About this paper

A Pathfinder paper navigates decision-makers through the issues surrounding a specific technology or business case, explores the business value of adoption, and recommends the range of considerations and concrete next steps in the decision-making process.

About 451 Research

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EXECUTIVE SUMMARY

Digital transformation benefits every part of an organization. For example, omni-channel marketing and in-store customer-tracking technologies are transforming how retail organizations improve customer conversion beyond ineffective, first-generation captive Wi-Fi portals. Successful manufacturing organizations have evolved from legacy preventative-maintenance ‘bolt on’ devices and services to integrating pervasive sensor data from the factory with enterprise resource planning (ERP), material requirements planning and even customer relationship management (CRM) systems to rapidly automate remediation of potentially expensive equipment downtime. Consumer ‘white goods’ providers are integrating sensors and communications throughout production lines not only to unlock new business models and value to consumers, but also to provide valuable telemetry data to their product engineering and support staff to help identify design flaws and impending failures before they occur.

In each of these examples, the true value to the business is unlocked not just by instrumenting equipment or environments with sensors, but by leveraging the data generation across organizational boundaries for interdisciplinary insights. Combining operational data from equipment (biological, mechanical and environmental sensors) with state-of-the-art IT big-data analytics is the cornerstone of the Internet of Things (IoT). The widespread connecting of previously unconnected environments and equipment, from automobiles and factory equipment to buildings and cities, is unlocking dormant value in the form of energy and water savings, reduced manufacturing waste, and highly effective marketing and sales models based on a solid foundation of customer purchasing behavior. Figure 1 illustrates the types of initiatives and projects enabled by IoT, based on responses by organizations to the 451 Research Voice of the Enterprise quantitative research.
IoT is often a subset of an organization's broader digital transformation initiatives that incorporates process changes in sales, marketing, engineering and business models. Early adopters of IoT frequently failed to achieve value from investments because projects were limited to a narrow application or use case and did not integrate data across organizational boundaries from core operations (operational technology – OT) and IT, as well as other critical stakeholders from product management, marketing, sales, finance and engineering.

Digital transformation is an ongoing journey that builds a bridge between OT and IT, led by C-suite executives such as the CEO, CFO, chief information officer and head of sales (increasingly referred to as the chief revenue officer (CRO). The complexities surrounding digital transformation require a holistic approach where the stakeholder groups work collaboratively on reinventing the organization's relationship with its customers and technology.

This is best accomplished by engaging in co-creation efforts with strategic technology partners to brainstorm, evaluate best practices in the industry, and develop architectures, trial plans and measures of success. These activities represent an ongoing collaborative process that includes stakeholders from throughout the organization and technology partners to iteratively plan, architect, deploy, test and measure the outcomes of projects. Projects have clear and measurable outcomes in operational efficiencies to reduce bottom-line costs, as well as grow top-line revenue from enhanced customer targeting and experience.

The collaborative co-creation process gives customers the flexibility to choose their level of involvement in project execution. Once projects and outcomes are defined, customers can decide to implement the projects themselves with mentorship from the partner, work alongside the partner to implement the projects together, or have the partner lead the technology projects with oversight provided by the customer to ensure that organizational objectives are met.

Organizations can accelerate time to value by leveraging one of many IoT platforms. These platforms connect physical devices, translate legacy protocols, normalize data, create digital models of the physical devices, and provide both real-time and post-hoc analysis of ingested IoT data. While these platforms are abundant, bridging the gap between the desired business outcomes and the platform capabilities is a highly customized endeavor, hence the value of co-creating with industry leaders to reach those goals faster.
Introduction
The path to digital transformation is complex and requires identifying the right group of stakeholders, key business processes and objectives, working through internal and external dependencies, and picking the right technology partners. Digital transformation encompasses all aspects of business processes, from how product management and engineering teams design and deliver products to how sales and marketing personnel identify customer needs, and how companies share risk with their customers. The Internet of Things, the key component of digital transformation, provides insight into all steps of the process from ideation to execution, allowing organizations to reduce risk, optimize operations, develop new products and services, and identify key customers and sales opportunities.

IoT also enables companies to shift from a one-time sales model, where a product or service is sold once (often with a maintenance contract) to a model based on the customer’s intended business outcome being sold as a perpetual service offering. This increases the stickiness of the customer relationship and shifts the onus of responsibility for lowering costs (and optimizing margins) from the customer to the vendor, which has the most incentive to operate a profitable service.

The array of options and opportunities presented by digital transformation can be overwhelming and will drive change within supporting organizations (see Figure 2).

Figure 2: Level of organizational transformation required for IT organization to support IoT projects

Finding the right partner with domain expertise in your business area is essential, as is that partner’s ability to collaborate with key stakeholders to identify technologies, skill gaps and opportunities for organizational process improvements in order to identify and achieve the desired outcomes.

Co-creation as the key to success

The first stage of digital transformation begins with planning. There are many moving parts to a digital transformation, including a thorough assessment of the organization’s operational and information systems, business processes, organizational charts and objectives. These are overlaid with ‘the realm of the possible’ by looking at vendor offerings collaboratively to determine what new business models and customer engagement can be achieved when starting with a blank slate.

Beyond the brainstorming phase, another benefit of co-creation workshops is to augment the knowledge of existing staff. As part of digital transformation and the Internet of Things, OT and IT staff will be exposed to an array of time-series data from newly connected devices and sensors, and new device types and networks will be introduced into the corporate security architecture. Staff will need to find the right balance between edge computation and analytics of latency and the security of sensitive information and centralized cloud-based tools. The co-creation process clarifies key technology areas and highlights potential areas where the organization will need to build additional expertise. Figure 3 shows what skills organizations anticipate they will need to add or augment within their enterprise in order to deploy IoT efforts.

Figure 3: Skills needed by new staff for IoT projects

Which skills or capabilities will these new IoT staff need?

The importance of broad stakeholder engagement

Any digital transformation effort requires input and guidance from personnel across the organization. No single department or individual has perfect knowledge of what will be required to succeed. Line-of-business managers, who are the most aware of the dynamics of the physical assets and processes, bring critical context to the IoT effort. IT departments are most aware of the existing analytics, compute, network and security architectures, as well as available resources, and where they will need to be augmented as part of the project. Executive management brings the broader business objectives and organizational strategies that are imperative to evolve, and can ‘rewire’ the processes and groups within the organization to best serve the needs of the changing market.

Figure 4: Key influencers for IoT projects

Which groups at your organization are influencers for your IoT-related budget?

As shown in Figure 4, each functional group within a company benefits from the insights obtained by IoT projects and digital transformation; each, therefore, requires a seat at the table during the co-creation process:

- Marketing teams are critical stakeholders in co-creation because this new sensor data can optimize customer interactions and tracking experiences, as well as how the product or service is fundamentally monetized (as a product, as a service or using a shared-risk outcome model).
- Finance leadership can bring clarity to business decisions by balancing the initial capital requirements with the ongoing operational costs involved over the expected duration of the initiative.
- Legal and compliance teams are critical stakeholders in co-creation workshops and brainstorming because industry data is frequently regulated regarding how it can be transferred from the point of origination to computing resources – cloud or colocated – within or outside of the country.
- Post-sales service and support can be fundamentally transformed by insights obtained from operating data of fielded equipment, improving customer satisfaction, increasing uptime and unlocking new revenue models.
- Manufacturing and operations teams gain real-time visibility into customer demand, enabling accurate material forecasts, improved logistics and avoiding expensive inventory.
- Engineering and product management personnel can aid in product development and feature decisions by observing how customers interact and use connected products on a regular basis, prioritizing resources for maximum customer benefit and return on investment.


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The right partners provide clarity in selecting the best options and outcomes by combining the assets of these teams with their customer and domain experience, and by leveraging a best-of-breed IoT platform. Vendor-developed IoT platforms accelerate the time to value of IoT deployments by leveraging common frameworks, device and data management and analytics, and avoiding costly custom development. This process begins with translating legacy protocols and interfaces on physical equipment to open, interoperable standards, allowing the data obtained by these devices to be ingested by analysis tools that integrate the sensor data with existing organizational data from IT systems such as CRM and ERP to provide actionable insight.

**Platform selection**

There are numerous IoT platforms on the market, most tailored to a specific function or industry. They fall into four categories: connectivity platforms, middleware platforms, application platforms and integrated platforms. Connectivity platforms focus primarily on integrating and managing communications with the cellular network (although this is gradually evolving to include Wi-Fi and fixed connections as well), establishing identity and managing device security. Middleware platforms’ primary function is to provide adaptation layers to translate from existing systems to formats ingestible by analytics and other business applications. These middleware platforms also frequently include some form of notification management to contact maintenance staff when data values meet or exceed pre-determined thresholds. Application platforms provide the necessary abstraction to allow the simple integration of vertical-specific applications, preliminary analysis and data-distribution mechanisms such as publish-and-subscribe interfaces.

Integrated platforms combine the capabilities of connectivity platforms, middleware platforms and application platforms and deliver actionable insight by combining advanced analytics and a digital representation of physical assets, frequently called a ‘digital twin’ or ‘digital shadow’. Much of the value of these platforms comes from the vendor’s domain experience in vertical-specific applications and use cases, which have been incorporated into the platform as a set of pre-built integrations and applications. This can save on deployment time and cost given the existing functionality of the platform for market-specific needs, such as role-based compartmentalization of data and access given a department or job role.
Robust data integration is a differentiating feature of integrated platforms. Vendors with experience in vertical markets such as manufacturing, energy and transportation can leverage previous integration expertise incorporated into the platform to connect to physical assets and equipment. Data integration is not a 'one time' process because as the physical assets and configuration of an organization change, so do the integration demands on the IoT platform to adapt to the new environment. This puts a special emphasis on the supporting tools for data integration, beyond the base functionality. The base platform needs to include support for a wide range of sources and integration models, and platform tools must make the task of integration simple enough to allow dynamic adaptation as the deployment matures and evolves. This adaptation should be considered an ongoing part of an IoT system, with resources allocated to support it for the life of the project. This is another area where effective platform capabilities can lead to long-term operational savings. Integrated platforms are the most complex of the platform types, but they offer the greatest capabilities and the longest supported evolution.

Each organization's environment is unique and requires an IoT platform that is flexible enough to be adapted for each new customer. This is accomplished by the platform's modular architecture, which allows for specific components to be replaced by third-party modules and custom interfaces for proprietary, or even 'home built' systems. Well-defined interfaces to third-party applications allow for more customer flexibility in vendor selection, reduce risk and provide a built-in growth path when application requirements change. For a more in depth look into this topic, please refer to our recent Pathfinder report: IoT Platform Selection Guide.

Recommendations

Digital transformation initiatives can feel overwhelming in scope when getting started – as you seek to revisit and possibly redesign nearly all aspects of how your company creates value and monetizes its relationship with customers. However, by implementing IoT, organizations can better identify key areas for process improvement, reduce operating costs and increase operational efficiency. The new data can also lead to the company shifting its business model from one solely based on selling a one-time product, possibly with installation services and a support contract, to one that shares risk with end customers to help them achieve their ultimate business outcomes. This creates opportunities for the vendor to shift from being easily replaceable to a strategic partner that is as invested in customer success as the customers themselves.

Picking the right partner for your digital transformation journey is key. Partners with long experience in your business, with both OT and IT expertise, can bring the best practices from across industries. There is no 'one size fits all' solution that works in all environments but, rather, solutions that have been built by years of experience solving real business problems in your market. Partners that have also embraced their own digital transformation and are willing to share the risk in helping you to accomplish your ideal outcome will likely not disappear once the initial sale is made because their success is tied to your successful transformation.

Finally, leveraging your partner's value in the form of an integrated platform will reduce the amount of time, effort and cost to move your IoT project from concept to implementation by utilizing device connectivity and management, protocol translation, data normalization, vertical-specific applications and integration with existing data repositories.