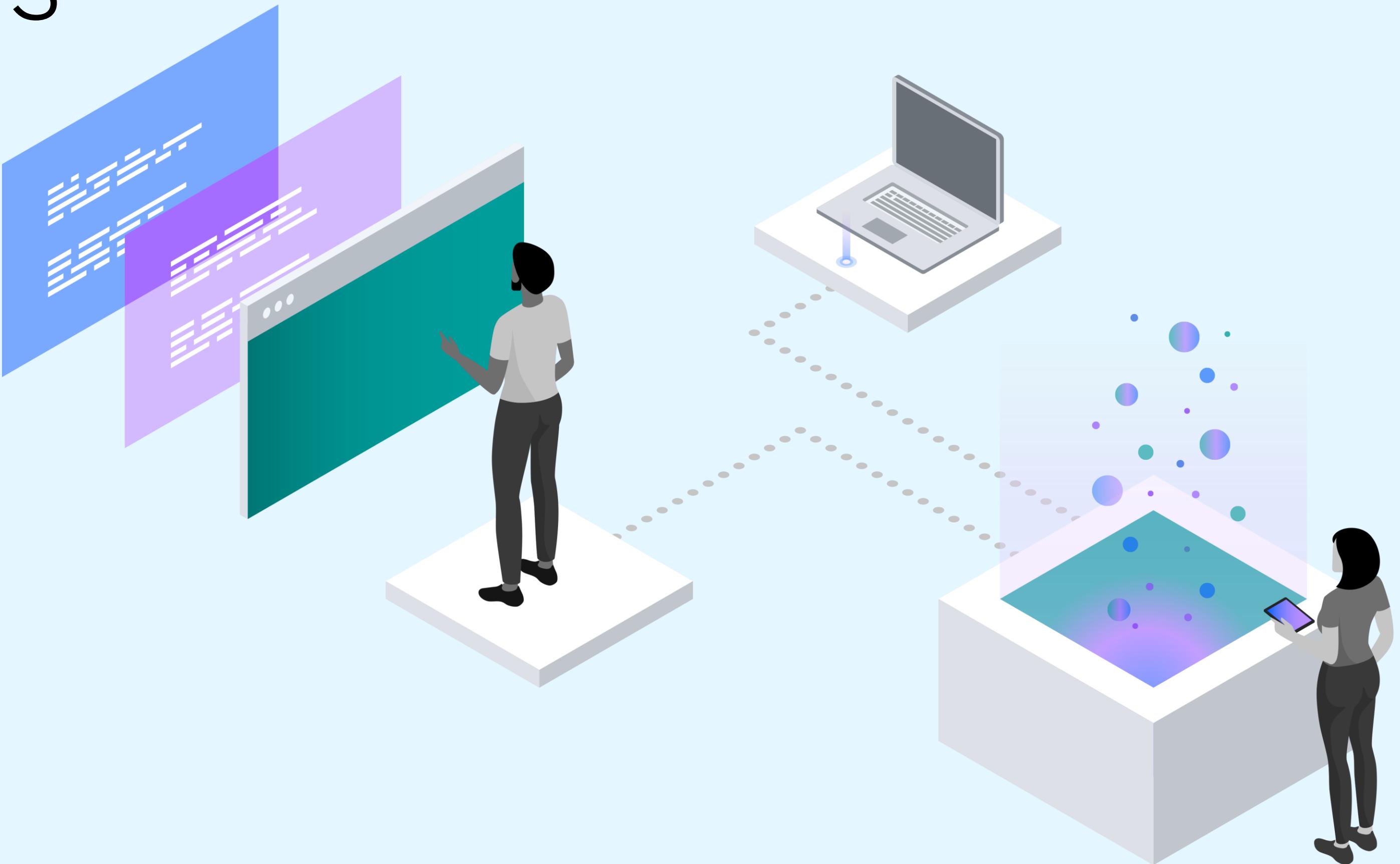


AIOps with IBM Z

Overview & Solutions



IT under pressure: Meeting greater customer demands with fewer skilled employees

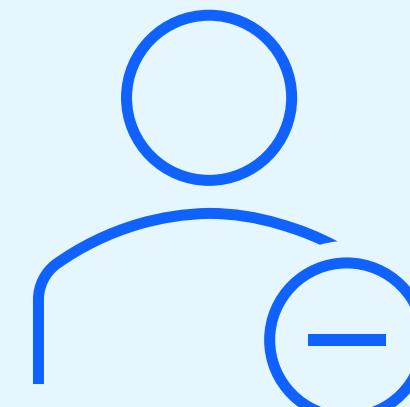
1 sec

of latency causes a 7% reduction in customer conversion and a **16% reduction in customer satisfaction**



50%

of all employees need to upskill or **reskill by 2025** for responsibilities arising from automation and new technologies



\$250K

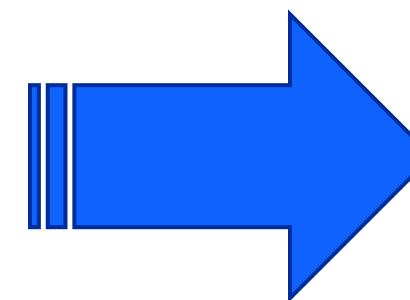
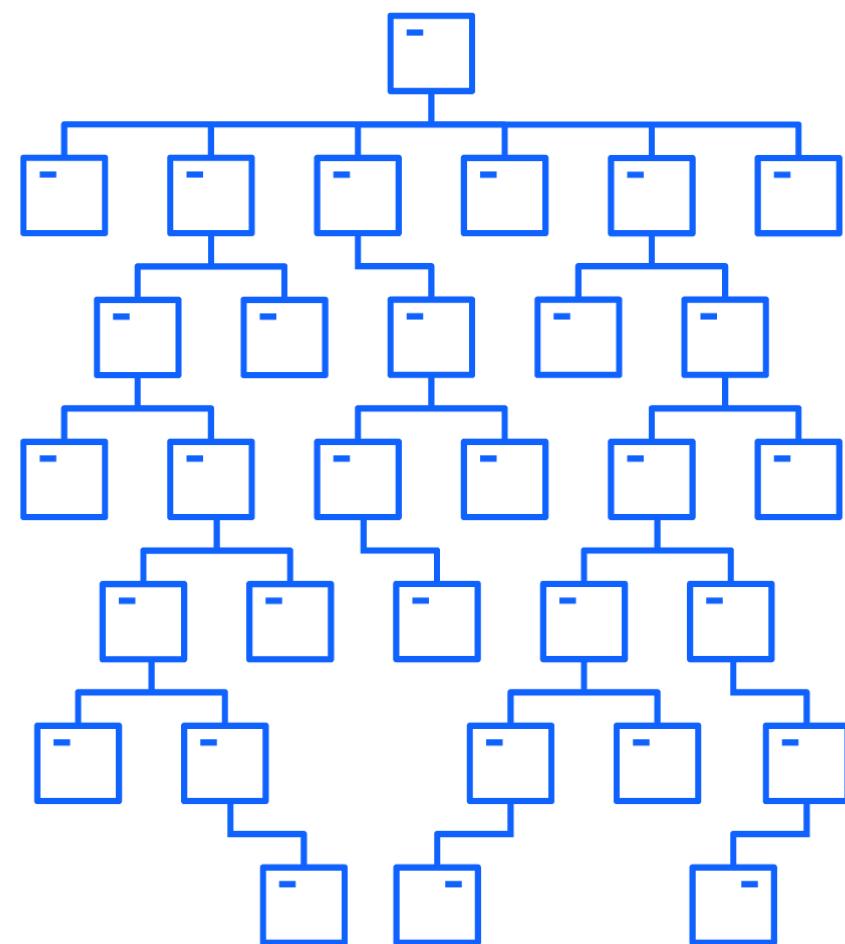
the average cost of an **hour of downtime** when a revenue generating production service is impacted



Current Landscape: Management Complexity

76% of companies use 2 or more public clouds

Organizations are using an average of over 1,000 applications across multiple clouds

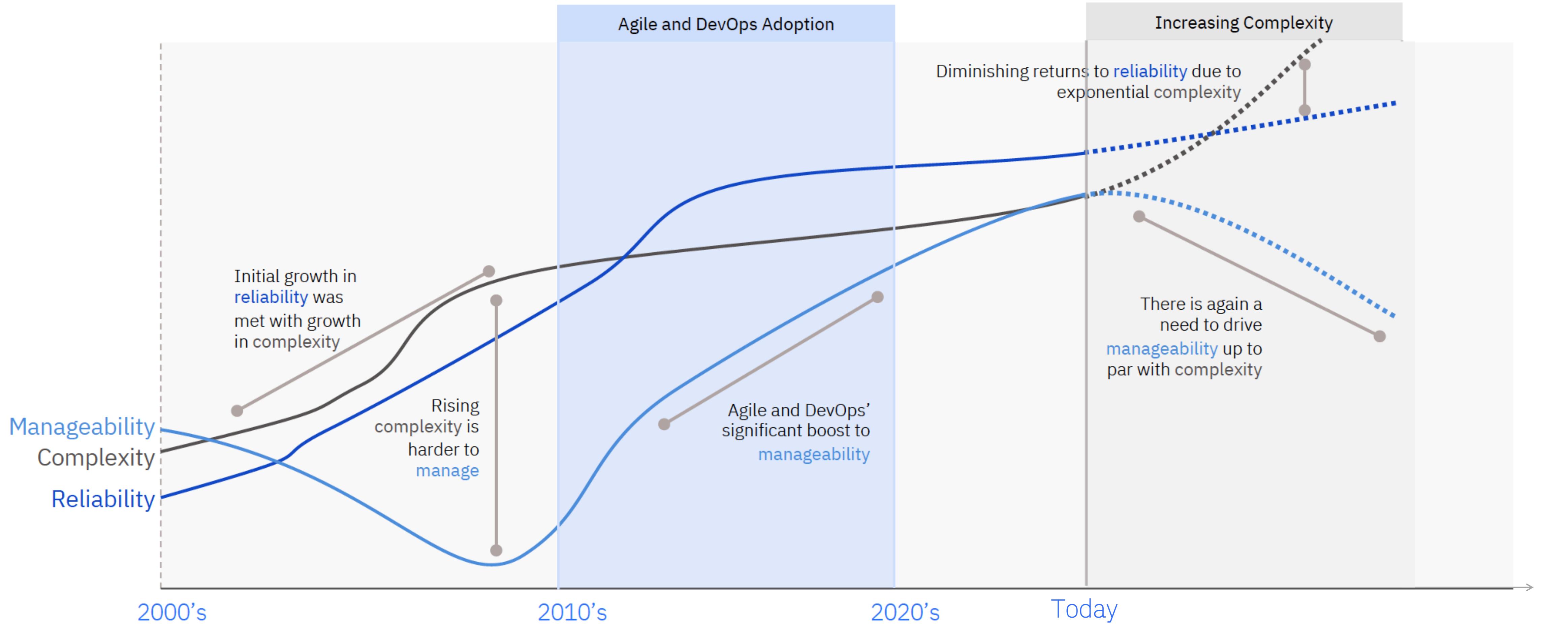


There's too much data for one person to handle

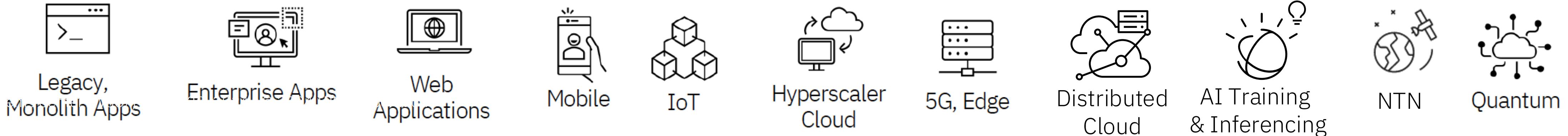
- Businesses need **real-time visibility** into their infrastructure and application estates to leverage actionable insights to **automate** and **enhance overall IT operations**
- Current **break-fix**, reactive approaches to IT management simply **cannot scale**
- Adopting **piecemeal** software solutions results in inconsistencies and inefficiencies, **undermining** integrated workflows and automations and **reducing visibility**

Why AIOps?

Modernization Accelerates Complexity



Example
Technology
Adoption



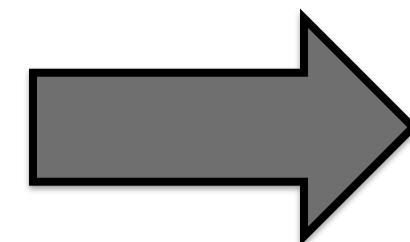


The capabilities of an AIOps Platform

Gartner defines an AIOps Platform as using machine learning to conglomerate insight, toward intelligent, AI powered Correlation & Automation solutions in the following areas:

AIOps Capabilities

- + Cross-domain data ingestion and integration
- + Topology generation
- + Event correlation and analytics
- + Incident and pattern recognition
- + Augmented remediation



Business Outcomes

- + Consolidate tools, teams and domains to work together and share understanding
- + See your entire IT estate and understand how incidents originate and propagate
- + Remove the toil of manual investigations, saving time and expanding operations capacity
- + Save time on repetitive fixes or deployments and empower operations to tackle complex problems

Source: Gartner

AIOps - Two IBM Z perspectives

“ZAIOps” – z/OS scope

- Encompasses z/OS monitoring & management solutions including the OMEGAMON suite, IBM Z Anomaly Analytics, IBM Z Operational Log and Data Analytics, IBM Z System Automation, and more.

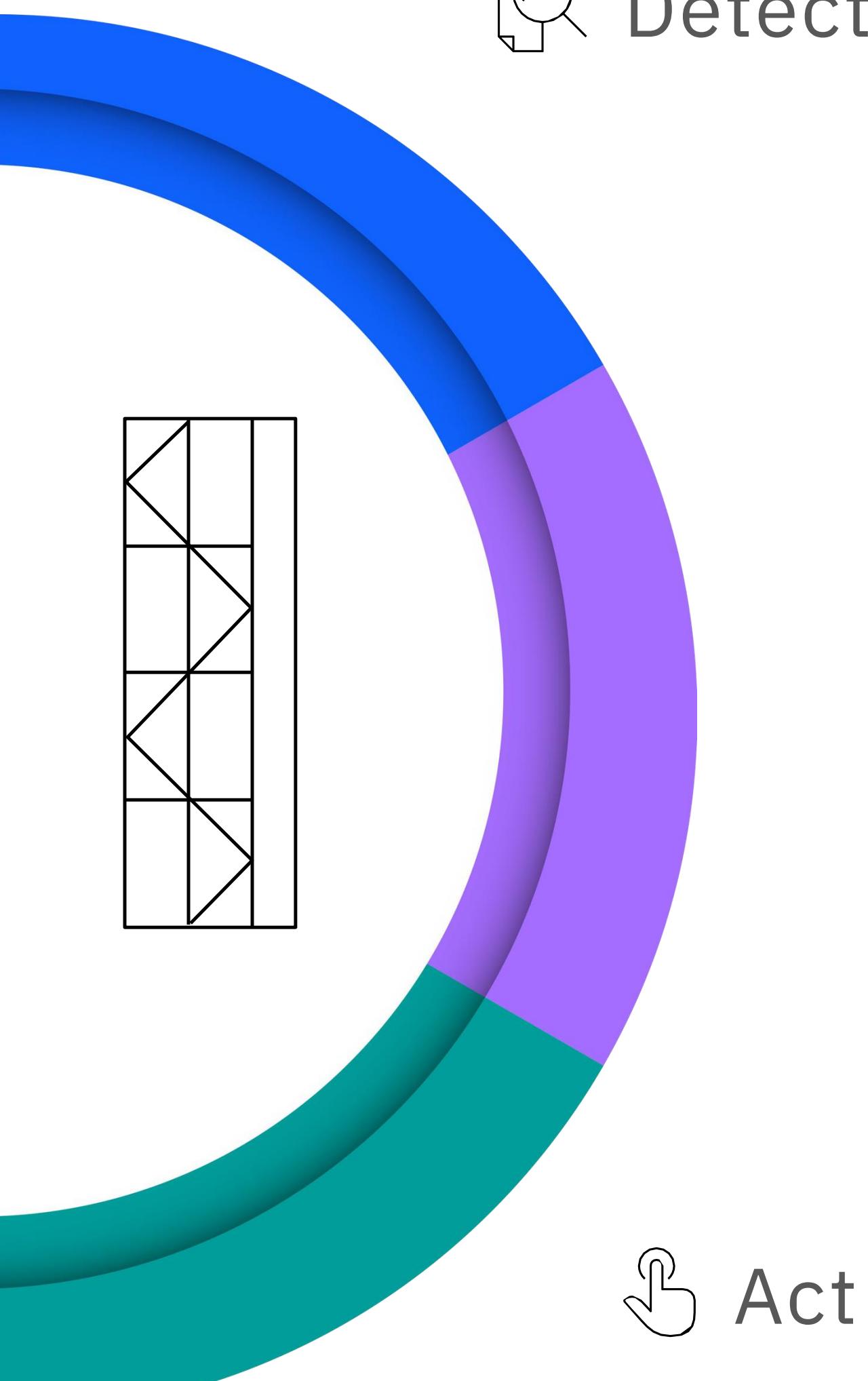
“Hybrid Cloud” AIOps – Broader scope

- Encompasses solutions that support Linux on IBM Z, distributed platforms, containers, public clouds, and more.
- Solutions include Instana, Turbonomic, IBM Cloud Pak for AIOps, SevOne, Apptio, and more.

These are not mutually-exclusive perspectives.

They work hand-in-hand to break down silos and bring IBM Z and z/OS into broader AIOps environments.

Better together – Hybrid Cloud Integrations



Monitoring

IBM Z Monitoring Suite

Hybrid cloud observability

IBM Z APM Connect
IBM Observability by Instana APM on z/OS IBM zSystems Integration for Observability

Anomaly detection

IBM Z Anomaly Analytics

Deep-domain metrics & application trace analysis

IBM OMEGAMON

Log analytics

IBM Z Operational Log and Data Analytics

Performance & capacity management

IBM Z Performance and Capacity Analytics

Intelligent automation

IBM Z System Automation
IBM Z NetView

Predictive workload automation

IBM Z Workload Scheduler



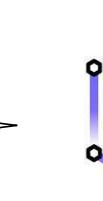
Hybrid Application Observability

IBM Instana®



3rd party solutions

App Dynamics



Hybrid Application Incident Management

IBM Cloud Pak for AIOps



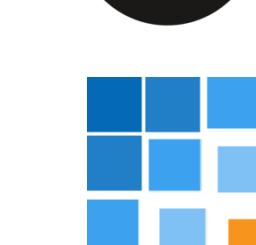
3rd party solutions

Splunk
Elk
DataDog
ServiceNow
Other 3rd party products



Enterprise Automation

RedHat Ansible



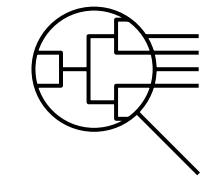
Automation hub

with 100+ plugins for hybrid cloud and other integrations

IT Automation with IBM

The most complete and integrated set of modular automation technologies

Application Monitoring



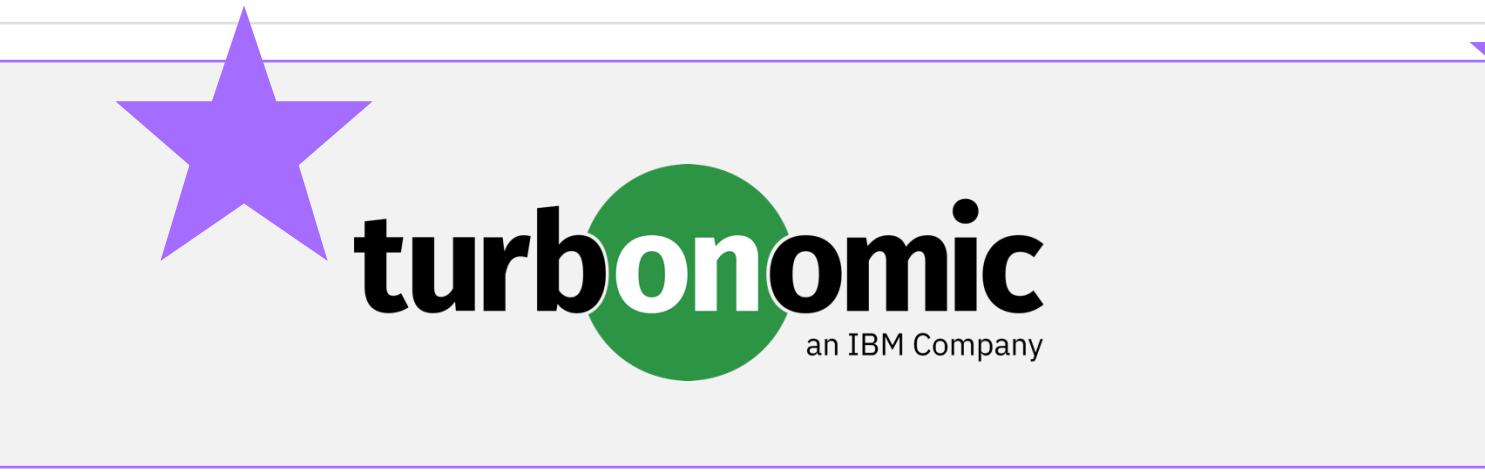
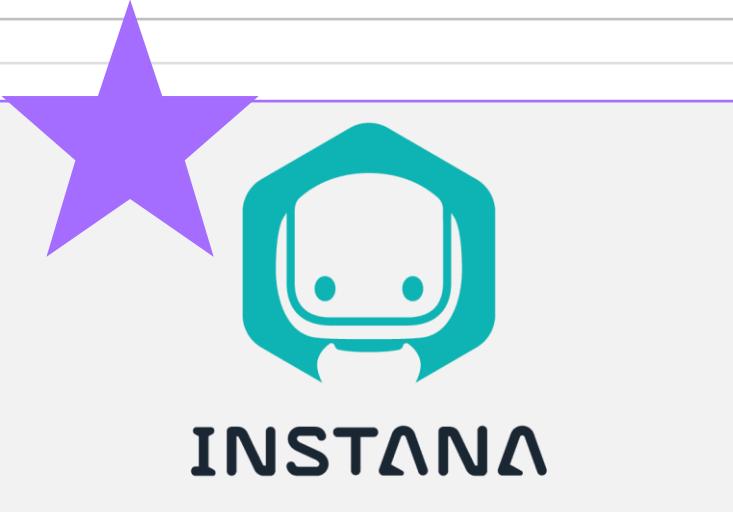
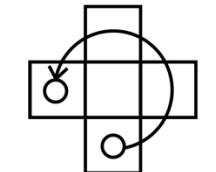
Network Performance Management



Cost-effective Resource Management



Proactive Incident Resolution



Cloud Pak for AIOps



IBM AIOps Insights



Enterprise Observability

Enhance visibility and comprehension with full stack scalable application and network health and performance monitoring

Automated Operations

Dynamically and continuously assure cost effective application performance and resource utilization

Incident Management

Automate and manage end-to-end IT and network operations at scale with efficiency and resiliency

Integrated AI-powered IT Operations



Platforms



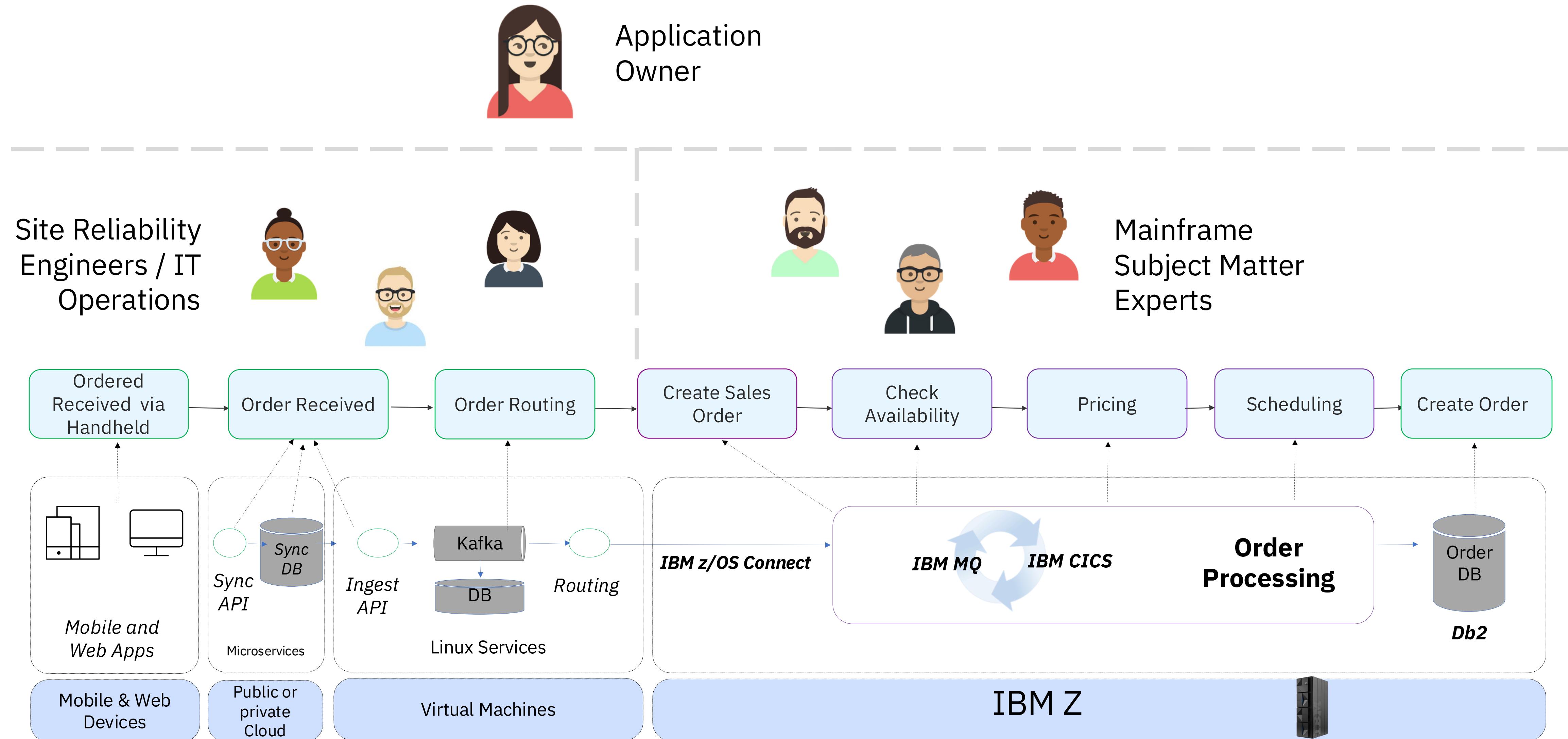
Hybrid Multicloud Networks



Data & Operations

IBM Observability by Instana

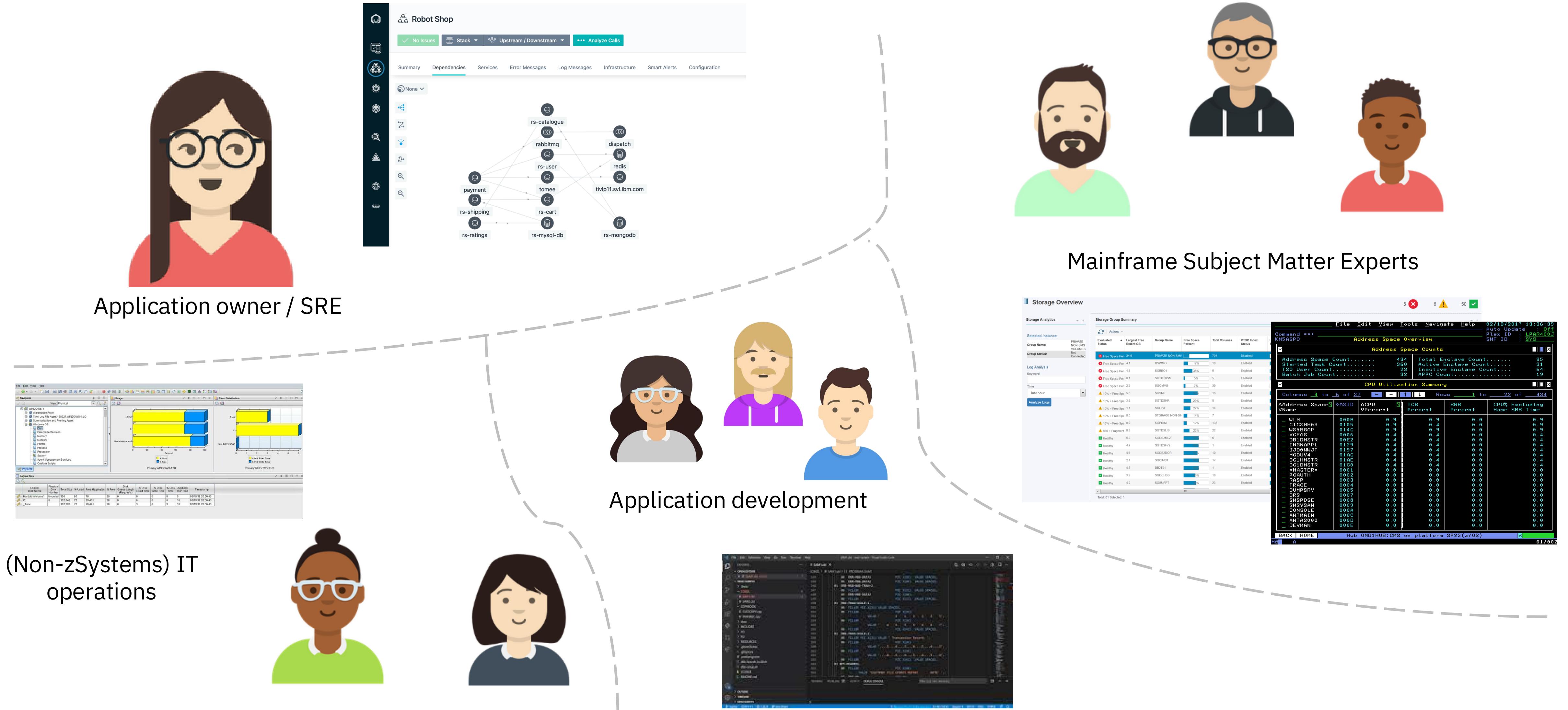
The challenge of enterprise observability



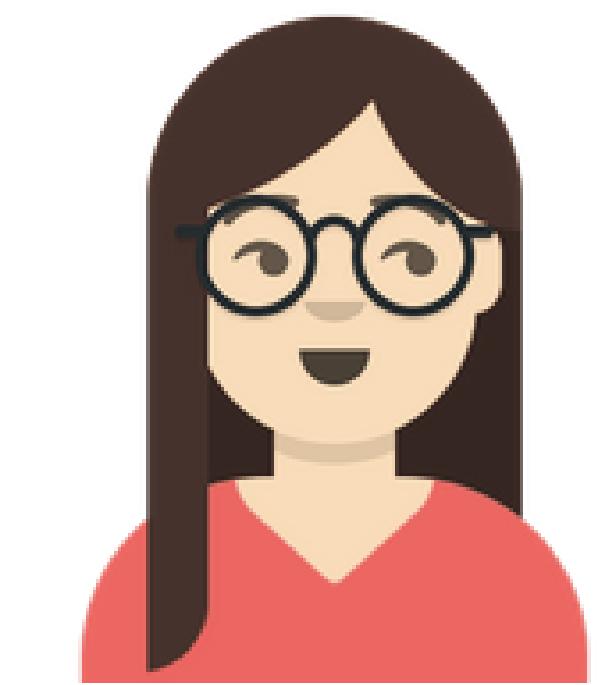
The mainframe is essential to the successful operations and business workflows of major enterprises...

Yet the majority of IBM Z users **lack integration of this key platform** into their enterprise-wide observability strategy

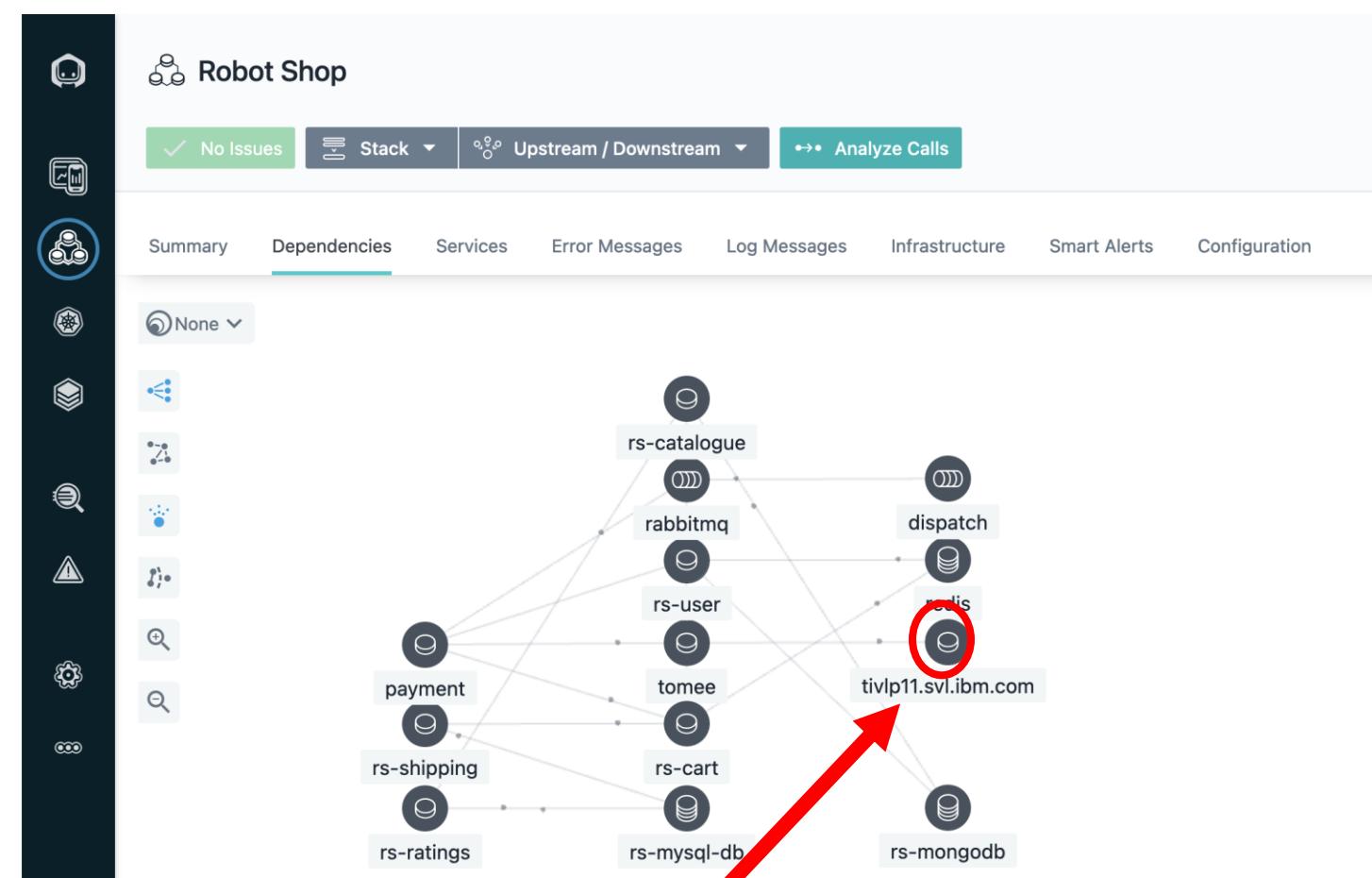
The ongoing challenge of Enterprise Observability



The absence of end-to-end observability...

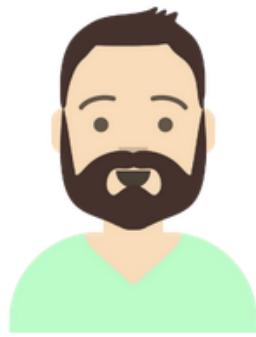


Application
Owner



The response time of our principal customer-facing application has increased significantly over the past 30 minutes...**it looks like the mainframe is where the slowdown is occurring, but I can't see any details.**

MQ is looking good according to my dashboards. Not our problem. Have you spoken to the IMS team?



MQ SME

No problems with IMS. I don't think IMS is part of this application.



IMS SME

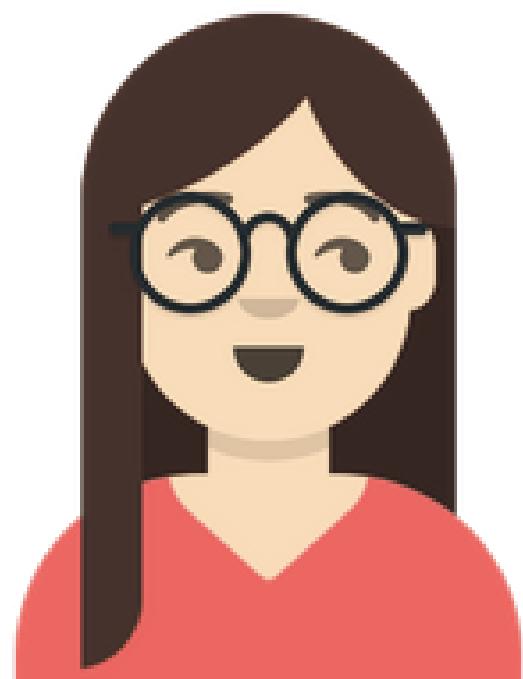
Uh-oh. One of our CICS regions is experiencing a slowdown. I'll fix it right now



CICS SME

Improved experience with enterprise observability

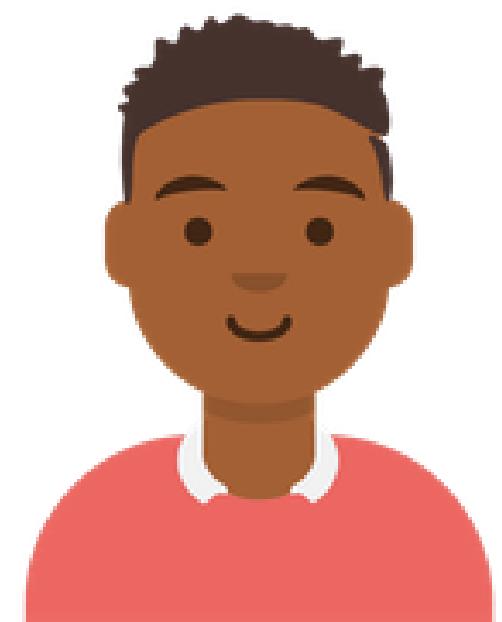
The response time of our principal customer-facing application has increased significantly over the past 30 minutes...**it seems there is a slowdown coming from CICS. It appears to be stemming from CICST11A and task 56177 is associated.**



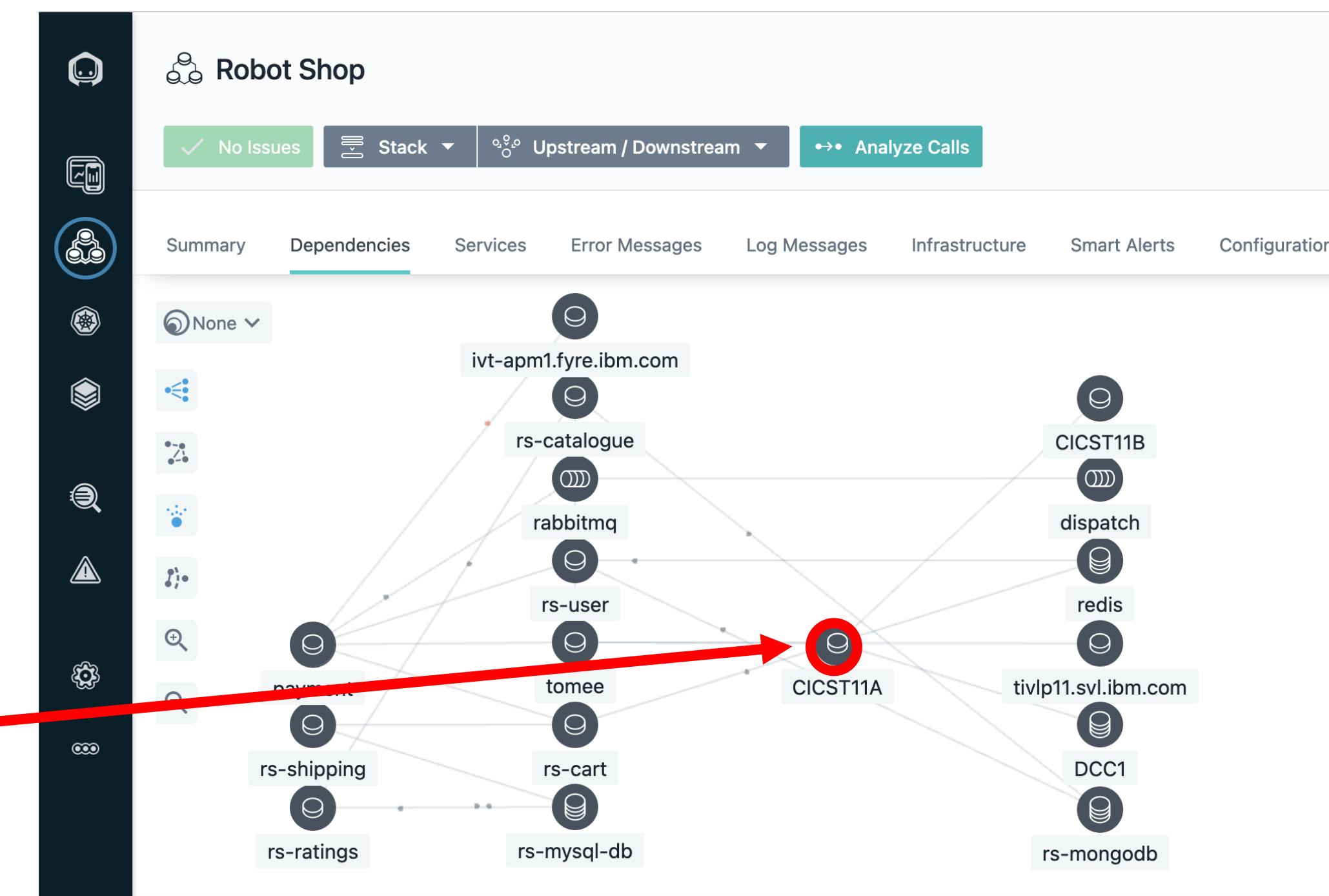
Application
Owner

Thanks for the heads up.

I'm going to look at that CICS region in OMEGAMON, review the CICS task history, and take action immediately.

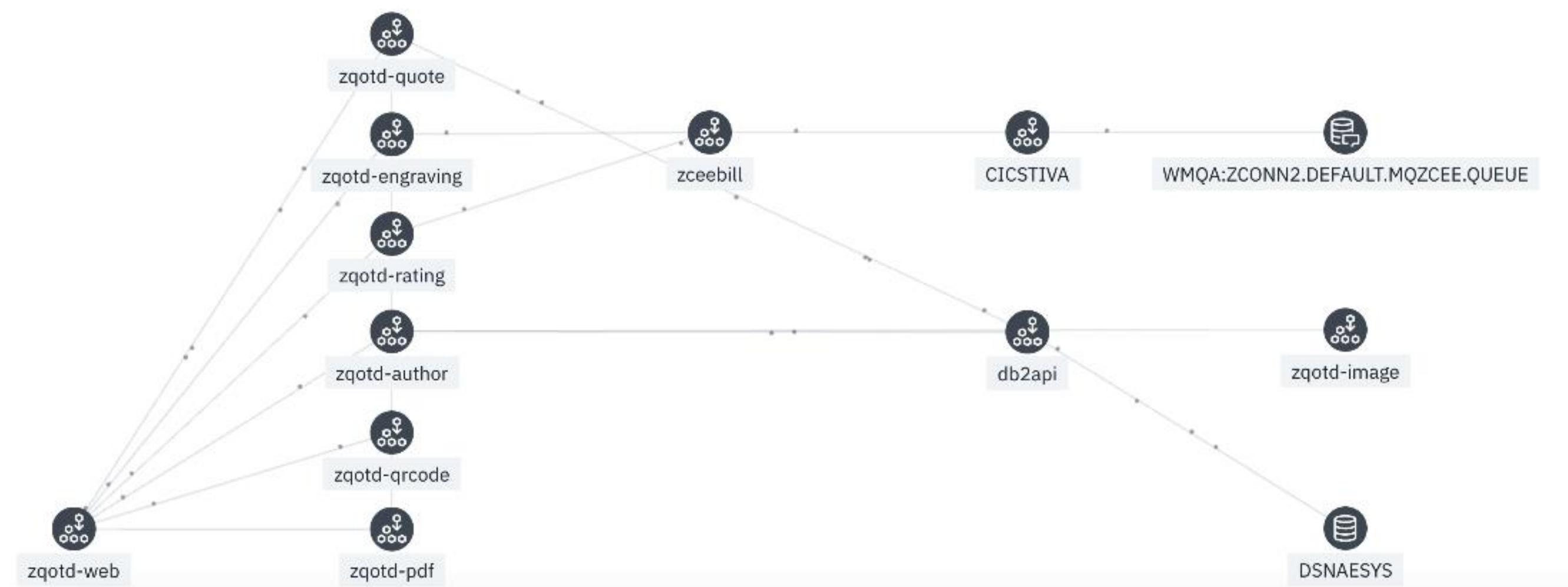
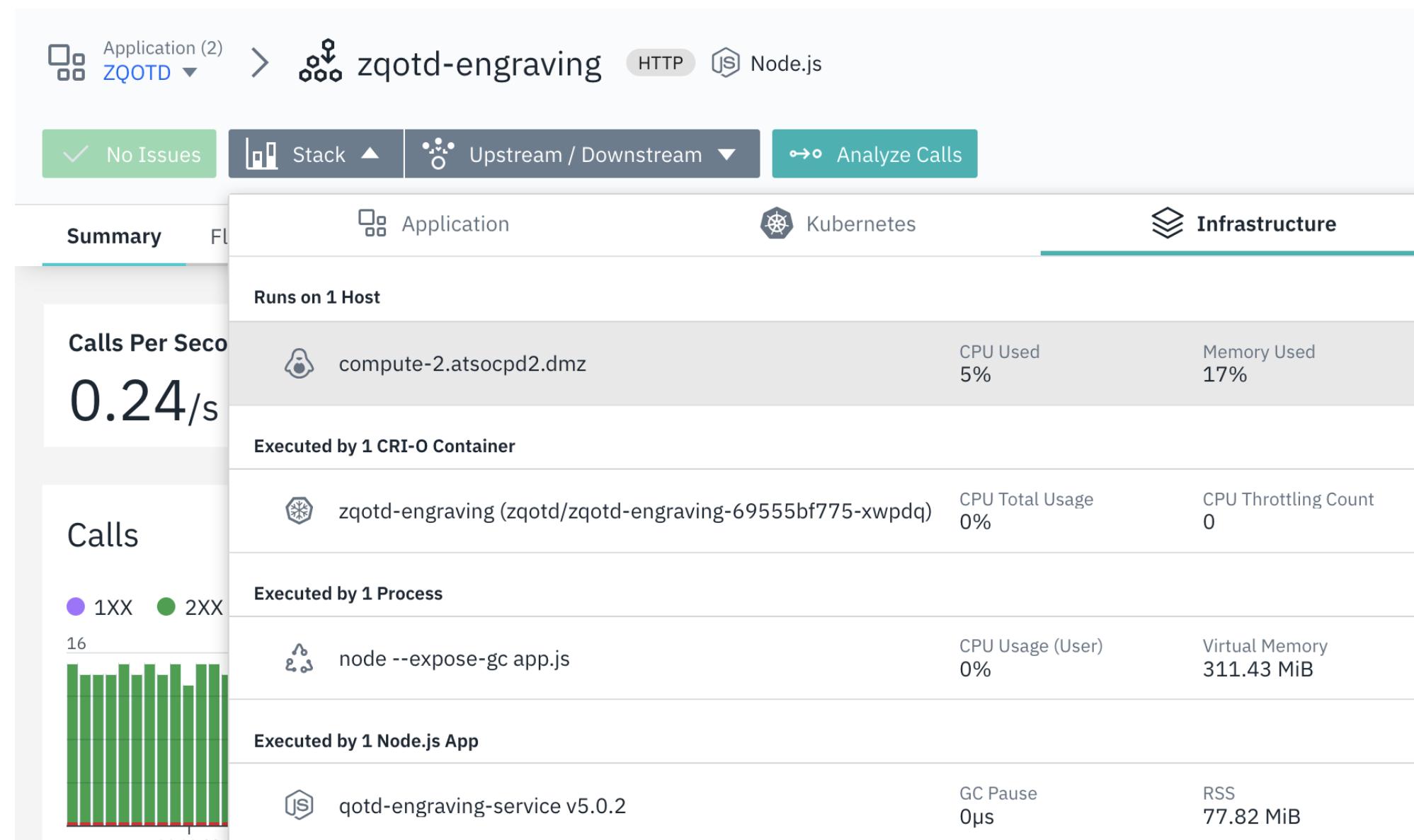


CICS SME



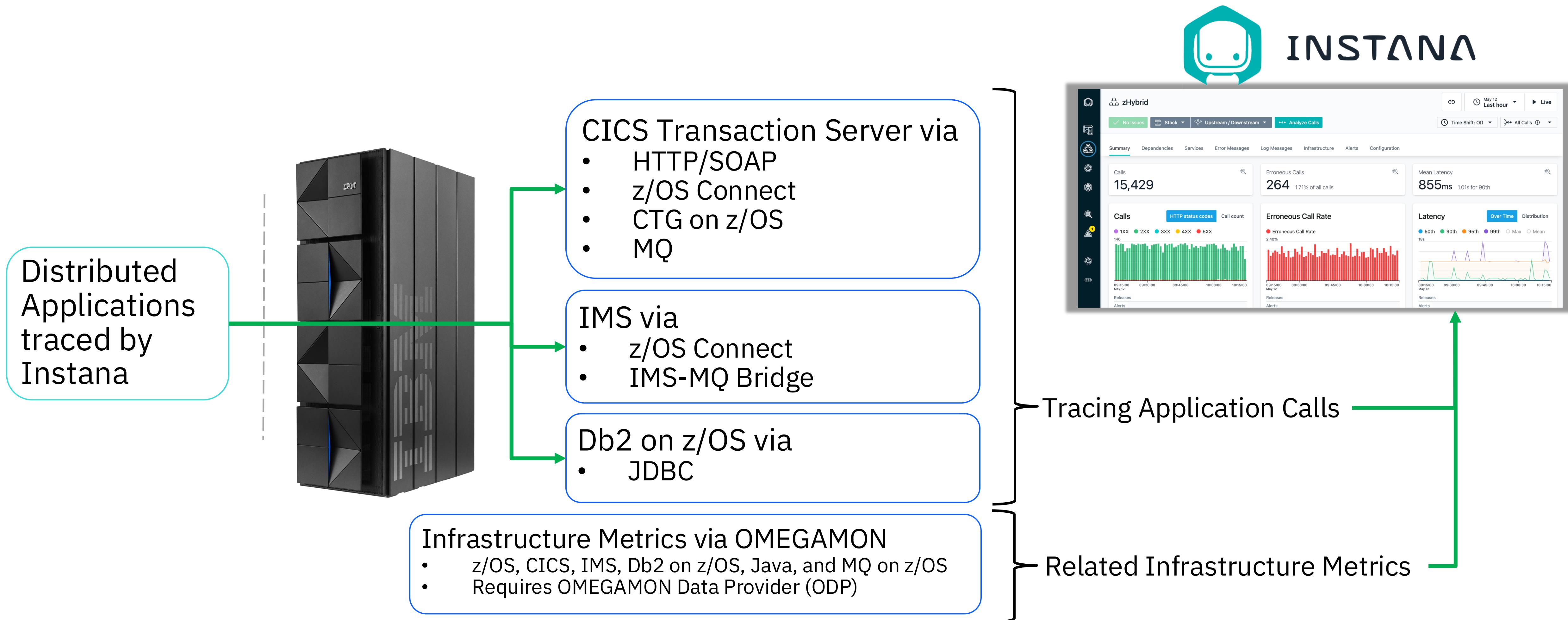
Collect accurate data in context

Real-time detection and mapping of all interdependencies reduces risk and decreases MTTR (Mean Time to Restore) by ensuring that you're always looking at accurate information.



Instana Capabilities on z/OS

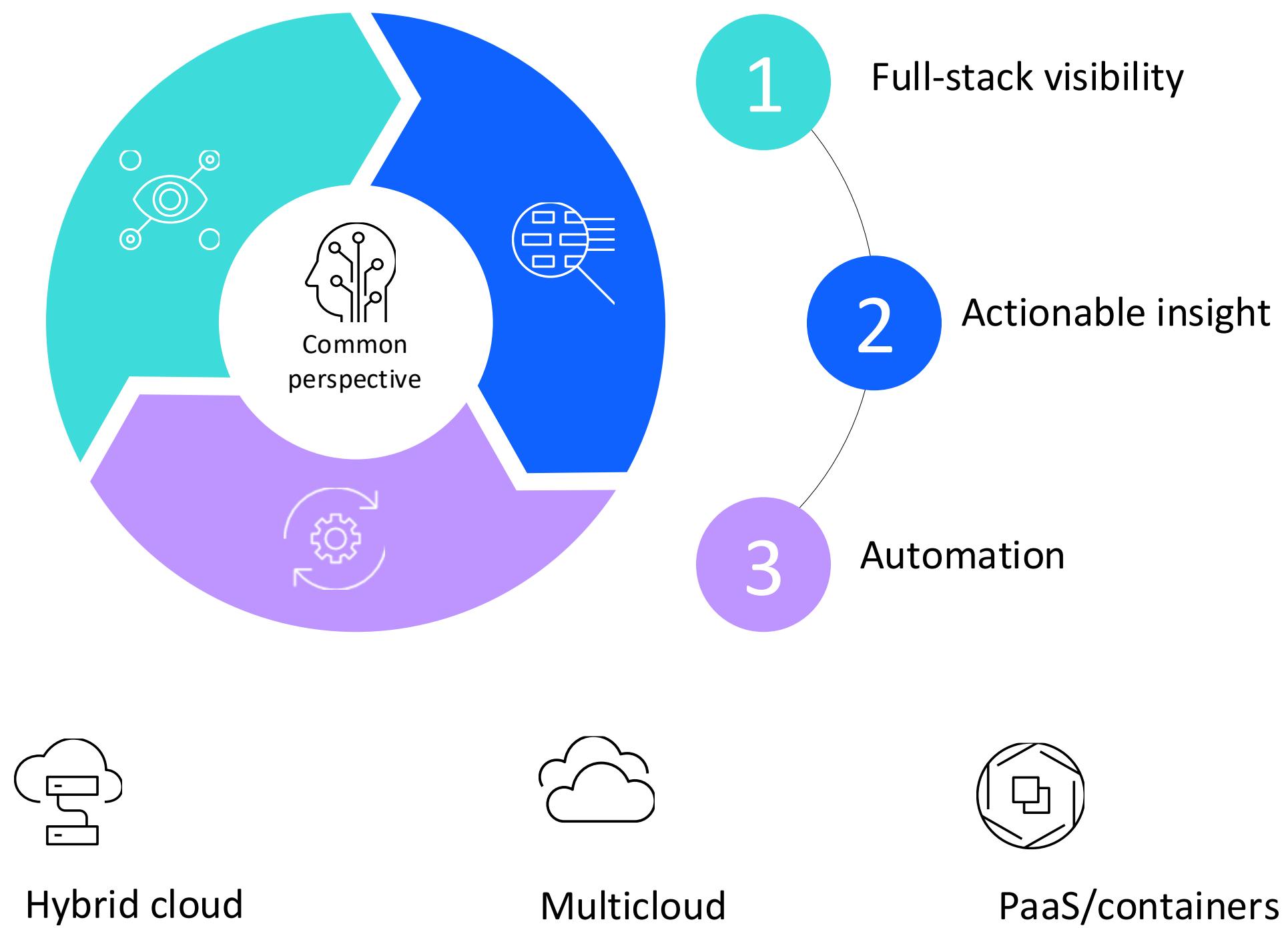
- Designed to observe hybrid applications that start on distributed systems and call into z/OS transactions
- Instana tracing isolates the location of the problem and provides data about the likely cause
- Integration with OMEGAMON shows correlated metrics related to the problem in Instana (Optional)



IBM Turbonomic Application Resource Management

IBM Turbonomic® Application Resource Management

Continuous application performance while safely reducing cloud costs



IBM Turbonomic

Software (not people) continuously makes complex resourcing decisions to ensure all applications get exactly what they need to perform.

Public cloud optimization

- VM rightsizing
- Storage volume configuration
- Database configuration
- Maximize RI coverage
- Optimize RI purchasing

[Learn more](#)

Kubernetes optimization

- Container rightsizing
- Pod moves
- Cluster scaling
- SLO-driven scaling
- Container platform planning

[Learn more](#)



Data center optimization

- Continuous compute placement
- VM rightsizing
- continuous storage placement
- Superclusters
- Initial placement

[Learn more](#)

Sustainable IT

- Container rightsizing
- Pod moves
- Cluster scaling
- SLO-driven scaling
- Container platform planning

[Learn more](#)



What actions can Turbonomic recommend and automate?

1. Vertically scale workloads
(uses more historical data than other autoscalers like OCP VPA)
2. Horizontally scale workloads (to meet SLO)
3. Provision or suspend cluster nodes
(recommend only on s390x)
4. Move pods to different nodes
(unique to Turbonomic)

1

Modify CPU requests and limits, equivalent to:
`oc set resources deployment foo \ --limits(cpu=200m, memory=512Mi) \ --requests(cpu=100m, memory=256Mi)`

2

Increase or decrease number of pods, equivalent to:
`oc scale deployment foo \ --current-replicas=1 \ --replicas=2`

3

Cannot *automatically* scale nodes on s390x – however you can manually scale when *recommended*

4

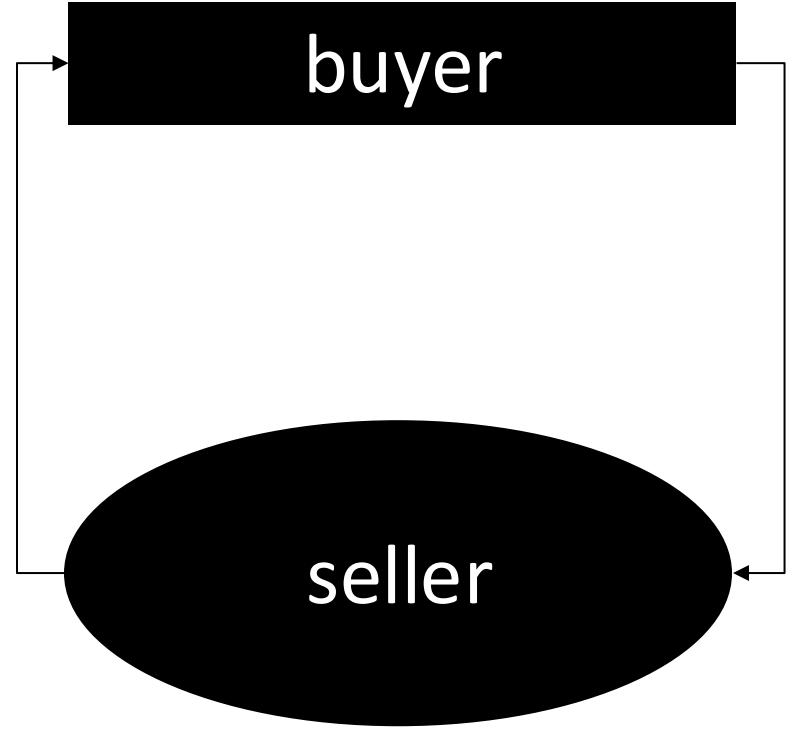
Spin up new pod on target node -> ensure it is up and running and passes health checks -> delete original pod

[More details](#)

IBM Turbonomic automates resource decision-making

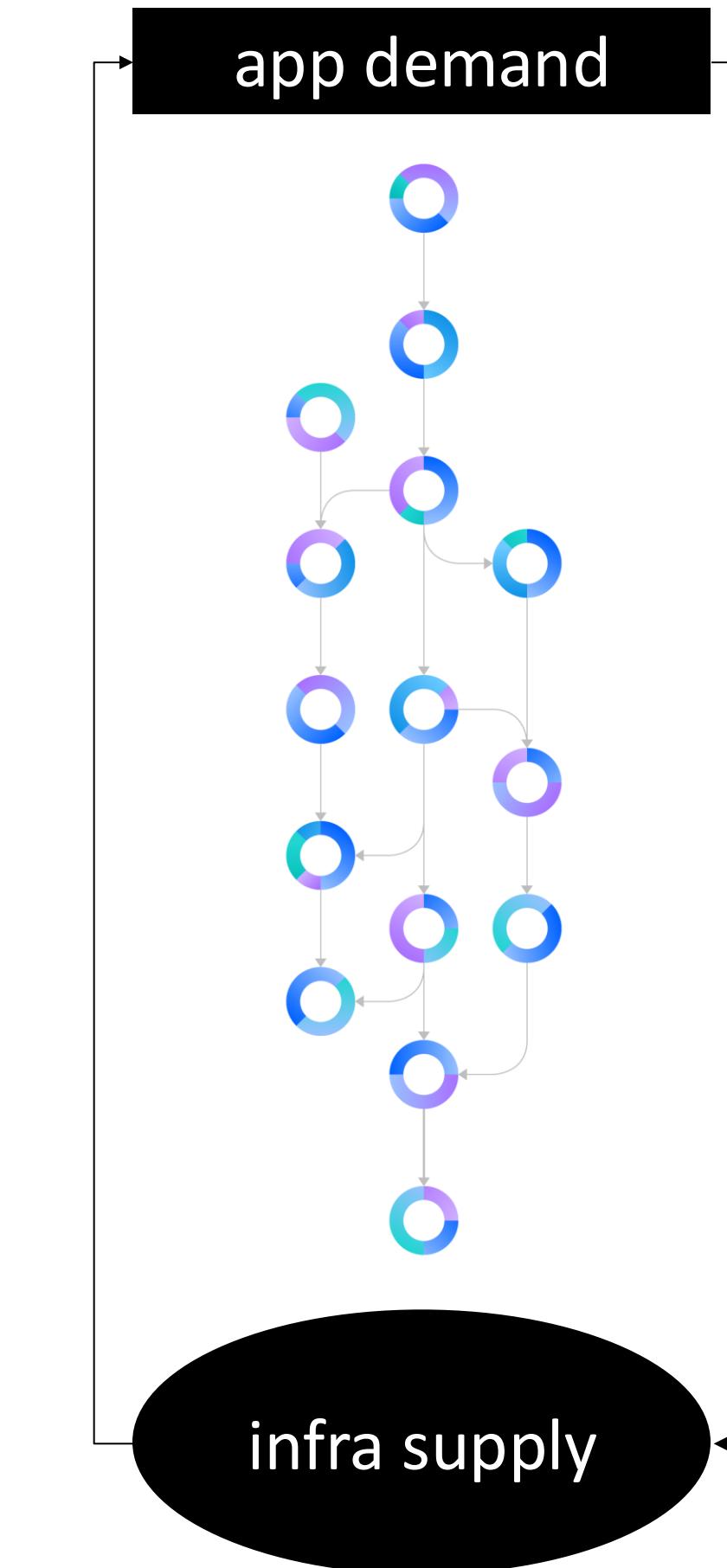
1. Abstraction

Entities in the environment are abstracted as buyers or sellers of application resources (compute, storage, network).



2. Analytics

Environment / the application stack is modeled as a market and the principles of supply, demand, and price are applied to match app demand to infrastructure supply.



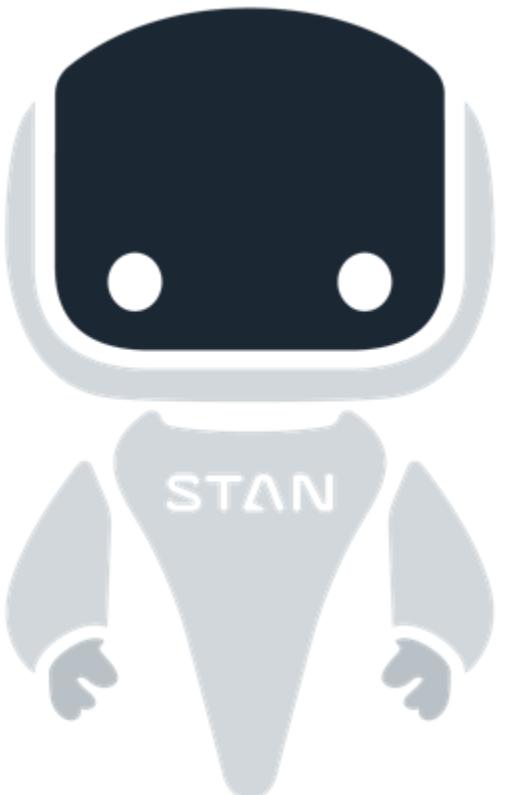
3. Automation

App-first, full-stack approach ensures actions are safe to automate. Clients operationalize automation by integrating actions into pipelines, processes, and workflows

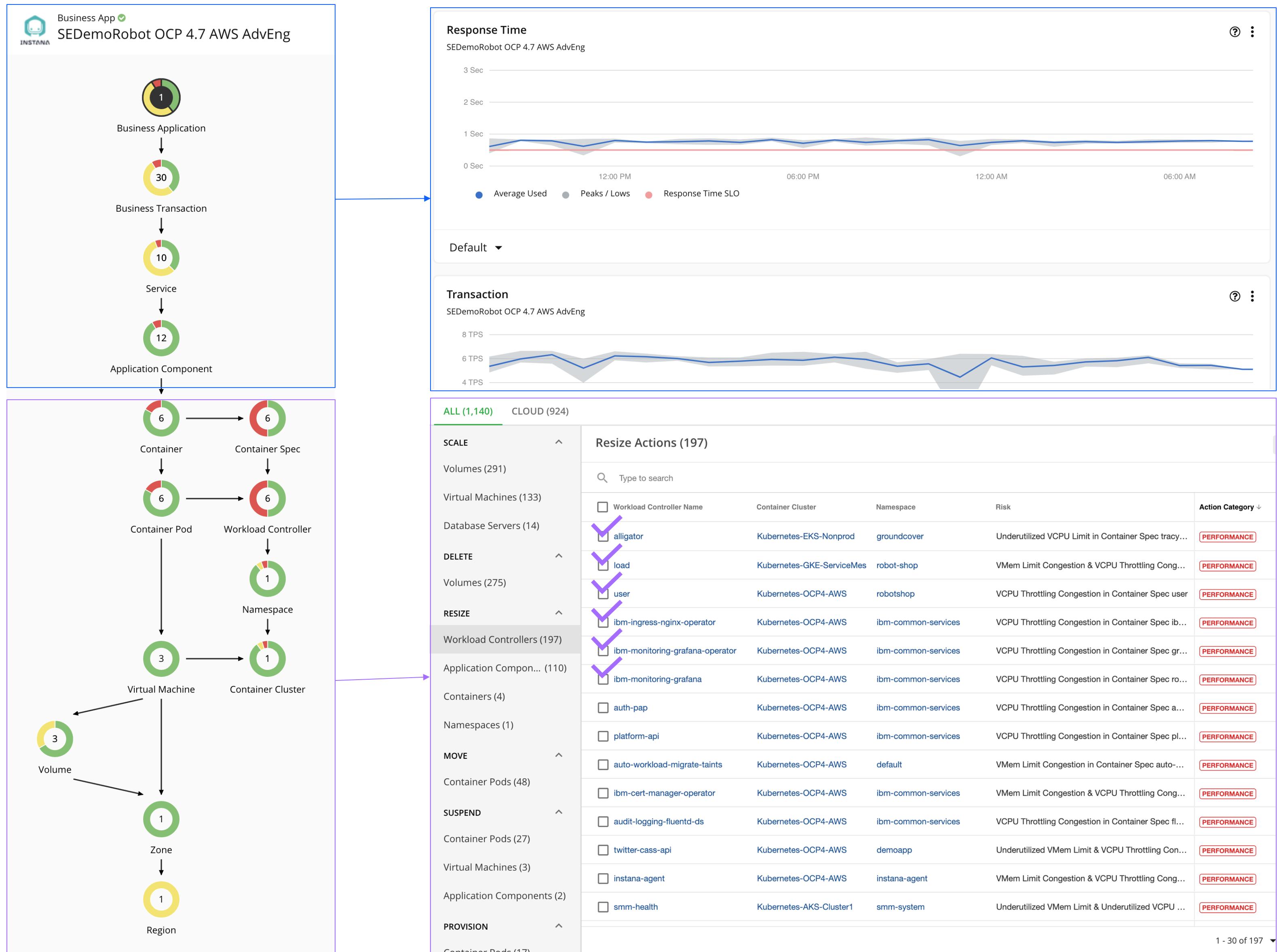
IBM Instana + IBM Turbonomic

Powerful alone,
better together

Only **Instana** provides
real-time observability
data with 1 second
metric granularity



Only **Turbonomic**
provides cost
optimization you can
operationalize and
automate.



IBM Cloud Pak for AIOps

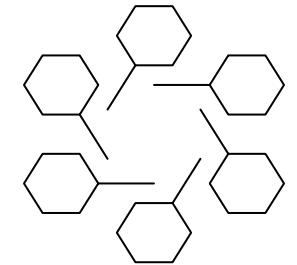
IBM Cloud Pak for AIOps

Proactive problem determination, remediation and avoidance



Proactive incident resolution using AI to eliminate unnecessary down time

Cross Domain Data Ingestion

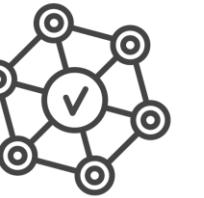


Events, metrics, alerts, topology, CMDB

Tickets, defects, CI/CD events

On-Prem, Cloud, SaaS, VM's and containers, systems, apps, network

Event Correlation



Correlate across all relevant data sources

Detect hidden anomalies, group based on patterns

Find deviations in performance metrics

Proactive Incident Management



Prioritize incidents based on business criticality

Dynamically update application topologies

Recommend fixes based on analysis of past tickets

Runbook Automation



Create runbooks to automate recurring remediations

ChatOps and prescriptive next best actions

Centralize policies across cloud and VM environments



Comprehensive AIOps approach to Real Business Outcomes

Multi-Domain Data Ingest

Automated Data Ingest

Unstructured

CI/CD

Logs

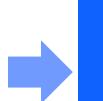
Tickets

Structured

Events / Alerts

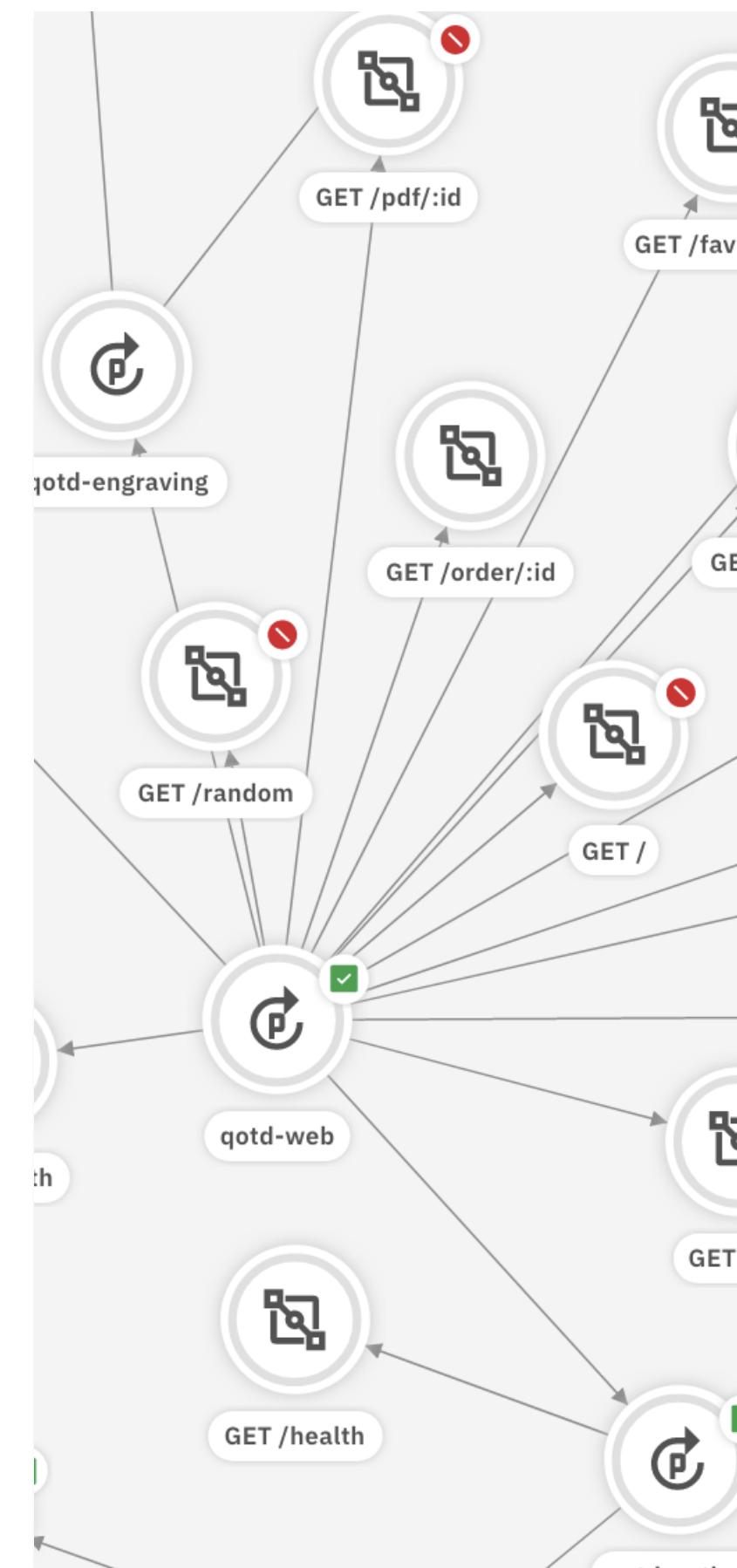
Metrics

Topology / Changes



Informed, Actionable Insights

Acclimate & Enrich Data



Augment Ops

Take Actions

Change Tracking

Anomaly Detection

Event Processing Correlation

& Enrichment

Fault Localization

Blast Radius

Probable Cause Analysis

Story Creation

Contextual side-launch

Act Manually (with a click)

Semi | Full Automation

Pipelines & Workflows

Explainability

Collaboration Integration

Together Ops teams
in near real-time...

Assure Performance



Accelerate rates of change



Free staff from toil



Reduce tickets by up to 70%



Environment and Tooling Data Connectors

Over 160 industry standard connectors out-of-the-box

Ingest Events & Alerts, Metrics,
Topology and Logs from across your
estate and tooling

Create your own custom connectors
using generic connectors and SDKs

Leverage your existing Netcool Probes

Easy configuration and management

AIOps Incident View

Probable Cause alerts are prominently displayed and ordered by likelihood, with additional details only one click away.

Topology view of affected and associated resources, and historical change tracking to quickly pinpoint the source of an incident and its impact

Recommended runbooks based on incident context and user feedback.

The screenshot shows the IBM Automation AIOps Incident View. At the top, there's a navigation bar with 'IBM Automation' and a search bar. Below it, tabs for 'Overview', 'Alerts', and 'Topology' are visible, with 'Alerts' being the active tab. A header bar displays 'Stories and alerts' with counts for 'Internal Server Error', 'Log anomaly', and 'Metric anomaly'. It also shows 'Priority 1' alerts, 'Assigned' status, and 'Related stories (3)'. On the left, a sidebar lists 'Probable cause alerts: 3' under 'Runbooks'. The first alert is 'Response time high for ts-ticketinfo-service-ts-ticketinfo-service-68cc7ff6c56-fbcrzts-ticketinfo-services'. The second is 'Log Anomaly - HTTP Response Anomaly (503) detected for services: ts-ticketinfo-service-68cc7ff6c56-fbcrzts (1)'. The third is 'MemoryUtilization is Higher than expected. Actual: 1345.8800m Expected: 300.8648m'. To the right of the sidebar is a 'Topology' section showing a network graph with nodes like 'Alert topology', 'Distribution dashboard', and 'Fuel tracker'. A callout bubble points from the 'Fuel tracker' node to a detailed view of a specific alert. Below the topology is a 'Resources' section showing 'Pod 1:Fuel tracker'. Further down are sections for 'Recommended runbooks' (listing three 'Migrate virtual machine to new tier' runbooks) and 'Similar past resolution tickets' (listing two tickets for 'Noticing 500 internal server error and out-of-memory error'). At the bottom right is a 'Topology churn' chart showing relationship and property changes over time, with a zoomed-in view of a specific event on 11/5/2020 at 11:08:38 AM with 56 property changes. The bottom left shows a 'Status severity breakdown' chart.

Access to ChatOps for team coordination and shortcuts to actions

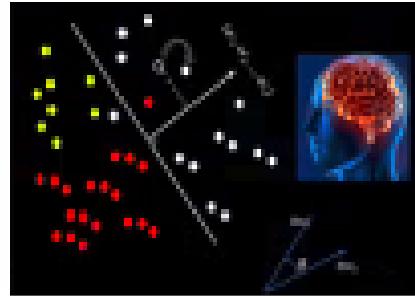
Direct link to ServiceNow ticket or other ITSM systems

Similar incident tickets, to inform operators of rapid resolution steps as well as tracking recurring types of incidents.



AI Analytics in Cloud Pak for AIOps

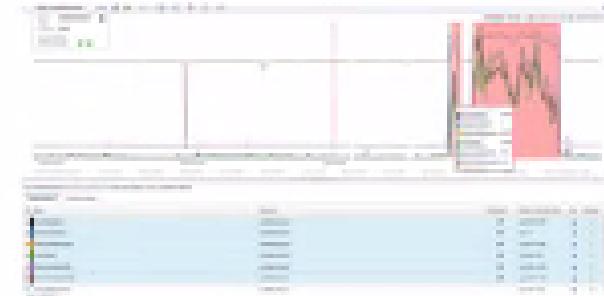
Log Anomaly Detection



Detect anomalies from log messages

- Anomalous time period prediction
- Entity mentions in error logs
- Explanation & Pointer to log messages from anomalous time periods

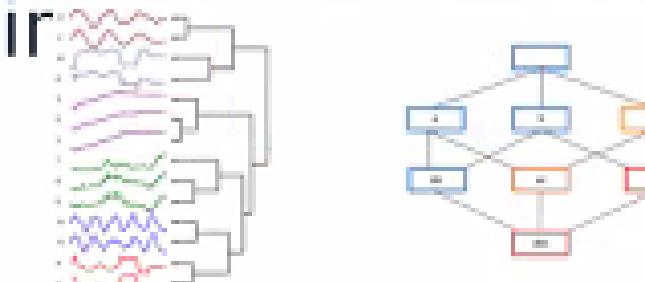
Metric Anomaly Detection



Detect anomalies from time series metrics

- Deviation from normal operating range
- Change from variable to flat
- High & low range changes
- Exceed previous range
- Exceed normal range variance

Event Grouping with Entity Linking



Group events, alerts, anomalies to reduce tickets

- Topological: Group events that are related and/or connected (e.g. “runs on”).
- Temporal: To automatically discover events that tend to co-occur
- Scope: Automatically group events based on scope
- Super-Group: Group of Groups

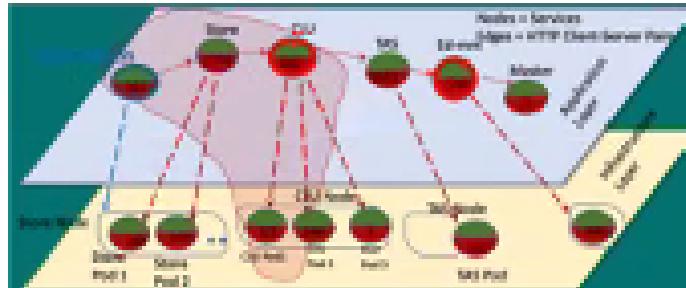
Event Seasonality



Automatically discovers events that occur with a regular pattern

- Identify chronic issues that may go un-detected
- Provide valuable insights into problem solving
- Continual learning over days, weeks, months, and years

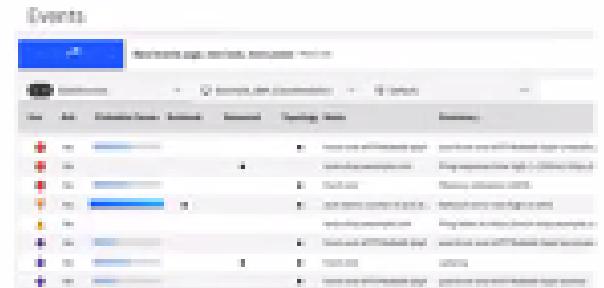
Fault Localization & Blast radius



Derive full scope of components using vertex-weighted topology graph traversal and a Reasoning engine to understand the meaning of the topology relationships

- Blast-radius via directional dependency analysis of the related components that interact with the localised source of the issue.

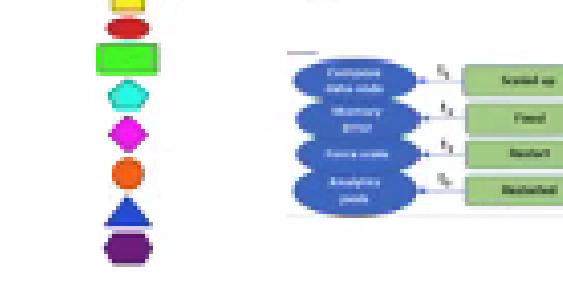
Probable Cause



Derive probable fault component using vertex-weighted topology graph traversal and a Reasoning engine to understand the meaning of the topology relationships

- Probable Cause localisation to the most likely source of an issue within the application topology

Incident Similarity



For a given problem description, find top k ranked similar incidents from the past. Helps understand the current issue and previous successful resolve actions. Consumes tickets and any data from the ticket progression to closure including human written investigation and resolution actions.

Uses Entity-Action extraction and Action sequence mining to understand tickets and summarize what was done.

Change Risk Prediction



Assess the risk for each proposed change based on issues caused by historical changes.

- Harvest and analyse the change ticket history to identify changes that implicitly failed when applied.
- Identify changes that resulted in subsequent issues if they rolled out



AI Management

IBM Cloud Pak | Automation

AI model management

Training Application coverage Data assets

Models-generating algorithms

Change risk
Training started: 8/4/2022 8:38:54 PM
Version trained v10
Data quality ● No tickets data available

Log anomaly detection - natural language
Last trained: 7/17/2022 1:47:46 PM
Version trained v4
Data quality ● Good

Error

Temporal grouping
Last trained: 7/5/2022 4:06:39 AM
Version trained v2
Data quality ● -

○ Complete Deployed

Online algorithms

Log anomaly detection - statistical baseline
Discovers abnormal behavior in log data using a statistical moving average.
Logs On

Enabled

Log anomaly detection - natural language
Last trained: 6/28/2022 6:13:19 AM
Version trained v5
Data quality ● Good

○ Complete v3 deployed

Metric anomaly detection
Last trained: 6/28/2022 6:13:19 AM
Version trained v5
Data quality ● -

○ Complete v3 deployed

Similar incidents
Discover details about similar messages, anomalies, and events that occurred in the past and are impacting the current application.
Tickets

○ Complete v3 deployed

AI model management / Training / Log anomaly detection - natural language

Overview Versions Coverage

Training status

3 of 3 complete

○ Models created

- Training started: 7/17/2022, 01:47 PM
- Queued
- Preparing data
- Training

● [Jobs: 9 jobs](#) [View](#)

Log data

Name OGvqDYIBVPLMfCLDWy1F

Start date 07/16/2022 4:00 PM UTC

End date 07/17/2022 8:00 PM UTC

IBM Cloud Pak | Automation

AI model management

AI algorithms Manage Coverage Data assets

Trained AI algorithms

These are your most recently trained AI algorithms.

Name	Version	Deployed version	AI algorithms	Schedule	Last trained	Status
similar_incidents_configuration	v1	v1	Similar incidents	Run manually	3/24/2022 9:50:32 AM	○ Training complete
change_risk_configuration	v1	v1	Change risk	Run manually	3/24/2022 9:52:44 AM	○ Training complete
metric_anomaly_detection_configuration	v2	v2	Metric anomaly detection	Run manually	3/25/2022 10:10:44 AM	○ Training complete

Items per page: 10 1-3 of 3 items

1 of 1 page ▶ ▷

Data quality

○ Good

3 recommendations

○ Your data was inspected and looks good for training.

We have detected that a portion of this data is in an unsupported language and could impact the quality of this model.

We recommend that you remove any data containing unsupported languages. Then, run training again.

Models

9 Resources

- Resources with models
- Resources without models

Start training

Deploy v4

Delete configuration

Overview details

AI type Log anomaly detection - natural language

Version v4

Version deployed v3

Created on 6/21/2022, 9:35:26 AM

Created by jconallen



Ansible Automation Platform & Cloud Pak for AIOps

Accelerate IT Transformation & use of Automation. Improve Scalability and tolerance of Change.

The screenshot shows the Red Hat Ansible Automation Platform dashboard. It includes a top navigation bar with the Red Hat logo and 'Ansible Automation Platform'. Below it is a sidebar with various icons. The main area displays three summary boxes: 'HOSTS' (3691), 'FAILED HOSTS' (83), and 'INVENTORIES' (3). A 'JOB STATUS' chart shows the number of jobs over time, with a green line peaking at approximately 350 around 1:30 AM. A 'RECENTLY USED TEMPLATES' section lists five items: 'Deployment pipeline', 'Rollback deployment', 'Deploy to development', 'Test application', and 'Deploy database', each with a progress bar and a rocket icon. The overall theme is dark with light-colored cards for data visualization.

Direct Integration

Register & Invoke Job
and Workflow
Templates into actions



Provenance of Automation

Track actions when &
where they occur



...this action
occurred on these
elements...

Step 1: Check if puts are disabled on queue

Navigate to the queue here: <https://esysmvs.ztec.dmz:1419/ibmmq/console/#/>

Check if puts are disabled in the configuration.

If they are, run the following runbook step to enable puts with Ansible.

If they are not, [End](#) [Edit](#)

Step 2: MQ Patch

Automated step

MQ Patch

Step 3: Check Instana Application Perspective

If the issue is fixed, error rate should return to normal in the ZQOTD Instana app

<https://instana.io/s/BX9rkEQ9TBKRqx4Bs2d4YQ>

Step 4: Check that the engraving function of the QOTD application is working

If you can order an engraving on the [ZQOTD application](#), this runbook worked an

Log a ServiceNow ticket with the relevant information.

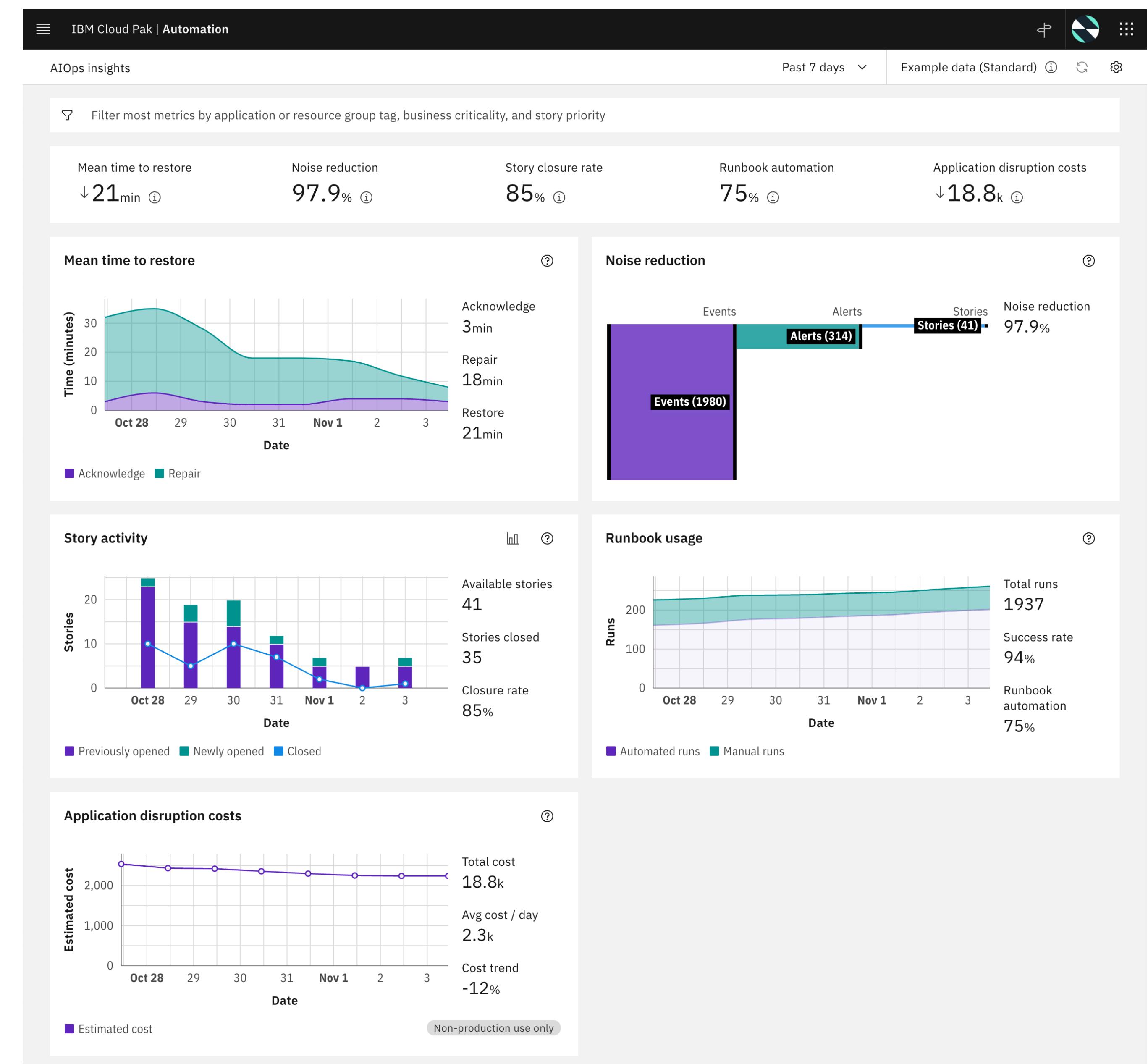
AIOps Insights Dashboard

Understanding Operations Performance

Track KPI's and automation utilization to ensure operations teams are benefiting from AIOps and identify new opportunities for automation.

Observe trends and understand application and service performance over time.

Analyze cost impacts of outages, and savings realized with AIOps (Tech Preview)



More information

- Want to learn more?

- Excellent technical introduction video series on Instana- eight videos, each close to an hour in length: <https://community.ibm.com/community/user/viewdocument/intana-technical-training-series?CommunityKey=8d661410-d1fb-4067-ab9a-019475fc541e&tab=librarydocuments>
- Short YouTube product tour on Turbonomic- about a half hour:
<https://www.youtube.com/playlist?list=PLy1IfoLMgdeZcC6sYKwVz0YLUz3Gdztye>
- Dozens of Cloud Pak for AIOps videos of varying lengths:
https://www.youtube.com/playlist?list=PL_4RxtD-BL5t8kaHEq9ef8piEAycxdhWd

- Join the IBM AIOps for IBM Z community ([Link](#))

- Join the Instana community group ([Link](#))

- Join the Turbonomic community group ([Link](#))

Thank you

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