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WHITEPAPER

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Contents





Bringing clarity to the IIoT landscape. Where should your focus be?

The benefits of networking devices to gather data across industrial operations, using the Industrial Internet of Things (IIoT), have been widely discussed, acknowledged and adopted for some time; and most businesses and industrial plants are currently deploying IIoT in some form. However, to propel the journey forwards and achieve true digital transformation, it's important to look at the challenges and opportunities which companies are facing on their journey.

This paper will examine these factors and provide insights, using research conducted with organizations across the globe including in Europe, China and the US; in a wide range of industrial sectors such as manufacturing, food and beverage, oil, gas and petrochemicals, renewable energy and utilities; and in job functions spanning digital, electrical, engineering, operations and production.

It will bring into focus how current IIoT investments are being made; what approaches are being taken; what's working best; plus the main barriers to adoption that you may face as an organization, and how to overcome them.

The goal is to help you understand where you stand today, and from there to help you take a confident step forward in achieving your digital ambitions and truly scaling the adoption of IIoT. This will be vital in order to manage the energy transition and move towards decarbonization – with digital transformation contributing to improved energy management and sustainable operations; and the added benefits of increased profitability, reduced downtime and enhanced safety.

Survey methodology

Research was conducted from March to June 2023, with a total of 346 respondents in two sets. In the first set, consultative online data collection agency Potentia Insight used a research panel to conduct fieldwork with 201 industrial decision makers across 7 markets and 9 industries¹. Approximately 50% of respondents were in manufacturing (discrete and process). 70% of respondents were primary decision makers and 30% secondary decision makers in IIoT. One third held digital roles, one third operational roles and the remainder were from production, engineering, electrical and risk/safety.

The second set of 145 respondents were ABB customers across 19 markets in the same 9 industries. These customers completed an online survey which mirrored the fieldwork research. By surveying a broad range of industries, and with a specific focus on IIoT decision makers, we believe the research methodology and results provide valuable and current insight into IIoT implementation, motivations and trends.

The sample size for each industry varies. Please keep this in mind when interpreting the results, which should be treated as indicative.

1. Discrete Manufacturing; Process Manufacturing; Data Centers; Food & Beverage; Mining & Metals; Oil, Gas & Petrochemicals; Renewable Energy; Transport Infrastructure (Rail, Air, EV); Utilities.



What does the IIoT journey look like?

Everyone discusses IIoT as a journey, so it's helpful to look at the stages of that transformation and the progress that organizations are making.

Journey

Who's on the journey?

93% of organizations are already on their digitalization journey

Focus

Which areas of the organization are the priorities for IIoT investment?*

50% operations management

43% electrical systems

38% safety

Reasons

What are the main drivers of interest in IIoT?*

46% cost savings

40% efficiency

34% productivity

28% energy optimization



* Percentage of respondents who selected this option as a top 3 choice. (Reasons and Focus)

Implementation

Where are companies on their IIoT journey?

7% not started

31% just getting started

41% are starting to scale

21% are mature

Approach

What's the approach to digitalization of electrical systems?

30% by upgrades or retrofitting

34% by upgrades and the purchase of new digital assets

36% by replacing assets when required

Value

Where are companies realizing value?

78% say that IIoT is delivering business value

AND

84% are positive or highly positive about the impact on sustainability targets

56% are very positive about the cost savings

54% are highly positive about the impact on Overall Equipment Effectiveness (OEE)

48% noted a very positive effect on developing new business models





Where is the untapped potential?

As well as delivering clear-cut evidence of progress in IIoT implementation, the research highlights areas where organizations could achieve more through digitalization.



Potential 1: Fully exploit the value of IIoT

“Achieve scale to realize the true value of IIoT”

30% say IIoT is delivering significant value

BUT

22% say IIoT is delivering little value, very little value, or don't know if it is delivering value



Potential 2: Focus on digitalizing electrical systems

“Make prioritizing electrical digitalization a reality”

43% say digitalizing electrical systems is a top functional priority*

BUT

57% of the remainder aren't making digitalizing electrical systems a priority

AND

22% have no plans to switch from transformers to sensors

36% are replacing assets only when required



*Percentage of respondents who selected this option as a top 3 choice.

Where is the untapped potential?



Potential 3: Use IIoT to increase sustainability

“Accelerate digitalization to meet environmental targets”

44% say environmental targets are very important for electrical systems management

BUT

only **20%** say sustainability targets are a driver of interest for IIoT implementation*

*Percentage of respondents who selected this option as a top 3 choice.



Where is the untapped potential?

Potential 4: Use IIoT to increase visibility

“Improve transparency and control over operations”

84% say that increasing visibility has been very positive or positive

YET

only **17%** class visibility as a top three driver of interest for IIoT implementation*



Potential 5: See safety as a necessity and an opportunity

“Realize the benefits of running a safer operation”

only **25%** class risk or safety as a top three driver of interest for IIoT implementation*

*Percentage of respondents who selected this option as a top 3 choice.



Barriers to digital adoption

Now that we better understand the journey and progress that companies are taking towards IIoT implementation – and some potential untapped business opportunities – it is appropriate to highlight areas that can be seen as barriers to digital adoption in electrical systems. We have selected five barriers here as revealed by key statistics in the research, to discuss their importance, and what it will take to overcome each one.



Barrier 1: Cyber security

“How can we safeguard mission-critical data?”

42%

say cyber security concerns are a barrier to IIoT implementation for electrical systems*

Security is the foundation for building future industrial systems based on the Internet of Things. Since IIoT enables the collection of vast amounts of data, cyber-attacks or technical glitches can be costly in terms of lost production, damage to physical assets, and financial or business value losses.

Historically, the cloud has been seen as a security issue. Yet the cloud is essential if organizations are to scale IIoT and benefit from powerful analytics. Securing cloud data storage and transfer is of course critical, but not all data needs to be sent to the cloud. A partner with experience of both cyber security and industrial

process automation systems can identify data which benefits from cloud analysis, and recommend the right balance between cloud-connected devices with built-in safety protocols and edge devices that encrypt and streamline information on-site.

Safeguarding data across the IIoT infrastructure will also require a unified end-to-end approach. Organizations should employ a combination of firewalls, encryption, multi-factor authentication, and regular security audits to create a strong defense against cyber-attacks. Human error remains one of the most significant vulnerabilities in data security. So, ensuring that all employees are aware of data protection protocols and are given regular security training will help minimize the risk of data breaches.

The key to safeguarding mission-critical data and overcoming the cyber security barrier is not to wait: investing in cyber security should be an ongoing process, so that it's embedded in processes and operations, and organizations can take advantage of the many benefits of modern big data management.

*Percentage of respondents who selected this option as a top 3 choice.

“Cyber security has always been top of our agenda. That's why ABB partners with companies like Microsoft who have invested a great deal in the security of their systems. We even add our own guidelines and test protocols as additional protection to their rigorous security, to protect data with unsurpassed cyber security.”

Sherif El-Meshad, Digital Lead, ABB Electrification

Barriers to digital adoption



Barrier 2: Ease of integration

“How do we future proof integration?”

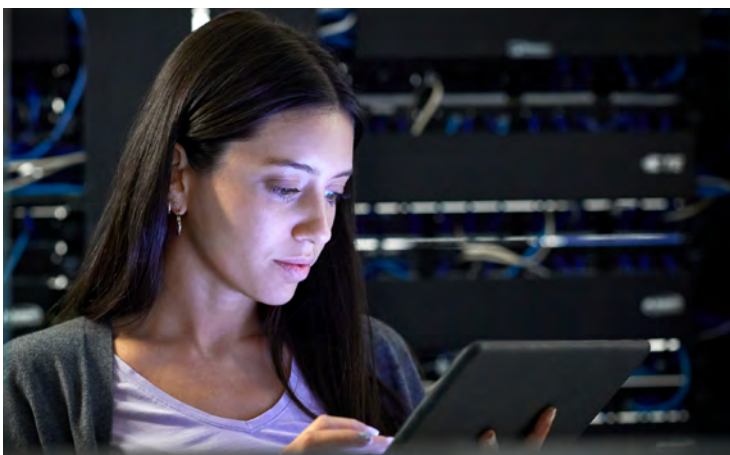
41%

named integration with existing assets as one of their top three barriers to IIoT implementation*

In most companies, Information Technology (IT) and Operational Technology (OT) have lived for decades in separate worlds. Bringing IT and OT together requires horizontal integration (networking between machines to allow production data to be used) and vertical integration (connecting devices such as sensors to systems, to deliver business insights).

While this can seem like a barrier to creating an energy infrastructure system or smart plant, integration can be assured by following some simple steps. On the IT side, organizations should ensure standard interfaces (such as open APIs) are used for data exchange, rather than incompatible protocols or proprietary ecosystems. While on the OT side, the use of international communication standards and industrial communication protocols – specifically International Data Transfer Agreement (IDTA) data container standards – will guarantee barrier-free data logistics between systems and devices.

Whenever an investment is made in IIoT – such as new digital switchgear – interoperability for both IT and OT standards should be checked, since some solutions offer compatibility with only a limited range of third-party solutions.



Barrier 3: Return on Investment (ROI)

“How can we be sure IIoT will deliver ROI?”

35%

say evidence of business value or ROI is a barrier to IIoT implementation*

Our research revealed that no matter the size of the enterprise, balancing the right level of digital investment while demonstrating a robust potential ROI remains a key challenge.

That’s why it’s important to have a clear ROI target to determine if the costs are worth the benefits for specific use cases and facilities. It’s here that a manufacturer’s expertise, combined with maintenance engineers’ internal knowledge, can help to determine the best strategic approach to everything from maintenance to new installations – in order to overcome barriers to expenditure based on hard facts.

As well as up-front expenditure, costs reductions in the future should be factored in. According to ABB data, a predictive asset management strategy can decrease maintenance time and frequency by up to 30%, helping organizations to reduce total cost of ownership by 40%. Condition monitoring devices and sensors can track up to 70% of the most common failure causes, which avoids costly unplanned labour. Digital switchgear can also reduce the footprint: for the Air Insulated Switchgear (AIS), for example, the bus bar metering cubicles can generally be omitted because sensors can be placed in other panels of the lineup. Meanwhile, for some Gas Insulated Switchgear (GIS) applications, more compact panel variants can be chosen to implement voltage measurements on the cable side of the lineup. Put together, all of these factors can help organizations overcome the ROI hurdle when they assess IIoT viability.

*Percentage of respondents who selected this option as a top 3 choice.

Barriers to digital adoption



Barrier 4: Skills

“Where will we find the right skills?”

35%

say internal skills expertise is a barrier to IIoT implementation*

IIoT implementation can create high quality jobs for people, however, to prepare for the jobs of tomorrow, organizations may need to re-think their education and training processes. Due to the skills gap and an ageing workforce, companies may already have seen the number of people transferring their experience to younger generations decrease, and the knowledge base in the company shrink. At the same time, it's likely that the organization is being challenged to introduce digital change.

To overcome the skills barrier, change management and training are equally as important as technology. Investment is required



to build different skill sets for digitalization, such as maintenance competencies and the expertise required to work with IIoT devices and analyze data.

Third-party educators can rapidly help to introduce digital skills, foster the workforce to take advantage of changing opportunities and continuously improve their expertise for a digital future. What at first appears to be a major barrier can be an opportunity to beneficially redefine the working environment, and increase productivity. At the same time, skills training will facilitate faster scaling of IIoT, to support the company's business goals.

*Percentage of respondents who selected this option as a top 3 choice.



Barriers to digital adoption



Barrier 5: Complexity

“Why change a system that’s already working?”

56%

still use time-based or usage-based maintenance

17%

of companies still use a corrective maintenance approach

Underlying electrical equipment in plants has changed very little for decades. However, in the modern age, maintaining a large number and variety of assets and electrical infrastructures (such as gas insulated or air insulated apparatus, switchgear, primary, secondary distribution and transformers) is increasingly complex. The cost of maintaining legacy and outdated systems is also high. Running equipment to failure, for example, can cost up to 10 times more than investing in a program of predictive-based or condition-based maintenance, which extends the lifecycle and productivity of electrical assets. The research indicated that the industries most affected by using time-intensive or potentially costly types of maintenance programs are Utilities and Oil & Gas.

To overcome the perceived barrier of complexity and change ‘systems that are working’, digitalization must be embraced as a means to reduce complexity, not add to it. Digitalizing assets like switchgear does not have to be complex: with careful planning, assets can be replaced or upgraded in larger, scheduled deployments to minimize disruption and ensure interoperability.

Introducing a modular, interoperable, secure and scalable IIoT approach means organizations will no longer have to manage disparate workflows and processes across different facilities. This has a knock-on benefit in helping to address the widening skills gap, since workers can move away from more repetitive and dangerous tasks, and through training, develop new skills based around analytics and monitoring in real time. Proactive digitalization therefore creates new digital opportunities in the business: including reducing downtime; raising workforce productivity; increasing sustainability due to reduced travel for on-site inspections; and better operational safety through greater visibility into systems.





Top five takeaways

A few pointers on staying competitive with your IIoT implementation:



1. Create proactive plans

Use the data in this report to prove the power of proactively digitalizing – and create a year-on-year upgrade plan for replacements. Manufacturers and partners can help you develop accurate Total Cost of Ownership calculations and Return on Investment predictions, and establish a framework for measuring ROI at every stage of your digital transformation.



2. Digitalize for cost and efficiency, but not just that

It's natural to see IIoT as a great cost saver and productivity booster – and it is. But it's also a door-opener to entirely new methods of working that could see you leapfrog competitors with new models of business and revenue streams: using Artificial Intelligence, Big Data, Virtual Reality and more. There is also great potential for your organization to meet its sustainability goals, such as reducing energy use and shrinking its carbon footprint, through the use of smart technology.



3. Basic isn't best

Relying on traditional switchgear and maintenance may be a strategy; but it's not a competitive one. A slow-but-steady replacement strategy is actually likely to stifle innovation, whereas fully functional predictive maintenance takes your operation to the next level in terms of operational efficiency, performance and lower maintenance costs.



4. Go for scale and maturity

While it takes time to determine where technology should be deployed, and in what functions, quick adjustments to production with minimal investment cannot and will not demonstrate the true value of IIoT. Achieving scale requires sound planning and investment; and potentially targeting under-exploited areas for competitive advantage, such as being amongst the first in digitalizing electrical systems.



5. Trust in partners

Manufacturers and partners can help you make an informed decision on IIoT investment, give you roadmaps, help you validate ROI, and solve implementation challenges working with your engineers. These organizations will undoubtedly have previous experience and knowledge – be it around sensors, cyber security, integration, data science or the cloud – that can maximize your IIoT investment.





See the full potential of IIoT, faster

We drive automation and future-proofed IIoT

As you pilot and scale in IIoT, your technology partners should offer practical support across the entire digital ecosystem. You can tap into a vast network of expertise and technology with ABB, to help everyone in your organization see the bigger picture. For the fifth time in ten years, Clarivate has named ABB as a top global innovation leader.

Our industrial software solutions are based on decades of experience gained in providing challenging process automation, information

management systems and services to process industries, utilities and manufacturers worldwide. We bring clear focus to how IIoT can power modern operations that are safe, smart and sustainable.

Read more on how we are supporting IIoT journeys across the globe here: