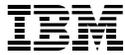# Optimize your Internet of Things strategy with predictive analytics

Incorporate predictive analytics to improve product and service offerings

Highlights

- Obtain accurate, detailed performance insight from data produced by myriad instrumented devices

- Deliver real-time asset performance information to lines of business

- Apply performance insight to improve product quality, functionality and reliability

- Employ predictive maintenance to transform business models from product-based into service-based

The Internet of Things (IoT) era is here. A proliferation of smart sensors, mobile devices and interconnected systems are generating, collecting and transmitting enormous volumes of data that are changing almost every aspect of the way industries do business.

Auto manufacturers already monitor car performance to alert drivers to potential repairs. Energy companies use sensors to proactively identify generation, transmission and distribution infrastructure maintenance issues. Medical devices can alert doctors to potential health issues earlier than ever before. As devices become increasingly instrumented and connected, benefits accrue to both manufacturer and consumer (or maker and operator) in terms of the value provided.

The IoT represents a transformational opportunity for organizations that successfully acquire, analyze and act on the data produced by myriad devices and their connections (see Figure 1). In many instances, you can gain real-time insight into product performance and usage. Moreover, you can use these insights to refine or invent new product or service capabilities, address new markets and even redefine your business models.
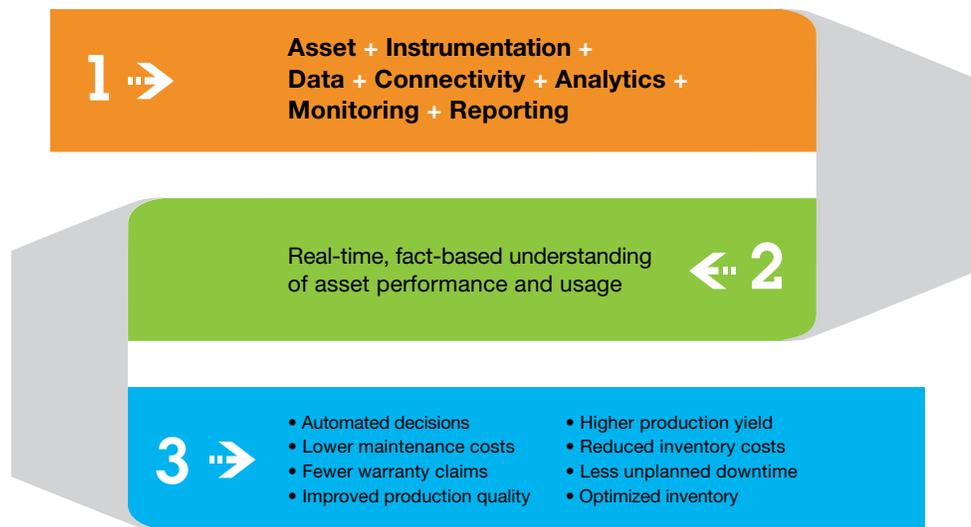
Figure 1. Unlock insights from the Internet of Things with predictive analytics.

To successfully realize these benefits, you need to:

- Efficiently manage the volume, variety and velocity of IoT data
- Employ sophisticated predictive analytics to accurately model IoT device performance
- Adopt a predictive strategy to efficiently monitor, maintain and optimize your IoT offerings

Device data: A foundation for understanding performance and usage

Instrumented devices have a story to tell. They generate time, location, temperature, operator and many other relevant performance metrics that you can capture and use to create an accurate model of device performance and usage. As you acquire more device data, perhaps as a result of additional instrumentation, you can continually improve your performance models.

In the IoT, the value of "things" is measured not only by the data they generate, but also by the way they connect with people, organizations and other things. Without the right connections, instrumentation can shift from competitive advantage to unmanageable complexity.

Your IT infrastructure must be able to efficiently capture and manage all this data, both now and in anticipation of future IoT data-related requirements. Exploiting that data also requires much more flexibility than traditional out-of-the-box statistical or analytics packages generally offer. You need capabilities to manage a wide variety and volume of data types, identify which data sources are most relevant in describing device performance, and continually refine your performance models to improve predictive accuracy.

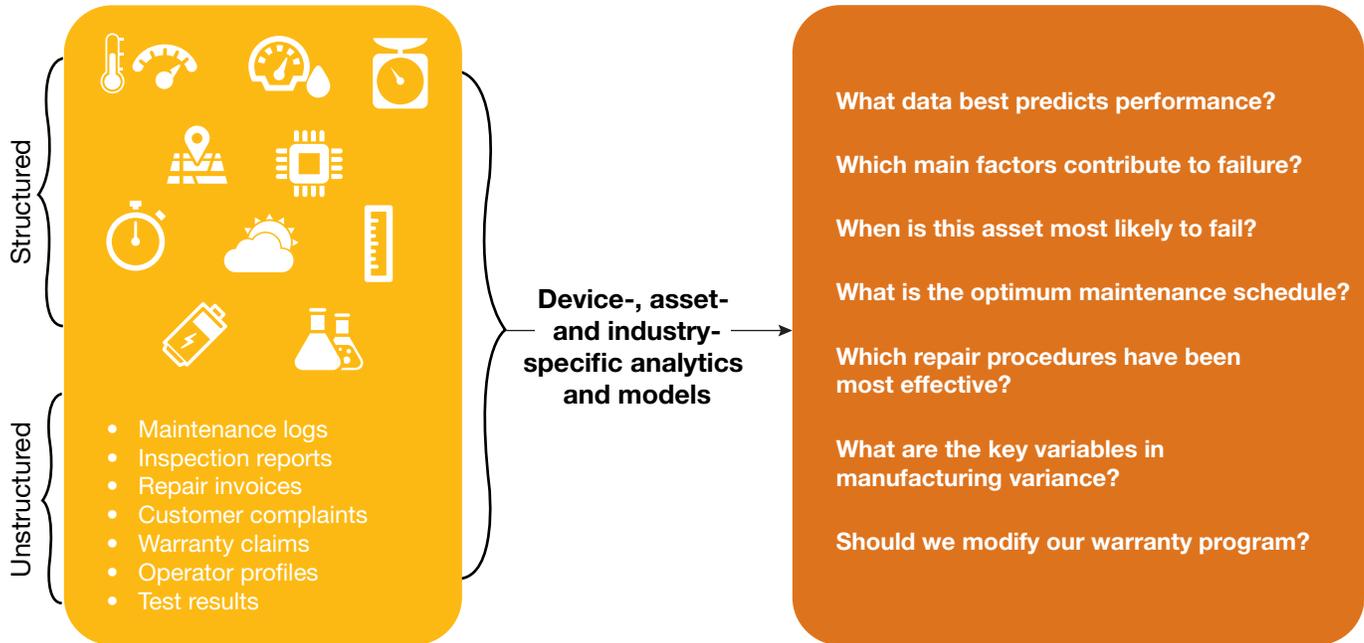**Create accurate predictive models that inform makers and operators**

Figure 2. Adding value to your IoT offerings and enhancing the customer experience requires an end-to-end solution for collecting data from instrumented devices and turning it into action.

Predictive analytics: Exploiting the potential of IoT

If your goal is to exploit the potential of the IoT, you'll need powerful analytics capabilities. Analytic algorithms designed for specific devices, products and industries can extract relevant insights from the data streaming in from devices and products, maintenance records, productivity metrics, warranty claims and customer service inquiries (see Figure 2).

Sophisticated statistical analysis, such as real-time and predictive analytics, delivers numerous benefits to line-of-business (LOB) teams as well as customers. You can use these techniques to determine the combination of data that most accurately predicts degraded performance, improper usage or pending failure.

As a result, product designers can gain a better understanding of actual or sometimes unexpected usage, identify components that are prone to premature degradation, and develop ideas for product enhancements and new applications. Your quality control and procurement teams might learn that a product fails because of substandard components obtained from a particular supplier. Your customer service team can proactively alert customers to potential recalls and optimize maintenance service schedules. And your warranty management group can develop cost-effective programs based on product usage that may vary considerably across market segments or geographies.

Transforming the business through predictive maintenance and quality and the IoT

Data from instrumented devices can facilitate real-time monitoring, and enable a predictive maintenance approach from the very start of your emerging IoT strategy. You can proactively initiate alerts, notifications and inspections, and potentially execute real-time device modification without removing the device from service.

If your current product or service maintenance strategy is reactive, preventative or condition-based, analytics and development of predictive models enable you to implement a predictive, proactive strategy. Such a strategy takes full advantage of your IoT offerings by helping improve asset availability and the quality of products and services. It can also lower maintenance costs and optimize spare parts inventory.

Each system can become its own interactive, adaptive and intelligent network of not only things, but places and people. The IoT presents a tremendous opportunity for organizations to achieve their high-level business objectives, including finding new revenue models, lowering costs throughout all phases of the product lifecycle and improving customer experiences.

By leveraging predictive analytics and the IoT, you can transform your business from a product-based model to a service-based model. To optimize the customer experience, for example, you could offer an extended warranty that includes an agreement to proactively manage the product. This means that even before your customer discovers a problem, you have dispatched maintenance personnel to inspect, repair or replace it. The potential is virtually unlimited for organizations that want to capitalize on the opportunities provided by combining the power of analytics and rich IoT data.

How IBM can help

With years of experience and market leadership in information management, data quality and analytics, IBM solutions can help you capture and manage the ever-increasing volume and variety of IoT data. Using IBM solutions, you can turn that data into indispensable insights that inform and enhance your products and services.

IBM research in device-, asset- and industry-specific predictive algorithms paves the way for integrating predictive maintenance and quality capabilities into IoT offerings. For example, IBM has developed specific models for rotational equipment, pumps, turbines and electrical distribution infrastructure, as well as models for top failure reasons, maintenance optimization, wear and tear, and integrated asset health.

In addition, IBM has helped clients create custom predictive models to accurately describe device performance. These solutions let organizations monitor device performance in real time and display data in a format meaningful to LOB users. They can readily assess the current state of a device, asset or product with the goal of continuously improving functionality, availability and service.

IBM Predictive Maintenance and Quality

IBM® Predictive Maintenance and Quality is designed to reduce operational costs, improve asset productivity, increase process efficiency and promote product quality. The solution does so by providing operational, maintenance and quality insights directly to decision makers. Sophisticated analytic capabilities help you monitor, maintain and optimize the components that comprise your IoT products and services. These capabilities can improve utilization, performance and quality, as well as help you predict failure points.

The solution combines data from disparate sources and automatically detects asset failure or product quality degradation patterns. It can help predict future failures, enabling preemptive deployment of maintenance and repair resources. In addition, it can identify minute changes in product or materials quality well in advance of traditional statistical process control methods.

By taking advantage of capabilities for master data management, advanced analytics, business intelligence, dashboards and visualization, IBM Predictive Maintenance and Quality delivers comprehensive analysis to improve decision-making confidence. Its open architecture enables the solution to work with multiple data sources and data types: structured and unstructured, real-time or batch, streaming or at rest. The customization and adaptability of IBM predictive models—plus pre-configured dashboards and visualization templates, and an analytics data store available through a service-oriented architecture—mean IBM technology can be tailored to your specific industry, device, product and customer service scenarios.

IBM can help you construct a comprehensive IoT solution that includes IBM Predictive Maintenance and Quality and other key elements:

- **IBM IoT Foundation:** Fully managed, cloud-hosted service designed to simplify and derive value from your IoT devices
- **IBM Maximo® Asset Management:** Single point of control to manage physical assets on a common platform allowing organizations to share and enforce best practices, inventory, resources and personnel
- **IBM Global Business Services®:** Consulting organization with deep industry and implementation experience

Act now to incorporate a predictive culture into your IoT strategy, and position your organization on the forefront of device management, maintenance and performance. Become a leader in your industry as the IoT reinvents and redefines almost every aspect of current business practices.

For more information

To learn more about the value of predictive maintenance and quality for IoT solutions, contact your IBM representative or IBM Business Partner, or visit:

- **ibm.com**/software/products/en/predictive-maintenance-quality
- **ibm.com**/software/info/internet-of-things

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