Solution Brief

The Power of Analytics at the Edge

Delivering intelligence at the edge with IBM Watson IoT and Cisco Edge Analytics Fabric

IBM Watson IoT

cisco

– IBM and Cisco are working together to provide real time Internet of Things insight at the edge of the network, providing businesses in remote locations with the ability to tap the combined power of IBM's Watson IoT and business analytics technologies and Cisco's edge analytics capabilities to more deeply understand and act on critical data on the network edge
– This breakthrough alliance enables businesses to run analytics where they will make the biggest impact—in the cloud, on premises or right at the point of collection—all from one integrated IoT platform

Capture and analyze your data where it will make the most impact

Digital business and the IoT are placing new demands on how companies think architecturally about the distributed nature of networks, applications, data, analytics and systems. In just ten years, the Internet of Things (IoT) has gone from science fiction, to reality, to exceeding our wildest expectations. By 2020 there will be nearly 21 billion connected devices,[1] generating more bits of data than there are stars in the known universe.[2] Companies need a way to process and analyze this data faster and smarter across the network to achieve distinct business value.

The ability to manage and extract insights from IoT data will be essential to staying competitive in the marketplace of the very near future. But the massive amount of data being generated is both the promise of IoT and its most critical pain point. Not only do businesses need solutions that can help them tap more of their IoT data, they need a way to separate high-value data from the noise.

In a world where IoT is becoming increasingly pervasive, the upside for businesses that can harness more of their data is undeniable. For example, McKinsey estimates that potential economic impact of of IoT to be as much as $11.1T per year by 2025. Factories are estimated to feel an estimated impact of up to $3.7T, while worksites in sectors such as mining, oil and gas and construction could see an impact on the scale of $930B.[3]

Today, industrial worksites have thousands of sensors, but as little as 1% of their data is ever used for decision making[3]—the rest seems to disappear into a sort of "data black hole." So where is the other 99% of data going? Let's start by looking at a single oil platform:

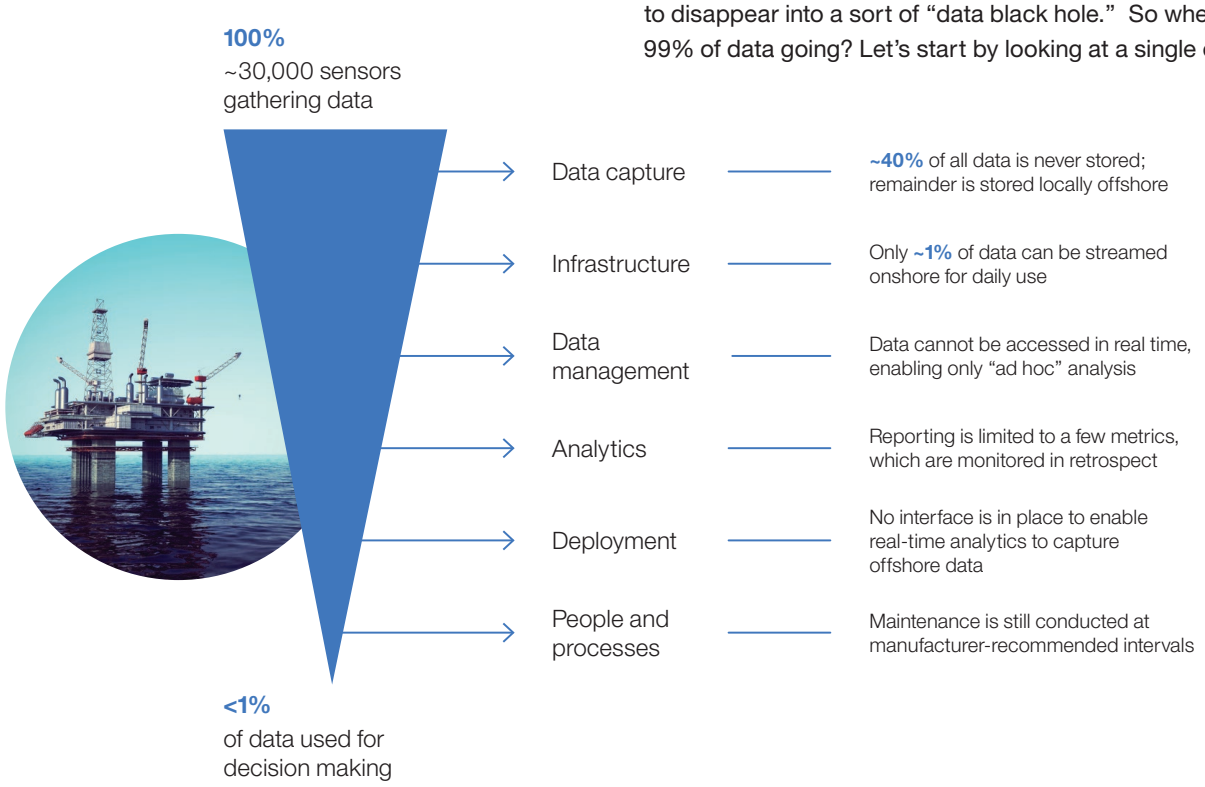


Figure 1: Where does 99% of data go?
Source: McKinsey Global Institute analysis

Most of the missing data is lost right at the point of collection. McKinsey found that 40% of all data is never stored, while nearly all of the remaining 60% is stored locally offshore. That means only 1% is ever streamed to the data center or cloud for analysis. Because of this, data can't be managed or analyzed in real time. Reporting is limited to small number of metrics, which are only viewed in retrospect. In short, businesses are only finding precisely what they are already looking for and missing the opportunity to run deeper analytics on broader sets of IoT data.

These types of challenges are growing as businesses struggle to bring together the data generated by IoT devices across their organization at some central point where it can be analyzed alongside contextual sources like weather and enterprise asset management (EAM) data for greater insights. The sheer volume makes bringing this data to a central location for analysis inefficient and costly.

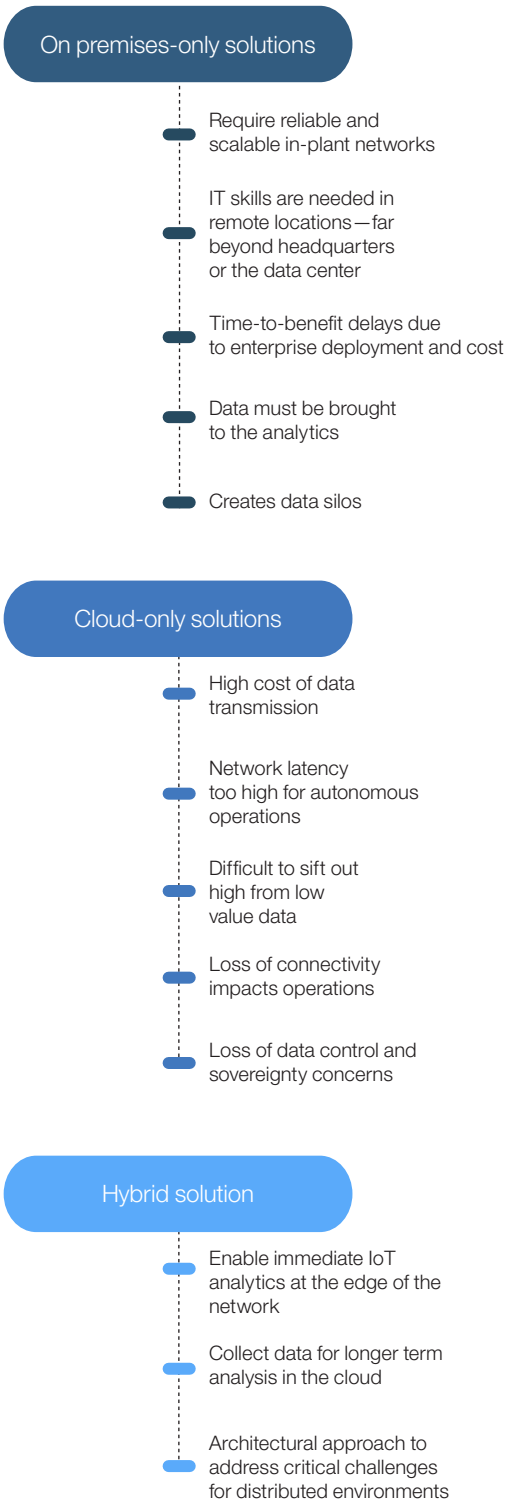
The limitations of today's solutions

Current solutions have, until now, failed to provide an adequate solution to these data challenges.

While IoT is viewed by many as a recent phenomenon, manufacturers have been implementing on-premises IoT solutions for years. These approaches help businesses maintain data security, but they place a burden on central storage. And, more importantly, they create a system of data silos. Data stored locally can't be easily cross referenced across multiple sites and thus goes unanalyzed.

But for many operations, a cloud-only model is not necessarily the perfect fit. The cost of cloud storage is dropping, but transmitting and storing massive amounts of data in the cloud for analysis quickly becomes prohibitively expensive. All data is transmitted at its current fidelity, with no ability to sift out what is of the highest business value. Cloud-based IoT platforms also require a constant network connection, making them less than ideal for companies with remote operations—such as oil platforms or underground mines—who can't afford to cease operating when their connection goes down.

It's clear that bringing data to the analytics has failed to unlock the full potential of IoT. What's needed is a revolutionary new approach that instead brings analytics to the data.



A breakthrough hybrid approach to IoT

IBM and Cisco have teamed up to provide real-time Internet of Things insight to businesses in remote locations with the ability to tap the combined power of IBM's Watson IoT and business analytics technologies and Cisco's edge analytics capabilities to more deeply understand and act on critical data on the network edge and in fog nodes.

This first-of-its-kind solution offers a powerful way to produce immediate, actionable insight at the point of data collection. Ideal for companies operating on the edge of computer networks such as oil rigs, factories, shipping companies and mines, this solution takes processing and analysis to places where time is of the essence but bandwidth is often lacking.

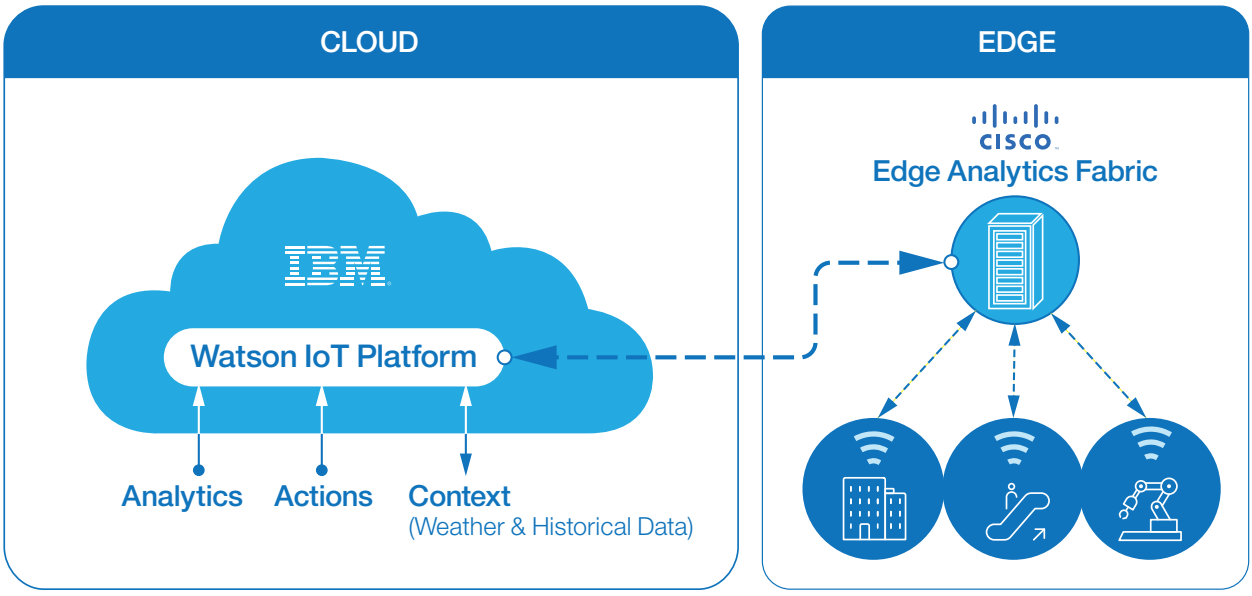
From the data center, to the cloud and now to the edge of network—businesses can define and run analytics where they will have the biggest impact. Distributed data can be processed and analyzed closer to where it's created, eliminating the time and costs associated with transmitting device data across a network. This creates the ability to tightly control how assets are performing against short and long term missions, at the point of data collection. Now you can solve complex, distributed data challenges with a best-in-class solution.

To understand how this solution works, take the example of a turbine, which may be producing gigabytes of data per day from numerous sensors. When that data hits the Cisco network device, it can now be immediately measured against business rules. If certain conditions are met, it can trigger an action, such as firing off a maintenance alert. Then it will send only data defined as essential to the Watson IoT platform in the cloud, reducing data transmission. The Watson IoT platform analyzes this data—drawing in contextual sources such as weather, audio or video—and processes it alongside the broader view of data from every other machine across the organization. Cognitive capabilities allow the system to learn from this data and adjust its algorithms for optimal turbine performance. Intelligence from these updated algorithms can then be pushed back to the edge of the network, where each turbine is measured against the new models of operational efficiency.

This innovative solution optimizes data for immediate analysis and decision making at the edge of the network and beyond. Through the work of two trusted brands, this differentiated solution tames the complexity of distributed environments, addressing low latency requirements and reducing network traffic and costs without compromising the quality of analytics.

"With IBM and Cisco we have immediate insight into the health of our equipment locally at the edge, and our overall operations in the cloud."

Eduardo Bustamante,
Director of Operation, Port of Cartagena



Key benefits for businesses

- **Best-in-class collaboration:** Cisco and IBM—leaders in networking and cognitive analytics—deliver a single, hybrid IoT platform that solves the most critical operational and business challenges in IoT today. Together, we are empowering clients to put analytics where they need it most: at the edge, in the cloud or any point in between.
- **Filter essential data:** Data processing and analytics are performed where they will have the biggest impact; data can be monitored and evaluated at the edge, and only relevant data can be transmitted for deeper analytics in the cloud.
- **Reduce costs:** Analyzing business data is no longer an all-or-nothing prospect. Filtering out non-essential data lets businesses analyze and store data where it will be most effective, leading to a dramatic reduction in network and storage costs. One analysts estimates that data processing costs are reduced by 30% when the edge is 200 miles away from the network and by 60% when the edge is 100 miles away.[4]
- **Powerful analytics:** Watson IoT represents the leading edge of cognitive computing and analytics, processing IoT data and other contextual inputs, redefining data exploration and uncovering patterns and insights previously unattainable. Cisco delivers valuable edge and fog analytics that connect business patterns to data at the edge of the network.
- **Redefining the role of the network:** By infusing network devices with intelligence, this solution redefines the role of the network itself in IoT. In doing so, it massively expands network capabilities without impacting bandwidth.
- **Correct anomalies before they become problems**: Monitor asset behavior against performance models, then course correct for trending metrics. A recent report found that nearly half of all maintenance efforts are ineffective.[5] Maintenance work based on actual machine condition will help you respond more quickly to anomalies, reducing downtime and eliminating wasted work.
- **Better data control and sovereignty:** Many businesses are reluctant to stream the entirety of their data to the cloud. This solution gives them control over precisely what is stored and analyzed locally, and what is sent for centralized analysis.

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Use cases

This new capability to run analytics where they will have the biggest impact and cost savings has benefits for various industries.

Today, autonomous operations are common in automotive, oil and gas, heavy equipment and manufacturing industries. In order to maintain competitive advantage, equipment on the plant or factory floor needs to be able to operate autonomously, 24x7x365. There is a strong need to gain insights from the performance of this equipment across all sites. But when milliseconds are critical, operations often can't spare the extra time it takes to send data to the cloud and back. Analytics at the edge allows businesses to tap more of their data for valuable insights.

Autonomous operations

- **Impact on processes:** Course correct asset performance before it impacts the business. Rely on the precision of sensors and analytics rather than human judgment (and potentially human error) to adjust performance rules. Adjust production steps based on precision measures while parts are still in production phase. Downstream quality detection drives notifications for service of upstream performance.
- **Impact on people:** Use video to monitor workers in construction sites or hazardous areas, and instantly analyze with Watson IoT platform—reducing human observation costs by 30% to 50%.[3]
- **Impact on equipment:** Recover as much as half of your maintenance budget by aligning maintenance investment to asset condition, rather than manufacturer recommendations.[6] Monitor equipment by video (drone) and audio to immediately detect anomalies.

Remote management is widespread in industries like transportation, oil and gas, utilities and mining. Manufacturers with geographically distributed equipment and infrastructure need a reliable way to monitor performance, regardless of location. But getting data back from these assets is often difficult because of transmission costs and lack of a steady cellular, satellite or network connectivity. Analytics at the edge can help reduce operations costs by 5% to 12.5%,[3] while boosting productivity and extending the lifetime of the equipment.

Remote management

- **Impact on operations:** Monitor performance across all connected assets for insight into dependencies and correlations that cause failure. Gain contextual insights from weather and environmental equipment that impact performance.
- **Impact on people:** Monitor and evaluate remote locations for hazards; trigger action based on safe operating directives. Monitor weather and trigger mitigation plan based on conditions. Monitor worker health in hazardous environments against personal health history.
- **Impact on equipment:** Evaluate asset performance at the point of monitoring, drive corrective action, reduce wasted work in progress and premature asset degradation. Increase condition-based maintenance to reduce the need for capital investments.

"Silverhook Powerboats is tapping into Cisco edge analytics and IBM Watson IoT business analytics to help race pilots react immediately to environment and multi-variant engine conditions in real time. For example, this helps the pilot know when to throttle back in a split second to prevent the boat's systems from failure and to perform optimally. Without this insight into the critical data, the outcomes could spell disaster."

Nigel Hook, CEO of DataSkill,
Inc. Founder of Silverhook Powerboats

Companies managing large fleets of assets, machines or vehicles—in industries such as commercial real estate, transportation or electronics—face a unique set of challenges. They must monitor a widely dispersed set of assets, usually across many sites, often generating a high volume of data. In addition, they are sometimes located in or passing through areas where there is no connection to the network (a train traversing remote mountain ranges, a ship in the middle of the ocean, an oil platform in the North Sea). The challenge is to determine which data will be brought centrally for analysis, and what will remain onsite. Analytics at the edge now empowers businesses to choose precisely what data is best analyzed at the edge and what should be transmitted centrally.

Large-scale fleets

- **Impact on logistics and scheduling:** Link insights from weather and environmental or physical infrastructure conditions that effect schedules, drive actions based on operational business rules. Connected navigation systems automate alternate course selection. Trigger service events based on analysis of changed conditions.
- **Impact on people:** Anticipate and automate climate control adjustments based on predicted impact of weather. Wearable technology can monitor and alert worker health and safety, assuring safe operations and occupant comfort and safety.
- **Impact on equipment:** Recover as much as half of your maintenance budget by aligning maintenance investment to asset condition, rather than manufacturer recommendations.

Conclusion

The ability to infuse intelligence at the edge of the network will begin generating immediate value for businesses. This will deliver distinct insight for customers to address their most complex IT/OT challenges in distributed environments.

As the computing power of the network grows, increasingly complex analytics capabilities can be pushed to the edge. Predictive analytics, powered by machine learning, will be able to read and evaluate data against expected outcomes at the source, without needing to transmit to the cloud. Unstructured data such as text analytics—perhaps years of hand written maintenance technician logs—can be fed into the analytics system and examined as additional sources of data which, in turn, update operating models. Insight on past work becomes part of recommended next steps in this future perfect state of cognitive analytics.

With this first-of-a-kind offering, a hybrid solution with the ability to distributed cognitive analytics from edge to cloud, Cisco and IBM have taken a very important step on the path toward helping businesses harness the value of IoT.

Want to learn more?

Visit us at ibm.biz/totheedge to watch a replay of this groundbreaking announcement, read an infographic, hear from clients and more.

Footnotes

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