

Prepare Today for the Next Wave of Digital Transformation

The Internet of Things 2020 Indicator



An IDC Thought
Leadership White Paper

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IoT Will Drive the Next Wave of Digital Transformation

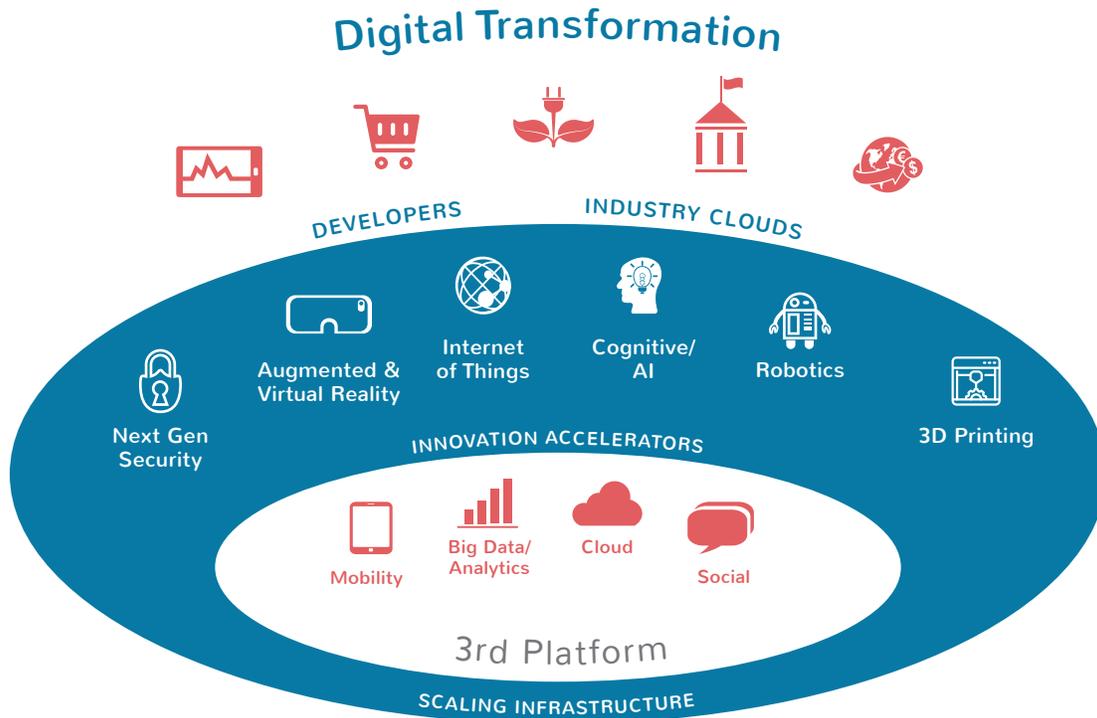
Digital transformation (DX) – a technology centric business strategy – is an essential mandate for businesses to thrive in a digital economy. Businesses embark on DX initiatives to create value and extend their competitive advantage through new products and services, new business models and relationships, improved customer experience, and increased operational efficiencies. IDC 3rd Platform technologies – which encompass mobile, cloud, big data/analytics, and social applications and platforms, and include innovation accelerators such Internet of Things (IoT) – are key enablers of DX (see Figure 1). Any organization that isn't actively planning on a DX of its business and operations model risks being left behind.

IoT 2020 Readiness Indicator

- Cloud-first Delivery
- Distributed Control
- Geo-Dispersed Connectivity
- Distributed Analytics
- Security and Compliance



Figure 1



The IoT – in which businesses take advantage of networks of connected devices (beyond computers, laptops, and smartphones) that produce data to get insights and provide greater control – enables businesses to digitize “things” that make the business tick: factory floors; supply chains; containers; aircraft, trains and automobiles; and specialty devices like cranes, elevators and heavy earth machinery.

The IoT also includes healthcare measurement devices, home automation appliances, media devices and entertainment consoles, and specialized utility vehicles like tractors that allow businesses to interact with their customers. Businesses in industries as diversified as transportation logistics, healthcare, hospitality, insurance and retail are already taking advantage of IoT to gain greater efficiency, rapidly go to market with new products and services, develop new customer engagement models and enhance customer experiences.



IDC estimates that by 2025, we will live in a world that has over 80 billion IoT connected devices that generate over 162 zettabytes of data.

IDC predicts that:

- By 2018, investments in operational sensing through IoT and situational awareness via analytics will deliver 30% improvement in critical process cycle times.
- By 2019, as IoT adoption grows in major industry, government and consumer sectors, 20% of all IoT deployments will have basic levels of Blockchain for security. At least 40% of IoT-created data will be stored, processed, analyzed and acted upon close to, or at the edge of, the network.
- In 2017, connected vehicles, insurance telematics, personal wellness and smart buildings will be four IoT use cases in the spotlight across all worldwide regions, accounting for \$96 billion in spending.
- By 2019, 40% of local and regional governments will use IoT to turn infrastructure like roads, street-lights, and traffic signals into assets instead of liabilities.

According to IDC's [Global IoT Decision Maker Survey, 2016](#), 56% of respondents stated that IoT is strategic to their business. IoT is no longer a nice-to-have for businesses to utilize for their DX journey – it is a must have.

IDC is building an [IoT 2020 Readiness Indicator](#) to enable IT organizations to design and implement a next-generation “IoT-ready” infrastructure. This indicator, to be published in early 2017, will be based on a global quantitative study of line of business (LOB) and IT executives to be fielded in January 2017, as well as two focus groups of U.S.-based line of business and IT executives, which were conducted in October 2016. This vision document includes insights from those focus groups, and provides the broad outlines of what will be included in the indicator.

Embarking on any IoT-based journey requires businesses to take a three-phased readiness approach. This approach needs to be developed as a partnership between LOB and IT organizations. In order to successfully get to “IoT 2020,” businesses need to:

1. Define their vision.
2. Use this vision to guide their business strategy – and articulate the role of IoT in it.
3. Develop an implementation plan that fits into this business strategy.



Aligning **Business Strategy** to the **Company Vision**

The first thing businesses must do is set their vision for today and tomorrow. Areas such as increased competitive differentiation, new revenue streams and improved customer engagement guide this vision. Businesses use this vision to articulate their business strategy – in which they also articulate the role of IoT in getting them there. For example, part of this strategy is to decide whether IoT would aid in improving existing business processes or whether it will be utilized as a conduit for a complete business transformation. There are several ways businesses can leverage IoT today.

“I can give customers a reason to pick up my products in the grocery store aisle and interact with them. That allows me to market other products. I can actually perform target marketing in the aisle”

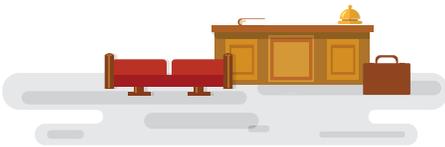
Sr. Director of Finance, Consumer Retailer





Vision: **Drive new service revenue streams**
Strategy: **Connected automobiles**

Today, automobile manufacturers can IoT-enable their vehicles. These manufacturers auto configure their vehicles over-the-air for optimal performance and efficient handling in particular terrains and weather conditions, a process that otherwise requires the vehicle to be brought into a service center. This opens up new sources of revenue as the manufacturer is able to charge its customers for this capability as a value-added service. Tomorrow, autonomous vehicles will interact in real-time with a centralized station that monitors vehicle and passenger health, and provides real-time guidance on traffic movement and routing.



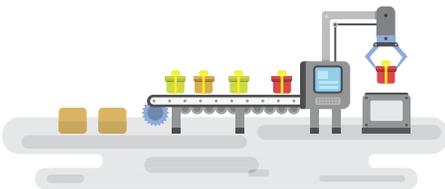
Vision: **Improve customer experience and gain market share**
Strategy: **Automated check-in experience**

Hospitality providers are automating the check-in experience for travelers by installing smart devices in their hotels. Today, this allows travelers to check-in and open room doors via their smartphones. This streamlines the customer experience and provides a new source of competitive differentiation. Tomorrow, hotels will provide a fully automated experience for guests, eliminating the need for human interaction.



Vision: **Reduce operating costs**
Strategy: **Automated inventory management**

Today, packaged goods firms are using smart pallets to optimize their inventory, warehousing, and control processes. This streamlines operations and reduces supply chain operating costs. Tomorrow, such businesses can fully automate operations, eliminating the need for human intervention in inventory management.



Vision: **Reduce business risk**
Strategy: **Smart supply-chain management**

Today, manufacturers use smart production warehousing systems to improve product configuration, reduce the rate of errors in order processing and delivery, and thus reduce the risk of returns and charge-backs. Tomorrow, supply chain management will be fully automated, governed by demand-supply logistics and driven by a variety of real-time inputs.

It is important to note that there is no single way to implement IoT. It varies from industry to industry and from business to business. Each firm's vision is unique, and therefore business strategy and the use of IoT varies from company to company. Industries that are leading IoT initiatives today include financial services, retail and manufacturing. However, businesses in other industries are also taking measures to innovate with IoT.

One of the key things to measure with any IoT strategy is the "before and after" picture. While each business must decide how best to apply IoT to its own business, IDC finds that IoT delivers maximum value when it is used to enhance the customer experience around the primary products or services an organization uses to engage with its customers. In IDC's Global IoT Decision Maker Survey, 2016, 24% of respondents noted increased productivity, 23% noted reduction in operating costs, and 22% noted process automation as the top reasons to create an IoT strategy.

IoT benefits cited by focus group participants included:

Increased operational efficiencies

Reduced business risk

Increased service revenue

Improved customer experience



An IoT Strategy Is About **Accelerating the Shift to Digital Business Services**

Businesses can take a couple of approaches to develop an IoT strategy. They can start with **data-centric IoT** – a strategy that aids in improving existing business processes, and to some extent sets the stage for a long-term business transformation. Data-centric IoT is about harnessing data from new sources. The primary focus of this IoT model is to collect or stream data from “endpoints” to the “core” – a centralized data hub that serves as the location for the analytics necessary for identifying tactical or opportunistic issues. For the most part, the amount of data flowing back to the devices is relatively small, and there is little device-to-device communication or interaction.

Subsequently, businesses can make a shift to **action-centric IoT** – a strategy that builds on data-centric IoT. An action-centric IoT introduces bi-directional interaction to the equation. In addition to collecting and analyzing data from endpoints to the core, businesses can now take pre-emptive action to prevent a certain condition, or corrective action to remedy it. In order to effectively do so, the endpoints themselves have to be part of a system that is highly interactive, and connected via a constant bi-directional communications network. Action-centric IoT is all about real-time analytics, and completely changes the manner in which businesses can harness and analyze data.

Data-centric IoT introduces the concept of **core-to-edge-to-EP**, where “edge” is an intermediary between endpoints and the core. It enables a hub-and-spoke data collection and analysis mechanism, which reduces network traffic, and can enhance causality and correlation of various data sources. In action-centric IoT, the role of edge is significantly increased, as it also becomes an intermediate and often an autonomous control hub.

In many industries, data-centric IoT is table stakes – it enables businesses to dip their toes into IoT, and figure out ways to gain competitive advantage by mining data from new sources. Most of this effort is dedicated to the search for pointers for tackling specific issues. Such pointers deliver significant incremental improvements to existing business practices, but do not disrupt the business completely. Over time as technology matures, business processes become IoT-friendly, and regulation catches up; businesses can introduce action-centric to the mix.

An action-centric IoT-based strategy on the other hand truly brings DX to the masses – it is intended to completely transform businesses and their industries by introducing entirely new sources of competitive differentiation, and even change lifestyle for workers and consumers alike. This is why action-centric IoT is best suited for new businesses that can disrupt the market, or can be embraced by existing organizations that want to take a disruptive approach to how they conduct business. Lastly, businesses that are well-entrenched in data-centric IoT and wish to go to the next-level can also make the shift to action-centric IoT. In fact, such is the scale of this transformation that by 2018, IDC believes that one third of leaders in each industry will be disrupted by competitors whose business models will be entirely built on a connected experience, i.e., they will utilize IoT systems.

A good example of this transformation can be found in the insurance industry. Today, carriers are installing devices in vehicles to monitor driving habits, gauge risk factors, and adjust customers' premiums according to their risk profile. Much of this information today is asynchronous. Slowly the industry in collaboration with automobile manufacturers is introducing enhancements such as providing real-time feedback to drivers on how they are driving, and taking basic action such as alerting authorities when driving anomalies are detected.

Eventually, businesses may begin using in-car devices to communicate with each other to avoid on-road risks in real time, or even interact directly with vehicles to reduce the risk of accidents. This has the potential to not only dramatically improve insurance cost curves but also greatly improve customer experience.

IDC believes that many of the new generation of IoT initiatives will be in full operation by 2020 and will include engagement models such as self-driving cars, fully automated intelligent factories and supply chains, and smart cities. It is imperative for businesses to decide how they should engage in IoT. For many businesses, it makes sense to improve or enable current business practices with IoT, followed by a more expansive vision. For some businesses, it makes sense to disrupt themselves completely. Either way, businesses need to begin laying the groundwork for IoT 2020 initiatives today.



The **Role of IT** in Implementing an IoT Strategy

The successful implementation of an IoT strategy requires a close partnership between the sponsoring LOBs and corporate IT. LOBs drive the overall vision and strategy, and IT develops and implements a suitable architecture. It is essential that both teams be staffed with the right personnel to make this happen. The role played by the right infrastructure cannot be underestimated here.

In fact, so critical is this role that in the aforementioned IDC Global IoT Decision Maker Survey, 2016, 16% of respondents said that having the right IT infrastructure and 14% said having the right IT skills are top inhibitors to IoT adoption. IoT applications need to be built on security and privacy as the two key infrastructure pillars. In the same survey, 26% of respondents cited security and 21% noted privacy as among the top inhibitors. Finally, the infrastructure itself has to be lean in terms of up-front and ongoing costs; 22% and 19% of the survey respondents respectively identified these as the top inhibitors.



Preparing IT Infrastructure for IoT

Current generation IT infrastructure is “monolithic” – it is application-constrained, centralized, hardware-centric, and rigid. Infrastructure designed for IoT on other hand is “multi-pronged” – it is service-ready, cloud-based, agile, flexible, scales on demand, and is capex friendly. Additionally, IoT infrastructure is distributed, software-defined and secure (see Figure 2).

Many businesses choose to design their IoT Infrastructure to use infrastructure-as-a-service (IaaS) frameworks such as OpenStack, which utilize familiar components like server virtualization, shared storage and centralized data repositories for post-collection analytics, and enable businesses to start their IoT journey with minimal disruption. As businesses develop next-generation applications to usher in the

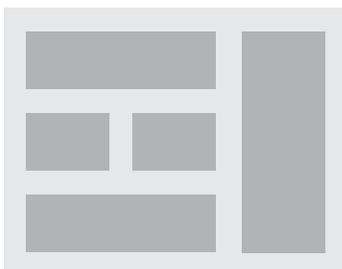
next wave of action-centric IoT, they need to add platform-as-a-service (PaaS) frameworks such as Cloud Foundry and OpenShift to their IoT infrastructure.

Next-generation applications are built on newer software development paradigms, and utilize development methodologies like DevOps and are delivered as PaaS-based micro-services. They are stateless, analytics-driven, and cognitively-enabled. These applications make no assumptions about the infrastructure resiliency and utilize distributed, portable and light-weight compute platforms (such as containers). Such applications also rely heavily on intelligent edge devices that communicate with each other directly, do some level of analytics locally and pass only minimal amounts of data and metadata back to the core.

Figure 2

IoT Readiness 2020 requires a service ready enterprise

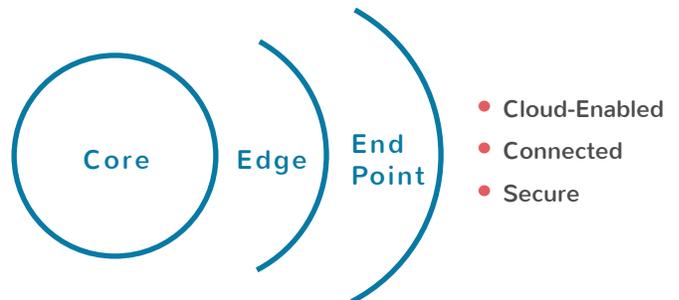
Application “Constrained”



Monolithic, Proprietary Rigid



Service “Ready”

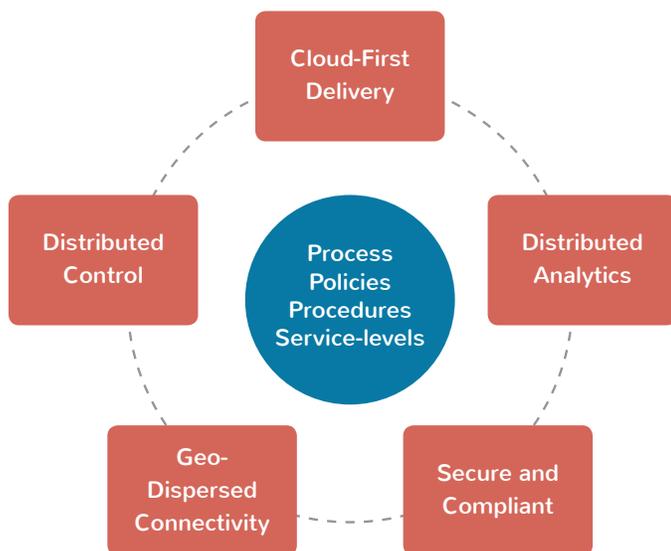


Open, Distributed, Software-Defined, Secure

The IoT Readiness Indicator

IDC is developing an IoT 2020 Readiness Indicator that will assist businesses in charting a path to having a future-ready IoT infrastructure. This indicator (to be published in early 2017) focuses on six key areas that are bound together by corporate-wide processes, policies, procedures, and service levels (see Figure 3):

Figure 3



Cloud-first delivery

The infrastructure should be service-ready to enable current and next-generation applications. Furthermore it should support corresponding development and delivery frameworks and methodologies.

Distributed control

The management paradigm should be core-to-edge-to-endpoint-based, and include distributed asset management and control.

Geo-dispersed connectivity

The vision should allow communications from massive datacenters at the core to micro-datacenters and intelligent devices in critical edge locations.

Distributed analytics

The platform should support real-time and near-real-time analytics of large data sets in a distributed fashion. Organizations should have in place a mechanism to implement cognitive and machine learning in areas such as security, behavior, and predictive maintenance.

Secure and compliant

Organizations must be prepared to make their environment secure and privacy compliant. The security framework should dynamically adapt to changing threats.

Begin Now to Prepare for IoT 2020

IoT is here and it is here to stay. It is poised to drive change at most businesses, by way of DX. Today's IoT implementations are barely scratching the surface of the transformative promise they have to offer. Future solutions, however, will fundamentally change the way businesses operate. Businesses with the vision to lay the groundwork for that future will thrive in the digital economy; the rest face an existential threat. Preparing for IoT 2020 starts with a vision for what businesses want to be in the future. Their strategy follows, and articulates an understanding of how intelligent connected devices can drive new sources of customer value. The IoT infrastructure then enables businesses to implement their strategy, and realize their vision.

“We... [started our IoT initiative focused on] preventative maintenance and reducing our shipping costs, but then better patient outcomes came about as an additional benefit”

Sr. Director of IT Infrastructure
Major Medical Device Maker



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