



# **Business Monitoring Systems**

## Using Machine Learning to Analyze Business Metrics

**By Wayne W. Eckerson**

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Research sponsored by



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## About the Author

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**Wayne W. Eckerson** has been a thought leader in the data and analytics field since the early 1990s. He is a sought-after consultant, noted speaker, and expert educator who thinks critically, writes clearly, and presents persuasively about complex topics. Eckerson has conducted many groundbreaking research studies, chaired numerous conferences, written two widely read books on performance dashboards and analytics, and consulted on BI, analytics, and data management topics for numerous organizations. Eckerson is the founder and principal consultant of Eckerson Group.

## About Eckerson Group

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[Eckerson Group](#) provides research, consulting, and education services to help organizations get more value from their data. Our experts each have 25 years of experience in the field, specializing in business intelligence, data architecture, data governance, analytics, and data management. We provide organizations with expert guidance during every step of their data and analytics journey. Get more value from your data. Put an expert on your side. [Learn what Eckerson Group can do for you!](#)



## About This Report

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To conduct research for this report, Eckerson Group interviewed numerous industry experts and viewed demos of business monitoring tools. The report is sponsored by Outlier, Yellowfin, Sisu, and Anodot who have exclusive permission to syndicate its content.

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## Executive Summary

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The health of modern organizations depends on many complex business and operational processes that are impossible to monitor and manage manually. A disruption to these processes can cost millions of dollars and jeopardize customer satisfaction and loyalty. Until recently, few analytical tools could sift through mountains of data, detect subtle changes over time, and proactively notify users about issues that might adversely affect business outcomes.

While monitoring systems are not new, applying them at scale to business metrics is revolutionary. Using statistics and machine learning algorithms, the systems can analyze millions of factors that affect business metrics over various time intervals. They continuously detect anomalies, trends, and correlations and present individuals with a handful of the most relevant insights. Unlike prior generations of alerting mechanisms, these systems excel at separating signal from noise: they quickly learn what business users consider relevant and deliver only those insights.

The best part about business monitoring systems is that they require minimal setup. Organizations don't need to create a special repository, semantic models, feature sets, or visualizations or configure time-series databases and logic. They simply point the systems to existing data sources and press the "start" button. The systems automatically create a baseline of behavior for millions of metric combinations and detect changes in them over time.

The business monitoring revolution has just begun. Today, these systems detect anomalies, identify correlations, and display potential root causes. Soon, they may suggest remedies, predict change, and suggest ways to optimize processes to avoid issues in the future. In essence, the systems will automate things that humans can't do and augment what humans can with real-time recommendations and suggestions.

## Beyond Dashboards

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**Then...** A well-designed dashboard displays about 10 metrics or key performance indicators (KPIs) on a top-level screen. Business users can drill down to examine those metrics against 10 or more predefined dimensions with a handful of attributes and hierarchies. In all, a good dashboard gives business users a sandbox of about 1,000 metric combinations to explore—big enough to answer most questions about the KPIs, but not so large that they get lost in the data.<sup>1</sup>

**But now...** Imagine a dashboard that contains 100,000, 1 million, or even 1 billion metric combinations. Better yet, imagine one that notifies you in real time when any of those metrics deviates from its normal range or changes in combination with other metrics or attributes during a given time period, indicating an issue that affects key business outcomes. Imagine not needing to log in to a dashboard, hunt for relevant patterns, and navigate to root causes. The system does all this for you.

Better still, imagine you can create this real-time environment by simply connecting to one or more data sources and clicking a start button. There is no data repository to create, no semantics to model, no visualizations to design, and no complex time-series database or logic to configure. And best of all, the systems adapt over time, learning what insights are relevant to each user. Through intelligent design, the systems deliver only high-fidelity signals, filtering out the noise.

## Business Monitoring Systems

Sound like a pipe dream? This scenario is already made possible by an emerging technology that analyzes business metrics over time using specialized statistics and machine learning algorithms.

Called business monitoring, this technology is more like a smart notification system than a dashboard. It's designed to continuously monitor operational processes that correlate with business outcomes and provide real-time alerts of relevant trends, correlations, and anomalies, all without human intervention, and with unprecedented speed and scale. And unlike prior generations of alerting mechanisms, these systems excel at separating signal from noise: they quickly learn what business users consider relevant and deliver only those insights.

*Business monitoring systems...excel at separating signal from noise.*

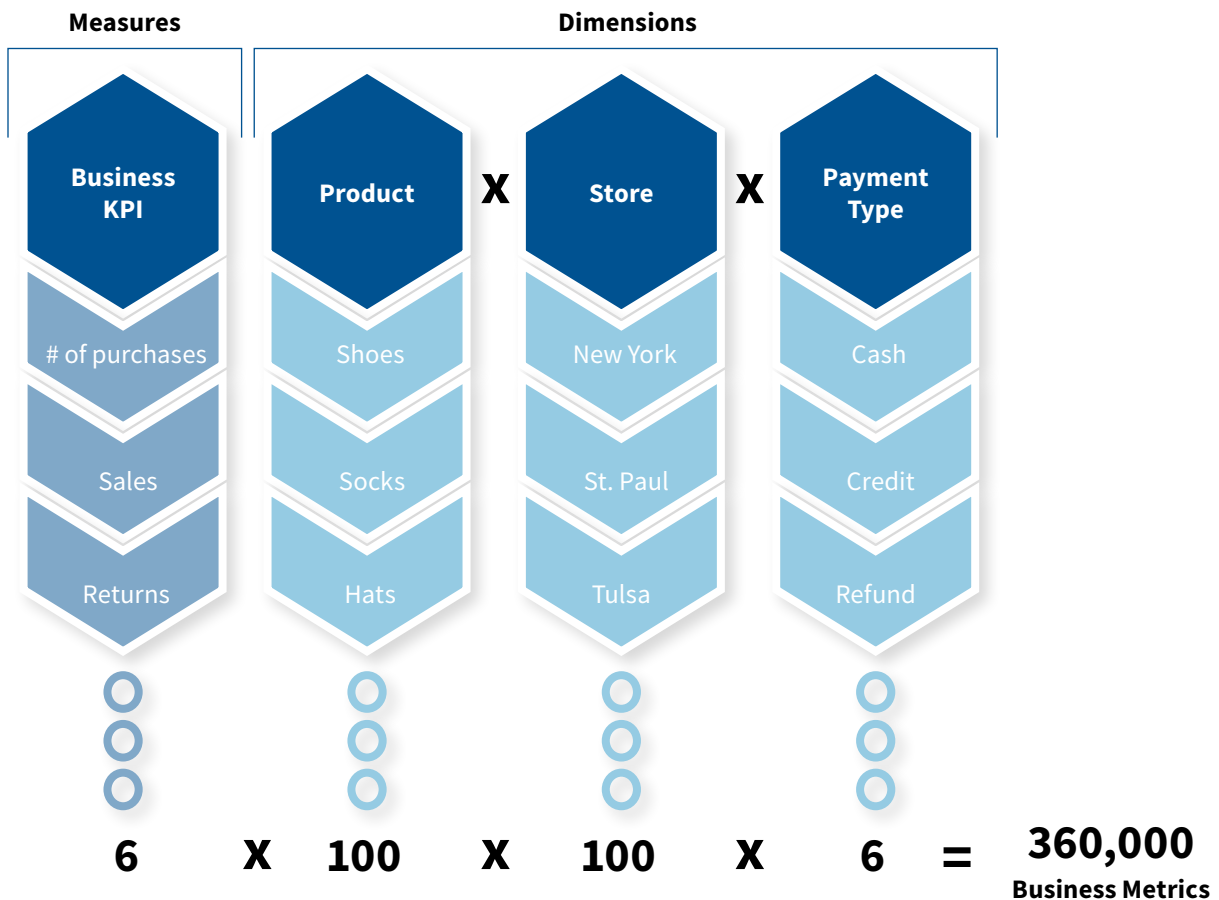
**Business metrics.** All executives want to track revenue, costs, and customer experiences. And they want to know the minute anything disrupts those things, such as changes in the number of items purchased per transaction, the number of returns, a decline in net promoter scores, or some combination of those items. And they want to monitor these metrics for every region, store, and product across various time intervals, from minutes and hours to days, weeks, or

<sup>1</sup> See Wayne Eckerson, [Performance Dashboards: Measuring, Monitoring, and Managing Your Business](#), 2010 (second edition).

months. But tracking each metric against all possible dimensions over various time intervals creates exponential combinations of things to measure.

For example, a retailer might sell hundreds of products in dozens of stores in every state using a variety of payment methods (cash, credit card, gift card, etc.) Tracking the intersection of every metric and dimension and comparing the results across one or more preset or custom time intervals is impossible without intelligent automation. That’s the role of business monitoring systems. (See figure 1.)

Figure 1. The Combinatorial Explosion of Business Metrics



Organizations have millions of time-series or business metrics that can be created from a nearly infinite combination of metrics, dimensions, attributes, and time intervals. Adapted from a graphic created by Anodot.

For example, a business monitoring system may detect that men between the ages of 15 and 24 who bought shoes in St. Paul on a credit card last week purchased \$3 more on average than other customer cohorts, driving up overall average order value (AOV) by \$0.67. Most dashboards would not detect this change and its significance, and it might take data analysts a day or more to find out what is driving an increase in AOV. Business monitoring systems do this instantaneously.

**Dark data.** While dashboards measure performance against predefined or “known” metrics, business monitoring systems track all business metrics, both known and unknown. These systems scour the “dark data” that exists within all companies that is too voluminous to monitor and examine using traditional analytics techniques and tools. More importantly, they free up data analysts to spend more time interpreting, communicating, and responding to insights rather than sifting through mountains of data to find them.

*Business monitoring systems scour the “dark data” that exists within all companies that is too voluminous to monitor and examine using traditional analytics techniques and tools.*

**Dashboard’s dirty little secret.** It’s a dirty little secret that most business users stop looking at dashboards after a while. Rather than scan a dashboard for issues and trends, most business users would rather have the dashboard alert them to relevant exceptions and changes to data. That’s exactly what business monitoring systems do: they serve as an early warning system to alert business users to anomalies, trends, glitches, and issues that might adversely affect business outcomes.

Companies today use business monitoring systems to do a range of things, including:

- Manage cloud computing costs
- Track changes in buyer behavior across product segments and channels
- Monitor the performance of payment gateways and partner APIs
- Receive alerts when individuals, cars, or trucks cross a geo-perimeter.
- Monitor the performance of channel partners
- Monitor e-commerce shopping carts and checkouts
- Optimize ratio of inventory to sales
- Detect patterns of fraud
- Monitor advertising technology networks for glitches and outages

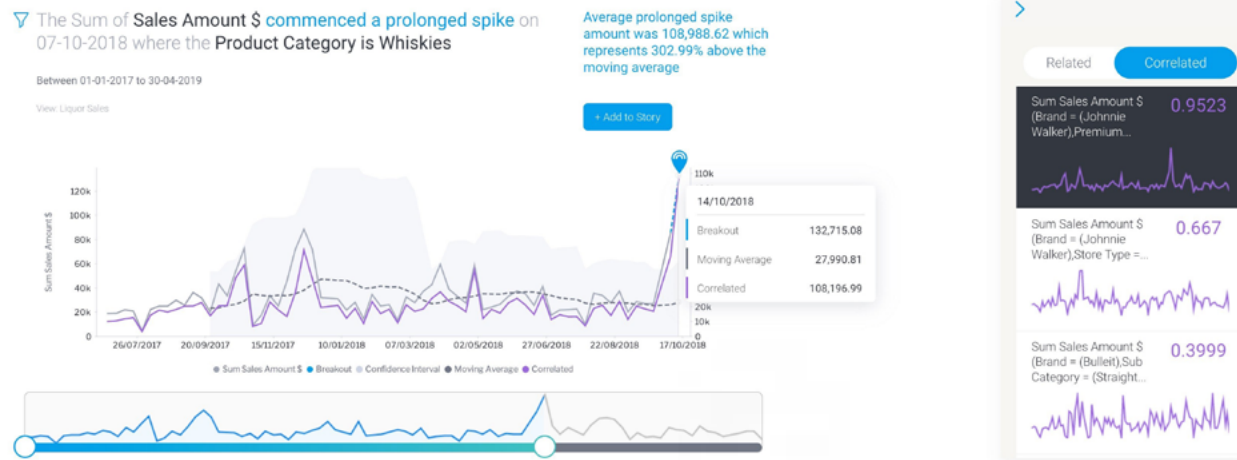
## Benefits

**Increase agility.** Business monitoring systems enable organizations to respond quickly to significant changes in the business. By detecting significant deviations in business metrics, the systems alert business users to issues that need immediate attention.

For example, a liquor distributor used Yellowfin Signals to detect a prolonged increase or “spike” in sales for whiskey, more than 300% above the moving average. In the background, the system also identified several changes that correlated with this spike, most notably a

significant spike in sales for Johnnie Walker Premium. After some investigation, the distributor discovered that Johnnie Walker had run a promotion on its Premium whiskeys, causing sales to skyrocket. (See figure 2.)

**Figure 2. Business Monitoring at a Liquor Distributor**



**Work proactively.** Business monitoring systems also enable organizations to proactively prevent problems. For example, one travel company used the technology to detect a significant drop in traffic from two hotel chains and proactively alerted the hotels about the change. One of the chains had implemented a new A/B testing program that reduced the flow of traffic, while the other chain had started diverting traffic to another partner. In both cases, the hotel chains were surprised and impressed by the travel company's proactive attention to detail and the value of the hotel's partnerships improved.

**Improved ROI.** Business monitoring systems can also proactively detect issues before they escalate into major problems, averting untimely expenditures. For example, one of the world's largest gaming companies uses a business monitoring system to detect incidents that affect the performance of its games, and ultimately, the satisfaction of its customers. The company estimated that it saved multiple millions of dollars over a year by detecting and resolving incidents more quickly.

**Other benefits.** Early customers have also discovered that business monitoring systems improve business models (i.e., products, customers, partners) by replacing conceptual models with ones based on actual data. The systems also boost the utilization of business intelligence (BI) tools since the systems surface issues that require additional analysis. (Note: some business monitoring systems have their own analytical tools.) Also, some customers have discovered that the systems reduce the number of help desk analysts required to staff network and systems operating centers.



# Market Dynamics

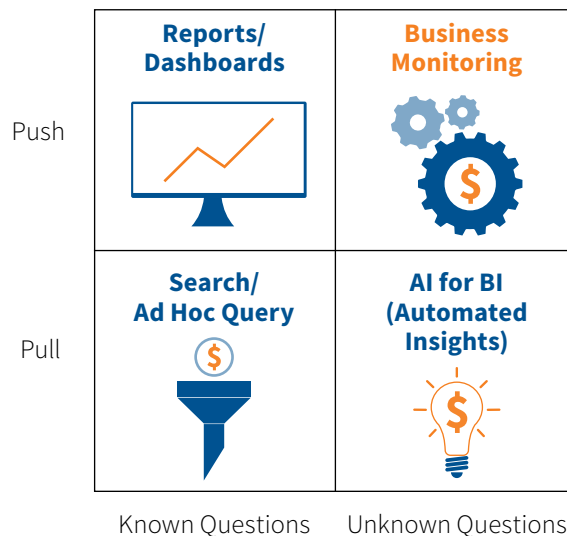
Business monitoring systems have emerged in the last several years, leveraging advances in machine learning, cloud computing, high-performance computing, and software-as-a-service models. These systems fill a critical gap in the data analytics marketplace.

**Push versus pull.** Data analytics systems exist in two major categories: push and pull. Push systems deliver predefined metrics and content in the form of reports and dashboards to business users at regular intervals via email, mobile devices, or the web. In contrast, pull systems rely on the business user to generate content through a search, a query, or an experiment. Business users of push systems are passive recipients of data, but are active participants in pull systems.

**Known versus unknown.** These systems can be further divided by the type of questions they answer. Known questions are those that people know they want the answers to in advance, while unknown questions can't be anticipated. Both push and pull systems can be used to answer both types of questions. (See figure 3.)

**Pull-unknown.** One emerging market segment consists of pull systems that answer unknown questions. BI vendors have taken the lead here, enhancing their products with algorithms that run in the background, analyzing data based on a user query or experiment. These so-called "AI for BI" tools automatically generate additional insights based on underlying patterns in the data that aren't surfaced in a chart, dashboard or report.<sup>2</sup>

Figure 3. Business Monitoring Systems Fill a Gap in the Data Analytics Market



*Business monitoring systems fill a gap in the data analytics market by automatically pushing insights that business users didn't know to ask about. Adapted from a graphic by ThoughtSpot.*

<sup>2</sup> See Wayne Eckerson, "AI is the New BI: How Algorithms are Transforming Business Intelligence Analytics," 2018.

**Push-unknown.** Business monitoring systems are “push” systems that address unknown questions. In other words, they work autonomously, analyzing millions of metric combinations in real time, looking for significant deviations and correlations in business activity. No human intervention is required to define the metrics, alerts, or correlations: the system presents users the nuggets of information that demand immediate attention.

*Business monitoring systems are “push” systems that address unknown questions... they work autonomously, analyzing millions of metric combinations in real time.”*

### Vendor Products

Not surprisingly, some BI vendors are leveraging their investments in AI for BI capabilities to develop business monitoring systems. ThoughtSpot, Yellowfin, Metric Insights, Qlik, and Amazon QuickSight are BI vendors that have already announced or released business monitoring capabilities. For example, Yellowfin Signals discovers and sends automatic alerts about critical changes in business metrics, such as spikes, drops, and breakouts, step changes, new and lost attributes, changes in trend direction, and volatility.

Several promising startups are also focused exclusively on business monitoring, including Outlier, Sisu, and Anodot. Outlier, for example, uses statistical functions to detect unexpected changes. Each day, it presents users with four to eight insights, called “stories”, with automatically generated text that describes the exceptions and their potential root causes. These daily digests work well with mobile devices that alert users to significant insights and issues.

Other vendors circling the space include relational database vendors, such as Teradata, that embed time series and other functions to analyze data in real time. Other candidates include vendors that sell time series databases, IT monitoring products, and streaming analytics tools. (See next section.)

### Adjacent Market Segments

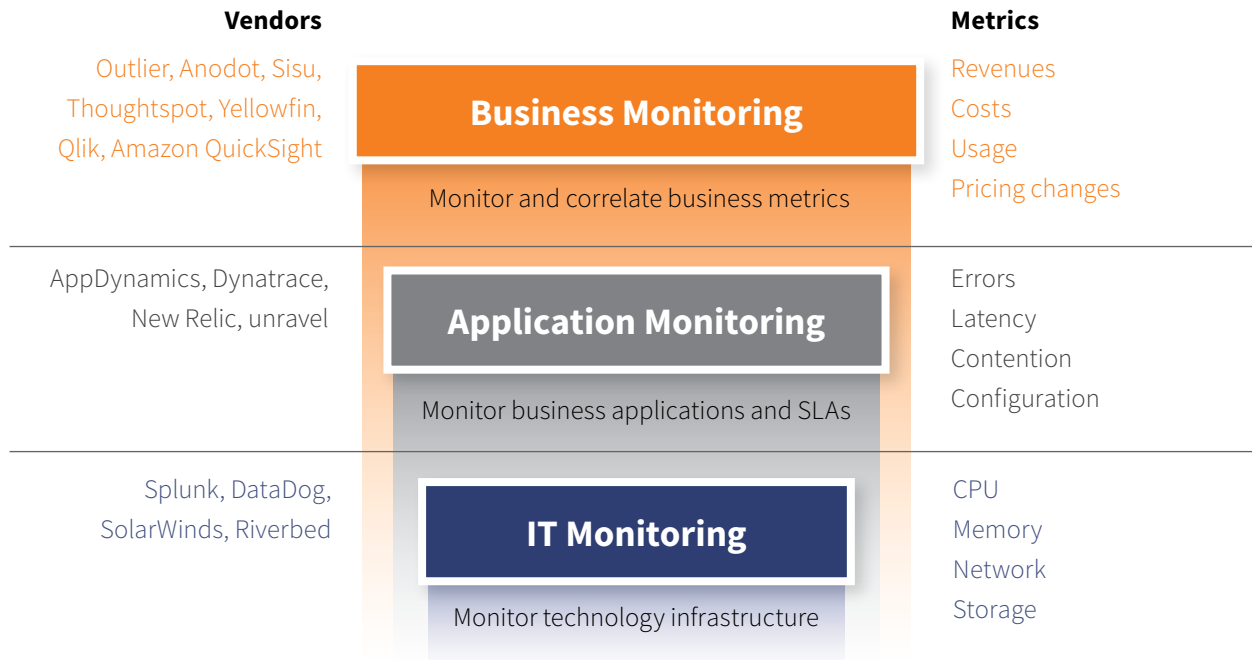
High-performance monitoring systems are not entirely new. They have a long history in technical markets and are fast becoming a staple for managing Internet of things (IoT) devices and other machines as well as social media and web traffic data.

### IT and Application Monitoring

Information technology (IT) departments have used IT monitoring and application monitoring tools for decades. Those tools use anomaly detection, event correlation, and root cause analysis to monitor IT infrastructure (web servers, application servers, CPU, memory, storage,

containers, and microservices) and applications (errors, latency, configuration problems, resource contention, and bottlenecks). (See figure 4.)

**Figure 4. Types of Monitoring Systems**



*Business monitoring systems focus on monitoring business metrics, while application and IT monitoring systems focus on systems metrics.*

IT monitoring systems differ from business monitoring systems in scope and types of algorithms and models they employ. IT monitoring systems focus on a complex but highly constrained domain. Their algorithms and models are tuned for the types of applications, systems, and errors these systems generate. Most monitor technical issues, but many are starting to correlate those with business processes, applications, and higher-level artifacts.

In contrast, business monitoring systems tackle an infinite number of domains, so their algorithms must adapt to a wide variation of metric behaviors. Also, business monitoring systems must learn continuously, since organizations change dramatically over time, which is a major reason they incorporate machine learning algorithms. When companies introduce new products, enter new markets, and acquire new customers, their metrics and behavior change. In contrast, information systems rarely change, once designed and delivered, although their workloads and interactions with other systems can.

***Compared to IT monitoring, business monitoring systems must learn continuously, since organizations change dramatically over time.***

**Growing competition.** Some companies employ all three types of systems. Some products in these categories can integrate with each other. However, it's more likely that these products will increasingly compete with each other over time.

Although business monitoring systems can monitor technical incidents, their advocates say it's better to take a top-down approach and focus on issues that directly affect the business rather than respond to tens of thousands of technical alerts. For their part, IT monitoring vendors say they detect issues that are leading indicators of business health, so a bottom-up approach is warranted.

### IoT and Prediction Systems

Another sizable market consists of products that analyze IoT and machine data. Sensors in jet engines, automobiles, bridges, phones, and agricultural fields generate millions of events per second. Surveillance cameras and credit card transactions also generate huge volumes of data. Companies use these systems to predict failures and ship parts in advance or detect fraud in real time, not 24 hours later.

**Time series databases.** These large-scale monitoring and prediction systems, such as those from Splunk or AppDynamics, typically rely on time series and other specialized databases to analyze, capture, process, and store continuous streams of high-volume event data. They apply a variety of time series functions and predictive models to identify anomalies that indicate issues that require immediate attention. They also tend to generate large volumes of alerts so systems must be able to filter, correlate and/or consolidate alerts to avoid overwhelming operators.

In contrast, business monitoring systems do not capture and store transaction or event records in time-series databases. Rather, they analyze aggregated slices of columnar data (i.e., date field, metrics fields, and dimension fields) by fixed time intervals (i.e., 1 minute, 5 minutes, 1 hour, 1 day, 1 week) across varying time intervals. In essence, business monitoring systems analyze time-based snapshots of columnar data, not business events represented as time series records.

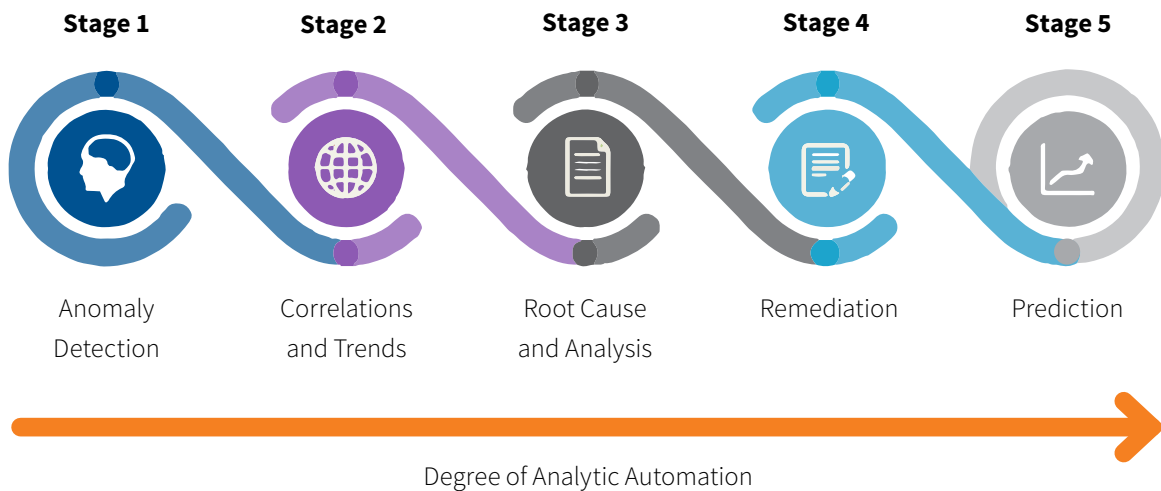
## Understanding Business Monitoring Systems

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### Evolution

Business monitoring is a nascent technology, and most products are in their early stages. Today, most focus on anomaly detection and correlations, while some have ventured into root cause analysis. Eventually, some products may address the entire business metrics lifecycle. (See figure 5.)

Figure 5. The Business Metrics Lifecycle



*Business monitoring systems may eventually run algorithms that automate the entire business metrics lifecycle.*

**Anomaly detection.** Anomaly detection systems can automatically alert users when metrics deviate from the norm, weigh their significance, and alert users if warranted, all without human intervention. There are many challenges to detecting anomalies, such as alert storms and false positives, that vendors need to address before they have a shot at commercial success. (See “Key Features” below.)

**Correlations.** Correlation engines go a level deeper: they compare all the factors that contribute to metric outcomes. They excel at measuring subtle changes in one or more business metrics or cohorts. For instance, the system might tell a credit card company that the correlation between first-time logins and new Platinum card activations has changed,

Business monitoring vendors continuously add algorithms that detect various types of correlations and behavior. For example, one vendor boasts algorithms that detect and analyze “Spikes”, “Drops”, “Milestones”, “Funnels”, “Broken Correlations”, “Resumed Correlations” and “Launch Performance.” The latter automatically compares the launch of a new event (e.g., a marketing campaign) to the overall trend of prior launches of any type.

**Root Cause Analysis.** Root cause analysis engines go even further and suggest possible causes of a deviation from the normal shape of a business metric or combination of metrics. They rely on machine learning algorithms to infer the cause from historical correlations, or they provide users with tools to help them triangulate a cause by comparing multiple correlations.

**Evolution.** In the next several years, some business monitoring vendors will develop and refine algorithms that automate the entire business metrics lifecycle. After detecting an anomaly or correlation the products will determine its root cause, suggest a remediation,

and predict future changes. They may even suggest ways to optimize the business process to eliminate future incidents. These will be nearly autonomous and automated systems.

## Characteristics

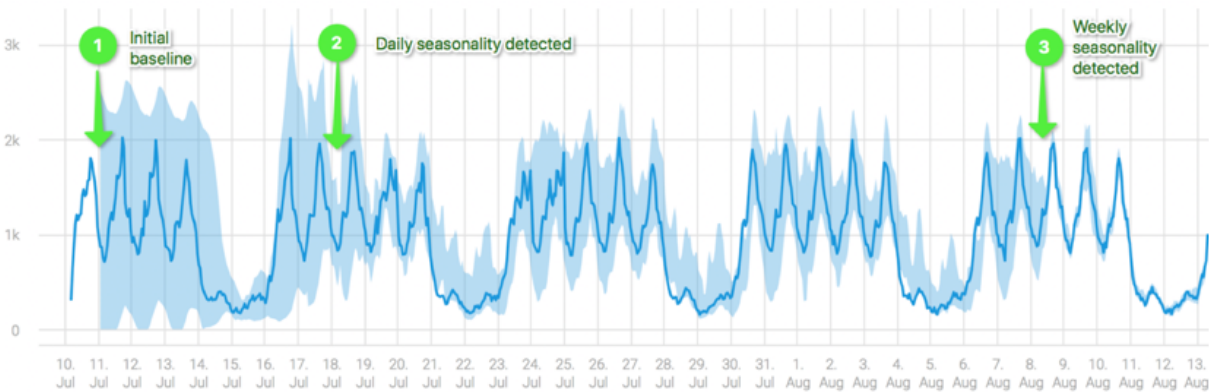
Although no two business monitoring systems work the same way, most share the following characteristics:

- 1. Comprehensive.** The systems consume data from many sources, including databases, files, and events, such as holidays, promotions, and planned outages, that might affect business performance. As one expert said, “You don’t know where incidents will come from, so you must analyze everything. Otherwise, you are blind to 80% of the data.”
- 2. Automatic.** Many systems capture and analyze data automatically to generate timely alerts. Most systems deliver insights daily to avoid overwhelming business people. But some capture streaming data to monitor high-volume operational processes, such as online transactions or point-of-sale fraud. As one expert said, “There’s no value in getting an alert after the fact.”
- 3. Simple.** The systems don’t require much effort to set up and run. Just point the system at data sources and identify fields as dates, metrics, or dimensions, and press start. Of course, administrators and users can change default settings to improve performance and accuracy. And they can apply filters, create comparison periods, tune alert settings, and create composite metrics to track things like customer attrition or retention.
- 4. Intelligent.** The power of business monitoring systems comes from their machine learning algorithms, which are custom designed by each vendor. The algorithms create a behavioral baseline for every metric, which gets more accurate over time. (See figure 6).

Vendors also deploy algorithms detect activity that produces significant deviations from the baseline, identify correlations among anomalies so they can be grouped together, and generate alerts that exceed a default score or threshold.

- 5. Adaptive.** Business monitoring systems learn over time how a metric behaves and what’s important to each user of the system. Thus, it only delivers alerts that are deemed essential and avoids overwhelming users with notifications. The system learns by watching what is important to users and what is not. Users can accelerate the training time of an algorithm by “liking”, sharing, classifying, or commenting on an alert.

Figure 6. Creating a Baseline of Expected Behavior for a Business Metric



Business monitoring systems train algorithms with historical and actual data to create a baseline of expected behavior, including daily, weekly, and yearly seasonal shifts. Courtesy Anodot.

6. **Actionable.** By delivering relevant alerts to a user's channel of choice (email, Slack, web, text, and mobile apps) with related correlations and suggested root causes and remediation strategies, business monitoring systems prompt business users to take quick and effective action.
7. **Scalable.** Detecting anomalies, trends, and correlations across large volumes of time-series data requires significant computational power. Some products distribute processing across source systems, while others process the data in specialized high-speed databases in the cloud.

## Key Features

**Separating signal from noise.** On the surface, business monitoring seems straightforward: detect when a business metric deviates from its baseline and alert business users. But nothing is simple. The Achilles' heel of notification systems is that they generate too many or too few insights or alerts. With too many insights, users get overwhelmed and stop using the system; too few and the user fails to detect critical issues.

### Identifying critical issues

**Degree and duration.** The first task of a business monitoring system is to identify relevant changes. While each deviation from the baseline is an anomaly, not all anomalies are created equal. It's important that a system factors in both the degree and duration of the deviation.

For example, a decline of 20% in the number of users clicking on a campaign ad is less significant than a 50% decline; but it may be more significant if the 20% decline lasts for 3 hours, while the 50% decline only lasts 5 minutes. Some systems assign a significance score (a number between 0 and 100) to each anomaly based on the degree and duration of the deviation and how it compares to past anomalies for the metric or group of metrics.

**Time scales.** It's also important to detect both slow-moving changes that happen over days or weeks or months as well as fast-moving ones that happen in minutes. To capture both types, a business monitoring system can aggregate and analyze data across a small range of time scales, such as 1 minute, 5 minutes, 1 hour, 1 day, and 1 week.

**Event storms.** A single business incident can trigger a deviation in hundreds or thousands of metrics, creating an "event storm." It's critical for business monitoring systems to correlate and group these metrics into a single object that generates one insight, not hundreds, which would overwhelm business users. Multiple correlation algorithms ensure that the insights are related to the same incident, not distinct incidents that occurred in the same time period.

### Creating Insights

Business monitoring systems auto-generate insights or alerts. Some rely entirely on machine learning techniques to adapt insights to user preferences. These systems ascertain user alerting preferences by imputing weight to their direct actions (e.g., likes, shares, comments) and indirect activity (e.g., views, clicks, scrolls). Others systems use default settings, which users can configure, to generate an appropriate level of alerts. (See next).

### Tuning Alerts

A business monitoring system generates alerts automatically based on a number of factors: the degree of deviation from the baseline (by value or percentage), a user-defined threshold, the absence of data, or when the ratio between two metrics exceeds a predefined threshold.

Some business monitoring systems enable users to manually tune alerts by changing default settings. Although the goal of business monitoring systems is simplicity, some vendors recognize that certain classes of business users want to turn the "knobs and dials". In some systems, this can be as easy as moving a slider to register more or fewer alerts for a specific data set. In other cases, they can configure advanced settings.

For example, some users might want to specify how long an anomaly, trend, or correlation must exist (i.e., duration) before triggering an alert. They might also specify to receive alerts only when a metric falls below the baseline, not above it. They can also change the type and degree of deviation (i.e., threshold) required to generate alerts. For instance, they can set thresholds based on a percentage or numeric deviation or using a significance score.

**Simulating Alerts.** Another way users can tune alerts is to simulate them using historic data. Some products let users configure an alert and run it against historical data to determine the number of alerts that configuration would generate. Users can then alter the configuration and re-run the simulation until they achieve an optimal level of alerts. Other products, however, rely solely on their built-in learning features to adjust and personalize alerts for every individual.

### Correlating with events

The business monitoring system must be able to correlate patterns with events, such as holidays or planned outages, by specifying their proximity in time. For example, the system might correlate an insight with an event that happens within two days. But outside of that



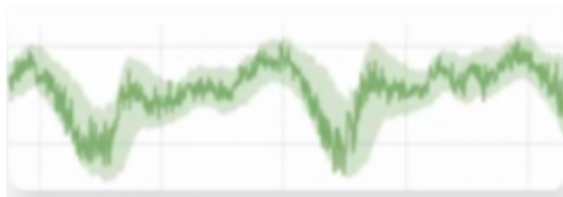
period, the system won't correlate the two. Customers can upload events manually or have the system pull events from a database.

### Classifying algorithms

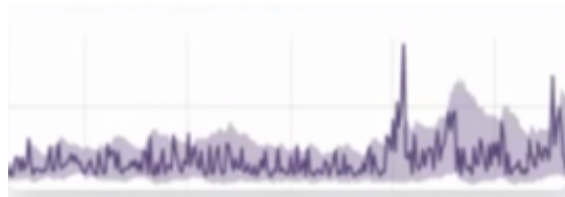
Perhaps the biggest challenge with business monitoring systems is fitting algorithms to business metrics. Many metrics change behavior periodically. For instance, smooth metrics constitute 40% of all metrics, while irregular metrics represent 30%. A variety of other metric types account for the rest. To ensure accuracy, the system must classify a metric and then apply a specific algorithm to it. (See figure 7.)

**Figure 7. Different Types of Metrics Require Different Algorithms**

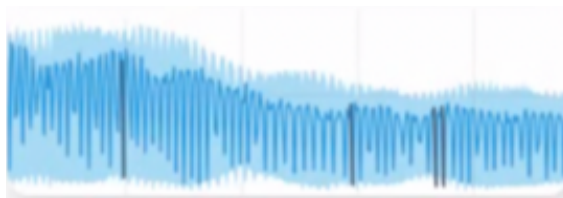
Smooth



Irregular Sampling



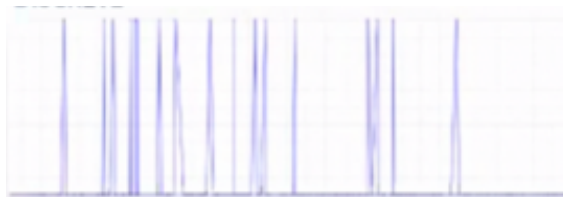
Multimodal



"Step"



Discrete



Sparse



*Each type of business metric requires a different algorithm to monitor its behavior. Courtesy of Anodot.*

Most business monitoring vendors have a patented set of algorithms they apply to various types of metrics. They also have an algorithm to select the right algorithm! They must periodically reapply the selection algorithm in case the business metric has changed shape.

### Training Algorithms

Before algorithms can detect anomalies, correlations, trends, they must create an accurate model of baseline of behavior. When connecting to a data source, an administrator can pull in historical data to train the algorithm. Or they can run the algorithm against live data and it will learn what is normal behavior over time. Some vendors rely on historical data gleaned from all their customers to train algorithms.

To reach full fidelity with accurate representation of daily, weekly, and seasonal rhythms, the algorithm will need to run for a period of time. For example, the algorithm that tracks data every minute might require one hour to become fully trained. Likewise, an algorithm that tracks data every day might require 40 hours to become fully trained. (See figure 6.)

### Security

It's critical that a business monitoring system not share alerts or data with business users that they are not authorized to see. The system must enforce row and column level security and integrate with customer authentication and access control systems. It must also support single sign on to ease access.

*It's imperative that business monitoring systems learn and adapt quickly to changing conditions to deliver an optimal signal-to-noise ratio.*

These are some of the main challenges that business monitoring systems must address before they can deliver beneficial alerts to business users. If the systems deliver more noise than signal, business users will quickly dismiss them. It's imperative that business monitoring systems learn and adapt quickly to changing conditions to deliver an optimal signal-to-noise ratio.

## Conclusion: How to Get Started

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Business monitoring systems fill an important gap in the data analytics market and will soon be part of every organization's analytics portfolio. They are powerful tools that will supplant operational dashboards that require humans to observe, detect, and filter exceptions. They are like having hundreds of data analysts working 24/7 every day of the year scouring corporate data for pertinent issues that might affect business outcomes.

Like most new technologies, it's best to start small with an explicit use case. Think of operational snafus that caused a loss of revenue or an untimely expenditure or ruined customers' experience or sullied your company's reputation. Prioritize those processes and pick one to monitor. Evaluate relevant data sources for completeness, quality, and granularity. Make sure you can access those data sources in a timely manner. Then feed the data into the business monitoring system and see what signals it generates. Give it several days or weeks to reach full fidelity, depending on the context and tool.

The results are likely to surprise you. The business monitoring system will surface critical insights for executives that they won't see in existing dashboards and reports. They'll focus your data analysts on high priority issues, making them more efficient and effective. And they'll enable your organization to work proactively, addressing issues before they escalate into problems that undermine business objectives. The business monitoring revolution is here; it's time to evaluate this emerging technology.

## About Eckerson Group



Wayne Eckerson, a globally-known author, speaker, and advisor, formed [Eckerson Group](#) to help organizations get more value from data and analytics. His goal is to provide organizations with expert guidance during every step of their data journey.

Today, Eckerson Group helps organizations in three ways:

- **Our thought leaders** publish practical, compelling content that keeps you abreast of the latest trends, techniques, and tools in the data analytics field. We share best practices that align your team around industry frameworks.
- **Our consultants** listen carefully and craft tailored solutions that translate your business requirements into compelling strategies and solutions.
- **Our educators** share best practices in consulting workshops or external conferences on 30+ topics.

Our experts each have more than 25 years of experience in the field. They specialize in data analytics—from data architecture and data governance to business intelligence and artificial intelligence. Their primary mission is to help you get more value from data and analytics by using their extensive experience.



Our clients say we are hard-working, insightful, and humble. It all stems from our love of data and our desire to help you get more value from analytics. We see ourselves as a family of continuous learners, interpreting the world of data and analytics for our clients and partners.

Get more value from your data. Put an expert on your side. Learn what Eckerson Group can do for you!

## About Yellowfin

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Yellowfin is the only enterprise analytics suite that enables organizations to extract transformational value from their data because we combine action based dashboards, automated data discovery, and data storytelling into a single, integrated platform.



By delivering the best analytical experience, Yellowfin provides your users with unique ways to engage with and act on their data, and addresses the needs of data analysts, business users, customers and developers who want to build, deploy or use amazing analytical experiences.

### Analytics for software companies

Integrate and embed analytics with a difference into your app

- Replace legacy or home grown reporting tools
- Embed a modern self-service analytics suite
- Deliver an exceptional customer experience

### Analytics for enterprise

Get more value from your data in new and innovative ways

- Migrate from spreadsheets to a modern analytics platform
- Replace legacy BI applications
- Embed analytics into operational workflows

### Analytical Application Builders

Leverage your domain expertise to create data products that delight

- Create unique data driven applications
- Close the loop on analytics
- Deliver insights as a service