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My z/OS has Analytics?

Session 15123

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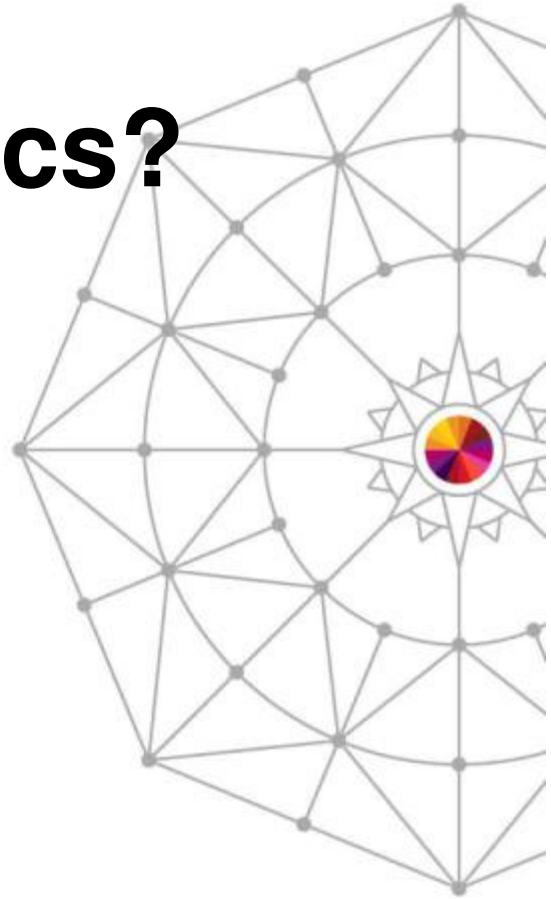
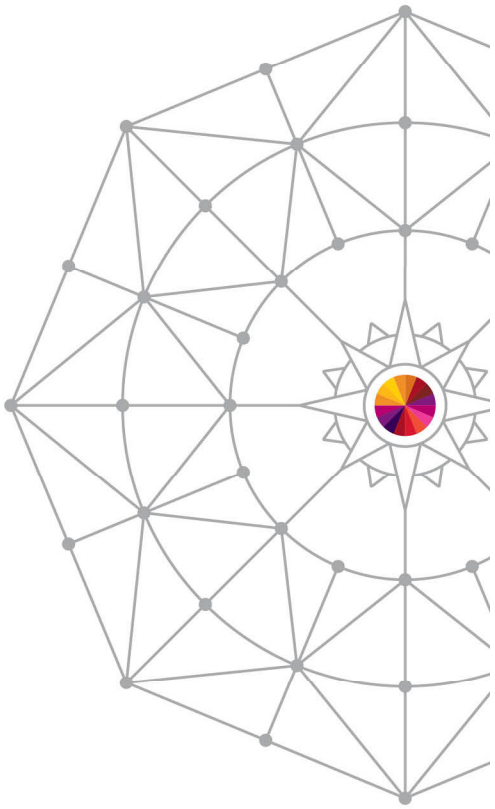


SHARE in Anaheim

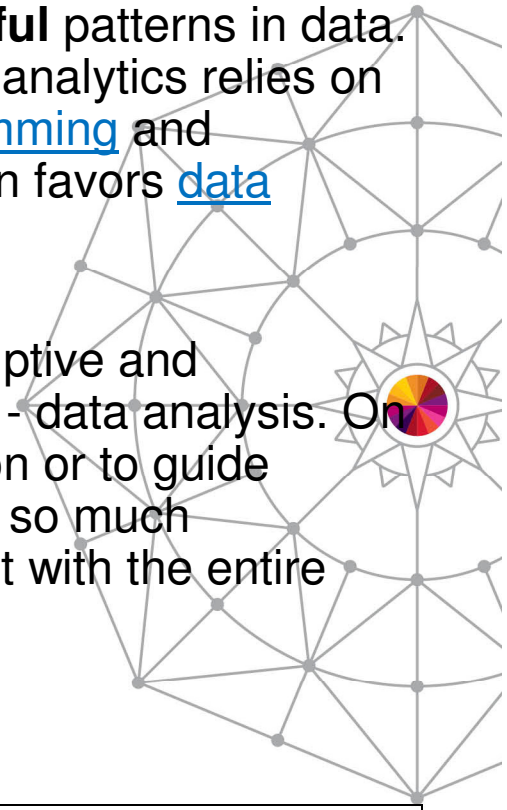
Agenda

- What is Analytics?
- Analytics in z/OS (and Analytics for z/OS)
- Analytics in z/OS components
- Analytics based features in z/OS
- External analytics solutions for z/OS
- Direction/strategy



What is Analytics – (from wikipedia)

- **Analytics** is the discovery and communication of **meaningful** patterns in data. Especially valuable in areas rich with recorded information, analytics relies on the simultaneous application of statistics, computer programming and operations research to quantify performance. Analytics often favors data visualization to communicate **insight.** (wikipedia)
- Analytics vs analysis
  - Analytics is a two-sided coin. On one side, it uses descriptive and predictive models to gain valuable knowledge from data - data analysis. On the other, analytics uses this insight to recommend action or to guide decision making - communication. Thus, analytics is not so much concerned with individual analyses or analysis steps, but with the entire methodology.



When we talk about analytics in z/OS we are referring to **IT Analytics**!!

What is IT Analytics?

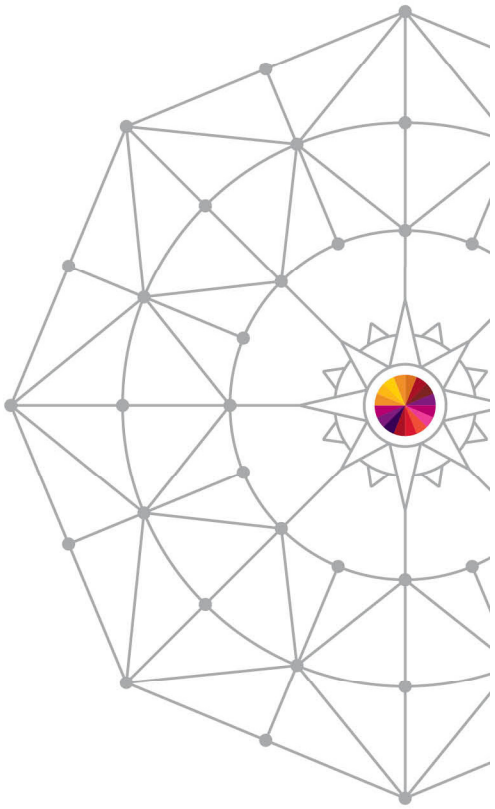
- **IT analytics is** the use of data from our IT infrastructure and systems to manage the IT systems (datacenters) better and also to drive improved business performance**.**
  - **For system z it means even more improved resiliency, availability, security and scalability.**
    - improved system performance
    - predicting capacity needs
    - diagnosing and solving problems faster
    - predicting problems before they occur
    - identifying impacts to workload caused by system behavior
    - improved consumability of the system.
  - The source of the data is the systems themselves, be it logs, messages, alerts, metrics at different levels, etc.
  - It can also includes external data about system behavior, problems, fixes, etc. be it formal or informal documentation or social media content.

- **Business analytics** is where the data source is the actual business data like consumer information, buying patterns, etc and goal is to solve and grow business outcome
- **Operational analytics** applies to both business analytics or IT analytics as it basically enables analytics and gaining insight while the data is in motion or operational.

Analytics solution lifecycle

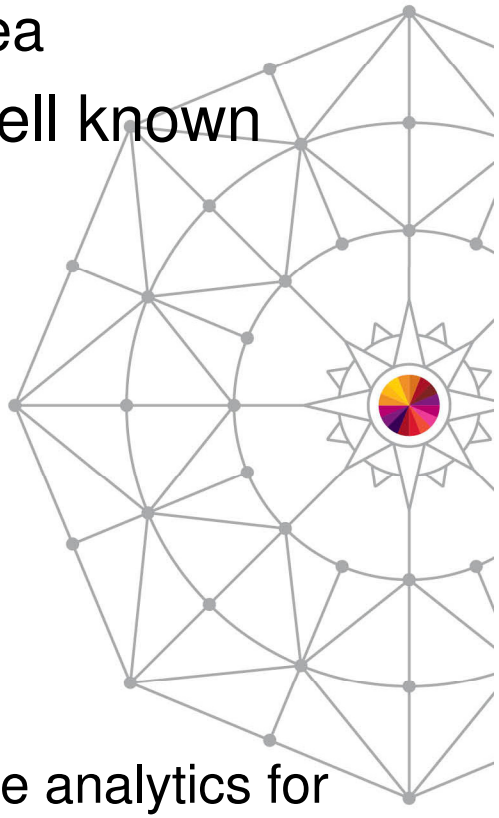
Common phases and requirements for an analytics solution

- Define use case – what problem is being solved
- Identify Data – source and content
- Data Acquisition/prepare data – frequency, volume
  - Streaming data – batch or real time
- Build model - training
- Process data
  - Scoring (real time)
    - Making sense of the data
  - Perform analysis
    - Index, search, annotate,
- Present result
    - Trends, Anomaly detection, prediction, insight
- Actions based on analysis
  - Decision making and process management
    - Risk and impact analysis



Analytics in z/OS?

- z/OS has had analytics for a long time
  - Long before it became a big industry focus area
- There is analytics in z/OS that enables the well known Qualities of service ('QoS')
  - WLM is the best example of that.
  - Health checker
  - Communication server for z/OS
  - SMF data
  - Run Time Diagnostics (RTD)
  - Predictive failure Analysis (PFA)
- There are additional features and products that provide analytics for z/OS data



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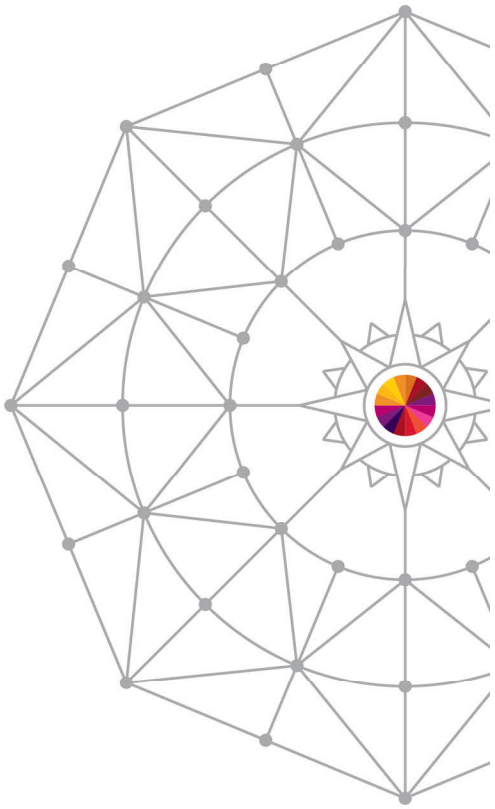
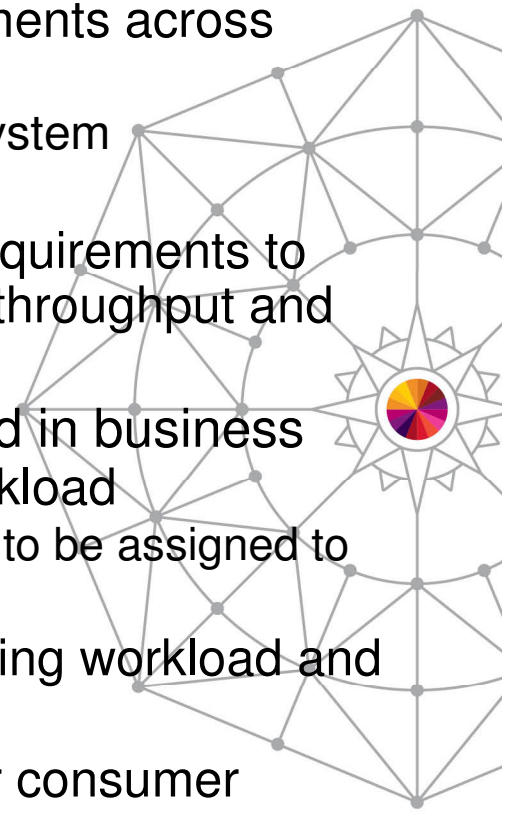


Workload management –
sophisticated analytics in system Z

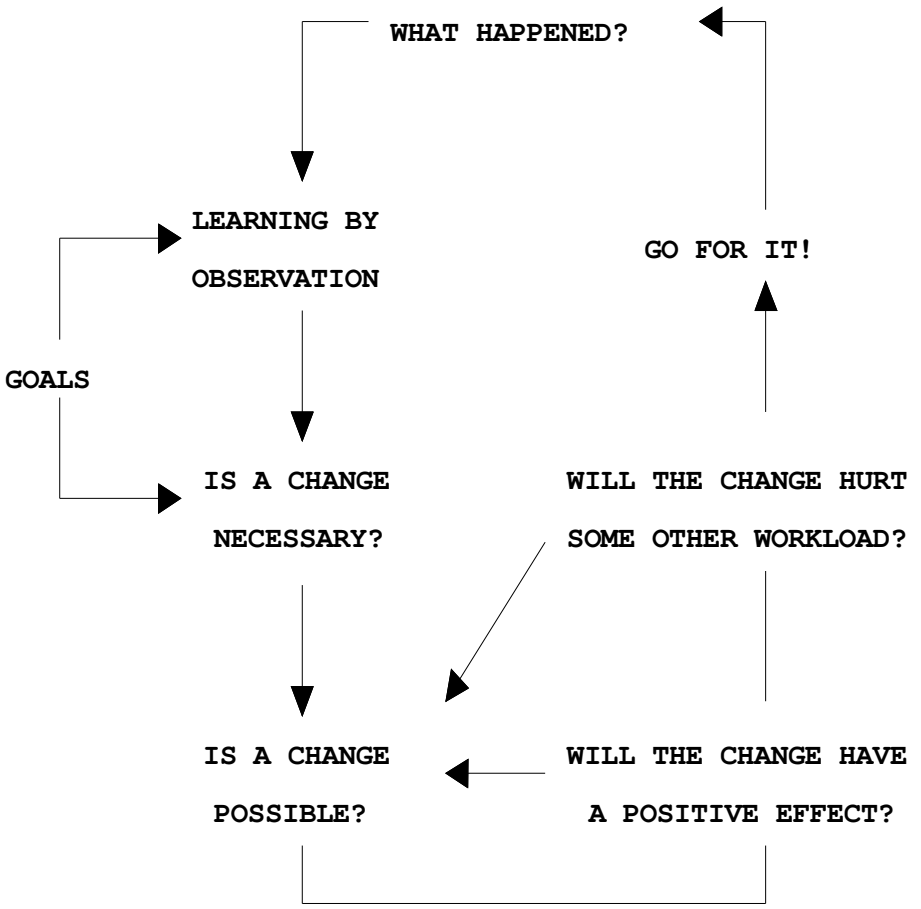
- Work load management in z/OS provides –
  - Dynamic management of multiple workload requirements across multiple systems simultaneously
    - Workload may have different and often competing system requirements
  - Continuous analysis of system metrics to balance requirements to provide best use of resources and maintain highest throughput and system responsiveness
  - Actions based on defined performance goals defined in business terms and assign business importance for each workload
    - System decides the resources (CPU, Storage, IO, etc.) to be assigned to each workload to meet the goals
  - Continuous monitoring and analysis to adapt to varying workload and system needs to meet the goals.
  - Provides robust metrics and performance reports for consumer monitoring and modification of goals.



z/OS Workload Management – packed with analytics

- WLM/SRM uses analytic approaches to
  - Understand workload and system behavior
    - Frequent state "sampling" provides statistical knowledge about work units and system
  - Build historic views at different scales
    - Sampled historic views are relatively short term views, ranging from 10 sec to ~ 21 min
    - Statistical significance is required
  - Consider, assess, and implement WLM-initiated changes to change access to resources (processor, storage, I/O,…)
    - Some changes can be derived deterministically
      - *E.g. effect of changing a dispatch priority*
    - Other changes are influenced by more complex or variable parameters and can only be assessed heuristically
      - *WLM "Plots" are used to represent empirical knowledge about how changing an independent variable influences one or more dependent variables*
      - *Used to assess benefit and cost for changes being considered*

How Does WLM Work?

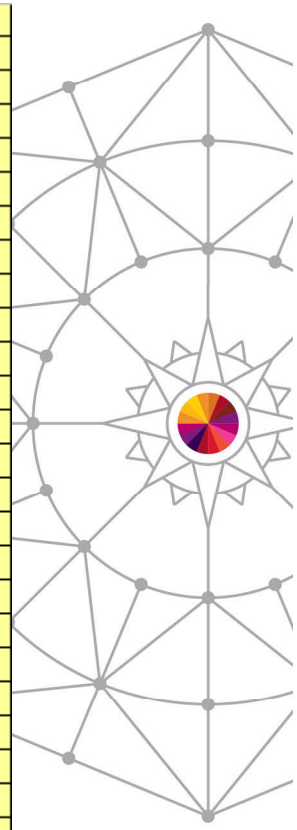


- The Problem
  - Resources must be dynamically adjusted to meet service goals
- Required
  - Seamless adjustment when load changes
  - End user response times for important work must always be guaranteed
  - System must be highly utilized
- Solution
  - Measure system state every 250ms
  - Assess workload state every 10 seconds
    - additional resource adjustment every 2 sec
  - Adjust access to resources (CPU, storage, IO) to help workloads by importance every 10 seconds
- Result
  - Faster than every human ever can be
  - WLM status and monitoring tools to fine tune goals if needed

WLM history tables represent WLM knowledge about recently sampled work unit states

10 sec 20 sec 40 sec .... 10 min 21 min

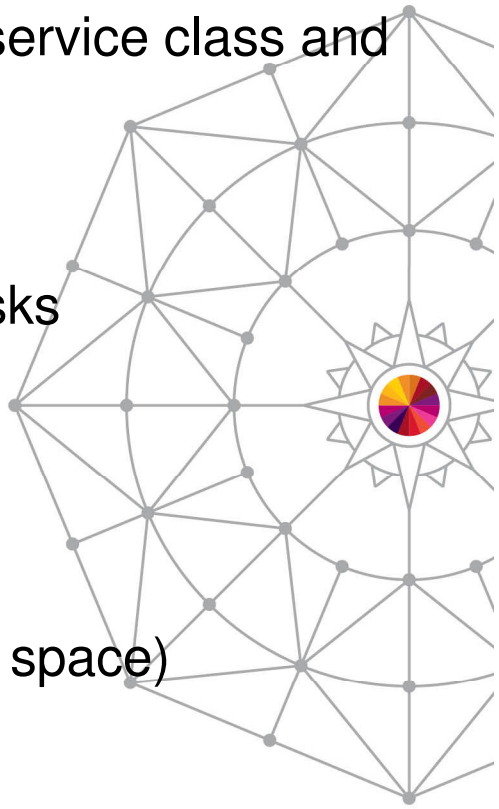
Delay Categories	Adjusted	Row1	Row2	Row3	Row4	Row5	Row6
IDLE	00000AAE	00000000	0000006E	00000082	00000950	0000300E	000027CB
OTHER	00000014	00000000	00000000	00000000	00000014	00000014	0000009D
CPU_USING	00000048	00000000	00000000	00000001	00000047	0000019B	0000010A
DASD_IO_USING	00000449	00000000	00000000	00000000	00000449	000015CD	00000DB8
IFA_USING	00000000	00000000	00000000	00000000	00000000	00000000	00000001
SUP_USING	00000000	00000000	00000000	00000000	00000000	00000000	00000000
CPU_DELAY	0000002B	00000000	00000000	00000000	0000002B	000000B2	00000087
AUX_PAG_PRIV_DELAY	00000000	00000000	00000000	00000000	00000000	00000000	00000000
AUX_PAG_COM_DELAY	00000000	00000000	00000000	00000000	00000000	00000000	00000000
AUX_VIO_DELAY	00000000	00000000	00000000	00000000	00000000	00000000	00000000
AUX_SCR_HISP_DELAY	00000000	00000000	00000000	00000000	00000000	00000000	00000000
AUX_CAC_HISP_DELAY	00000000	00000000	00000000	00000000	00000000	00000000	00000000
AUX_SWAP_DELAY	00000000	00000000	00000000	00000000	00000000	00000000	00000000
MPL_DELAY	00000000	00000000	00000000	00000000	00000000	00000000	00000000
CPU_CAP_DELAY	00000000	00000000	00000000	00000000	00000000	00000000	00000000
SHARED_PAG_DELAY	00000000	00000000	00000000	00000000	00000000	00000000	00000000
DASD_IO_DELAY	000000A5	00000000	00000000	00000000	000000A5	0000032F	00000241
WLM_QUEUE_DELAY	00000000	00000000	00000000	00000000	00000000	00000000	00000000
ENCLAVE_PVT_PAG	00000000	00000000	00000000	00000000	00000000	00000000	00000000
ENCLAVE_VIO_PAG	00000000	00000000	00000000	00000000	00000000	00000000	00000000
ENCLAVE_HSP_PAG	00000000	00000000	00000000	00000000	00000000	00000000	00000000
ENCLAVE_MPL_DELAY	00000000	00000000	00000000	00000000	00000000	00000000	00000000
ENCLAVE_SWAP_DELAY	00000000	00000000	00000000	00000000	00000000	00000000	00000000
IFA_DELAY	00000000	00000000	00000000	00000000	00000000	00000000	00000000
SUP_DELAY	00000000	00000000	00000000	00000000	00000000	00000000	00000000
AUX_PAG_XMO_DELAY	00000000	00000000	00000000	00000000	00000000	00000000	00000000
BP_OTHER_DELAY	00000000	00000000	00000000	00000000	00000000	00000000	00000000



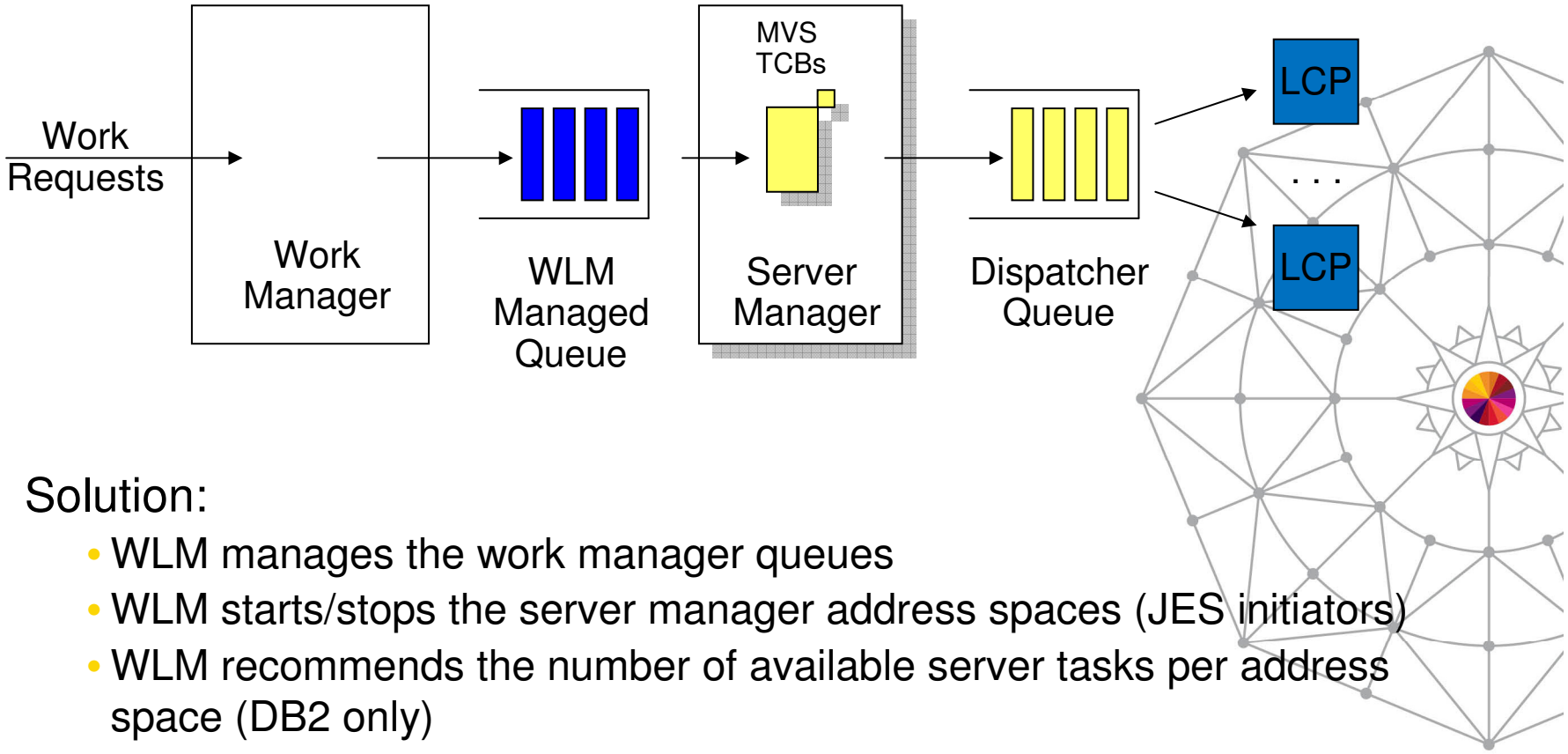
(only subset displayed)

Example: WLM Queue Server Management

- Objective: Manage number of servers (AS) and server instances (TCBs with server AS) required to meet the goal of a service class and optimize throughput
  - Initiators for WLM-managed job classes
  - Number stored procedures address space
  - Number of WebSphere servant address spaces/tasks
- Data considered (subset):
  - Queue delays
  - Constraints (CPU, storage, paging), contention
  - Service time
  - #Servers, #server instances (within server address space)
  - CPU use by server
  - Storage used by server and server instances



Example: Queue Server Management



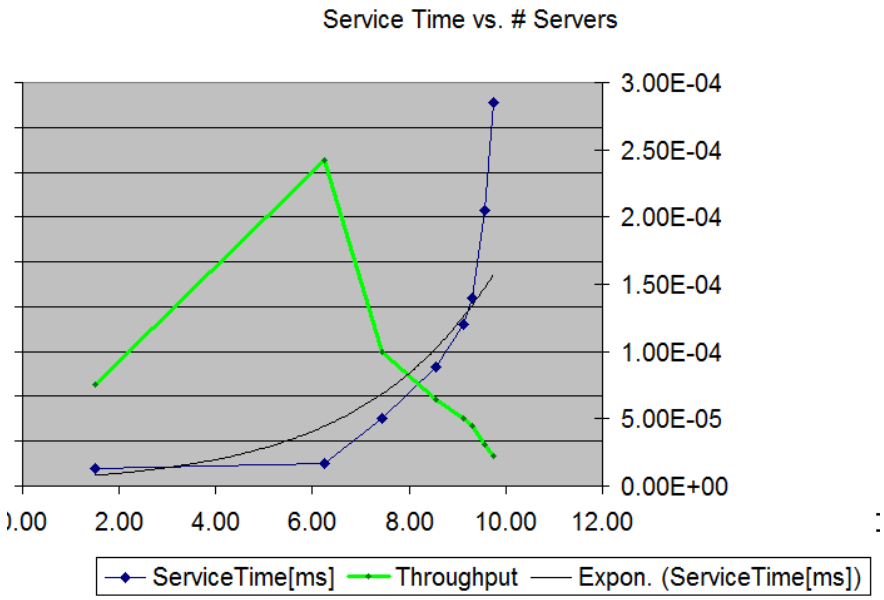
Solution:

- WLM manages the work manager queues
- WLM starts/stops the server manager address spaces (JES initiators)
- WLM recommends the number of available server tasks per address space (DB2 only)

Example: WLM Queue Server Management

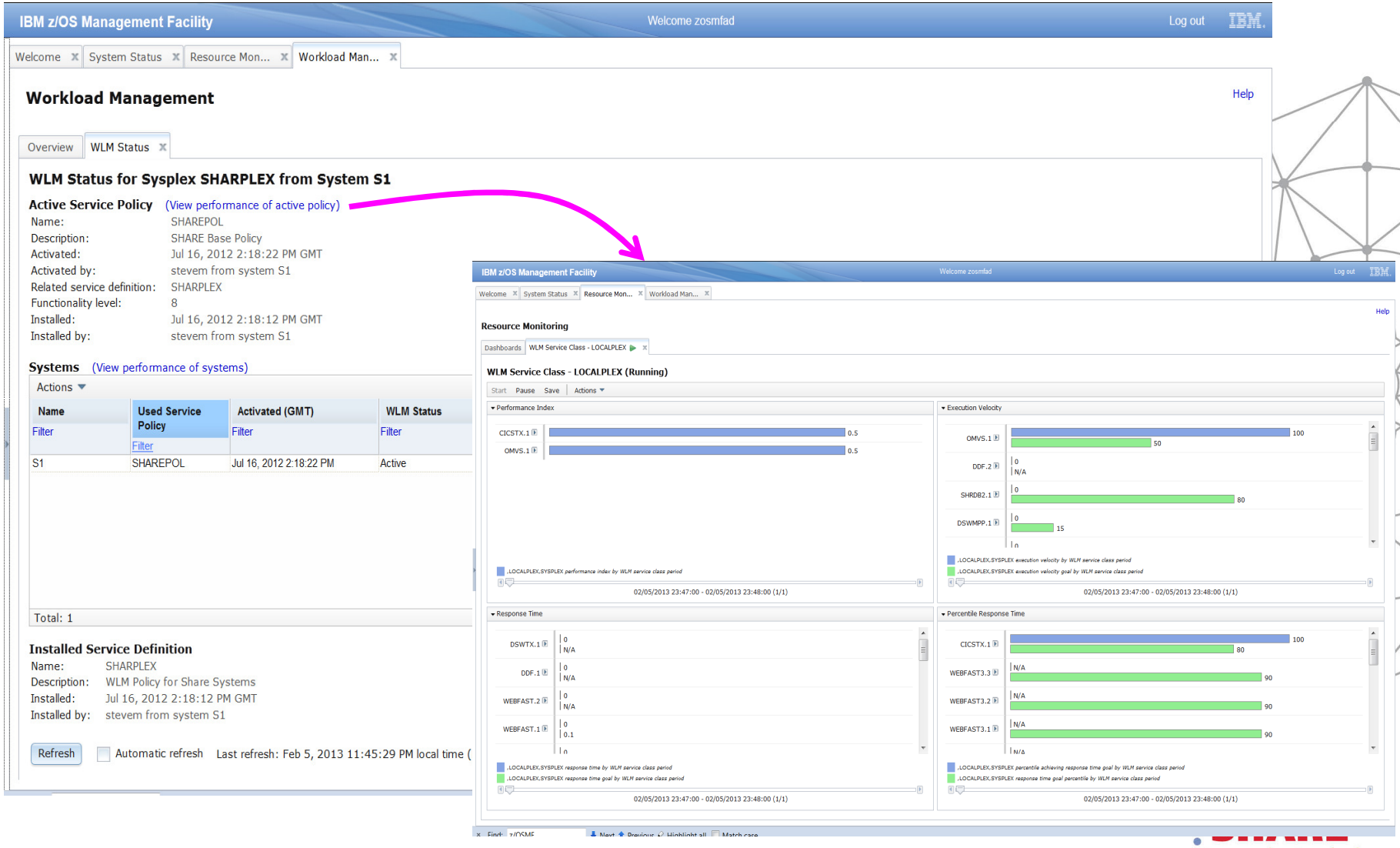
- Plots can be used to consider relationships that are otherwise unknown to WLM.
- Example: the throughput of servers might be limited due to “hidden” constraints, such as
  - Limited connections required to other backend servers
  - Bandwidth of communication to other systems, potentially non-z/OS systems

  WLM may be unaware that such dependencies exist.



•Nevertheless the service time vs. # servers plot may identify that the service time increases when the number of server instances is beyond an optimum range. WLM can therefore avoid high number of servers that could reduce throughput dramatically

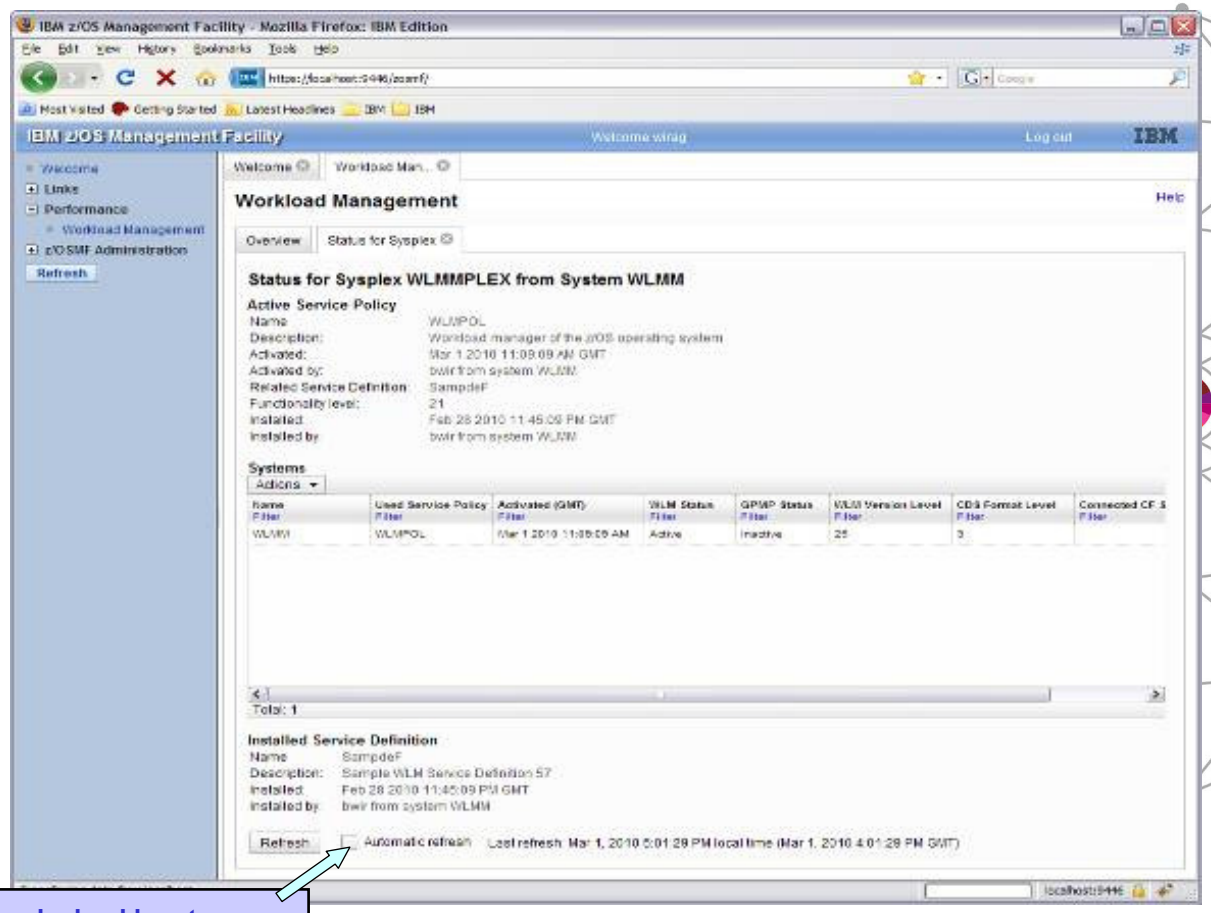
View performance of Active policy – z/OSMF



z/OSMF Workload Management

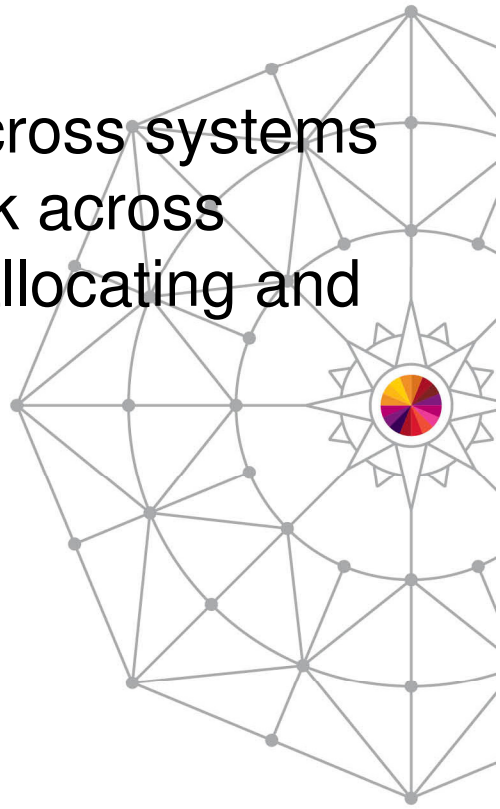
View Sysplex Status

- The View Sysplex Status task displays
  - The active service policy
  - The WLM status on the systems in the sysplex
  - The installed service definition
  - The Sysplex Status panel comprises the information provided by the MVS console command D WLM, SYSTEMS
  - WLM status report is automatically updated if the WLM status on the systems changes



WLM Summary

- Workload manager can manage workload across systems by analyzing various metrics across the stack across systems and software layers (middleware) allocating and moving resources as needed.



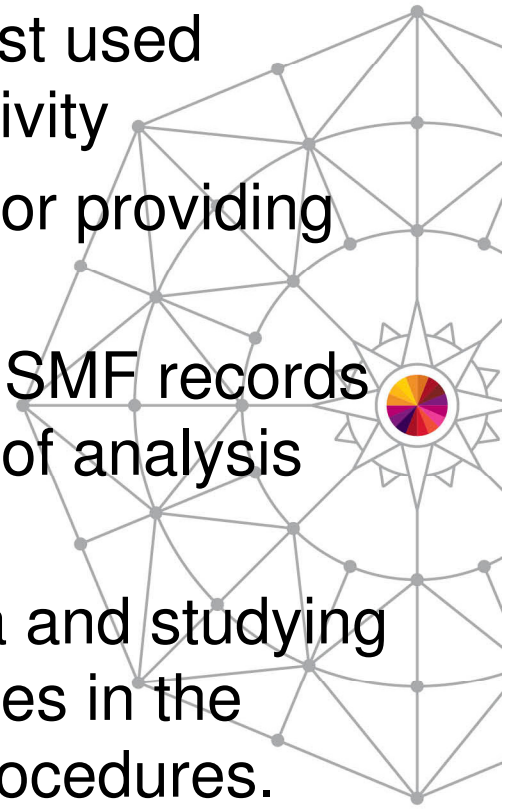
z/OS Health Checker - Rules based Analysis in z/OS

- IBM Health Checker for z/OS is a key component of the z/OS operating system
- It simplifies and automates the identification of potential configuration problems before they impact system availability.
- z/OS Health Checker enables Health checks that are executed to identify the potential problems
- The health checks continuously check many current, active z/OS and sysplex settings and compares them with those suggested by IBM or defined by you.

- The IBM Health Checker for z/OS consists of:
  - A framework that provides management and execution services for the checks, such as health check registration, messaging, scheduling, command processing, logging, and reporting. The framework is provided as an open architecture in support of writing health checks.
  - Individual checks that look for specific z/OS settings and definitions, checking for potential problems are provided separately and are independent of the framework.
  - The architecture of the framework supports checks written by IBM, independent software vendors (ISVs), and users.
  - Health Checks evaluate settings and definitions specific to products, elements, or components.
- Customers can use the IBM Health Checker for z/OS infrastructure to run their own checks, extending the reach of IBM Health Checker for z/OS to environment-specific settings.

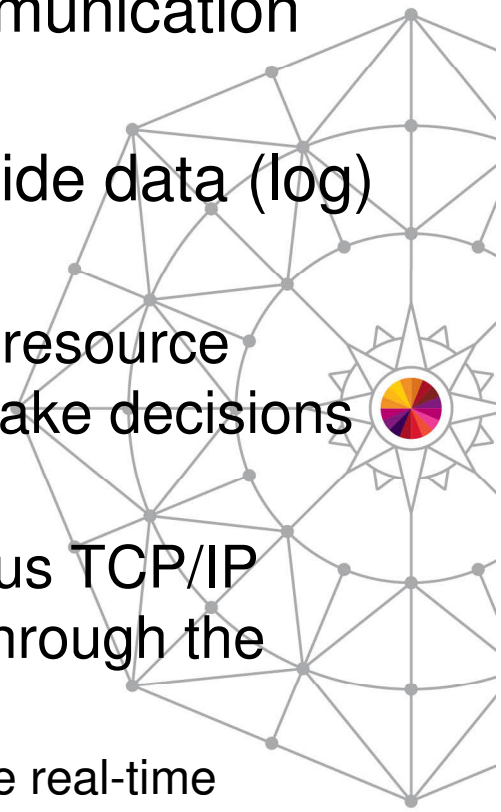
SMF

- SMF data is one of the most reliable and most used source of information about z/OS system activity
- It is being used for analytics and has scope for providing detailed information about system behavior
- The volume and variety of information in the SMF records enables installations to produce many types of analysis reports and summary reports.
- For example, by keeping historical SMF data and studying its trends, an installation can evaluate changes in the configuration, workload, or job scheduling procedures.



z/OS Communication server

- There are various types of functions in Communication Server for z/OS
- Intrusion Detection Services (IDS), that provide data (log) that could be input to some analytics engine.
- There are other functions that internally monitor resource health (storage, interface availability, etc) and make decisions (remove TCP/IP from sysplex).
- It also records many SMF records from the various TCP/IP components and applications that are provided through the real-time SMF Network interface (NMI) service.
    - Tivoli and several vendor products use these for some real-time analysis (event driven).

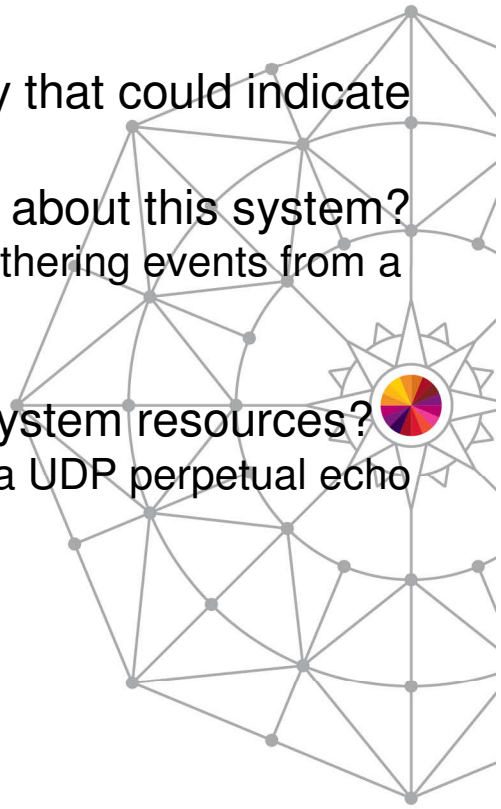


z/OS Network Security: TCP/IP Intrusion Detection Services

- With Intrusion Detection Services (IDS), TCP/IP performs real-time analysis of incoming/outgoing network traffic

- Looks for “signature events” based upon configured IDS policy that could indicate system misuse/abuse:
  - Scans: Is a remote system trying to determine information about this system?
    - Ex: The stack detects a scan as multiple unique information gathering events from a single source IP within a defined period of time
  - Attacks: Is there an attempt to crash the system or affect system resources?
    - Ex: Look for malformed packets, detect a TCP SYN flood, or a UDP perpetual echo

- Reports this information through
  - Logging
  - Console messages
  - IDS packet trace
  - Notifications to external event managers (like Tivoli NetView)



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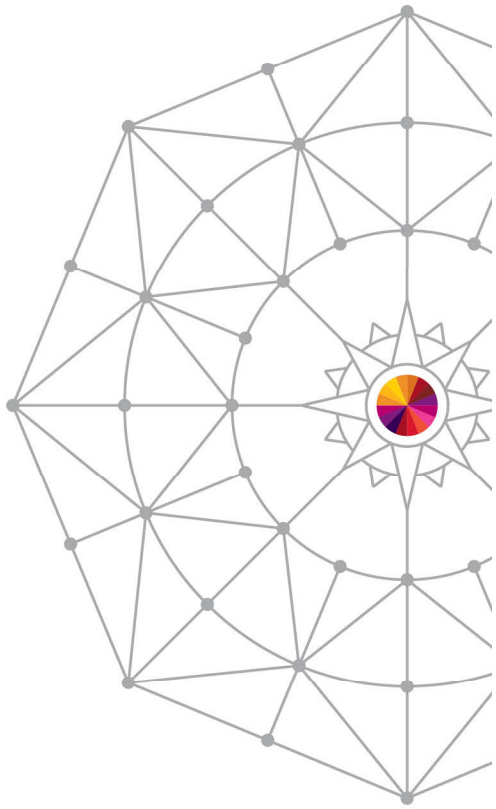


Addressing a failure – can analytics help?

Systems running, but

Seem impaired
Slow
Applications “not working”
Sysplex problems
UNIX problems
Irate users

Action!: Check out the systems for cause

Outstanding contention?
Critical errors detected?
Important tasks looping?
I/O bottlenecks?
Network issues?

Prep for “Bridge” call

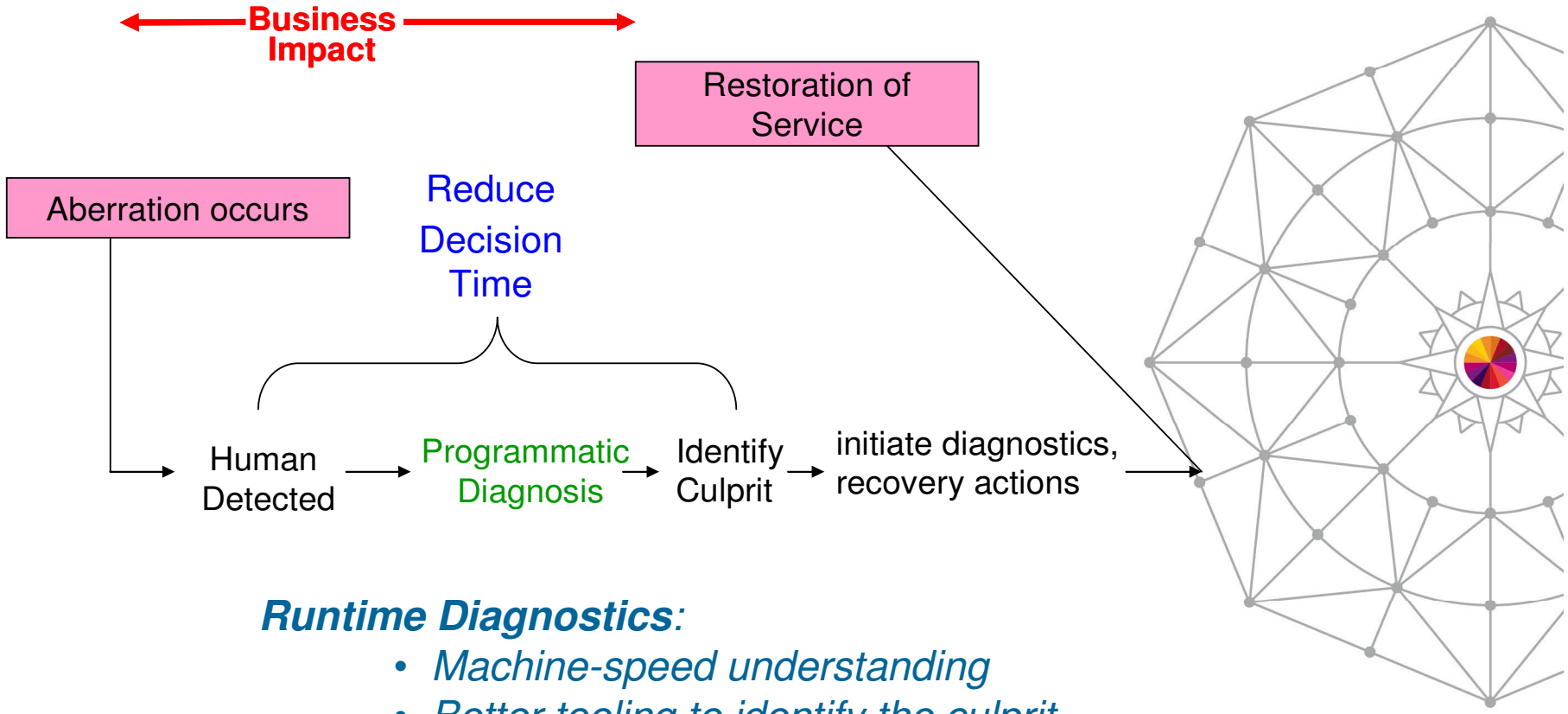
Is it fixed yet?

Investigate the clues using monitors and commands

Get diagnostic data such as dumps and command output

Restart the system
Open a PMR
Fix your resume/CV

Analytics for faster Problem Diagnosis: Reducing Decision Time



***Runtime Diagnostics**:*

- *Machine-speed understanding*
- *Better tooling to identify the culprit*
- *Enables faster, correct recovery actions*

Run Time Diagnostics for faster problem determination – a rules based Analysis

- Runtime Diagnostics performs diagnostics on a “sick, but not dead” system in a timely manner
  - Reduces the skill level needed by a system programmer for investigating soft failures
  - Provides timely, comprehensive analysis at a critical time period
  - Performs analysis similar to that of a very experienced system programmer
    - But, more comprehensive and faster – goal of 60 seconds or less
    - great productivity aid for experienced system programmers!
  - Looks for specific evidence of “soft failures” occurring RIGHT NOW!
  - In contrast to catastrophic failures, a soft failure is defined as the combination of typical and abnormal behavior that causes the software to withhold a requested service.

Run Time Diagnostics for faster problem determination – a rules based Analysis

- Runtime Diagnostics helps analyze a system that has potential soft failures.
  - Reviewing critical messages in the log
  - Analyzing contention
  - Examining address spaces with high central processing unit (CPU) usage
  - Looking for an address space that might be in a loop
  - Evaluating local lock conditions.
- In many cases, when Runtime Diagnostics finds a critical message, it performs additional analysis based on the job name in the message or other information in the message text.
  - For example, if Runtime Diagnostics identifies an XCF stalled connector message, it performs additional analysis of the identified address space to help narrow down the problem.

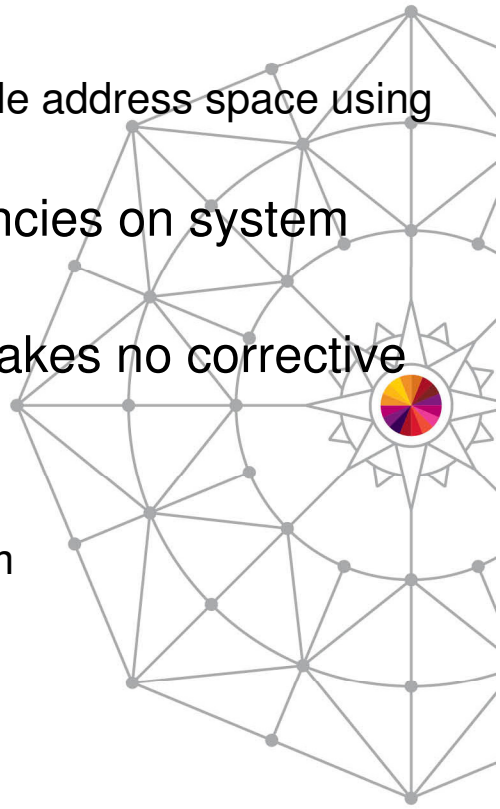
Run Time Diagnostics for faster problem determination – a rules based Analysis

- Runtime Diagnostics is set up as a subsystem that runs as a started task It searches for certain messages and message combinations in the operations log (OPERLOG) stream and attempts to identify other system symptoms with minimal dependencies on other system services.

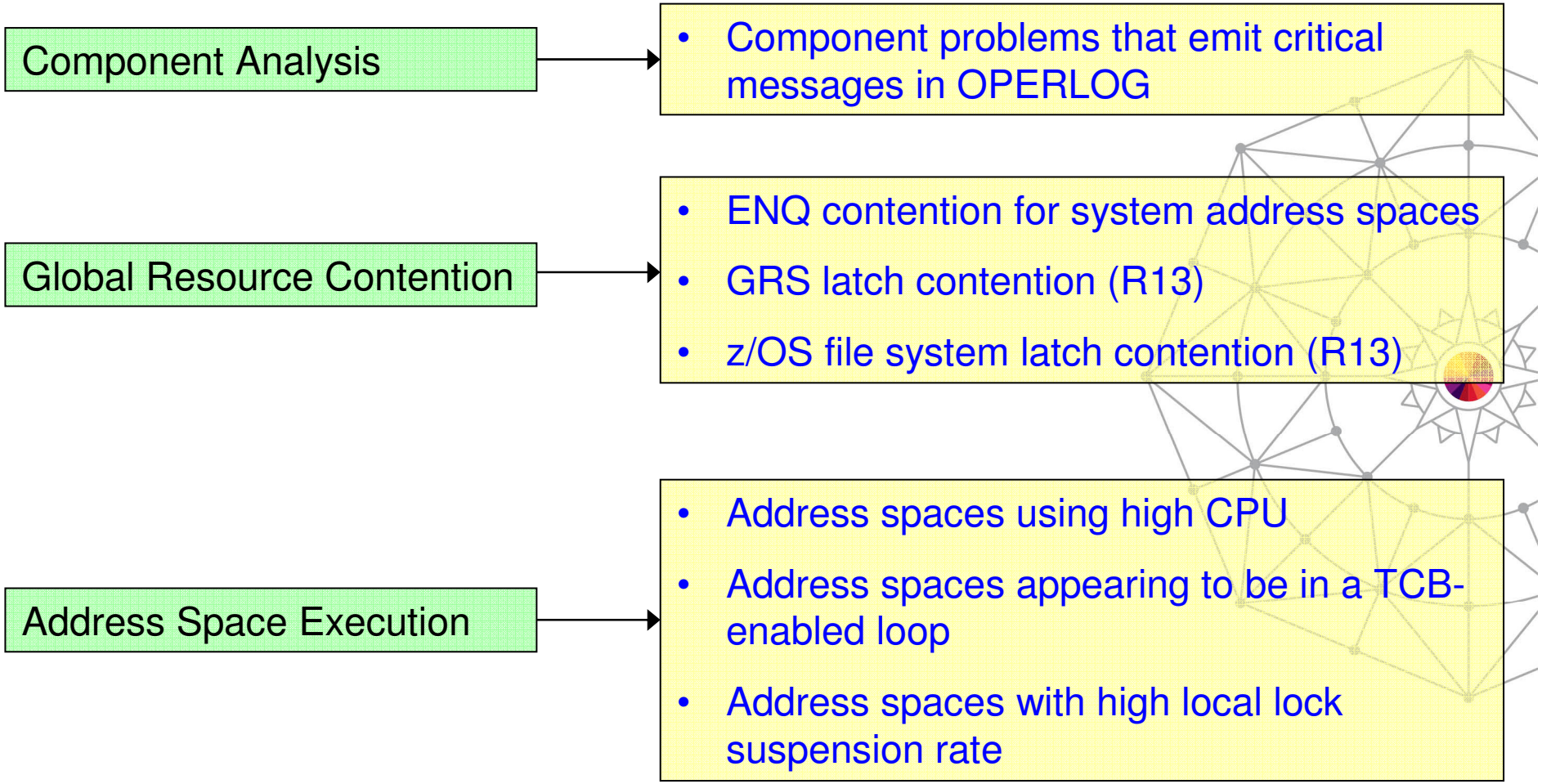
- When Runtime Diagnostics finds a problem, it displays a multi-line write-to-operator (WTO) message, HZR0200I RUNTIME DIAGNOSTICS RESULTS, which lists system error events containing a problem description and a suggested action for your analysis.

Runtime Diagnostics Usage and Benefits

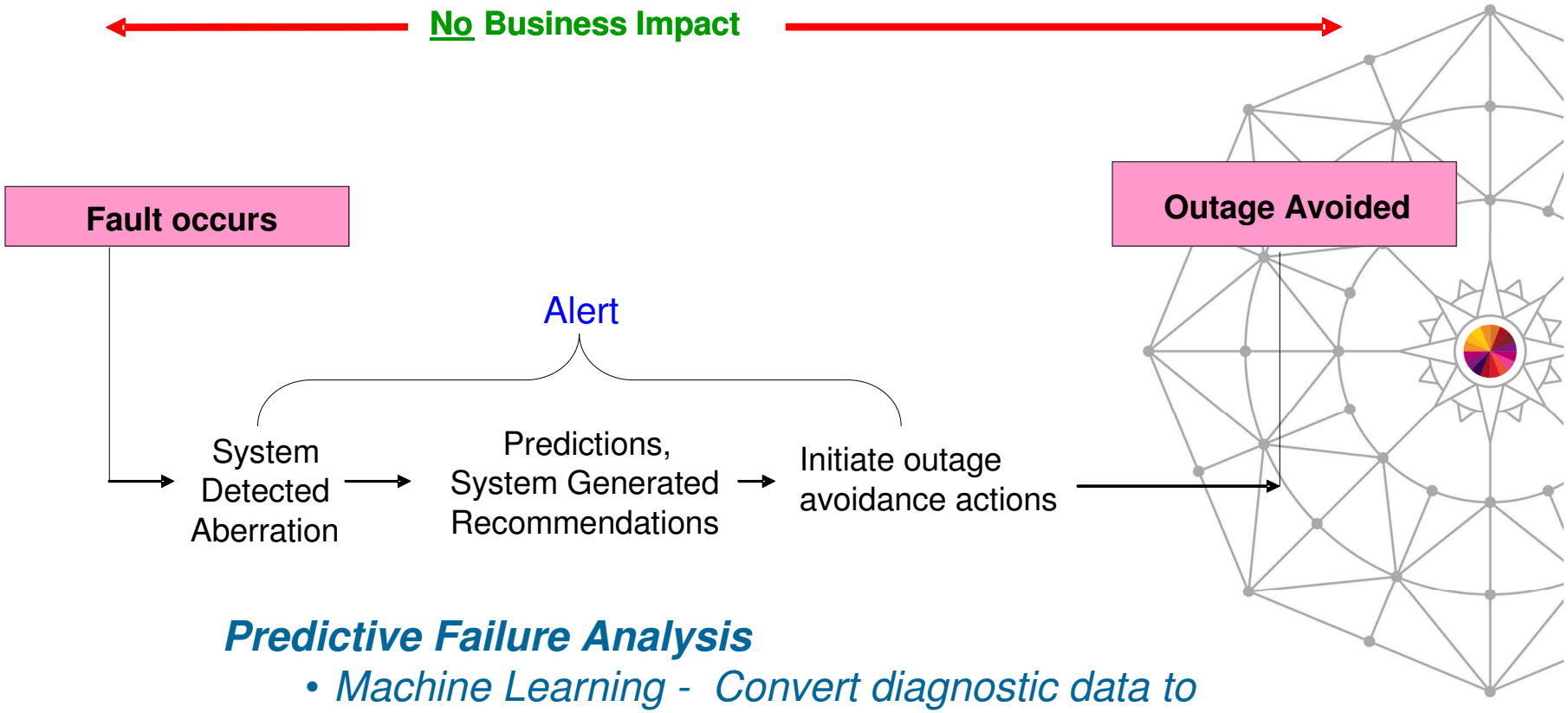
- Runtime Diagnostics helps recommend next steps; Allows you to quickly discover next actions to take such as
  - Which jobs to cancel
  - What to investigate further such as classes of resources or a single address space using a monitor like RMF or Tivoli Omegamon
- There is no background processing and minimal dependencies on system services
- Runtime Diagnostics is not automation or a monitor and takes no corrective action,
- Use Runtime Diagnostics…
  - when the help desk or operations reports a problem on the system
  - to get ready for the “bridge call”
  - when PFA detects abnormal behavior



Runtime Diagnostics Analysis Types



Early Detection → Outage Avoidance

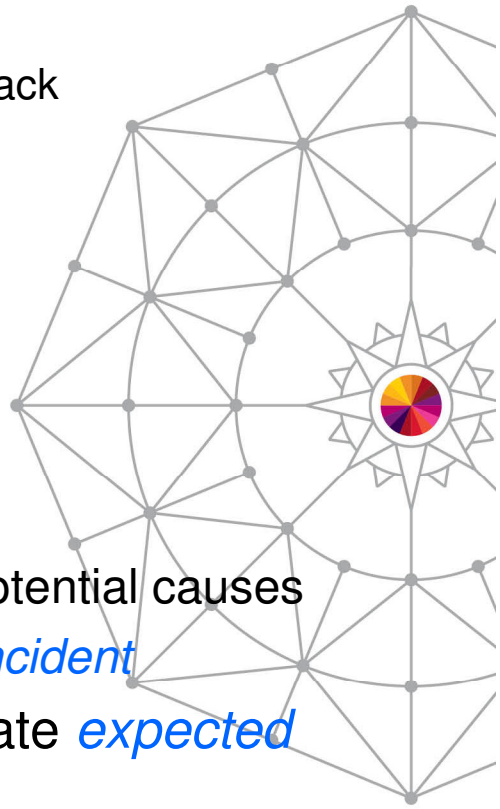


Predictive Failure Analysis

- *Machine Learning - Convert diagnostic data to knowledge in real time*
- *Convert soft failures to correctable incidents*

Predictive Failure Analysis

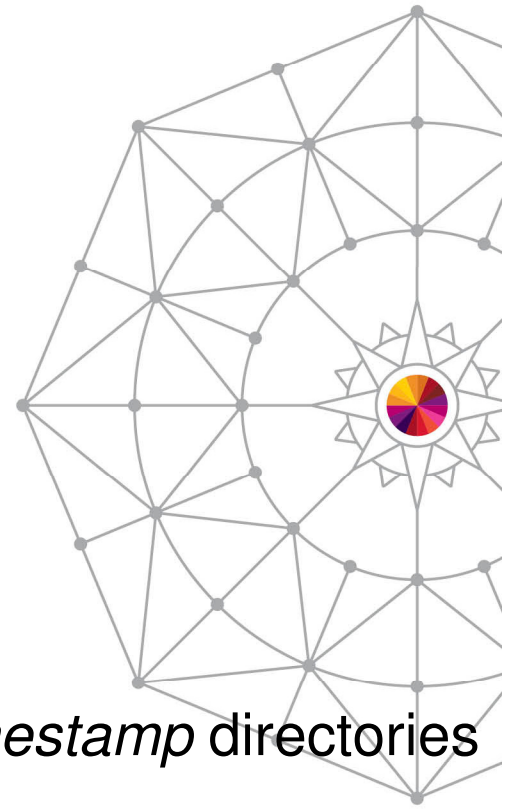
- PFA looks at two classes of problems
  - *Damaged systems*
    - Recurring or recursive errors anywhere in the software stack
  - *Resource exhaustion*
    - Physical and software resources



- PFA uses
    - Historical data from each LPAR
    - Machine learning and mathematical modeling
  - To *detect and alert* you to *abnormal behavior* and its potential causes
  - To *enable you* to convert soft failures to a *correctable incident*
- PFA does *trend analysis* and models behavior to create *expected* value or rate

What happens when PFA detects a problem?

- *Health check exception* written to console
  - New exceptions suppressed until new model is available
- *Prediction report* available in SDSF (s.ck)
  - *"Top address spaces"* = potential villains
  - *Address spaces causing exception*
  - *Current and predicted values* provided
  - Reports also available when no problem occurs
- *Modeling automatically runs* more frequently
- *Logs and data files* for service written to EXC_*timestamp* directories
- *Best practices and more information* in *z/OS Problem Management*



The PFA Checks

- z/OS 1.10 SPE
  - Common storage exhaustion check
    - CSA+SQA → below the line
    - ECSA+ESQA above the line
  - LOGREC arrival rate check
    - Groups arrivals by key
    - Four time ranges
- z/OS 1.11
  - Message Arrival Rate check
    - (WTO + WTOR) / CPU = Rate
    - Tracked, persistent address spaces
    - Other persistent address spaces
    - Non-persistent address spaces
    - Total system
  - ~~Frames and Slots usage check~~
    - Removed from all releases in 2012 with OA40065
- z/OS 1.12
  - SMF arrival rate check
    - SMF arrival count / CPU = Rate
    - Same categories as Message Arrival Rate
  - Common storage exhaustion = 6 locations
  - Dynamic modeling improvements
  - Supervised learning (exclude jobs)
  - Performance and serviceability
- z/OS 1.13
  - JES spool usage check
    - JES2 only
    - Tracks all persistent address spaces
  - Enqueue request rate check
    - Tracked, persistent address spaces
    - Total system
  - Integration with Runtime Diagnostics to detect “too low”

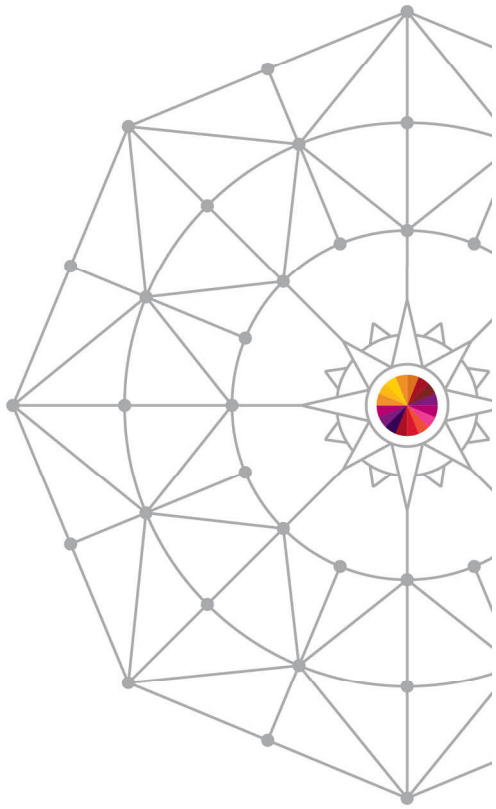
PFA and Runtime Diagnostics Integration

- **Runtime Diagnostics output** included in PFA report
- Prediction report and result message **available in SDSF** (sdsf.ck)
- **PFA current rates and predictions** relevant to category causing exception

```
                Message Arrival Rate Prediction Report
(Heading information intentionally omitted.)

Persistent address spaces with low rates:
                                         Predicted Message
                        Message            Arrival Rate
   Job                  Arrival
   Name      ASID          Rate        1 Hour       24 Hour        7 Day
   ________  ____  ____________  ____________  ____________  ____________
   JOBS4     001F          1.17         23.88         22.82        15.82
   JOBS5     002D          2.01          8.34         11.11        12.11

Runtime Diagnostics Output:

   Runtime Diagnostics detected a problem in job: JOBS4
     EVENT 06: HIGH - HIGHCPU - SYSTEM: SY1 2009/06/12 - 13:28:46
     ASID CPU RATE: 96% ASID: 001F JOBNAME: JOBS4
     STEPNAME: PFATEST PROCSTEP: PFATEST JOBID: STC00042 USERID:
   ++++++++
     JOBSTART: 2009/06/12 - 13:28:35
   Error:
     ADDRESS SPACE USING EXCESSIVE CPU TIME. IT MAY BE LOOPING.
   Action:
     USE YOUR SOFTWARE MONITORS TO INVESTIGATE THE ASID.
   ----------------------------------------------------------------------
   -----
     EVENT 07: HIGH - LOOP - SYSTEM: SY1 2009/06/12 - 13:28:46
     ASID: 001F JOBNAME: JOBS4 TCB: 004E6850
     STEPNAME: PFATEST PROCSTEP: PFATEST JOBID: STC00042 USERID:
   ++++++++
     JOBSTART: 2009/06/12 - 13:28:35
   Error:
     ADDRESS SPACE APPEARS TO BE IN A LOOP.
   Action:
     USE YOUR SOFTWARE MONITORS TO INVESTIGATE THE ASID.

   (Additional output intentionally omitted.)
```

Agenda

- What is Analytics?
- Analytics in z/OS (and Analytics for z/OS)
- Analytics in z/OS components
- Analytics based features in z/OS
- External analytics solutions for z/OS
  - IBM zAware
  - Capacity Management Analytics
  - Smart Cloud Analytics: Log Analysis
  - *Smart Cloud Analytics: Predictive Insights*
- Direction/strategy



IBM focused on managing end-to-end analytics for improved performance and workload management

Predict:

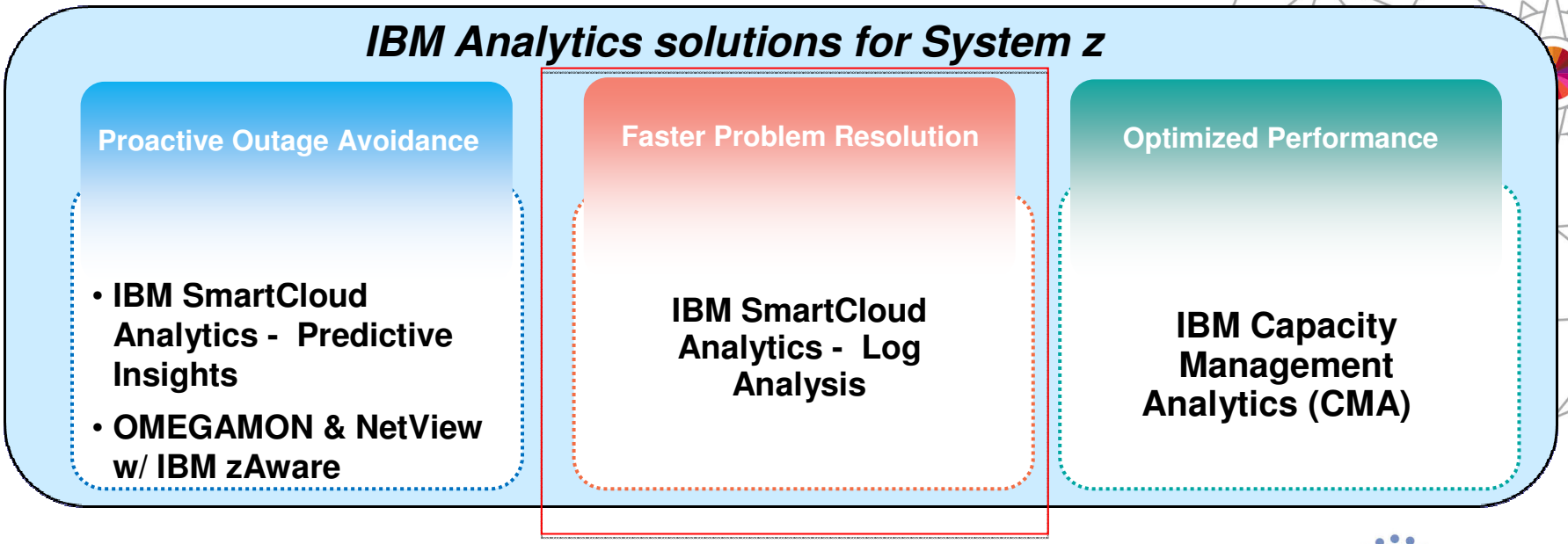
- Pro-Active Outage Avoidance
- Predict Problems before occurrence

Search:

- Quickly analysis large volume of log data
- Match Log-files with alerts and metrics

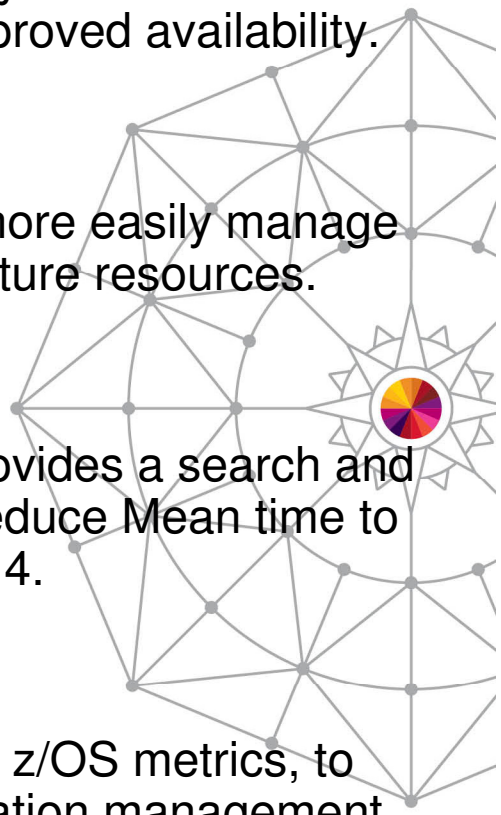
Optimize:

- Improve Performance across IT Infrastructure



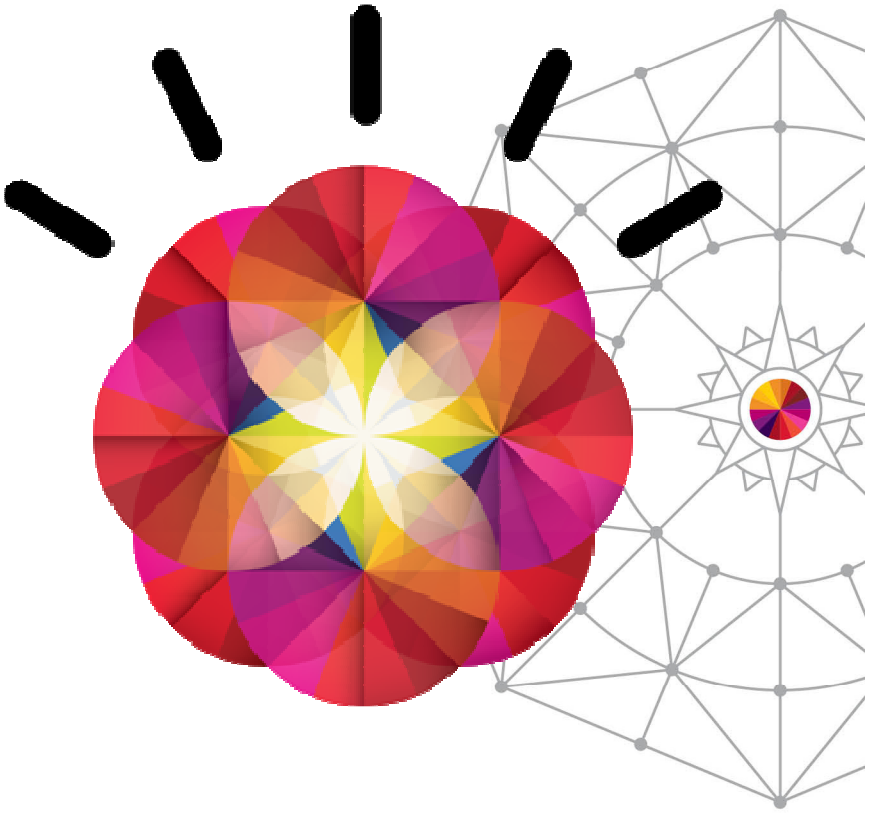
IT Analytics Solutions for z available today

- IBM zAware –
  - zAware provides z/OS Message log analysis and anomaly detection in a zEnterprise firmware partition for faster diagnosis and improved availability.
- Capacity Management Analytics (CMA)
  - CMA runs on System z, consumes System z metrics to more easily manage and predict consumption of IBM® zEnterprise® infrastructure resources.
- Smarter Cloud Analytics – Log Analysis (SCA-LA)
  - SCA-LA processes LOGS (WebSphere and DB2) and provides a search and index capability to enhance problem determination and reduce Mean time to Recovery (MTTR). Support for z/OS logs provided in 1Q14.
- Smarter Cloud Analytics – Predictive Insights (SCA-PI)
  - SCA-PI supports distributed and zlinux data, with plan for z/OS metrics, to enable predictive and preventative operations and application management with next generation behavioral learning analytics.

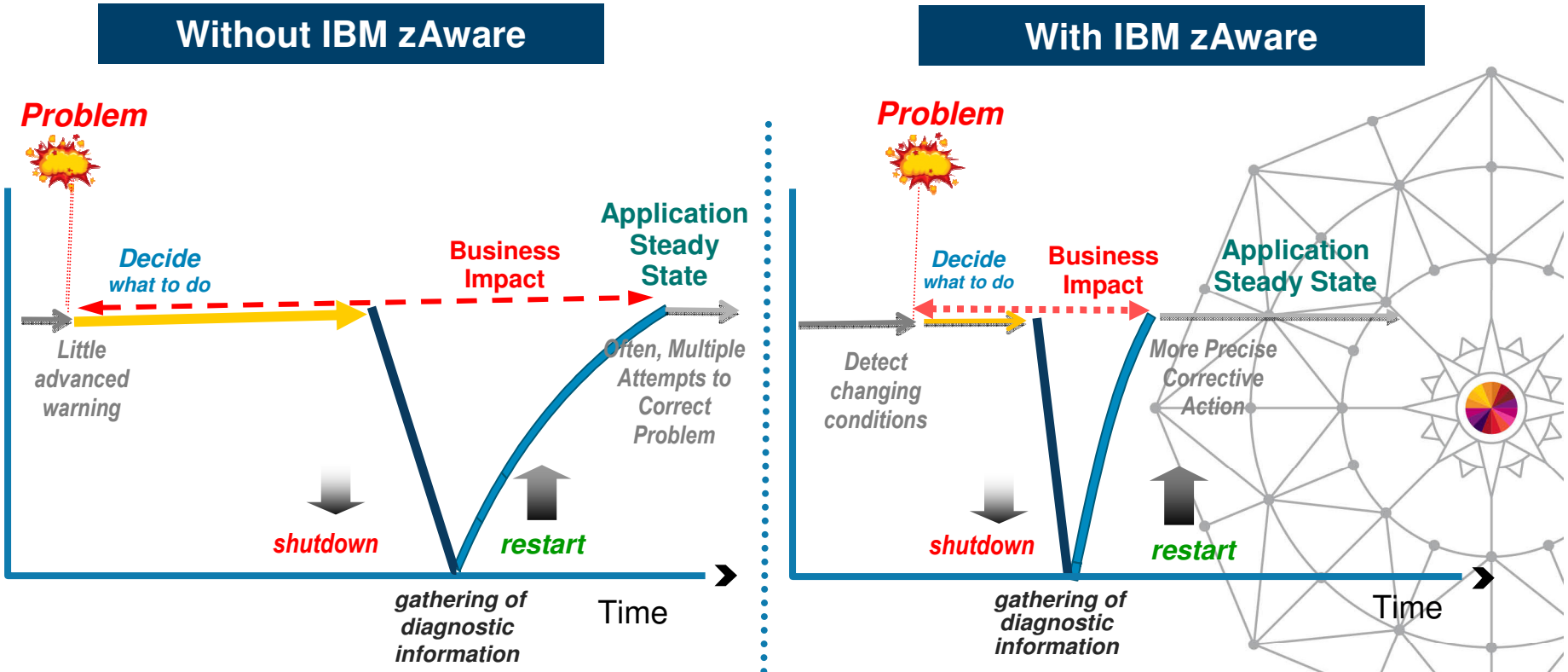


IBM **System** z A**dvanced** W**orkload** A**nalysis** R**eporter** – **zAware; Smarter Computing Needs Smarter Monitoring**

- New technology based on machine learning developed by IBM Research
- Cutting edge pattern recognition techniques look at the health of a system to pinpoint deviations from the 'norm'
- High speed analytics facilitates the ability to consume large quantities of message logs
- Improves problem diagnosis across a set of System z servers
- Speeds up the time to decide on appropriate corrective actions on problems before they get bigger
- Allow establishment of procedures to prevent reoccurrence



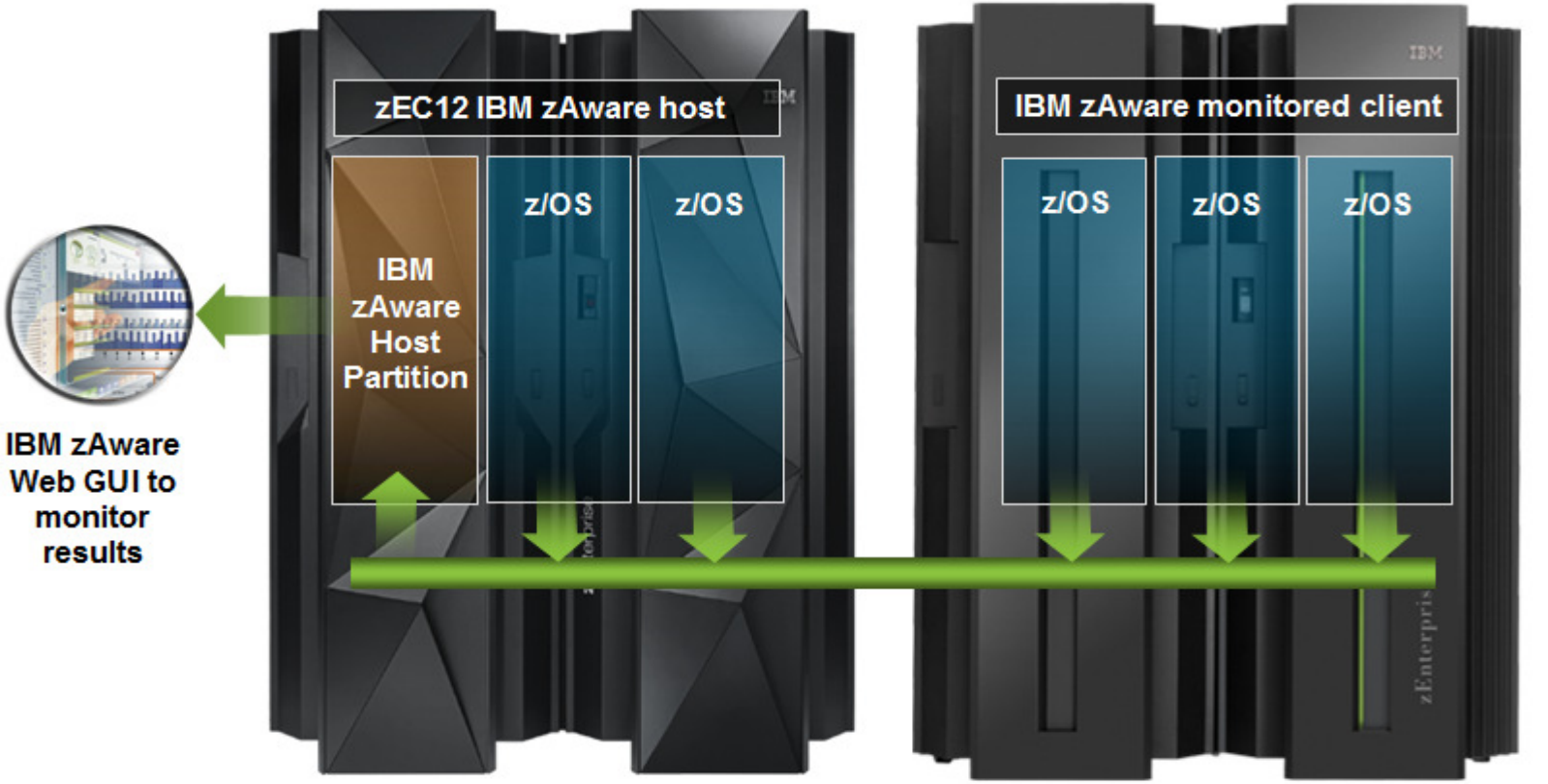
IBM zAware can reduce time to repair to improve availability



Ineffective time spent in problem determination and trial and error. Incorrect problem identification may result in the wrong fixes being applied.

More precise and early diagnosis can shorten impact time and help you to avoid a similar problem. Gain an edge in your ability to respond to events.

IBM zAware – System Analytics for Availability

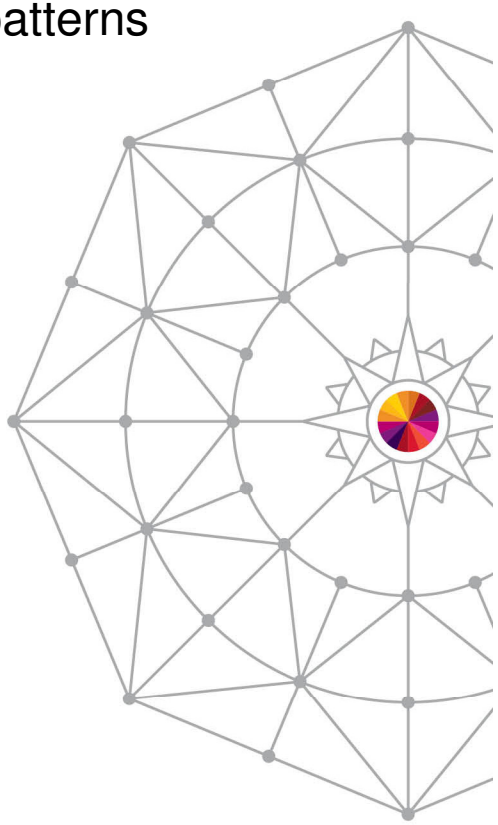


- Identifies unusual system behavior of z/OS workloads
- Runs in a special purpose firmware partition (isolated from production)
  - on zEC12 or zBC12
- Monitors zEC12 or other System z servers running z/OS v1.13 +PTFs or later
- Requires OPERLOG

Identify unusual behavior quickly

Which z/OS image is having unusual message patterns?

- High score generated by unusual messages or message patterns
- GUI shows all systems or selected subsets



Which subsystem or component is abnormal?

- Examine high-scoring messages

When did the behavior start?

- Current 10 minute interval or earlier?
- Which messages are unusual?
- How often did the message occur?
- When did the messages start to occur?

Were similar messages issued previously

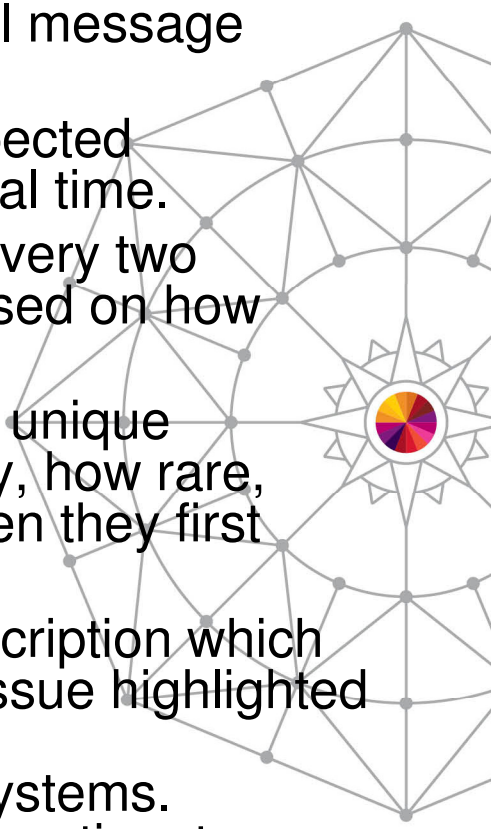
- Easily examine prior intervals or dates

Is the unusual behavior after some maintenance or upgrade?

- Easily pinpoint changes caused by new software levels, configuration settings.

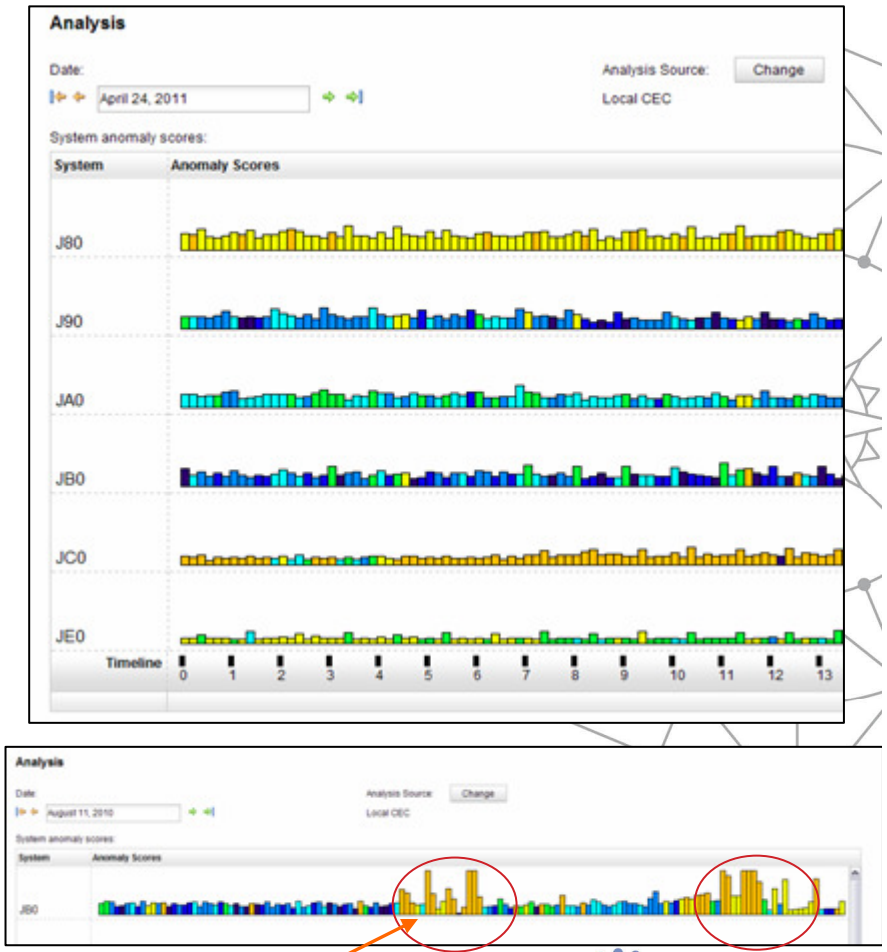
zAware characteristics

- The analytics creates a statistical model of the normal message traffic generated by each individual z/OS.
- Using this model which is stored in a database unexpected messages and patterns of messages are identified real time.
- Using a sliding ten minute interval which is updated every two minutes, a current score for the interval is created based on how unusual the message traffic is.
- For each interval zAware provides details of all of the unique message ids found within interval including how many, how rare, how much they contributed to the intervals score, when they first appeared.
- For IBM messages there is a link to the message description which often includes a recommended action to correct the issue highlighted by the message.
  ◀Output can be queued up to existing monitoring systems. Early detection and focused diagnosis can help improve time to recovery



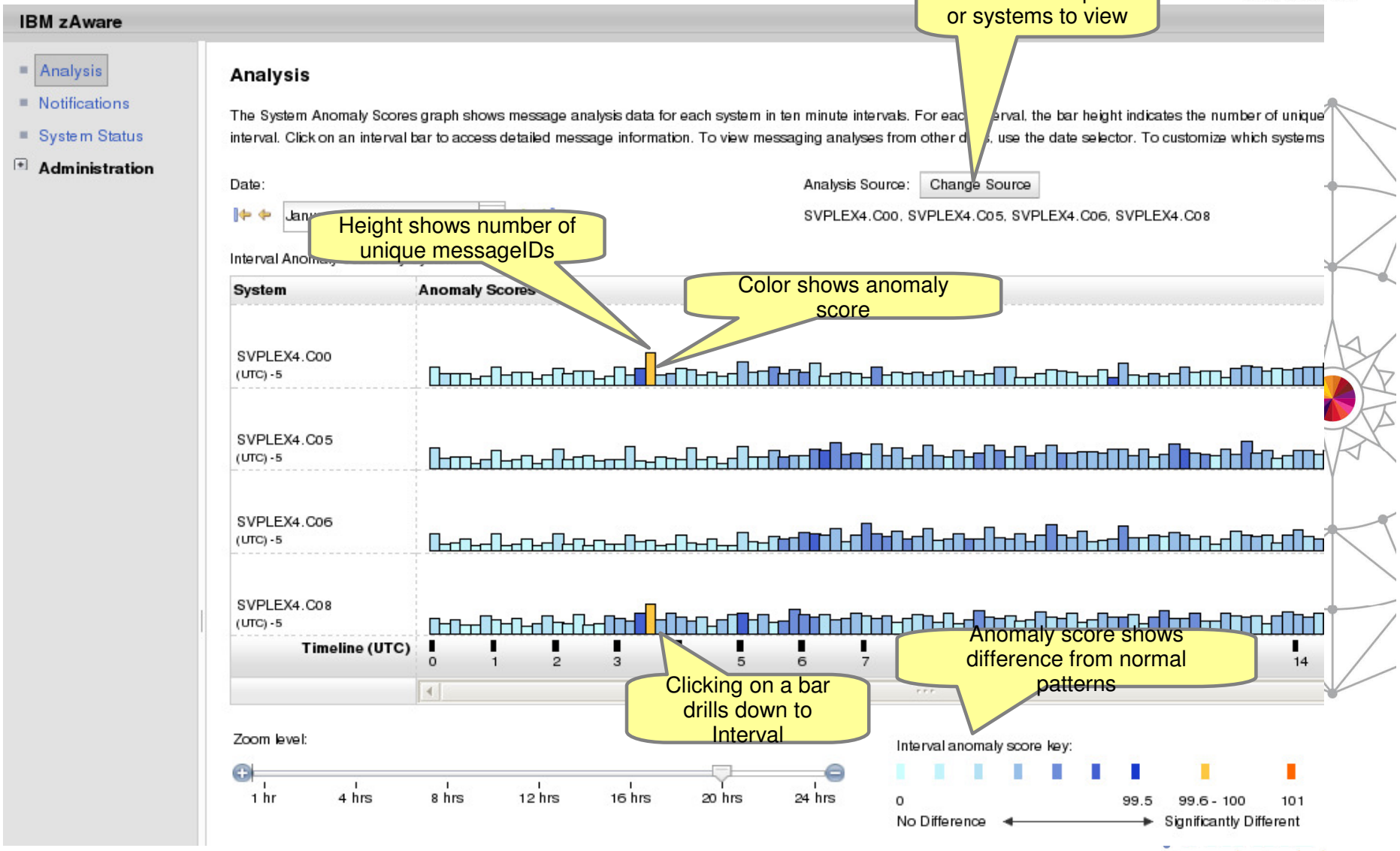
zAware output

- Monitors z/OS OPERLOG including all messages written to z/OS console, including ISV and application generated messages
- Detects things typical monitoring systems miss due to:
  - Message suppression (message too common) - Useful for long-term health issues
  - Uniqueness (message not common enough) - Useful for real-time event diagnostics
- Color coded easy to use GUI via web browsers
- Output can be queued up to existing monitoring systems.
- Early detection and focused diagnosis can help improve time to recovery

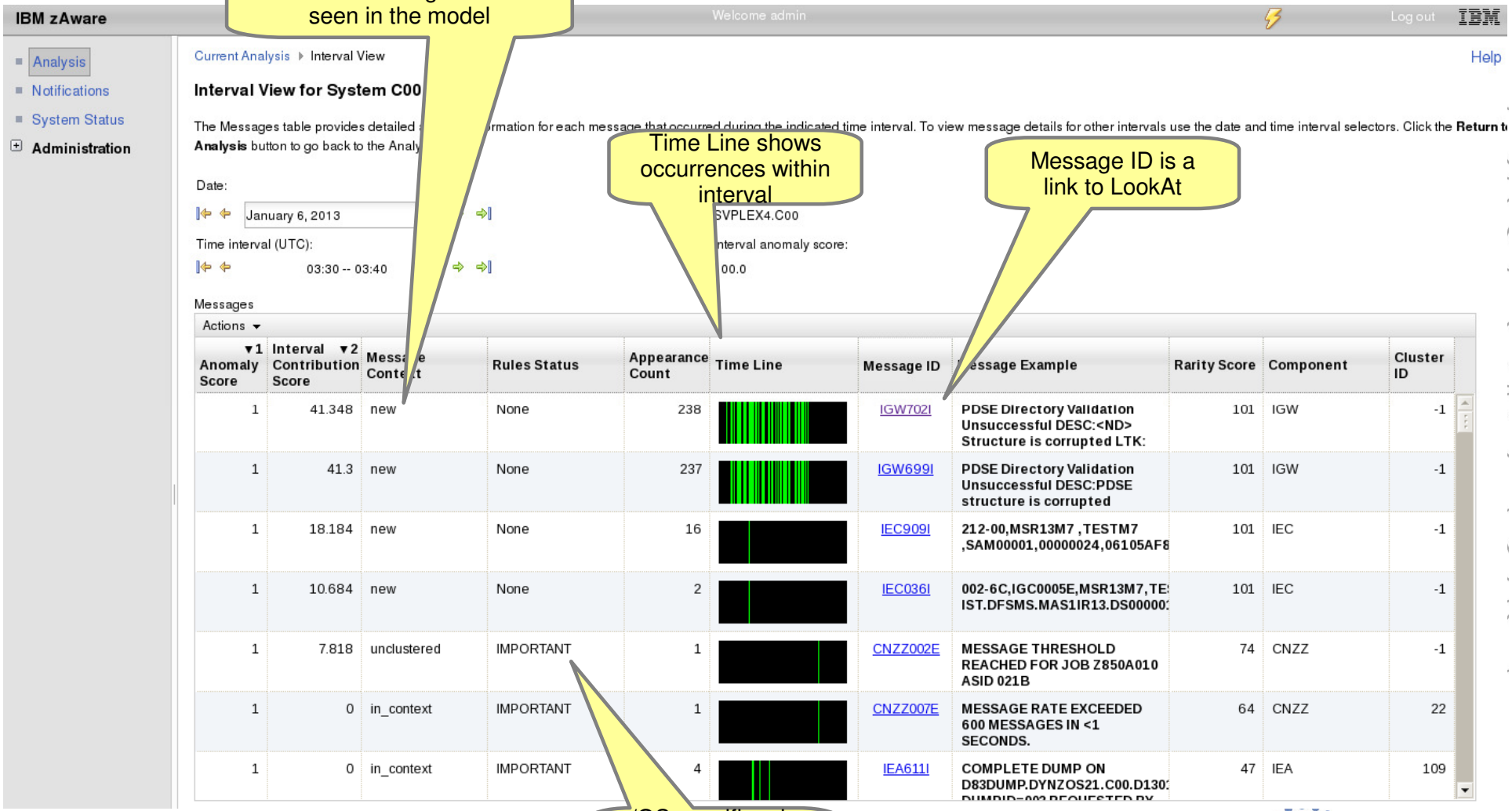


Ability to drill down for details on anomalies

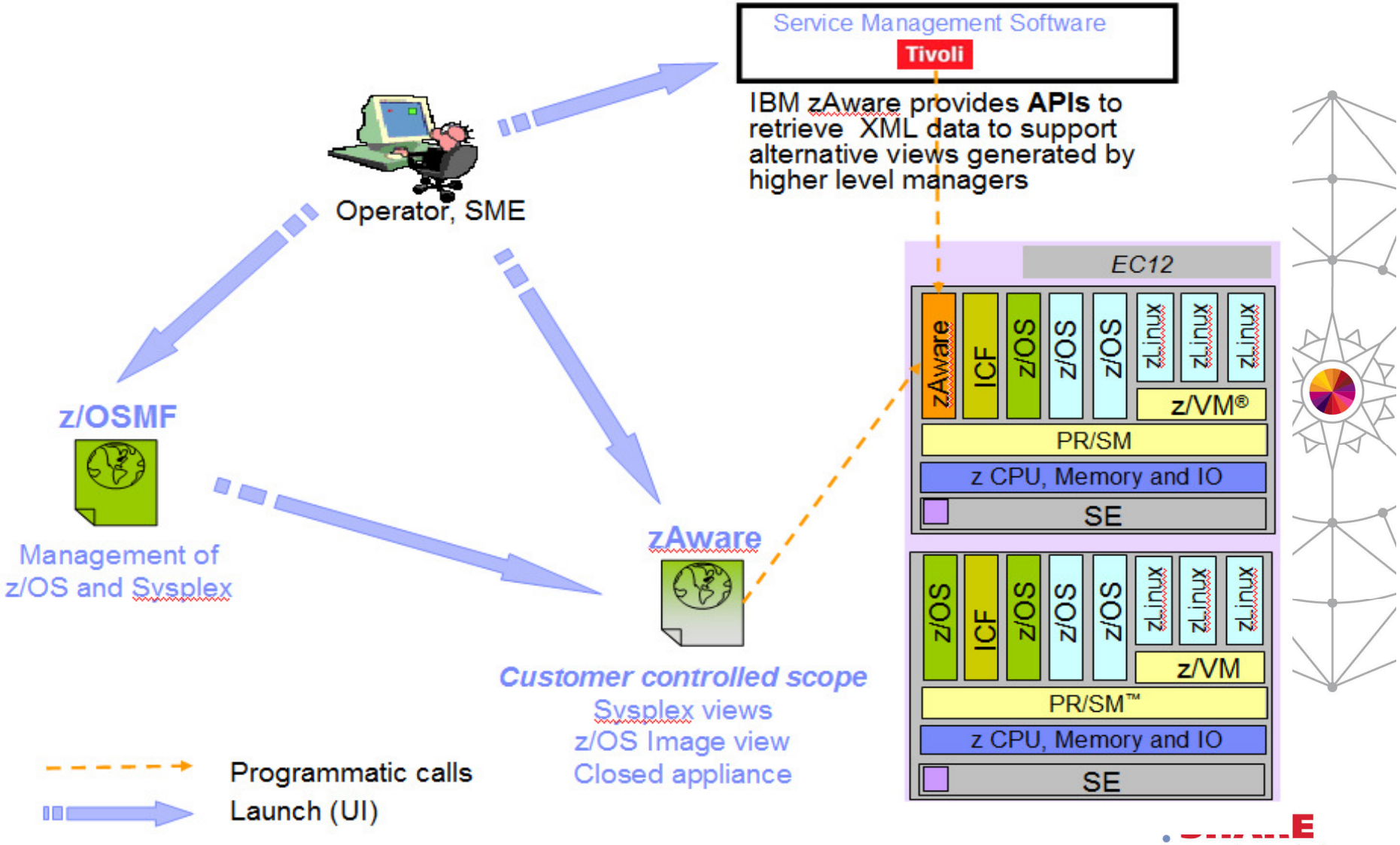
Analysis View



Interval View



IBM zAware Complements Your Existing Environment



IBM Capacity Management Analytics

Cost effective, optimal use of zEnterprise capacity: Today, tomorrow, beyond

A single, integrated cost effective solution

System Management: usage, service objectives, resource utilization, system tuning, accounting, cost recovery, and more…..
Problem Identification & Resolution
Capacity Forecasting & Monitoring

Manage the complete time horizons

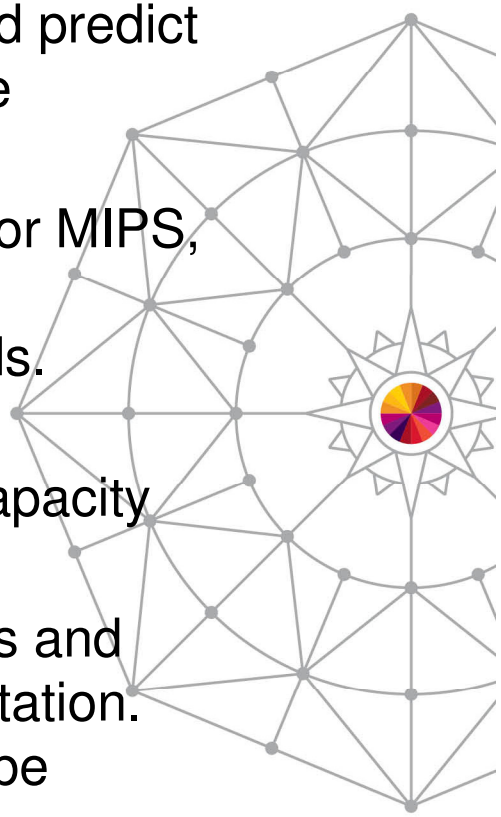
Historical reporting of past performance
Forecasting future requirements
Rite-time optimal decision making

Jumpstart your time to value & ease implementation.

Built on IBM's easy of use analytics
Includes prepackaged, interactive reports
Optional services and education

Capacity Management Analytics

- IBM Capacity Management Analytics is an advanced analytics solution designed to help you more easily manage and predict your consumption of IBM® zEnterprise® infrastructure resources.
- This integrated offering provides insights into processor MIPS, LPAR, workload and memory usage to uncover any constraints that might affect critical business workloads.
- Dynamic, customizable visual displays help business managers understand System z® usage and future capacity needs.
- A set of reports gets you started, and optional services and education are available to enable a smooth implementation. As your needs change, the reports and analytics can be tailored to change with them.



Capacity Management Analytics

- The IBM Capacity Management Analytics solution is designed to help you:
  - **Track, measure and forecast zEnteprise capacity and usage** with IBM analytics solutions.
  - **Jumpstart your understanding of exactly how zEnterprise capacity is being used** with a set of prebuilt interactive reports and optional deployment services and education.
  - **Pinpoint issues or potential issues** before they adversely affect user experience.
  - **Compare actual usage to forecast in real-time so you can quickly identify and resolve anomalies and predict future requirements.**
  - **Communicate zEnterprise usage information** to various decision-makers in IT and the business.

Search for and rapidly analyze unstructured data to assist in problem identification, isolation and repair

SmartCloud Analytics – Log Analysis (System z)

- Faster Problem Identification and Isolation
  - Search and indexing of logs and data
  - Cross domain analysis
- Faster Problem Repair
  - Linking expert knowledge to log error/warning messages
- Improved Service Availability and Maintainability
  - Provide users with advanced insights into custom applications

Function and value

For IBM System z users who encounter IBM z/OS related problems, IBM SmartCloud Analytics - Log Analysis z/OS Insight Packs is a log analysis solution that accelerates z/OS problem determination and resolution from a single interface. Unlike other search tools in the market, IBM SmartCloud Analytics - Log Analysis z/OS Insight Packs is the first solution to truly support z/OS log analysis.

INSTANT SEARCH: Focus on the problem and not the servers. Avoid having to login into multiple systems and painfully read logs for errors. Instead, quickly search and index logs across heterogeneous enterprise from a single interface. Search for specific logs or all logs and have it customized as your customer's preference under My Search.

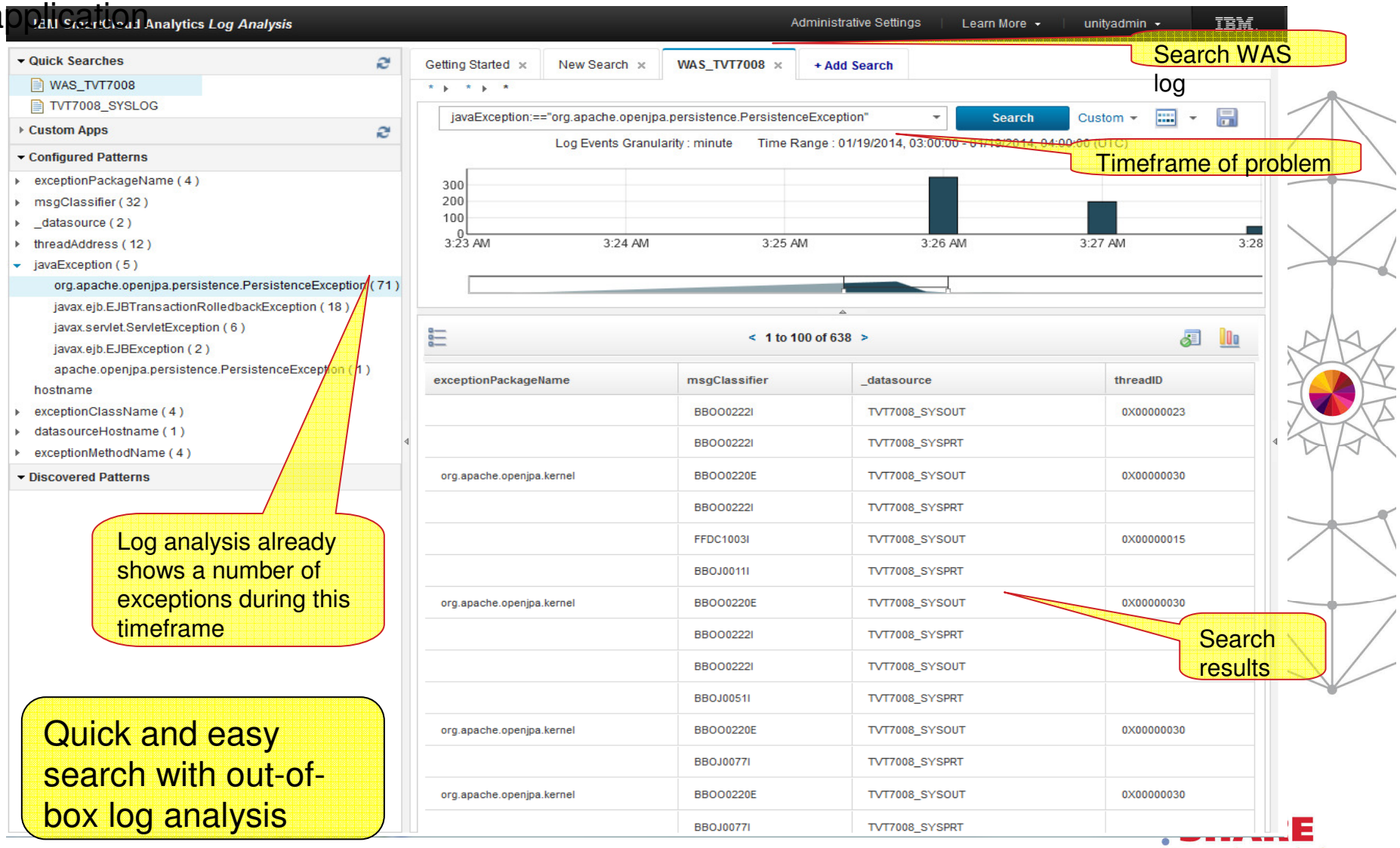
PRECONFIGURED FILTERS : Preconfigured patterns to gain quick access to common errors and occurrence frequencies. Click to drill down to narrow on a specific problem investigation.

STATUS VIEW: Report results as a List or Grid Table view by time frequency and range for ease of readability. Slide the Time Filter bar to seamlessly view searched occurrences at any given time frame by order and build priority and credibility with their management by summarizing the problems using graphical chart options.

EXPERT ADVICE: Do not stop at finding the problem. Leverage the auto link to the IBM Support Portal that references the search for faster resolution.

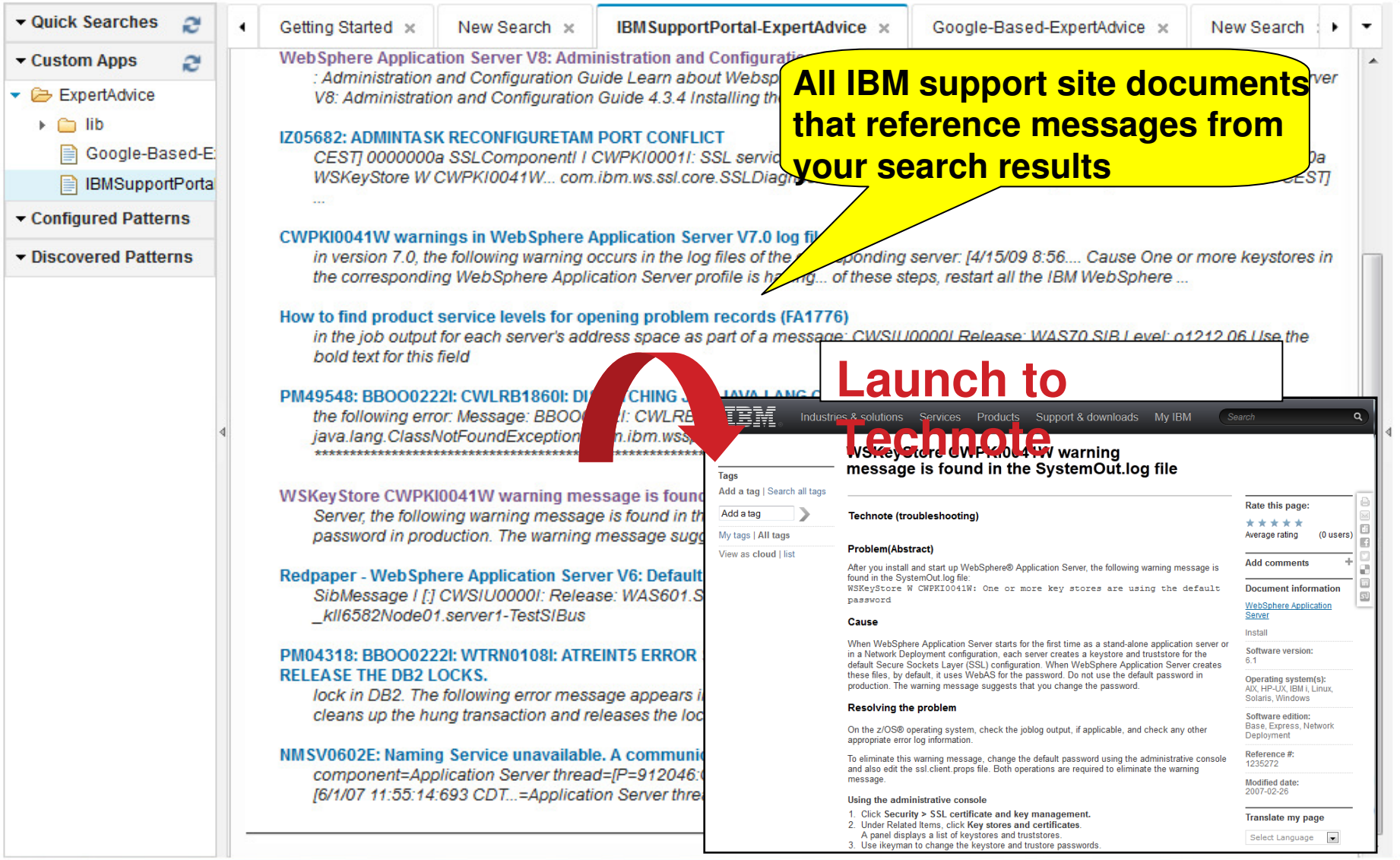
WebSphere Application Server Search – java Exception pattern

4pm - WAS application owner is alerted to a response time issue with a WebSphere application



IBM Support Portal based Expert Advice

Search for expert advice with the click of a button



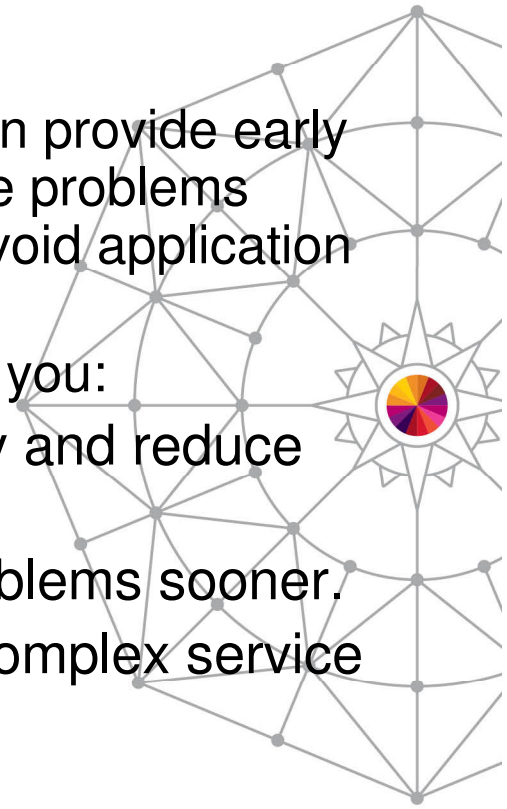
Handle more complex workloads with increasing metrics for early prediction of problems

- New next-generation **behavioural learning** and predictive analytic solution.
- Discovers how IT and Network infrastructure are related from **holistic viewpoint**.
- Maximizes **early detection** of problems manifest in performance and monitoring data before service or business is disrupted (enabling prevention)

IBM SmartCloud Analytics - Predictive Insights

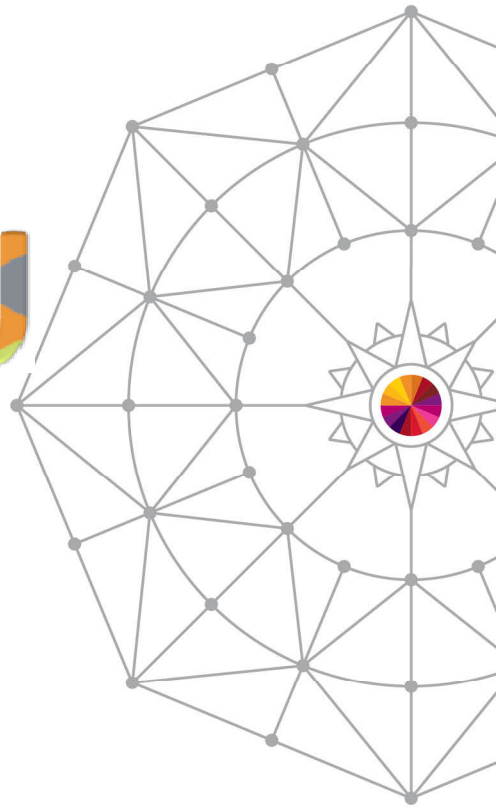
Reduce outages and increase service performance with predictive problem detection

- IBM® SmartCloud® Analytics – Predictive Insights can provide early problem detection to predict application or middleware problems before they impact service. The software helps you avoid application outages and increase service performance.
- IBM SmartCloud Analytics – Predictive Insights helps you:
  - Avoid outages to increase application availability and reduce service degradation.
  - Perform faster root cause analysis to isolate problems sooner.
  - Reduce operational costs without the need for complex service models or specialized skills.



Summary

- Analytics in the IT systems provides a lot of value to the business with higher availability, faster problem diagnosis, problem avoidance and prediction and optimization of IT resources and capability.
- z/OS has analytics and more solutions are being delivered to constantly improve and optimize the IT environment.



THANK YOU

Session 15123

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