

# Business Monitoring Systems

## Applying Machine Learning to Business Metrics

Wayne Eckerson

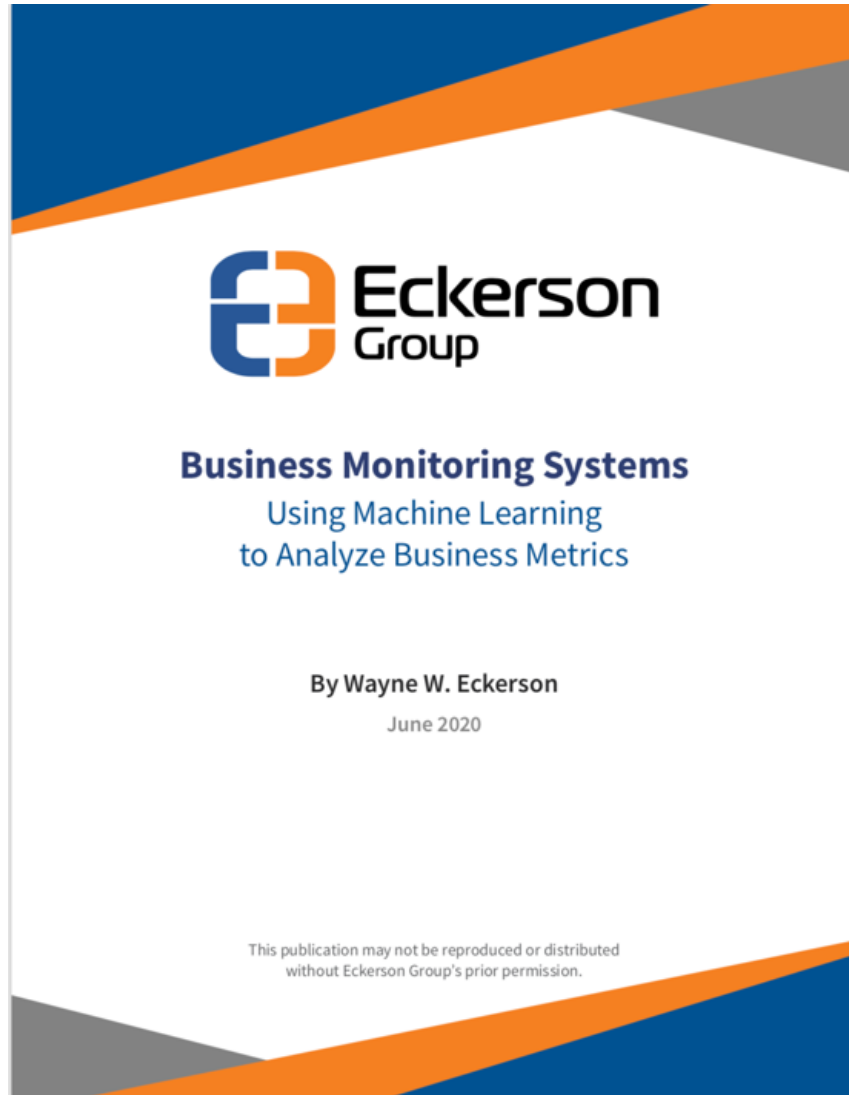
June 2020



**Wayne Eckerson**  
President  
Eckerson Group



**Sean Byrnes**  
CEO  
Outlier.ai



**Downloadable now at [Outlier.ai](https://outlier.ai)**

## Dashboard

1,000  
Metrics

10 metrics  
10 dimensions  
10 hierarchies

**Time:** dashboard update interval

**Analysis:** Higher/lower trend

**Alerts:** Manual by threshold

## Business Monitoring System

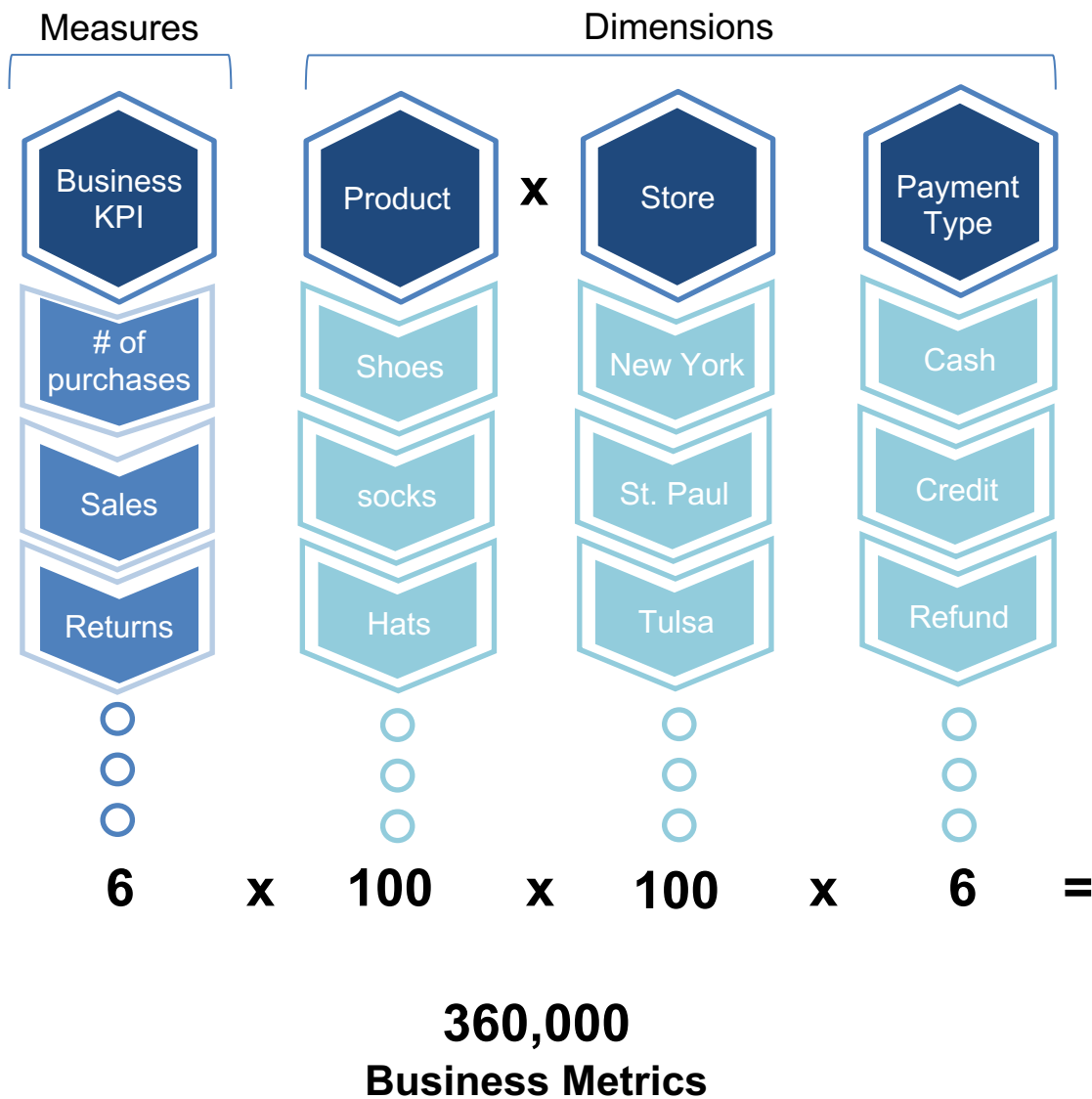
1,000,000  
Metrics

100 metrics  
100 dimensions  
10 hierarchies

**Time:** Any interval

**Analysis:** Trend, correlation, anomaly, cohorts

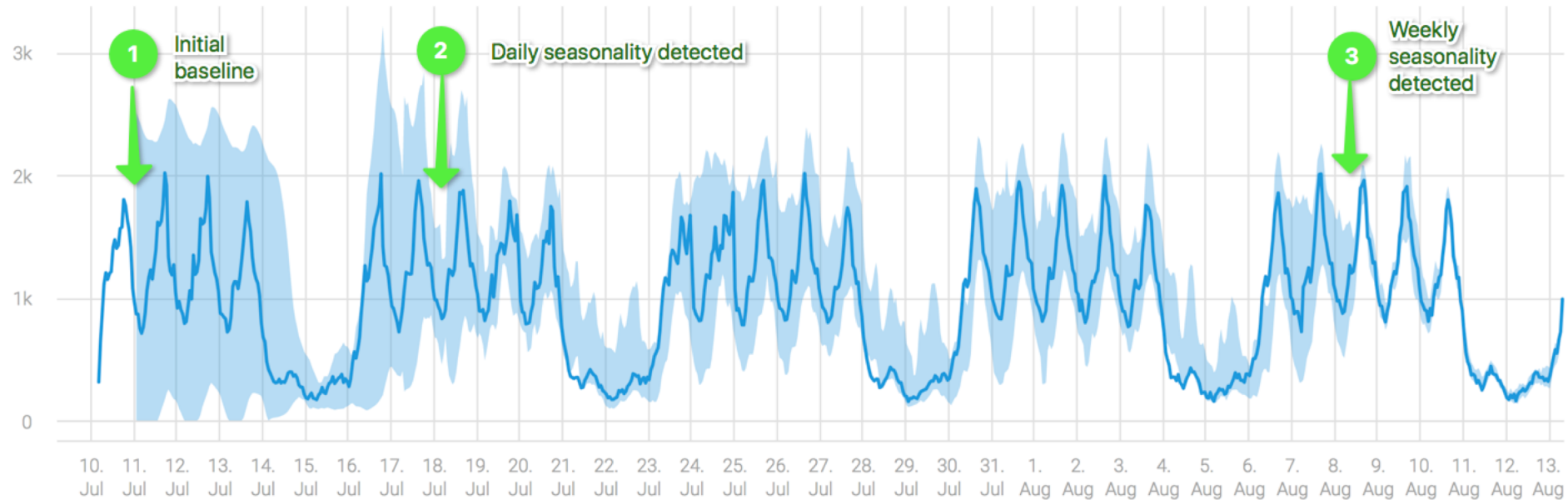
**Alerts:** Automated, intelligent, personalized, filtered



## Benefits

- Surface hidden patterns
- Proactively address issues
- Monitor “dark data”
- Reduce help desk staff
- Improve business models
- Free up data analysts
- Easy to setup and run

**“A business monitoring system is like having a 100 data analysts working 24x7 looking for issues that might affect business outcomes.”**

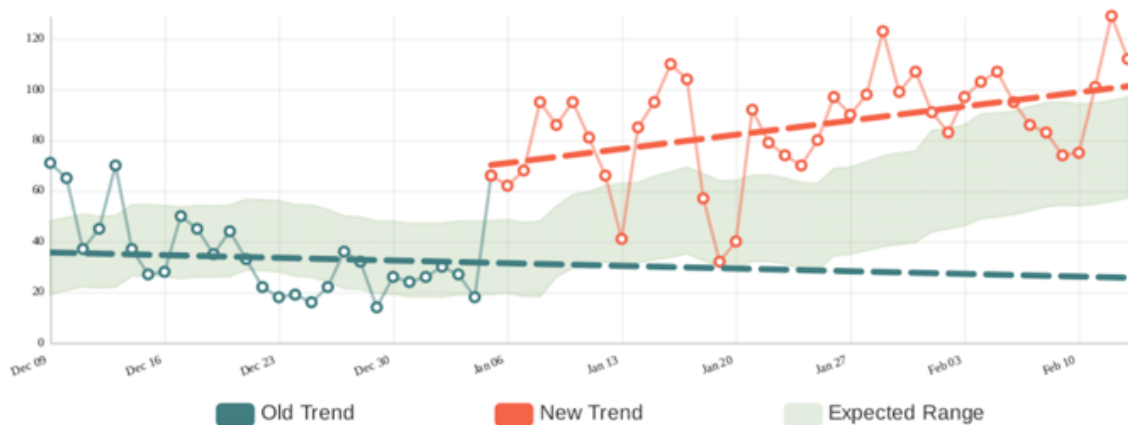


## Role of Machine Learning

1. Learn metric behavior – “baseline” (above)
2. Detect significant deviations from the baseline
3. Personalize alerts by discovering what each person finds significant
4. Correlate deviations with other changes
5. Suggest root causes

Wednesday  
**13** Sessions is trending up for Gender: female

February 15% over model and impacting 27% of Unique Users  
Investigate this, and related movements in 2 other metrics, for Gender: female



### Details

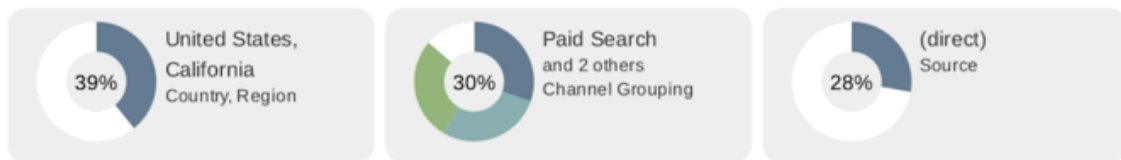
A trend started January 5, where this segment has averaged 33% over the expected model for the past month. The most recent day's value was 15% higher than the expected model. The population impacted by this change increased from 26.2% to 26.9% of Unique Users compared to the previous day. The overall Unique Users metric was flat during this time.

### Related Increases

- ↑ Exits
- ↑ Unique Users

### Potential Causes

The following is the percentage contribution for each potential cause of the change in Sessions. Click on a cause to see details across the segment.



## Daily Insights

- Visualize deviation
- Natural language explanation
- Suggest potential causes
- Select the most relevant insights to display each day
- Collaboration (share, follow)

# Use Cases Are Largely Operational



Monitor e-commerce carts



Detect data quality issues



Detect patterns of fraud



Manage cloud costs



Monitor ad tech networks



Monitor payment gateways

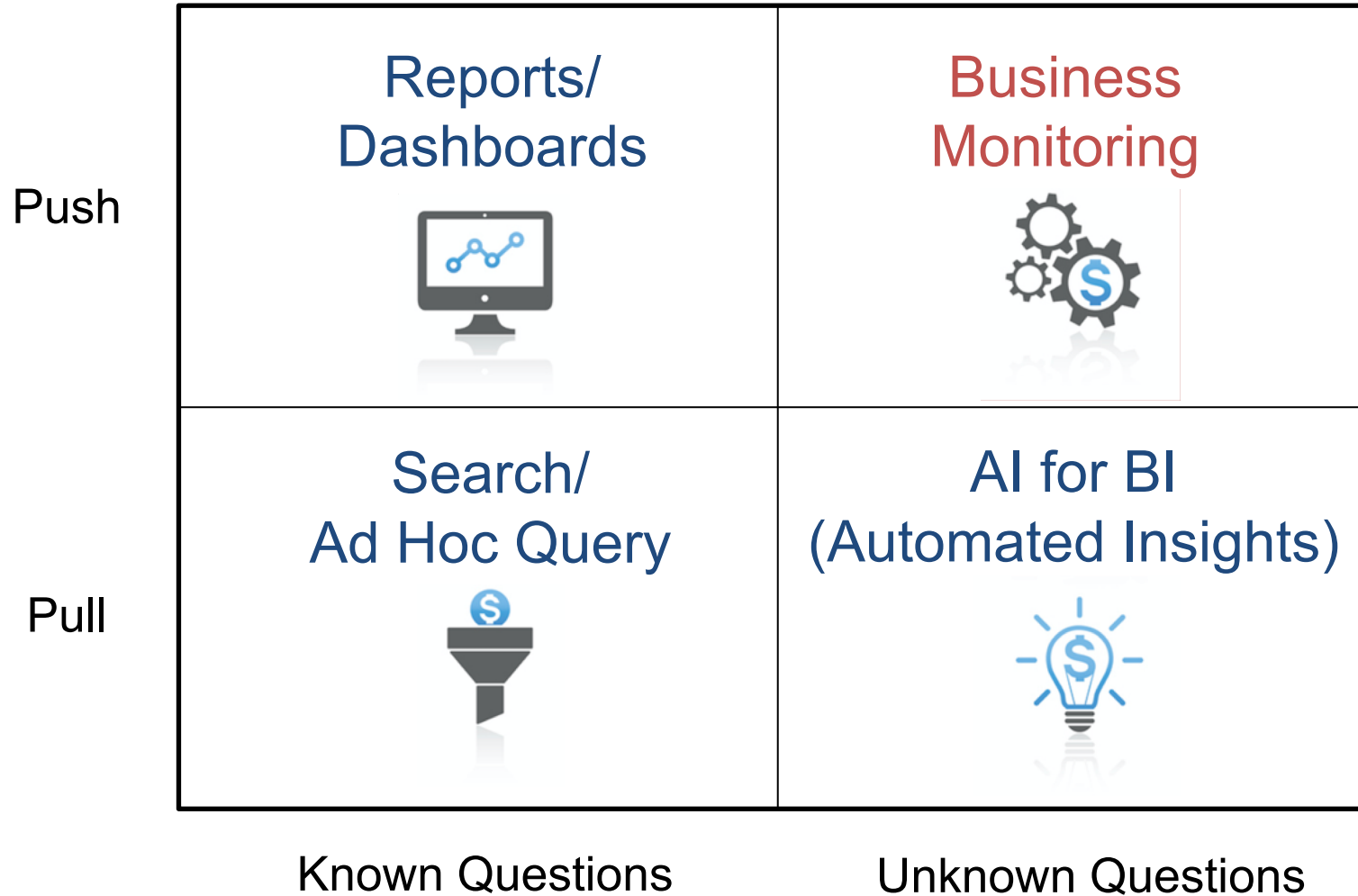


Optimize inventory to sales



Monitor geo-perimeter violations





## Vendors

Outlier, Anodot, Sisu,  
Thoughtspot, Yellowfin,  
Qlik, Amazon QuickSight

### Business Monitoring

Monitor and correlate business metrics

## Metrics

Revenues  
Costs  
Usage  
Pricing changes

AppDynamics, Dynatrace,  
New Relic, unravel

### Application Monitoring

Monitor business applications and SLAs

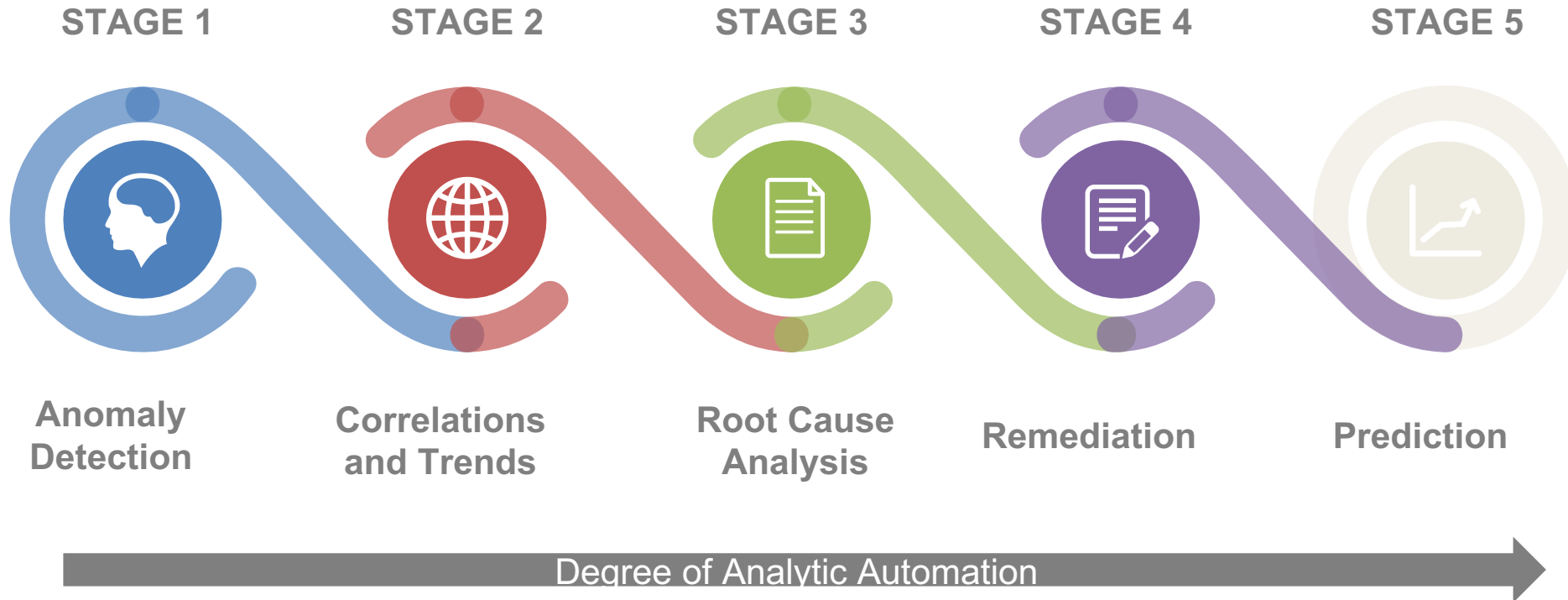
Errors  
Latency  
Contention  
Configuration

Splunk, DataDog,  
SolarWinds, Riverbed

### IT Monitoring

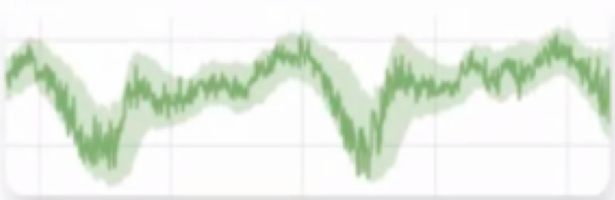
Monitor technology infrastructure

CPU  
Memory  
Network  
Storage

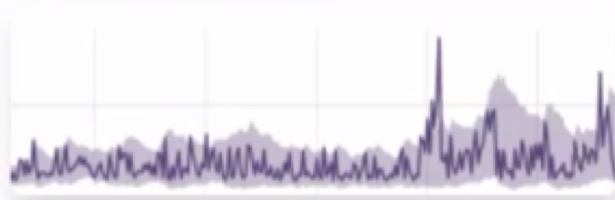


## Not All Metrics Are Created Equal

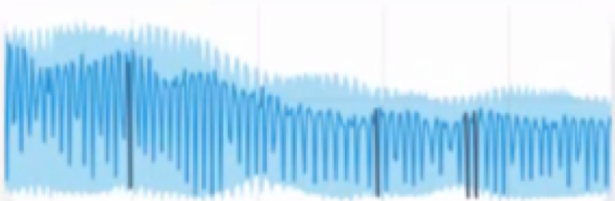
SMOOTH



IRREGULAR SAMPLING



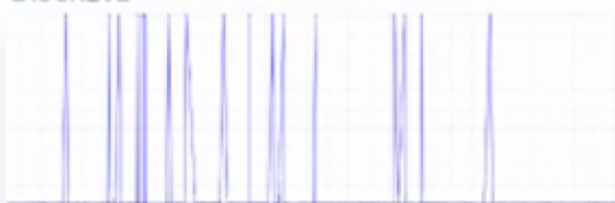
MULTIMODAL



"STEP"



DISCRETE



SPARSE

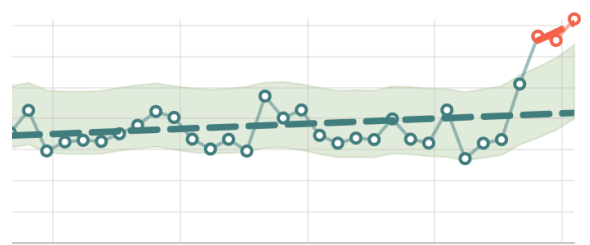
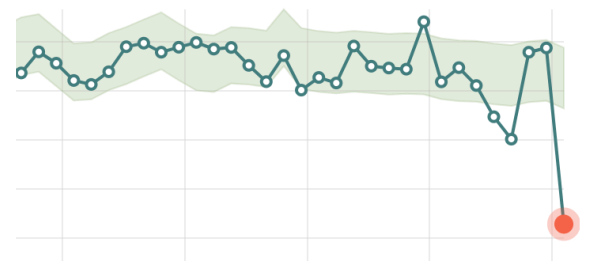


### Automated Detection

An algorithm detects the shape of each metric and determines which algorithm to use to analyze it (i.e., create baseline and detect deviations)

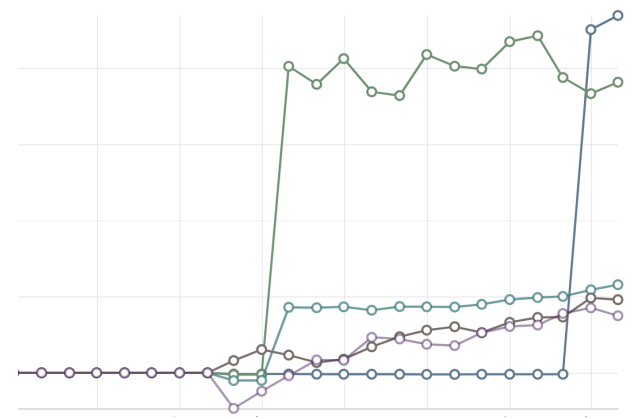
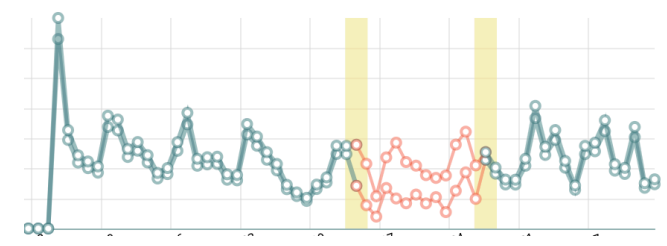
## Single Metrics

Anomalies and trends in individual metrics.



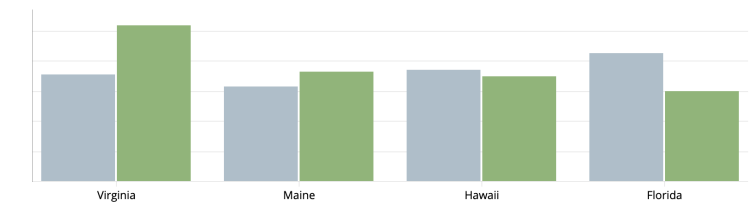
## Groups of Metrics

Relationships between metrics and how they influence each other.



## Larger Patterns

Changes in metric composition, clustering of events and comparisons.



<b>Unique Page Views</b> ↑ 50,098 country: United States		50,098	100%
<b>Adds / View</b> ↑ 0.9		0.870	87%
<b>cartAdditions</b> ↑ 43,571 country: United States		43,571	87%
<b>Checkout %</b> -0.8		0.795	79.5%
<b>checkouts</b> ↑ 34,620 country: United States		34,620	69.1%
<b>Billing Rate</b> -0.7		0.740	74%
<b>Sum purchase</b> ↑ 25,632 table: Revenue, zip:		25,632	51.2%

- User Issues
  - *Trust*
  - *Explainability*
  - *Perception issues:*
    - Data quality
    - System setup
- Vendor Issues
  - *Identifying “significant” changes*
  - *Event storms*
  - *Security*

## Noise

Too many alerts or too few alerts render the business monitoring system useless.

- 1** **Test with a small, doable use case**  
Experience a new way of monitoring the business
- 2** **Identify operational snafus and business outcomes**  
Prioritize pain points
- 3** **Evaluate data sources**  
Completeness, quality, and quantity
- 4** **Select a use case and monitor results**

# Eckerson Group

*RESEARCH*

CONSULTING

*EDUCATION*

GET • MORE • VALUE • FROM • YOUR • DATA

Best in class thought leadership reports, articles, and webinars

Strategy and design work to create modern data programs and platforms.

More than 30+ educational courses taught at your site