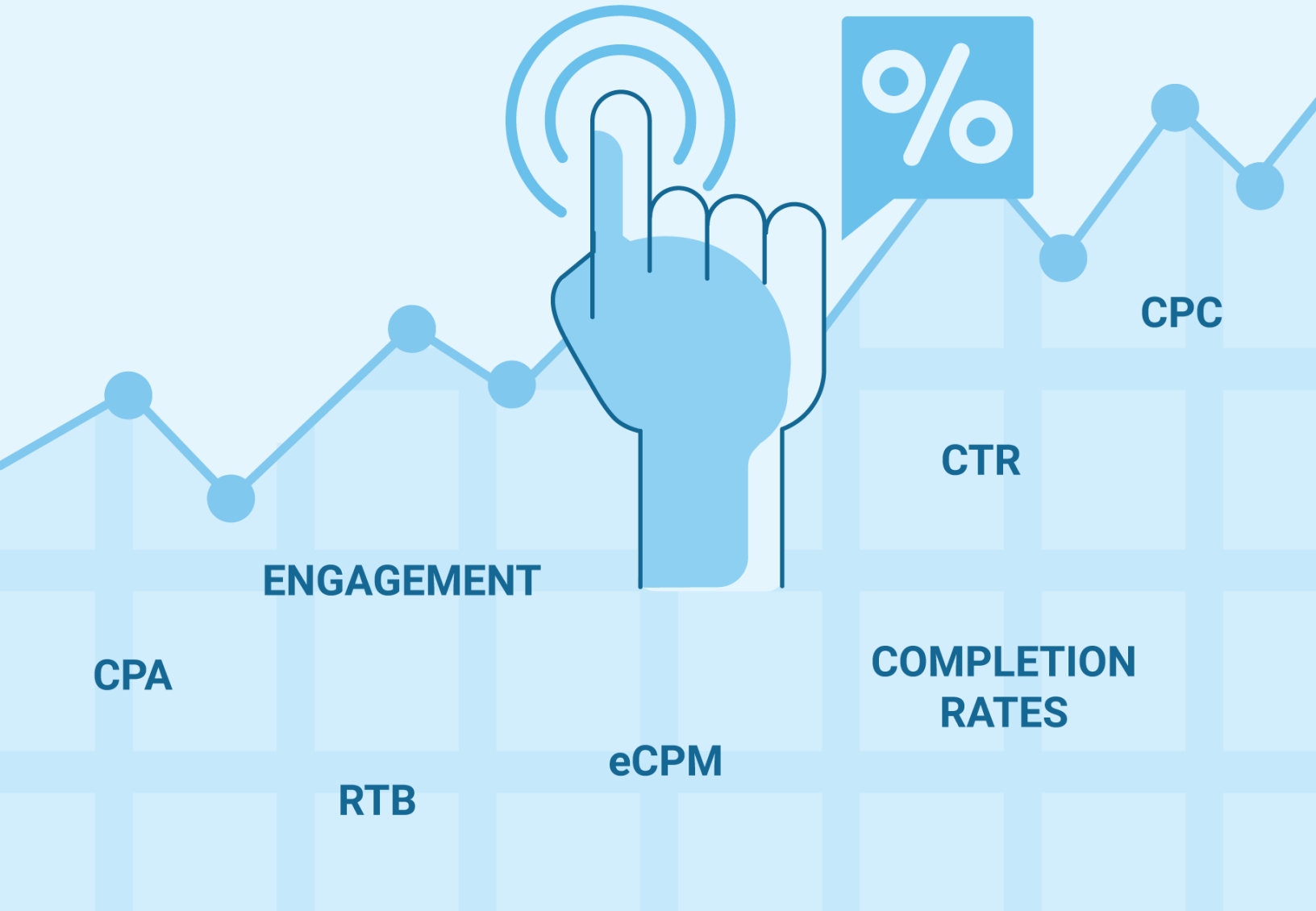
anodot

HOW FIVE LEADING ADTECH COMPANIES USED ARTIFICIAL INTELLIGENCE TO SAVE MILLIONS



How Five Leading Adtech Companies Used Artificial Intelligence to Save Millions

In the world of online advertising, minutes can translate into tens of thousands of dollars and hours into millions. This white paper explores the financial and business benefits five leading adtech companies—Rubicon Project, NetSeer, Eyeview, Uprise and Penske Media Corporation (PMC) — experienced when they changed their data analytics solutions from traditional business intelligence to state-of-the-art machine learning systems.

REAL-TIME MACHINE LEARNING FOR ADTECH MONITORING

The vast array of moving parts in online advertising, like demand-side platforms, ad networks and exchanges, combined with the massive assortment of data metrics, like conversions, impressions, eCPM and more, means that adtech companies need to collect, analyze, interpret, and act upon immense data sets instantaneously, every single day. One glitch in the adtech matrix—a sudden change in impressions or click-throughs, a decrease in engagement, or even an incorrect line of code—could mean the loss of millions of dollars.

The operational complexity associated with today's automated bidding is not unlike the intricacy of algorithmic trading on major global stock exchanges. Adtech companies manage billions of transactions daily—and they need analytics and artificial intelligence tools that can function at this immense scale and in the real-time mode required of this unique business.

With advertising markets changing second-by-second, real-time analysis is the only way for adtech companies to determine whether key indicators are under or over performing. To ensure these companies always have their finger on the pulse of every possible metric or anomaly, executives, data scientists, and analysts are turning to real-time machine learning and artificial intelligence to help them resolve issues immediately.

A NEW WAY OF DOING THINGS

For our featured adtech companies—Eyeview, Rubicon Project, Uprise, NetSeer, and Penske Media Corporation (PMC)—alert storms, decentralized systems, extreme data fluctuations, unmanageable data quantities, and constant software releases were just a few of the challenges that affected revenue and business performance. To provide valuable business insight and increase revenue, these companies turned to Anodot to help them leverage the power of machine learning by discovering outliers in the vast quantities of time series data.

Modern machine learning uses cutting edge technology and patented algorithms to analyze patterns and trends, and identify relevant changes and anomalies. Because of the vast and complex volume of data processed in the adtech world, these types of systems are extremely attractive, with the ability to automatically aggregate, learn, and identify normal—and abnormal—data behaviors. Machine learning solutions partner exceptionally well with the adtech data that requires immediate analysis, such real-time bidding information, demand-side and supply-side platforms, ad exchanges, pricing models, bounce rates, impressions, ad targeting, and application programming interface (API) functionality, as well as other KPIs and metrics.

THE TROUBLE WITH TRADITIONAL BUSINESS INTELLIGENCE TOOLS

For adtech companies like Eyeview, Rubicon Project, Uprise, NetSeer, and PMC, traditional business intelligence (BI) tools, such as dashboards and email alerts, offered some support, but in general their capacity in the context of adtech data analysis was severely limited. In working with these adtech companies, the Anodot team found:

Technical Anomalies Affect Revenue. Technical problems, such as server uptime and latency, can dramatically affect adtech revenue. For example, if a server supporting a particular region is "timing-out", conversion will suffer in that region. Traditional tools may only show one problem—like server latency—but will not show or correlate multiple issues, such as server latency and a dip in conversion, in the same unified alert. And if only one region is suffering, it may be frustratingly difficult to diagnose.

Alert Fatigue. An overly sensitive alert solution can cause even the smallest blip to generate an alert. And large volumes of data coming from multiple sources can produce an alert storm. The more alerts, the greater likelihood of false positives and the chance that staff will relegate the alerts to an unchecked email folder.

Seasonality Issues. Seasonality issues can make it nearly impossible to set up static thresholds. With numerous peaks and valleys in a set pattern, based on hourly, daily, or weekly trends, static thresholds can only capture the very highs or the very lows, but nothing in between. Traditional BI tools, don't consider seasonal patterns, and often end up capturing too many samples that are falsely identified as anomalies.

BI tools work from hindsight. It can take hours, days, or even weeks to find issues and apply patches or repairs, when using traditional business intelligence and monitoring tools. When dealing with programmatic advertising, adtech companies have vast amounts of business data, with millions of different data points that traditional BI and monitoring tools are unable to track and process in any meaningful amount of time.

Minor Undetected Issues Can Cause Major Losses. Often, businesses will lose hundreds of thousands, if not millions, of dollars due to the passage of time between a business incident and its discovery. These incidents may be something simple like a computer glitch or a misplaced HTML tag that, if caught in time, will barely cause a disruption. But if left too long, even minor issues like these could cause a detrimental disruption to service.

ANODOT ARTIFICIAL INTELLIGENCE IN ACTION

Rubicon's Real-time Data Insights Drive Revenue

With 2.5 times more transactions than NASDAQ, Rubicon Project is one of the largest ad exchanges in the world. In fact, more than 90% of people browsing the internet will see an ad that goes through the Rubicon exchange.

Rubicon uses proprietary computing systems to automate the buying and selling of advertising, enabling the world's leading publishers and advertising applications to reach more than 1 billion consumers.

Throughout Rubicon's bid stream, there are many potential areas for communication or technical breakdown that could prevent a bid from going into the auction and impact the overall health of the business. With 13 trillion monthly bid requests, 55,000 CPUs and 7 data centers, Rubicon's business intelligence needs were growing beyond the scope of what humans could monitor, analyze, and control. Rubicon turned to Anodot to help track their data in real time to aid in the creation of a fair and healthy ad marketplace.

Their old monitoring tools required Rubicon to manually set alert thresholds. In particular, the company found it had challenges with manual alerts & false positives. For example, when machines went down, they were alerted. But, if a client in Asia or Europe was trading at a much higher or lower rate than normal, Rubicon possessed no alerting system, other than human analysts "eyeballing" trends, sometimes several days after the fact. Furthermore, Rubicon had no way to correlate this trend. So, if a client was bidding or trading at a much lower rate than normal, it could take days to determine why.

"After working with Anodot, our Chief Data Scientist estimated that it would have taken at least six of our data scientists and engineers more than a year to build something of this caliber, so it was a no-brainer for us to jump on board and take it."
—Rich Galan, Director of Analytics, Rubicon Project

With Anodot's advanced machine-learning BI and analytics solution, the Rubicon team now identifies trends and correlations in real time. Recently, Rubicon was able to instantly correlate a drop in one customer's bidding activity to system "time-outs" or server latency. Rubicon immediately contacted the client and alerted them. The customer quickly identified a bug in a recent software release as the culprit for the time-outs.

Rubicon also benefitted from the added ability to pull existing business intelligence solutions into the Anodot system. Rubicon used an open-source monitoring tool, so Anodot simply extracted data from the tool, allowing Rubicon to streamline and automate data analytics.

Learn more about Rubicon Project and how they use Anodot to improve and enhance their ad-tech business in **this video**.

Eyeview Quickly Gets to the Root Cause to Protect Revenue

A video advertising technology company, Eyeview has found success with Anodot's real-time business incident detection. Eyeview continuously deals with massive amounts of data and traffic, as well as managing real-time bidding. The company maintains a high-volume, low-latency, and high-throughput system, processing 200,000 requests per second, which require evaluation in less than 30 milliseconds. Eyeview's success depends on making complex decisions instantaneously. Before Anodot, they experienced alert storms when single issues would trigger hundreds of downstream alerts in a short period of time. In addition, their ad service data fluctuated hourly, daily, and weekly, so pinpointing problems, and identifying the difference between a meaningless trend deviation and a harmful anomaly was difficult.

Anodot provides Eyeview with a centralized, machine-learning management system that monitors, detects, correlates, and alerts on relevant and important trends that could positively or negatively affect Eyeview business. The company benefits most from the Anodot module that automatically identifies and groups related metrics, even before an anomaly occurs. This way, the most important anomalies are quickly identified and ranked, providing crucial information to allow Eyeview to get to the root cause quickly.

> **"Our system evaluates 20 billion requests and drives hundreds of thousands of dollars every day, so maintaining the system's stability and preemptively identifying potential issues correlates directly with the company's revenue. Using Anodot's solution we are able to achieve this,"**
> **— Gal Barnea, Chief Technology Officer, Eyeview**

ANODOT QUICKLY IDENTIFIES OUTLIERS IN DATA

As demonstrated in the sample alert below, the Anodot system can capture outliers in the data. This example graph shows the trends for the number of impressions for a specific video advertisement. The light blue shaded area represents what the historic range of "normal" behavior might look like based on Anodot's machine learning algorithm. Unlike traditional static threshold systems, no alert is sent as long as the data stays within the 'learned' normal range. When a dramatic and potentially harmful deviation does occur—as indicated by the orange graph line—the Anodot system sends an automatic alert several hours before a traditional static thresholds alert would have caught the same anomaly.

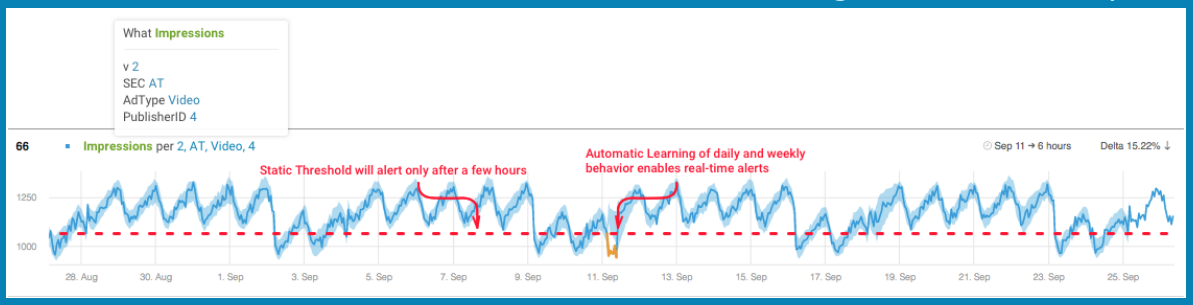


Figure 1: Anodot's artificial intelligence system provides minute-to-minute data on relevant trends and anomalies. | Source: Anodot

Uprise Ensures Continuous Delivery with Continuous Monitoring

The performance advertising company Uprise depends on continuous monitoring to keep track of hundreds of thousands of metrics including revenue, spend rate, fill-rate, and ad placement performance. Using a continuous delivery approach, the Uprise team pushes an average of 20 new software releases into production each day, with a positive or negative effect on their platform's overall performance. In addition to the rapid software release schedule, the Uprise team also must monitor server issues, changes at the ad affiliates, introduction of ad blocking software, and even fraud. And, while Uprise uses standard network monitoring tools for notification of major network issues (like outages), these services only identify major problems in the most extreme cases. In addition, since Uprise network traffic behaves seasonally, with peaks and dips throughout the day, noticing a 20% loss or gain at any given point was difficult for their team.

"If something breaks, or something changes suddenly, I want to know about it immediately. Anodot helps us achieve this."
— Doron Ben-David, Chief Technology Officer, Uprise

Because of these complexities, the Uprise team needed to track and analyze results as they happened, so they would know immediately whether or not to roll back the new release or explore other potential issues.

Using the Anodot system, data related to software releases and advertising performance is captured and analyzed. Unlike the static thresholds previously used by Uprise, Anodot's machine-learning system immediately flags anomalies that occur outside of the normal range. With Anodot, Uprise has been able to identify software bugs much more quickly.

PMC Leverages Automated Anomaly Detection for Real-time Business Insights into Google Analytics and More

Penske Media Corporation (PMC) is a digital media and information services company, with content across a series of digital, video, print, & event properties. The company boasts 179 million monthly active users (comScore August 2016) and 101 million video views per month (as of August 2016). Among its 22 brands are *Variety*, *Deadline*, *Hollywood Life*, and *WWD*.

With millions of users across dozens of publications and massive advertising click-through data to capture on an hourly and daily basis, PMC was experiencing significant delays in discovering important issues. PMC tried setting alerts in Google Analytics, however found it incredibly time consuming for the scale they needed to achieve.

"The results were so immediate when we started using Anodot to better understand our Google Analytics that we decided to try additional data streams, to solve other issues within the organization."
— Andrew Maguire, Head Data Scientist, PMC

The company began using Anodot to automatically identify anomalies in its Google Analytics, which pointed the team to important business incidents. The Anodot system first learned the normal and seasonal behavior of each PMC metric, such as impressions or click-through rates. Then the Anodot system alerts automatically when a metric behaves differently than expected.

One dramatic and notable anomaly discovered by the Anodot system was referral spam that was inflating visitor statistics, and originating from a known and unethical source. Spotting the issue would have required PMC's analytics team to know about the problem in advance. By discovering it through Anodot, and then blocking the spam traffic, PMC was able to free up resources for legitimate visitors, as well as accurately track the important traffic, enabling executives to make better informed decisions and plans.

PMC also used Anodot to identify software bugs early, before small issues turned into major incidents. In one case, Anodot flagged a higher-than-expected bounce rate in a publication's gallery pages, and correlated it with an increase in the corresponding image sizes after a back-end code push. The resulting spike in page latency harmed revenue. By identifying it quickly using the Anodot solution, PMC was able to swiftly roll out a fix to the affected pages, decreasing the impact on readers and revenue.

Learn more about PMC and how they are using Anodot to improve and enhance their ad-tech business, in **this video**.

NetSeer Implements Complete Business Incident Detection and Notification

A provider of market-leading visual monetization solutions for advertisers and publishers, NetSeer's standard static thresholds were causing either too many false positives or not enough alerts. The team was spending excessive time managing the thresholds, all the while losing money because the thresholds were different for each publisher. They also experienced occasional performance issues that were undetectable for some time when new services were implemented.

"Anodot has sent several useful post-deployment alerts that have enabled us to respond immediately and fix bugs that could have negatively impacted revenue."
— Greg Pendler, Sr. Director of Technical Operations, NetSeer

In the past, NetSeer used monitoring tools whose separate reports needed to be patched together to gain useful information. Anodot stepped in with a solution that integrates directly with the open-source, enterprise-ready monitoring tool used by NetSeer to track performance.

With its complete business incident detection and notification system, Anodot provides NetSeer with significant revenue benefits by identifying traffic drops that let NetSeer automatically scale down their Amazon cluster for significant savings. The company also employs Anodot APIs to post metrics from different systems and create personalized dashboards.

Learn more about NetSeer and how they use Anodot to improve and enhance their ad-tech business in **this video**.

With the Anodot system, Netseer immediately noticed a difference. By correlating anomalies between publishers and the systems and devices being used, Netseer was able to reach out directly to the publishers to advise them of potential problems on publisher websites.

BUILD OR BUY?

Anomaly detection systems can contribute significantly to achieving an adtech company's goals and objectives. Because many adtech organizations already have their own machine learning algorithms and data scientists, building a home-grown system may be something companies are considering.

However, developing an anomaly detection system in-house will take even the most experienced professionals one to two years and will require their involvement in maintaining the system, even after deployment. Distracting such valued team members from their company's core mission in order to develop something that is already available as an off-the-shelf product really does not make sense.

Adtech companies will find that a comprehensive and sophisticated off-the-shelf anomaly detection system, such as the Anodot solution, offers considerably more benefits and significantly faster time to value than an in-house development.

Looking for the full comparison of whether to build or buy? Download **this white paper**.

ANODOT'S ANOMALY DETECTION PROTECTS ADTECH REVENUE

Adtech companies need a scalable real-time BI and analytics solution like Anodot, which can handle any number of data variables, intelligently correlating related anomalies that may not be apparent to a human observer. Best results are achieved with machine learning, which does not require any manual configuration, data selection, or threshold settings; and algorithms that can handle complex data such as click rates, impressions, and bid duration for every combination of campaign, publisher, advertiser, and ad exchange.

Where traditional BI tools fail due to time delays, data constraints and complexity, Anodot's predictive analysis learns data patterns for a variety of KPIs and dimensions, and delivers actionable insight through automated anomaly detection. Its patented big-data machine-learning algorithms are specifically designed to detect outliers, preemptively identifying trends as well as issues before they become problems, facilitating optimization and proactive operational maintenance.

Anodot can—in real time—detect anomalous behavior, correlate multiple anomalies, and then alert the proper teams in order to get a fix in place.

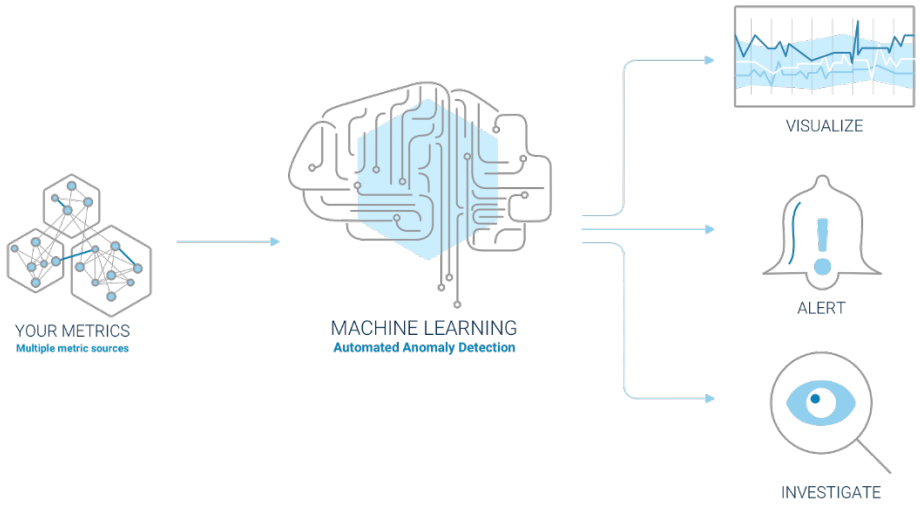


Figure 2: How the Anodot Anomaly Detection System Works

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 financial technology (fin-tech), 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, VF Corp, Waze (a Google company), 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/.