



RETAIL & E-COMMERCE GAIN A COMPETITIVE EDGE WITH AUTONOMOUS ANALYTICS

REAL CASE STUDIES



CONVERSION FUNNEL MONITORING USING AUTONOMOUS ANALYTICS

Quality business intelligence gives e-commerce and retail companies a competitive edge. But finding compelling patterns in the deluge of data and dashboards is challenging even for the most sophisticated digital natives. Through a series of case studies, this paper explores how artificial intelligence—or real-time 'autonomous analytics'—can be leveraged by e-commerce companies to identify problems, promote solutions, and improve overall business acumen.

GETTING PAST THE “MORE DATA, BUT LESS INSIGHT” QUANDRY

E-commerce and retail companies are bursting with information—everything from key performance indicators (KPIs) and web analytics to weather and mobile data. When analyzed correctly, this vast quantity of data has the ability to provide unique and powerful insights that can enable companies to develop market-leading business strategies. At the same time, with so much automation driving e-commerce operations, the smallest blip or glitch has tremendous power to do significant financial and reputation damage.

To capture and understand data, for years e-commerce and retail companies have relied on traditional tools, like alerts, dashboards, and statistical analysis software. But, as e-commerce thrives and more digital data become available, consider that information from every physical store, website, mobile operating system, competitor, and country in which the e-commerce or retail company operates must be captured, tracked, and analyzed, in order for it to be used to develop a meaningful business strategy, and to enable the company to adapt that strategy in “Internet era.” The simple truth is that the number of combinations that can be applied to e-commerce and retail data sources is simply too vast for any business intelligence (BI) team to keep up with using traditional BI solutions.



To provide valuable business insight and increase revenue, companies are turning to the real-time, autonomous analytical tools developed by Anodot to help them leverage the power

of machine learning. With the market factors that drive retail sales and e-commerce changing day-to-day, real-time machine-based analytics is the only way for companies to use these vast quantities of data to gain meaningful business insight, such as whether coding errors exist that may be obstructing online purchases or if certain buying trends indicate an emerging market opportunity.

BIG DATA ≠ FAST INSIGHTS

As the Anodot client in the previous case study points out, data's complex, it's varied, and it's big. And, it holds tremendous potential for businesses wishing to improve revenue, reduce losses due to undetected problems, and better understand their customers and markets.

But e-commerce and retail data is also often 'siloes'. To make decisions, companies may rely on multiple feeds from numerous independent sources like CRM systems (e.g. Salesforce.com) web analytics (e.g. Google Analytics, Adobe Analytics, Mixpanel, Webtrends) and social analytics (e.g. Twitter, Facebook), as well as other internal and external sources, such as weather, customer behavior (click throughs), website performance, and data related to customer device use, such as location, mobile applications, and type (e.g. Apple, Android). In addition, companies may struggle with combining and analyzing data sources—such as user tracking systems (Hitwise) and other e-commerce systems.

These disparate data sources make it tremendously difficult for data analysts to get a complete picture of what is going on. In the end, traditional data analytics methods require that a human business intelligence team identify, collect and prioritize issues, often based on cherry-picked data views from segmented sources, sometimes depending on static thresholds instead of thoroughly learn and monitor each metric which is simply humanly impossible.

Do Things Bigger AND Smarter

For e-commerce and retail companies today, mission-critical decisions are not just about getting more data, and they most certainly cannot be about intuition or hunches. Leveraging information to make strategic decisions is about managing and analyzing the data in a smarter way. Big data alone isn't going to sell more products or improve brand recognition. But, a business intelligence solution that can actually *learn* the company's seasonal patterns and *interpret* complex data to provide unique, real time insights, which prove to be a valuable, in giving companies a competitive advantage. This next case study describes how an online retailer consolidated their previously siloes information sources into the Anodot real-time machine learning system to leverage the power of big data.

CASE STUDY: CHALLENGES OF MONITORING THE PURCHASE PROCESS



This 100-year old company has done a pretty good job of migrating from traditional bricks and mortar stores to a solid

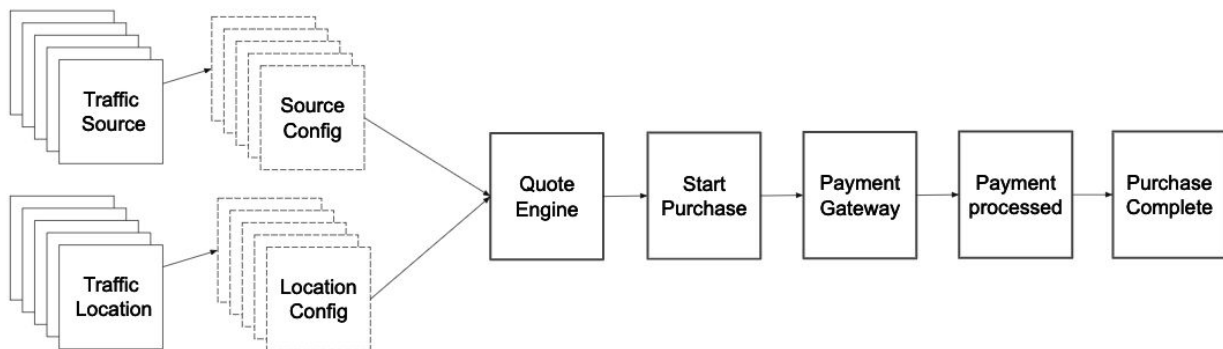
combination of web, mobile, and in-store commerce.

With more than a dozen globally recognized brands for sale worldwide, this company invested great efforts in building a scalable online presence. However, the lack of capability of traditional monitoring methods created “alert storm” syndrome with the team, where staff began to ignore many alerts because they were so frequent and meaningless. The company turned to Anodot to provide them with a machine learning-based, business intelligence solution that offered anomaly detection. The first flow to monitor was the actual purchase process, within a few days the company gained full visibility and continuous monitoring of the actual purchase process.

According to the company’s director of digital analysis, *“When we started to really begin to explore the power of big data, we realized that we needed a tool that would help us identify trend changes across all our metrics and through different data streams, so we finally gain full visibility . This is why we chose Anodot.”*

“Using Anodot, we were recently able to identify the root cause of a problem that could’ve produced a potentially significant revenue drop. An increase in HTTP and API errors from purchase ‘time-out’ problems was the result of a new online checkout upgrade. We were able to fix the issue in one day, where previously identifying such issues would take up to a week and potentially cost us up to millions in revenue.”

Using the Anodot solution, this online and bricks and mortar retailer now tracks more than 260,000 real-time metrics extracted from a variety of internal and external data sources. Anodot’s algorithms learn the pattern of each metric and identifies when anything deviates from the norm, applying machine learning and artificial intelligence to alert only when patterns or incidents are relevant. According to the digital analytics director, *“Using Anodot, we were recently able to identify the root cause of a problem that could have produced a potentially significant revenue drop. An increase in HTTP and API errors from purchase ‘time-out’ problems was the result of a new online checkout upgrade. We were able to fix the issue in one day, where previously identifying such issues would take up to a week and potentially cost us up to millions in revenue.”*



1. Monitor conversion from each step to the other for any traffic source and geo location.
2. Monitor Vol. for every step and for every permutation

E-COMMERCE MERGES WITH ANODOT'S 21ST CENTURY REAL-TIME MACHINE LEARNING

For e-commerce companies, things like web analytics, system and website performance, weather, social media analytics, and competitor information are some of the types of data that require analysis. With revenue, reputation, and mission-critical business decisions at stake, having valuable and statistically reliable business insight at your fingertips is critical.

Modern machine learning uses cutting edge technology and patented algorithms to analyze patterns and trends, and identify relevant changes and anomalies. Sophisticated solutions, like Anodot's, are industry, source, and size-agnostic. It doesn't matter if you have a few hundred data feeds based on regional sales, or several thousands based on your global online locations, Anodot's solution is able to leverage artificial intelligence to learn and understand your data.

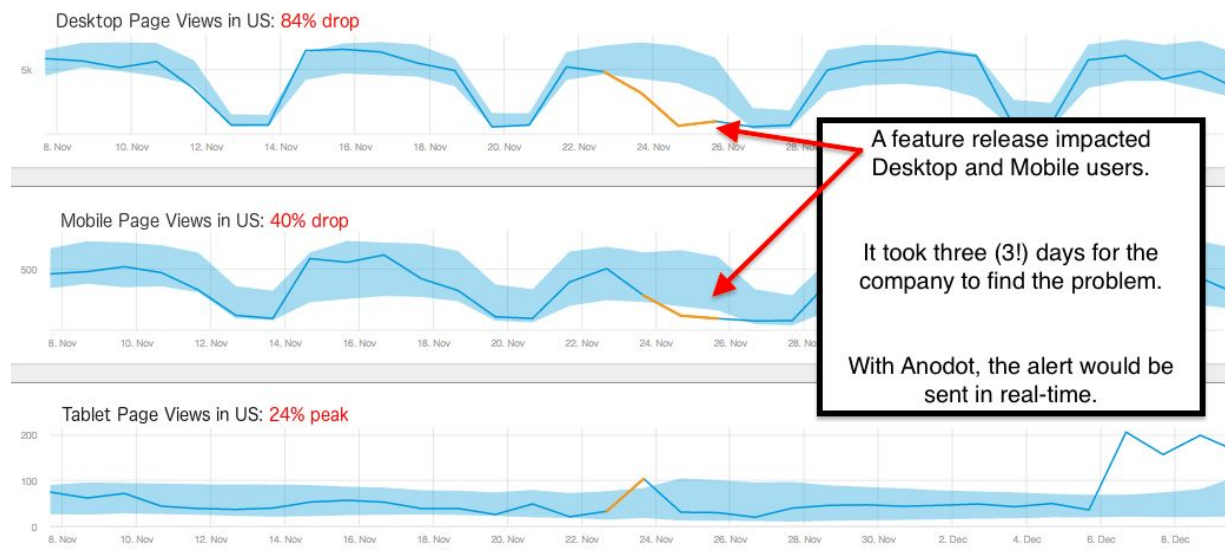
CASE STUDY: DATA IS VERY VERY COMPLEX



Sometimes no matter how knowledgeable the data analytics staff is, they're not going to be able to get to the root cause of a problem simply based on past experience, or even if they do, it will take too long to be useful. Anodot recently learned of an incident with one of its e-commerce clients when business revenue KPIs dropped dramatically. The Anodot solution was quickly able to determine that the decline was due to a system issue—http errors and an increase of open connections caused high consumption of database memory, which in turn caused a higher rate of 'http

500 status code - internal errors.' This was leading to customers leaving the site without completing transactions, which in turn was causing a decline in revenue.

According to the client: *"Our data analytics team was thrilled that the problem was discovered in near real-time and solved within a few hours. The team simply used the Anodot solution to automatically correlate the number of site visitors, with transaction success and with transaction failure ratios. Without the Anodot solution, it would've taken us days if not weeks to make this connection."*



THE PROBLEMS WITH DASHBOARDS

The changing nature of business intelligence (BI) means that e-commerce companies increasingly accept that advanced data analytics must be a key component of their current and future operations. Traditionally e-commerce companies have turned to dashboards and on-demand reports to measure a momentary trend. However, many data analysts are finding that BI dashboards or static thresholds no longer suffice, particularly as higher levels of customization and flexibility are needed. Consider these challenges associated with large amounts of dashboards and on-demand reporting:

- **Missing Metrics**— Humans tend to prioritize requirements based on intuition or past experience and not necessarily verifiable metrics and trends. Because of the innate limitation of having to select what data to display on dashboards, certain data will necessarily be left out, leaving holes in the potential insights.
- **Dashboard Maintenance**—Dashboards require heavy maintenance. If data changes in complexity or behavior, maintenance can become complicated, particularly if the organization must develop new algorithms, include additional KPIs, or incorporate new systems and networks.
- **Alert Fatigue**—Many data analysts report that they get easily overloaded with too many dashboards, and too many alerts. In addition, because static thresholds often generate numerous irrelevant alerts, staff often begin to ignore alerts, even those that have potential relevancy.
- **Configuration**—Dashboards and accompanying alerts are hard to configure and easy to get wrong. Data analysts need to ask the right questions, then set a static threshold. If data is seasonal, staff will often set the thresholds above the maximum and below the minimum.

In the next case study, we describe the type of problem one e-commerce retailer encountered with managing their old dashboard system and how they turned to Anodot to achieve greater insight and flexibility with a real-time, machine learning-based business intelligence solution.

CASE STUDY: DASHBOARDS DON'T ALWAYS UNDERSTAND DEVIATIONS



An Anodot client recently shared their story of frustration when managing thresholds and identifying outliers on their old system. Their previous dashboard solution had static thresholds set based on annual and seasonal e-commerce travel trends. But the thresholds were based solely on data from single points in time, since the system was unable to ‘learn’ and extrapolate a reasonable range of deviation based on historical data. During one particularly ‘bad’ season, the data analytics team dealt with dashboard alerts on an almost hourly basis due to two entirely different anomalies: weekly revenue was dropping due to extreme temperature lows

in a holiday vacation spot, as well as failed transactions from an unusually high number of API errors (originated from a payment provider issue). Because the patented algorithms in the Anodot real-time autonomous analytics system are designed to actually learn and understand normal behavior and deviations from the norm (anomalies), anodot build a dynamic baseline around each and every metric. In switching to Anodot, this company was able to save time and improve their understanding of their own seasonal market.

IT'S NOT ABOUT WHAT YOU KNOW.

IT'S ABOUT WHAT YOU DON'T KNOW.

Traditional monitoring tools have inherent business insight latency and do not show a real-time status, which means that you could discover business problems when it's already too late. Anodot's solution operates in real-time so you can see relevant trends and issues as they occur. As described in this next case study, trying to identify the cause of an incident in a timely fashion using traditional business intelligence solutions can be like looking for a needle in a haystack, particularly when you're faced with interpreting data from tens of thousands of different sources.

CASE STUDY: A TALE OF NEGLECT

Week One—Sales declined by 10% in one week at this online retailer and no one knew why. It was an unusual anomaly for that time of year, when seasonal buying habits should be significantly driving sales the other direction. The data analytics team reached out to the website management team to see how the site was functioning. Were certain pages down? Were there old banners displayed? Were all the links working? What about the live chat? The website management team did a test of overall website functionality and found no obvious glitches. Sales continued to decline.

Week Two—The data analytics team then reached out to the pricing team, and asked them to check to see if there had been any major changes to competitor pricing models. Over the

course of the next couple of days, the pricing team checked the models and found no significant changes or discounts being offered by the primary competitors. Sales revenue dropped to 15% less than the same time the previous year.

Week Three—The data analytics then looked at the possibility of a price glitch. The computer programming experts were called in to locate any inaccurate price coding. Nothing was found.

Week Four—A newly hired associate decided to take advantage of the company's 25% employee discount program to buy some new summer clothes. After adding a few items to her cart, she clicked "Proceed to Check-out." Nothing happened. She tried again, and still nothing. After trying and failing to get to the payment page, she finally walked over to the website management team (which happened to sit a few cubicle rows over) and ask them about the problem. After reviewing the glitch, the website management team figured out that two items in the cart had been incorrectly coded for check-out processing. A deeper analysis showed them that, in fact, a total of 20 online products (most of which were summer seasonal items) had incorrect coding, resulting in excessive cart abandonment, which in turn drove the dramatic sales decline.

It's About Time. Real-time.

Using Anodot, time to quality insights can be reduced dramatically. Instead of long investigations through multiple dashboards analysis and manual correlations, analysts at this company now rely on Anodot's real-time auto anomaly detection to surface business opportunities and insights. Anodot helps to move from searching for a needle in haystack to acting upon reliable alerts.

ANODOT'S REAL-TIME MACHINE-LEARNING ENGINE AND PREDICTIVE ANALYTICS

Anodot's real-time autonomous analytics solution is ideal for e-commerce and online retail companies. The solution discovers outliers in vast amounts of time series data and turns this information into valuable insights that can be leveraged to develop business strategies, identify issues, and correlate trends. Using patented machine learning algorithms, Anodot isolates issues and correlates them across multiple parameters in real time, eliminating business insight latency and supporting rapid business decisions. And, the beauty of a machine-learning system like Anodot's, is that it is specifically designed to connect to any data feed, regardless of the origin.

- **All Internal or External Data Types**—Unlike dashboards, the Anodot system can connect, capture, and interpret data feeds directly from all of your data, without having to pick and choose the important feeds—from internal sources like web analytics, social media analytics, and website performance to external sources such as weather or competitor information.
- **SaaS Solution**—Anodot offers a scalable SaaS solution that automatically learns normal data behavior and identifies abnormalities, alerting on them without any manual configuration, data selection or threshold settings necessary.

- **Digitally Agnostic**—Anodot’s platform is size, industry, and data agnostic. The platform’s algorithms can handle all types of data, from any industry, and of any quantity. Everything from complex system data, like API errors, search terms, conversion rates and inventory information can be inputted into the Anodot system for correlation and analysis.
- **Auto Correlation and Detection**—Anodot’s algorithms can handle any number of data variables, intelligently correlating related alerts to avoid alert storms and enable faster root cause analysis.

ABOUT ANODOT

Anodot was founded in 2014, and since its launch in January 2016 has been providing valuable business insights through anomaly detection to its customers in fintech, ad-tech, web apps, mobile apps, e-commerce and other data-heavy industries. Over 40% of the company’s customers are publicly traded companies, including Microsoft, Waze (a Google company), AppNexus, and many others. Anodot’s real time business incident detection uses patented machine learning algorithms to isolate and correlate issues across multiple parameters in real time, supporting rapid business decisions. Learn more at: <http://www.anodot.com/>.

Appendix

Example metric E-commerce companies monitor with Anodot.

Alert name	Measures	Dimensions
Anomaly in payment start	payment start	Payment provider SKU Traffic source Category Device type Store Visitor type Geo
Anomaly in ‘search’ to ‘add to cart’ conversion	search/add to cart (composite)	SKU Traffic source Category Device type Store Visitor type Geo
Anomaly in time to complete purchase	time to complete purchase	Payment provider SKU Traffic source Category Device type

		Store Visitor type Geo
Anomaly in repeat buyers	repeat buyers	Geo Traffic source