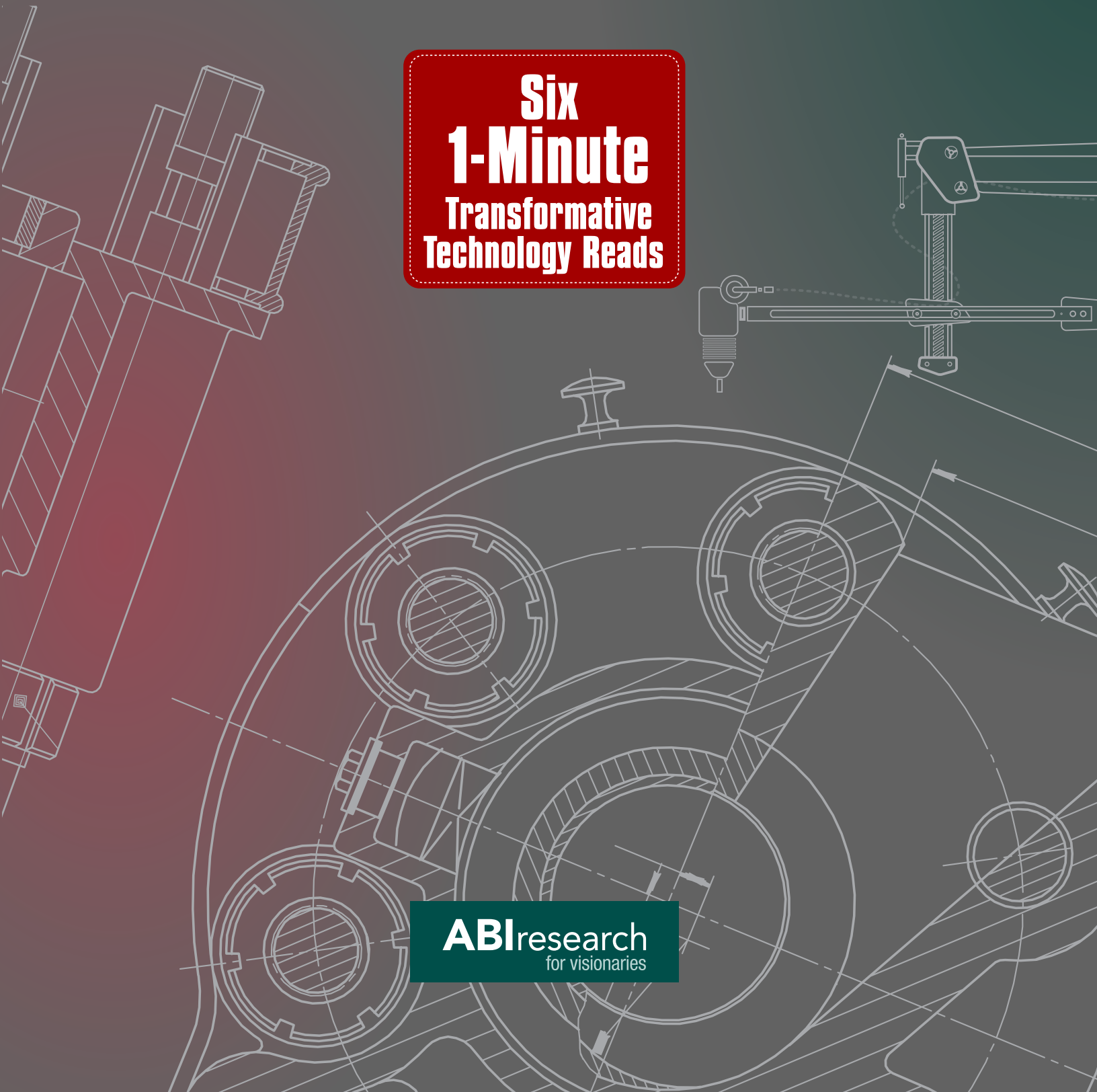
The Top Questions & Answers FOR Industrial Innovators



Six 1-Minute Transformative Technology Reads

ABIresearch
for visionaries

Artificial Intelligence (AI)

Q: What is the most suitable implementation of AI for industrial companies? Full edge implementation (*e.g.,* both training and inference on-premise)? Cloud AI? Hybrid implementation (inference on edge and training at the cloud)?

A: Many manufacturing industries are dealing with mission-critical tasks that need real-time actions (*e.g.,* predictive/proscriptive maintenance, chain switch in case of chain overload, operation flexibility). Any communication failure with the cloud or delay in receiving the right data could result in significant latency in the chain operation. In addition, manufacturers are often skeptical of sharing sensitive data with the outside world and consider the security of their infrastructure a key priority. Manufacturers should be meticulous in choosing the best approach to implement AI and first need to decide on the use case they want to address. This choice should be based on the balance between cost, efficiency, security, and data protection.

Q: Is there an AI as a service type solution for industrial companies?

A: While AWS (Amazon Web Services), Facebook, and Google all provide an AI solution in the public cloud, they may not be ideal for industrial companies in a private cloud. IBM Watson and GE Predix offer AI implementations on-premise as well as to the cloud solutions. GE Predix also offers a revenue risk-sharing model that enables industrial companies to minimize initial adoption cost.

Blockchain

Q: What is the advantage of implementing blockchain in a manufacturing supply chain?

A: Blockchain can add a level of transparency in an increasingly complex manufacturing supply chain, providing immutable information about origin, parts, identity, ownership, certification, maintenance, and other data, that can be useful to all participants from manufacturer to end-user. In addition, smart contracts leverage automation and AI to administer prognostic health management, remote diagnostics, and predictive maintenance for industrial machinery, thus, cutting out time-consuming human resources that would otherwise be required.

Q: Won't blockchain put some middlemen out of business?

A: There are business models in which centralizing data about manufactured products, especially between manufacturers and wholesalers, has created a lucrative reselling opportunity. This is notable, as price points can be more easily obfuscated. The blockchain may well put some of these companies out of business, but it will benefit the broader industrial ecosystem in the long run through better transparency. Furthermore, new business models can be created around the blockchain platform management that can replace siloed, opaque transactions with end-to-end visibility management.

Q: How can blockchain address the problems of counterfeiting and IP theft?

A: Increasingly complex manufacturing processes have expanded the use of contract manufacturing. This growing number of external parties has actually enabled IP theft and counterfeit production. Blockchain applications can be designed not only to assign and track identities of manufactured products but also to monitor those identities across their lifecycle. Not only can designs be locked down in the block itself using cryptography, but when illegitimate copies start appearing on the blockchain, tracking and monitoring software can also help determine when and where those products were counterfeit, and immediate remediation can be sought.

Cybersecurity

Q: Have I accounted for protecting my operational technologies in my corporate cybersecurity strategy?

A: Digitization and connectivity make operational technologies (OTs) vulnerable to existing cyberthreats and create new threat vectors within an organization. Cybersecurity strategies must consider extending protection to OT systems, in a similar fashion to those deployed for IT. This is especially true in smart factories that are increasingly making use of cyber-physical systems to improve manufacturing processes. Cyberattacks against those systems are a reality, and therefore their cybersecurity is imperative.

Q: Have I included security in the design and production of my products?

A: Many new technology products include connectivity, but not all are designed with security in mind, especially those that belong to the IoT world. This lack of security can have serious repercussions in post-market: easy cloning, device subversion for cyberattacks, loss of functional/critical safety, device failure and data loss that can lead to liability and non-compliance with potential security/safety regulation. In the parts belonging to manufacture and wholesale markets, security by design can enable a more robust build of final devices, cutting down on potentially defective and vulnerable products.

Q: Are there post-market secure service opportunities or new business cases (such as lifecycle device management) that could create better customer stickiness with my product?

A: There is a transformation of many industries to an as-a-service model. These core services are offered under an umbrella term called "lifecycle management," where the device is managed post-market through various technologies, focusing on trust management, product security, and service integrity. In manufacturing settings, the ability to provide secure maintenance and management services to products after-market is significant, increasing device lifespan, creating customer stickiness, and opening new value creation opportunities with new feature enhancements.

IoT

Q: How do you deliver actionable analytics to the employees that need to act?

A: You must start with a business or operational goal or problem that needs solving. Once you know what you hope to achieve, IT liaisons on the affected OT teams or joint-task forces between IT and OT can increase communication and exchange of ideas to help digital technology specialists understand the needs of various business units. As a result, those business units better understand how to use IIoT (Industrial Internet of Things) platforms and IT systems. Increased exchange of ideas and access to the right information will help solve the original problems and build potential for future innovation.

Q: How can you securely network mission-critical assets in the Industrial Internet of Things (IIoT) to allow access to insights or control of those assets by the appropriate employees?

A: First, we as an industry have misnamed the IIoT. Although we already see quite a few connections linking to AWS or Azure, even public clouds do not allow simply anyone to access the data like one might do on the Internet. The IIoT looks more like a collection of Industrial *Intranets* of Things with "Subnets of Things" within them. For your Subnets of Things, you need hyper-converged on-premises edge platforms. By working with companies such as VMware, Eurotech, Dell EMC, HPE, or FogHorn Systems in conjunction with a platform provider, you can run digital tests and simulations based on real-world data to optimize the performance of assets, reduce downtime, and perform predictive analysis for failing parts or run the applications your platforms enable all at the edge.

Q: If edge computing can solve so many problems, how do workforces benefit from the cloud?

A: While edge computing can help improve operations at individual plants, cloud computing helps set longer-term global strategies for larger corporations. Consolidating data and computing in the cloud can find more underlying trends in the long term and help coordinate operations across geographies and job functions. For instance, if a part is failing, maintenance obviously needs to know, but so does purchasing, accounting, the engineering team, and the supply chain. Accounting and engineering have different work and deadline cycles than maintenance, but they also need to know. Accounting needs to update the books, and engineers need to plan to improve the next product series. Cloud platforms help link these employees and their functions.

Q: Can a single connectivity technology address all Industrial IoT applications in the future?

A: Stringent network demands of industrial applications have historically driven an ecosystem of proprietary and application-specific protocols with most of the communication protocols based on wired connectivity technologies, such as Fieldbus and industrial Ethernet. In more recent times, wireless connectivity has shown potential in reducing network costs with Wi-Fi, Bluetooth, cellular, and 802.15.4 based technologies used in varying degrees.

With the increasing availability of low-cost sensors devices, the proliferation of wireless connectivity is expected to gain wider adoption. However, with a massive install base of wired devices, especially Fieldbus, Ethernet-based protocols are likely to co-exist with wireless technologies.

Q: Which connectivity technologies will have the most impact and drive different use cases or IoT applications in an industrial environment?

A: Wireless connectivity technologies' low network costs and increasing availability of industrial-grade sensors will proliferate in the industrial environments complementing wired technologies. Wireless sensors networks using Wi-Fi, BLE, 802.15.4, and LPWAN technologies will be used in gathering environmental and process control information. Cellular technologies that can support very low-latency communications will witness wider traction in monitoring and control applications.

Q: What impact will IoT platforms have on small and medium-sized industrial companies and their market readiness to compete with large companies?

A: According to an ABI Research industry survey in July 2017, which focused on the IoT adoption U.S. market, IoT familiarity and adoption was strongest in large companies, whereas the majority of small and medium enterprises (SME) were either not implementing or in the early assessment of IoT. While large companies' implementation is often seen at the operational level and target business functions that can benefit most from operational efficiencies, SMEs' implementations are more strategic in nature and can have an impact on the overall business. Benefits of IoT are still mainly focused on improving operational efficiencies that deliver immediate ROI (return on investment). With IoT, SMEs can not only benefit from faster decision making with improved visibility of the supply chain but also from efficient demand planning.

Robotics

Q: Should an industrial company go with a best-of-breed type approach or single vendor approach when they consider robotics solutions?

A: While best-of-breed is always preferred, the choice depends on the internal IT capabilities of the enterprise user, the complexity of the automation needs and requirements, and the trade-off between cost (lower for single vendor approach) and performance (best-of-breed guarantees best performance). Yaskawa Motoman recently launched a new family of industrial robot controllers that will allow easy integration with an existing PLC (programmable logic controller), since no separate programming language is required for the robot. Growing pains still present challenges to incorporating solutions from different robotics vendors.

Q: When is the right time to adopt a collaborative robot (aka "cobot")?

A: For the manufacturer yet to adopt robotics automation, it may be that a cobot is an ideal first step toward automated processes, given the slightly lower price point. Once multiple cobots are required, the cost will quickly exceed the cost of a fleet of industrial robots. The best way is to access the nature of the process (fixed or changeable) and the scalability requirement in the long term.

Q: What is the right business model implementers should consider for automating their manufacturing processes?

A: Robotization and automation of the manufacturing chain is complex and requires significant capital investment. This is particularly the case for small manufacturers and those burdened with legacy equipment. With the multitude of solutions on offer and the fragmented technology landscape, manufacturers are reluctant to take the risk in automating their facilities, uncertain of their potential return on investment and/or the cost to run and maintain the new equipment. Robotics-as-a-Service (RaaS) is emerging as a new business model likely to lower the barrier to adoption for manufacturers.

Q: How do I implement Robotics-as-a-Service to shift from CAPEX to OPEX?

A: If you are a small-to-medium business in the manufacturing sector, there is a pretty good chance you have missed out on many of the benefits of automation over the years. The incorporation of smaller collaborative robotic arms is beneficial, but the price remains high. The alternative business model of RaaS provides an opportunity to shift expenses from large upfront capital investment to more long-term operational expenses. This is likely to benefit smaller companies and lower the barriers to adoption for automation.

Q: What new opportunities will smaller collaborative robotics provide?

A: Today, manufacturers are increasingly demanding robotics technologies that support agile manufacturing, production processes that make no assumptions as to volume levels, or even types of products being manufactured. Collaborative robots can provide this flexibility, through high modularity and the ability to perform multiple tasks with new end-effectors, but also through location and mobile flexibility (being able to move and be moved quickly around the workspace).

Q: How will major innovations in gripper and end-effector technology advancements impact me?

A: From handling soft materials to manipulating objects autonomously, an ever-growing number of players are developing innovative end-effector solutions that expand the utility of robots in the workspace. Key vendors to look out for include Robotiq, On Robot, Schunk, Destaco, and Soft Robotics.

Wireless Connectivity

Q: Why should I be looking beyond Ethernet to wireless connectivity in my installations?

A: Wired technologies are proven and robust. Key vendors, engineers, and implementers have long-term experience and training with wired solutions. However, they are more labor-intensive and costly, difficult to retrofit or upgrade, less flexible, less scalable, cannot easily integrate with new systems or devices, and are more challenging to install in hazardous environments. In contrast, wireless solutions often come at a lower cost, are easier to install and maintain, provide greater flexibility, are more scalable, and can cover greater coverage areas through mesh networking or longer-range technologies. Wireless technologies

can help drive a range of new innovations in condition monitoring, predictive maintenance, people and asset tracking, health and safety, and security applications, among others.

Q: How do I triage the wireless connectivity technologies available for me to employ?

A: There is no single wireless connectivity technology that can address the varied requirements of a smart factory on its own. Industrial facilities will require effective co-existence and co-operation between multiple and different technologies dependent on specific application use cases and requirements. However, organizations must better understand the strengths and limitations of each wireless solution, the scalability and security features of different implementations, how emerging LP-WAN technologies compare to short-range wireless technologies, such as Wi-Fi, Bluetooth and 802.15.4, and which wireless solutions can replace or extend wired coverage in harsher industrial environments.

Q: What should I be concerned about when looking at wireless connectivity solutions in my operations?

A: Despite the inherent advantages of wireless sensor networks in industrial environments, there are also numerous hurdles that need to be overcome to gain wider traction. Wireless technologies are relatively new to industrial environments, and there is still a lack of confidence and trust in these solutions, thereby hindering growth opportunities. Poor past performance, battery life challenges, technology fragmentation, interoperability issues, lack of awareness and education, security concerns, and a risk-averse environment all remain key obstacles. In addition, according to ABI Research's "Industry Survey on Transformative Technology Adoption and Attitudes" report, aligning innovative technologies with the existing framework represents the biggest barrier to adoption in manufacturing environments. And, a lack of technical knowledge was the biggest obstacle to integration between IS/IT and operations. There is a clear need for better education on wireless solutions and best implementation practices across different industrial environments. Existing fragmentation, confusion, and hesitancy around wireless technologies are preventing companies and industrial environments from reaching their full potential.

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