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The Role of the CIO in Integrating IIoT for Industrial Companies



As the Industrial Internet of Things (IIoT) integrates technology more fully into the business, CIOs have a great opportunity.





Global Manufacturing & Industrialisation Summit

Taking a Transformational Approach



At a glance

From our 10 years of research we know CIOs now have that seat at the table. Their role has changed and will continue to be critical as companies capitalize on IoT and other emerging techs—what we are calling "nextgen digital." With the advent of the Industrial Internet of Things (IIoT), all manner of new information and operational technologies, from tiny sensors to massive data analytics engines, will become an instrumental part of how industrial companies conduct business. And it will be up to CIOs not just to manage the effort, but to make it happen. In our recent Digital IQ survey, we found that companies where the IIoT agenda is a high priority, CEOs are solely involved with digital strategy, investments, and capabilities.

Thus, the CIO must work closely with the CEO, and educate the board, and other C-suite executives about the benefits of the IIoT. They will help lead the design, implement the required company-wide technology architecture, aid in measuring the business outcomes, and lead the change management effort to ensure compliance with the new way of doing business. As they say, it's a tough job, but somebody's got to do it.



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Executive summary

The Industrial Internet of Things (IIOT) promises to revolutionize industrial and manufacturing activities, and disrupt today>s business models. Many analysts have estimated that the impact may be exponentially greater than for the consumer internet, which explains why companies are expected to invest \$1.7 Trillion annually in 2020!

A diverse portfolio of technologies such as artificial intelligence (AI), robotics, drones, block chain, 3-D printing, sensors, data analytics, and others promise to rewire industry in ways not seen for the past five decades or more. This is clearly a call for action for top executives to integrate IIOT into their business strategies, and CIOs will have a key role to support their executive teams, and catalyze change.

Our research, ongoing engagements, and discussions with senior executives point to the need for companies to map their IIOT plans and roadmaps on the basis of a reference architecture, which then enables them to redefine their ecosystems and

IIOT strategies. The CIO's role will touch various parts of their company more than ever, and they will also need to help their businesses operationalize rapid changes in business models, from products to services, cloud-based models, outsourced models, and others. We also expect most of the benefits of IIOT to go to those who can create aligned strategies and governance, adopt a culture of prototyping and design thinking, quickly hire the right teams and build capabilities, and can adapt their ecosystem of partners and suppliers to the future needs of their customers. It is an opportunity that few companies will want to miss!

الملخص التنفيذى

يعد التحوّل نحو إنترنت الأشياء الصناعي نقلة نوعية ضخمة ستعمل على إحداث ثورة في الأنشطة الصناعية وعمليات التصنيع، وتغيير نماذج الأعمال المتبعة في الوقت الحالي. ويقدّر العديد من المحللين امتلاك إنترنت الأشياء الصناعي أثراً أكبر بكثير من ذاك الخاص بإنترنت الأشياء الاستهلاكي، الأمر الذي يوضّح سبب استثمار الشركات ١,٧ ترليون دولار أمريكي سنوياً بحلول عام ٢٠٢٠.

سوف تغير التكنولوجيا المتنوعة مثل الذكاء الاصطناعي (AI)، والرجل الآلي، والطائرات بدون طيار، وسلسلة الكتل (Block chain)، والطباعة ثلاثية الأبعاد، والمستشعرات، وتحليل البيانات، وغيرها الصناعات بشكل لم نرى مثله خلال العقود الخمس التي مضت. ويعد هذا سبباً لاتخاذ الإجراءات اللازمة من المديرين التنفيذيين في المناصب العليا في الشركات لدمج إنترنت الأشياء الصناعي في أعمالهم واستراتيجياتهم. وفي هذا الصدد، سوف يضطلع مديرو تقنية المعلومات بدور رئيسي في دعم الفرق التنفيذية وتحفيزهم نحو التغيير.

تشير البحوث التي أجريناها والتواصل المستمر والنقاشات مع المديرين التنفيذين إلى الحاجة إلى الاستعانة بوثيقة مرجعية لأفضل الممارسات المتعلقة بخطط التحول إلى إنترنت الأشياء الصناعي وخارطة الطريق الخاصة بالشركات، من أجل ممكينهم من إعادة تشكيل منظومة العمل الخاصة بهم وتطوير استراتيجيات تنسجم وتتواءم مع عملية التحوّل نحو إنترنت الأشياء الصناعي. وفي هذا الشأن، سينصب دور مديري تقنية المعلومات على عدد من المجالات ضمن الشركة،

وسيحتاجون إلى مساعدة الأعمال على تنفيذ التغييرات في نهاذج الأعمال المتبعة بسرعة، بدءاً من المنتجات وصولاً إلى الخدمات المقدمة والنماذج المبنية على التكنولوجيا السحابية، بالإضافة إلى النماذج من مصادر خارجية وغيرها. كما أننا نتوقع أن تعود الفائدة من إنترنت الأشياء الصناعي بشكل كبير على من يقومون بتطوير استراتيجيات وحوكمة تتواءم معها، إلى جانب تبني ثقافة خلق النماذج والتصميم، وتوظيف المهارات الصحيحة وبناء القدرات، والتمكن من التأقلم مع منظومة العمل المكوّنة من الشركاء ومزودي الخدمات لتلبية احتياجات عملائهم المستقبلية. ويعد تبني والتحول إلى إنترنت الأشياء الصناعي فرصة لا تعوض لا يجب تفويتها! By 2020, manufacturing, energy, healthcare, transportation, real estate, and other sectors will be spending \$1.7 trillion annually to make the transformation to the Internet-of-Things.^{1, 2, 3}

The sheer size of the industrial IoT opportunity far outweighs all expectations of the consumeroriented IoT.

Managing the transition to IIoT will be an enormously complex task, and the #1 priority for CIOs and CEOs. As we have all heard, time and time again, the IIoT will profoundly change how manufacturers and makers of industrial products make, sell, and service their products. According to a recent PwC survey, industrial companies are planning to commit \$904B (and rising) annually to their IIoT initiatives, and 55% of respondents say their companies expect a payback within two years. By 2020, companies will likely spend fully \$1.7 trillion a year on the combined consumer and industrial IoT (see Figure 1).² In another survey, the 2017 Global Digital IQ Survey, a survey of 2,216 global IT executives, more than 63% of respondents said they have and will make significant investments in IOT.³

Figure 1. Total spending on hardware, software, services, and connectivity for the IoT in 2020.

Forecasted Worldwide IoT Revenue by Technology Element in 2020



Source: "IDC's Worldwide Internet of Things Taxonomy, 2015," IDC, May 2015; "Worldwide Internet of Things Forecast, 2015–2020," IDC, May 2015.

And indeed, the IIoT is becoming real. Figure 2 shows the key findings from a recent PwC survey on expectations and challenges of the IIoT.^{2, 3} The survey outlines the key actions that will make Industry 4.0 a success, such as investments, focus on people, need for learning from action, and others. Survey respondents, for example, expect to see US\$421B in cost reductions and US\$493B in increased annual revenues annually, thanks largely to greater operational efficiency as well as deeper relationships with customers. But respondents remain concerned about the relative lack of the talent needed to make the digital transformation, and of their ability to foster the truly digital corporate culture needed to succeed.

No scattershot approaches, please

Unfortunately so far, the effort to embark on the transformation to IIoT has led to a scatter-shot approach at many large industrial companies, creating a great opportunity for CIOs-the executive most commonly tasked with overseeing the digital effort-to provide an integrated and aligned roadmap. Each business unit and corporate function, it seems, is facing the challenge in its own way, forging ahead on its own with projects and pilot programs designed to test how to connect their products to the IIoT and experiment with the kinds of services such connectivity will enable. This approach has kept companies from coming to grips with the truly



disruptive consequences of IIoT, the radically different approaches in how they take their newly connected products to market, the implications for their operating models, and even the ability to create a robust business case, a roadmap, and a budget.

This won't work. IIoT isn't just about connecting devices to the internet. At its heart is the collection of all manner of data, and making that data actionable, and this will require new capabilities, processes and organizational structures. The shift to the IIoT will transform any number of basic processes. When a sensor alarm goes off, for example, what structures will be in place to respond? How will the data produced by the sensor be presented and validated? What actions must be taken to meet service level agreements (SLAs)?

Figure 2. The 2016 Industry 4.0 survey-key findings

Do pilot some ideas, but clarify your business and operating models soon

These questions lead to larger issues for CIOs and other leaders. As companies shift their business models from selling individual products to offering ongoing services, how will they evolve their operational capabilities? Once companies succeed in connecting a particular product to the internet, and developing a few services around that connectivity, how will they integrate and scale up such efforts into a consistent, company-wide IIoT program?

CIOs must think, too, about how they will operationalize and support their IIoT products and services. What systems will be needed for the operational aspects of IIoT? How will companies track and bill for a technician or third party's labor when sensors and devices are installed at a customer's location? How will they handle warranties and entitlements? How will updates and maintenance be scheduled, performed, and accounted for? The list of questions is long and evolving. Given the wholesale transformation required, answering these questions isn't just a matter of designing and implementing the company's new IIoT systems—though that is of course central to the mission of all CIOs, and to their success. Just as important, they must take an active role in developing the digital strategies, operating models, organizational structures, and new business models their new technology architecture will enable. CIOs are also realizing that they will need people with a variety of new skills at their companies-digital architects, data scientists, cyber security experts, and others.

Taken together, this is a tall order. Only by taking a carefully structured approach to all the strategic, technical, and organizations issues involved can CIOs hope to carry it out successfully.



The CIO's role in defining his or her company's digital strategy has become more important than ever.

The goal of CXOs, including the CIO, in promoting their company's transition to IIoT begins with the effort to contribute to the overall corporate strategy, and then to link that strategy with the company's technology transformation. This can be an especially tough assignment at industrial companies, as many of them have long standing business models, legacy technology, and under investments in more innovative technologies.

A proper IIoT strategy must account for three tightly interlocked aspects of a company's activities (see Figure 3). First comes the desired business outcomes or use cases, which can be further divided into four categories:



Trust

Ensuring trust and security as a competitive differentiator



Source: PwC analysis

These goals must then be supported by the right set of distinctive capabilities that gives the company a clear competitive advantage, and whether to build them, buy them through others, or partner with others to develop them. Finally, those capabilities must be integrated into a carefully designed technology and security architecture. A clear roadmap for IIoT transformation is critical in carrying out the company's strategy. The roadmap must clearly define the company's role in its IIoT ecosystem—from connected products player, to provider of complete solutions, to data integrator, to provider of a complete ecosystem solution—and the value to be achieved at each stage, as well as the capabilities needed to achieve its ecosystem goals, and whether to build, partner, or buy them (see Figure 4). The CIO must work with the CEO and other CXOs to define where in the ecosystem the company should play, how IT can support this strategy, and how the IT function can work with the owners of operational technologies. Setting a clear capability roadmap is critical to avoiding redundant or competing systems, platforms and technologies.





Source: PwC analysis



CIOs will need to guide their organizations to make architecture and technology choices

Getting the alignment between strategy and technology is critical, given that perhaps the key challenges of IIoT are its ever-changing technologies, capabilities, and business models. IIoT's protocols, platforms, and standards are relatively new and still evolving, security standards are still lacking, and it is the CIO's responsibility to evaluate what is already a wide variety of options. Should the company choose a proprietary system or an opensource offering? Light, efficient device communication protocols, or heavy, fast, data-driven ones? (see connectivity layer in Figure 4) An on-premise, public, or hybrid cloud option? (see platform layer in Figure 4) The answer to these questions will depend largely on the underlying digital strategy, and the particular use case. CIOs will also have to determine what capabilities can be developed in-house, what can be addressed through partnering, and what should be acquired.

Moreover, moving to IIoT requires not just a major transformation of a company's information technology—the gathering and analysis of the massive amounts of data the IIoT will inevitably produce—but also of its operational technology. Offering all-new sets of services alongside the products a company produces demands that companies rethink how they manage their relations with customers and how they should organize their internal operations. Given these new demands, CIOs will be instrumental in helping define their companies' goals vis-à-vis IIoT, as well as the path to achieving them. A "seat at the table" will no longer be adequate. Their deep knowledge of how IIoT works-what it can and cannot do-must inform every aspect of strategy, from developing their company's IIoT value proposition, to strategies for putting IIoT data to use and monetizing newly connected products and services, to devising a plan to initiate change management effort that will inevitably be required by the shift to IIoT.

The IIoT roadmap needs a business and cross-functional agenda

No CIO can do all this alone, of course; another aspect of the CIO's new job description will involve making sure his or her company has the people and skills—notably in the area of data and analytics—required to carry out the IIoT strategy. This is especially critical at industrial companies with aging workforces that have had limited exposure to the digital world and are all too likely to meet any major changes with resistance.

Finally, reaping the benefits of the IIoT will invariably require strong alliances and joint projects with other corporate functions such as operations, manufacturing, distribution, sales and marketing, and finance. Under pressure of increased digitization, the CIO's role will touch and overlap with every aspect of the company more than ever.

A reference architecture is instrumental in guiding every company's shift to the IIoT.

Developing the IIoT reference architecture

Once the overall digital strategy has been set, it is time to begin putting it into practice. At this stage, the task of the CIO is well defined: to provide a firm foundation—the proper platform and surrounding ecosystem—on which all of the company's efforts can rest. To that end, PwC has developed an IIoT reference architecture, a detailed design for the full range of technologies and processes needed to carry out a full-scale foray into IIoT. This technical architecture is supported by the business perspective, as well as the whole user experience which has been a catalyst for widespread technology adoption.

Our reference architecture doesn't just set out the common protocols and platform for the organization and the technologies required. It is designed specifically to enable companies to operationalize IIoT, specifying in detail components such as provisioning and assurance, and providing the means to evaluate and select the IIoT platforms best suited to their needs—while laying out the details of the robust security framework on which the entire effort must rest. Figure 5 lays out the key elements.





Source: PwC analysis

Data source layer. This layer consists of "things"—the sensors, actuators, and intelligent devices needed to monitor and control activities in the IIoT, and collect the resulting data. This layer might consist of smart meters for the utilities industry, remote patient monitoring equipment or hospital equipment location sensors for healthcare, and inventory management devices for retail.

The sensor level presents a variety of issues to CIOs that could determine the success or failure of their implementation. Should the sensor technologies be open-source or proprietary? What business models should be used to deploy the sensors own or lease, for example? How should maintenance, including software updates, and battery replacement be carried out? Such questions must be answered in the light of the defining IIoT strategy and each use case.

 Connectivity layer. This layer describes the technologies and standards necessary to establish connections between "things" and broader networks.
 Elements include the networking technologies themselves, such as Bluetooth, WiFi, cellular, telephone or cable, the design of the network itself, and the standards and protocols that will enable interoperability between devices and networks. CIOs must ensure that the connectivity technologies used are in line with the use case requirements established by the business. Factors to be considered include interoperability, length of battery life, cost, and security.

- Data messaging and integration layer. This is the layer at which the data that drives the IIoT is collected and managed. It defines how data is collected, aggregated, and transformed into useable formats for analysis. Here, CIOs must ensure that the proper data standards and structure are established—an especially tricky effort in large companies with multiple geographies and business units. Realizing that data is the most critical element in any IIoT rollout, some companies have been appointing chief data officers to oversee this effort.
- Platform layer. It is at this stage that the entire IIoT system is managed, and integrated with the relevant business functions. Operations at this level include data analytics, predictive analytics, inventory management, and billing, as well as critical

monitoring and maintenance activities. Selecting a platform or building one in-house must also be the responsibility of the CIO. The platform must be selected based on the use case and capabilities outlined in the IoT strategy and vision, and it must carry out the traditional FCAPS-Fault, Configuration, Accounting, Performance, and Securityfunctions. And since every IIoT implementation is basically a network implementation, service assurance will be a key focus in designing and implementing the platform.

Interaction layer. Here is where both business users and customers ultimately interact with the information and activities enabled by the IIoT, through any number of business systems, data visualization and performance management tools, mobile apps, and reporting mechanisms. The user experience is an area that cannot be overlooked. The CIO must ensure that all end users and other stakeholders are involved in its design, from conceptualization through to testing the user experience. It is very important that experts in user experience design are brought in from the very start of digital projects, especially for consumer-facing products.

• Security. Not a layer, but rather a critical concern at every level of the IIoT stack. Any security effort must ensure the confidentiality, integrity, and availability of both the inputs and outputs of the overall system.

At the sensor and data collection layer, the lack of standards remains a critical issue. This gives hackers another means of breaching customer data and corporate networks, a problem that is magnified due to the sheer scale of the IIoT—the billions of IIoT devices already installed and yet to be rolled out. Data as it is being transmitted must also be secured, and this depends on the communications protocol being used. Lighter protocols allow devices to be more efficient, but heavier protocols are for the most part more secure.

Finally, once collected and stored, that data must be secure from breaches. While database security options are reasonably mature, that data, especially as it pertains to customer privacy, is so valuable and so sensitive that it will likely become a persistent target of hackers.

• Governance. Like security, this aspect of the architecture cuts across every layer, defining the business processes, business value metrics, resource and risk

management practices, and operational activities that determine how the IIoT system fulfills its business goals. The CIO must establish a clear governance process, from design through to testing and deployment, that brings in all business stakeholders and ecosystem partners. From an enterprise-wide point of view, the CIO must ensure that every business unit follows the established standards and processes to ensure interoperability and realization of the value proposition.

This architecture is intended to be tailored to a company's specific vertical and use cases. A reference architecture for utilities and critical infrastructure, for instance, will emphasize different elements than one for the hospitality industry. And this architecture can be mapped back to the company's overall strategy, defining the products and services the company will offer. If the data to be captured is critically time-sensitive, for example, it will require robust fault and performance management functions. And if there are services involved, functions for dispatching technicians and billing will be needed. Once an architecture driven by specific use cases is developed, the CIO must then identify the target capability maturity for each function, develop a baseline assessment of current capabilities, and plot out a roadmap to bridge the gap.



As the IIoT is deployed, the CIO must work with every unit and function to carry out the process, while experimenting with new related technologies as they emerge.

Important as it is, the reference architecture is only a framework, and it is up to the CIO to oversee its full-scale implementation. This includes, first, settling on the specific requirements of each of the system's functions, and choosing and managing the vendors whose devices and software will make these functions a reality. The CIO must work closely with each business unit and corporate function to organize and oversee their pilot programs, to ensure compliance with the reference architecture, to avoid duplication of effort, to monitor success, and to aid in bringing successful projects up to full-scale production.

Design thinking, experimentation, and the "digital factory"

During the implementation of an IIoT program, the CIO will likely co-own alongside the head of operations or sales and other executives, what's often called the "digital fac-

tory," where much of the experimentation and proof of concept of IIoT system and its features takes place. This activity should not be limited to the early stages of discovery and implementation; digital factories are critical to the ongoing effort to keep up with emerging IIoT technologies, and to integrate them as part of new strategies and business models. The careful 'waterfall' model of yesteryears will need to be replace with a model more appropriate for the digital factory. Instead, CIOs must be willing to experiment, fail, and learn quickly, through the use of such techniques as agile software development, regular prototyping, user experience testing, and design thinking.

Once implemented, the full-scale IIoT system cannot be left to run on its own. Taking advantage of IIoT will inevitably represent a huge investment, and the CIO must actively oversee its ongoing management, upgrading, and performance evaluation. Indeed, given his or her critical involvement with the effort, the CIO's reputation rests on its success. So it is incumbent on him or her to keep a very close eye on the return on investment the company is reaping.

As companies shift from their traditional product orientation to a focus on services and customers, and new digital offerings, they must design an entirely new operating model.

Architecting the business roadmap

Building out a functioning IT and operational system based on the IIoT reference architecture is no easy task, of course. It's one thing to put in place the technical components, and ensure that the sensors, network, and data collection activities are in working order. But CIOs must also be intimately involved in answering the necessary follow-up questions: Which products will be connected, which services will be devised on the basis of that connectivity, how the platform that provides key components such as analytics will be organized, and which features of the interaction layer are needed must all be worked out. This is the critical stage at which the new operating model must begin to come into focus, and on which its newly envisioned business models must be based.

The CIO must work closely with the board, the CEO and other key stakeholders on the details of how the company will now operate, how it brings its new products and services to market, and how it interacts with customers. This should all be defined in the IIoT strategy and vision. Here is where the company must make the transition from an engineeringand product-oriented operation to one centered on services, platforms, and the customer-and, eventually, to create an entire ecosystem of suppliers and customers deeply connected through the IIoT.

To this end, no area is more important than that of the collection and analysis of data, both internally generated and externally sourced. The CIO must understand both the potential and the pitfalls of big data analytics in defining and implementing the customer's new digital journey, further improving go-to-market models, and constantly updating and refining the portfolio of products and services. If the CIO is to help lead a successful transformation to the new operating model, he or she must also make sure the right people are in place, with the talent and devotion to the company's digital future to take into what for many will amount to unknown territory.

Many companies may find these changes—of products and services, business and operating models, and capabilities, among others quite radical and transformational.

Resistance at this stage may be high at many companies. It involves a major change in how companies make money, from one-time sales of products to revenues streams from ongoing services, and thus a major cultural change as well, especially at companies in industries such as mining that have been conducting business the same way for decades. It will be up to the CIO to help break through this resistance, working with other CXOs, to create and communicate the value proposition inherent in the IIoT-faster innovation, higher levels of engagement and trust with customers, greater operational efficiency, and the resulting incremental revenue streams—and to generate specific business cases outlining in detail how that value will be achieved.



The IIoT will place huge new demands on the CIO. It's an opportunity few will want to miss.

Making the transformation to the IIoT, and then managing and monitoring ongoing operations, will require a strong set of principles governing a wide range of activities. Where the CIO is positioned as part of this process is critical.

On the one hand, he or she must accept a considerable portion of the responsibility for ensuring that the company's IIoT technology roadmap and implementation is aligned tightly with its digital and business strategy, for deploying the resources required under the new IIoT program, for managing the risks involved, and for ensuring that the new business processes linked to the technological components of the IIoT work smoothly. On the other, he or she must be willing to be held largely accountable for the success of the transformation. It is up to the CIO not just to manage and monitor how the new system performs, but to work with the board, colleagues in the C-suite, and business unit leaders to ensure that it delivers the promised business value on an ongoing basis. In doing so, business outcomes, whether they be cost reduction, operational efficiency, or revenue generation, must be clearly articulated and agreed on before commencing any IIoT project.

It's time to move forward, devising your digital strategy, building capabilities, and initiating pilot programs.

First-mover status is critical to gaining a competitive edge as companies begin moving en masse to reap the benefits of digitization. Our research into the IIoT suggests that CEOs, CIOS, and senior executives take six key steps toward their companies' future.

- Map out your Industry

 A.0 strategy. Evaluate your
 digital maturity now and set
 clear targets for the next five
 years. Then prioritize the pilot
 projects, capabilities, and
 architectural revisions to put in
 place that will bring the most
 value to your business and
 make sure they are aligned
 with your overall strategy.
- 2. Create initial pilot projects. Use pilots to establish proof of concept and demonstrate business value. Not every project will succeed, but they will all help you to work in a cross- functional and agile approach with customers and technology partners
- 3. Define the capabilities you **need.** Building on the lessons learned in your pilots, map out in detail what distinctive capabilities you need to achieve vour vision. Include how enablers for Industry 4.0, such as an agile IT architecture, user experience design, business integration, and others, can fundamentally improve all of your business processes. And remember to develop strategies for attracting the talent you need and improving business processes as well.
- 4. Become a virtuoso in data analytics. Consider how you can best organize data analytics; cross-functional expert teams are a good first step. Learn to get value out of data by building direct links to decision-making and to intelligent systems design, and use the data to improve products and their use in the field to offer and build new service offerings.
- 5. Transform into a digital enterprise. Capturing the full potential of Industry 4.0 will likely require a companywide transformation. This will require not just a new operating model, but also a new "tone from the top," with clear leadership, commitment and vision from the C-suite and financial stakeholders while fostering a digital culture.
- 6. Actively plan an ecosystem approach. Develop complete product and services solutions for your customers. Use partnerships or align with platforms if you cannot develop a complete offering internally. Real breakthroughs in performance happen when you actively understand consumer behavior and can orchestrate your company's role within the future ecosystem of partners, suppliers and customers.



The IIoT greatly increases the importance of technology in every business process, and the CIO's role in the resulting governance mechanism will increase as well.

Perhaps the key element in any company's transformation to the IIoT is that its information and operating technologies will be woven far more tightly into the fabric of its business operations than ever before. This in turn will require of the CIO a far greater understanding not just of the technologies involved in the IIoT but also of how it will transform the business—how it will be run, and how it will create value. Even more important is the CIO's role in educating his or her company's board on the changes to come, and as an enabler and change agent in the effort to maximize the value to be gained. It may be that not every CIO will be up to the task. But those who are—and are prepared to begin the effort now—can look forward to a truly game-changing experience.

Considerations for your business

Extract from PwC's 2017 Digital IQ Study.³



Make emerging tech a priority

Your leadership team should view emerging tech as a core competency of the organization. If emerging technology is considered a side project, it is unlikely ever to have any lasting impact on the organization as a whole. Get your C-suite and your board excited about the potential for emerging technology by showing demos at your next board meeting or encouraging hands-on homework to experiment with consumer technology like home automation systems or AI assistants.

Appoint an emerging tech evangelist

While emerging technology needs broad support, it also needs a single individual who has ownership over your emerging tech initiatives. At the same time, the emerging tech leader can't go it alone. He or she will need to rely on the expertise of other executives, as your organization thinks about applying emerging technology to solve business problems. Identify those at all levels and in all functions who are passionate about different technologies, and create a team responsible for emerging tech scouting and experimenting.



Focus on the human experience

As you experiment with emerging technology, don't shortchange the customer or employee experience. You can develop a digital product that leverages AI, for example, but have you sufficiently thought through issues like whether you've created the necessary trust and transparency your customers and employees need, so your innovation becomes indispensable?



Develop a scouting plan

Most organizations don't look broadly enough to identify how and where emerging technology can make a difference. Beyond analyst reports, white papers, and technology publications, a proper plan should go much deeper. Look to underutilized sources, such as engaging with the startup ecosystem, participating in open source development projects, and joining the maker community.

Resources

Connect and optimize: The new world of digital operations, Strategy& and *PwC*, August 2016

Connected car report 2016: Opportunities, risk, and turmoil on the road to autonomous vehicles, Strategy& and PwC, September 2016

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Endnotes

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- 2. PwC, Industry 4.0: Building the Digital Enterprise, 2016
- 3. 2017 Global Digital IQ Survey, PwC





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