# Build or Buy? The Decision Maker's Guide to Business Monitoring

The main goal of Business Monitoring is the detection of business incidents as an enterprise-wide self-service solution. As companies realize the benefits they can achieve from Business Monitoring they're faced with the immediate question: build our own system — or buy one? We outline the benefits and drawbacks of each approach, providing both the calculations and conceptual considerations you need to weigh in order to achieve the right decision for your organization.

# Introduction

In a highly competitive market, companies are vying to drive operational efficiency, deliver a better customer experience, and prevent both major malfunctions and slow leaks that impact the bottom line. For every operation, the goal is to move from reactive problem solving to proactive monitoring, enabling stakeholders to know more about what is happening across their operations and fix incidents before minor issues escalate into bigger problems.

During the past decade, the scale, velocity and mission-critical characteristics of digital operations have turned manual monitoring into a thing of the past. When companies create immense volumes of data and need to track thousands of metrics and dimensions in real time, manual thresholding and dashboard monitoring provide very limited visibility and leave much of what is happening in the dark. Modern monitoring is predominantly autonomous, relying on Machine Learning to monitor and correlate huge data streams in order to surface anomalies in real- or near-real time, without human intervention. Typically, autonomous monitoring systems both alert users of issues and glitches, and provide data visualization for enhanced observability.

Companies that use advanced monitoring systems across their stack typically experience significant costs savings and high ROI resulting from:

- Reduction in time to incident detection
- Reduction in time to incident resolution
- Reduction in total number of alerts
- Reduction in the number of non-actionable alerts
- Reduction in workload on support operations
- Improvement in customer satisfaction scores

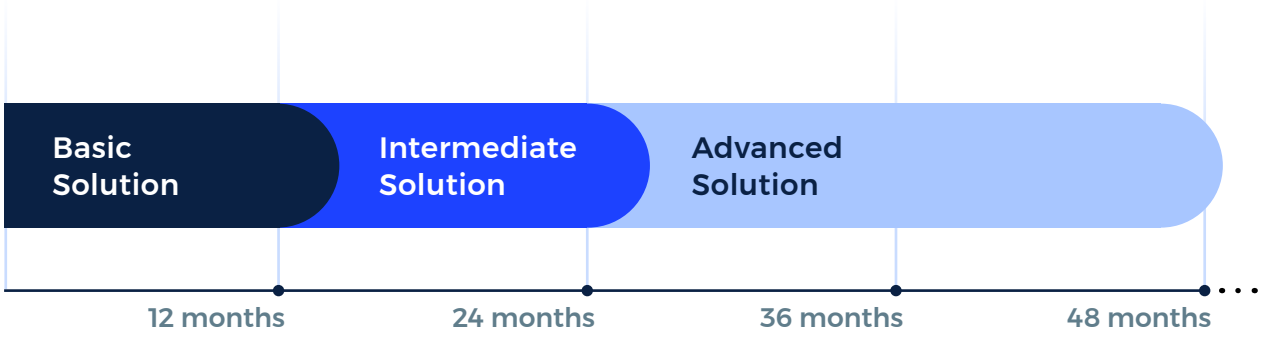
As companies realize the benefits they can achieve from autonomous monitoring compared to manual / static methods, they're faced with the immediate question: build our own system — or buy one?

In this whitepaper we will outline the benefits and drawbacks of each approach, providing both the calculations and conceptual considerations you need to weigh in order to achieve the decision that is right for you.

# What does it take to build your own monitoring platform?

The build option poses multiple conceptual, technical and resource challenges, and is therefore usually only viable for companies with small amounts of uncomplicated data — or for extremely large, innovative companies with a dedicated team. Depending on the robustness of the solution the organization chooses to pursue, some build scenarios could take more than four years to develop, particularly for large, complex, and changing monitoring needs.

To achieve the capacity and prowess of a fully matured autonomous monitoring platform, there are three solution maturity levels to be pursued one on top of the other: Basic, Intermediate, and Advanced.




| Solution Maturity | Duration (Months) | Production (Man Days) | Maintenance (Man Days) | TCO (Man Days) | TCO (USD) |
|---|---|---|---|---|---|
| **Basic** | 12 | 2,565 | 2,009 | 7,551 | $4,052,836 |
| **Intermediate (+Basic)** | 24 | 5,045 | 4,034 | 16,541 | $7,377,904 |
| **Advanced (+Intermediate)** | 48 | 13,250 | 6,169 | 36,656 | $14,817,699 |

In the next pages we outline the feature development plan and TCO for each level, including detailed feature descriptions, limitations, alternatives, required resources, and incremental development and maintenance costs.

# Building a basic monitoring platform

| Solution Maturity | Duration (Months) | Production (Man Days) | Maintenance (Man Days) | TCO (Man Days) | TCO (USD) |
|---|---|---|---|---|---|
| **Basic** | 12 | 2,565 | 2,009 | 7,551 | $4,052,836 |

## Data Integration

1. Metric definition: normalize KPIs and measures
2. Provide push API from data source to platform

**LIMITATIONS**

Requires implementation of API from every new source of data (coding effort)

**ALTERNATIVES**

Use known API metric normalizations (Graphite)

## Alerts

1. Alert types
   - Static threshold alerts
   - Single metric anomaly alerts
2. Conditions
   - Incident duration
   - Incident magnitude (values above/below static values)
   - Anomaly yes/no condition

**LIMITATIONS**

- No ability to filter anomaly based on significance
- Creates alert storms when real incidents occur (no alert correlation)
- No ability to filter anomaly alerts based on business context
- No ability to consider the effect of external events

## Administration

Internal user management

## Anomaly Detection

1. Normal behaviour modeling
   - Manual seasonality setting
   - A single baseline using simple statistics, usually "week over week"
   - User driven on/off
   - Adaptation capability: Manually selected during normal learning, usually very noisy
2. Anomaly types
   - Transient anomaly detection

**LIMITATIONS**

Applicable for small amounts of time series because:

- High false positive rates when manual settings incorrect
- Requires significant user input to exclude metrics that cannot be modeled with simple statistics.

## Time Series Analytics

Ad-hoc functions on top of raw metrics

**ALTERNATIVES**

Perform functions in data source

## Visualization

1. Time series and baseline charts
2. Dashboard creation and management capability

**ALTERNATIVES**

Base your charting on existing time series/dashboarding solutions

## Outgoing Integration

Email Alerts

**ALTERNATIVES**

Perform functions in data source

## Investigation

1. Repository of all incidents and alerts
2. Slice & dice visualization
3. Ability to save filtered views

**ALTERNATIVES**

Existing visualization platforms

## Architecture

Data retention policies & implementation

**ALTERNATIVES**

Perform functions in data source

| Feature | Resource | Resource Qty | Effort (Man Days) | Production (Man Days) | Maintenance (Man Days) | TCO (Man Days) |
|---|---|---|---|---|---|---|
| Data Integration | SW Eng. | 1 | 60 | 60 | 7 | 88 |
| Timeseries Analytics | SW Eng. | 1 | 180 | 180 | 7 | 208 |
| Anomaly Detection | Data Scientist | 1 | 365 | 365 | 30 | 485 |
| Alerts | SW Eng. | 3 | 180 | 540 | 30 | 900 |
| Outgoing Integration | SW Eng. | 2 | 90 | 180 | 30 | 420 |
| Investigation | FE Eng. + DS | 2 | 365 | 730 | 30 | 970 |
| Administration | DevOps Eng. | 1 | 90 | 90 | 10 | 130 |
| Visualization | FE Eng. | 2 | 180 | 360 | 30 | 600 |
| Architecture | SW Eng. | 1 | 60 | 60 | 10 | 100 |
| Product | PM | 1 | - | - | 365 | 1460 |
| QA | Automation Eng. | 0.5 | - | - | 365 | 730 |
| UX | UX / Design | 0.5 | - | - | 365 | 730 |
| R&D Manager | R&D Manager | 0.5 | - | - | 365 | 730 |
| Data Science Manager | DS Manager | 0 | - | - | 365 | 0 |

| ASSUMPTIONS | | | |
|---|---|---|---|
| Platform Size (Metrics) | 1,000,000 | Hosting Price/Metric/Month | $0.003 |
| Duration (Years) | 4 | Avg. Annual Employee Cost | $135,000 |

# Building an intermediate monitoring platform

| Solution Maturity | Duration (Months) | Production (Man Days) | Maintenance (Man Days) | TCO (Man Days) | TCO (USD) |
|---|---|---|---|---|---|
| Intermediate (+Basic) | 24 | 5,045 | 4,034 | 16,541 | $7,377,904 |

## Data Integration

1. CLI based connector per data source in organization
2. Complex queries to data source

**LIMITATIONS**

Requires installation of connector at the source environment (IT effort)

**ALTERNATIVES**

Assuming use of existing integration platforms

## Outgoing Integration

1. Webhook alerts
2. Handle time zone differences, DST changes

**ALTERNATIVES**

Use existing integration platforms

## Administration

Single Sign On based on your IdP

## Anomaly Detection

1. Normal behaviour modeling
   - Automated seasonality detection using fourier transform (FFT)
   - 1-2 statistical baseline algorithms (e.g. Holt-Winters, Seasonal Hybrid ESD)
   - Manual or simple rule baseline selection
   - Adaptation capability: simple rule driven normal adaptationy
2. Anomaly types
   - Pattern change detection
3. Statistical confidence test based anomaly scoring
4. Manual rule based anomaly correlation

**LIMITATIONS**

- Not applicable for large amount of metrics, especially business/ digital experience type metrics
- Does not cover over 60% of metric types - especially irregularly sampled metrics (e.g, usage metrics) which tend to be measured irregularly and are highly non stationary
- FFT based approach does not accurately capture multi-season scenarios - requires significant manual work to fix
- Known algorithms do not adapt well when there is anomalous data - creates false positives and false negatives around real anomalies

## Investigation

1. Highlight leading dimensions in the incidents
2. Incident management - acknowledge received alerts

## Alerts

1. Alert types
   - Missing data alerts
2. Conditions
   - Send updates on alert

**LIMITATIONS**

- Creates alert storms when real incidents occur (no alert correlation)
- No ability to filter anomaly alerts based on business context
- No ability to consider the effect of external events

## Architecture

1. Production & DR sites
2. Data protection policy – In transit and at rest

| Feature | Resource | Resource Qty | Effort (Man Days) | Production (Man Days) | Maintenance (Man Days) | TCO (Man Days) |
|---|---|---|---|---|---|---|
| Data Integration | SW Eng. | 1 | 30 | 150 | 10 | 190 |
| Anomaly Detection | Data Scientist | 3 | 365 | 1095 | 60 | 1815 |
| Alerts | SW Eng. | 2 | 180 | 360 | 30 | 600 |
| Outgoing Integration | SW Eng. | 1 | 240 | 240 | 30 | 360 |
| Investigation | FE Eng. + DS | 1 | 365 | 365 | 20 | 445 |
| Administration | DevOps Eng. | 1 | 90 | 90 | 20 | 170 |
| Architecture | SW Eng. | 1 | 180 | 180 | 30 | 300 |
| Product | PM | 1 | - | - | 365 | 1460 |
| QA | Automation Eng. | 1 | - | - | 365 | 1460 |
| UX | UX / Design | 0.5 | - | - | 365 | 730 |
| R&D Manager | R&D Manager | 0.5 | - | - | 365 | 730 |
| Data Science Manager | DS Manager | 0.5 | - | - | 365 | 730 |

| ASSUMPTIONS | | | |
|---|---|---|---|
| Platform Size (Metrics) | 1,000,000 | Hosting Price/Metric/Month | $0.003 |
| Duration (Years) | 4 | Avg. Annual Employee Cost | $135,000 |

# Building an advanced monitoring platform

| Solution Maturity | Duration (Months) | Production (Man Days) | Maintenance (Man Days) | TCO (Man Days) | TCO (USD) |
|---|---|---|---|---|---|
| Advanced (+Intermediate) | 48 | 13,250 | 6,169 | 36,656 | $14,817,699 |

### Data Integration

1. UI based connectors
2. Self service to data analysts and business users
3. Integration additional capabilities:
   - Time Zones
   - Daylight Saving Time handling
   - Gaps in data
   - Delays in data arrival
   - Out Of Order data arrival
   - Data repair
   - Data Readiness – watermarking

### Time Series Analytics

1. Composite functions on top of raw metrics
2. Manage computations timing

**ALTERNATIVES**

Perform functions in data source

### Investigation

1. Tools to collaborate & bookmark over the incidents
2. Snooze alerts as a whole, or partially to minimize noise

### Anomaly Detection

1. Normal behaviour modeling
   - Robust and efficient seasonality detection (Anodot patent pending) ACF based
   - 6 and more baseline algorithms
   - Advanced classifier based baseline selection
   - Adaptation capability: ML-based normal adaptation, ML-based adaptation during anomaly
   - ML based consideration of event regressors
2. Anomaly types
   - Trend change detection
   - Slow trend detection
3. ML-based anomaly scoring
4. ML-based anomaly correlation

### Administration

1. Manage groups of users
2. Provision users based on your organizational user management platform

### Alerts

1. Alert types
   - Anomaly alerts
2. Combinations of conditions and automated conditions to minimize number of alerts
   - Correlated metric values
   - Correlated anomalous metrics
   - Number of anomalous metrics in incident above/below value
   - Auto discard low volume alert
3. Correlations
   - Event correlation
   - Alert correlation – minimize number of alerts per incident

### Outgoing Integration

1. Additional destinations
2. API calls to consume alerts by 3rd party apps

**ALTERNATIVES**

Use existing integration platforms

### Architecture

Scalable architecture (unlimited)

| Feature | Resource | Resource Qty | Effort (Man Days) | Production (Man Days) | Maintenance (Man Days) | TCO (Man Days) |
|---|---|---|---|---|---|---|
| Data Integration | SW Eng. + FE Eng. | 3 | 410 | 815 | 40 | 1015 |
| Timeseries Analytics | SW Eng. | 1 | 180 | 180 | 30 | 300 |
| Anomaly Detection | Data Scientist | 6 | 730 | 4380 | 90 | 6540 |
| Alerts | SW Eng. | 4 | 365 | 1460 | 30 | 1940 |
| Outgoing Integration | SW Eng. | 1 | 60 | 180 | 20 | 260 |
| Investigation | FE Eng. + DS | 1 | 365 | 365 | 30 | 485 |
| Administration | DevOps Eng. | 1 | 180 | 180 | 20 | 260 |
| Architecture | SW Eng. | 3 | 365 | 1095 | 60 | 1815 |
| Product | PM | 1 | - | - | 365 | 1460 |
| QA | Automation Eng. | 1 | - | - | 365 | 1460 |
| UX | UX / Design | 1 | - | - | 365 | 1460 |
| R&D Manager | R&D Manager | 1 | - | - | 365 | 1460 |
| Data Science Manager | DS Manager | 1.5 | - | - | 365 | 2190 |

| ASSUMPTIONS | | | |
|---|---|---|---|
| Platform Size (Metrics) | 1,000,000 | Hosting Price/Metric/Month | $0.003 |
| Duration (Years) | 4 | Avg. Annual Employee Cost | $135,000 |

# Buying options for autonomous monitoring

Monitoring solutions differ in the area of the business they are designed to monitor. The three main monitoring categories are IT & APM, which focus on machine, infrastructure, network and application performance monitoring; Enterprise Data Monitoring platforms, offering IT, APM and Security and Information Event Management (SIEM) monitoring; and Autonomous Business Monitoring (ABM), positioned at the top of the stack and providing detection of incidents across the entire business to proactively detect issues that impact revenue and cost.

The main goal of Autonomous Business Monitoring is the detection of business incidents as an enterprise-wide self-service solution. Not all revenue impactful issues can be observed through infrastructure and application metrics. Very often, revenue issues occur without leaving a trace in the app or infrastructure data. For example, a surge in hourly cloud costs because of increased queries, a drop in traffic from a partner that's testing out competitors, or a slump in conversions and purchases due to campaign efficiency issues will not show up on your infrastructure or application monitor — but will directly translate to revenue loss. Only monitoring and correlating between 100% of your data and metrics can surface these common types of revenue bleeds.

Typically, ABM covers ITIM, NPM, APM, and CEM/DEM, in addition to providing Revenue and Cost Monitoring. While revenue and cost streams are complex and fragmented, acute incidents or chronic glitches can quickly result in massive bleeds. However, monitoring machines and monitoring business KPIs are completely different tasks.

Business KPIs are influenced by dynamic context, and have an unknown topology and irregular sampling rate, demanding a different algorithmic approach than other areas of monitoring. Based on this approach, ABM solutions monitor cost and payment data ecosystems to surface potential issues and catch missing revenue or runaway costs in real time.

Here is a list of some of the critical elements to consider when reviewing the right monitoring solution for you:

- **Data coverage.** A monitoring solution is only as robust as the data it can cover. When streams are siloed or cannot be ingested by the solution, holistic visibility is sacrificed as well as the systems' ability to correlate across relevant metrics and dimensions.

- **Level of automation.** While monitoring is autonomously executed by ML algorithms, there is a varying degree of human intervention required to manage and oversee the solution's initial implementation and on-going performance. While some platforms still require manual baselining and correlation definition, other platforms get close to 100% hands-off monitoring.
- **Context.** Monitoring with ML enables not only to surface anomalies, but to also correlate between anomalies in different areas in order to expose the context of what is happening, and, in some cases, the cause. While Time to Detection (TTD) is exclusively determinant on the technology, Time to Resolution (TTR) can be decreased dramatically with good contextual information. While this is a critical feature, current solutions vary widely in the ability to correlate across metrics and dimensions.
- **Noise reduction.** Surfacing critical alerts while preventing alert storms, false positives and false negatives separates the monitoring boys from the men. Monitoring solutions offer different logics and methodologies for noise reduction mechanisms, opting for the sweet spot where no critical alert is silenced — but noise, and the troubleshooting associated with it, is reduced to a minimum.
- **Implementation & time to value.** As with most other data platforms, implementation and positive ROI time can vary greatly from a few weeks to a year. When time is of the essence, this is an important factor to consider.
- **Cost of ownership.** Solutions differ in pricing logic and levels, hosting prices, and scaling costs.  Most monitoring solutions can have high costs as you scale due to data volume or host-based pricing models. When considering TCO it's also important to examine the solution's integration with existing monitoring solutions, which can reduce secondary monitoring costs.

# Comparison of buying options

| | Autonomous Business Monitoring | Application & IT Observability Platforms | Enterprise Data Monitoring Platforms |
|---|---|---|---|
| **Vendors** | Anodot | New Relic, AppDynamics, Dynatrace, Datadog | Splunk, Microfocus, Broadsoft, BMC |
| **Data coverage** | Infrastructure,<br>App. Performance,<br>Digital Experience,<br>Revenue and Cost,<br>Partner.<br>• No limits on data | Infrastructure,<br>App. Performance,<br>Digital Experience<br>• Can't deal with complex and volatile business data<br>• Limits on data | Infrastructure,<br>App. Performance,<br>Security<br>• Limits on data |
| **Level of monitoring automation** | • Autonomous real-time detection and alerting on all data<br>• Auto-learning of seasonality<br>• Autonomous learning of metric behavior<br>• Automatic selection of optimal model from over 20 algorithms<br>• Sequential adaptive learning and feedback<br>• Fast detection time, including detection of small and slow leaks | • Real-time detection and alerting only on manually created alerts<br>• Anomaly detection on suitable data only; must be applied manually<br>• Manual setting of granular alerting parameters such as algorithms, deviations and roll-up intervals<br>• Manual thresholding for alerting, warning and recovery of each KPI<br>• Limited selection of anomaly detection algorithms that need to be selected on alert creation<br>• Pre-defined seasonality selection | • Real-time detection and alerting only on manually created alerts<br>• Anomaly detection and specific criteria needs to be manually enabled for each alert<br>• Limited selection of anomaly detection algorithms require manual selection on alert creation<br>• Limits on memory, hardware and number of entities monitored<br>• Pre-defined seasonality selection |
| **Context** | Fully automated, comprehensive event and metric correlation, and root cause analysis via a patented correlation engine | Automated event correlation based on pre-generated software map | Manually predefined event correlations using time and geographic location, transactions, sub-searches, field lookups, and joins |
| **Noise reduction** | Advanced alert scoring, alert reduction, and false positive reduction mechanisms | Alert reduction via user-defined and system-suggested logic which must be applied to each alert | Manual data enrichment and alert deduplication for noise reduction |
| **Implementation and time to value** | Anodot can be implement within 2-4 weeks and can deliver value within the first 30 days | IT and APM tools typically take months to implement and 3-6 months before they can deliver value to the organization | Very complex to implement, typically taking a year or more before they can deliver value |
| **Total cost of ownership** | Low: Metric-based pricing regardless of data granularity, no limits on data and hardware. Anodot works seamlessly with existing monitoring solutions to improve the quality of alerts generated and reduce secondary monitoring costs | Medium: Data volume and host based pricing usually starts low but quickly balloons as you scale. Many companies complain of the high costs of IT & APM monitoring. | High: Each area of the monitoring stack is typically sold as a stand alone product, which is priced and implemented separately. Sprawling costs with increase in data types, volume and hosts. Can ingest data from other monitoring tools but this incurs additional costs. |

# Build vs. Buy Comparison

While viewing the build vs. buy options for Autonomous Monitoring side by side, some key points come to light:

**The complexity of autonomous monitoring makes it especially hard to build.** That's why generally, build scenarios are applicable in two cases only:

- For small companies monitoring small stream of uncomplicated data
- For very large, innovative tech companies with dedicated R&D and dev teams.

**The complexity of autonomous monitoring makes it especially expensive to build and maintain.** Estimates show that developing and maintaining a data-driven enterprise software application can cost upwards of $4 million USD. Given that real-time monitoring is at the cutting edge of computer science, your project might greatly exceed this figure.

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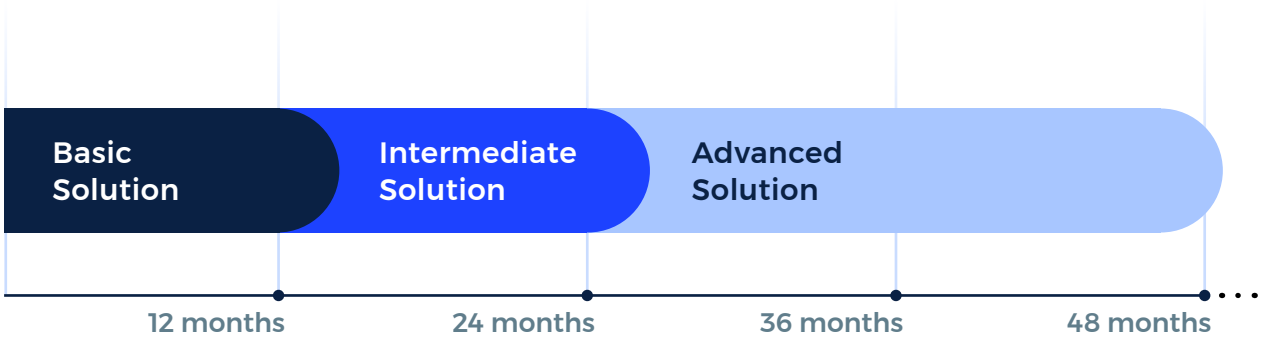
**Building your own solution? Expect an exceedingly long time to value.** To recap, the duration of building an anomaly detection and monitoring solution is as follows:



**You will struggle to achieve the scale and performance of best of breed dedicated solutions.** Even after investing the above resources, the final solution's performance will usually fall behind that of dedicated solutions:

1. Basic home grown solutions usually struggle to scale with the business. As businesses grow, the number of metrics to monitor may multiply very quickly, and you essentially "scale out" of the feasibility of implementing your own outlier detection approach.
2. More mature home grown solutions (Intermediate and Advanced) will struggle to achieve the results of dedicated solutions built on the cutting edge of monitoring science. Under par results will inevitably translate into:
    - Less accurate detection
    - Longer time to detection and resolution
    - More noise

**Most home grown AI solutions fail.** According to Gartner, 85% of AI projects ultimately fail to deliver on their intended promises to business. High failure rates of bringing AI to production and keeping it on the rails result from the inherent complexity of AI solutions, multi-faceted data challenges, and production challenges related to both maintaining model confidence and scaling the solution.

**Since Anodot is a completely autonomous solution, customization comes with the territory.** While customization is a key driver towards the "build" route, it is actually better achieved by the advanced machine learning algorithms built into mature solutions. This is doubly true in case of Unsupervised ML systems, like Anodot. Anodot's patented library of monitoring algorithms and cross-data correlation enable it to instantly adapt to any data architecture, business logic and signal type out there.

**Anodot's fast and seamless integration and implementation level the playing field for time to value.** For many companies, the typical exceedingly long implementation time of monitoring solutions is a trigger for building their own. This rejection is irrelevant for Anodot, which can be up and running within weeks.

# Conclusion

AI-based monitoring and anomaly detection is the key to ensuring that businesses can keep pace with the high level of service required for mission-critical applications. Early, contextual detection is a basic requirement for speedy resolution. AI-based monitoring creates more visibility and provides the agility needed to mitigate the outages, blackouts, glitches and issues that do and will happen.

There is a wide range of monitoring solutions on the market, and adoption is often correlated with the organization's maturity level. IT monitoring is implemented very early on, and APM usually follows closely. Mature organizations require the monitoring abilities that only Autonomous Business Monitoring can deliver by monitoring and analyzing 100% of the business's data, including complex signals influenced by volatile parameters such as seasonality and human behavior.

Companies opting to build their own solutions need to understand the costs, staffing challenges, and potential pitfalls to ensure that any home-grown solution not only serves its intended purpose, but also provides a comparable return on investment. While the promise of open-source AI-based solutions is great, so are the challenges associated with implementing them at scale, and, especially, of moving beyond the proof of concept to production — an endeavor which only a fraction of companies building their own platforms successfully achieve.

To start with AI-based monitoring fast it's critical to accelerate time to value by reducing prolonged development and implementation times. In the case of monitoring solutions, reducing time to value works in two channels: less resources are spent on building a solution, while implementing a monitoring solution without delay dramatically cuts costs on faster detection and resolution of incidents that are already happening right now.

# Anodot Autonomous Business Monitoring

At Anodot we enable teams to adopt a proactive approach to monitoring focusing on the core indicators impacting your business. Our customers use Anodot to rapidly identify and resolve revenue-critical issues before they impact your business. Our platform uses machine learning to constantly monitor and correlate every core indicator, providing real-time alerts, in their context. Our patented technology is trusted by Fortune 500 companies, from digital business, finance and telecom. Anodot reduces time to detection and resolution of revenue-critical issues by as much as 80%. We have your back, so you're free to play the offense and grow your business.

## Built for Autonomous Monitoring of All Data


www.anodot.com