



Mastering the operational complexity of IoT Applications

The benefits of AI-powered, full stack monitoring



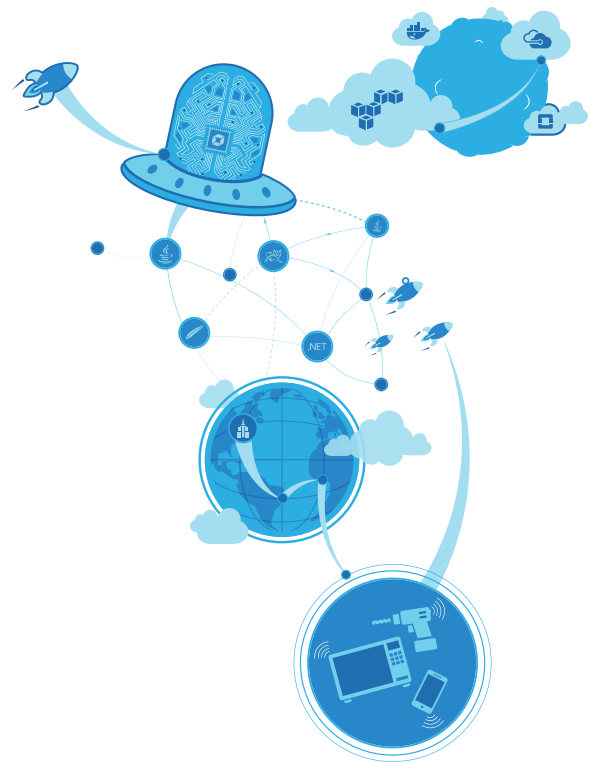
Executive Summary

Internet-of-things (IoT) is increasing in excitement across all industries as they look to provide innovation in their product and services, and monitor risks and costs in their business operations. But IoT is not a single technology. It is an ecosystem of human and non-human touchpoints that span across multiple technologies. This creates a dynamic and complex environment that is difficult to see and manage in scope.

The traditional monitoring approach of watching dashboards, responding to alerts, and manually analyzing doesn't work anymore. Today's hyper-dynamic, highly distributed IoT application environments have become way too complex and move too quickly. The volume, velocity, and variety of information is simply more than humans can keep up with using traditional tools.

Artificial intelligence, however, can absorb terabytes of data and make sense of it instantaneously. It automates the "heavy lifting"—all the discovery and analysis that take teams of experts hours or days, AI does in milliseconds—and proactively identifies problems and pinpoints the underlying root causes across the entire IoT ecosystem.




This short paper discusses IoT scenarios, challenges and implications, and how AI-powered, full stack monitoring can transcend the complexity of IoT and make it easier to manage. Sample use cases across industries are also provided.



The Internet of Things (IoT) is transforming how we do business and how we live

Digital transformation and IoT are everywhere, including retail experiences and wearables, industrial and manufacturing applications, the connected home and smart cities. These trends are changing the world not only in terms of providing new user interfaces, but also by creating a completely new set of non-human touchpoints and multiplying them across any number of smart devices: home security systems, industrial sensors, televisions, and connected cars, to name a few. These two worlds are escalating together more tightly than ever before as the traditional environment of information technology and operational technology create the new ecosystem of IoT.




Forrester Research identifies three main IoT business scenarios:

 <p>Experience designers can embed IoT sensors in products or environments to enable better customer experiences.</p>	 <p>Business-process owners at all companies can operate IoT-enabled assets to improve their operations and tie them closer to customer journeys.</p>	 <p>A variety of business leaders can consume third-party IoT data or insights to improve their operations and offerings.</p>
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Successful companies will leverage IoT to optimize their existing operations, differentiate their products and services, and transform entire markets through new offerings. ⁽¹⁾

⁽¹⁾ "Untangle Your IoT Strategies, The Three IoT Scenarios And How They Drive Business Value", by Frank E. Gillett, September 21, 2017, Forrester Research

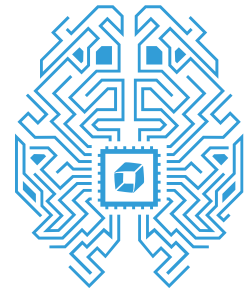
Challenges that IoT companies and developers face

 <p>Massive complexity and scale</p>	 <p>Impact on business-critical systems</p>	 <p>Diverse data sources</p>
<p>IoT ecosystems are complex, with many moving parts and huge amounts of data. Traditional or homegrown monitoring approaches are not built for, and cannot scale, to access complete insights into these dense environments.</p>	<p>In many cases IoT applications are mission-critical, with a direct connection to a business process or user experience. Because poor performance or outages can have a direct impact on the bottom line, when issues occur, identification and resolution of those issues needs to happen quickly, ideally proactively or in real time.</p>	<p>IoT systems may include a wide variety of edge devices, ranging from simple sensors to full-blown Linux servers, and everything in between. Monitoring systems need to be flexible enough to instrument and ingest data from all of these device types.</p>

Empowering artificial intelligence to address IoT challenges

The Internet of Things (IoT) is an ecosystem of technology. This universe of technology – unified around IoT cloud platforms – collects a gold mine of operational data that can help businesses and developers overcome the IoT challenges by identifying performance issues and risks.

The problem is that the sheer complexity of the environment, and volume of this data, is beyond human accessibility and capacity. But, by empowering artificial intelligence (AI) into the monitoring process, it is now possible to analyze these high volume, complex and dynamic ecosystems. The billions and billions of events that occur in real-time can be viewed in a format that is not only understandable, but actually gives you actionable insights (by priority of critical impact on the business) so that you can constantly improve the total IoT experience.



Manage IoT ecosystems the easy way with Dynatrace AI-powered, full stack monitoring

Dynatrace is the only performance monitoring solution that is designed to automatically detect and analyze an IoT topology without any manual configuration. It delivers full operational insights into the complex ecosystem of technology: sensors, devices, gateways, networks, cloud environments, private data centers and applications. The AI-powered engine allows you to:



Manage IoT complexity and scale with prioritized actionable alerts and insights

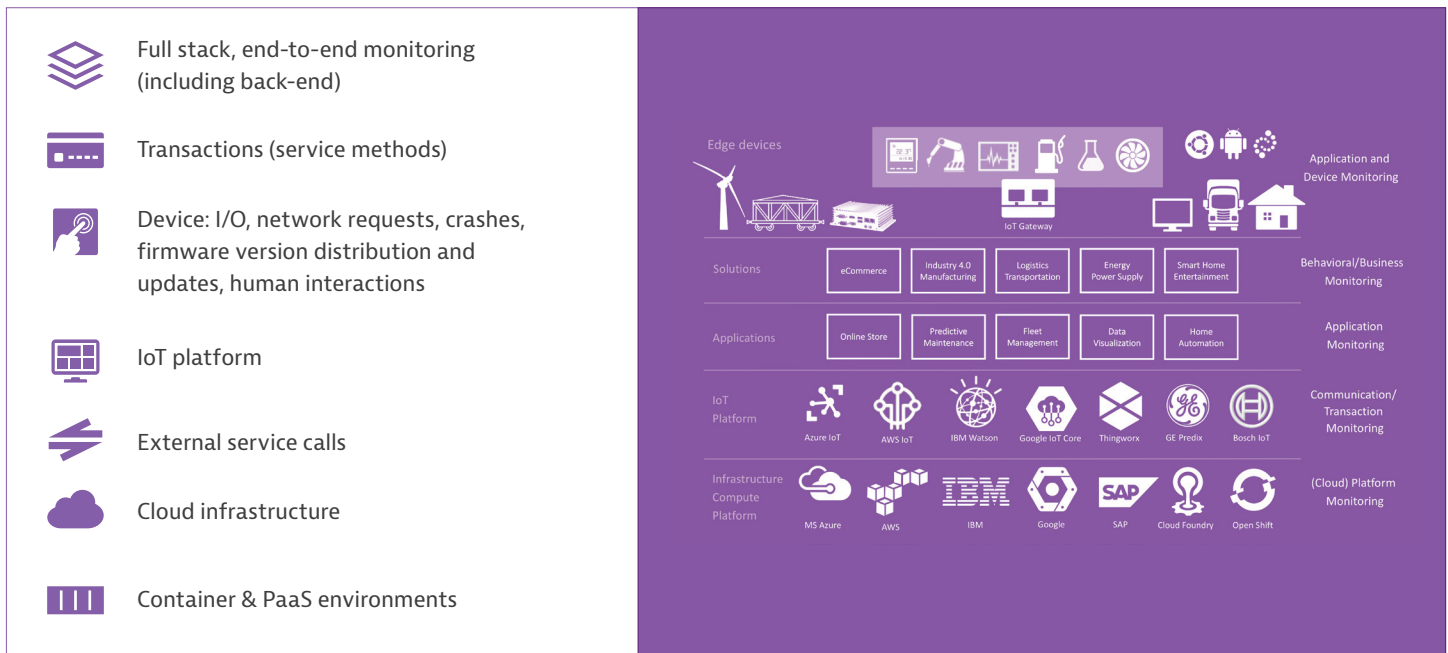


Understand the impact, and resolve, issues affecting business-critical systems quickly and proactively, in real-time



Ingest and understand health of diverse data sources from a wide variety of edge devices, simple sensors, to full blown servers and everything in between to understand performance, and create improvements in your IoT environment

AI-powered, full stack Dynatrace monitors not just the behavior of the back-end cloud platform, but also enables monitoring on the devices themselves. Dynatrace monitors:



Dynatrace does not monitor individual sensors - the minimum requirement for monitoring is that it can run its own code and perform actions and network transactions. However, communication between the sensor and the device could be an action which is monitored, e.g. activities, health, records timing, latencies, and errors to feed these metrics into the overall context of the application.

Dynatrace also does not capture the payload from a sensor; it is not a big data solution or a visualization tool for sensor data.

Dynatrace is the solution for monitoring the entire ecosystem because proper IoT monitoring includes not just the device, but also IoT back-end applications and integration into business processes.

How does Dynatrace AI-powered, full stack monitoring work?

OneAgent - OneAgent is used to instrument applications, cloud environments and back-end infrastructure with zero configuration. OneAgent is directly executed at the OS level and automatically detects running processes and services. Optionally, the OneAgent can be integrated into hosted environments. Network transactions are detected out of the box and used for tracing events across the application to an end-to-end transaction via Dynatrace PurePath, a patented technology that enables comprehensive and granular end-to-end monitoring for application performance management.

OpenKit - OpenKit is a set of open source libraries and reference implementations to enable edge devices, gateways, terminals, PoS devices, rich clients, microcontrollers and more to connect to a Dynatrace cluster via APIs. Currently available for Java, Node.js, .NET, and C++, OpenKit can be used to create agent-like processes or directly integrate into a customer's firmware or application running on the device.

Dynatrace solution can be deployed as SaaS or Managed to get full insight into the IoT application end-to-end, powered by AI.

Making IoT real – use cases across industries



Fleet Management

Anomalies trigger alarms and the collected data can be sent from vehicles to smart-panic emergency systems to avoid accidents. If there is an emergency the vehicle can be remotely disabled. Dynatrace ensures that devices are sending data on time and that back-end services are running error-free to make the best emergency decisions.



Off-site oil and gas

Monitors pipelines which can be thousands of miles long; gathers and processes data from sensors which send notifications when anomalies occur – such as leaks or theft of energy. Dynatrace identifies if device is sending and receiving data, and flags the location of issues.



Manufacturing operations

Sensor data is pre-processed on devices controlling the manufacturing process before being sent back for evaluation; improvements via software updates on devices can be delivered regularly. Dynatrace provides actionable data on deployment issues that minimize bad code and associated time and costs.



Smart cities

For example, controlling activation of streetlights, and increasing or decreasing brightness depending on current visibility. This manages costs and controls energy flow based on need. Dynatrace determines if devices are working, and if not, what is the problem, where is it occurring, and who should repair it.



Smart metering

Meters reduce operational costs and collect information about energy consumption, so that heating decisions can be based on fluctuating energy costs to optimize expenses for example. Dynatrace reduces issues like energy theft by monitoring communication and connection issues and detecting and flagging anomalies.



Agriculture

Many use cases, including knowing how much is remaining in a fodder container, or understanding details about the watering level of every single corner in the field. This helps to identify problems like water adjustments or empty containers to minimize risks to crops and livestock. Dynatrace maps all connections and devices and reports on performance, identifying issues and locations of variances.



Healthcare

Sensitive healthcare equipment can be monitored so that critical devices are updated regularly with minimal effort. Dynatrace helps find deployment and performance issues at the exact code level, lowering risk, and saving time and costs.



Connected home

Used in a variety of ways, for example heating, lights, oven, and alarm systems. All of these can be monitored for proper function and performance. Dynatrace assures connections are error free, and if not, identifies the problem and its root cause.



Retail

Consumers get customized offers on their mobile devices for an engaging in-store-experience, sold items can be equipped with sensors to improve customer service. If a problem occurs, a service team can be automatically notified to proactively help the customer. Dynatrace provides visibility at key connection points and identifies whether the customer is having a good or bad experience for faster remediation and continuous improvement.

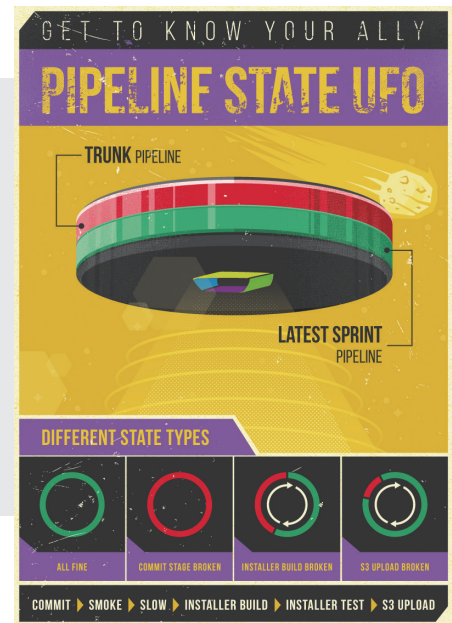


Wearables

As an example, a smart watch may capture biometric readings and use this medical data to improve patient treatment, prevent illness or even detect emergencies and notify the proper authorities. Data could also connect with health insurance providers to access discounts for exercising. Dynatrace can help to show if the connections are working, and if issues occur, locate problem points down to the OS and code level for faster repair or resolution.

Dynatrace IoT use case: Dynatrace UFO

For companies that face the challenges of a distributed team, the Dynatrace UFO is a highly visible IoT device that shares the status of a project. Using the Dynatrace UFOs, a quick stroll through the office tells our engineers if there are problems (red), or if things are running smoothly (green). This helps teams understand if there are outages, if customers are taking advantage of software updates, if specific firmware versions are not performing well, and if there are crashes. See the places you can go with Dynatrace and IoT?



Summary

IoT is an ecosystem of human and non-human touchpoints that span across multiple technologies, creating a dynamic and complex environment that is difficult to see and manage in scope. Traditional monitoring approaches don't work in these environments because today's hyper-dynamic, highly distributed IoT application environments are way too complex and move too quickly.

Dynatrace's AI-powered, full stack monitoring, however, can absorb terabytes of data and make sense of it instantaneously. It automates the "heavy lifting"—all the discovery and analysis that take teams of experts hours or days, AI does in milliseconds. Dynatrace understands how everything works together collectively—every component, every dependency, across every tier—no gaps or blind spots!

Next steps

Are you a cloud provider with your own IoT offering? An industry platform provider? A solution provider or system integrator? Or, do you just want to know more about how to easily monitor an entire IoT environment? Give us a call! Contact our team for Technology Alliances and Innovations at email iot@dynatrace.com.

To learn more, or take a test drive and get started now with a free Dynatrace SaaS 15-day trial, visit us here: <https://www.dynatrace.com/iot>.

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Dynatrace has redefined how you monitor today's digital ecosystems. AI-powered, full stack and completely automated, it's the only solution that provides answers, not just data, based on deep insight into every user, every transaction, across every application. The world's leading brands, including 72 of the Fortune 100, trust Dynatrace to optimize customer experiences, innovate faster and modernize IT operations with absolute confidence.

