

Machine Learning on the Mainframe

Michael Kiehl
CA Technologies

November 2018
Session **BK**



What if You Could...

PREDICT ISSUES



+2H Earlier

Take **action earlier** with embedded intelligence that dynamically alerts to abnormal patterns of operation

DIAGNOSE PROBLEMS



+5X Faster

Pinpoint **root cause faster** with multi-source data feeds and advanced machine learning algorithms

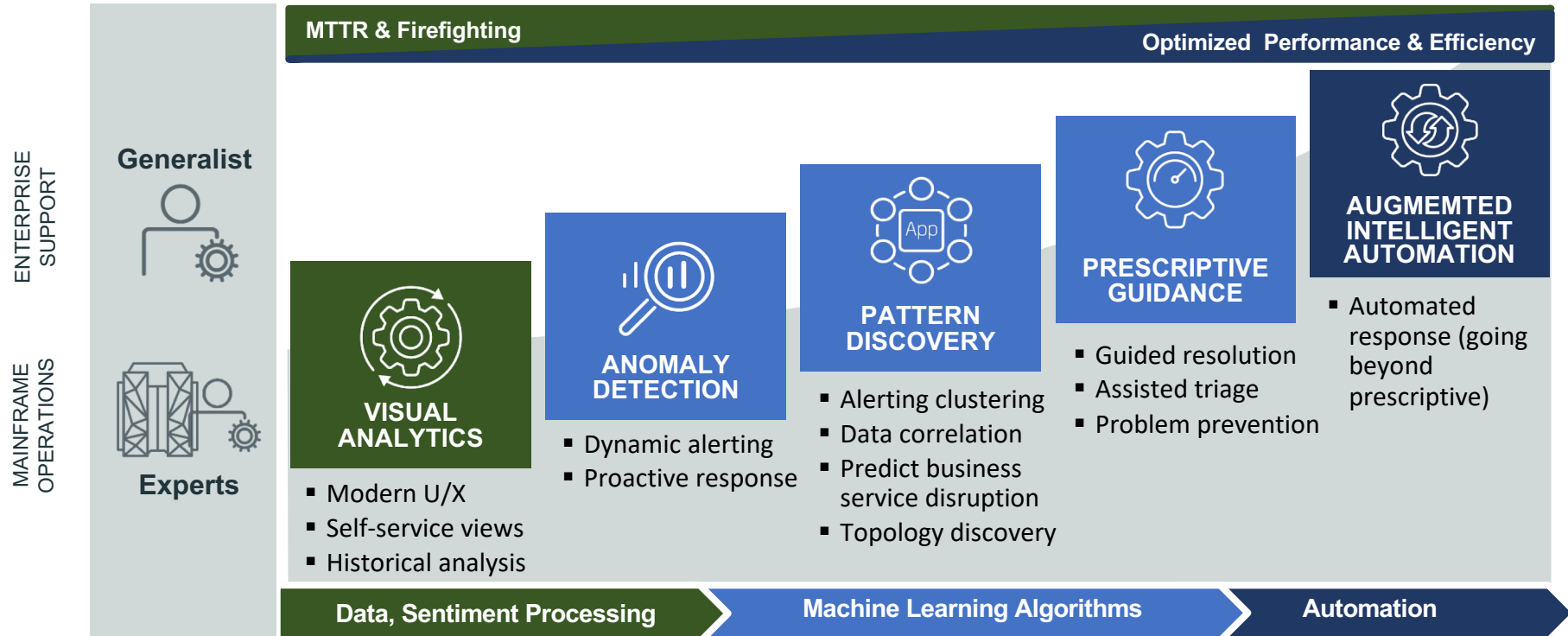
REDUCE MANUAL LABOR



> 40%

Enable generalists to triage issues and **engage only the experts needed**, and increase automation

Evolving to a Self-Driven Mainframe Data Center



Move From Reactive to Proactive

Significantly Reduce MTTR and False Alarms

Drowning
in data

Sea
of red

Reactive fire
fights



REACTIVE Monitoring

Adaptive
alerting

Fewer false
positives

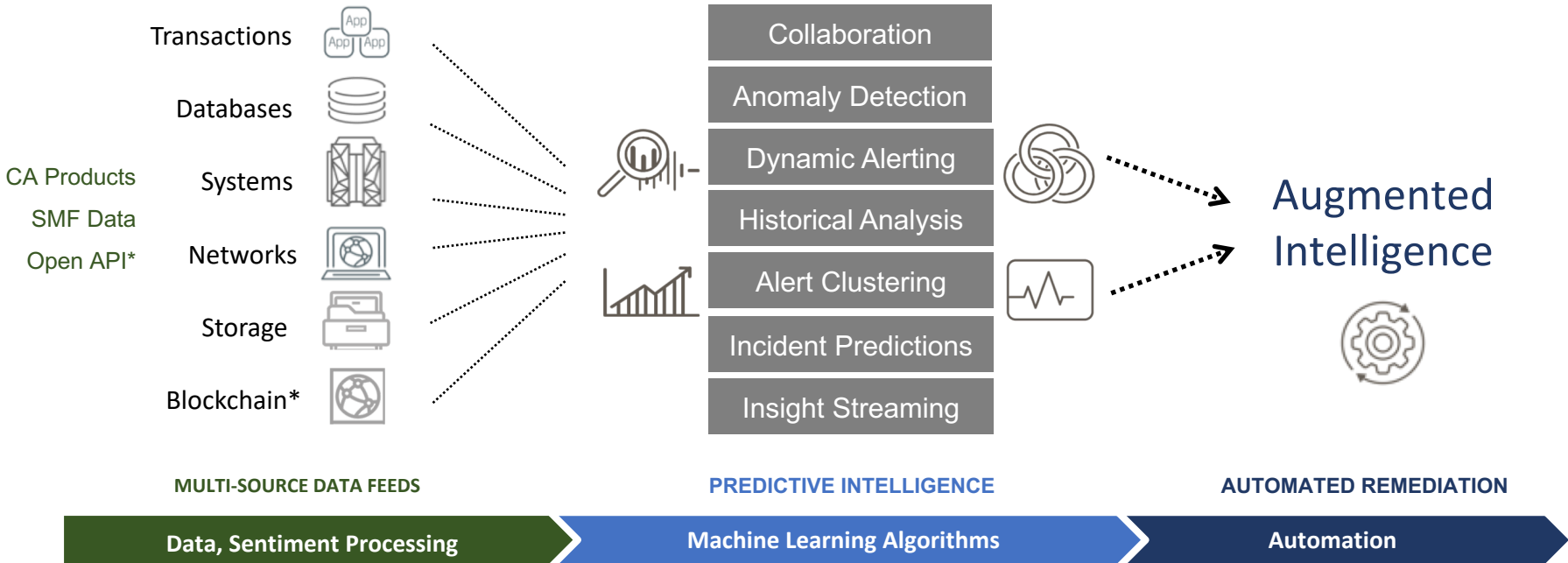
Faster MTTR
and RCA



PREDICTIVE Machine-based Alerts

How to Move Towards Self-Driving Data Center

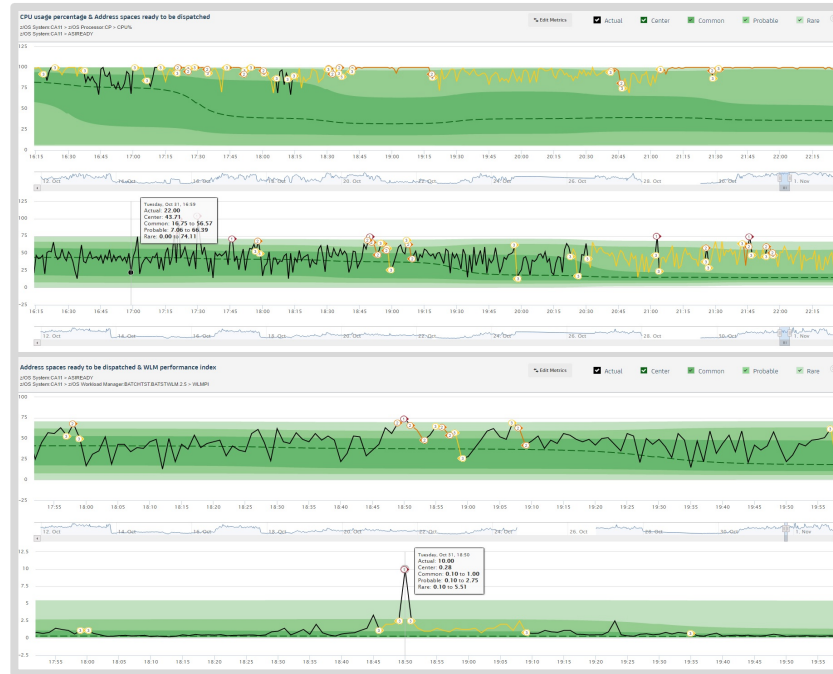
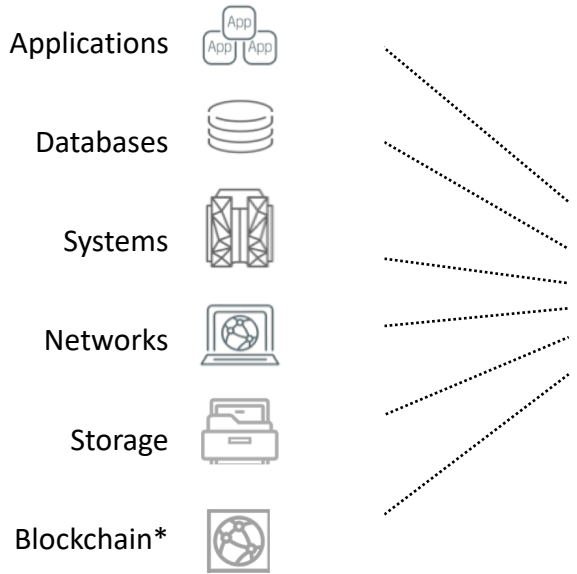
CA Mainframe Operational Intelligence



* In development

Easily Visualize Data Relationships

Flexible Multi-Source Data Feeds

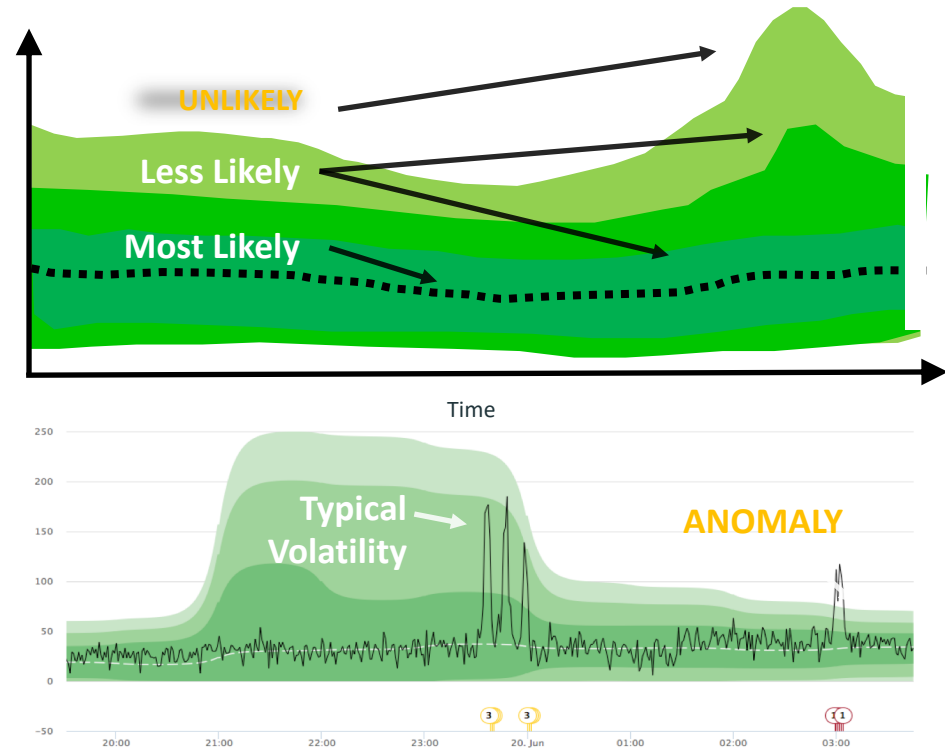


CA Products | SMF Data | Open API*

* In development

Proactively Detect Performance Anomaly

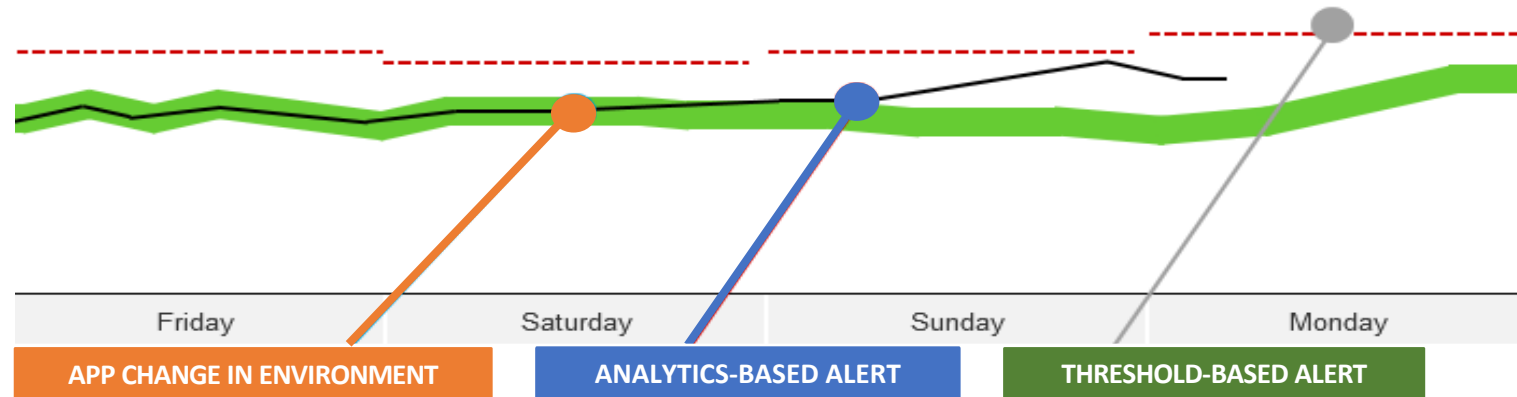
- Utilize historical data
- Define bands of *Likely* and *Unlikely*
- Map real-time metric streams
- Multi-point alerts generated using industry-standard Western-Electric rules
- Make static thresholds optional!



Adaptive Alerting

Prevent Failures and Avoid Problems Before they Happen

CPU Utilization

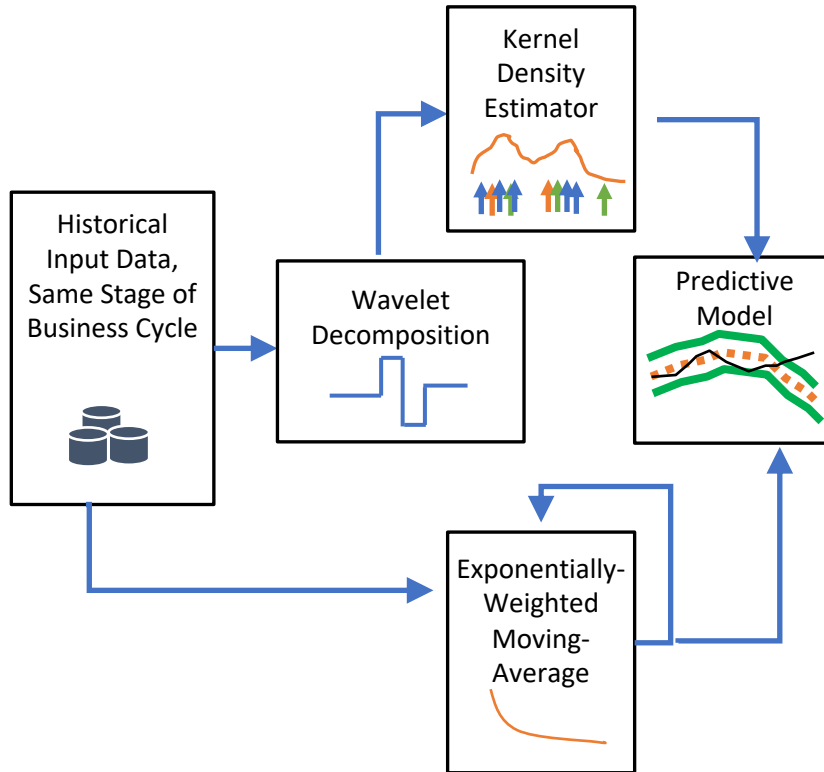


Analytics-Based Alerts detect signal from noise

- Subtler than “human-observed”
- Subtler than static thresholds which may be “last defense”

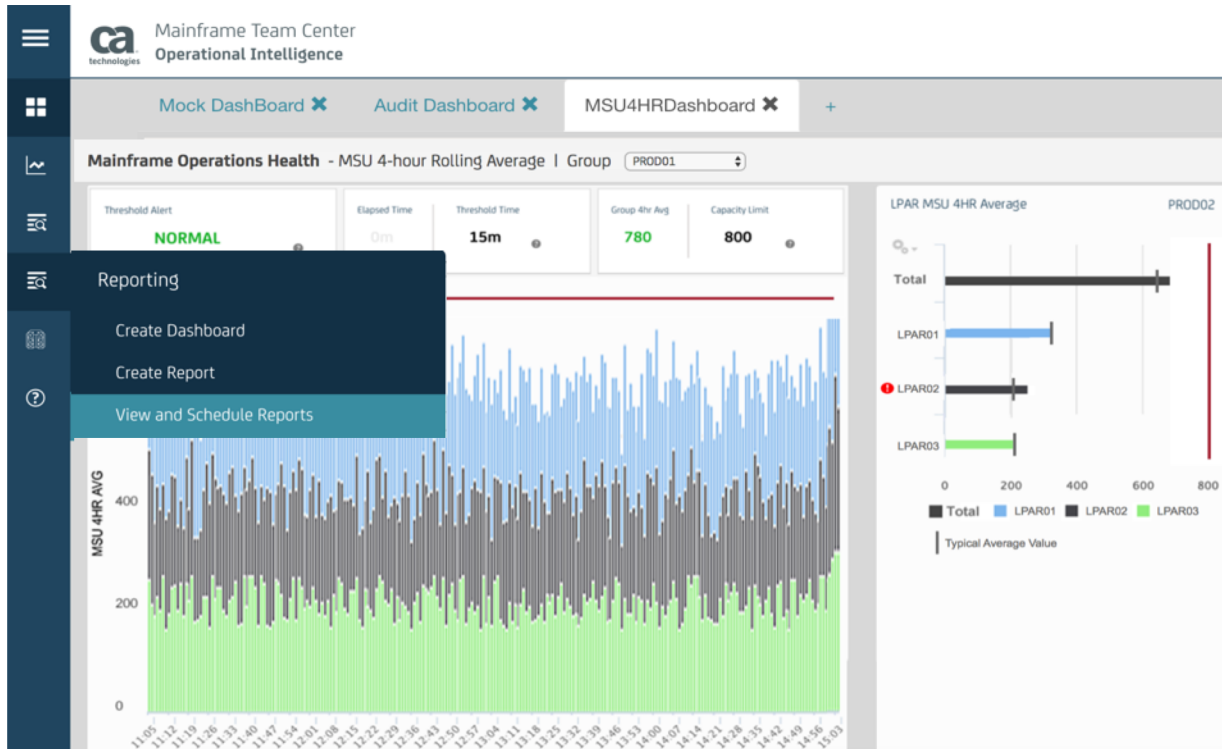
Magic Behind the Analytics

Data Science and Prediction

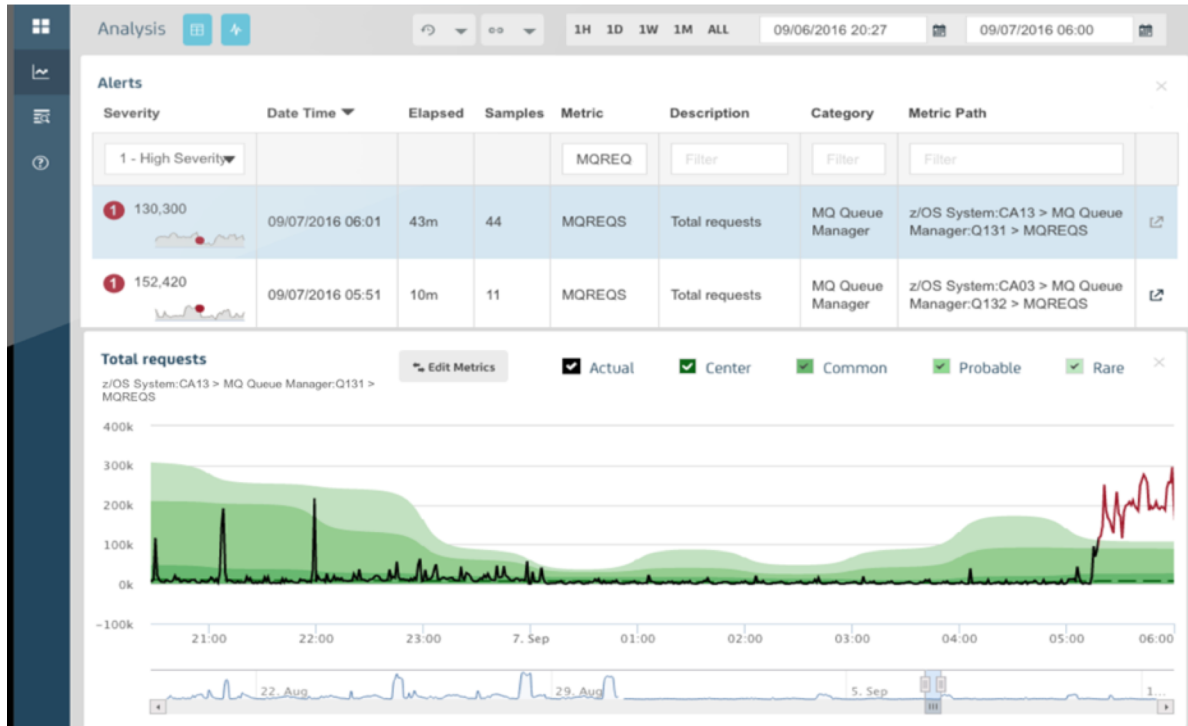


- Dynamically and automatically determine baselines and thresholds
- Generate alerts for abnormal scenarios, eliminate false positives and minimize false negatives
 - Business cycles
 - Natural volatility

Reporting and Dashboarding

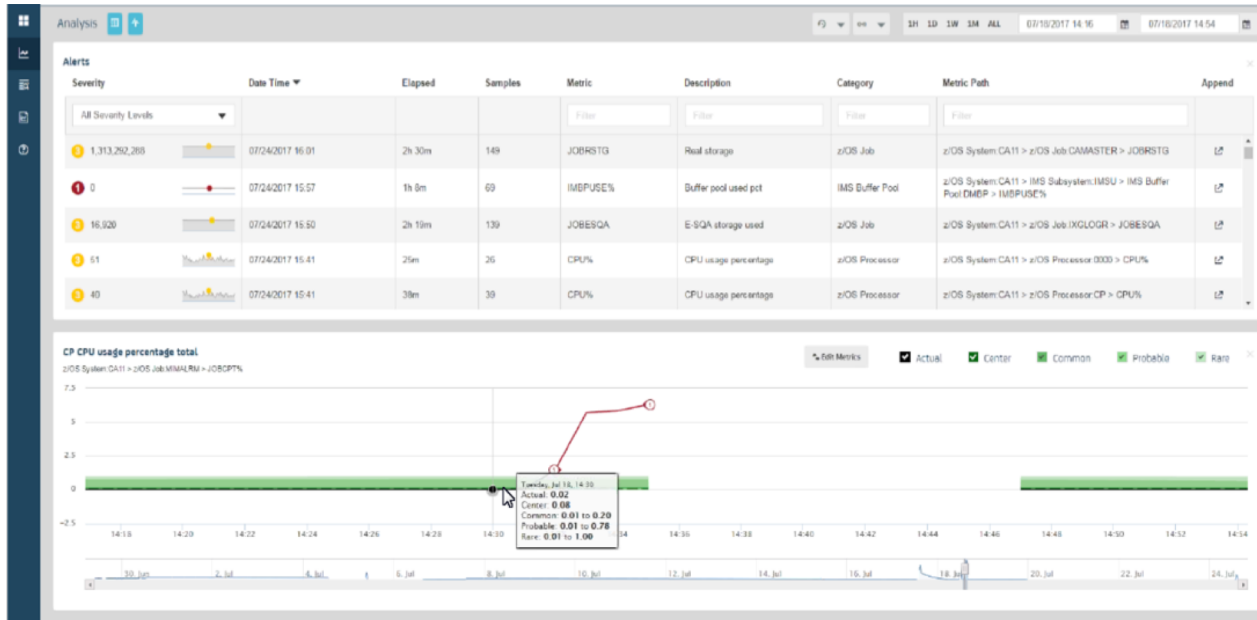


Anomaly Detection



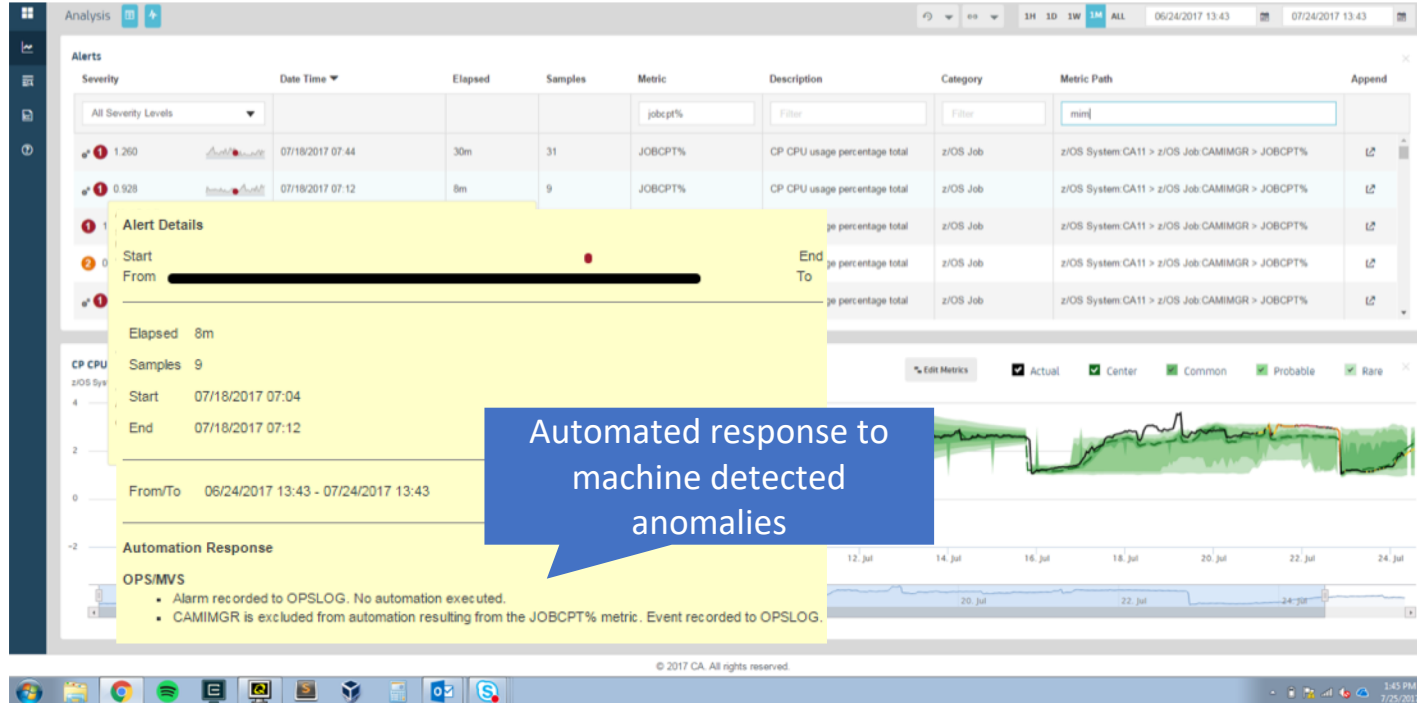
- Alerts Summary
- 3 Severity Levels
- Filters
- Green Highways

Dynamic-Alert Driven Automation



- Job "ran away"
- Anomaly detected
- Alert sent to CA OPS/MVS
- CA OPS/MVS canceled the job
- CA Automation (Automic) can also receive alerts

Automated Resolutions



The screenshot displays a monitoring interface with an 'Alerts' table and an 'Automation Response' section. A blue callout box highlights the automation response details.

Severity	Date Time	Elapsed	Samples	Metric	Description	Category	Metric Path	Append
1	07/18/2017 07:44	30m	31	JOBcpt%	CP CPU usage percentage total	z/OS Job	z/OS System:CA11 > z/OS Job:CAMIMGR > JOBcpt%	
1	07/18/2017 07:12	8m	9	JOBcpt%	CP CPU usage percentage total	z/OS Job	z/OS System:CA11 > z/OS Job:CAMIMGR > JOBcpt%	

Automation Response

- OPS/MVS
 - Alarm recorded to OPSLOG. No automation executed.
 - CAMIMGR is excluded from automation resulting from the JOBcpt% metric. Event recorded to OPSLOG.

Automated response to machine detected anomalies

Alert Clustering

Automated Correlation Delivers Issue Intelligence

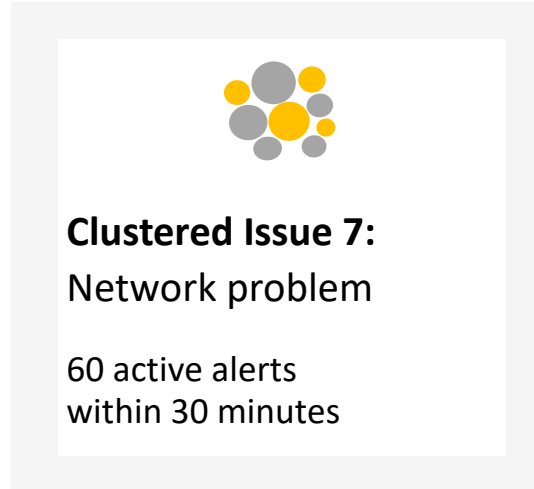
1

Gather Alerts from Multiple Sources



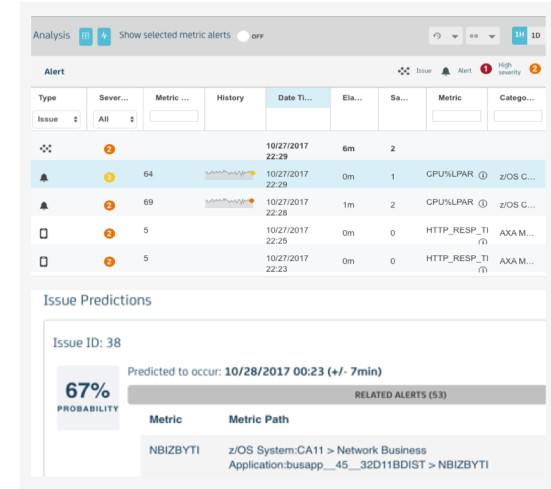
2

Automate Clustering of Alerts into Issues



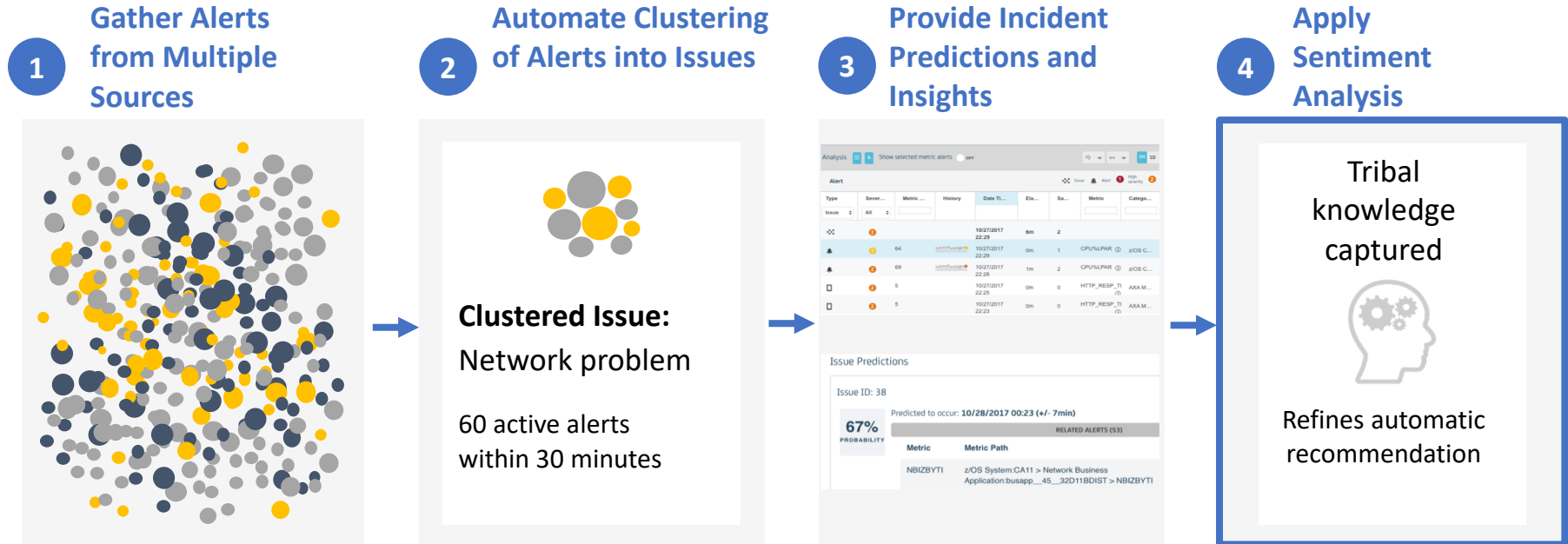
3

Provide Incident Prediction and Insight



Next Step: Apply Sentiment Analysis

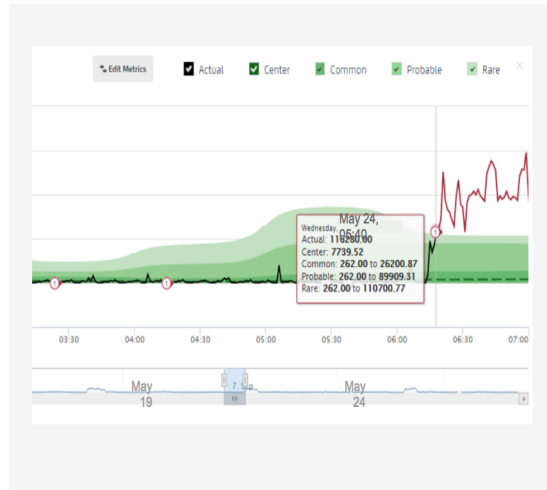
Refine Predictions with Augmented Intelligence



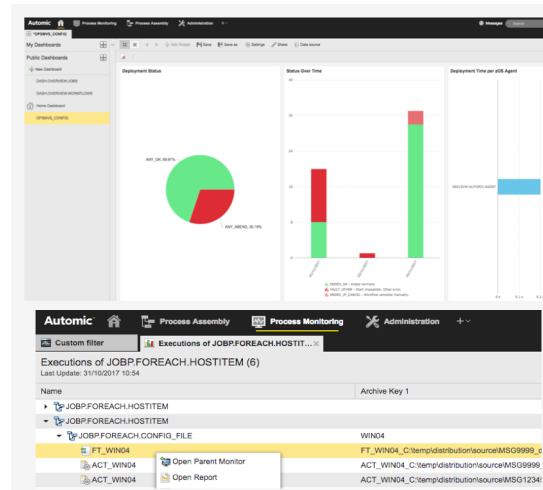
Intelligent Automation:

Reach Past IT with Process and Release Automation

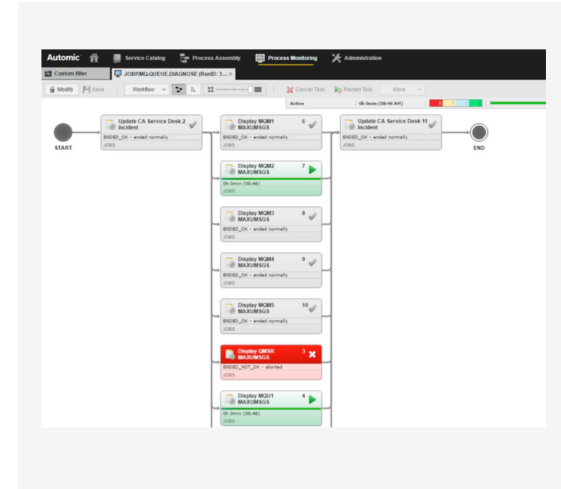
1 Trending Out of Norm Flags Dynamic Alert



2 Trigger an Automated Event

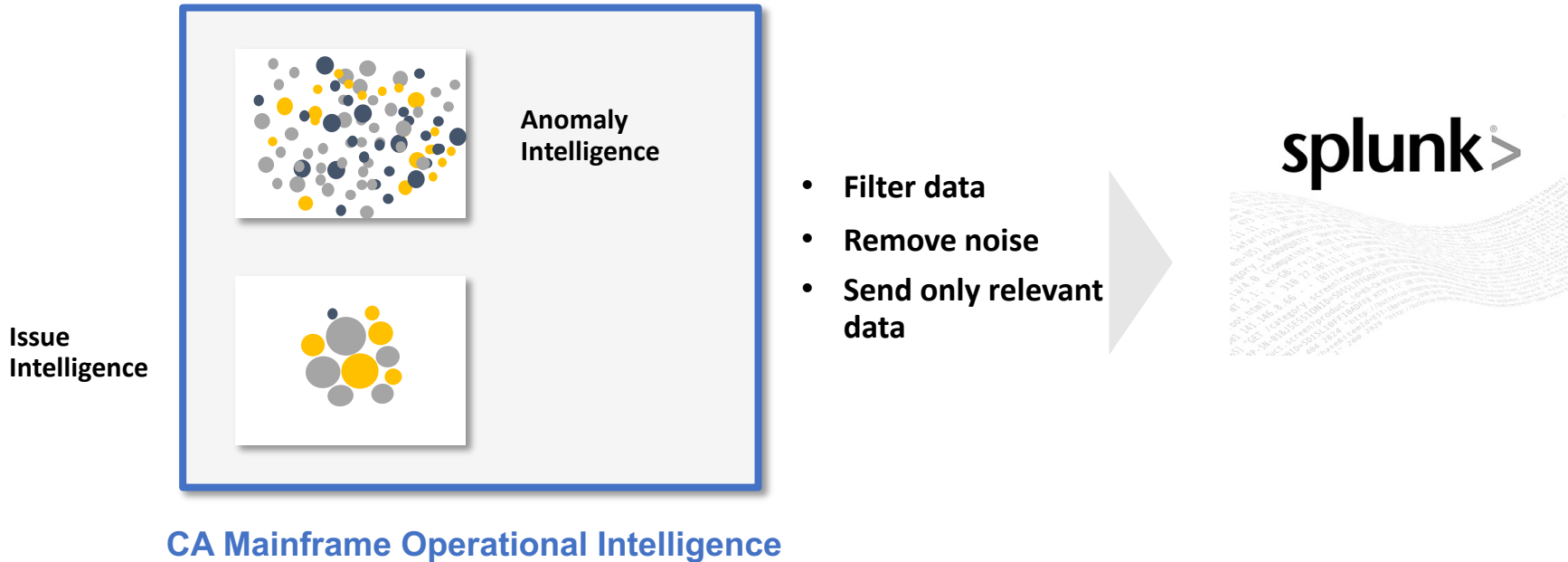


3 Identify Where in Process it Failed and Fix



Insight Streaming

Dramatically Drive Down Cost of Analyzing Machine Data

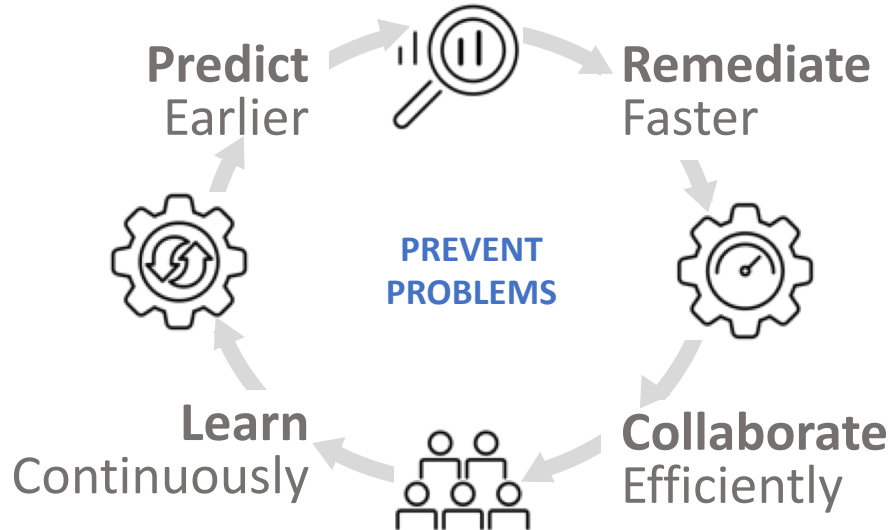


Summary

Benefits of Intelligent Operations and Automation

Take action earlier with **embedded intelligence** which detects abnormal patterns of operation

Machine learning with operational feedback recommends the next best action for future event



Operational intelligence captures patterns, triggering **dynamic** and reliable problem **remediation**

Get everyone working together to **isolate root causes faster** with data insights from multiple sources

We want your feedback!

- Please submit your feedback online at
 - <http://conferences.gse.org.uk/2018/feedback/BK>
- Paper feedback forms are also available from the Chair person
- This session is **BK**

