Getting The Most Out Of Your Monitoring Technology: Isolating And Solving Common IMS Performance Issues

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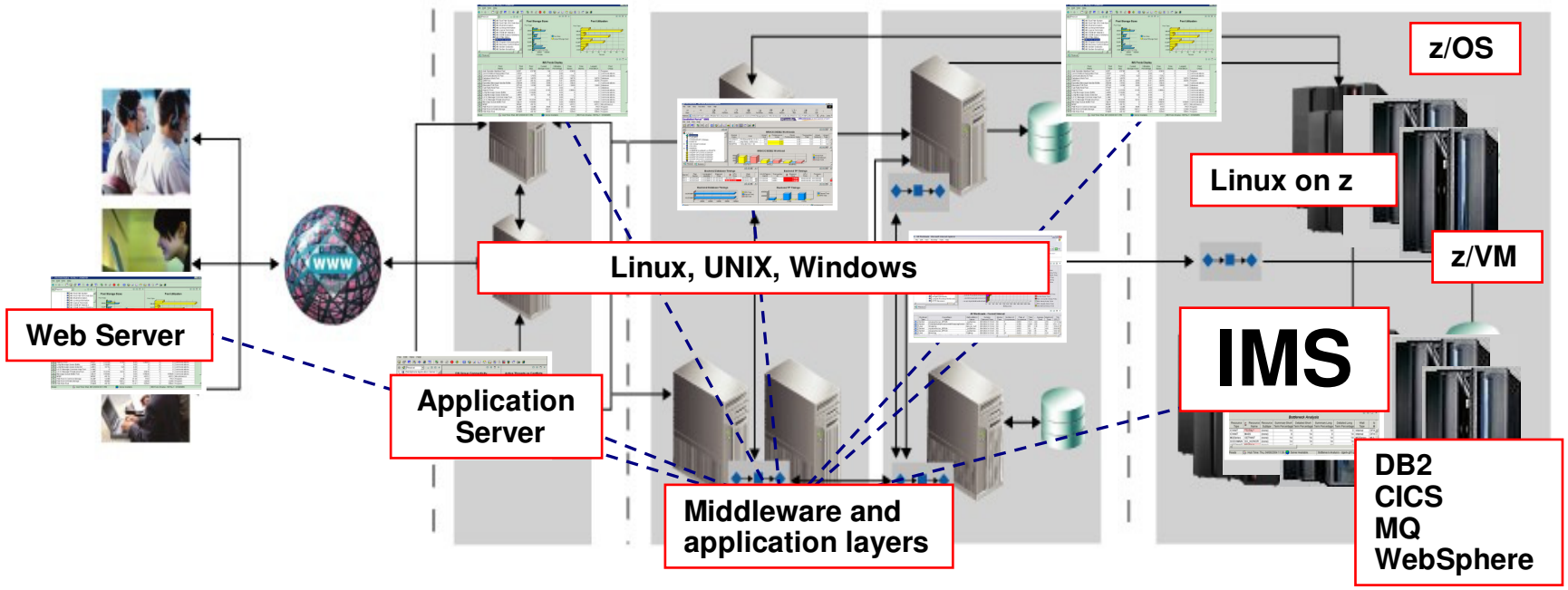
Agenda

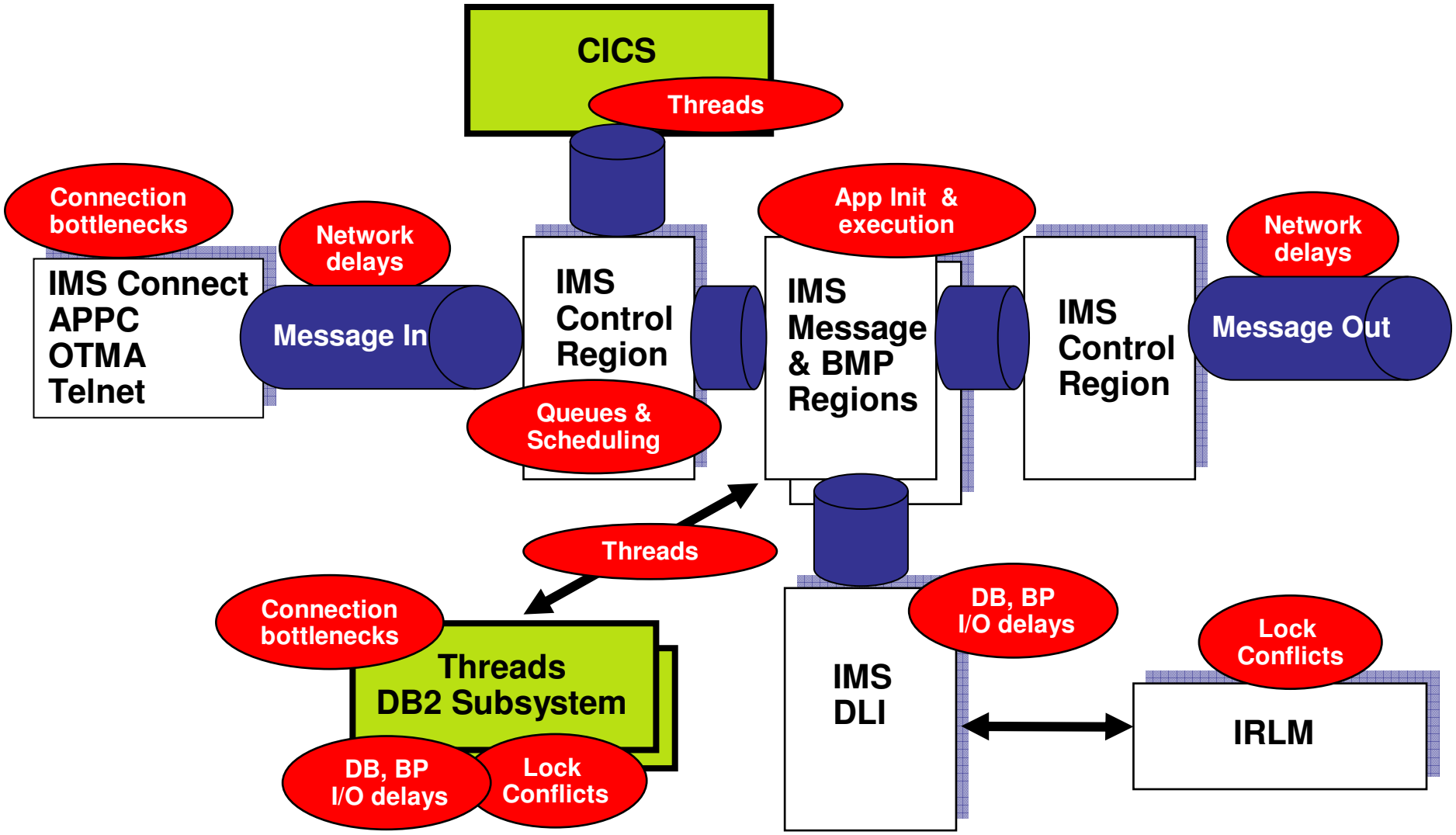
- Understanding the workload
  - IMS as part of a bigger picture
- Real Time IMS monitoring using the Tivoli Enterprise Portal
- Historical data collection options
- Alerting and corrective actions
- Integrated monitoring and management

IMS Is Part Of A Much Bigger Picture



- IMS works as a central component of many critical applications
- Application connectivity and flow may take many forms
- Understanding the flow helps drive monitoring requirements

Understanding The Flow Of IMS Processing
What Are The Potential Bottlenecks?



Creating A Consolidated Monitoring Strategy To Analyze IMS Processing And Bottlenecks

- Managing and analyzing IMS performance depends upon an understanding of the flow of the workload
  - What is the workload?
  - What is the flow of the workload?
  - Where are the potential workload bottlenecks?
  - If the workload is bottlenecked, to what extent?
- Build a monitoring strategy to focus on key metrics
  - Bottleneck analysis (wait states for the system and by workload group)
  - Transaction rate information at various levels
    - IMS transaction response time correlated with transaction rate
    - Transaction enqueue/dequeue rate at various levels
      - Enqueue/dequeue rate at the system level
      - Enqueue/dequeue rate at the OTMA level
      - Enqueue/dequeue rate at the Fast Path level
  - Transaction queue depth
    - Queuing at the system level and the transaction level
    - Queuing at other levels (FP BALG, MSC link, etc.)
  - Dependent region processing (region occupancy)

Monitoring Information
Real Time *versus* Historical *versus* Alerts

- A complete monitoring approach will commonly require elements of each of the following:
  - Real time performance and availability
    - Current resource utilization, availability, and status
  - Historical performance and availability
    - Detailed historical performance and availability information
    - Interval historical information for trending and analysis
  - Alerts and Automation
    - Alert notification of critical performance and availability issues
    - Notification of alerts (visual or via other means)
    - Automated corrective action (where appropriate)

Examples Of Typical IMS Performance And Availability Challenges

- IMS response time, queuing and bottlenecks
  - IMS transactions queued
  - IMS scheduling delays
  - IMS application performance bottlenecks
- IMS connection bottlenecks
  - CICS/DBCTL connection bottlenecks
  - Network delays
  - Delays related to IMS Connect, OTMA, APPC, etc.
- IMS database and subsystem delays
  - IMS database delays
    - High I/O, poor BP performance and IMS lock conflicts
- External subsystem (DB2) delays – elongate IMS application time
  - DB2 thread connection issues
  - DB2 SQL delays
  - DB2 database I/O delays and BP performance
  - DB2 lock conflicts

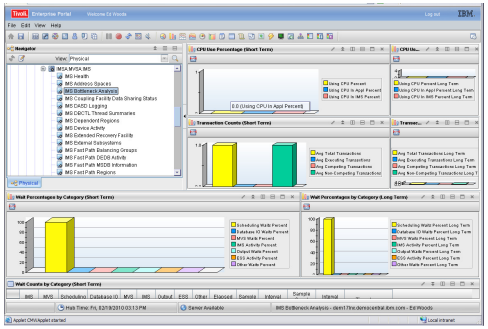
OMEGAMON XE For IMS on z/OS V4.20 Components And Facilities

Real Time

- ***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*
- ***Operator Assist & Integrated Console Facility***
  - *IMS resource commands*
- ***Near Term History***
  - *View recent transaction activity*
- ***Application Trace Facility***
  - *Detailed Application Trace function*
- ***Multiple System and Plex level information***
  - *N-way data sharing, Global Locking, Multiple Systems Coupling, shared queues*
- ***Exceptions, Alerts, Integration***
  - *Integrated alert/automation and analysis*

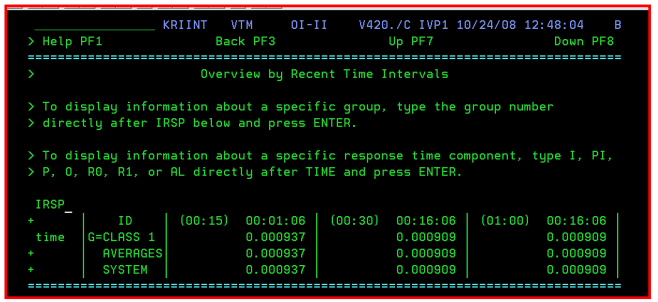
Historical

- ***EPILOG Historical***
  - *Historical analysis of transaction response, bottlenecks and IMS resources by group & interval*
  - *Stored in Epilog Data Store (EDS)*
- ***Transaction Reporting Facility (TRF)***
  - *Detailed transaction & database data – individual transactions*
  - *Data retrieved from IMS log*
  - *Integration with IBM IMS Performance Analyzer (IMS PA)*
- ***XE Snapshot Historical***
  - *Snapshot historical stored in the Tivoli Data Warehouse*
  - *Reporting, trending, baselines*

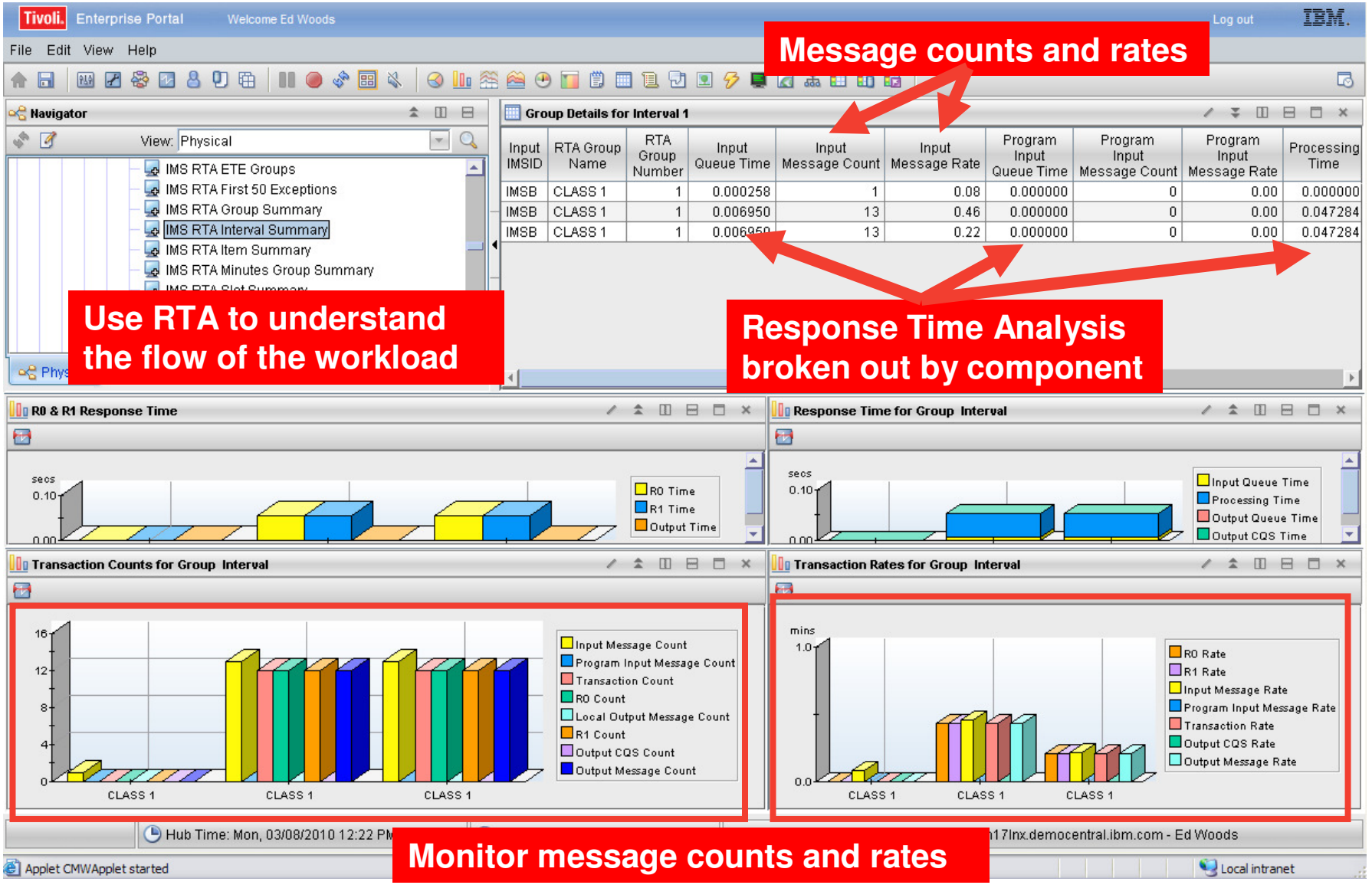


Response Time Analysis – RTA Monitors Workload On An Ongoing Basis

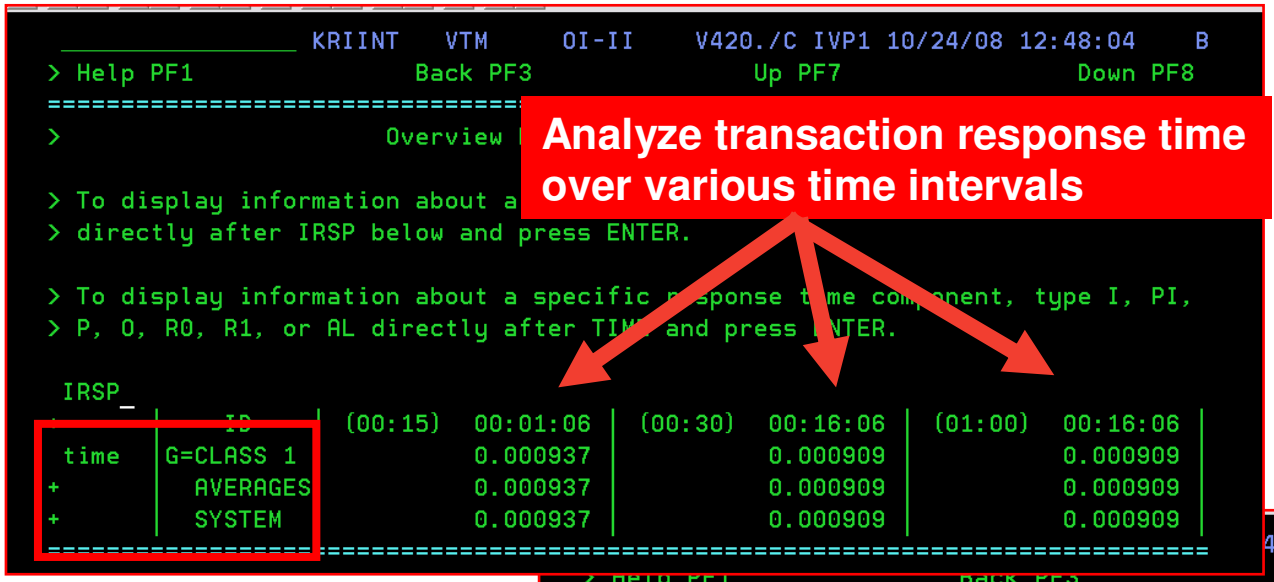
- Response Time Analysis (RTA) provides critical information on workload flow, issues, and outliers
- RTA does several things
  - Captures detailed response time data from IMS and stores it in user-definable groups
  - RTA measures queuing and service times within IMS
    - Input queue time, Processing time, Output queue time
  - Groups work in conjunction with Bottleneck Analysis
- RTA group considerations
  - Focus user-defined groups on key workload
    - Loved ones and problem children



Monitor The Flow Of The Workload
Use Response Time Analysis To Identify Problems And Outliers



Use Response Time Analysis To Understand Transaction Performance And To Identify Potential Issues

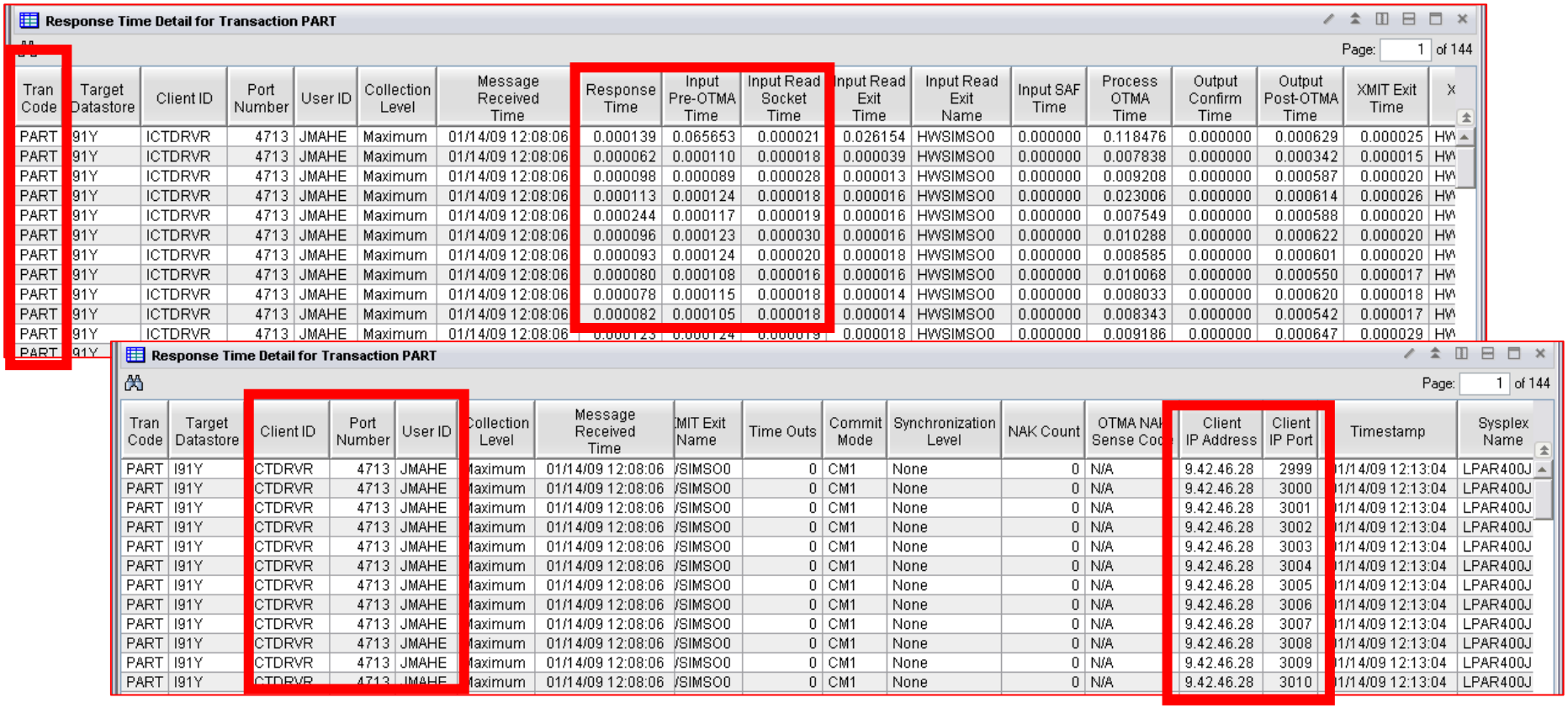


Analyze transaction response time over various time intervals

RTA will show transaction response time for workload groups, broken down by component, and various time intervals.

Identify tran with longest response times

For IMS Connect Transactions OMEGAMON Enables Detailed IMS Connect Transaction Level Monitoring



Response Time Detail for Transaction PART

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Tran Code	Target Datastore	Client ID	Port Number	User ID	Collection Level	Message Received Time	Response Time	Input Pre-OTMA Time	Input Read Socket Time	Input Read Exit Time	Input Read Exit Name	Input SAF Time	Process OTMA Time	Output Confirm Time	Output Post-OTMA Time	XMIT Exit Time	X
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000139	0.065653	0.000021	0.026154	HWSIMSO0	0.000000	0.118476	0.000000	0.000629	0.000025	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000062	0.000110	0.000018	0.000039	HWSIMSO0	0.000000	0.007838	0.000000	0.000342	0.000015	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000098	0.000089	0.000028	0.000013	HWSIMSO0	0.000000	0.009208	0.000000	0.000587	0.000020	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000113	0.000124	0.000018	0.000016	HWSIMSO0	0.000000	0.023006	0.000000	0.000614	0.000026	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000244	0.000117	0.000019	0.000016	HWSIMSO0	0.000000	0.007549	0.000000	0.000588	0.000020	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000096	0.000123	0.000030	0.000016	HWSIMSO0	0.000000	0.010288	0.000000	0.000622	0.000020	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000093	0.000124	0.000020	0.000018	HWSIMSO0	0.000000	0.008585	0.000000	0.000601	0.000020	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000080	0.000108	0.000016	0.000016	HWSIMSO0	0.000000	0.010068	0.000000	0.000550	0.000017	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000078	0.000115	0.000018	0.000014	HWSIMSO0	0.000000	0.008033	0.000000	0.000620	0.000018	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000082	0.000105	0.000018	0.000014	HWSIMSO0	0.000000	0.008343	0.000000	0.000542	0.000017	HW
PART	91Y	ICTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	0.000123	0.000124	0.000019	0.000018	HWSIMSO0	0.000000	0.009186	0.000000	0.000647	0.000029	HW

Response Time Detail for Transaction PART

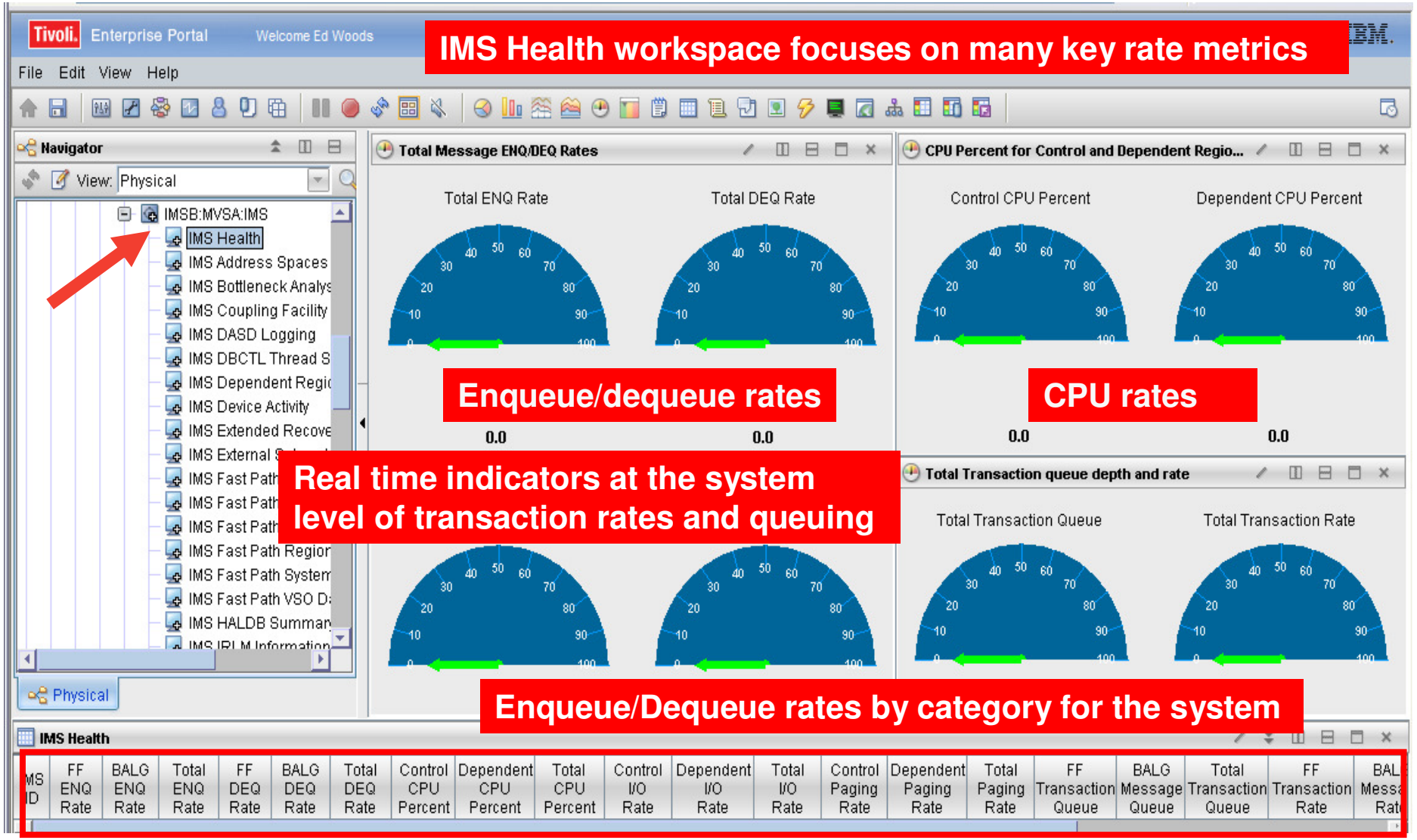
Page: 1 of 144

Tran Code	Target Datastore	Client ID	Port Number	User ID	Collection Level	Message Received Time	MIT Exit Name	Time Outs	Commit Mode	Synchronization Level	NAK Count	OTMA NAK Sense Cod	Client IP Address	Client IP Port	Timestamp	Sysplex Name
PART	I91Y	CTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	2999	01/14/09 12:13:04	LPAR400J
PART	I91Y	CTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3000	01/14/09 12:13:04	LPAR400J
PART	I91Y	CTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3001	01/14/09 12:13:04	LPAR400J
PART	I91Y	CTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3002	01/14/09 12:13:04	LPAR400J
PART	I91Y	CTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3003	01/14/09 12:13:04	LPAR400J
PART	I91Y	CTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3004	01/14/09 12:13:04	LPAR400J
PART	I91Y	CTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3005	01/14/09 12:13:04	LPAR400J
PART	I91Y	CTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3006	01/14/09 12:13:04	LPAR400J
PART	I91Y	CTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3007	01/14/09 12:13:04	LPAR400J
PART	I91Y	CTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3008	01/14/09 12:13:04	LPAR400J
PART	I91Y	CTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3009	01/14/09 12:13:04	LPAR400J
PART	I91Y	CTDRVR	4713	JMAHE	Maximum	01/14/09 12:08:06	/SIMSO0	0	CM1	None	0	N/A	9.42.46.28	3010	01/14/09 12:13:04	LPAR400J

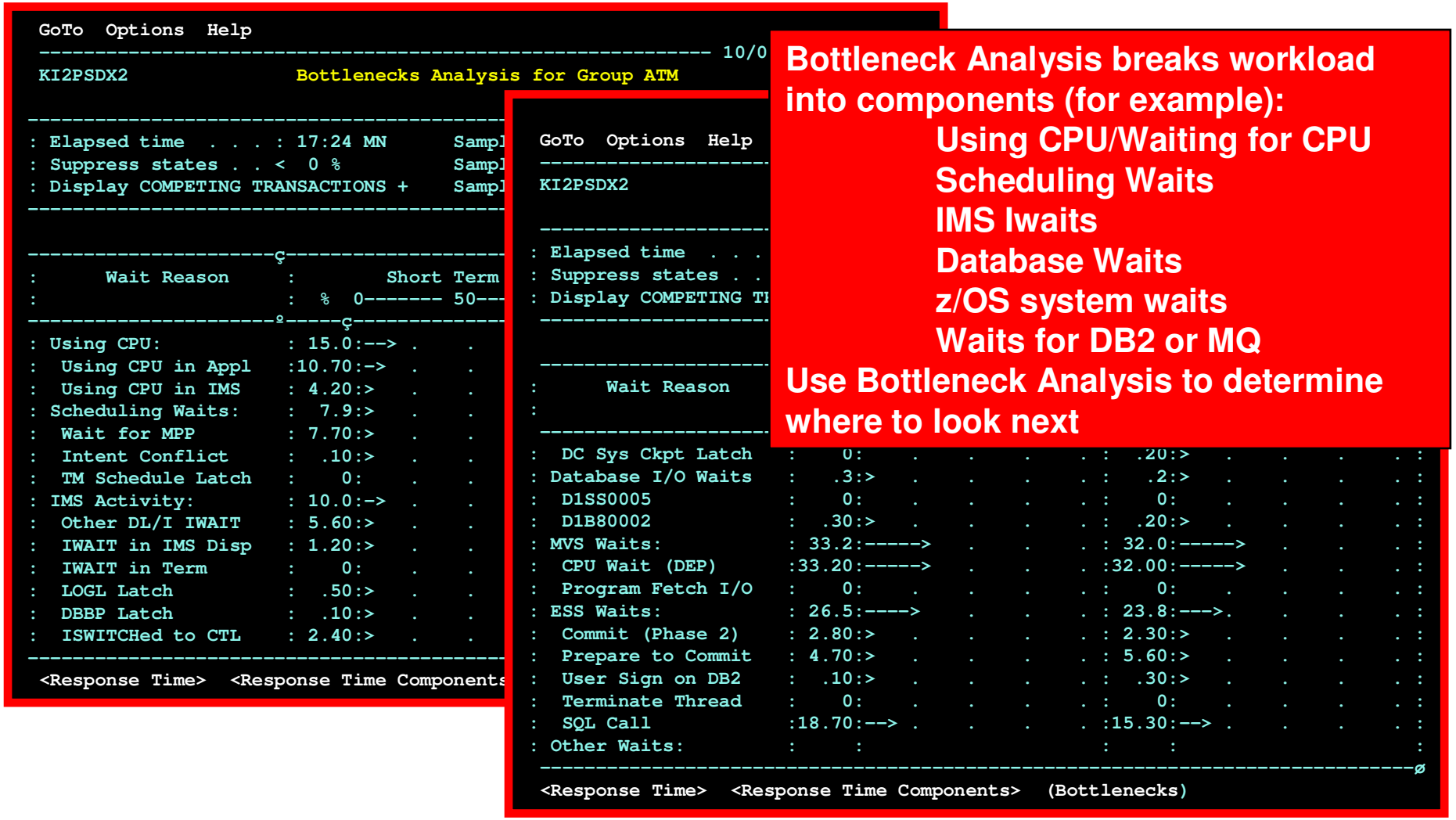
OMEGAMON XE For IMS provides support for IMS Connect monitoring. Provides detailed transaction level response time information.

Note – Detailed IMS Connect monitoring requires IMS Connect Extensions.

If RTA Indicates An Elongation Of Response Time
Use The IMS Health Workspace To Track Rates And Queuing



Use Bottleneck To Analyze Where The Workload May Be Bottlenecked

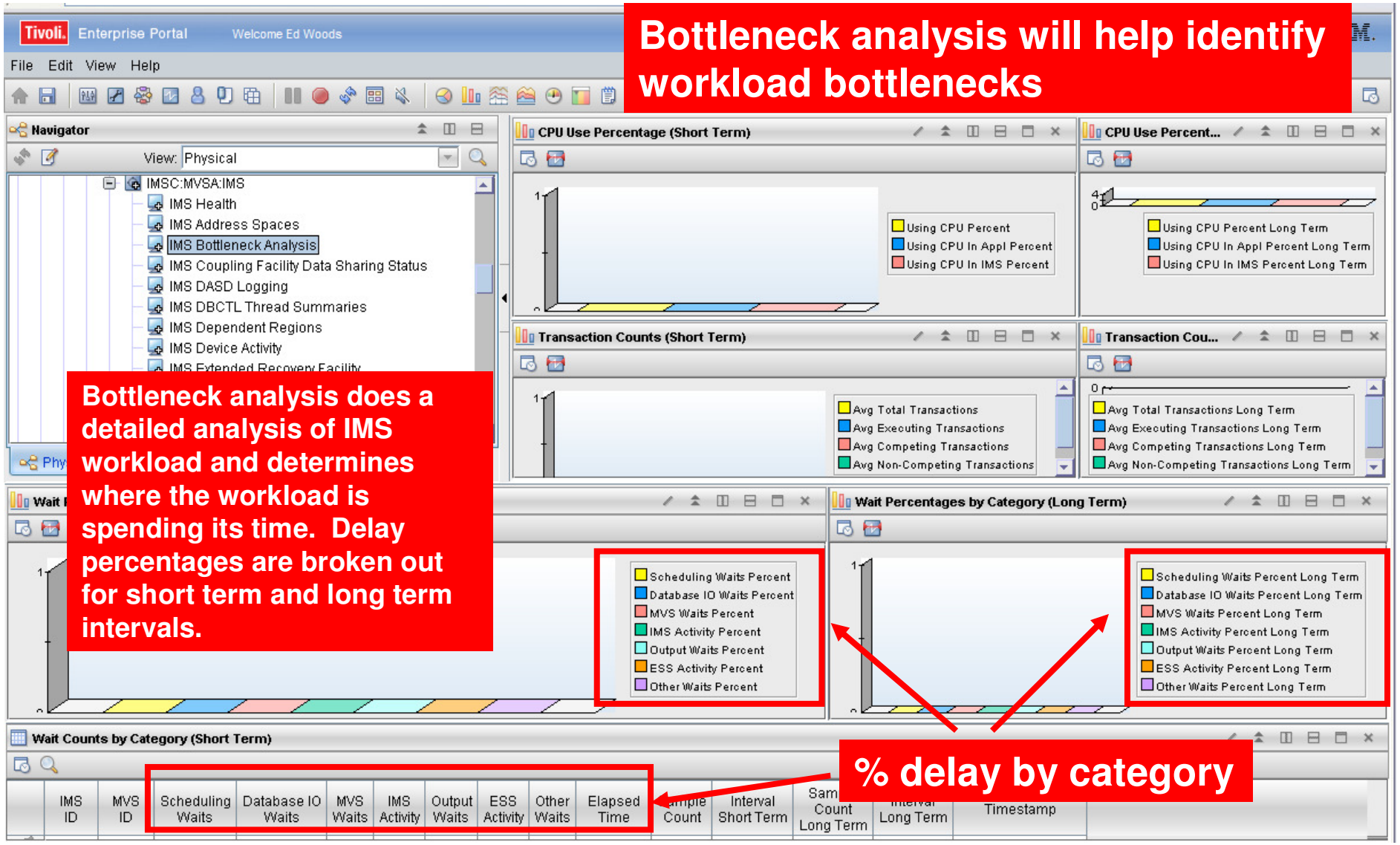


Bottleneck Analysis breaks workload into components (for example):

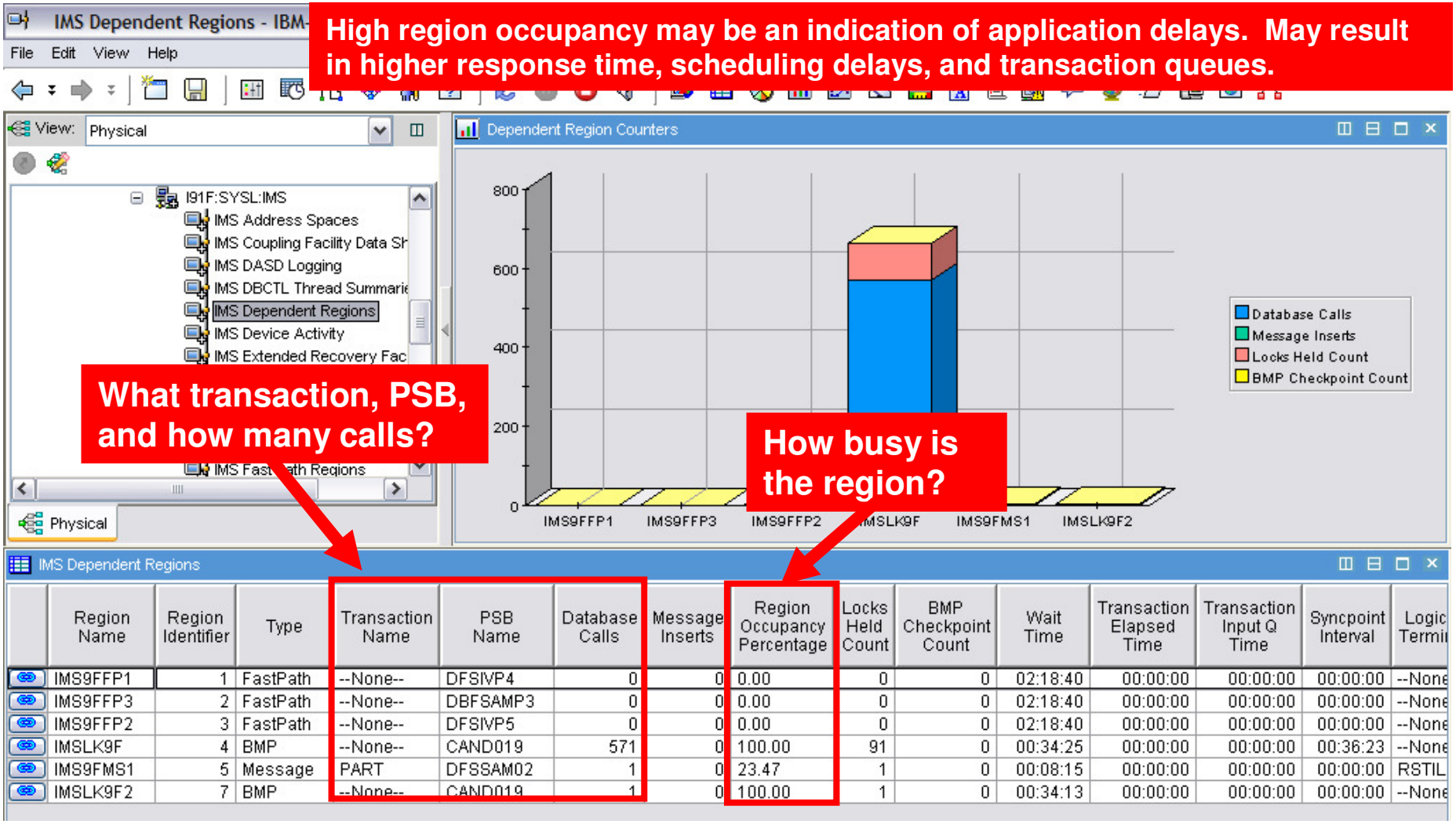
- Using CPU/Waiting for CPU
- Scheduling Waits
- IMS Iwaits
- Database Waits
- z/OS system waits
- Waits for DB2 or MQ

Use Bottleneck Analysis to determine where to look next

The Tivoli Enterprise Portal May Be Used To Understand And Analyze IMS Bottlenecks



IMS Dependent Region Display
Understanding Scheduling And Processing Delays



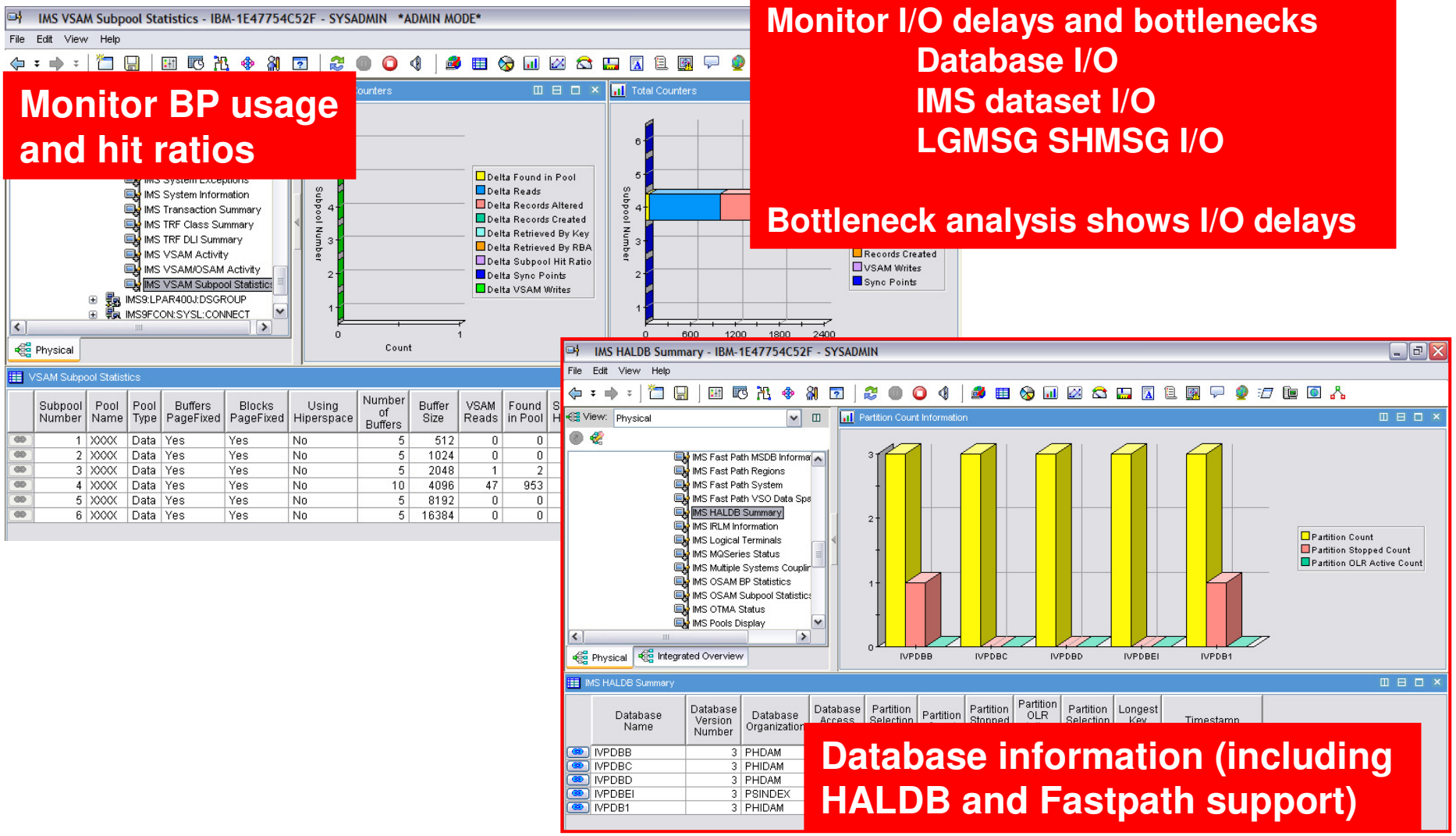
	Region Name	Region Identifier	Type	Transaction Name	PSB Name	Database Calls	Message Inserts	Region Occupancy Percentage	Locks Held Count	BMP Checkpoint Count	Wait Time	Transaction Elapsed Time	Transaction Input Q Time	Syncpoint Interval	Logic Termi
	IMS9FFP1	1	FastPath	--None--	DFSIVP4	0	0	0.00	0	0	02:18:40	00:00:00	00:00:00	00:00:00	--None
	IMS9FFP3	2	FastPath	--None--	DBFSAMP3	0	0	0.00	0	0	02:18:40	00:00:00	00:00:00	00:00:00	--None
	IMS9FFP2	3	FastPath	--None--	DFSIVP5	0	0	0.00	0	0	02:18:40	00:00:00	00:00:00	00:00:00	--None
	IMSLK9F	4	BMP	--None--	CAND019	571	0	100.00	91	0	00:34:25	00:00:00	00:00:00	00:36:23	--None
	IMS9FMS1	5	Message	PART	DFSSAM02	1	0	23.47	1	0	00:08:15	00:00:00	00:00:00	00:00:00	RSTIL
	IMSLK9F2	7	BMP	--None--	CAND019	1	0	100.00	1	0	00:34:13	00:00:00	00:00:00	00:00:00	--None

IMS I/O Bottlenecks And Contention

Monitor BP usage and hit ratios

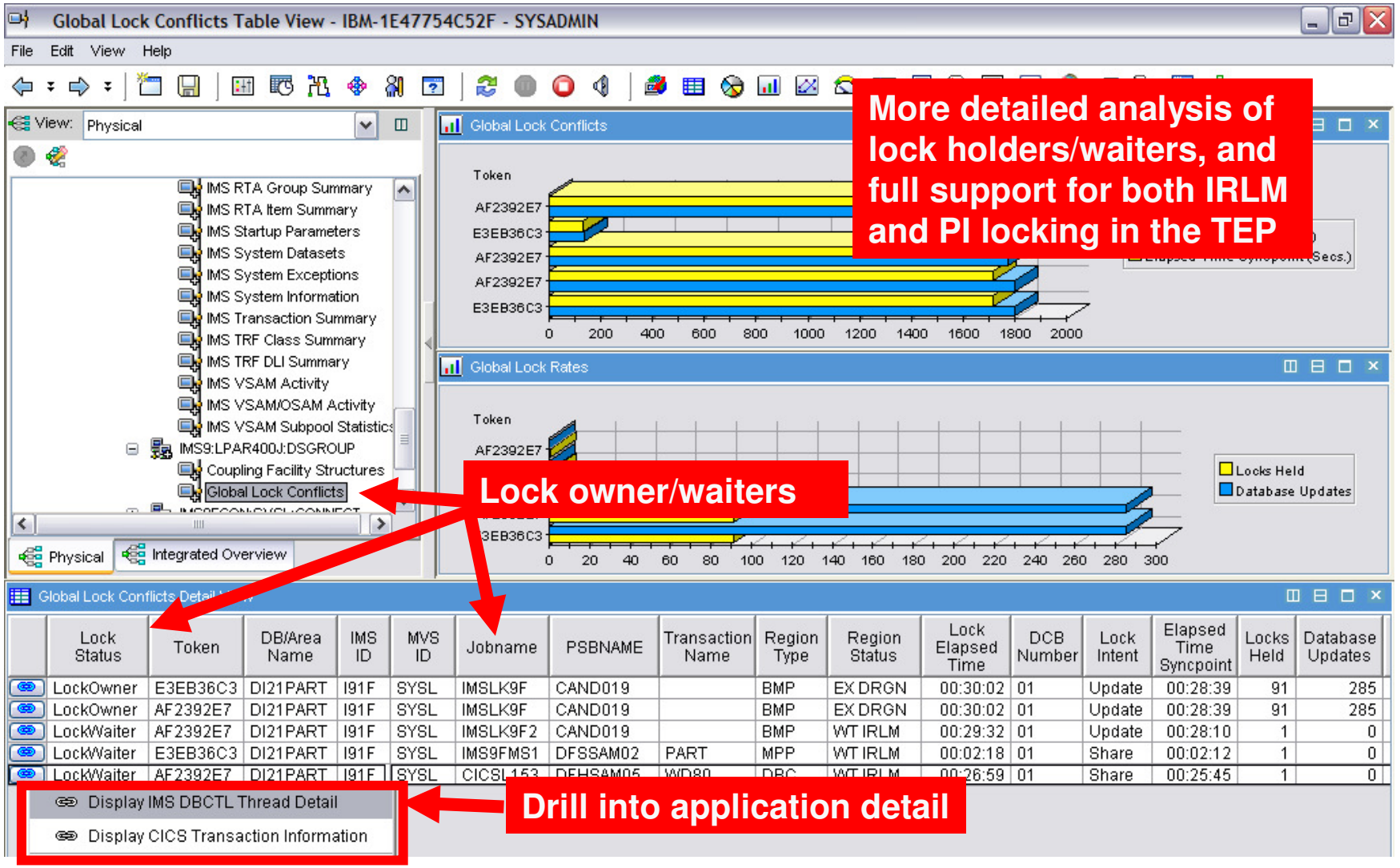
Monitor I/O delays and bottlenecks
- Database I/O
- IMS dataset I/O
- LGMSG SHMSG I/O

Bottleneck analysis shows I/O delays



Database information (including HALDB and Fastpath support)

IMS Lock Analysis Information In The Tivoli Portal



Lock Status	Token	DB/Area Name	IMS ID	MVS ID	Jobname	PSBNAME	Transaction Name	Region Type	Region Status	Lock Elapsed Time	DCB Number	Lock Intent	Elapsed Time Syncpoint	Locks Held	Database Updates
LockOwner	E3EB36C3	DI21PART	I91F	SYSL	IMSLK9F	CAND019		BMP	EX DRGN	00:30:02	01	Update	00:28:39	91	285
LockOwner	AF2392E7	DI21PART	I91F	SYSL	IMSLK9F	CAND019		BMP	EX DRGN	00:30:02	01	Update	00:28:39	91	285
LockWaiter	AF2392E7	DI21PART	I91F	SYSL	IMSLK9F2	CAND019		BMP	WT IRLM	00:29:32	01	Update	00:28:10	1	0
LockWaiter	E3EB36C3	DI21PART	I91F	SYSL	IMS9FMS1	DFSSAM02	PART	MPP	WT IRLM	00:02:18	01	Share	00:02:12	1	0
LockWaiter	AF2392E7	DI21PART	I91F	SYSL	CICSL153	DFHSAM05	WD80	DBC	WT IRLM	00:26:59	01	Share	00:25:45	1	0

IMS Historical Performance And Availability Analysis Categories Of History Data Collection

Interval summary (with some detail)

- ***EPILOG Historical***
  - Historical analysis of response, bottlenecks and IMS resources
  - Stored in VSAM Epilog Data Store (EDS) by group and time interval

Detail records

- ***TRF Historical***
  - Detailed transaction & database data – individual transactions
  - Detailed performance analysis & chargeback

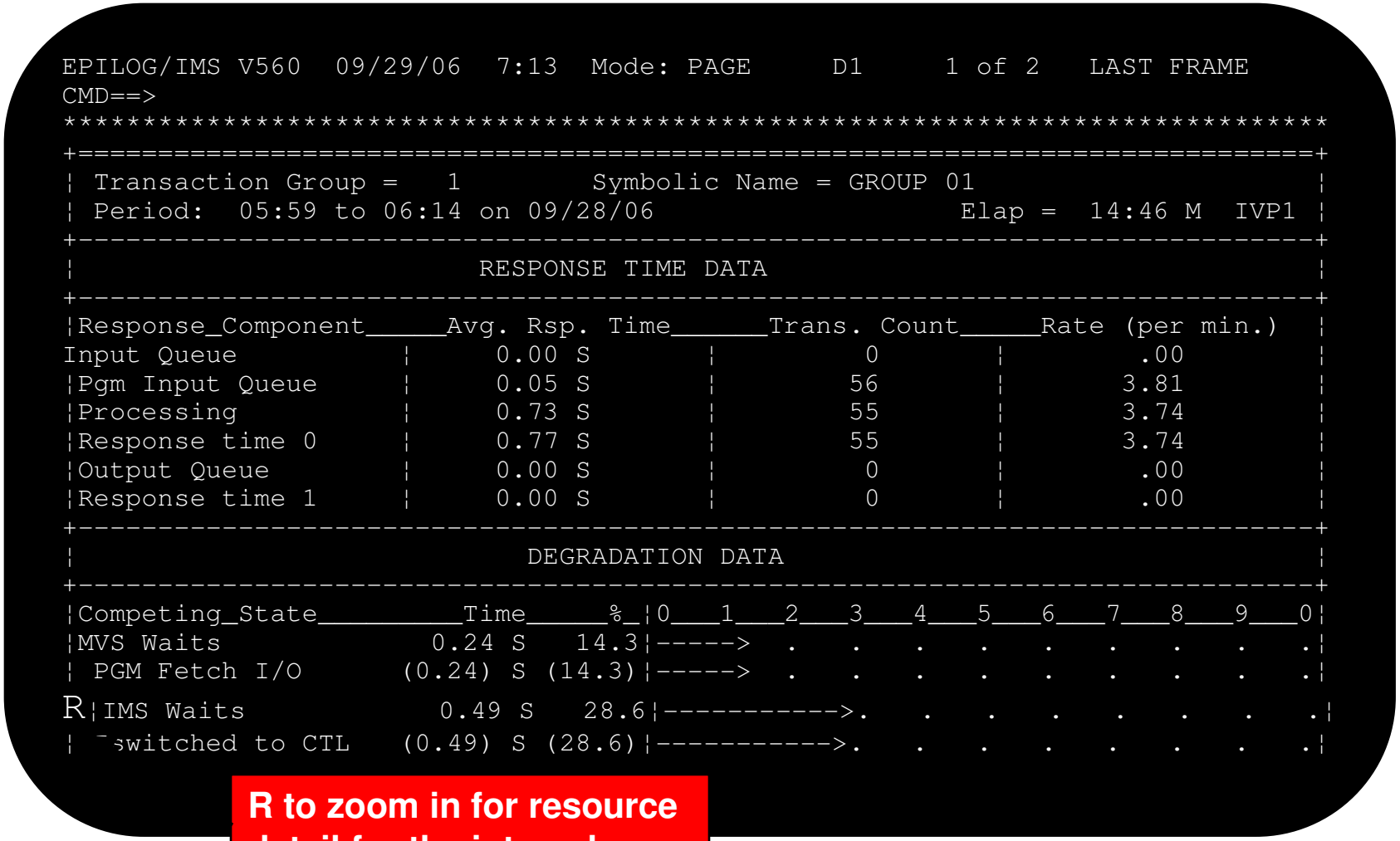
Recent detail

- ***Near Term Historical***
  - Detail on recent transaction execution

Interval snapshot trending

- ***Tivoli Enterprise Portal Historical***
  - Tivoli Data Warehouse history
  - Use for trending analysis

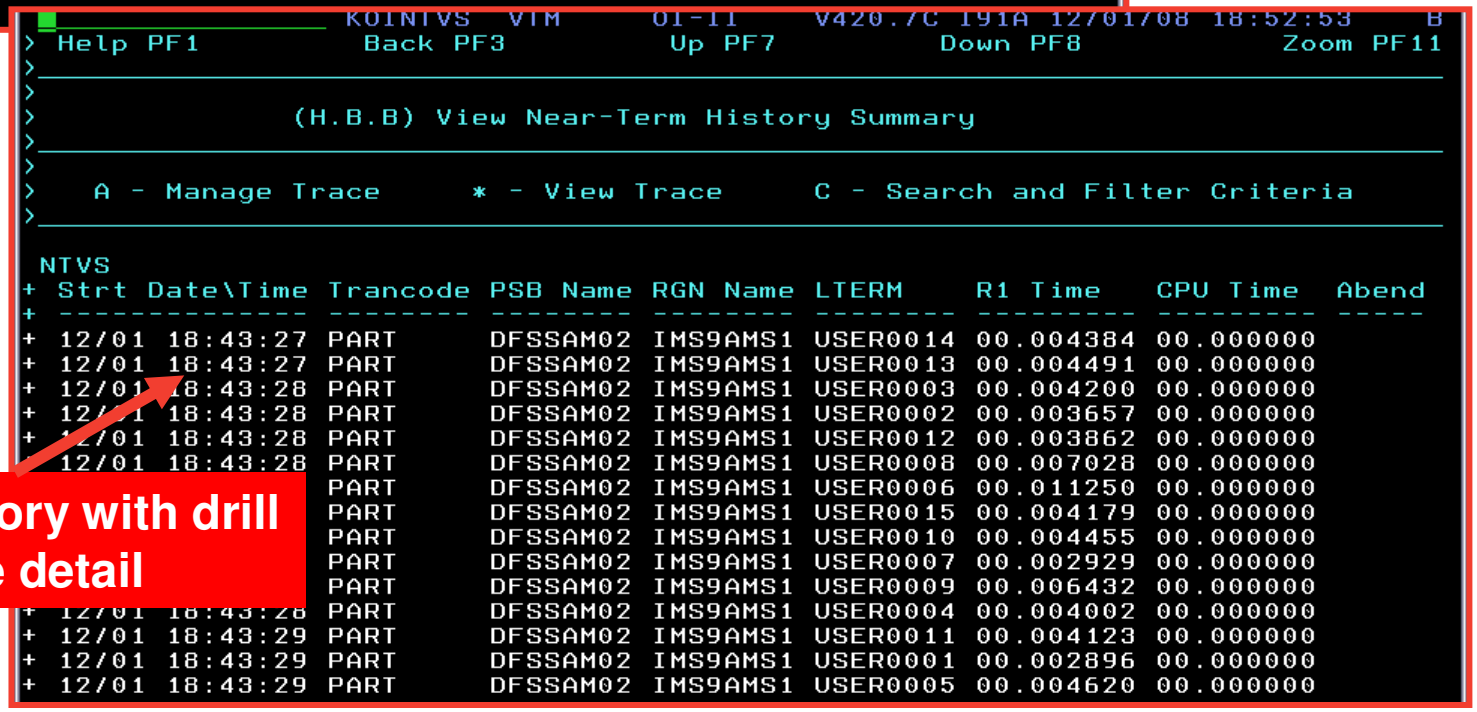
Epilog Shows Historical Bottleneck and RTA Information



R to zoom in for resource detail for the interval

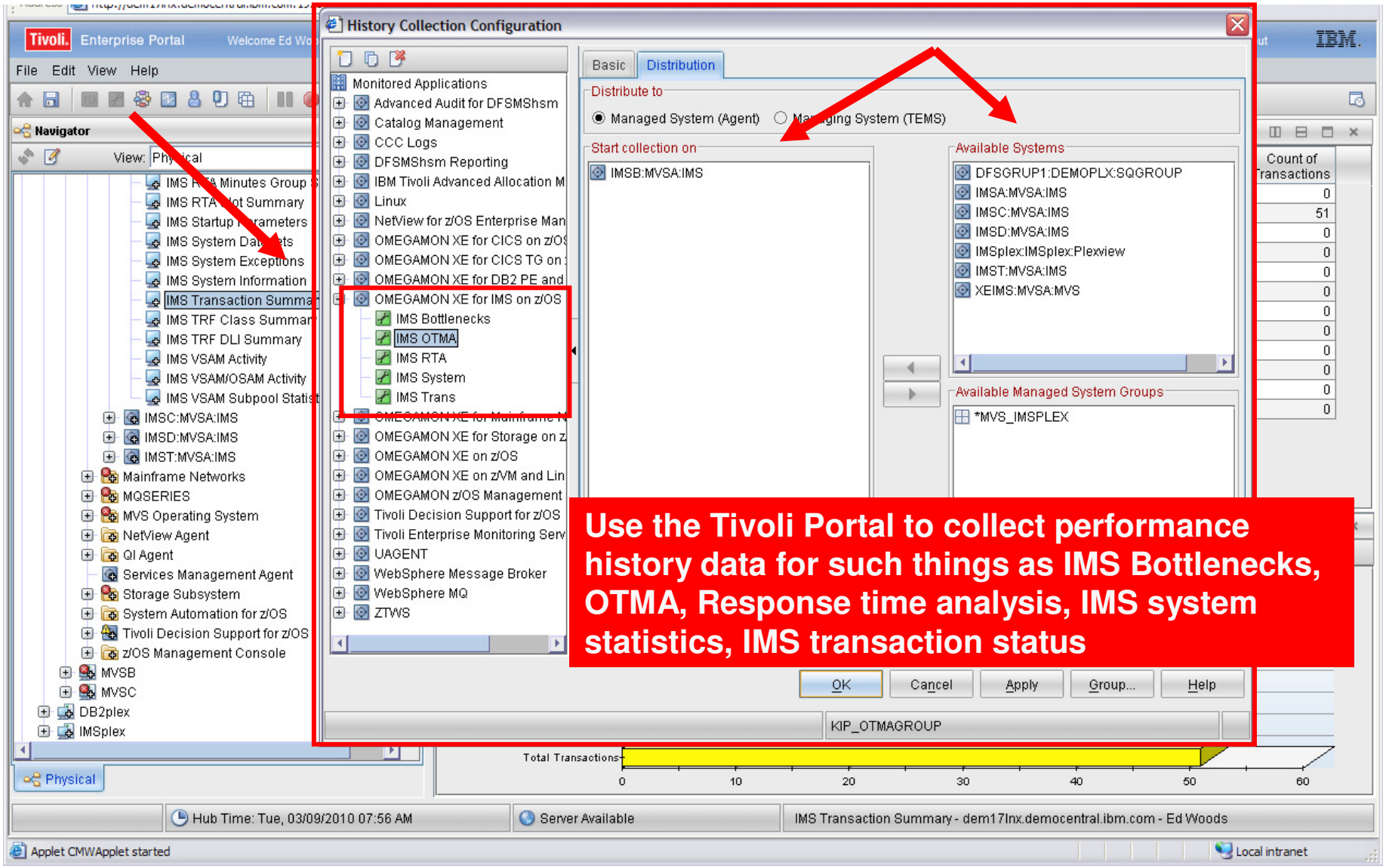
Near Term History Of IMS Transactions

Manage near term history collection



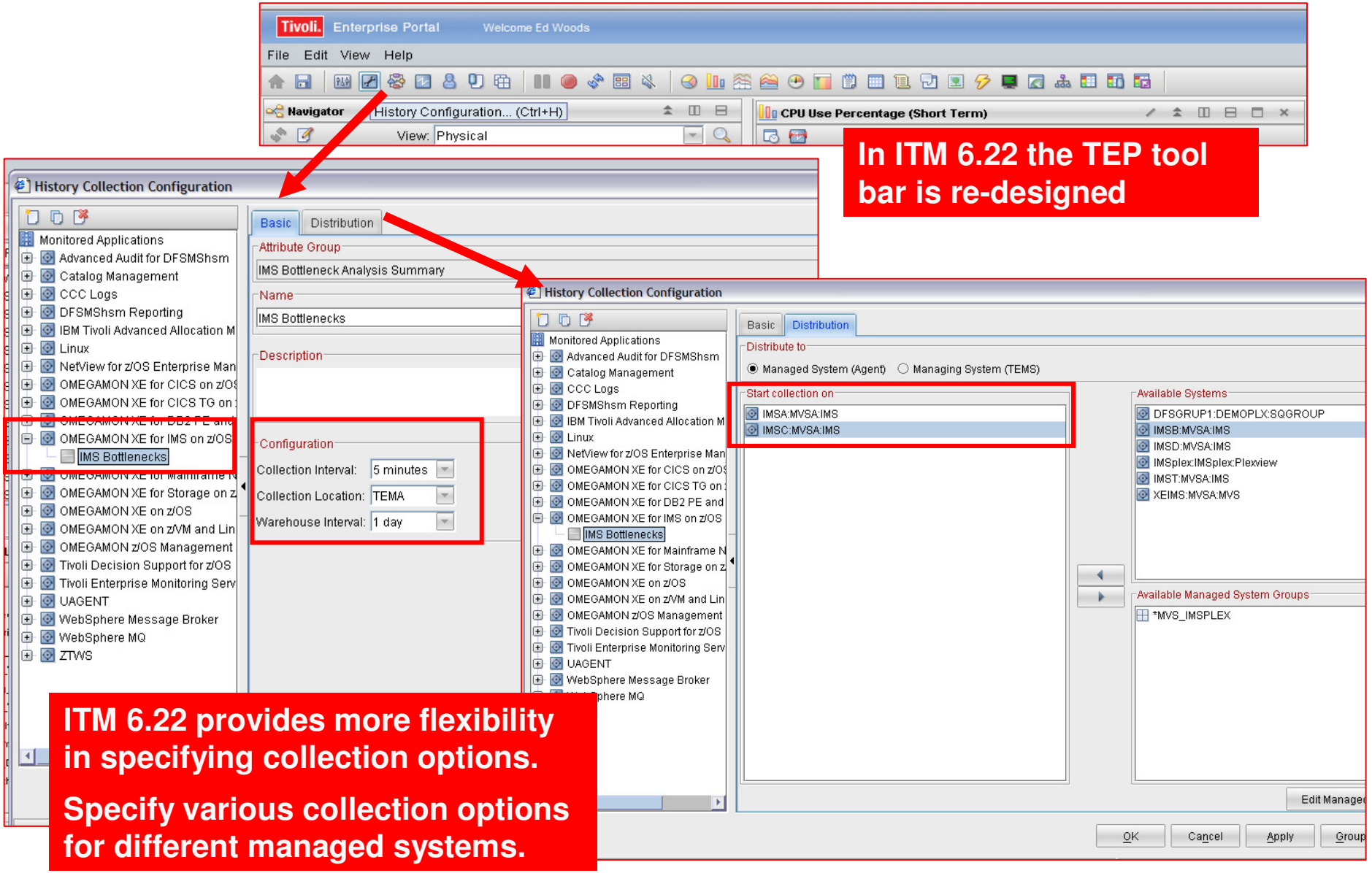
Near term history with drill down for more detail

Using The History Functions Of The Tivoli Enterprise Portal To Analyze IMS Processing And Bottlenecks

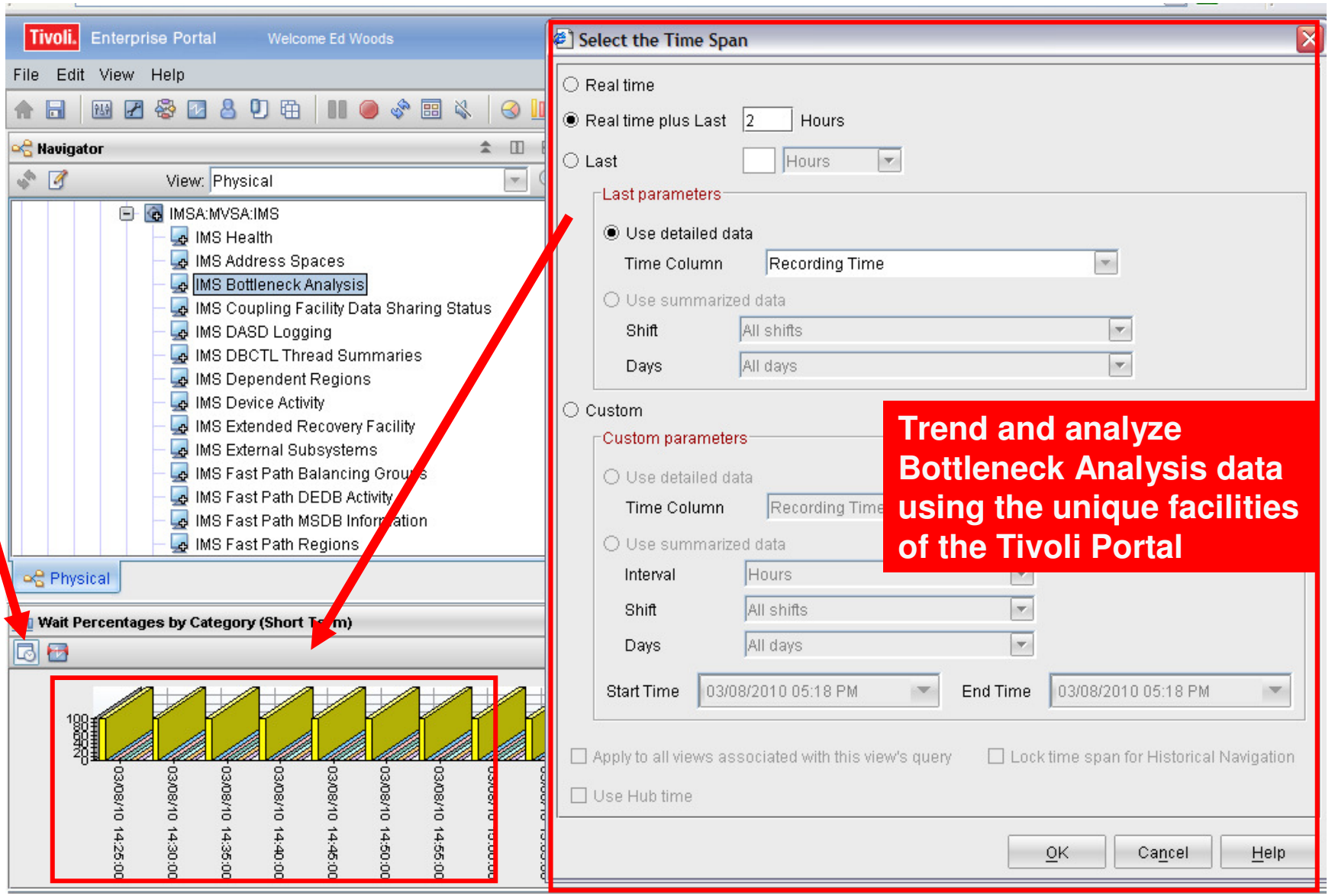


Use the Tivoli Portal to collect performance history data for such things as IMS Bottlenecks, OTMA, Response time analysis, IMS system statistics, IMS transaction status

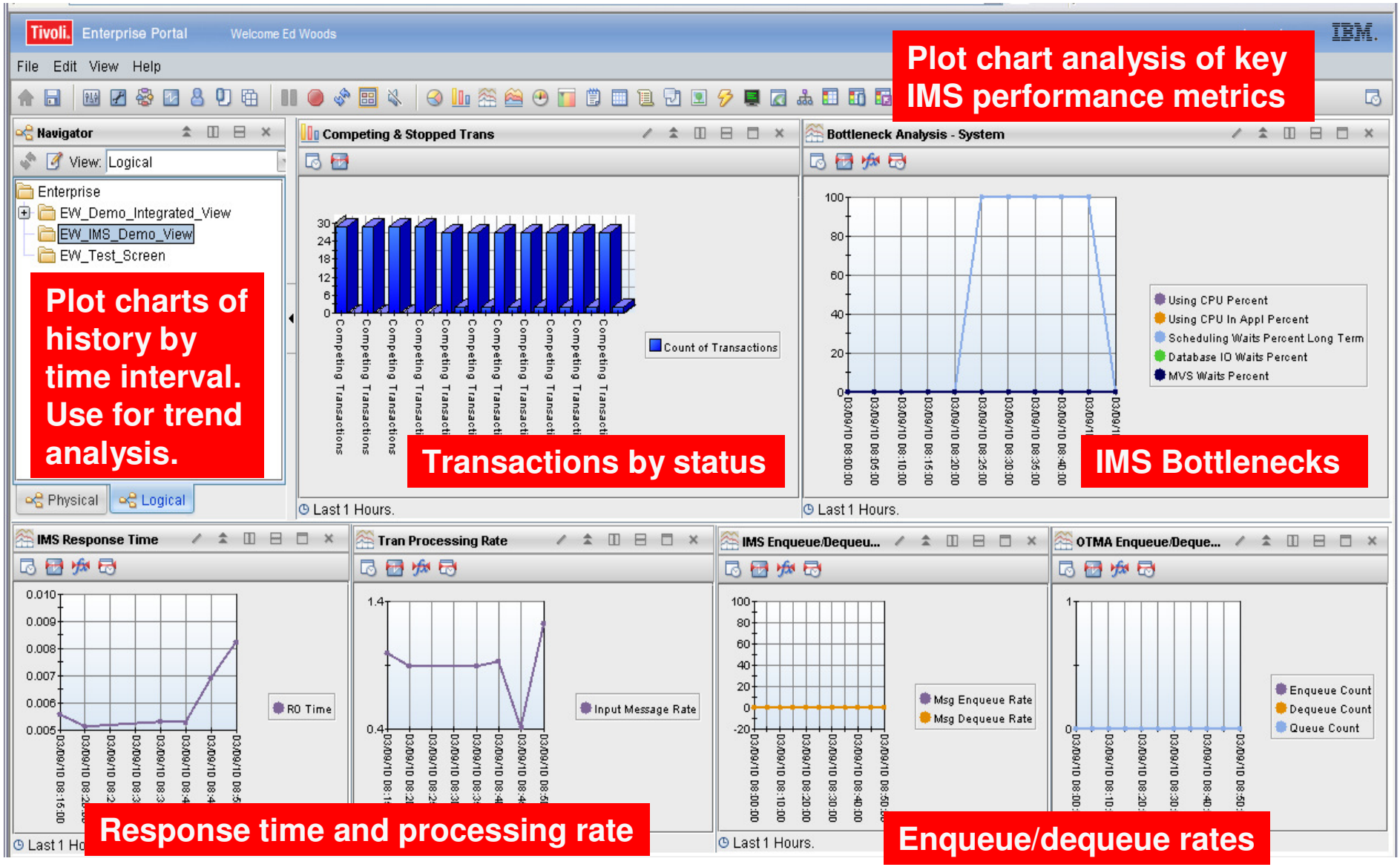
Historical Collection Options In The Tivoli Enterprise Portal



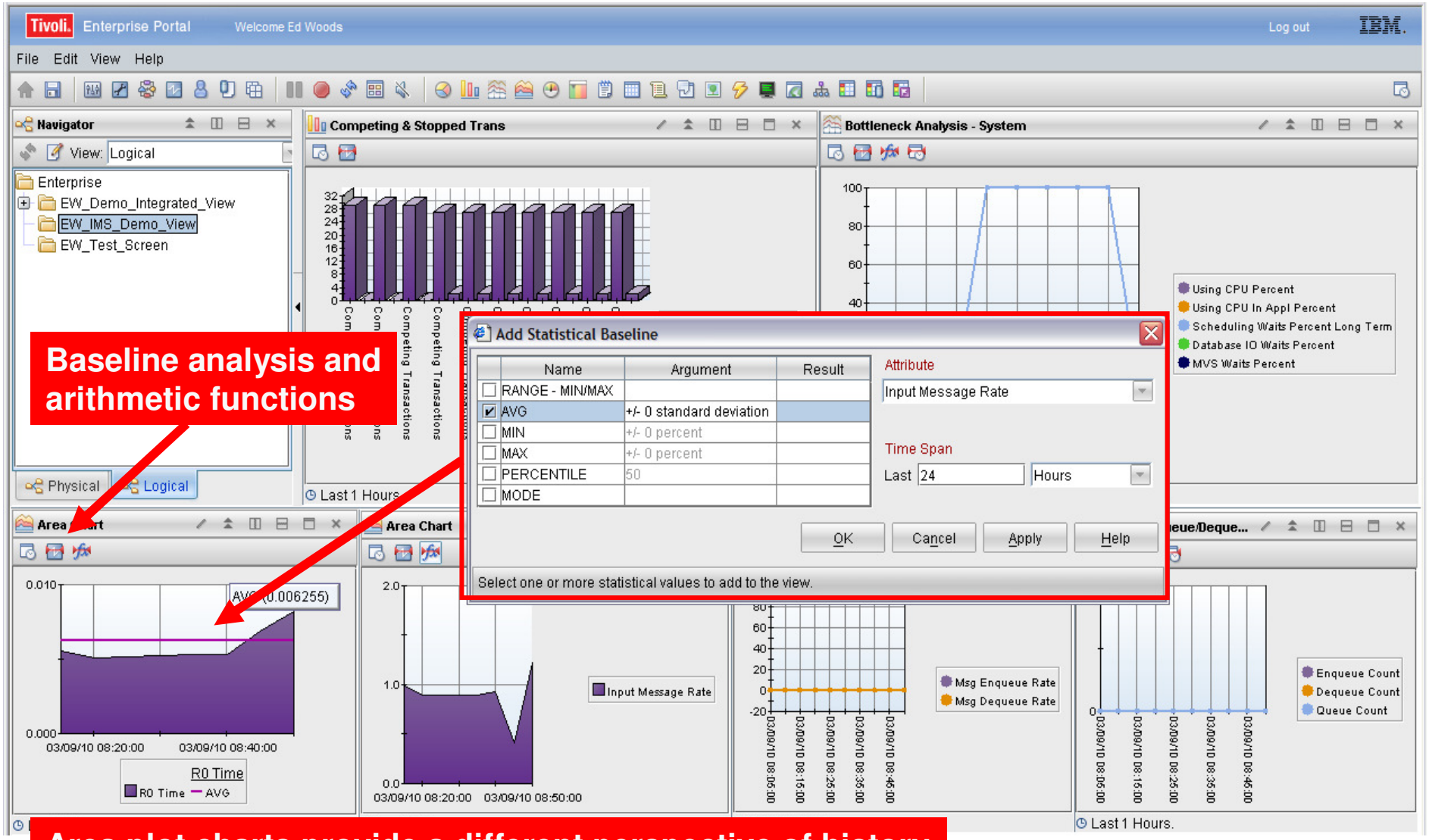
Analyze Historical Bottleneck Analysis Data In The TEP



IMS Historical Performance Analysis Workspace



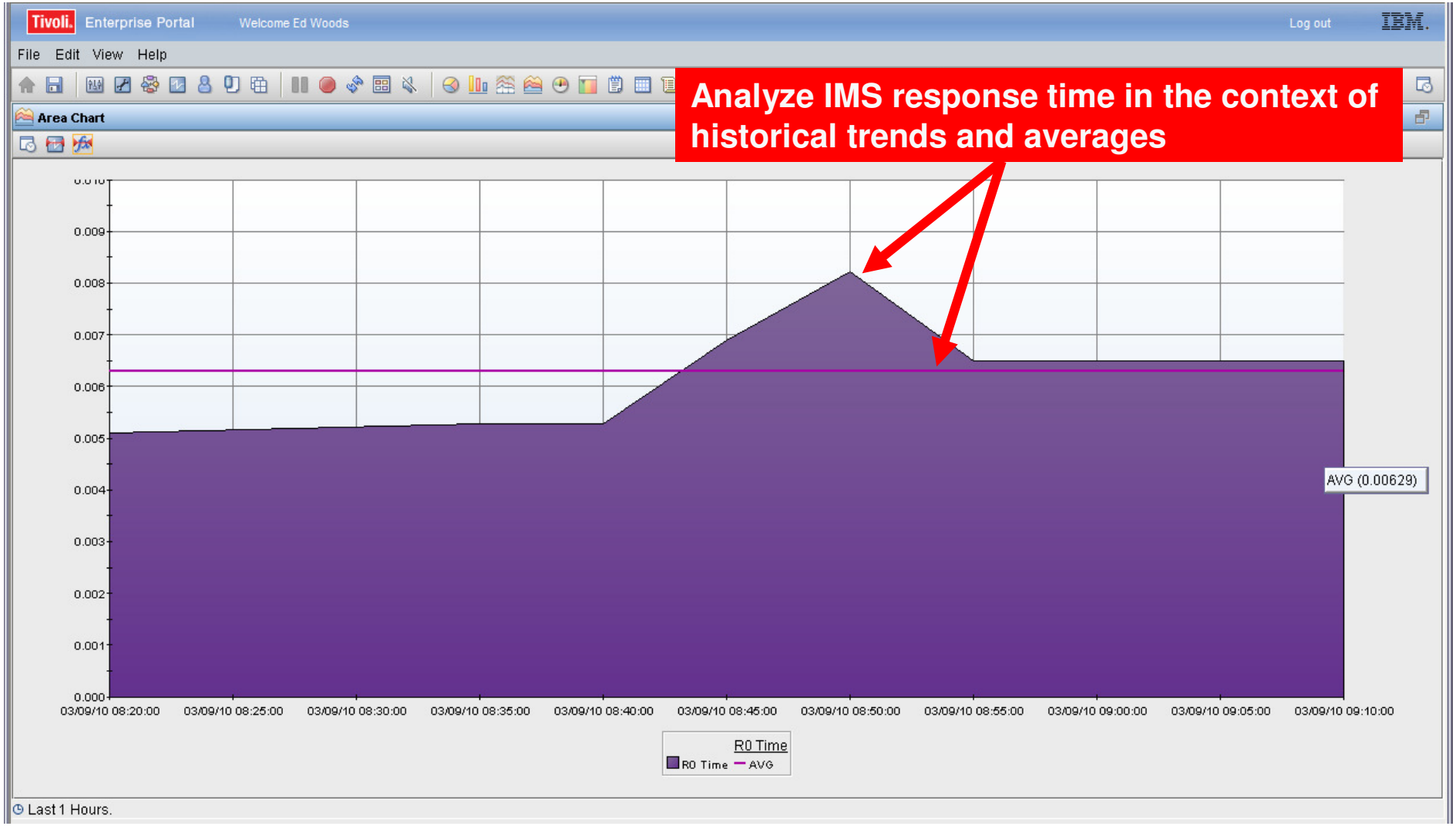
ITM Provides New Chart Functions And Statistical Analysis Features



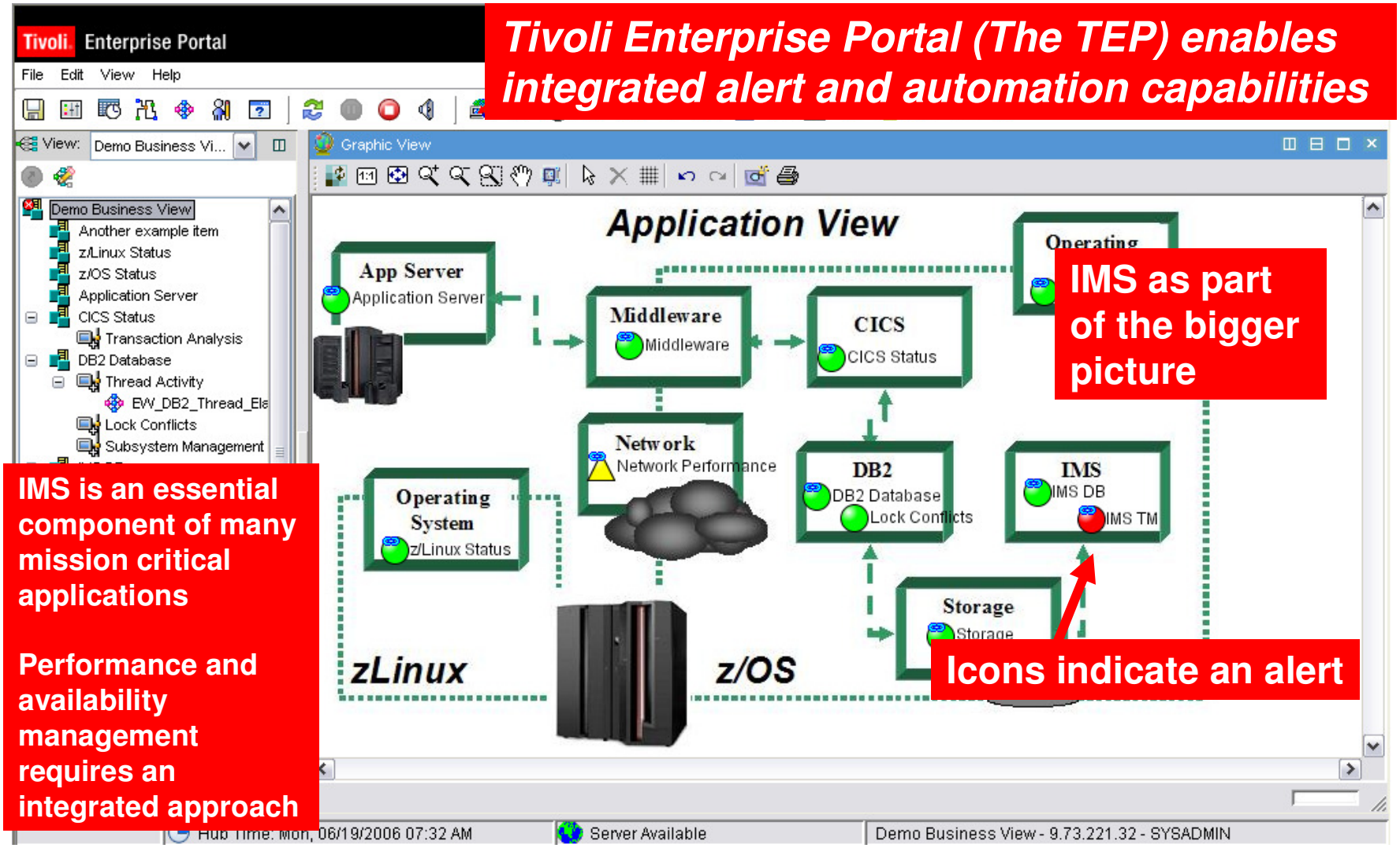
Baseline analysis and arithmetic functions

Area plot charts provide a different perspective of history

Example – Area Plot Chart Of IMS R0 Response Time With Statistical Baseline



Alerts - Use The Tivoli Enterprise Portal
To Integrate Essential Performance Information And Manage Alerts



Tivoli Enterprise Portal (The TEP) enables integrated alert and automation capabilities

IMS as part of the bigger picture

IMS is an essential component of many mission critical applications

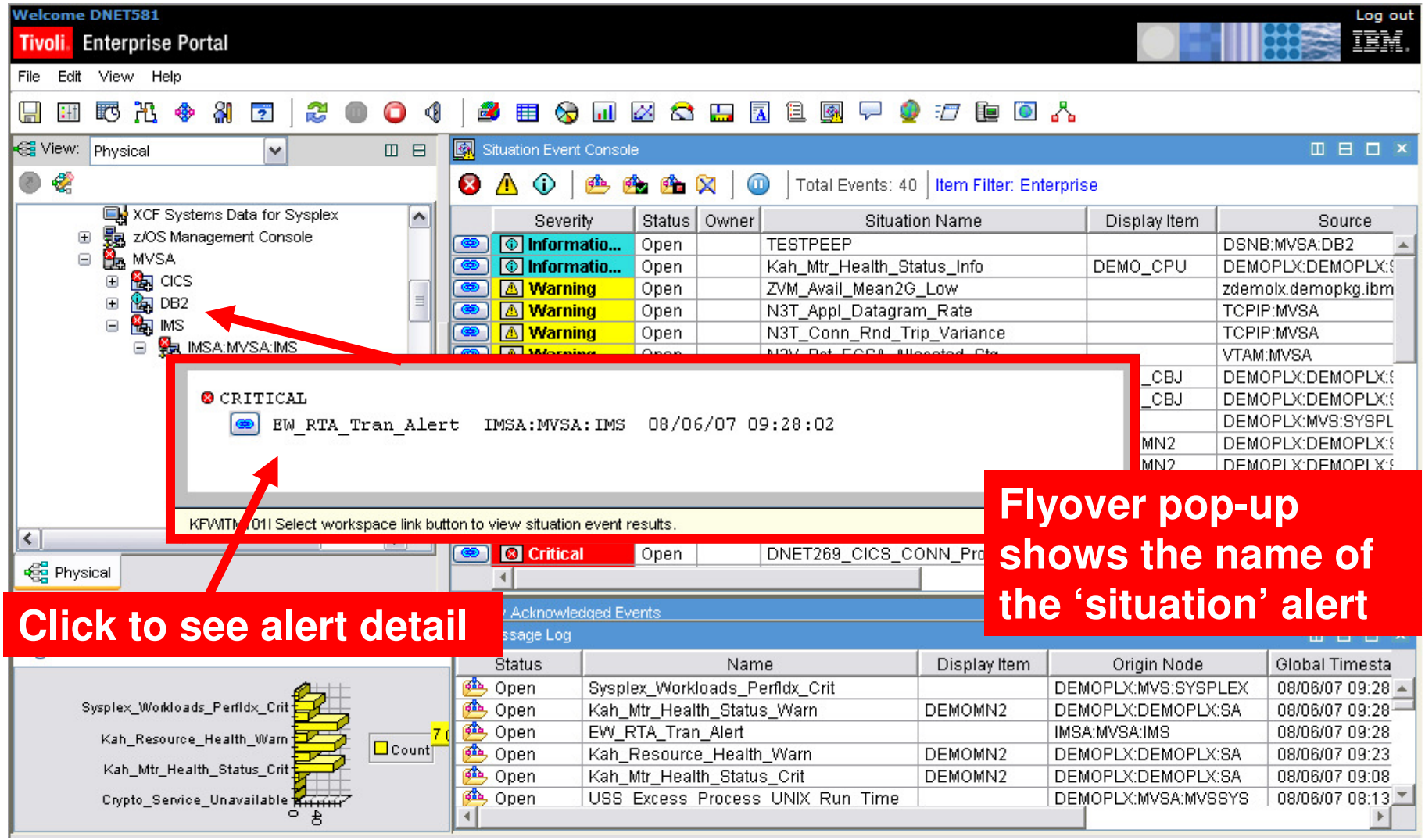
Performance and availability management requires an integrated approach

Icons indicate an alert

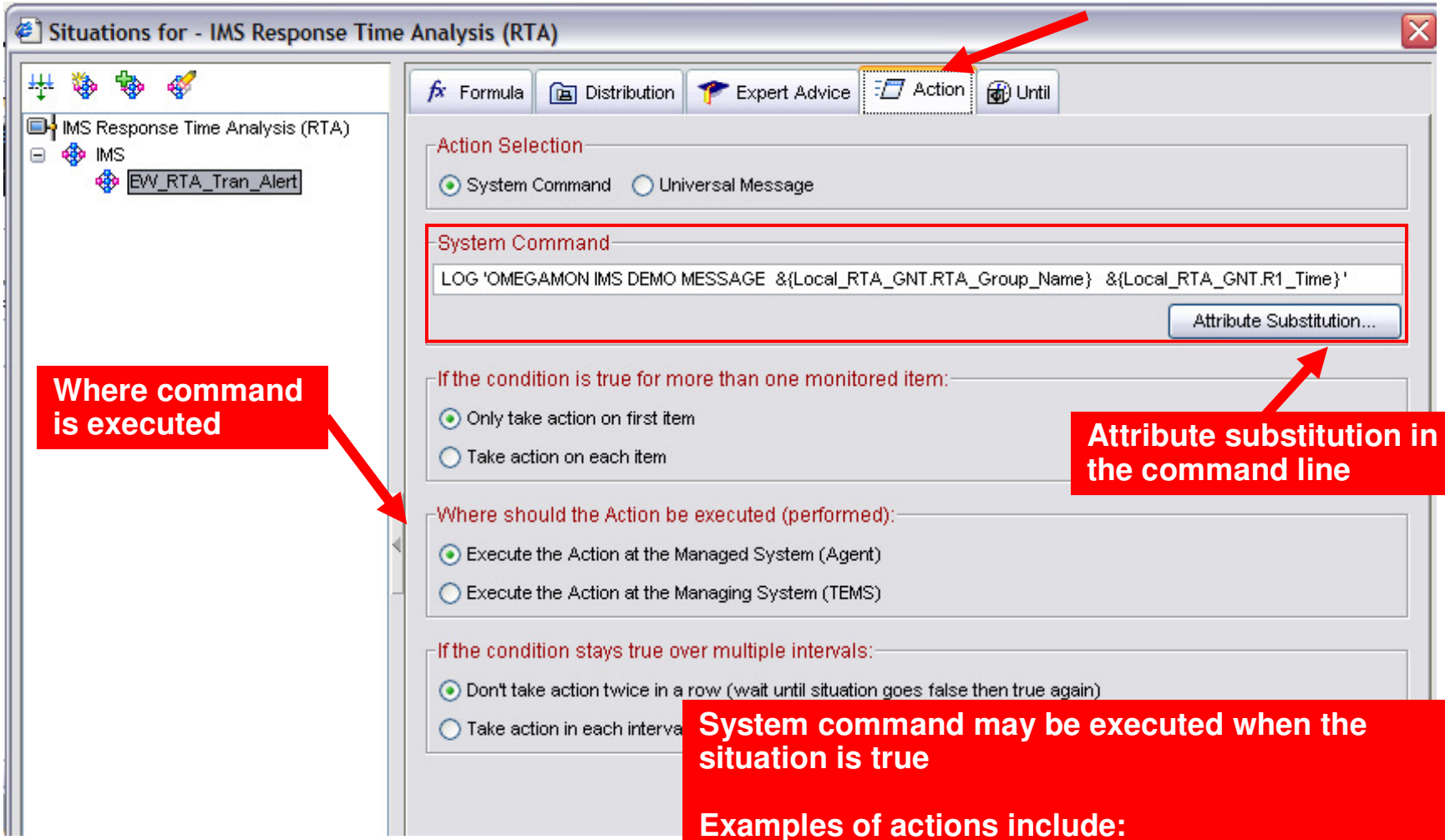
Alert Management Using The Tivoli Enterprise Portal And OMEGAMON Situations

- Situations are the building blocks of systems management logic in the Tivoli Enterprise Portal
- Situations may be used to highlight performance problems within key IMS subsystem resources
- Situations may be used to identify IMS subsystem problems that impact IMS availability
  - Monitor application availability
  - Monitor IMS subsystem availability
  - Monitor critical resource availability

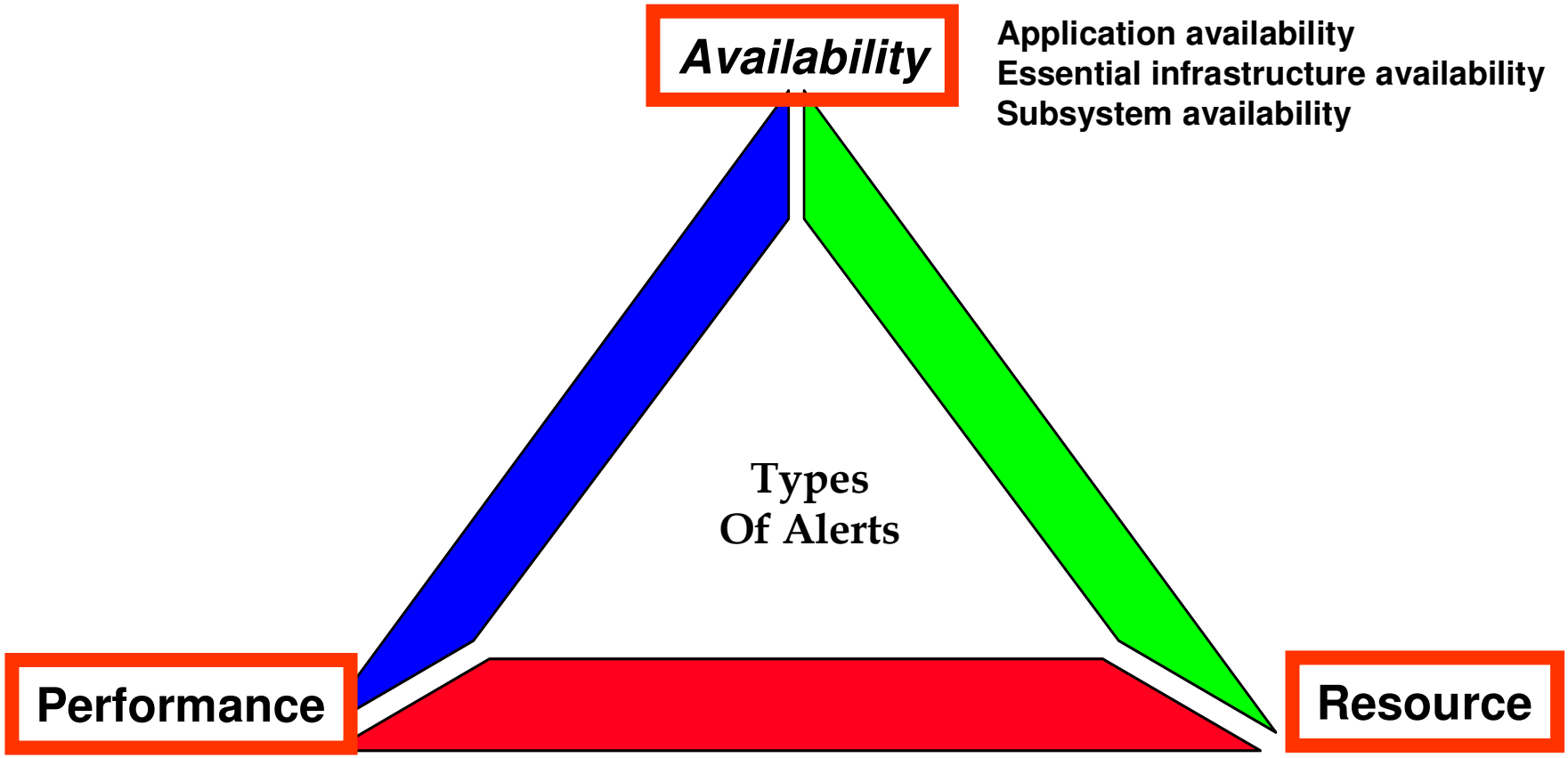
Situations – Usage And Benefits
Highlight Performance And Availability Issues



Situations – Usage And Benefits
'Action' To Perform Commands And Corrections



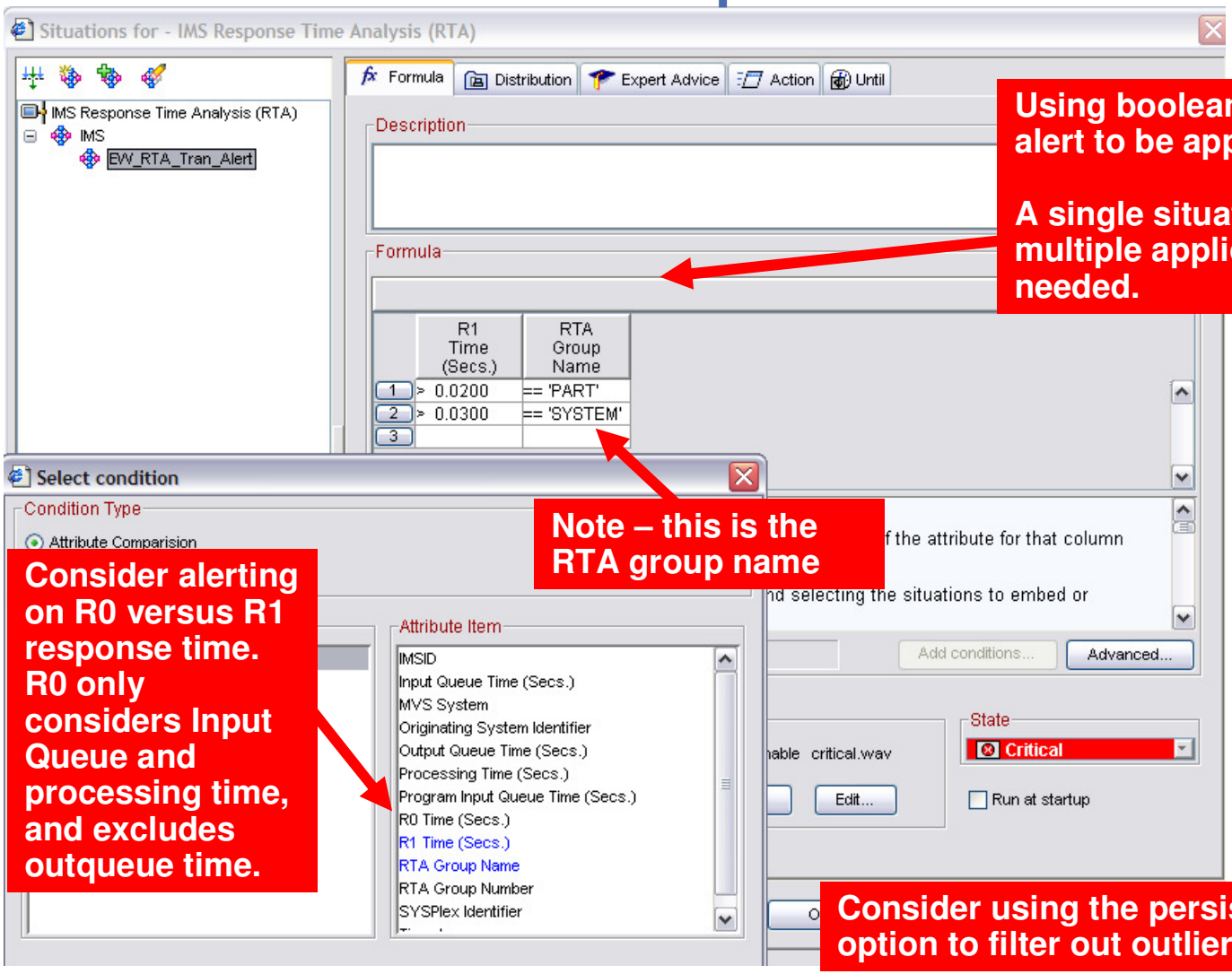
Categories Of Typical Situation Alerts



Alert Notification Types And Options

- Visual View – Custom Views – Enterprise View
  - Red/Yellow indicators and icons in Tivoli Enterprise Portal or TBSM displays
- Console messages
  - Example - Issuing messages and commands to the z/OS console
  - Use this as a mechanism to feed other automation
- Paging and emails
  - Issue commands to feed paging systems
  - Use 3rd party tools such as Postie to issue emails from the command prompt
  - Console messages may be used to feed email systems
- SNMP traps and alerts
  - Issue SNMP traps from the command prompt using situations or policies
- Netcool/OMNIbus events
  - OMNIbus acts as an event correlation engine
  - May receive events via traps or the EIF interface
- Alerts to 3rd party (non-IBM) tools

Application Performance Example Situations To Monitor Response Time



Using boolean logic allows the alert to be application sensitive.

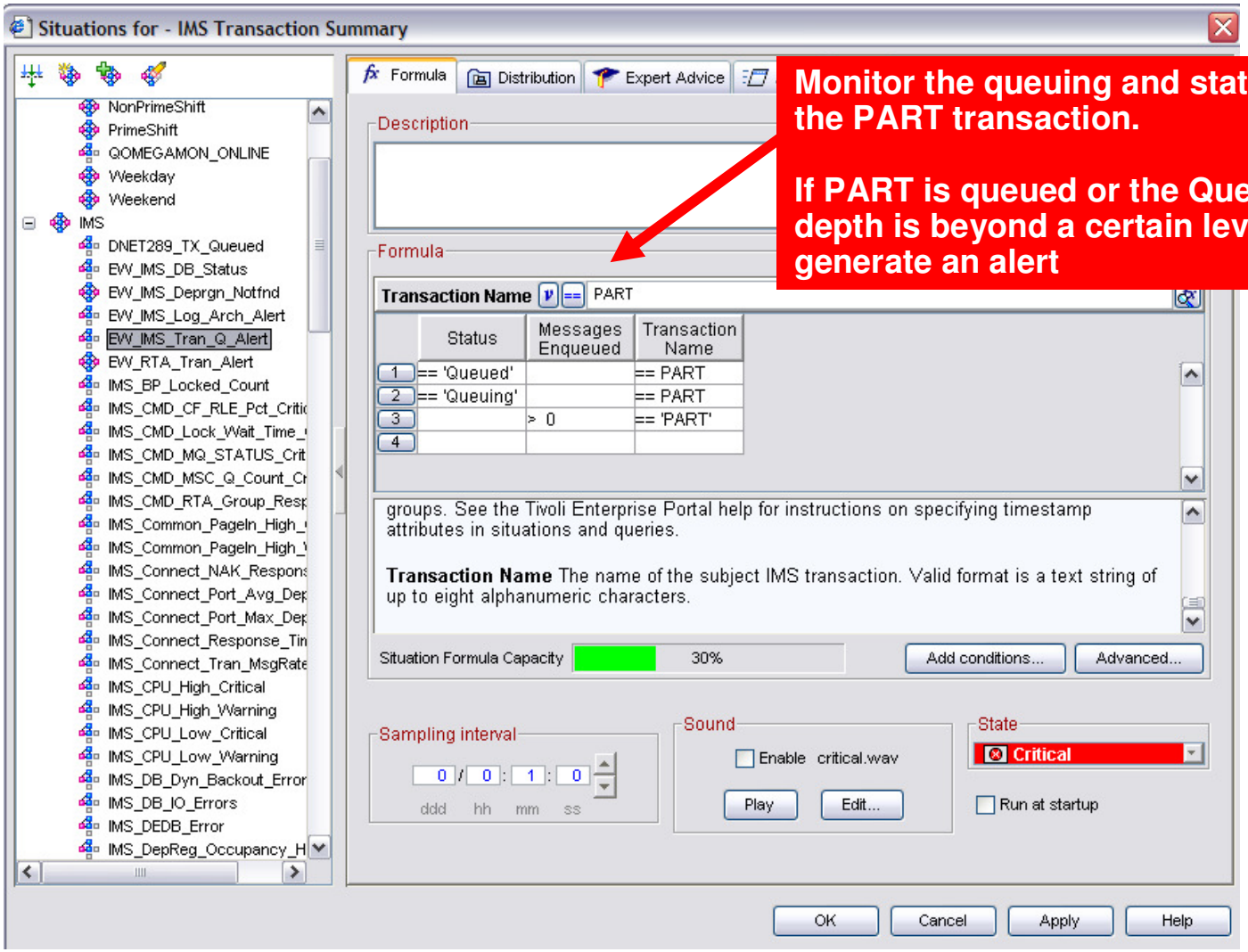
A single situation can handle multiple application groups, if needed.

Note – this is the RTA group name

Consider alerting on R0 versus R1 response time. R0 only considers Input Queue and processing time, and excludes outqueue time.

Consider using the persistence option to filter out outliers

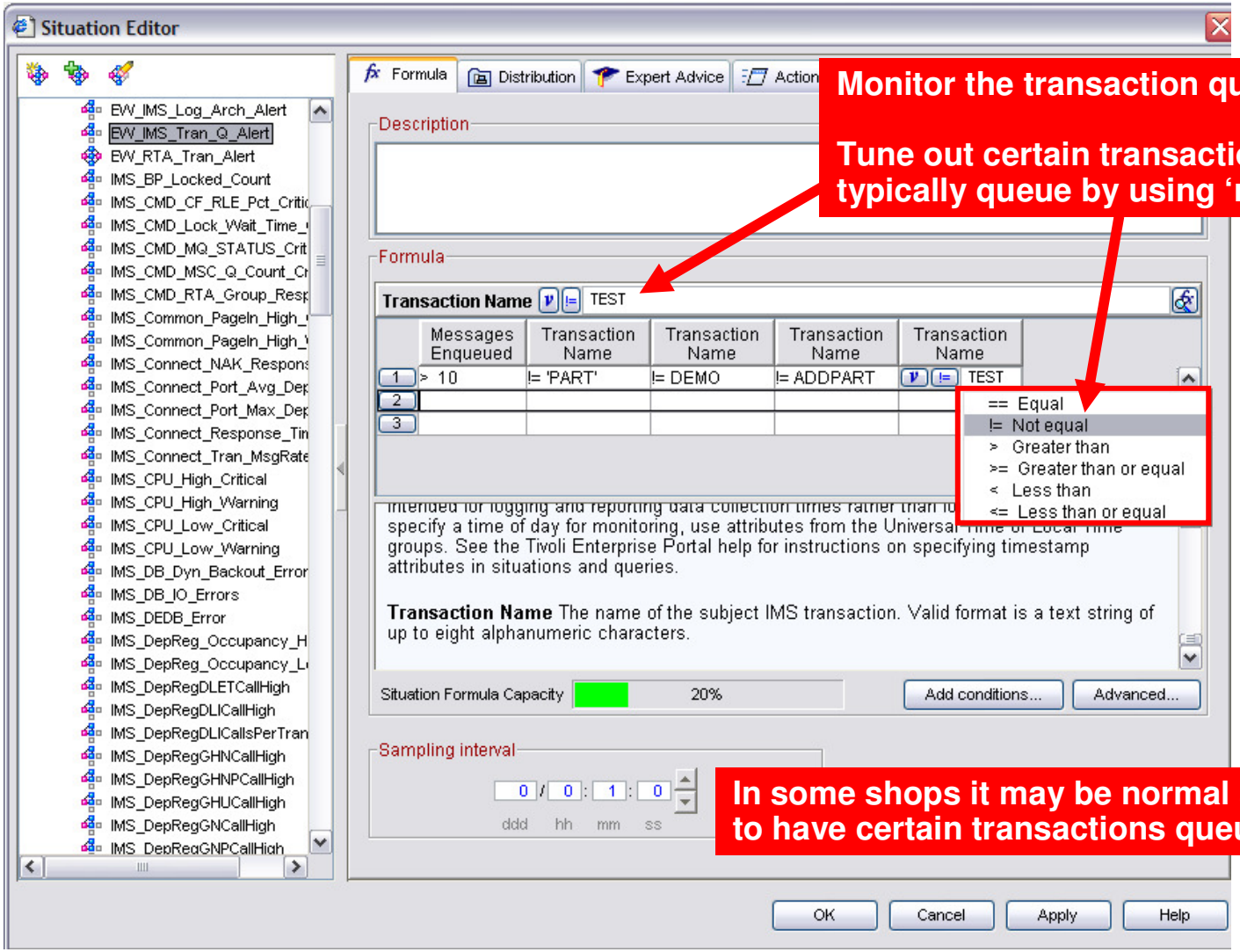
Application Performance Example
Monitoring Transaction Level Queuing



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

Application Performance Example
Monitoring Transaction Level Queuing

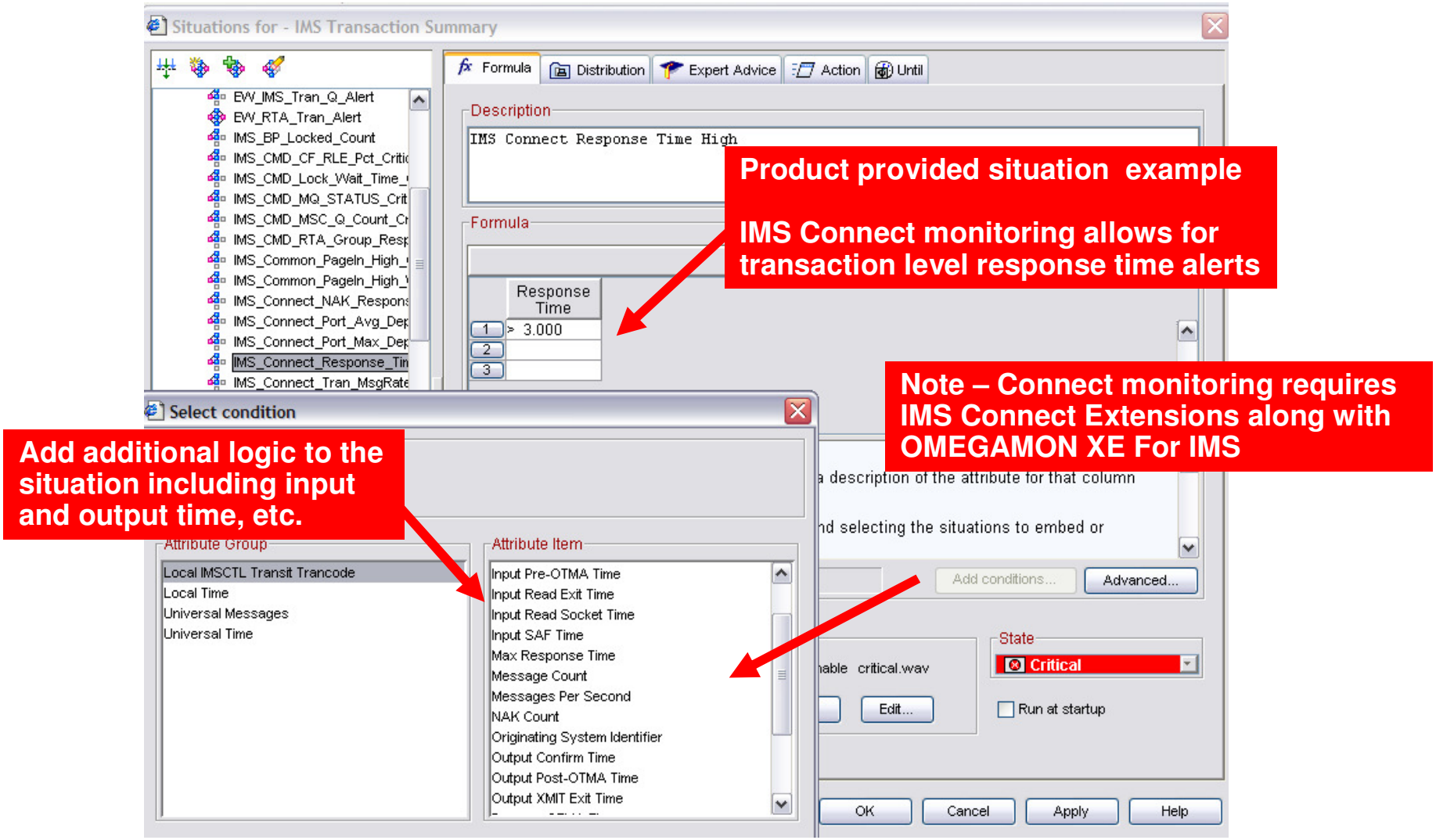


Monitor the transaction queue depth.

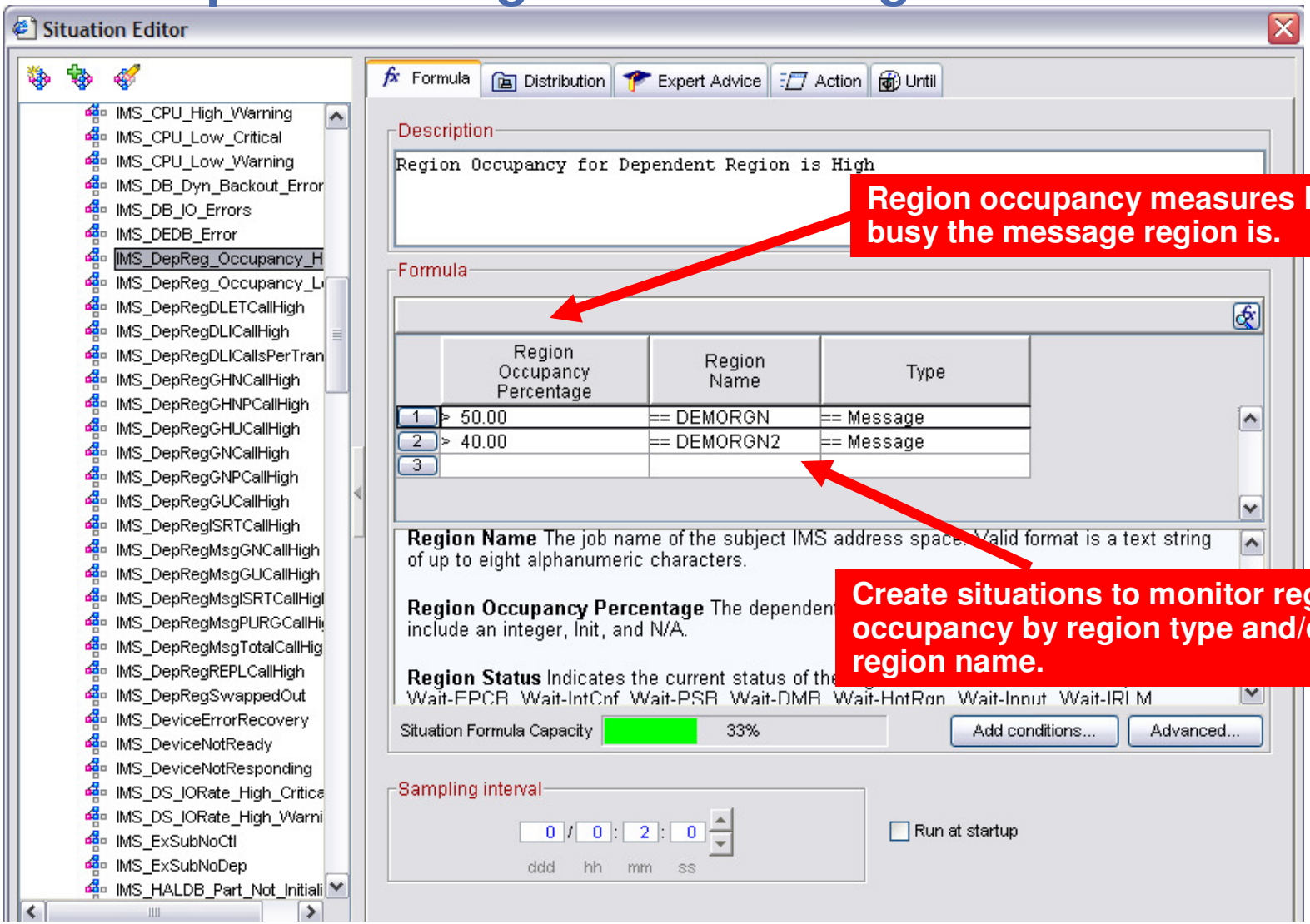
Tune out certain transactions that will typically queue by using 'not equal' logic.

In some shops it may be normal and acceptable to have certain transactions queue.

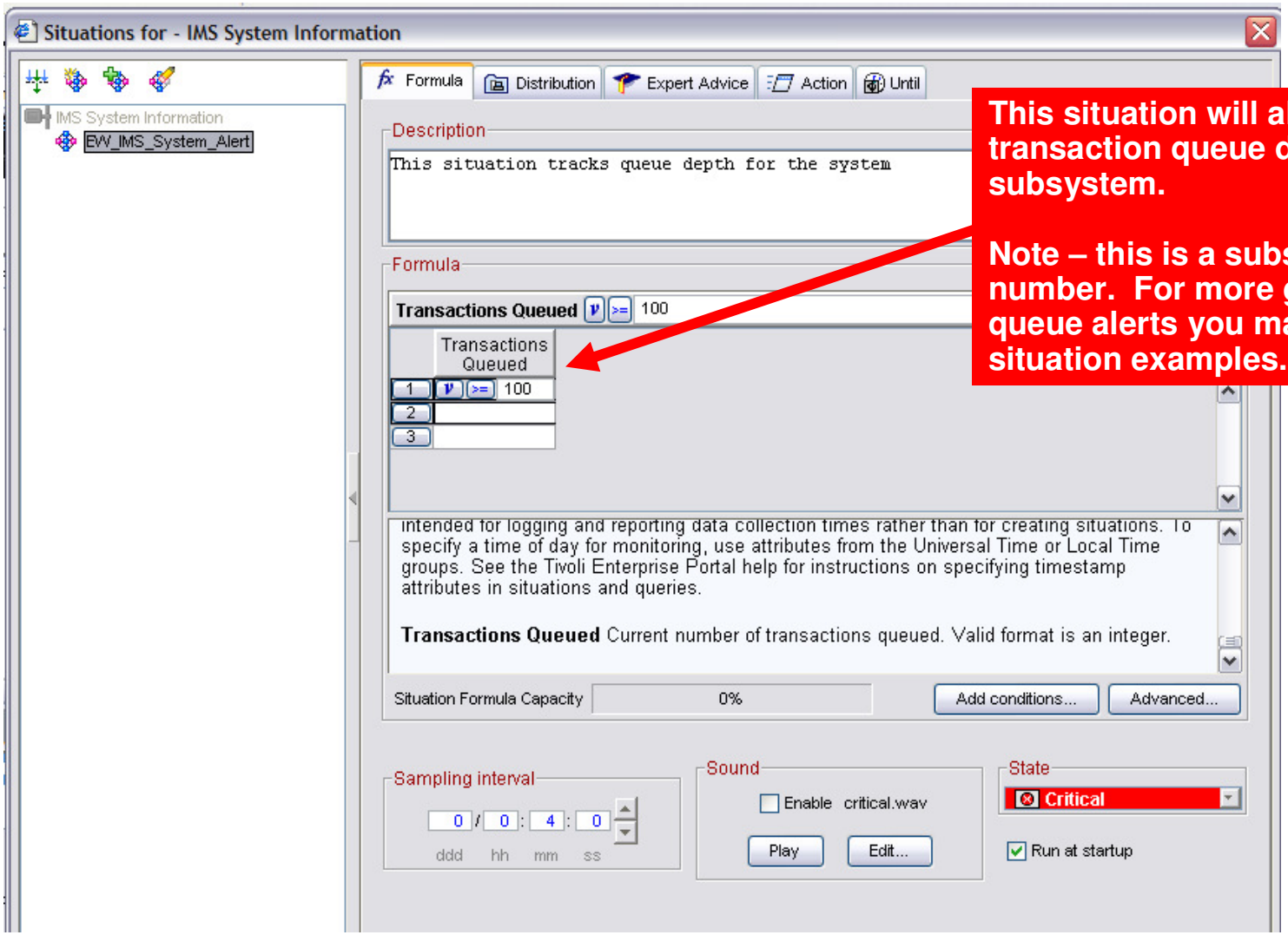
Application Performance Example – Connect Monitor IMS Connect Transaction Performance



Subsystem Performance Example
Monitor Dependent Region Processing



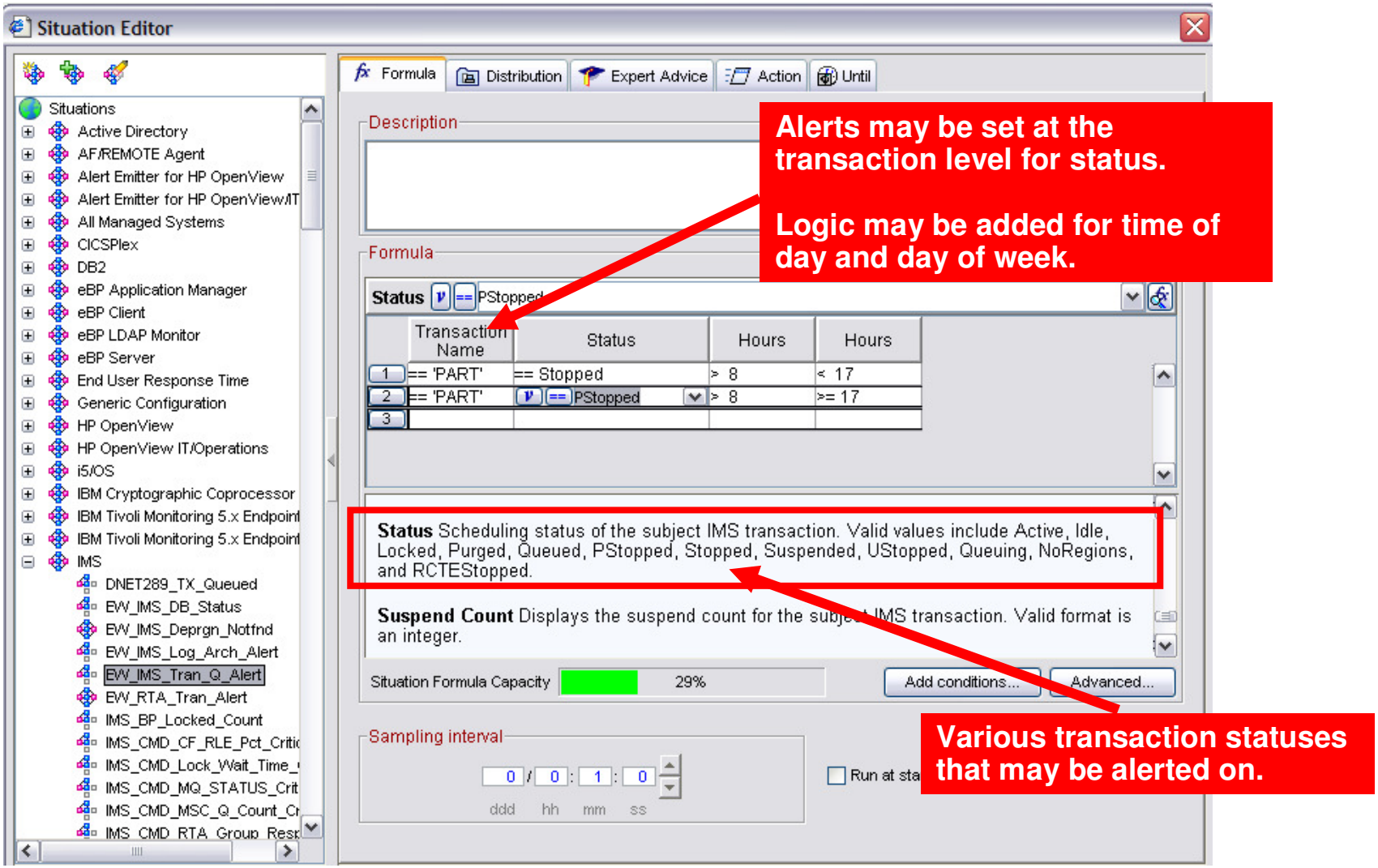
Subsystem Performance Example
Monitoring Queuing At The Subsystem Level



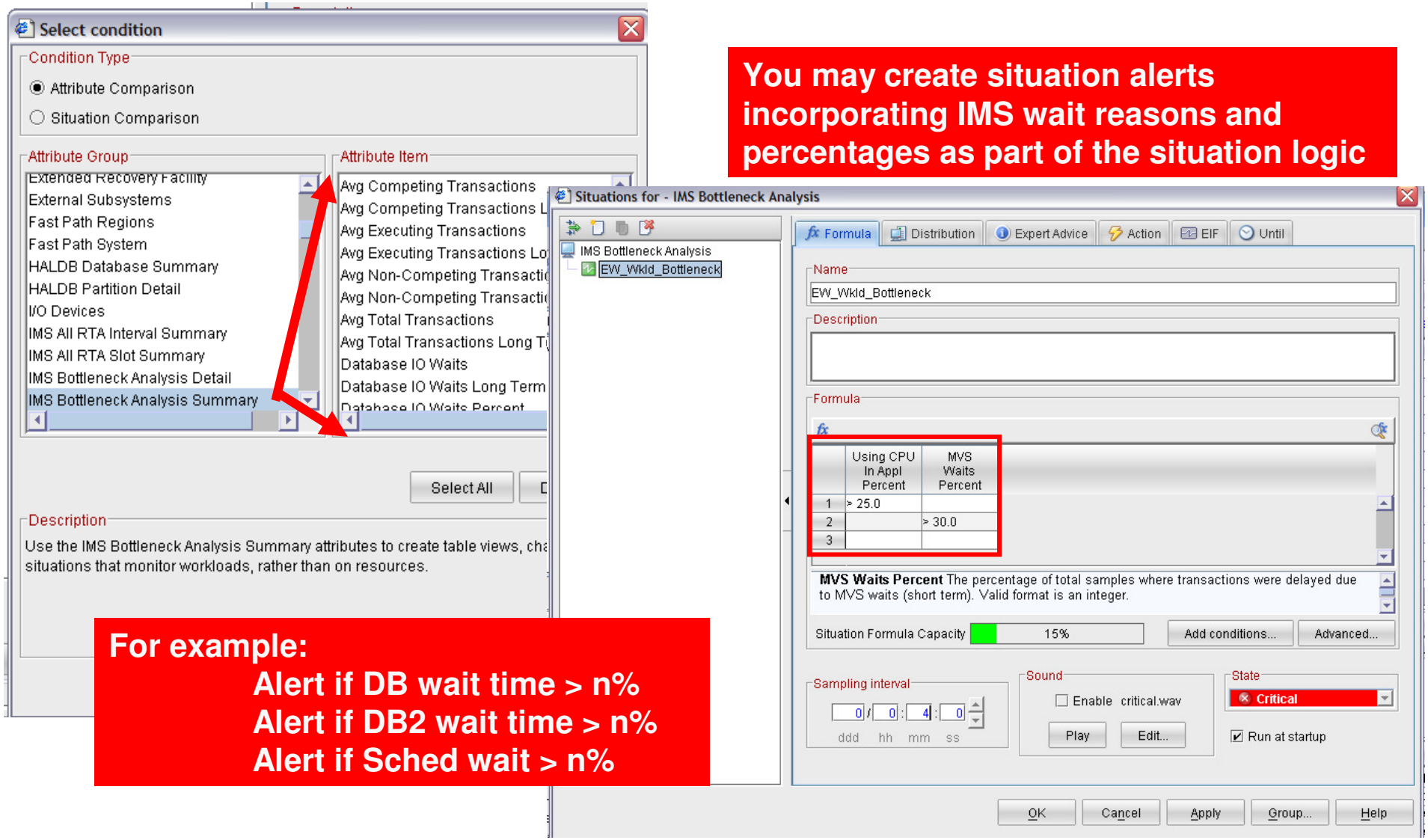
This situation will alert on transaction queue depth for the subsystem.

Note – this is a subsystem level number. For more granular queue alerts you may use other situation examples.

Application Availability Example
Alert On Critical Transactions In A Stopped Status



Create Situation Alerts When Certain Bottleneck Analysis Wait Percentages Exceed A Threshold



You may create situation alerts incorporating IMS wait reasons and percentages as part of the situation logic

For example:

Alert if DB wait time > n%
Alert if DB2 wait time > n%
Alert if Sched wait > n%

IBM's Integrated Service Management (ISM) framework can optimize costs and streamline operations

This session is focused on:

VISIBILITY

See your business services

Understand health and performance of services across your enterprise infrastructure

CONTROL

Manage service risk and compliance

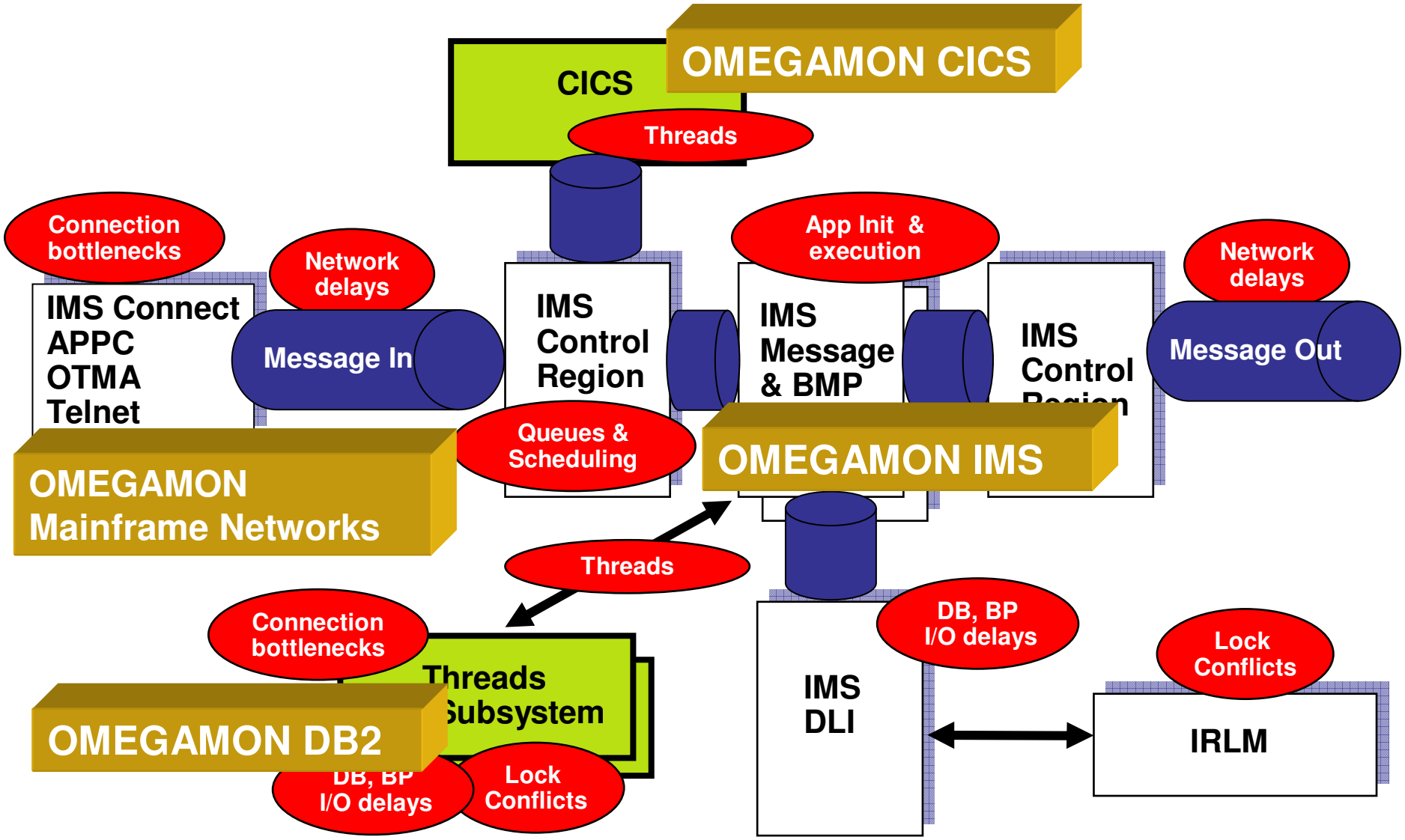
Govern and secure complex infrastructure and ensure regulatory compliance

AUTOMATION

Optimize business service delivery

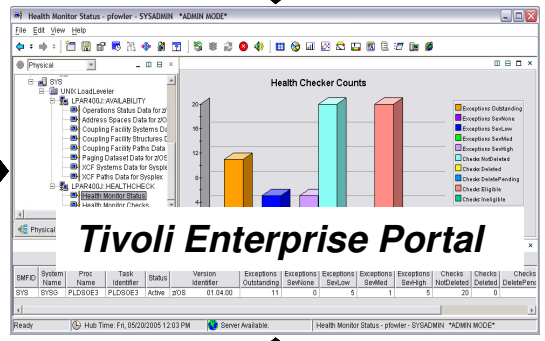
Drive down cost, minimize human error and increase productivity

Use OMEGAMON And The Tivoli Enterprise Portal To Consolidate Key Performance Analysis



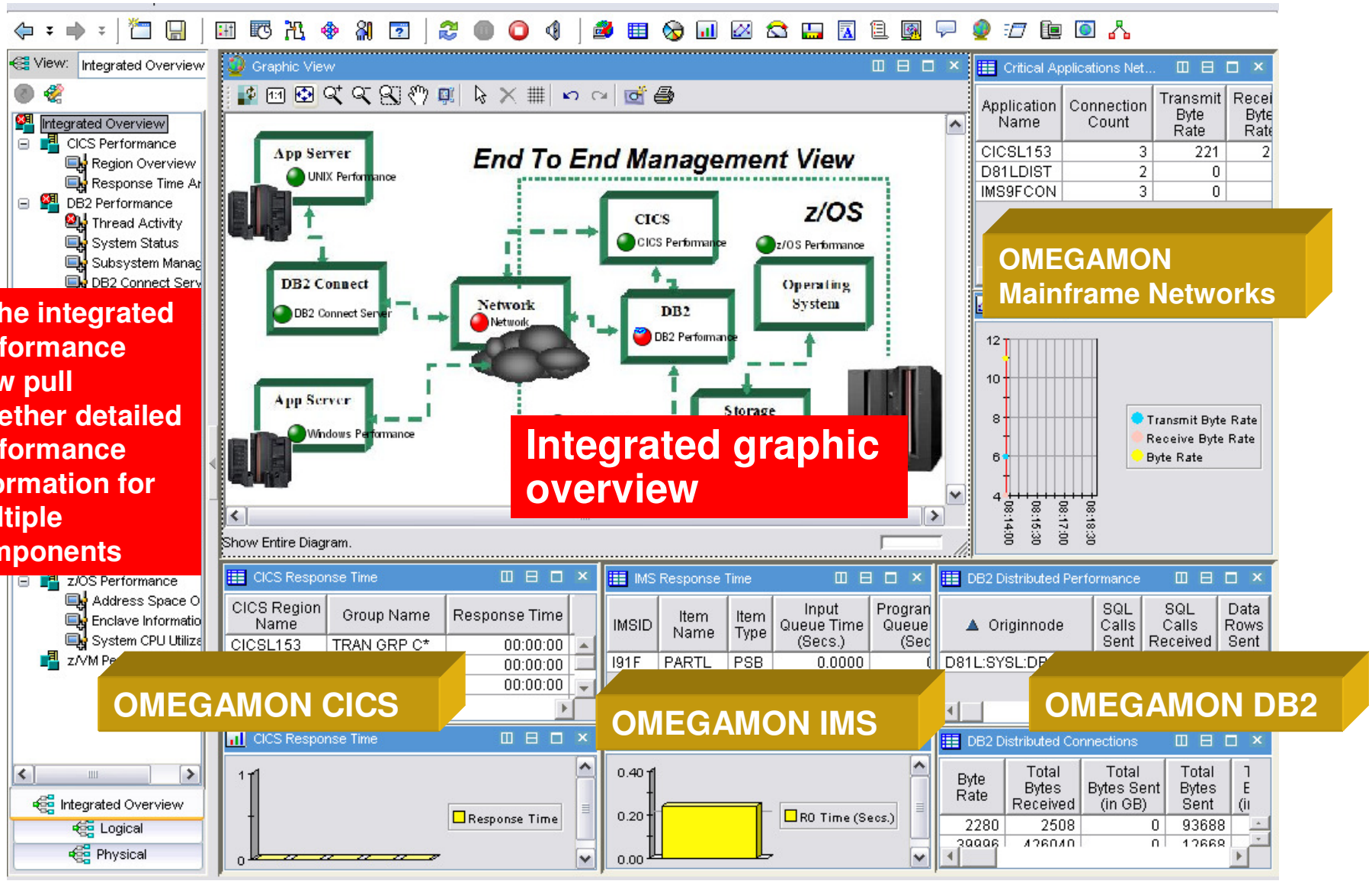
IBM solutions that integrate via the Tivoli Enterprise Portal

z/OS Health check	*z/OS Management Console*
z/OS & USS	*OMEGAMON XE on z/OS*
NetView for z/OS	*IBM Tivoli NetView for z/OS V5.3*
Network	*OMEGAMON XE for Mainframe Networks*
DB2	*OMEGAMON XE for DB2 PE/PM*
CICS	*OMEGAMON XE for CICS*
IMS	*OMEGAMON XE for IMS*
Storage	*OMEGAMON XE for Storage*
WebSphere MQ	*OMEGAMON XE for Messaging*
WebSphere Appl Server	*ITCAM for WAS*
z/VM & Linux on z	*OMEGAMON XE on z/VM and Linux*
Distributed Monitoring	*IBM Tivoli Monitoring (ITM) & ITCAM*
Automation	*SA for z/OS*
DFSMS Audit	*Advanced Audit for DFSMShsm*
Catalog Management	*Advanced Catalog Management for z/OS*
SMF trend analysis Reports	*Tivoli Decision Support for z/OS*

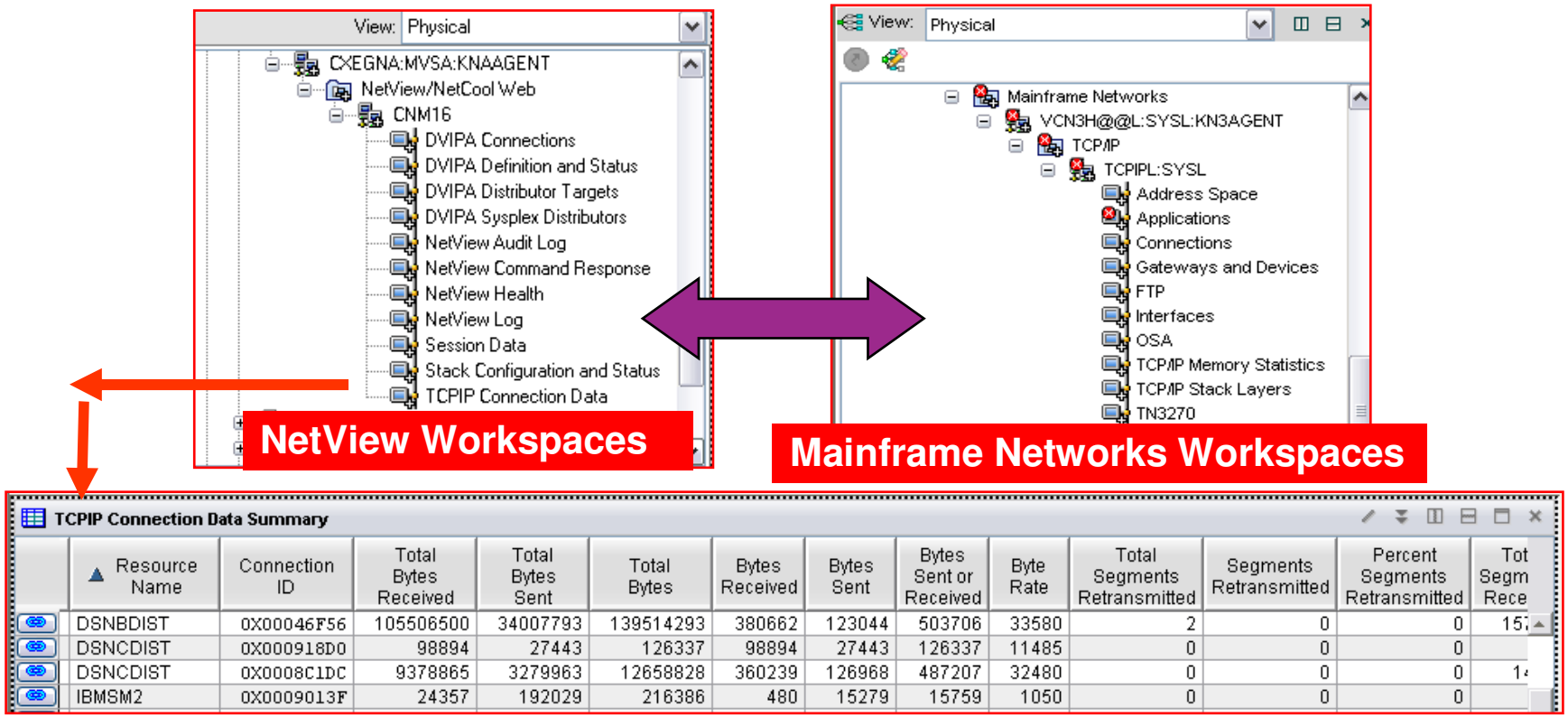


Tivoli Enterprise Portal

Use OMEGAMON And The Tivoli Enterprise Portal To Consolidate Performance Analysis - Example



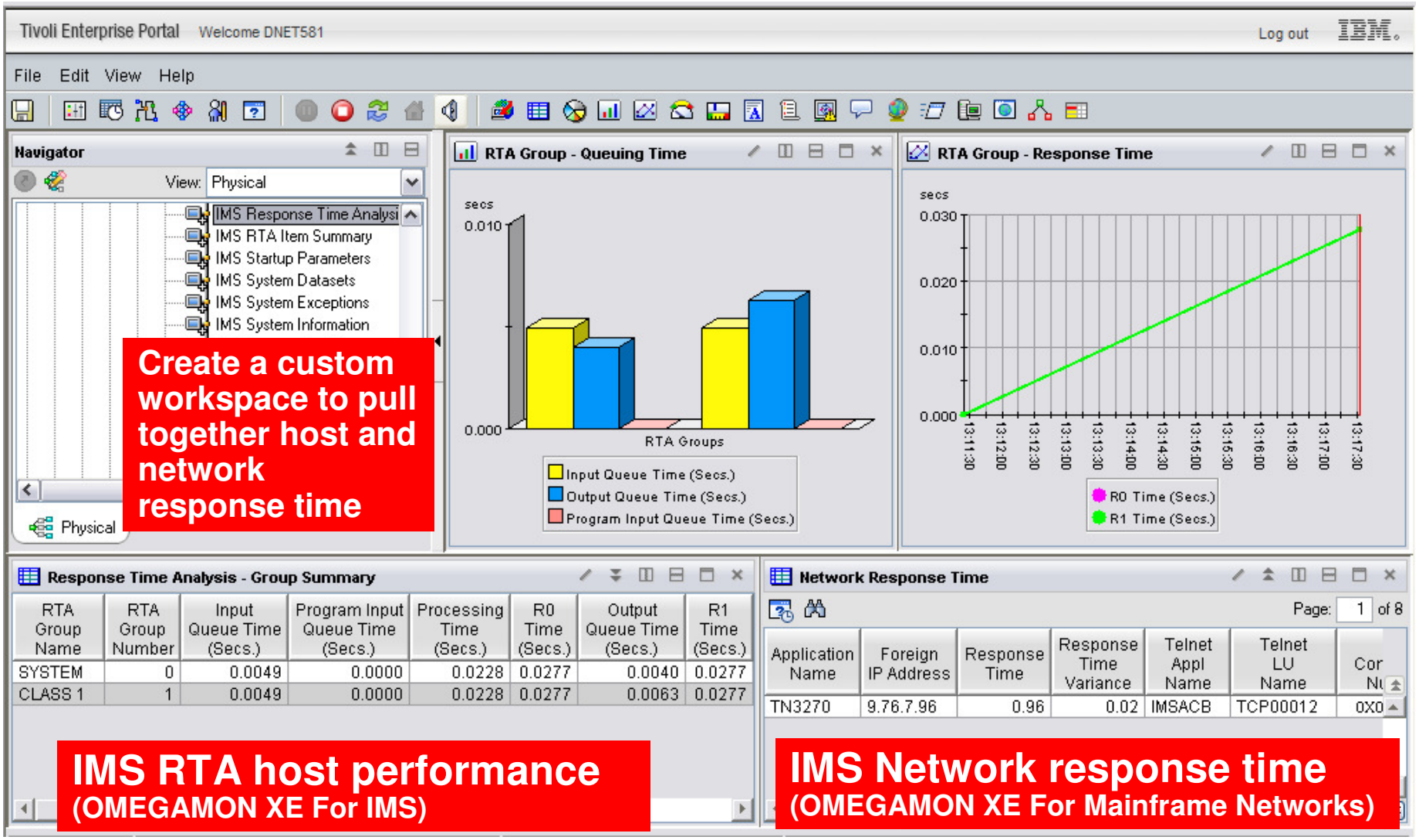
OMEGAMON XE For Mainframe Networks And NetView Integration In The TEP



Resource Name	Connection ID	Total Bytes Received	Total Bytes Sent	Total Bytes	Bytes Received	Bytes Sent	Bytes Sent or Received	Byte Rate	Total Segments Retransmitted	Segments Retransmitted	Percent Segments Retransmitted	Tot Segm Rece
DSNBDIST	0X00046F56	105506500	34007793	139514293	380662	123044	503706	33580	2	0	0	157
DSNCDIST	0X000918D0	98894	27443	126337	98894	27443	126337	11485	0	0	0	
DSNCDIST	0X0008C1DC	9378865	3279963	12658828	360239	126968	487207	32480	0	0	0	14
IBMSM2	0X0009013F	24357	192029	216386	480	15279	15759	1050	0	0	0	

- NetView provides an agent capability to plug in to the TEP
  - Allows the addition of VIPA and TCPIP connection information into workspaces
- Dynamic workspace links
  - Integration between OMEGAMON XE For Mainframe Networks, NetView, and other OMEGAMONs

Leverage The Power Of The Portal
Create An Integrated View Of IMS Response Time With Network



IBM's Integrated Service Management approach is recognized as best in class

IDC Market Share rankings:
#1 Overall in Systems / Network Management
#1 in Overall Performance and Availability Mgt.
#1 Performance Management
#1 Event Automation
#1 Network Management
#1 Output Management
#1 Archiving
#1 Identity and Access Management
#1 Security and Vulnerability Management
#1 Enterprise Asset Management

VISIBILITY	CONTROL	AUTOMATION
See your business services	*Manage service risk and compliance*	*Optimize business service delivery*

Learn more - http://www.ibm.com/software/tivoli/features/zsmc/

Thank You!!

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Visit my blog on IBM Tivoli performance and availability management of System z. Lots of information on OMEGAMON , Automation, and many things Tivoli…