mendix

Early Adopters Driving Smart Operations with IoT

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The Opportunity of IoT Applications

The convergence of the digital and physical worlds, enabled by the Internet of Things (IoT), is creating an explosion of data. By 2020, the world's data will double every two months, with an expected 34 billion IoT devices connecting everything from toothbrushes to turbines and transmitting data to the cloud.

However, all the sensors and big data in the world won't mean a thing until they are properly applied; they are enablers for something bigger. What makes a difference to the user – and what will create massive opportunity for your business – is making that data actionable to create dynamic, contextual experiences for your employees, customers and partners.

We are entering the era of IoT Apps. As the market is still early, we created this eBook for CIOs to learn how early adopters are leveraging IoT to drive smarter operations. The goal is to inspire them about the possibilities for IoT within their own organization.

IoT Apps Can Reshape Entire Industries

As connected experiences begin to proliferate the enterprise, companies face a sense of urgency to start generating value from the Internet of Things before competitors. According to MIT's Center for Information Systems Research (CISR), organizations that fail to catch the IoT wave risk losing 32 percent of their revenue to digital disruption in the next five years.

As much as these new trends represent an existential threat, they also present huge business opportunities. Technologies like IoT, big data and machine learning promise to reshape entire industries. According to McKinsey, IoT alone could generate up to $11.1 trillion a year in economic value by 2025.

IoT Apps are creating tremendous new innovation opportunities for organizations in virtually every industry. In a recent report, Forrester suggests that IoT offers two fundamental business opportunities: Connected Products and Connected Business Processes. Product managers can embed IoT sensors in products to enable better customer experiences. Business process owners can use IoT to improve their operations and tie them closer to customer journeys. The possibilities are endless, from smarter recommendations at the time of buying goods and services, to higher levels of employee productivity.

When getting started with building IoT applications for your business, the low hanging fruit is to use IoT sensors on assets to help improve your existing business processes and operations. These projects are internally focused, more quantifiable and tangible, increase the bottom line of your business, and don't have as much risk. Therefore, they are a natural place for businesses to start.

For a major airline just beginning to experiment with IoT, it is more practical to add sensors to equipment and build an app to track that equipment to improve the efficiency of maintenance engineers, versus creating an entirely new product.

Both IoT opportunities are two sides of the same coin. Although it might be easier to get started with building smarter operations through predictive maintenance, the next natural step is to transform the business model with new connected products and services. In other words, driving smarter operations through IoT can stand alone, but it often acts as the foundation to grow the business with connected products or new business models.

> "IoT alone could generate up to $11.1 trillion a year in economic value by 2025."*
> -McKinsey

*Source: http://www.mckinsey.com/business-functions/digital-mckinsey/ur-insights/the-internet-of-things-the-value-of-digitizing-the-physical-world

How to Gather Inspiration in a Nascent Market

While the IoT hype is big, early adopters have proven that the potential business value can be enormous. As a result, more companies are eager to make IoT applications part of their business to create new experiences for their employees, customers and partners. But it is important to emphasize the word “new” here. There is no shortage of potentially groundbreaking ideas out there, but there aren’t yet many IoT use cases to pull inspiration from.

In a recent report, Gartner mentions, “The lack of a compelling business case is a major impediment to growth for enterprises. It remains almost as big an issue as security and privacy. We believe that this is not so much because of a lack of a business case, rather that the business cases have yet to be discovered.”

The business justifications for IoT applications certainly exist, but have not yet been articulated and quantified by most companies. This is likely due to the lack of vision and the uncertainty of how to lead an IoT initiative or even where to get started. With the lack of established use cases out there, it is hard for customers or even employees to know what they are looking for from the Internet of Things.

We recommend that enterprises monitor what is happening in other industries as a source of ideas. There are instances where an enterprise can blur the industry boundaries and enter an entirely new market to explore growth opportunities. It is important at this early stage of IoT adoption that industries learn from each other. For example, smart city designers can learn from connected home and industrial applications of IoT.

In the next section, we will share several real-world examples of companies using the Internet of Things to improve their internal operations.

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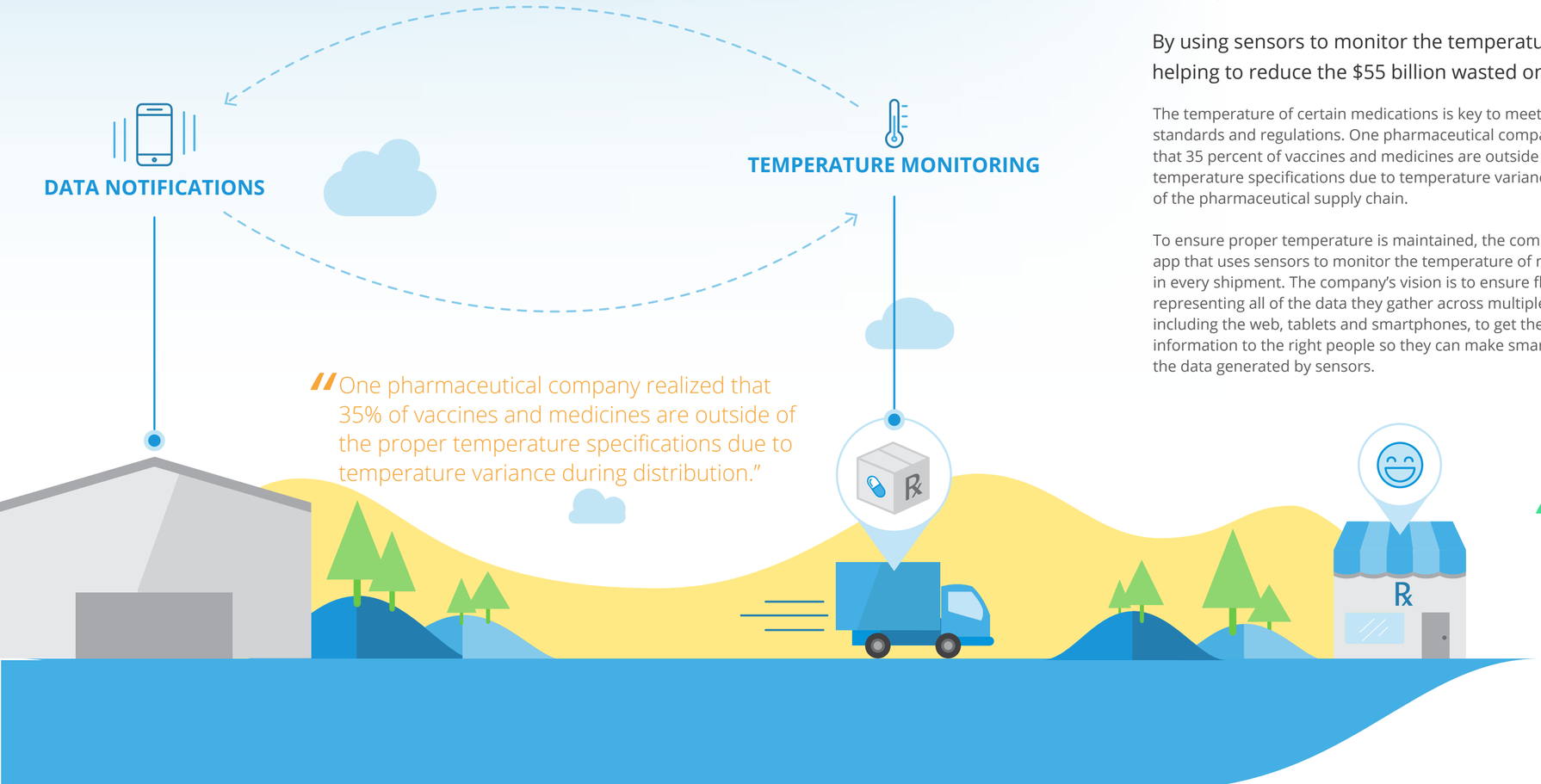
> -Gartner

Real World Examples of IoT Apps

Despite the lack of uses cases, early adopters are already putting IoT devices in practice and making sense of data with cognitive services to create new experiences. IoT Apps are infiltrating virtually every industry. This section will provide some examples of IoT Apps built on the Mendix platform, broken down by industry.



IoT Apps in the Healthcare & Pharmaceutical Industry

By using sensors to monitor the temperature of medicines throughout the supply chain, one organization is helping to reduce the $55 billion wasted on ineffective medicines each year, improving patient outcomes.

The temperature of certain medications is key to meeting quality standards and regulations. One pharmaceutical company realized that 35 percent of vaccines and medicines are outside of the proper temperature specifications due to temperature variance over the life of the pharmaceutical supply chain.

To ensure proper temperature is maintained, the company built an app that uses sensors to monitor the temperature of medication in every shipment. The company's vision is to ensure flexibility by representing all of the data they gather across multiple channels, including the web, tablets and smartphones, to get the right information to the right people so they can make smart decisions with the data generated by sensors.

For the warehouse manager, this means that even when he is not in front of his computer he will be able to receive notifications if a sensor stops transmitting data and can act immediately.

Using this IoT app, there has been a 99 percent success rate with regards to keeping medicine at the proper temperature and patients taking the medicine at the prescribed intervals due to reminders. This is helping to ensure better patient outcomes while reducing the $55 billion wasted each year on ineffective medicines.

"One pharmaceutical company realized that 35% of vaccines and medicines are outside of the proper temperature specifications due to temperature variance during distribution."

"As a result of their IoT app, there has been a 99% success rate with regards to keeping medicine at the proper temperature."

IoT Apps in the Aviation Industry

An airline built an equipment tracking app that's increasing the efficiency of its maintenance engineers, generating significant cost savings while improving the customer experience through more reliable, on-time flights.

Responsible for managing its entire fleet, the airline's engineering and maintenance department was challenged with delivering their services at a more competitive price compared to low-cost labor countries. When leadership dug into the engineers' daily routine, they discovered manual, paper-based processes and a lot of wasted time. For instance, aircraft maintenance requires expensive equipment that is typically scattered across multiple hangars. Engineers were spending half their day just searching for, and collecting, the tools needed to do their work.

The airline's vision for driving greater operational efficiency was to digitally enable their engineers. The first opportunity they identified was to leverage IoT and mobile devices to provide engineers with an up-to-date view of equipment location and inventory status, reducing the time spent searching. To do this, they built an equipment tracking app. The IoT App provides a live map of the department's equipment, enabling engineers equipped with iPads to instantly locate what they need.

> "Engineers were spending half their day just searching for, and collecting, the tools needed to do their work. The airline's vision for driving greater operational efficiency was to digitally enable their engineers."

Location data is tracked using a long-range network for connecting low-energy, low-data devices. Mounted on each piece of equipment, the devices have batteries that can last three to five years on a single charge. The data is plotted on an easy-to-navigate Google Map within the app.

By increasing the efficiency of engineers, this innovation is not only generating significant cost savings and process improvements – an estimated savings of $2 million per year – but also impacting the customer experience in the end through more reliable, on-time flights.

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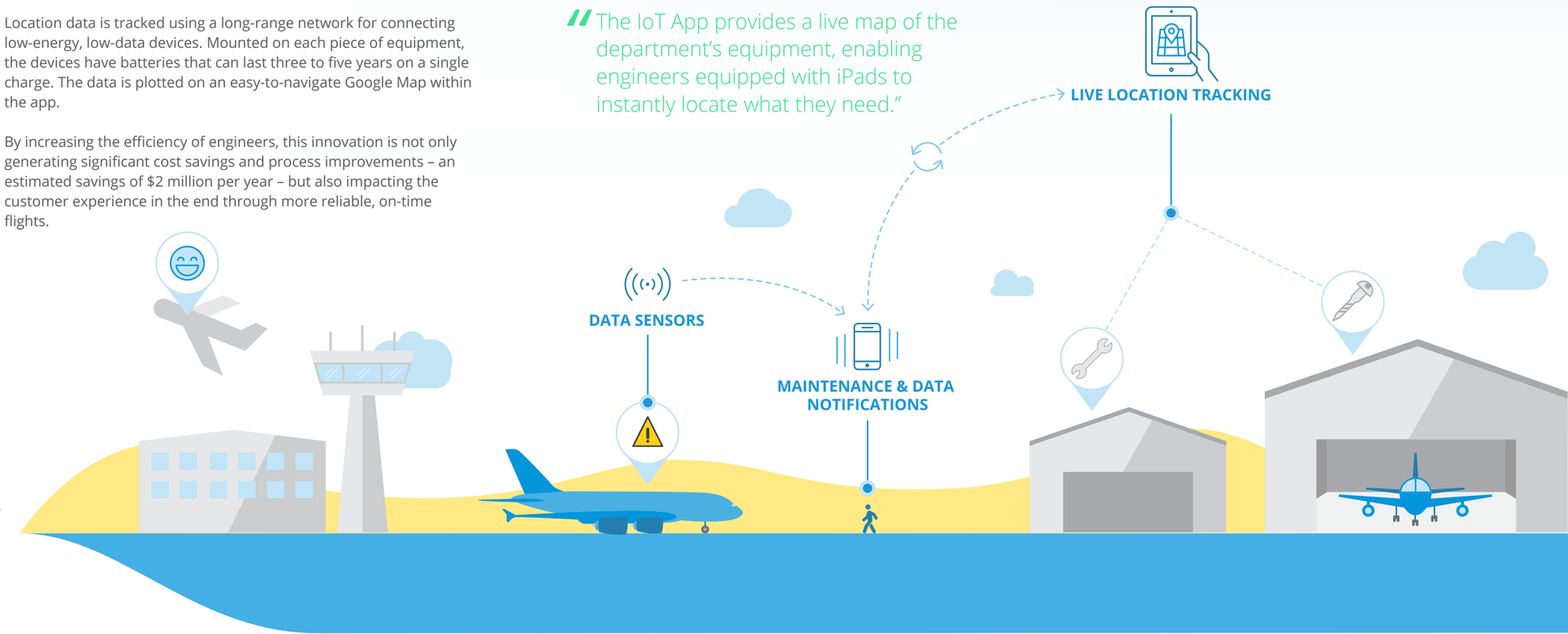

IoT Apps in the Business Services and Facilities Management Industry

A facilities management company has reduced operational costs and improved service levels by leveraging sensors to trigger proactive alerts to support staff, so they no longer have to perform manual checks.

In the labor-intensive facilities services business, worker productivity is a linchpin of success. For one facility services company, the costs of unnecessary work presented an opportunity to generate meaningful savings that could directly improve their bottom line.

The company helps clients manage everything from pest control, office cleaning, and soap dispensers to copy centers and building security. Previously, support personnel would have to regularly inspect each mouse trap and soap dispenser by driving to all of the locations and walking around the buildings to check them one by one.

The company built an IoT app that aggregates data from thousands of sensors in places like coffee machines, soap dispensers, paper towel dispensers and mouse traps rather than manual checks. The application has significantly cut costs and improved service levels. Now support personnel know exactly when the soap in the third level bathroom needs refilling.

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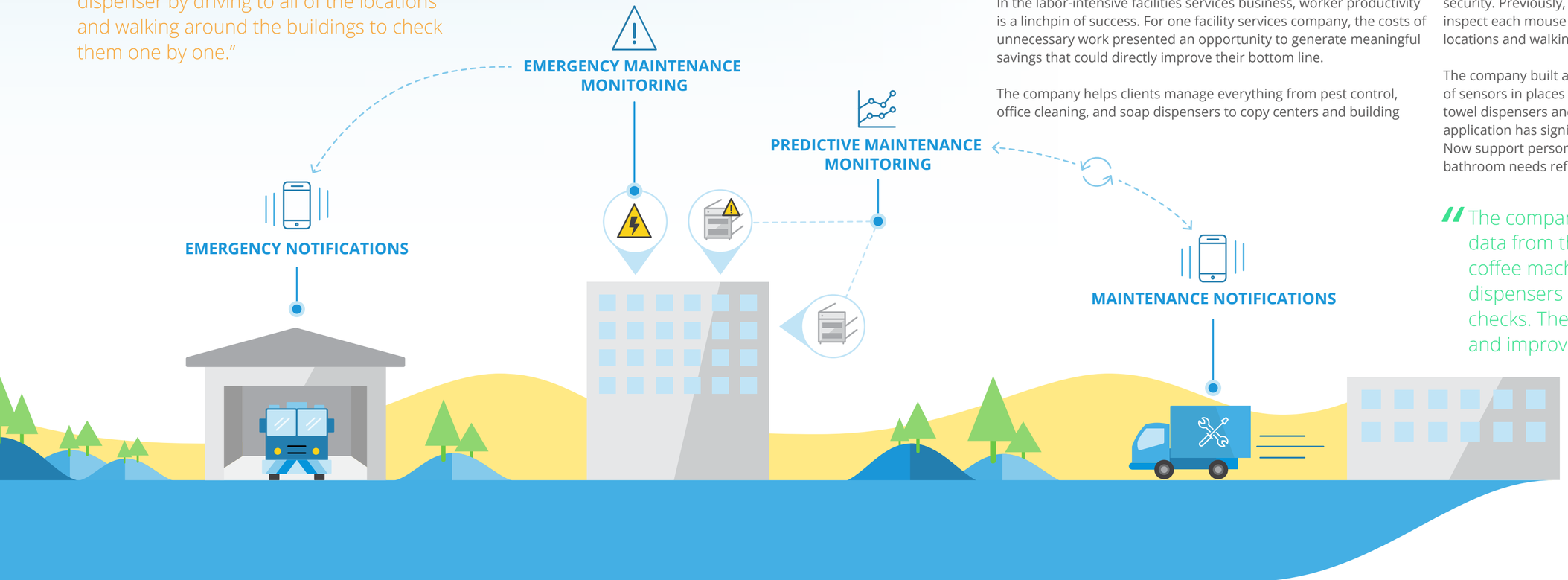

IoT Apps in the Media and Entertainment Industry

An entertainment firm is using IoT apps to help its clients generate incremental revenue, adhere to fire codes and optimize the event experience for attendees.

An entertainment company differentiates its services by offering clients information on the foot traffic at their event in real time. Many of their clients face issues with fire code capacity at their free events, and have been forced to deny additional attendees at the gates due to overcapacity without being able to take into consideration how many people have left the venue.

The entertainment firm created an app that leverages data from sensors in turnstiles to visualize attendee traffic in real time. Clients, as well as fire marshals, can access this information to understand how many people have entered and exited the venue at any given time. This information can show that even though the maximum amount of people has entered the venue, a quarter of those people have actually left and the venue remains under capacity.

The firm did not stop at this one use case and realized that these sensors could provide a breadth of information that is beneficial to their clients. For example, it is also helpful to understand which areas of the venue receive a higher amount of traffic in order to help sponsors place their advertisements in the most heavily trafficked areas. And knowing how many people enter the venue can help clients optimize how much food and beverages to provide the following night. Or how about security? These turnstiles can scan for credentials to ensure that all event staff are legitimate, or that there are no fraudulent tickets.

With the data gathered from these sensors, the firm can help clients optimize, secure and enhance the experience of their events.

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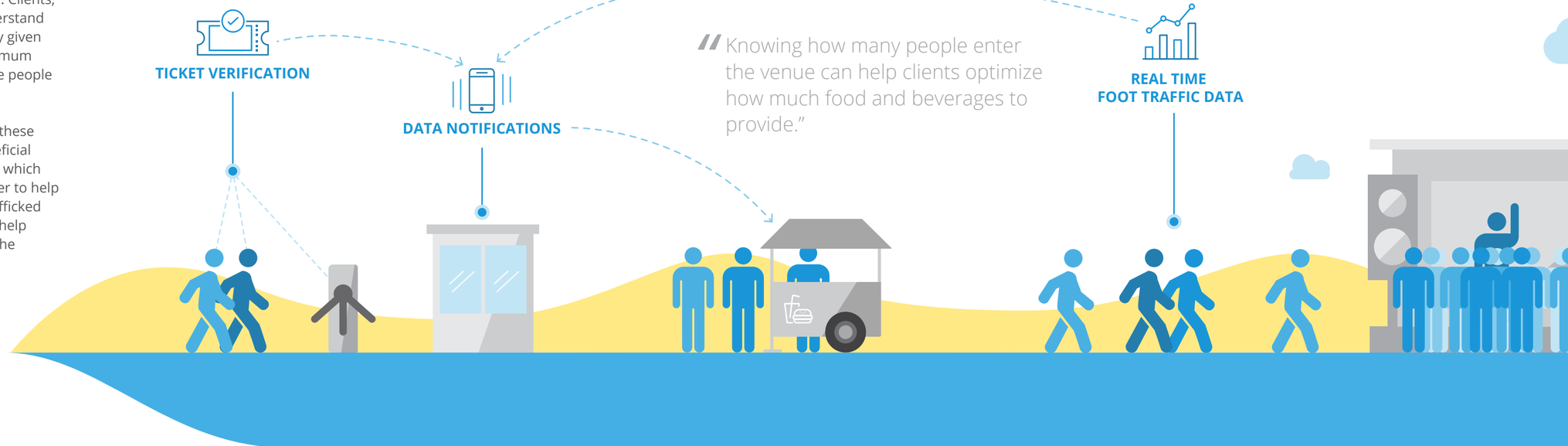

IoT Apps for the Agriculture Sector

Using sensor data, a lighting manufacturer for the horticultural industry has moved to a predictive maintenance model, doubling the life of its grow light solutions while increasing the crop yield of its customers.

Imagine a company manufacturing easy to commoditize grow light fixtures for the horticultural industry. They are no match for low-cost, offshore competition.

One company faced this very real threat, and realized that instead of being just a light fixture manufacturer, they could enable greenhouses to grow better plants, faster, with end-to-end grow light solutions. Machine learning services and predictive analytics optimize lighting, system performance, energy consumption and plant photosynthesis. The app predicts the life expectancy of each grow light and proactively notifies maintenance workers to replace it before any disruption occurs.

From predictive maintenance, they were able to transform their business into greenhouse optimization as-a-service with an application to collect sensor data on light, temperature, soil, weather and more. They can now ensure consistent and uniform quality levels of their crop and optimize their strategies for energy cost.

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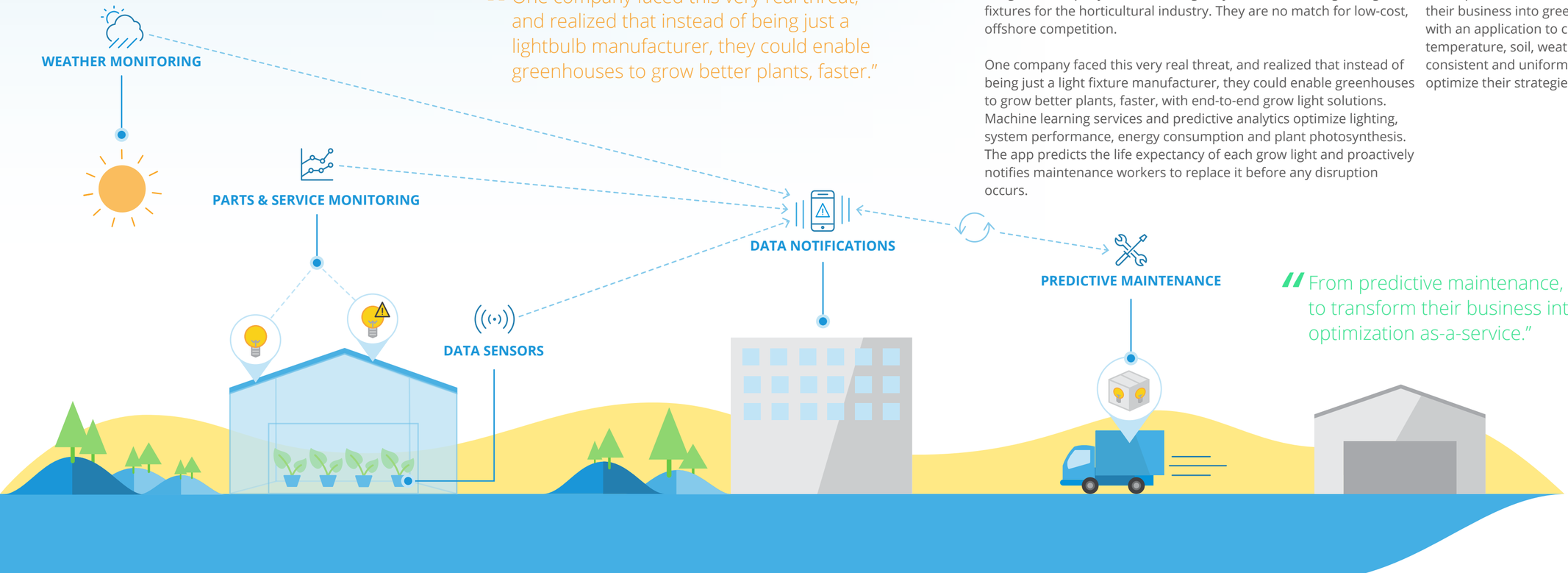

> "From predictive maintenance, they were able to transform their business into greenhouse optimization as-a-service."

Get Ahead of the Challenges of IoT App Development

Delivering on the promise of IoT Apps hinges upon an organization's ability to harness connected devices, big data, analytics and machine learning to create the right experience. These new trends are forcing organizations to rethink their technology platforms, as well as the people and process supporting them. Here are three challenges we have identified that you can start getting ahead of today.

Technical Complexity

The challenge is that building connected, intelligent IoT solutions currently requires many, disparate technologies. It can be a struggle to craft viable business plans and implement, integrate, and manage a mix of different and complex IoT technologies, endpoints, platforms, back-end systems and data.

In order to get ahead of this challenge, consider using an IoT Software Platform that brings together all of the technology required for an IoT project. IoT software platforms help simplify deploying, managing, operating, and capturing insight from IoT-enabled connected devices. They incorporate a diverse array of functionality, including:

- Creating and managing the link from the device to the Internet
- Protecting IoT devices, data and identity
- Controlling the maintenance and operation of IoT devices
- Transforming data into timely, relevant insight and action

Some IoT Software platforms to consider include:

IBM Bluemix™ amazon web services PREDIX SAP HANA Microsoft Azure

Lack of Skills and Resources

Building new IoT and algorithmic business solutions also requires scarce, hard-to-find specialist skills. According to Gartner, the top barrier to CIO success is skills and resources.

It requires a lot of time, effort and complexity to bring new IoT solutions to market. On top of that, the accelerating pace of change is making it hard for enterprise IT teams to keep up with new capabilities and advancements. In turn, it will be difficult for lagging organizations to catch up.

Low-code development platforms can help you get ahead of this challenge by enabling a much broader range of users to build IoT Apps using visual models and reusable components and connectors to IoT services. With model-driven development, business and IT have a common language to rapidly test, build and iterate new IoT solutions, shortening time to market while enabling easy ongoing modifications as needs and requirements change.

IT/OT Alignment

With IoT and smart operations, the integration and alignment between Information Technology (IT) and Operational Technology (OT) is more important than ever. OT has historically been separate from IT, but it is typically responsible for the hardware used in IoT solutions. This separation of IT and OT originally generated from the different technologies involved and the different skills needed.

There is still a strong resistance to change at the organizational level. Most companies still have two strongly separated departments for operations and IT. They have different people, goals, policies and projects. They not only operate in a very separate way, but sometimes they even have conflicting approaches and a lack of trust for the other.

In order to get ahead of this challenge, CIOs need to be aware of the issue, make an initiative to fix it, and collaborate with other areas of the business to achieve alignment.

Capitalizing on these trends involves being able to understand the new principles and paradigms of IoT Apps. These challenges around business strategy, technology integration, architecture and lack of resources and alignment will ultimately require organizations to undergo a broader digital transformation.

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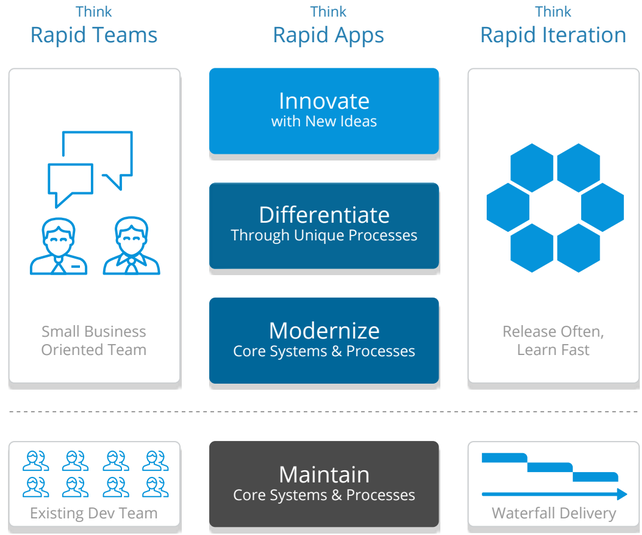

Conclusion

There is no shortage of ideas for innovative products and services. The challenge is to build IoT Apps at the speed of these ideas. In order to focus on the business goal of smarter operations, it is beneficial to choose a platform that enables rapid experimentation. To help the business unlock the value of IoT, IT teams need a way to experiment quickly and cost effectively. Above all, they need an approach that facilitates frequent iteration and close collaboration between business and IT, so they can turn new ideas into value-driving IoT applications.

Discover how high productivity platforms shorten time to value for new IoT applications.

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