ARUNDO

THE EXECUTIVE GUIDE TO THE INDUSTRIAL INTERNET OF THINGS

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WELCOME TO THE INDUSTRIAL INTERNET OF THINGS

The Industrial Internet of Things (IIoT) is the web of interconnected software, sensors, and connected devices that are increasingly embedded into equipment and throughout operations. Research firm IDC estimates there will be nearly 21 billion connected "things" by 2020.[1]

While there's a whole universe of technology behind the scenes, the Industrial IoT means that processes, equipment and people that used to operate in isolation can now be connected and talk to each other.

The real transformation is in the power of the connected "things," e.g. pumps, trucks, plants, ships, and so on that can be monitored and controlled remotely, and in concert with other parts of a system.

Imagine a pump that alerts an operator that the pump is going to fail due to excessive vibration, or a processing facility that generates its own maintenance schedule to avoid unscheduled downtime. The IIoT gives machines a voice, a way to communicate with people as well as with other machines.

Across a range of sectors, the Industrial Internet of Things is poised to disrupt operations and fundamentally shift the value of many industry verticals.

Across heavy industries, companies are under tremendous pressure to reduce production costs through operational efficiency, to improve safety and environmental compliance, and to improve asset utilization and throughput. The IIoT offers such companies a promise of reduced costs, improved revenue, and reduced risk through technology adoption.

For instance, in the oil & gas sector alone, Oxford Economics predicts that IIoT adoption has the potential to increase global GDP by up to 0.8 percent – or $816 billion – by 2025. [2] According to the 2015 Upstream Oil and Gas Digital Trends Survey, oil and gas companies plan to invest the same amount or more in digital technologies, including cloud-enabled mobility, big data-powered analytics and the Internet of Things.[3]

The goal for continued investment in IIoT strategies is to go beyond basic cost reduction to realize improved operational efficiency and effectiveness.

With increased availability of sensors, cheaper data storage and processing capabilities, and increased accessibility of advanced analytical techniques, such as machine learning, savvy companies are already making better decisions and enabling a more efficient workforce and safer work environment.

However, there are several barriers to this goal, with workflows and processes that create bottlenecks and physical and cybersecurity issues to generate the most value from digital technologies.

SURVIVAL DEPENDS ON TRANSFORMATION

Some companies call the IIoT "the Internet of Everything" to reflect the network of people, process, data, and things throughout the industrial value chain, including both the information and operating technology aspects of the business.

Many companies already have extensive experience with the "things" component of the IIoT, based on the number of sensors and other devices commonly deployed throughout most operations. The next step is to connect the "things" to the other areas: data, people, and process. Connecting all four operational aspects allows data-driven insights to flow across silos to maximize business and operational benefits.

There's no doubt the opportunities are huge. At one $50 billion company, maximizing operational efficiency through digital transformation translated into an 11 percent bottom-line improvement through faster problem resolution and improved efficiency.[4]

The disruptive, transformational value of IIoT comes from the ability to make better decisions in real or near real time.

Research from the World Economic Forum indicates business opportunities will be found in four major areas:

Improved operational efficiency (e.g., improved uptime, asset utilization) through predictive maintenance and remote management

New connected ecosystems, coalescing around software platforms that blur traditional industry boundaries

The emergence of an outcome economy, fueled by software-driven services; innovations in hardware; and the increased visibility into products, processes, customers and partners

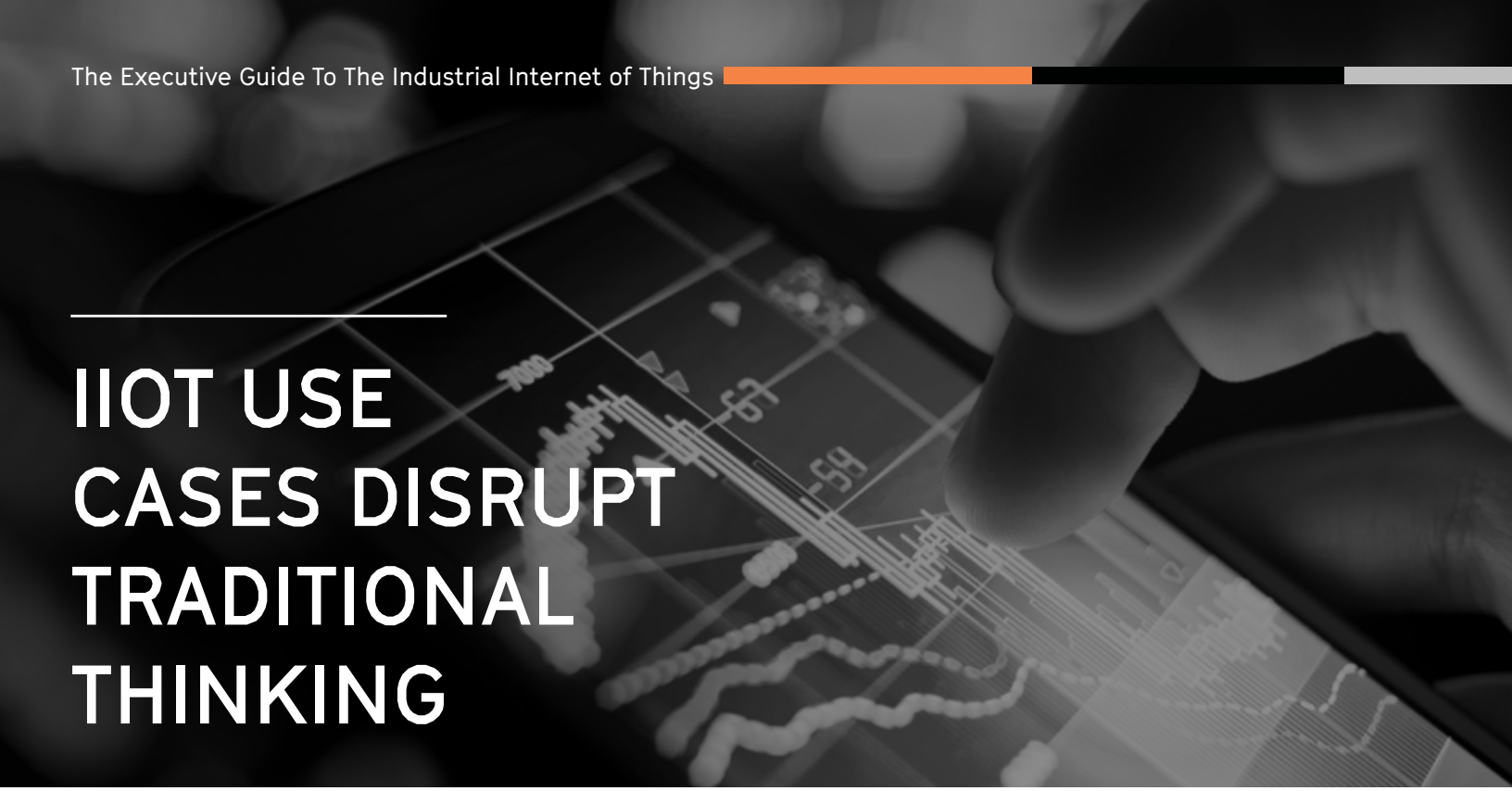
Collaboration between humans and machines, which will result in unprecedented levels of productivity and more engaging work experiences.[5]

Given the state of the market, most in the industry are focused on greater returns on existing infrastructure.

In a recent Cisco report, respondents named "operational efficiency of existing projects" and "maintenance of assets and infrastructure" as the top two areas of increased investment over the next 24 months.[6]

However, these enhancements require key business processes to be adjusted. More than half of the respondents in an oil & gas industry survey believed that the IIoT could potentially automate from 25 percent to 50 percent of manual processes.[7]

But the goal is not to simply automate processes to reduce overhead spend. Instead, an IIoT strategy creates a new value proposition: actionable insights about assets, supply chains, and customer relationships. By transforming into digital technology companies, industrial leaders can be more effective in all areas.



IIOT USE CASES DISRUPT TRADITIONAL THINKING

In the near term, remote monitoring and management of assets is seen as the most important capability enabled by digital technologies. Also, remote management and new “as a service” models are expected to grow in importance.[15]

Accenture sees the greatest impact from IIoT in enabling connected field workers, with 60 percent of survey respondents planning to have field workers and assets digitally connected with smart devices.

The use of the cloud has shifted from being used primarily for infrastructure to an enabler of mobile tools. This trend is expected to increase in the next three to five years, as companies keep using the cloud to get faster and more value from other digital technologies.[17]

The entire industrial value chain is ripe for exploiting data-driven IIoT strategies. However, utilizing the data generated from connected devices will demand changes in industry’s approach to data technology.

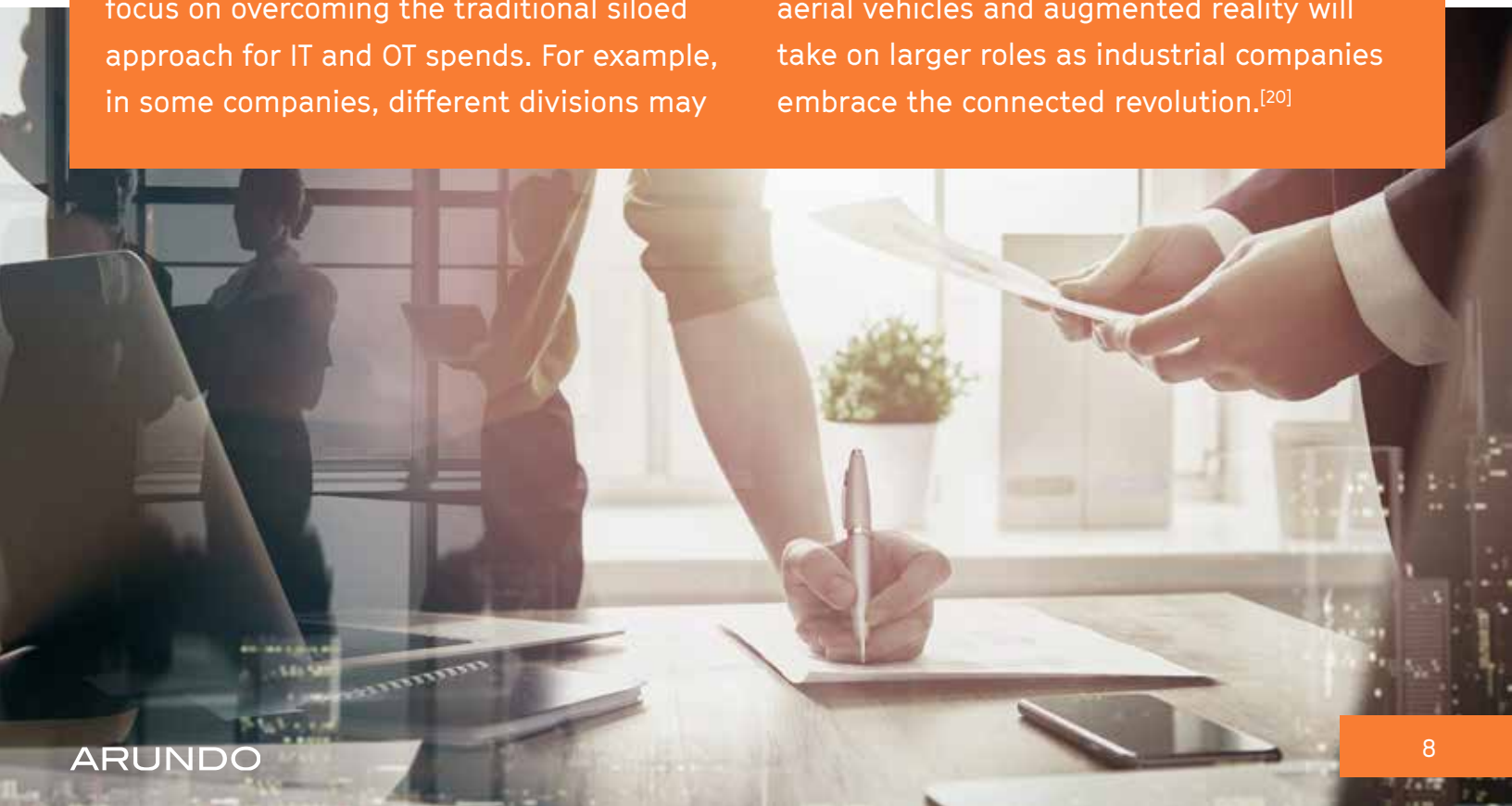
With common data standards, companies can integrate previously disparate data streams to gain insights into previously invisible aspects of operations, For example, applying machine learning models to a range of physical data could help engineers improve the overall understanding of complex physical systems, in order to better manage and improve such systems.[18]

To realize improvements from a connected infrastructure, most companies must transform their business processes to better integrate operational and information technology silos. Many companies believe their information technology (IT) and operational technology (OT) strategies are not closely aligned.[19]

Business process reengineering efforts must focus on overcoming the traditional siloed approach for IT and OT spends. For example, in some companies, different divisions may use appropriate but different solutions for asset performance management and other common tasks. All too often, OT functions are managed separately from IT, even in the case of mission-critical functions such as reliability.

These functional silos create friction and waste, increasing costs and limiting business agility. Without greater cooperation and coordination, investments in IIoT may fail to deliver the expected business and operational benefits.

Creating a convergence of IT and OT will deliver many benefits, including optimized business processes, enhanced decisions making, lower costs, reduced risks, and faster project timelines. In the long term, evolving technology such as wearables, unmanned aerial vehicles and augmented reality will take on larger roles as industrial companies embrace the connected revolution.[20]



INDUSTRIAL IOT CHALLENGES

For consumer level applications, unexpected glitches may result in a poor user experience, but no real consequences. But the Industrial IoT, where real-time is measured in the sub-millisecond level, requires bullet-proof reliability and security.[22]

Of course, many industrial facilities are part of critical national infrastructure and must mitigate cybersecurity risks. Unfortunately, security is an evolving state as internal processes and external attacks continuously change the landscape. Experts recommend planning for the eventuality that an attack will be successful, and how operations would change in that scenario. After all, security and resilience are vital not only for technology, but also people, data and processes.[23]

Embracing the Industrial IoT is not without risk.

The World Economic Forum reports the IIoT is still at an early stage, similar to where the consumer Internet was in the late 1990s.

At the basic level, companies can first seek to improve reliability with the goal of minimizing risk exposure to health, safety and the environment.

Then, companies can increase productive and optimize operations to improve the cost and efficiency of operations.

At the top level, companies can explore creating competitive advantage and new revenue streams derived from the deeper operational insights.

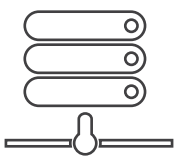
Many of the largest obstacles are likely to be internal. After all, simply deploying technology does not automatically deliver economic value. Companies must build a solid business case, linking IIoT deployments with specific business priorities. All too often distributed control systems (DCS) or Supervisory Control and Data Acquisition (SCADA) applications have been custom designed, making it difficult to connect and communicate with other systems. Companies must also address the "data deluge" generated by networked equipment. The advancement of embedded computing and industrial wireless networks now allow even small operations to reveal process anomalies real-time.[24]

Consider that a large industrial facility, such as an offshore oil platform, generates between 1TB and 2TB of data per day, and most of this data is time-sensitive, pertaining to production and safety.[25]

Of course, these insights must also integrate into a business process in order to effectively change operations. In fact, the greatest barriers lie not with the digital technologies but with the integration of existing internal workflows and processes.[27] To realize improvements, companies must transform the way they do business by creating convergence among people, processes, and technology.[28] The workforce will have to be transformed as well, with as much emphasis placed on analytical and IT skills as field knowledge.

To capitalize on the wide range of data, companies must overcome three key challenges:

Integrating data from multiple sources



Automating the collection of data

Analyzing data to effectively identify actionable insights[26]

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