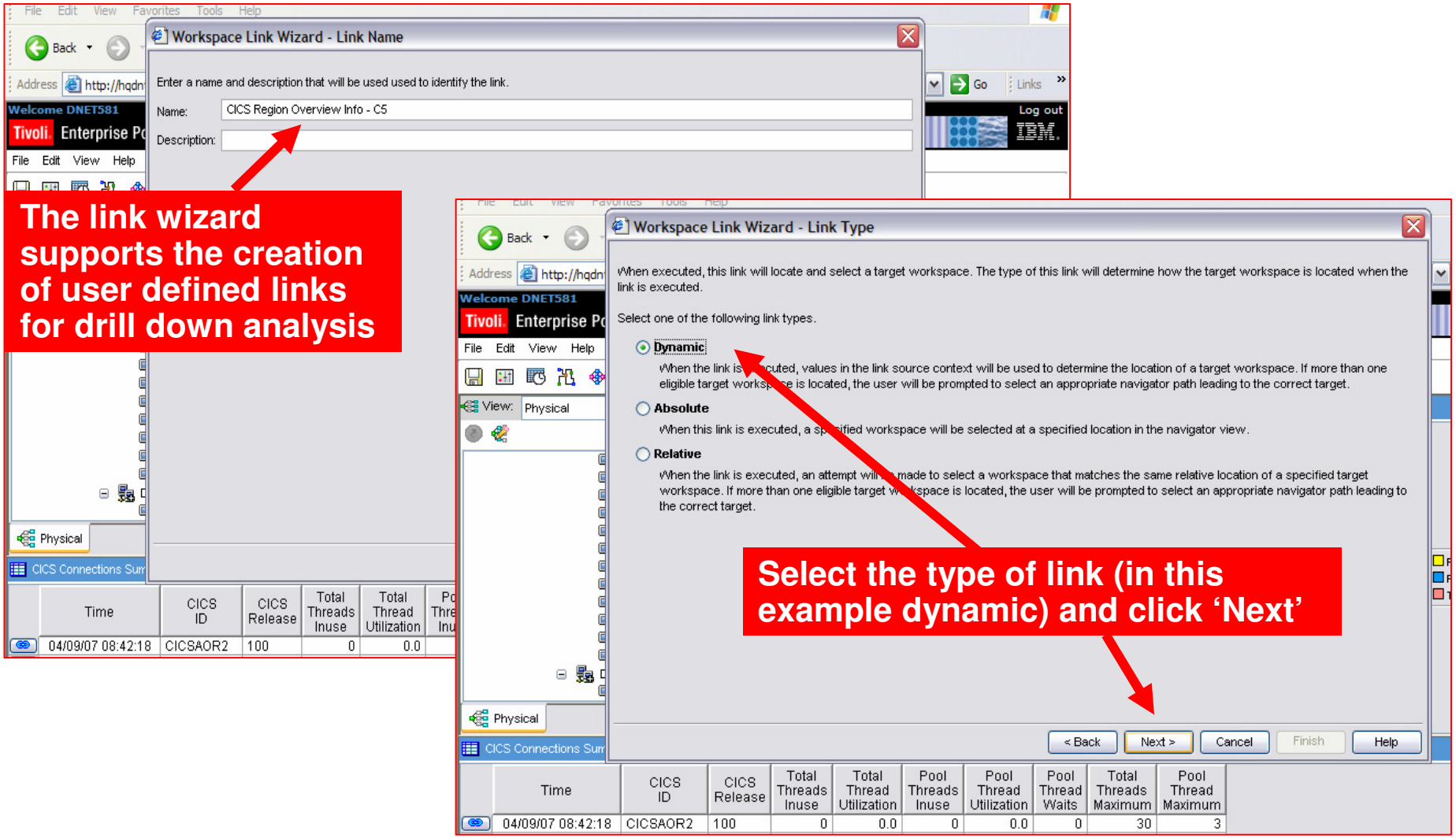
ITCAM for SOA topology

OMEGAMON XE For z/OS Address Space Workspace

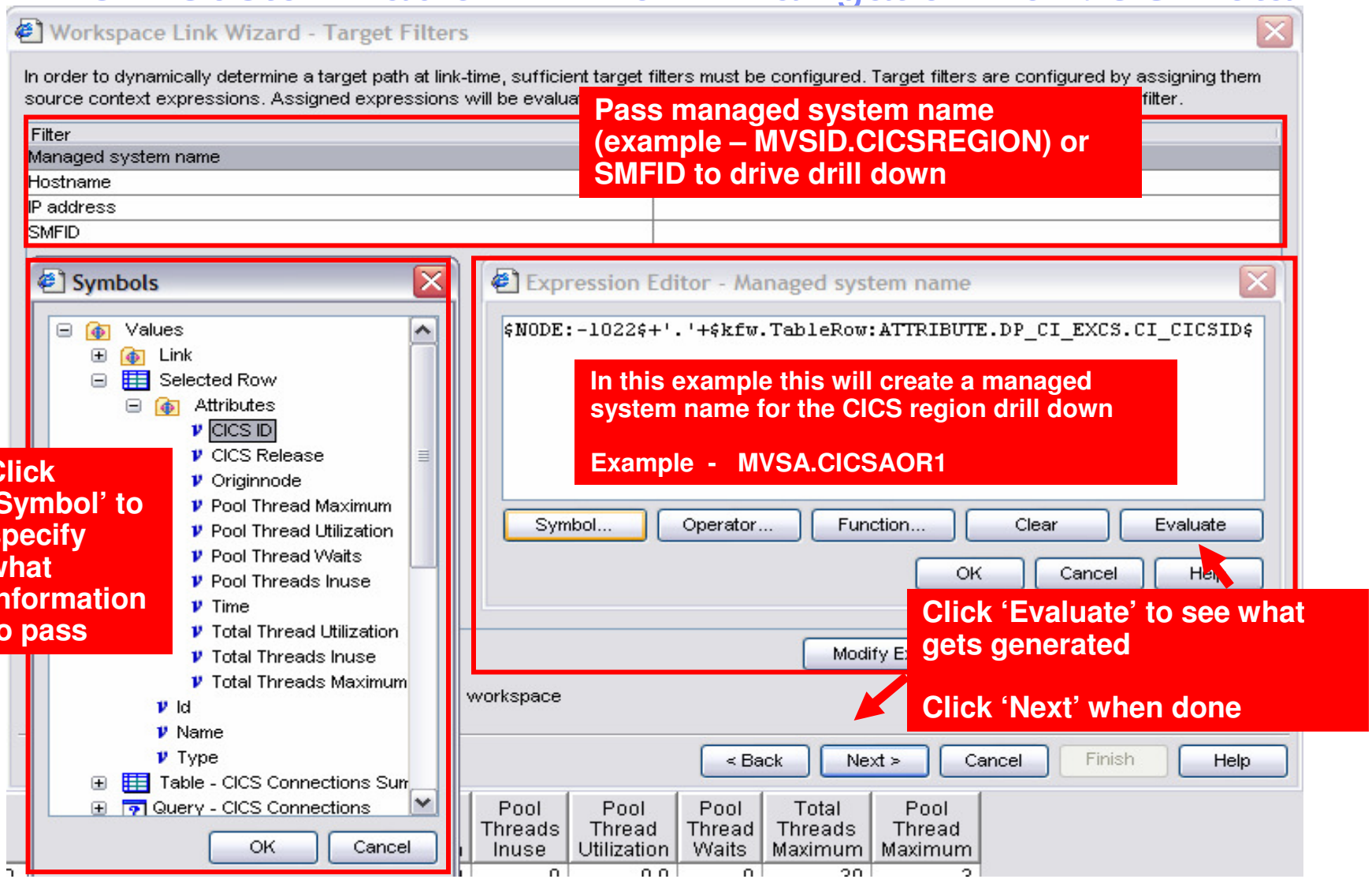
Dynamic Workspace Links To Drill Down From OMEGAMON XE For CICS TG To OMEGAMON XE For CICS



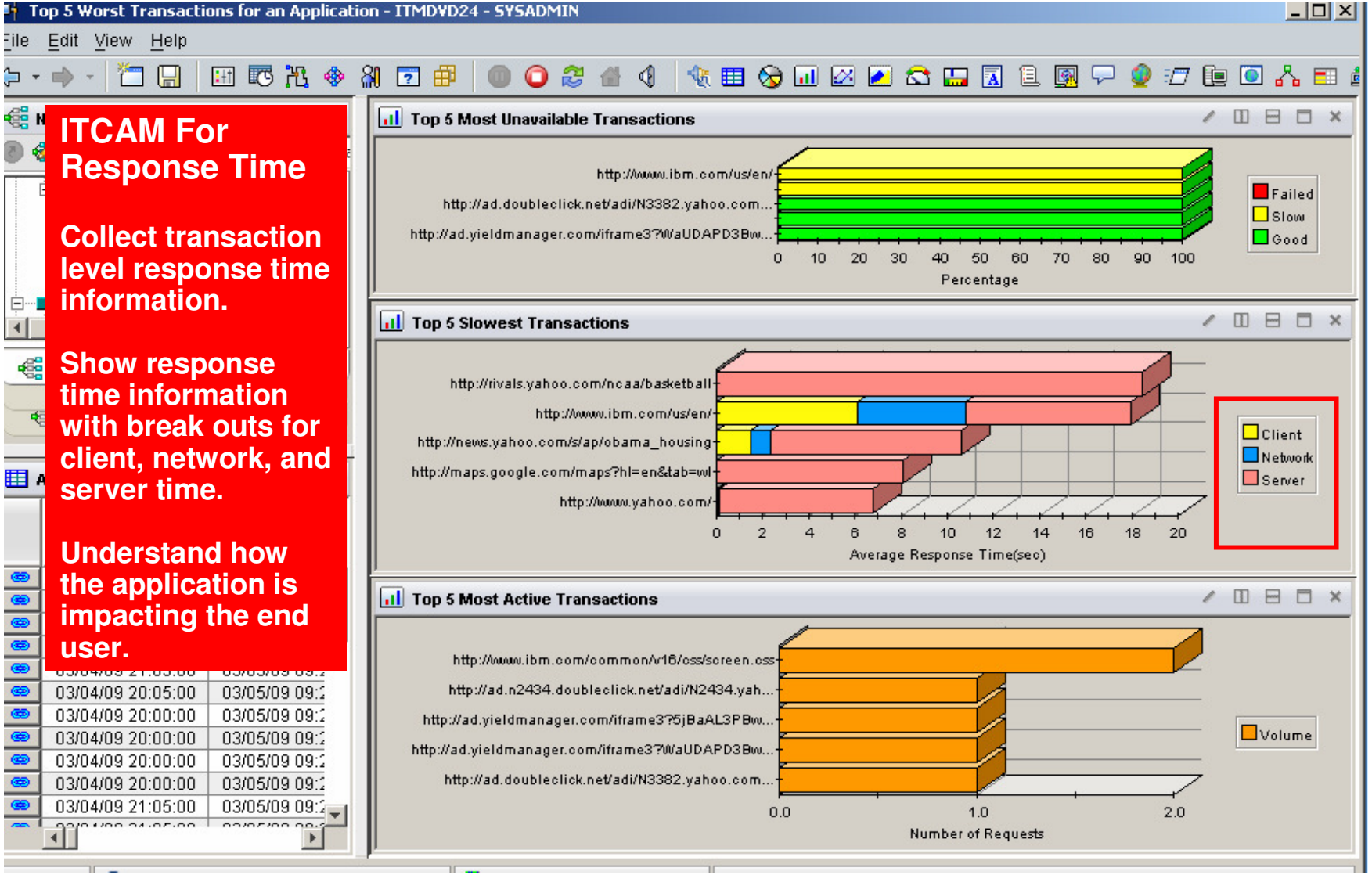
Flexibility Of Monitoring And Navigation Is Supported With Dynamic Workspace Links



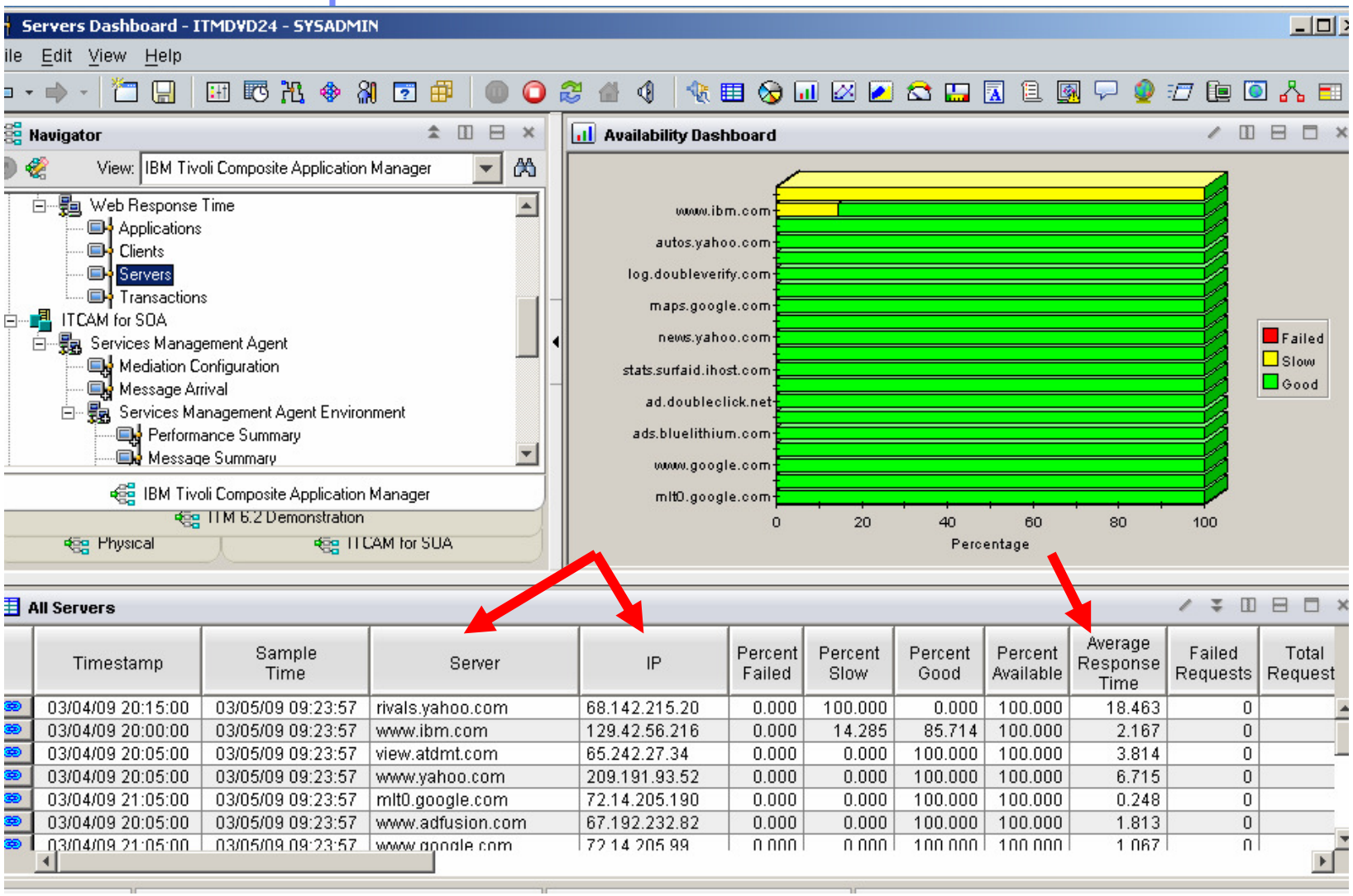
Use The Link Wizard To Define New Dynamic Workspace Links – Customizable Drill Down Navigation To z/OS Detail



Including End User Response Time



Collect Response Time Data From The Server Perspective



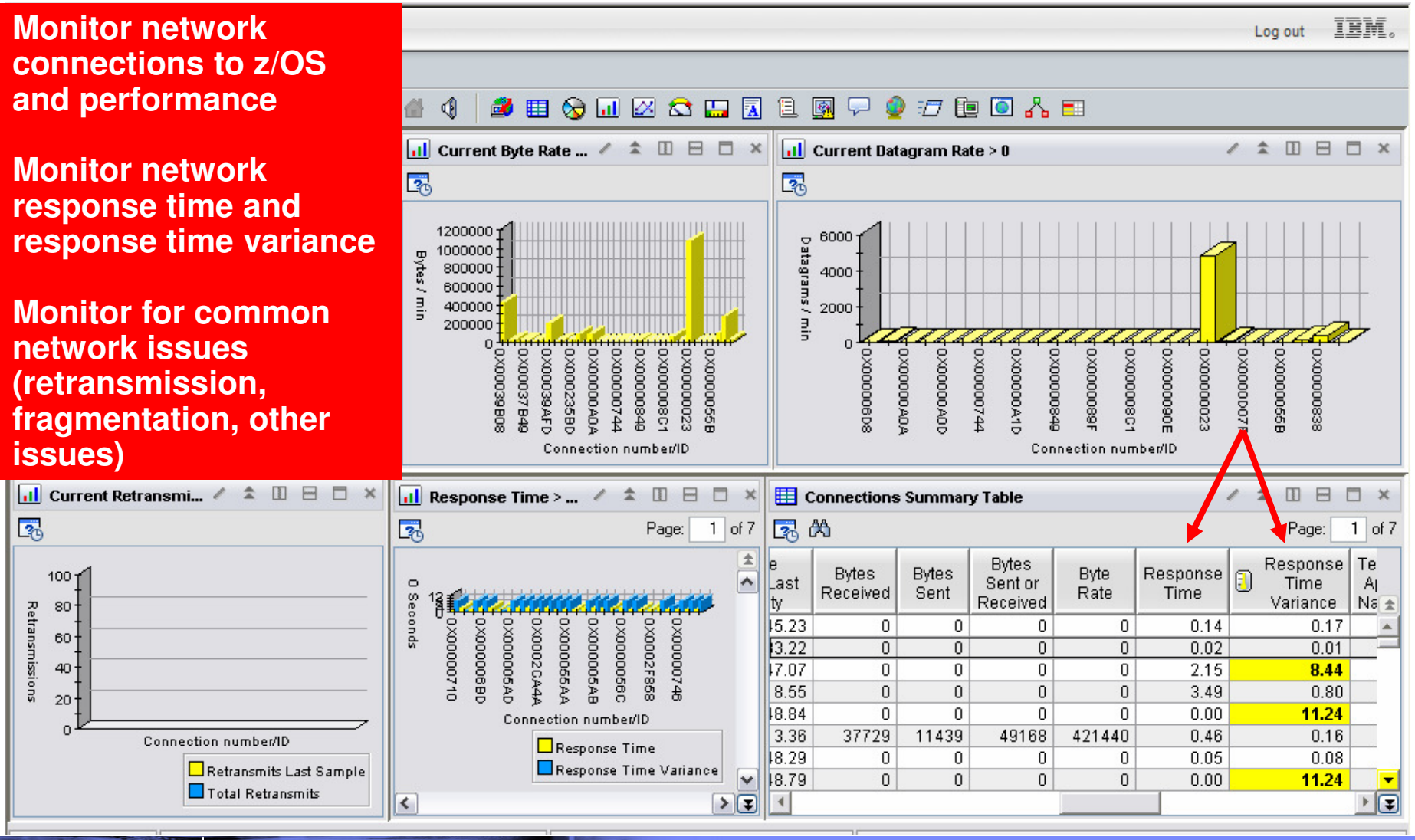
Timestamp	Sample Time	Server	IP	Percent Failed	Percent Slow	Percent Good	Percent Available	Average Response Time	Failed Requests	Total Request
03/04/09 20:15:00	03/05/09 09:23:57	rivals.yahoo.com	68.142.215.20	0.000	100.000	0.000	100.000	18.463	0	
03/04/09 20:00:00	03/05/09 09:23:57	www.ibm.com	129.42.56.216	0.000	14.285	85.714	100.000	2.167	0	
03/04/09 20:05:00	03/05/09 09:23:57	view.atdmt.com	65.242.27.34	0.000	0.000	100.000	100.000	3.814	0	
03/04/09 20:05:00	03/05/09 09:23:57	www.yahoo.com	209.191.93.52	0.000	0.000	100.000	100.000	6.715	0	
03/04/09 21:05:00	03/05/09 09:23:57	mlt0.google.com	72.14.205.190	0.000	0.000	100.000	100.000	0.248	0	
03/04/09 20:05:00	03/05/09 09:23:57	www.adfusion.com	67.192.232.82	0.000	0.000	100.000	100.000	1.813	0	
03/04/09 21:05:00	03/05/09 09:23:57	www.google.com	72.14.205.99	0.000	0.000	100.000	100.000	1.067	0	

The Importance Of Network Performance To SOA

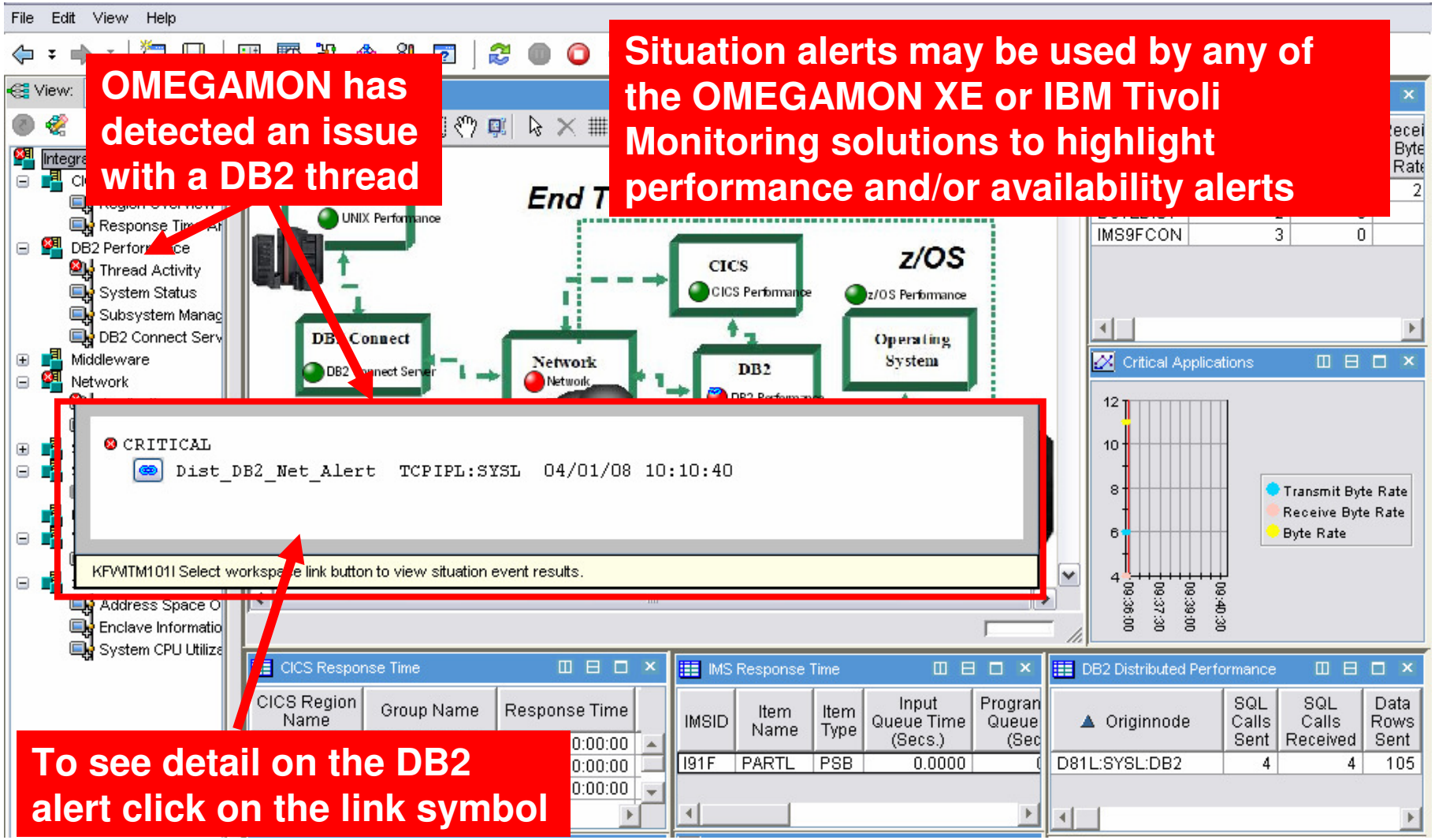
Monitor network connections to z/OS and performance

Monitor network response time and response time variance

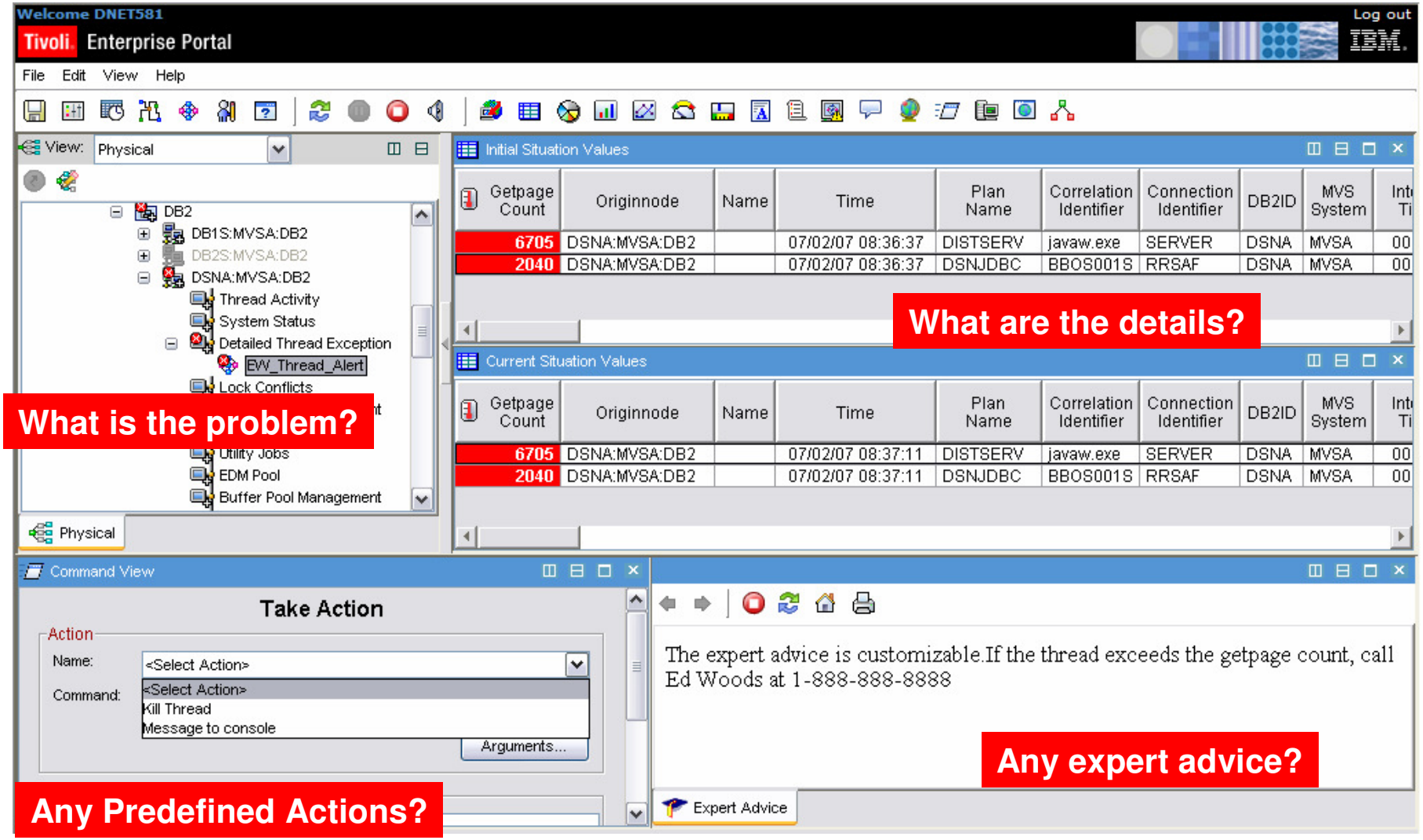
Monitor for common network issues (retransmission, fragmentation, other issues)



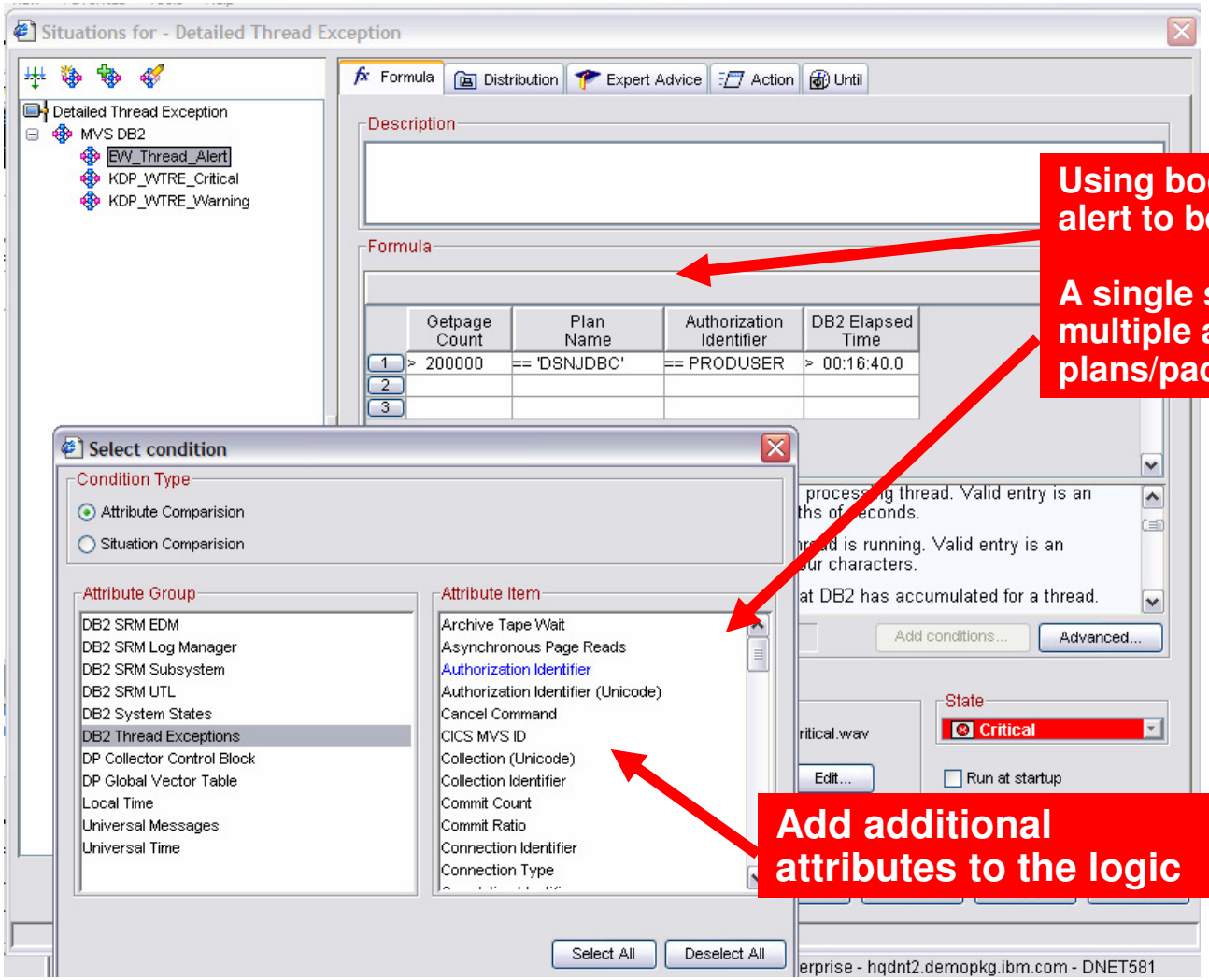
Use OMEGAMON Situation Alerts In The Integrated Technical View To Highlight Issues



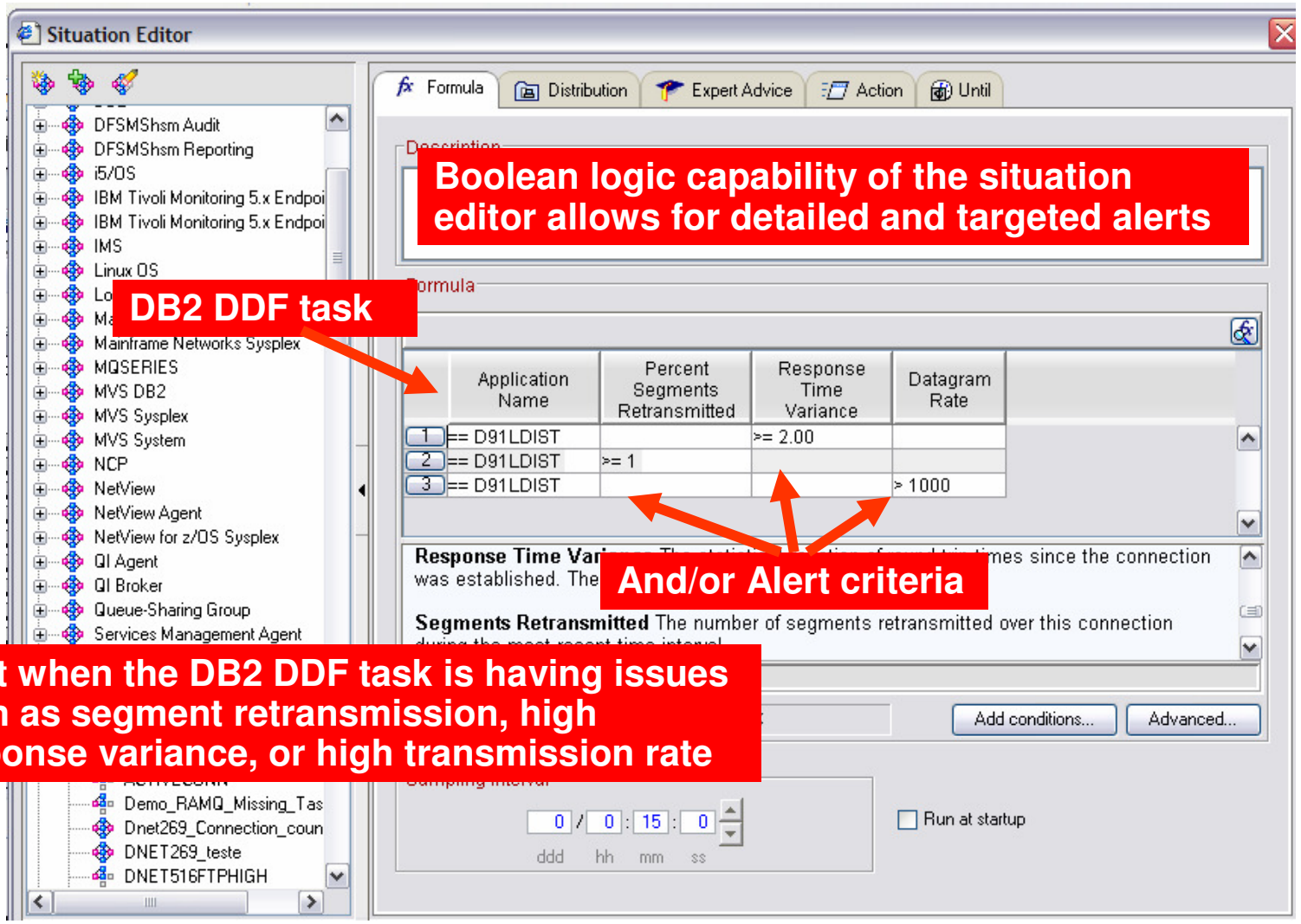
Situation Detail
Drill Down Detail To Analyze Problems



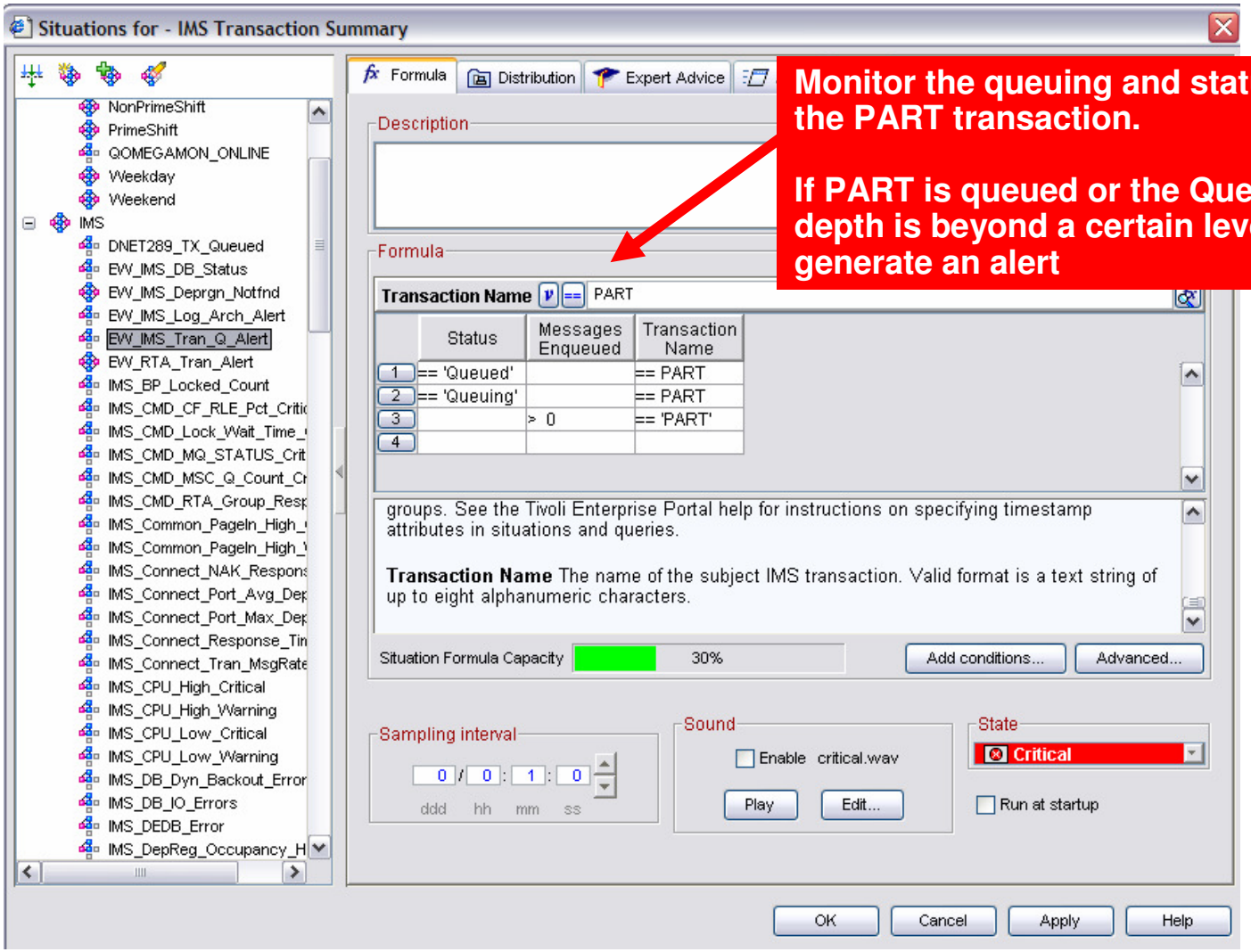
Situation Examples
Use OMEGAMON XE For DB2 To Track Problem DB2 Threads



Use OMEGAMON XE For Mainframe Networks To Alert On DB2 Distributed Network Issues



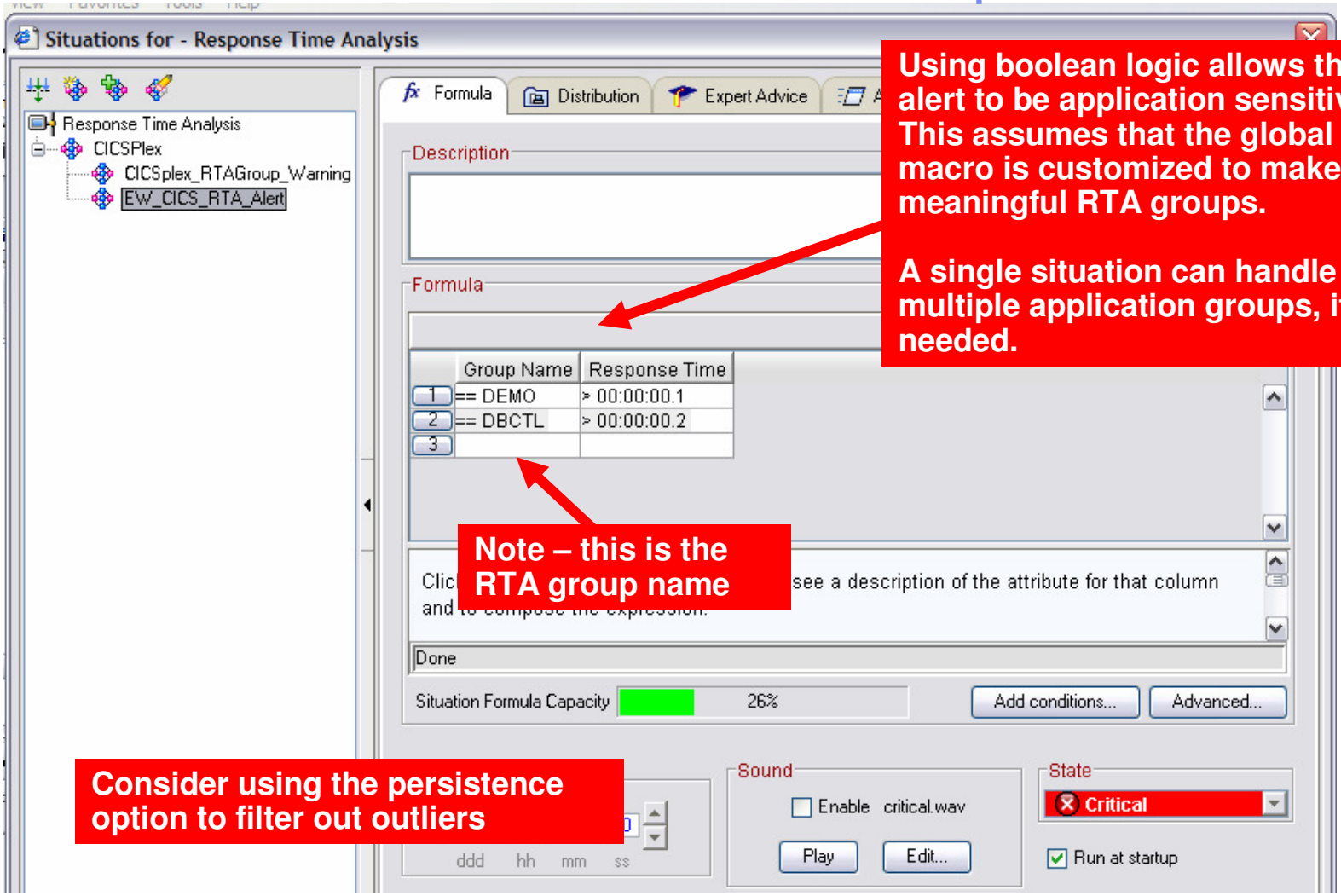
IMS Alert Example - Use OMEGAMON XE For IMS To Monitor IMS Transaction Response Time And Queuing



Monitor the queuing and status of the PART transaction.

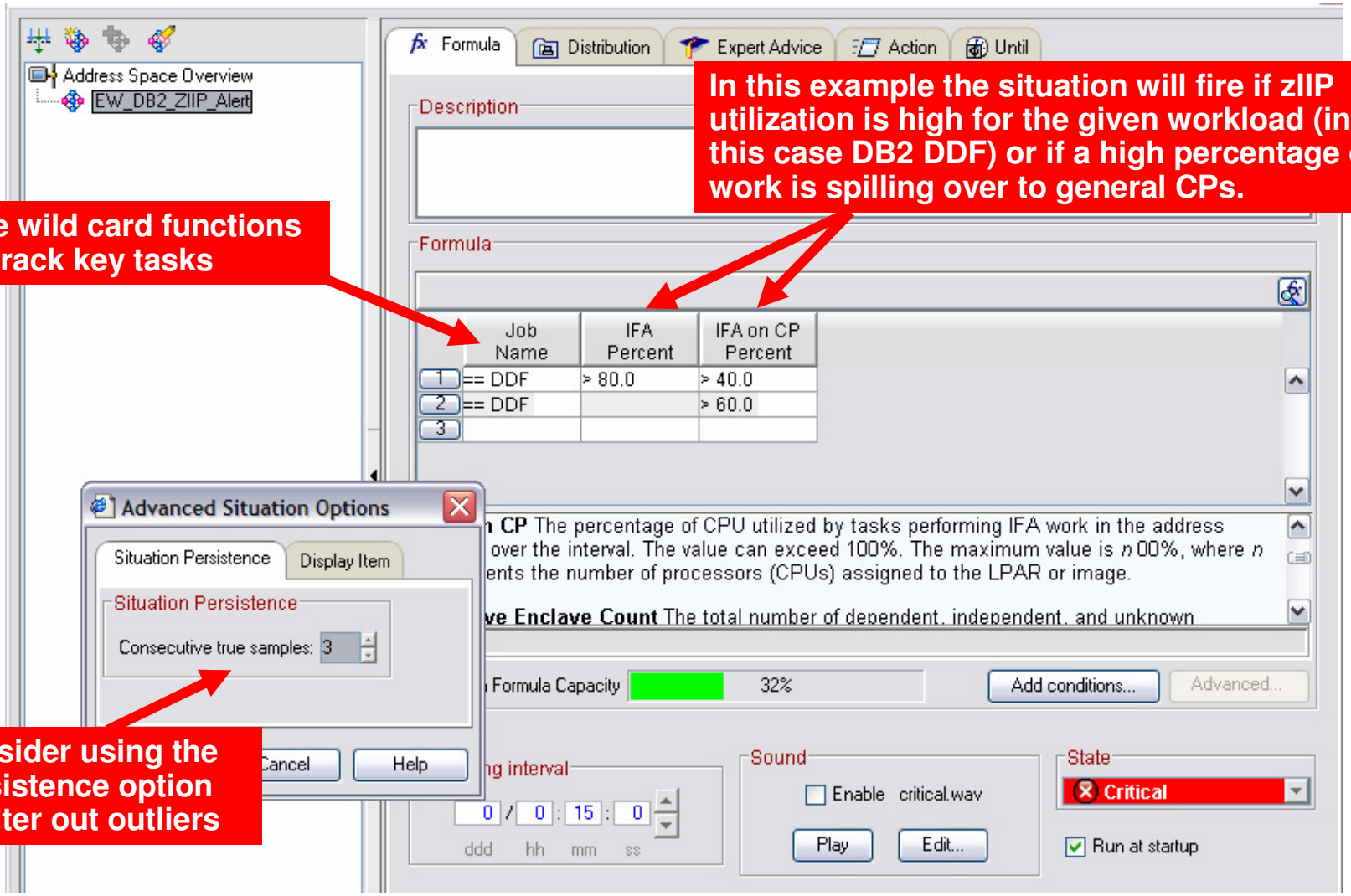
If PART is queued or the Queue depth is beyond a certain level generate an alert

CICS Performance Example
Use Situations To Monitor CICS Response Time

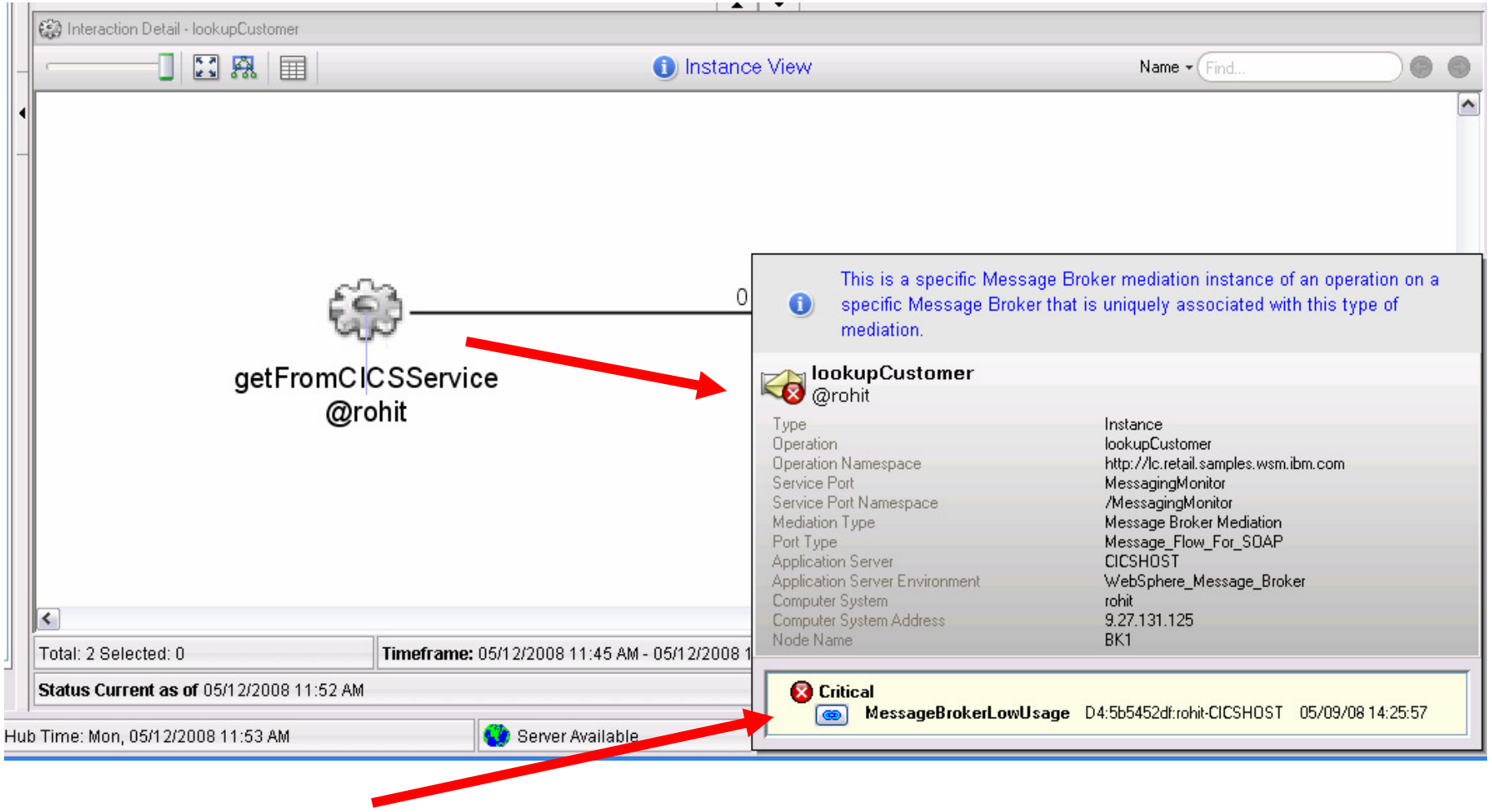


OMEGAMON XE For z/OS Resource Utilization Alert

Alert When zIIP Utilization Is High For zIIP Dependent Workload



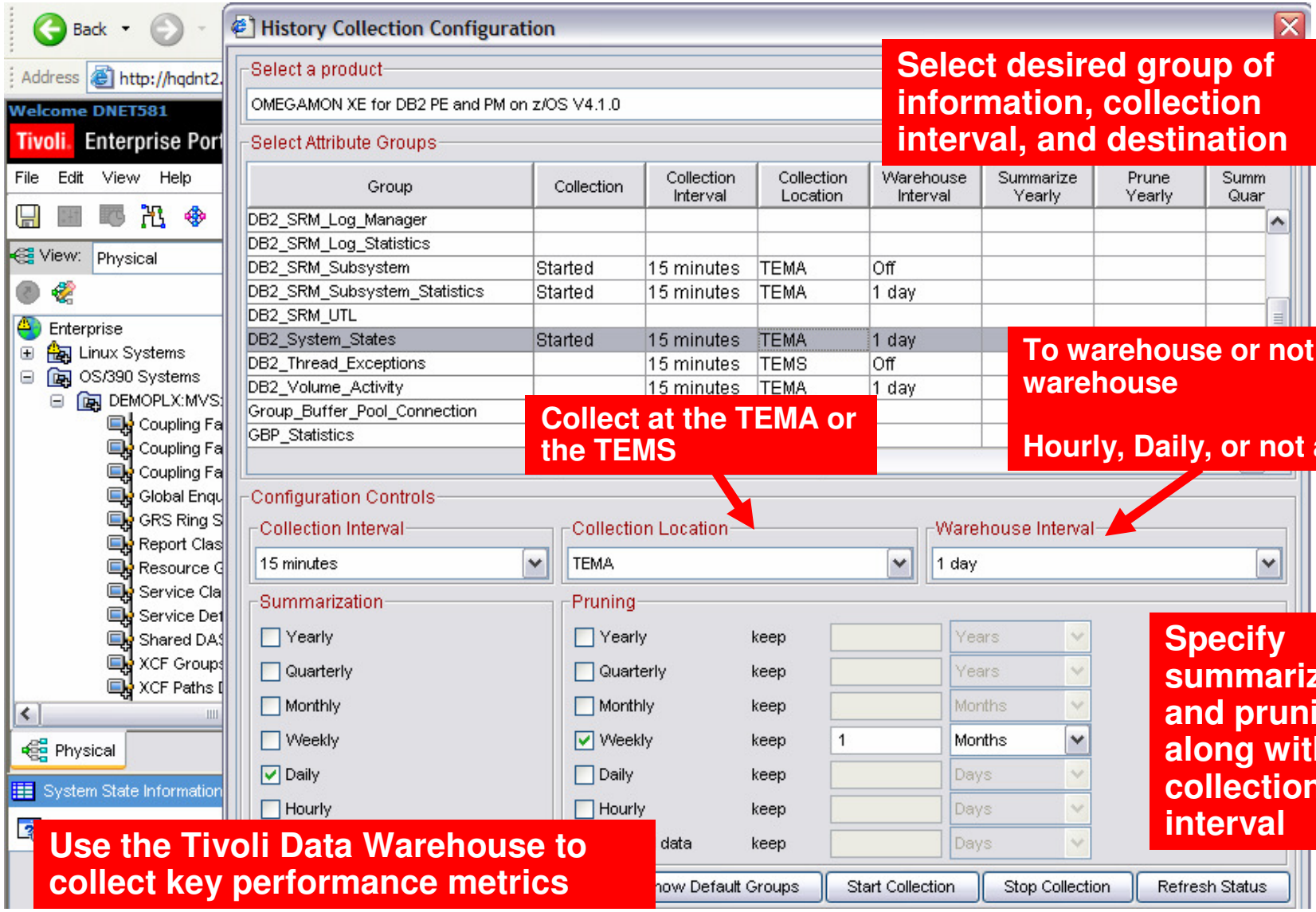
Situation Alerts May Appear In The ITCAM Topology View



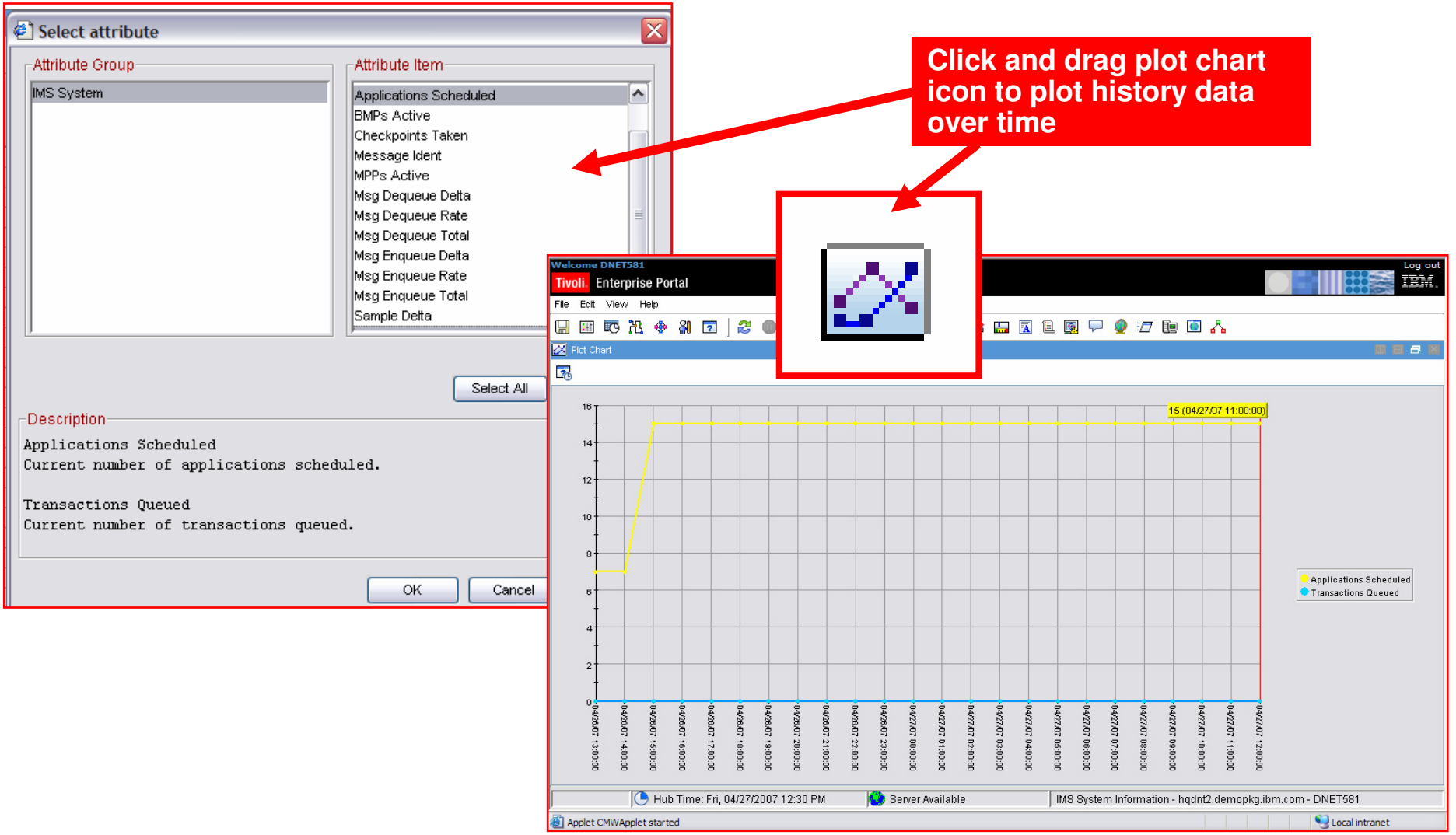
The Importance Of History In SOA Application Monitoring

- Relevant history may take several different forms
- History of application performance and availability
  - Trend application performance over time
- History of key resource performance and availability
  - Track and trend over time
- History of events and problems
  - Trend events and issue frequency over time
- Trending of resource utilitzation over time
- After the fact problem isolation
  - Drill down for detail
  - Correlate history for problem analysis
- Use Tivoli Data Warehouse to track key performance information metrics

Tivoli Data Warehouse History Collection Control



Use Tivoli Data Warehouse For Trend Analysis



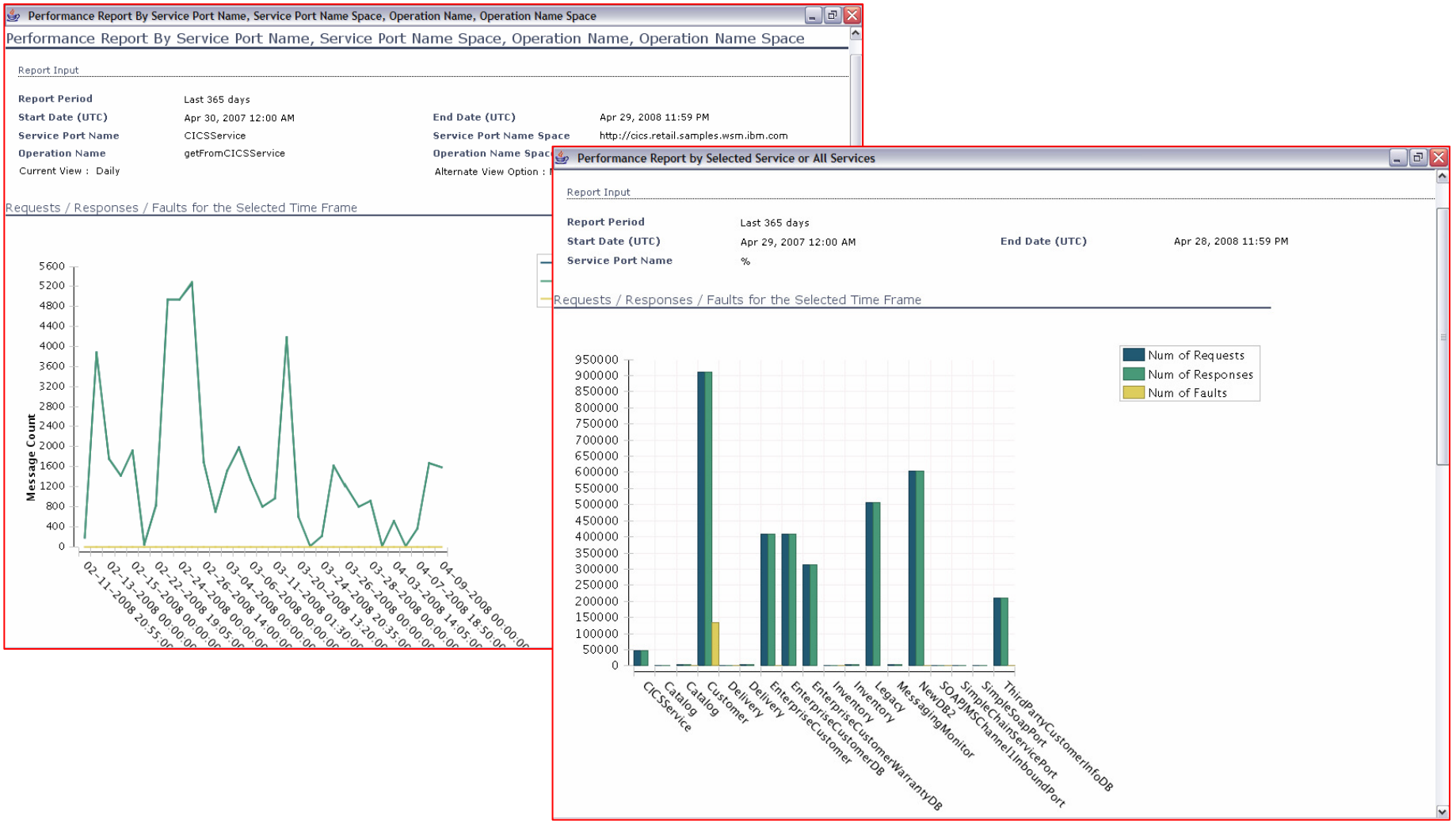
Tivoli Common Reporting

- **Tivoli Common Reporting (TCR) provides:**
  - **Installable package**
  - **Import / export of reports**
  - **Report management and categorization**
  - **Report snapshot generation**
  - **Search functionality**
  - **Data source modification**

Tivoli Common Reporting Web Site On IBM DeveloperWorks http://www.ibm.com/developerworks/spaces/tcr

- **Interaction with TCR can occur via browser using the web application or through the command line interface (CLI)**

Example SOA Reports Available With Tivoli Common Reporter



Developing An SOA Monitoring Strategy
Final Recommendations

- If you don't measure it, you can't manage it
  - Ongoing measurement of application activity and performance is key to success
- Select and publish ongoing performance metrics
  - Track and trend KPIs
- Many issues are anecdotal – gather measurement data
  - Measurement data quantifies the nature and severity of issues
  - Measuring and tracking response time is important
    - End user response time
    - Response time of services and business processes
- Establish performance base lines
  - Snapshot real time data
  - Use history data on an ongoing basis
- Build business application views for key components
  - The value of SOA is a business process as well as technical

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