

A White Paper

# Achieving Digital Transformation Using IoT and Big Data



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**Information Builders helps organizations transform data into business value. Our business intelligence, integration, and data integrity solutions enable smarter decision-making, strengthen customer relationships, improve performance, and drive growth.**

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# IoT in Action

The Internet of Things (IoT) is the latest buzzword. In this white paper, we'll tell you what IoT is, the impact it will have on your organization, and how to use it strategically in today's business climate. We'll also share use cases and real-world IoT success stories, and discuss how Information Builders technologies fit into your IoT strategy.

Before we get into defining IoT, let's see what it can do.

## Air Travel

When you travel, the airline, airport, and plane are most likely using the Internet of Things. For example, aircraft may use IoT devices to prevent delays and keep passengers safe by detecting mechanical anomalies in real time. IoT can also enhance passenger service and convenience by informing travelers where they need to go and what amenities are available to them along the way, or monitoring the movement of their luggage – something Delta is doing successfully. The airline enables customers to track their bags from drop off, to the plane, and eventually to baggage claim.<sup>1</sup>

IoT can also increase the cost efficiency of flight operations, while improving the passenger experience. For example, multiple devices can be used to monitor cabin pressure, temperature, and other in-flight services.<sup>2</sup>

## Virtual Personal Assistants

Alexa is a virtual personal assistant that lives inside a device from Amazon called the Echo. Voice recognition and speakers enable Alexa to respond to a variety of commands, such as playing music, reading news, setting alarms, controlling household appliances (television, garage door, lights), ordering pizza, or paying bills. Households are not the only beneficiaries of Alexa's capabilities. Hotels, offices, and other organizations can use Amazon Echo to send reminders when meetings and conferences are occurring, provide directions to those events, and more.

Data collected from devices like the Echo provides business stakeholders with insight into various information requests. Data can also be shared with others – for example, with music producers who can analyze it to determine what kind of music is popular among certain age groups, in certain places, or during certain activities. Another example might be the anonymous analysis of service and activity requests from Echos in hotel rooms, to determine which business or tourist requests are trending. Predictive analytics can also be applied here, to seek out patterns and trends in device data to uncover which factors have the most influence on outcomes and anticipate what is likely to occur based on current and historical device information.

<sup>1</sup> Drummond, Michele. "5 Great Ways Airlines Are Using the Internet of Things," Mercator, August 2016.

<sup>2</sup> Jenner, Gillian. "Analysis: How Airlines Are Tapping Into the Internet of Things," FlightGlobal, July 2015.

## Sports

Data collected from IoT devices can mitigate the risks associated with sports-related injuries and help teams play more effectively. Think of the innovative new “smart” football helmets that are connected to IoT devices. They can measure the impact of a hit and assess whether it was hard enough to cause a concussion. Early intervention lessens the severity and longevity of the injury, getting star players back on the field faster.

In the future, team managers and their athletes will be able to collect and monitor performance feedback in real time. Many are looking to IoT as a means of obtaining more granular information about a player’s condition – before, during, and after a game. Data management tools can be used to merge disparate data sets from team doctors, physiotherapists, sports scientists, and other sources. Predictive analytics can then be applied to mine that data to anticipate an athlete’s future performance in competitions, as well as his or her potential longevity.<sup>3</sup>

## Healthcare

IoT can empower providers and health networks to monitor locally and manage centrally, increasing care efficiency, effectiveness, and quality. For example, they can combat rising care costs and encourage patients to visit their primary care physician – rather than a hospital – for non-emergencies by collecting, integrating, and utilizing information obtained from wearable sensors to steer patients to the right provider.<sup>4</sup>

## Military Operations

IoT devices can be attached to weaponry, transportation equipment, and other machines to ensure they are maintained with minimal time delays and costs. The data collected from these devices will allow for predictive maintenance and placement schedules, based on past trends. This preserves taxpayer dollars while helping the military operate as safely as possible.<sup>5</sup>

## Energy Management

IoT is beneficial for smart buildings too, lowering utility costs and enhancing quality of living for residents and tenants. Individual devices can collect real-time data from the buildings and machinery they are attached to. That information can then be aggregated, cleansed, and shared with energy providers, who can leverage the insight to more effectively use energy within that building.<sup>6</sup>

<sup>3</sup> Gutierrez, Peter. “How IoT Can Prolong Athletes’ Careers,” IoT HUB, July 2016.

<sup>4</sup> Andrews, Catherine; El-Attrash, Francesca; Chakrabarty, Sonia. “The Internet of Things in Government,” GovLoop.

<sup>5</sup> Andrews, Catherine; El-Attrash, Francesca; Chakrabarty, Sonia. “The Internet of Things in Government,” GovLoop.

<sup>6</sup> Andrews, Catherine; El-Attrash, Francesca; Chakrabarty, Sonia. “The Internet of Things in Government,” GovLoop.

# What Is IoT?

IoT encompasses a wide array of physical devices and objects, as well as the electronics, software, sensors, and network connectivity that enable those devices to collect and share data. Although IoT already exists in countless places – from complex machinery and large transportation systems to home appliances and smartphones – it is still a young technology with plenty of room for growth. A report from MIT Sloan Management Review shows that only 13 percent of organizations have been actively using IoT for more than two years.<sup>7</sup>

“Many industry experts and excited consumers have pegged the Internet of Things (IoT) as the next Industrial Revolution or the next Internet,” says John Greenough, senior research analyst for BI Intelligence, Business Insider’s industry research service. “Why? Because it will be the future of the way businesses, governments, and consumers interact with the physical world.”<sup>8</sup>

Current expansion in the IoT market is substantial. Networking giant Cisco believes that the number of connected devices worldwide will double from 25 billion in 2015 to 50 billion in 2020.<sup>9</sup> The Boston Consulting Group anticipates that spending on IoT technologies will reach \$267 billion that same year.<sup>10</sup> And a recent Ericsson report anticipates that IoT will surpass mobile as the largest category of connected devices in 2018.<sup>11</sup>

There are great things in store for IoT in the future, with all these interconnected devices and the big data they generate opening up unlimited possibilities for organizations of all types. The key to success is identifying the opportunities IoT offers and knowing how to capitalize on them.

In an MIT Sloan Management Review survey<sup>12</sup>, respondents cited the following as their top examples of how IoT is successfully used in their organization:

- Improved customer experience by sharing more accurate and more timely data
- Early warning on poor equipment performance and failure
- Automated alerting for critical systems
- Real-time alerts for immediate action
- Real-time contextual collaboration between all stakeholders in an open and honest environment

<sup>7</sup> Ransbotham, Sam. “The Flood of Data From IoT Is Powering New Opportunities – for Some,” MIT Sloan Management Review, January 2017.

<sup>8</sup> Greenough, John; Camhi, Jonathan. “Here Are IoT Trends That Will Change the Way Businesses, Governments, and Consumers Interact With the World,” Business Insider, August 2016.

<sup>9</sup> Sun, Leo. “3 Internet of Things Stocks That Could Double Your Money,” The Motley Fool, February 2017.

<sup>10</sup> Columbus, Louis. “Internet Of Things Market To Reach \$267B By 2020,” Forbes, January 2017.

<sup>11</sup> Townsend, Keith. “Challenges of IoT Include Big Data, Data Analysis for Enterprise,” TechTarget, December 2016.

<sup>12</sup> Ransbotham, Sam. “The Flood of Data From IoT Is Powering New Opportunities – for Some,” MIT Sloan Management Review, January 2017.

# How Should Companies Take Advantage of IoT?

Forbes' Jayson DeMers says, "Even if you don't deal directly with technology, IoT devices are going to have a massive impact on how you do business."<sup>13</sup>

Given IoT's rapid growth and the many advantages that can be realized by leveraging the big data it generates, an investment in IoT is a smart one. There are numerous benefits that big data through IoT provides, including:

## Broader Big Data Collection

A survey conducted by Dimensional Research shows that data collection plays a role in 83 percent of IoT projects, with 70 percent of companies saying that improved data would enable better, more meaningful decisions.<sup>14</sup>

IoT makes big data collection better because more information, from more sources, is readily available for consumption. These larger volumes of data mean that more comprehensive and sophisticated intelligence can be obtained to better understand customer preferences, behaviors, and sentiment. This, ultimately, results in more effective and targeted sales, marketing, and loyalty efforts.

## Actionable Intelligence

TechTarget's WhatIs.com page defines "actionable intelligence" as "information that can be acted upon, with the further implication that actions should be taken."

Although gleaning actionable intelligence from big data can be a challenge, IoT presents opportunities for significantly improved data analysis and/or predictive analytics. Because greater volumes of data are gathered and made available, more actionable intelligence can be obtained from various situations.

This not only improves analysis and decision-making by helping businesses discover more elements and factors that can be exploited to improve business performance, but it also saves time and money. Dimensional Research claims that 86 percent of companies believe that faster and more flexible analytics would increase the ROI of their IoT investments.<sup>15</sup>

Companies that develop a solid big data analytics strategy, and implement the right technologies to enable it can easily reap these rewards. For example, leading automotive retailer AutoZone relies on sensors to collect real-time information about thousands of commercial delivery vehicles, including where each vehicle is located and how fast it is traveling, along with a wide range of service metrics. By enabling deep analysis of this raw telematics data, the company can better assess driver habits and predict maintenance intervals.

<sup>13</sup> DeMers, Jayson. "7 Ways The Internet Of Things Will Change Businesses In 2017," Forbes, January 2017.

<sup>14</sup> "New Research Highlights the Untapped Potential of IoT Data," ParStream, March 2015.

<sup>15</sup> "New Research Highlights the Untapped Potential of IoT Data," ParStream, March 2015.





## Automation for Faster Time to Value

Machine learning, artificial intelligence (AI), natural language, and 'bots' (automated scripts and programs) are becoming common elements of big data and technology stack strategies. The efficiencies of an automated AI and bot architecture, combined with the underlying power of big data analytics, can deliver significant value in a short period of time.

Human-to-machine interaction via natural language processing can drive immediate analytics responses versus waiting on human analysis for a report. Automation is quickly becoming a real opportunity for companies to go broader and deeper in their data analysis, attaining the kinds of insights that will optimize nearly all aspects of the business.

## Operational Efficiency

Big data from IoT can enhance the efficiency of internal activities or supply-chain operations. In a recent EMA study, 45 percent of respondents cited operational productivity and efficiency as a top driver of their IoT initiatives.<sup>16</sup> Of the 700 projects the report monitored, close to 30 percent were focused on process optimization or supply-chain management and monitoring.

The study notes, "This means that organizations will take information from their IoT ecosystem and use it to map out the efficiency of their existing processes in a more detailed fashion than their current measurements allow and use that information to reduce their cost structures."<sup>17</sup>

Siemens Energy is one of many examples of how organizations tap into massive amounts of data to drive higher levels of productivity. The company's business intelligence (BI) environment aids in project management, delivering insight from enterprise data that impacts cost, time, and quality, and provides early-warning indicators, to ensure project success.

<sup>16</sup> Myers, John; Wise, Lyndsay. "The Rise of the Internet of Things: Connecting Our World One Device at a Time," EMA, August 2016.

<sup>17</sup> Myers, John; Wise, Lyndsay. "The Rise of the Internet of Things: Connecting Our World One Device at a Time," EMA, August 2016.

# IoT: It's All About the Data



You may already be collecting data. But you've got to do a lot more with it if you want to derive real, tangible value from it – especially in IoT scenarios, where the data is of the utmost importance. If you don't optimize your big data – for example, by properly integrating and cleansing it, and considering its context so it can be properly interpreted and understood – its value will be significantly diminished and your IoT strategy won't deliver the desired returns.

## Make Sure Data Is Accurate, Consistent, and Complete

With IoT, it's not just about quantity, it's about quality. Managing integrity is an important step in how you handle your IoT data. Data integrity combines policies, procedures, and supporting technology solutions to give you full control over your enterprise information, even as the volume you generate rises. Companies that have implemented data integrity plans have achieved substantial benefits, including increased operational efficiency, improved planning and decision-making, and enhanced business performance.

MIT Sloan Management Review uncovered a direct correlation between experience with IoT projects, and the timeliness, detail, accuracy, and reliability of data. Seventy-six percent of companies that are active in IoT believe their data is sufficiently timely, compared to only 40 percent of companies that are not IoT-savvy.<sup>18</sup> This means organizations embarking on IoT for the first time need to pay close attention to the quality of their information, and make data integrity an integral part of their strategy.

It's important to note that data quality is more than just a standalone project or a single tool, particularly when dealing with the big data collected by IoT-enabled devices. To successfully eliminate invalid or corrupt data from the environment, you'll need to develop related rules and guidelines for information handling, continuously enforce those rules, and monitor and assess data on an ongoing basis to ensure peak quality at all times.

## Leveraging IoT Intelligence

The beauty of IoT is that data is generated automatically by intelligent systems or sensors. Sensors are primary objects for collecting IoT data. RFID is usually the first thing that comes to mind when someone hears the word "sensor", but a sensor can be so much more. For example, a sensor can be an instrument that gathers other variables beyond what an RFID might collect. Think of a piece of inventory tracked by RFID. Other sensors can work in tandem with the RFID to monitor that piece of inventory from its point of origin to its final destination, via its container on a vessel or in a truck.

<sup>18</sup> Ransbotham, Sam. "The Flood of Data From IoT Is Powering New Opportunities – for Some," MITSloan Management Review, January 2017.

Because there is so much of it, big data can be far more challenging to decipher or interpret in a meaningful way. Those less experienced with IoT may find it difficult to dig out the patterns, trends, and correlations that are most relevant and important to the decision or scenario at hand. Krish Krishnan, president of Sixth Sense Advisors, cites the improper contextualization of information as one of the biggest pitfalls in big data projects.<sup>19</sup>

Contextualization is critical, because it “not only helps to comprehend the data in the best possible manner but it also helps in gathering and storing data in ordered groups and sequences,” according to Daniel Newman, author of *Building Dragons: Digital Transformation in the Experience Economy*. “Once this process is in place, organizations can use big data to unlock various key insights that will help them prepare their businesses for the future.”<sup>20</sup>

One myth surrounding IoT and artificial intelligence is that the need for human interaction and manual intervention is all but eliminated, which will eventually lead to loss of jobs. But nothing could be further from the truth.

For sensors to be most effective, the information collected must be stored in a data repository for use later on. This requires that humans must perform the needed configurations to obtain the data from the device, ensure it is cleansed and mastered, and move it to the data warehouse or data store of choice. And, most importantly, it is humans who will derive true value from the data when they interact with it, use it to improve the way they perform their day-to-day activities, and rely on it to make decisions.



<sup>19</sup> Krishnan, Krish. “10 Mistakes Enterprises Make in Big Data Projects,” IBM Big Data & Analytics Hub, February 2014.

<sup>20</sup> Newman, Daniel. “Contextualizing Big Data for the Everyday Business,” Huffington Post, February 2015

# Information Builders and IoT

The Internet of Things may be a new phenomenon, but traditional data management methods can still be applied to create maximum value from the information you gather from IoT devices. Information Builders' business intelligence (BI), data integrity, and integration technologies make the most of your big data and maximize the results of your IoT strategy.

Because our platform encompasses both data management and analytics technologies, Information Builders is uniquely positioned in the market, enabling maximum operational and opportunistic value to be derived from IoT-sourced data.

Our iWay Software data management tools natively ingest, cleanse, and unify big data from IoT. This eliminates the challenges of fragmented, inaccurate, or incomplete information, and ensures that the information you rely on is comprehensive, and of the highest quality at all times. And because they seamlessly integrate and master raw data, iWay solutions can also help contextualize it, empowering users to interpret data in meaningful and relevant ways.

Once the data has been integrated, the WebFOCUS BI and analytics platform makes it available to stakeholders, allowing them to interact with and analyze it to obtain actionable intelligence. For example, WebFOCUS can be used to analyze purchasing behavior and online activity, which can help stakeholders uncover ways to improve the customer experience. WebFOCUS offers self-service analytics tools for visual discovery of IoT data in context, as well as tools that enable the easy creation of self-service applications for non-technical users across the organization.

Many companies rely on Information Builders to derive actionable intelligence from their IoT big data, including:

**The Cascades Tissue Group.** This manufacturer of packaging and tissue products uses machinery sensors to monitor temperature, humidity, and other operating conditions that affect the quality of the finished products. iWay tools integrate this data with the company's legacy business applications, ensuring that IoT-enabled production equipment is functioning optimally. Cascades can also monitor the quality of finished goods on the production line, improve forecasting, and remove waste from the supply chain.

**Plex Systems.** This company's IntelliPlex proprietary technology solution gleans data from networked sensors to enable manufacturers to analyze operational metrics. This data can be used for equipment configuration, troubleshooting, quality control, and maintenance. WebFOCUS makes that data available for analysis, driving efficiencies on the shop floor, and helping to identify areas for improvement throughout the supply chain.

**Maverick Transportation.** This logistics company's trailers are equipped with door sensors, fuel sensors, and other monitoring devices. Data from these devices is continuously transmitted from the drivers and their vehicles. Fleet managers analyze that data through WebFOCUS dashboards, improving driver supervision, enabling timely maintenance tracking, and delivering real-time insight into fleet safety.

## Conclusion

Connected devices are the wave of the future, with the prevalence of sensors used in automotive, manufacturing, energy, transportation, and other industries increasing by the day. Experts agree that the forecast for IoT growth looks extremely promising.

The majority of IoT strategies center around the big data these devices generate, but you've got to do more than just collect big data to truly capitalize on it. Information must be properly integrated, cleansed, and remediated to ensure its accuracy, timeliness, and completeness. Once you're confident that you're gathering and managing your IoT big data as effectively as possible, advanced analytics can help you contextualize it, so you can glean the actionable intelligence that facilitates smarter decision-making and promotes better business performance.

Information Builders' solutions can make your IoT big data work with existing applications and processes, and transform it into relevant, meaningful information for all users. With iWay, IoT big data sources can be contextualized into integrated data sets to support downstream business processes. WebFOCUS can then be leveraged for analytics against any of these data stores, giving you the insight you need to move your business forward.

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