

RESEARCH BRIEF



DaintreeNetworks

IIoT

INTERNET OF THINGS

Savings and Operational Efficiencies
for the Industrial/Warehouse Environment

October, 2015

MODERN
MATERIALS HANDLING

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Savings and Operational Efficiencies for the Industrial/Warehouse Environment

Internet of Things — Savings and Operational Efficiencies for the Industrial/Warehouse Environment

THE INTERNET OF THINGS (IoT) has been called the next wave of information technology (IT) because it holds the potential to glean new insights and efficiencies by tapping into data from smart, connected devices, sensors and machines. The IoT's benefits range from improved efficiencies and time savings to better energy efficiency.

Gartner defines the IoT as “a network of dedicated physical objects (things) that contain embedded technology to sense or interact with their internal state or the external environment. The IoT is an ecosystem that includes things, communication, applications and data analysis.” In simple terms, IoT is about automating various processes in an enterprise through machine to machine (M2M) connections to gain operational efficiencies.

In industrial settings such as warehouses, distribution centers (DCs), and manufacturing plants, there are many types of machines and systems that consume energy. Lighting fixtures, industrial machinery, exhaust fans, materials handling systems, heating, ventilation and air conditioning/cooling (HVAC) systems, as well as plug load (power from the electrical wall socket), are a few examples of the systems that can be connected to the Internet as part of an IoT strategy.

While building control and monitoring systems have existed for decades, they have tended to be point solutions whereas the IoT's great potential is as a platform to interconnect many types of systems and devices to provide the visibility needed to coordinate an enterprise's assets as conditions change, and to balance competing priorities in keeping with operational goals. For example, having building energy controls connected using an IoT platform could help an enterprise manage its lighting, HVAC, plug load, fans and other sensors for significant savings, arrange proactive maintenance based

on information about product installation date and expected life, and benefit from demand/response energy rate savings and rebates from a utility provider.

To best understand how enterprises are embracing and adopting IoT, Peerless Research Group (PRG) on behalf of Modern Materials Handling and Daintree Networks surveyed 213 professionals who are responsible for tasks involving operations management, warehouse operations, facilities management, information technology, environmental health and safety, as well as energy and sustainability for their organization. Roughly four out of ten manage more than one facility and one out of every five is responsible for warehouse or DC space in excess of 500,000 square feet.

Consistent with other research conducted by PRG on the topic of IoT, we heard, once again, from materials handling and warehouse pros that IoT awareness and adoption is still in its early stages. However, the IoT is gaining interest among warehouse and DC decision-makers as a means to gain operational efficiencies. Perhaps most notably, “six out of ten” survey respondents familiar with the IoT believe it will play a key role in improving facilities' operational efficiencies.

This paper will explain other key findings from the study, including challenges faced by respondents such as a lack of visibility into facility energy usage. In fact, 44 percent of respondents either said that they have no visibility into energy use (36 percent) or don't

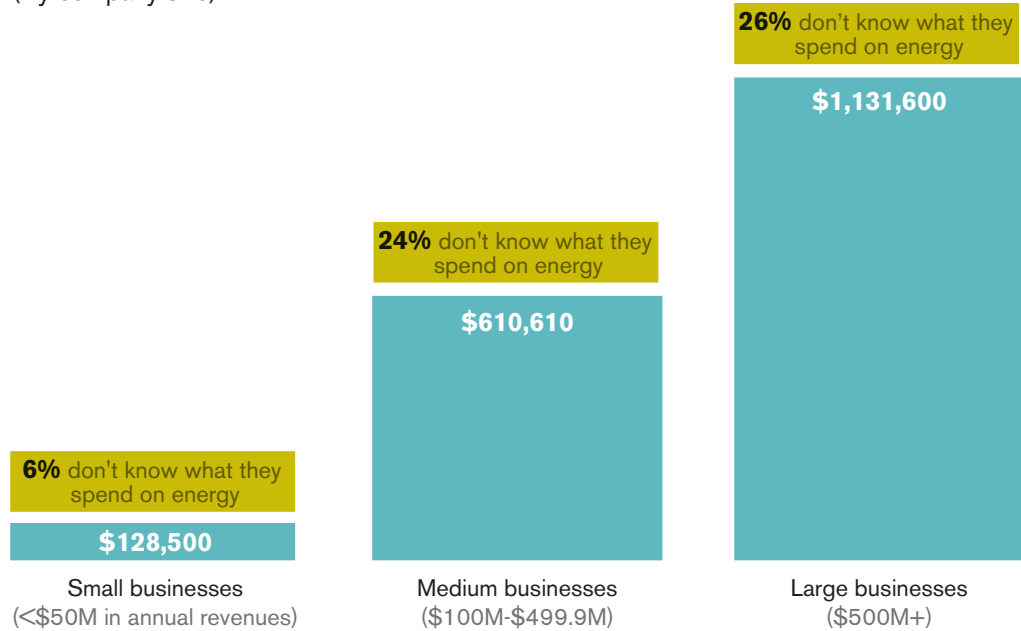
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FIGURE 1

Capital expenditures in 2015 for all warehouse energy management and building controls

(By company size)



know (8 percent) if their organization has any visibility. Given such constraints, the IoT merits a closer look when it comes to its potential to better monitor and manage energy use.

According to a report from the American Council for an Energy-Efficient Economy, if new “intelligent efficiency” technologies including the IoT were implemented by U.S. businesses and homeowners, energy use could be reduced by 12 to 22 percent. Of course, energy savings from IoT initiatives will vary by company based on their level of energy use and whether they have a legacy solution or the latest technology. That said, practical application of the IoT is becoming more widely recognized, as seen by the 30 percent of respondents to this survey who call the IoT a “reality today,” and the 46 percent who agree it is a “wave of the future.”

Organization’s Challenges related to Energy Efficiency

In 2015 organizations forecast spending an average of \$217,000 on energy management and building controls. This would include lighting, HVAC, plug load, fans, etc. for their warehouse and DC facilities. In fact, more than one in ten (13 percent) expect to invest over \$500,000 on controls and energy management solutions.

Interestingly, more than one out of five (21 percent) haven’t any idea what they’ll spend on energy management which suggests that organizations may be overlooking an opportunity to realize significant savings.

(See Figure 1 above)

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FIGURE 2

Top challenges organizations face

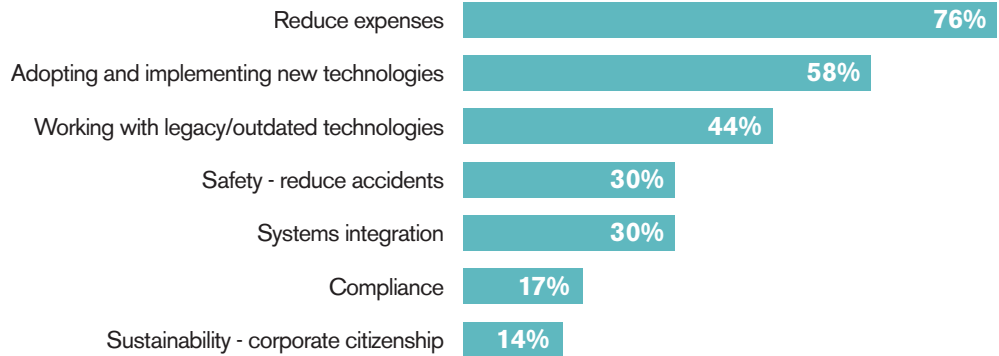
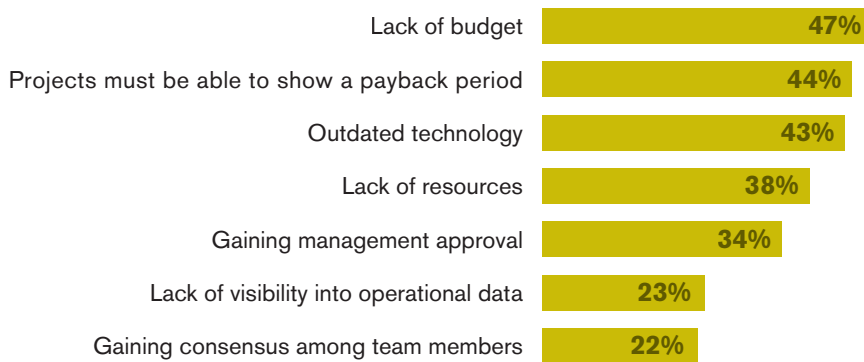


FIGURE 3

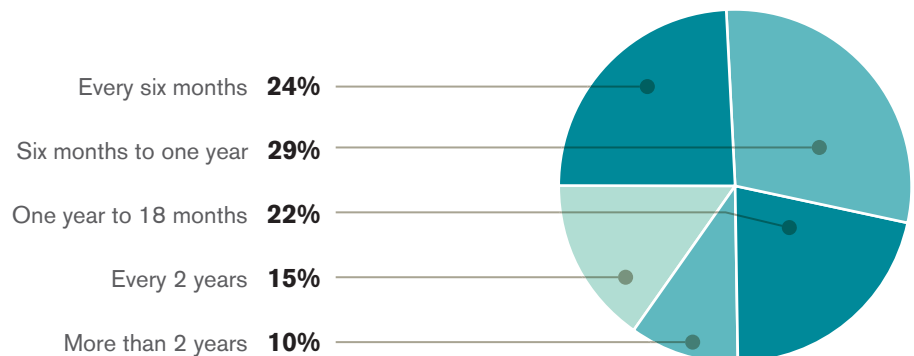
Obstacles in attaining goals



Not knowing what operations are spending on energy management seems to have even greater relevance as these same businesses report that their top challenge is to reduce expenses

FIGURE 4

Frequency with which operations change the location of items in their industrial space



at their facilities. Nearly all professionals we surveyed (97 percent) said that cutting costs, adopting and implementing new technologies, or working with outdated systems loom large as issues they face in operating their warehouses.

(See Figure 2 above)

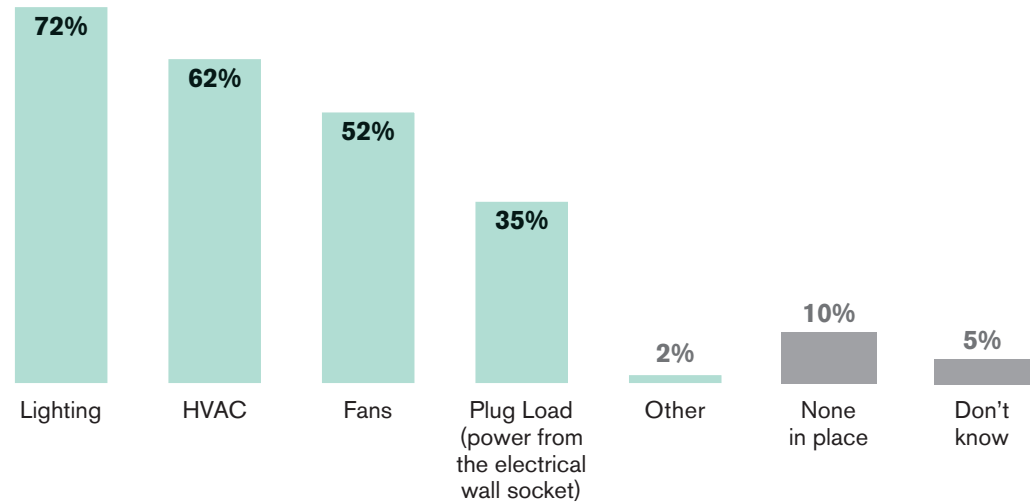
Hurdles managers must overcome in achieving operational goals at their facilities are numerous. Critical barriers often include a lack of funding and operating with limited resources, assuring a return on investment for projects, working with legacy technology, and securing management buy-in on key initiatives. (See Figure 3 left)

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FIGURE 5

Building control systems currently in use



To increase operational efficiency in their warehouse operations, managers commonly rotate items and inventory locations on a regular basis, allowing for easier picking operations and material flow. In fact, three out of four change the location of items at least once every 18 months. Such reconfigurations impact energy use patterns and lighting needs, which means the ability to provide a nimble approach to reconfiguring building automation solutions is key.

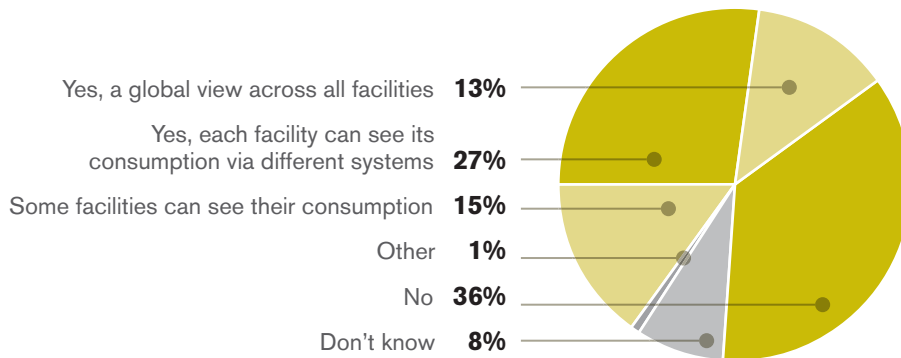
(See Figure 4 on page 3)

Building control solutions for lighting, HVAC and fans are widely used at respondent facilities. However, they are often aging systems that operate in silos or are poorly integrated. For example, if the lighting system can't detect which areas of a facility are being used, all areas may continue to be lit even when workers aren't present. This means the company is paying unnecessary lighting bills and it also generates extra heat which impacts HVAC needs. Since the lifespan for lighting and HVAC systems might be 10 to 15 years

or more in a warehouse or industrial facility, the reality is that companies might hang onto existing systems for years to come, whereas they would actually benefit more from an IoT strategy that uses latest LED lighting, and building controls to lower costs and create operational efficiencies today. (See Figure 5 above)

FIGURE 6

Organizations having visibility into energy usage

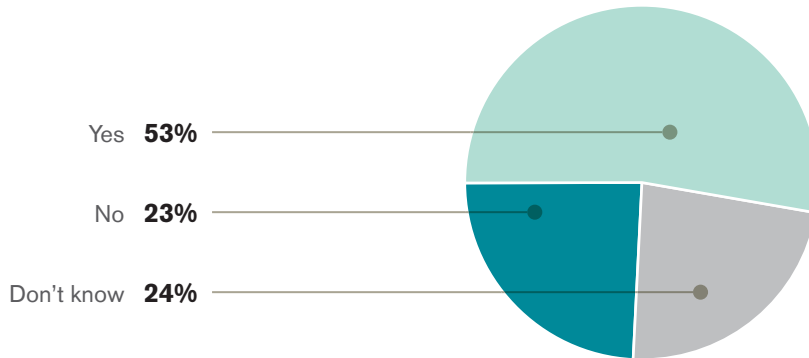


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FIGURE 7

Companies taking advantage of utility provider rebates



Roughly one-half of those surveyed take advantage of rebates offered by utility providers to help reduce the cost of energy systems. Yet again, many (47 percent) are not capitalizing on this money-savings opportunity. (See Figure 7 on left)

Further, most companies in our study do not participate in programs offered by utility providers that are designed to help reduce energy costs on an ongoing basis such as Demand Response (DR) or

Ways to Conserve and Save Energy Usage

Curiously, only slightly over one-half of the managers in our survey have some visibility into their energy consumption. Marginally more than one out of ten (13 percent) have an understanding of their energy usage across all facilities while more than one out of four (27 percent) state that each facility can see usage through various systems.

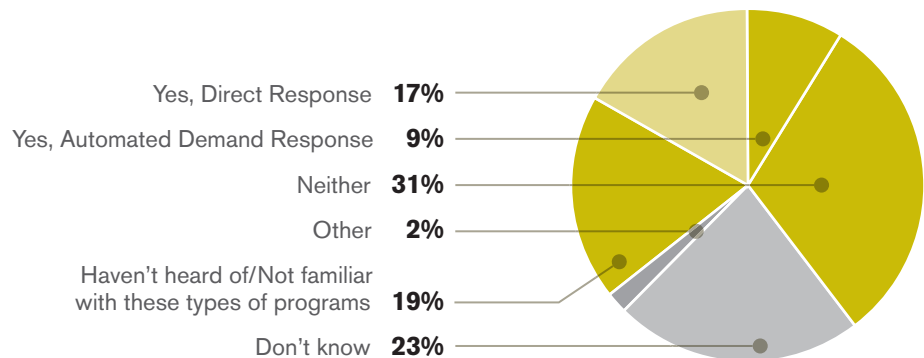
However, nearly one-half (44 percent) neither knows about nor has visibility into energy utilization. There is a famous saying that if you can't measure it you can't manage it. Operations that can monitor usage levels are in a better position to manage resources and save on energy costs. (See Figure 6 on page 4)

Automated Demand Response (ADR) programs. In fact, many are either unsure or unfamiliar with these types of plans. Even if they do not get rebates for Demand Response from their utility, it is possible to use today's control solutions to automatically cut back on energy usage at peak times of day.

In looking at the results of those companies that do take advantage of DR and ADR programs organizations, they are spread across the U.S. We had expected them to be located in the West and Northeast areas, regions where the most advantageous utility incentives are offered. (See Figure 8 below)

FIGURE 8

Companies involved in a Demand Response or an Automated Demand Response program



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Ninety one percent follow “green” or environmentally sustainable practices. In particular, seven out of ten facilities have a recycling program or efficient lighting solutions. (See Figure 9 below)

FIGURE 9

"Green" or environmental initiatives implemented/planned for implementation

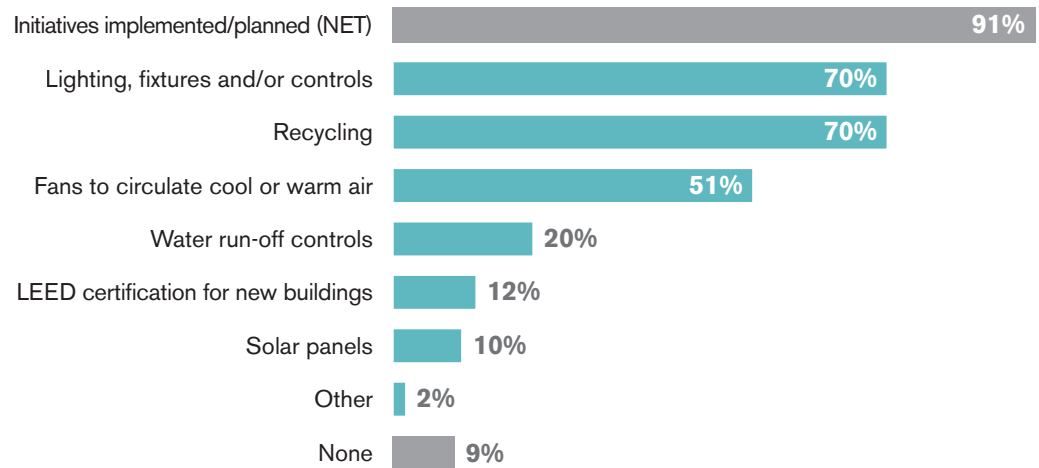
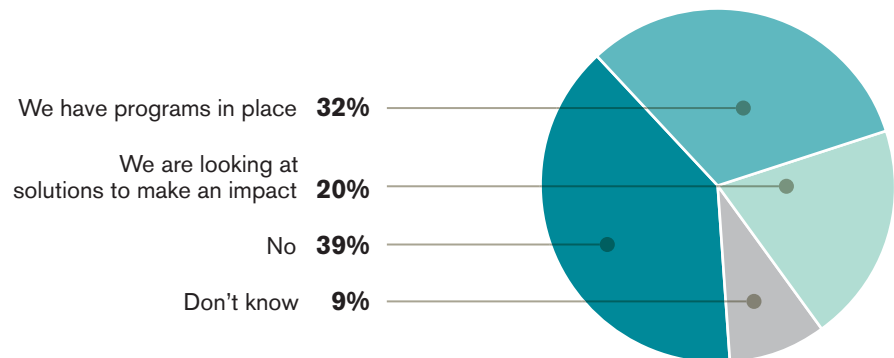


FIGURE 10

Organizations having a plan to leverage lighting or thermostat controls for employee comfort



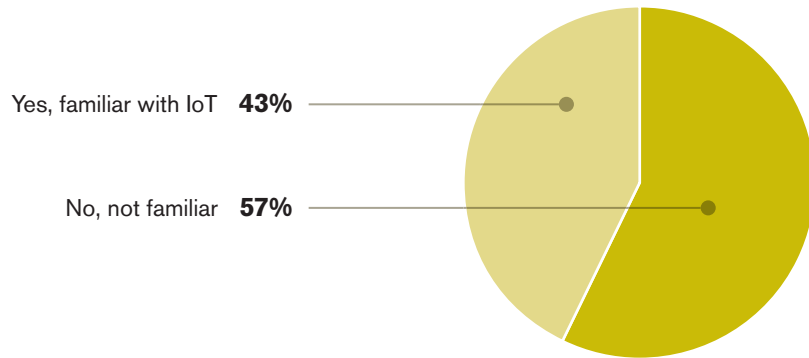
Some companies follow the principle that employee comfort leads to greater productivity. Correspondingly, one out of three companies has a plan to utilize lighting as well as cooling and heating solutions to create a more comfortable environment for their workforce; about one-fifth are now considering comfort solutions for their workers. Indeed there is empirical evidence that when employees have the right lighting and temperature in their work environment, their productivity increases by up to 25%. (See Figure 10 above)

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FIGURE 11

Familiarity with the Internet of Things (IoT)



Gartner defines the Internet of Things as "a network of dedicated physical objects (things) that contain embedded technology to sense or interact with their internal state or the external environment."

The IoT is an ecosystem that includes things, communication, applications and data analysis." In simple terms, IoT is about automating various processes in an enterprise through M2M (machine-to-machine) connections to gain operational efficiencies.

The Internet of Things (IoT)

Less than one-half of those we surveyed (43 percent) say they are familiar with the Internet of Things (IoT). (See Figure 11 above)

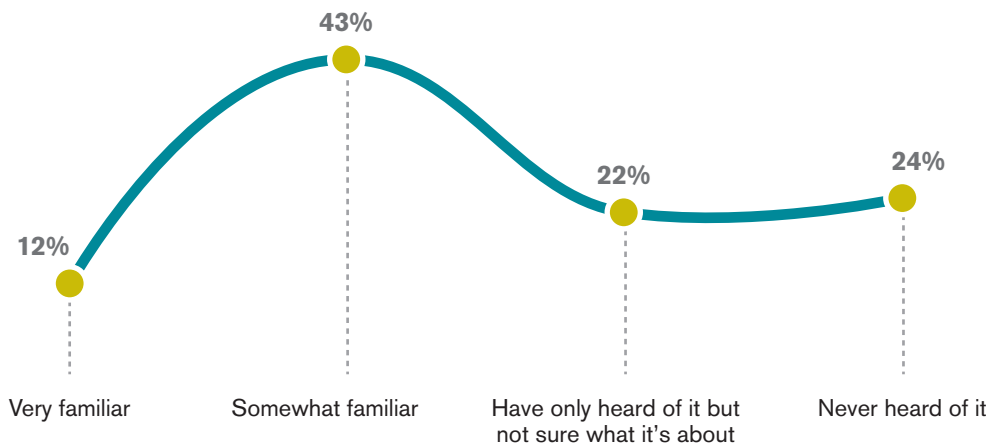
To gain a better understanding from decision-makers about their knowledge and acceptance of IoT, we provided a definition to all respondents to determine if IoT resonated.

After exposure to this definition of IoT, we see a slight spike in familiarity among survey respondents. Still, though, nearly one-half (46 percent) have either heard of IoT yet are not sure what it's all about or haven't heard of it at all.

Only 12 percent are highly familiar with the Internet of Things. These awareness levels show that adoption by end-users is in the very early stages and that warehouse decision-makers need more information and education about IoT and, in particular what it is and how it can dramatically impact the way we work. (See Figure 12 below)

FIGURE 12

Familiarity with the Internet of Things (IoT) based on definition





“We are now identifying the process that is best suited for adopting IoT and finding a solution that best suits our needs and goals that we want to achieve.”

Engineering Management; \$250M - \$500M in annual revenues

“Network security is a must. How will these devices impact our network in terms of security & speed?”

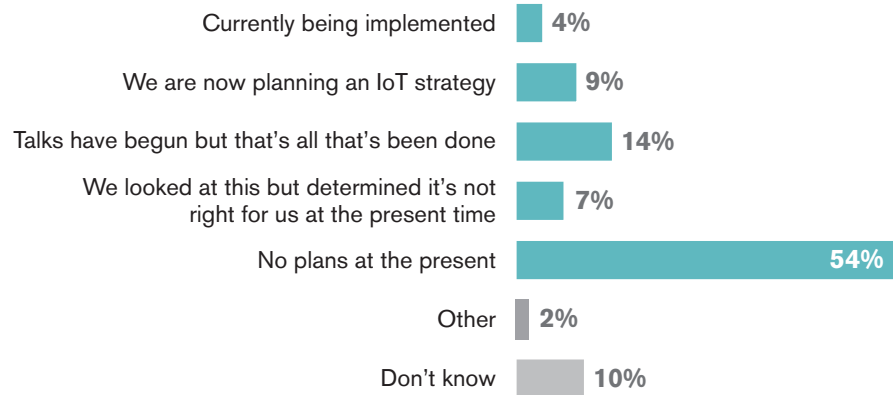
Distribution Center Manager: \$2.5B +

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FIGURE 13

Adoption plans for an Internet of Things strategy



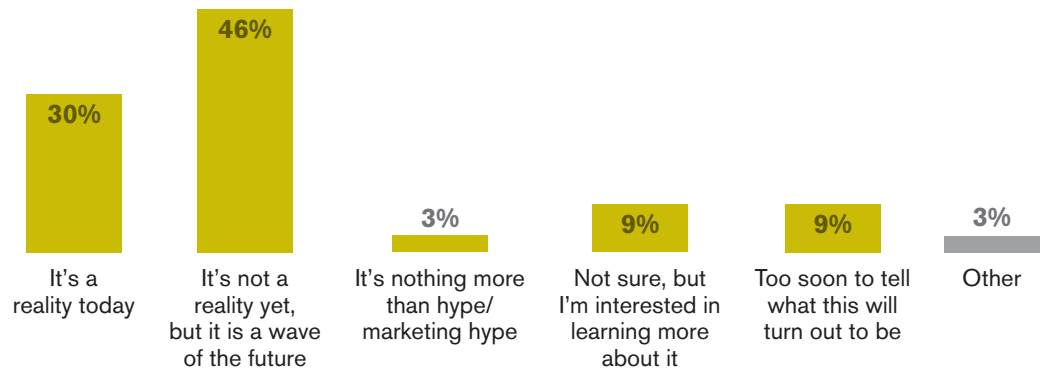
Most of those who are aware of the Internet of Things are slow to adopt. In fact, almost three out of every four (71 percent) contend they either have no plans to adopt an IoT strategy, feel it's not currently a viable solution for their facility, or are unsure of any plans at this time. Only a small percentage (4 percent) of companies are currently implementing while approximately another one out of ten (9 percent) are now planning an IoT approach. The reality is that many of these managers are probably already leveraging the Internet of Things through building automation with wireless building control types of solutions. However, the lack of understanding of the term IoT is reflected in low percentage for IoT adoption. (See Figure 13 above)

Among those familiar with IoT, the general perception is that it is now a reality or will be in the very foreseeable future. Only a very small percentage (3 percent) believes the Internet of Things is hype. (See Figure 14 below)

Six out of ten believe that the Internet of Things will play a key role in improving facilities' overall operational efficiencies. Conversely, 40 percent do not believe IoT will be important which, reinforces that decision-makers need to know more about how an Internet of Things strategy can improve efficiencies and help organizations control costs. (See Figure 15 on page 9)

FIGURE 14

Opinion on the Internet of Things



“We need to update the controls and equipment that is legacy material to ensure it is tied into useful digital management opportunities.”

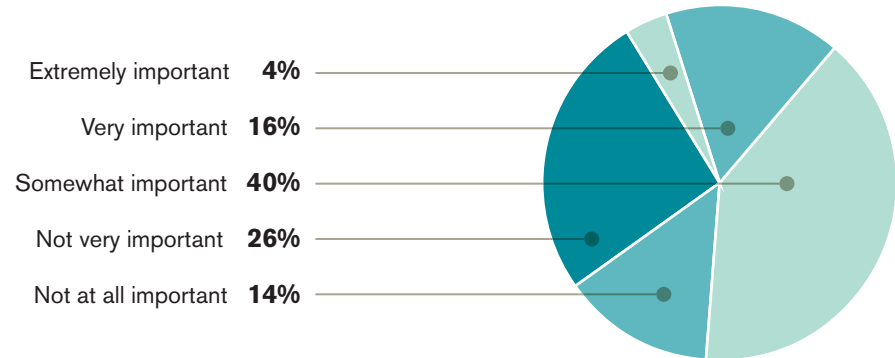
Warehouse Director;
\$1B - \$2.5B

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FIGURE 15

Importance of IoT in improving overall operational efficiencies



Conclusions

As managers on the front lines of operations and facility use, the respondents to this survey can generally be thought of as a no-nonsense group. They face everyday pressures and constraints on new systems, like the need to control costs such as energy spend, and the need to show rapid payback for technology investments. Significantly, even among this group of realists, over half are now familiar or very familiar with the IoT, and of those, a significant portion believe the IoT will be “very important” or “extremely important” to operational efficiency. What’s more, while adoption is clearly still in its early stages, over 10 percent have programs underway or in the planning stages, and 30 percent acknowledge that IoT is a reality today in the industry. Such findings among a hard-nosed group of managers lends credence to the idea that the IoT is ready to move from concept to practical application. The fact that some of them are probably already implementing smart building solutions implies that these percentages would be much higher if they were aware of what is included in IoT.

In today’s facilities such as warehouses and DCs, a practical application for IoT is the lighting. This is the most ubiquitous network in a commercial or industrial space. HVAC, plug load, and exhaust fan controls can also be added to save significant costs while meeting objectives for energy spend, employee comfort and safety. The survey suggests that managers on the front lines are beginning to see such short-term benefits, even while they read about how the IoT capability is improving the intelligence and efficiency of new products such as jet aircraft engines, tractor-trailer rigs, and agricultural tractors.

As evidenced in our research findings, a strategy of monitoring energy consumption and leveraging solutions to enable greater energy efficiencies is an approach that will allow organizations to reduce costs. Achieving greater control over expenses was cited by these managers as the top concern they struggle with in their facilities. Unfortunately, very few organizations recognize that improved management of energy usage is an area where not only cost savings, but greater operational efficiencies and improved productivity can be realized.



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Methodology

This research was conducted by Peerless Research Group (PRG) on behalf of *Modern Materials Handling* magazine for Daintree Networks. This study was executed in August 2015, and was administered over the Internet among subscribers to MMH.

Respondents were qualified for being involved in decisions regarding the operation of their company's warehouse(s) or distribution center(s).

The findings are based on information collected among 213 individuals. Respondents primarily work in warehouse, distribution or supply chain management (33%), executive management (24%), plant management (16%), and engineering management (11%). All company sizes are well-represented: 60% are employed with companies reporting less than \$100 million in annual revenues, 20% work at businesses having revenues between \$100 million - \$999.9 million, and 20% are with organizations with \$1 billion or more in annual sales. ●

About Daintree

Daintree Networks® is a trusted and leading provider of smart building control and operation solutions, the core application for the Enterprise Internet of Things™. Daintree's ControlScope® is an open standards-driven control, monitoring, and optimization solution for facility, operations, energy, and sustainability professionals. Using advanced wireless mesh networking and software that supports Automated Demand Response (ADR), ControlScope delivers up to 70 percent energy savings, operational efficiencies and up-time as well as occupant comfort, while providing actionable decision-support information through Big Data analytics. Leveraging Daintree's Enterprise Internet of Things™, or E-IoT™ approach, the solution utilizes sensors to also monitor other conditions, such as air quality, humidity, building security and more that comprise the networked ecosystem of an organization. Daintree Networks is a channel-friendly company with leading strategic and technology partners helping serve its customers globally, with major locations in Silicon Valley, California, and Melbourne, Australia. Further information is available at <http://www.daintree.net>.

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