CIOs are building the new digital platform to join, or even lead, vast digital ecosystems. More than building a digital business, these growing connections lead to an emerging digital society. CIOs must reshape their organizational and leadership style and decide what role their business will play.

Key Findings

- Technology change (and its disruptive business consequences), once gradual, now occurs so suddenly that what used to be a vision for the next era is now a project for next year.
- CIOs have built IT systems and the Nexus of Forces, and now need to build a digital platform to provide essential capabilities to reach customers, things and ecosystems intelligently.
- Ninety percent of large enterprises have initiatives at various stages along the path to digital business.
- Eighty-five percent of organizations have started or planned to start a tactical bimodal project. More than 40% of organizations have implemented bimodal IT.

Recommendations

CIOs building and expanding a digital business:

- Structure your IT portfolio for the digital platform with intelligence at the core and a focus on customer experience.
- Take a bimodal approach not only to your organization, but also to your leadership, by balancing your expertise with a beginner’s mindset.
- Move the business to an ecosystem play.
Plan for not only having a digital business, but also for contributing to an overall digital society over the long term.

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Strategic Planning Assumptions

By 2021, digital giants will have disrupted their way into 20% of all digital interactions.

CEOs expect 46% of customer-perceived value in their products to be digital by 2019.

Through 2018, half the cost of implementing Internet of Things (IoT) solutions will be in integration and security.

Real-time analytics will outpace traditional analytics by a factor of three by 2020, to become 30% of the market.

Analysis

Digital is accelerating:

- Cloud computing is mainstream, with approximately 58% of organizations well down the path of using cloud services to support some aspect of their business.  
- Sensors are growing pervasive. By 2020, Gartner estimates there will be more than 21 billion connected sensors and endpoints.
- The average CIO is already spending 18% of the organization’s budget in support of digitalization, with that number expected to increase to 28% by 2018.

Technologies that once seemed like science fiction have suddenly arrived. What used to be a vision for the next era is now a project for next year. CIOs are finding themselves confronted by virtual reality, virtual personal assistants, blockchain and artificial intelligence.

While some CIOs are driving digital to the core of their businesses, other CIOs exist in companies where IT is still viewed as pure expense — where IT value is measured as a percentage of revenue or as IT spend per employee. In contrast, leading CIOs — and CEOs — view technology investments as assets. They view revenue as a product of IT spend. Supporting digital business initiatives is more important than optimizing costs for 88% of top performers, compared to only 43% of trailing performers.

CIOs who are good at innovating are also good at IT cost optimization. Top-performing IT organizations have CIOs who are the best at reducing costs, while paradoxically spending nearly twice as much on digitalization as a proportion of their total IT budget than do the more typical CIOs in lower-performing organizations. These CIOs optimize business operations and are rewarded with digital leadership. They expect budget increases that are five times higher, on average, than trailing organizations.

The future opportunity for CIOs — and their businesses — revolves around digital ecosystems. As digital business has evolved, CIOs find their organizations participating in — or even leading —
emerging networks of businesses, consumers and government entities. Some have already discovered how to use these connections to their advantage:

- **Agriculture:** Business ecosystems are forming and interacting to improve this industry. Tractor companies are building business ecosystems to bring together dealers and maintenance companies to provide connected services to improve efficiency. Connected tractors are already being sold to farmers. A financial commodities futures company with its own digital ecosystem can add more value. Early improvement in digital agriculture is showing an 8% to 12% increase in yields, with the potential of as much as 25%.  

- **Automotive:** Carmakers are building mobility ecosystems. Ford is building new mobility applications through its subsidiary Ford Smart Mobility to help drivers park, share cars and remotely access vehicle functionality. Many car-sharing services, such as car2go by Daimler, DriveNow by BMW and Greenwheels by Volkswagen, are moving the industry strategy away from owning the asset to building access to mobility into the portfolio.

- **Shipping:** The port of Hamburg, Germany, relies on a connected partner ecosystem to improve the flow of goods and to add value to the network around it. The port used more than 300 IoT sensors on roads and bridges and at key points of congestion to capture all traffic flows and usage, as well as other data impacting flow, including tides, waterway information and the locations of all shipping containers in the system.

As digital connectivity persists, and these ecosystems mature, you will become contributors to an emerging digital society. You will build the expansive infrastructure that will forever change the way people engage socially, digitally and physically. To prepare for the digital world, you need to focus on three areas:

1. **Your Digital Platform:** The digital platform uses new technologies to provide essential capabilities to reach customers, things and ecosystems intelligently.
2. **Your Leadership:** The digital platform requires a bimodal leadership style, combining "experienced hands" with a "beginner's mind."
3. **Your Business Contribution:** This involves leading the conversation about the potential value created when ecosystems interact, deciding when will you lead and when will you partner and resolving your approach to the emerging digital giants.

Table 1 outlines Gartner's nine-point action plan for solidifying your organization's place in the digital world.
Your Digital Platform: Build the New Digital Platform, With Intelligence at the Core

The new digital platform[^8] extends beyond traditional IT systems to include customer experience, things, intelligence and a business ecosystem, which enable participation in a digital ecosystem. Of these five domains, intelligence functions as the core — improving the capabilities in all parts of the platform (see Figure 1).

**Figure 1. The New Digital Platform**

[^8]: Source: Gartner (November 2016)
The Five Domains of the Digital Platform

IT Systems

IT systems are how you run and scale the operation. They include data centers, networks and applications — which are often internally built and managed — along with new capabilities delivered via the Nexus of Forces (cloud, mobile, social and information).

Today, IT systems reside both within and outside the organization. Some core business application systems, such as CRM and human capital management, have passed the tipping point of adoption. Others, such as CRM sales systems, will be delivered mostly by the cloud as soon as 2017. However, large, proprietary and difficult-to-migrate systems such as supply chain planning and financial management systems will mostly remain on-premises. While the general trend is toward the cloud, organizations need to employ a balanced approach that uses the cloud when appropriate and internal capabilities when necessary.

In building the digital platform:

- Clean up your traditional in-house systems.
- Audit the mix of internal and cloud-delivered capabilities in your organization.
- Rationalize your application portfolio.
- Consolidate and modernize your data centers.
- Retire outdated technology.
- Invest in resilience, business continuity and disaster recovery.

Customers

CIOs must build their organization’s capability to engage customers and constituents across multiple digital touchpoints. And with the digital customer experience potentially being the only customer experience, it is imperative that CIOs invest and succeed in this area. They must architect and build systems, recognizing that the customer relationship is, in fact, that customer’s relationship with those systems.

Today, the digital customer experience spans web, mobile and social. It is made possible not only by targeted, compelling experiences, but by the intelligence that can understand customers’ needs and intents and respond appropriately to gain loyalty or wallet share. In the next few years, technology will redefine customer interaction again. Chatbots and virtual personal assistants powered by artificial intelligence will encourage more frequent and seamless engagement. By 2020, conversational systems will rise to 10% of all customer interactions, up from less than 1% today. Meanwhile, virtual reality and augmented reality will become deeply immersive and highly popular, with nearly 40 million applications anticipated by 2020.

An organizational shift is also occurring. In North America alone, the number of chief customer officers (CCOs) will quintuple between 2015 and 2017, to reach one quarter of organizations with
over $1 billion in revenue. This new leader is responsible for pulling together the disconnected, siloed customer touchpoints and processes, and for creating a cohesive experience (see "Predicts 2016: CRM Goes Back to the Future by Evolving to Focus on the Customer").

The CCO will lead a council that spans all the major stakeholders and constituencies that create the new user experience. Because the digital experience is heavily dependent on technology, the CIO must be one of the participants on the customer experience council.

In building the digital platform:

- Use advanced algorithms and artificial intelligence to understand customers' intent and serve up tailored experiences across multiple delivery systems.
- Create new experiences that surprise customers and solve problems they didn’t realize they had.
- Strive for a "seat at the table" on the customer experience council or its equivalent. If you don't have such a council, create one.
- Explore new ways to engage customers with virtual and augmented reality, such as allowing them to try out a product virtually before buying.

**Intelligence**

A new type of intelligence has emerged to enable your systems to make decisions — increasingly without human intervention. This artificial intelligence (AI) draws on existing systems, marrying data, analytics and traditional business intelligence, and combining those capabilities with those of advanced algorithms and artificial intelligence systems, including machine learning. Through this approach, information can drive action, resulting in new efficiencies and outcomes. Machine learning, for example, can result in outcomes that go well beyond the original intent of the system, enabling new sources of business value.

Gartner recognizes two critical attributes of modern artificial intelligence: The way AI operates, and the results AI produces. First, systems have the ability to learn and change behavior independently, based on the data they collect. Here, systems advance at the speed of data, not at the speed of code releases. Second, they will produce outcomes — unsupervised — that businesses will increasingly trust.

Today, increasingly smart, autonomous machines assist human workers in practical scenarios. The capabilities of smart machines will drive profound advances in the ability to perform complex tasks, removing the need for human control. This is already happening via algorithmic trading and "lights out" factories. Half of all analytic interactions will be delivered via artificial intelligence in three to five years.

In building the digital platform:
Educate colleagues on the advances in AI, while challenging myths and misconceptions about the potential of smart machines to operate independently of human oversight and become "unstoppable."¹⁰

Deploy AI for competitive advantage, but promote an evolutionary approach that uses smart machines to alleviate concerns that they will wrest control of critical decision-making processes.

Prepare for high growth in areas such as the use of AI in customer service and complex decision making.

Investigate how AI can change the customer experience using models such as conversational interfaces.¹⁰

Things

Your organization senses the physical world via connected devices. This includes the Internet of Things, both in the consumer world and in the enterprise, where the IoT is starting to take off.

Gartner estimates that, by 2020, there will be over 26 billion interconnected devices, 215 trillion stable connections and 63 million new connections emerging every second. But all these connections are meaningless if a business lacks a platform that can extract their value. As a result, CIOs must increasingly invest in integration and analytics. In fact, Gartner predicts that real-time analytics will outpace traditional analytics by a factor of three by 2020, to become 30% of the market.

In building the digital platform:

- Focus on data integration to capture value from the exponential growth in connections.
- Build a security platform for the IoT.
- Invest in analytics that enable real-time decision making.

Ecosystems

The ecosystem foundation determines how your business interacts as an entity in the digital world with customers, partners, suppliers and even competitors. Ecosystems are interdependent business networks offering innovation and productivity benefits to members through electronic interchange.

Top-performing organizations that participate in a digital ecosystem expect their average number of digital partners to double in the next two years.¹¹ And in making these connections possible, APIs become a necessity. In fact, Gartner believes that 70% of organizations will invest in tools to manage APIs (see "API Management, iPaaS and Mobile Back-End Services — Choosing the Right Tool(s) for the Job"). APIs implement business policies in the digital world, and enable you to connect your platform to other platforms and other platforms to connect to yours. An active community of citizen developers may even be able to leverage your API to build out capabilities that you haven’t even considered.
Reorganize for Digital

Along with building the five domains of the digital platform, success in digital increasingly requires cross-functional teams. This not only speeds innovation by bringing all the necessary parties together to accelerate decision making, but it is also imperative in a reality where the customer experience is the digital experience. That is, the digital experience is a culmination of your marketing effectiveness, product development acumen, supply chain excellence, web design prowess and many other efforts. Organizations can manage digital change at a project level, but managing continuous change is a greater challenge. Moving to a permanently integrated multifunctional organization with common objectives and metrics is the only way to digitally innovate at scale.

With nearly half of the value of products becoming digital in the next three years, companies that fail to support cross-functional operations will likely stand in the way of their own growth.

That completes the first part of the nine-point action plan (see Table 2).

Table 2. Nine-Point Action Plan

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Source: Gartner (November 2016)

Your Leadership: Reshape Your Teams and Leadership Style to Drive Digital Innovation

The Roadmap

The new digital platform is your roadmap for what you need to build next. But your specific roadmap will depend on where you’re starting from and your industry. IT systems are a common starting point. Once your infrastructure is modernized, think about what you want to achieve in your industry. Although you will have all five domains (IT systems, customer experience, intelligence, things and ecosystems), you will prioritize some domains over others:

- **Manufacturing and asset-intensive industries**: These have a greater need to sense and act to realize the benefits of the industrial internet, so their emphasis will be in the Things domain.

- **Banks**: Many banks aspire to become what the industry calls a "bank as a platform." This requires interacting, while engaging customers is also very important. The banking digital platform will emphasize the Ecosystems and Customers domains.
Smart cities, nations and digital government: These entities need to sense and control physical assets, and have a strong need to interact with partners that straddle public and private sector and coordinate across local, state and federal jurisdictions. They also need to reimagine citizen engagement. Their digital platforms will emphasize the Ecosystems, Customers and Things domains.

Insurance: Insurers want to engage customers, while the broker network requires interacting with partners. The digital platform will likely have a balanced emphasis.

Regardless of the focus, all organizations will benefit from increased intelligence to augment the capabilities in all parts of the platform. Invest in data, algorithmic and artificial intelligence.

The digital platform requires leadership to support it. Your enterprise structure will be reshaped. You can't expect that everything will change around your enterprise without your enterprise changing as well.

Bimodal IT

A bimodal strategy allows for planned and predictable change in Mode 1, and experimental and disruptive change in Mode 2. Among top-performing businesses today, 68% say they have a bimodal IT organization, compared to 43% for typical performers and only 17% for trailing performers. Eighty-five percent of organizations have started (or plan to start) a tactical bimodal project, such as adopting iterative processes, so they can "fail faster" and, ultimately, find the right approach.

The major benefits of a bimodal practice are closer engagement between the rest of the business and IT, improved business perception of IT, and increased innovation, especially for top performers.

Bimodal Leadership: Experienced Hands and a Beginner’s Mind

A bimodal organization comes with bimodal leadership. Bimodal leaders combine Mode 1 and Mode 2 leadership styles. Mode 1 can best be described as having an "experienced hand" — having built experience in IT over many years. But that is not enough in the digital world. Mode 2 adds a necessary quality: having a “beginner’s mind.” This means keeping an open mind to new technologies and use cases, daring to set aside mental models, and observing from scratch.

Bimodal leadership, with both experienced hands and a beginner’s mind, allows you to fundamentally rethink what the world looks like and how it functions.

Blockchain is an example of experienced hands and a beginner’s mind. Blockchain reimagines "value transfer." Value transfer today is based on uniquely identifying each transaction, but protecting the information. Blockchain comes with an entirely original approach, turning it around — allowing everyone to see the transactions while keeping them anonymous.

In the digital world, many get to reimagine their own industry with experienced hands and a beginner’s mind.
**Build Teams That Are Cognitively Diverse**

Cognitive diversity is key in your leadership team. All too often, companies fall in the trap of hiring like-minded people. They suffer from a lack of diversity of ideas; as a result, innovation is hindered. The status quo goes unchallenged. As you look to drive innovation and ultimately outpace the competition, you must hire for cognitive diversity.

Although underlying forms of diversity are harder to identify and understand, they are in fact more important than the more obvious ones, such as age, gender or cultural diversity. There is compelling evidence showing that diversity unlocks innovation and drives market growth. In a digital industrial economy, more diversity is needed to foster innovation and growth. Cognitive (or intellectual) traits affect everything, from the kind of work people want to do and are good at, to the way they learn, process and organize information, and communicate.

Perhaps even create a team of rivals — a team that is internally competitive. Some people will be analytical, others emotional. Some team members will be argumentative; others inquisitive. Discussions continuously diverge and converge. Although this approach can work very well, it requires more from you as a leader, making sure the discussions remain constructive, and that the team does not explode.

**Diversity of thought, guided by unity of purpose, works best.**

Cognitive diversity in a team helps challenge old and established views, and pushes for new thinking to create breakthrough results. While many organizations are hiring people with hard-core quantitative skills for data science, algorithms and machine learning, they will now need to look on the softer side of the spectrum. For example, organizations may need anthropologists who study people’s natural behavior in a digital world, or technical employees with higher emotional quotients. This completes the second part of the nine-point action plan (see Table 3).

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*Source: Gartner (November 2016)*
Your Business Contribution: Determine How You Will Participate in the Digital Ecosystem

Decide What to Do About the Digital Giants

Gartner predicts that, by 2021, 20% of all activities an individual engages in will involve at least one of the top-seven digital giants (currently Google, Apple, Facebook, Amazon, Baidu, Alibaba and Tencent; see "Top Strategic Predictions for 2017 and Beyond: Surviving the Storm Winds of Digital Disruption"). As products and services become more digital, physical things connect to technology platforms that are controlled and viewed from software and apps. Once that happens, the ability for digital giants to step in and disintermediate between your product, services and customers increases dramatically. Digital disruption ensues. Your enterprise will have to decide whether to join the digital giants or fight against them.

Gartner believes that many B2C businesses will choose to work with the digital giants. But if you’re in a B2B asset-intensive industry, such as manufacturing, utilities, logistics or transportation, we believe other leaders will emerge to fight against the digital giants, because many of them are giants in their own spaces, although not digital yet. They won’t give this up easily, and want to have a chance of being digital giants themselves.

Investigate the potential risks from digital disruptors, including possible moves into new markets by the digital giants (see "Ask Three Questions to Check Your Firm’s Digital Business Status"). Organizations may need to consider acquisitions to accelerate digital business initiatives, especially to secure new talent and skills.

Choose a Role

Every company will compete in a digital ecosystem — or risk becoming marginalized. Organizations need to decide the role they will play in the world of digital ecosystems. Every company will compete as a digital ecosystem. In doing so, they will be able to take on one of three roles:

- **Driver**: Leads the ecosystem, such as a smart city or supply chain ecosystems. For CIOs who run cities, regions and countries, taking this kind of leadership role is critical.

- **Market Maker**: Brings together sellers, buyers and anyone who contributes for the benefit of all. For example, a company called Yard Club lists hundreds of pieces of heavy equipment on its platform. Companies that join the club can rent equipment from Yard Club as well as from other club members (see "The Sharing Economy Can Turn Your Customers Into Your Competitors"). In Europe, the logistics company DB Schenker has invested millions to launch a platform business called Drive4Schenker that brings together shippers and carriers.¹⁵

- **Partner**: These businesses work together, contributing equally. Partners need technology that keeps checks and balances so competitors can collaborate. For example, the banking consortia led by R3 involves over fifty of the world’s largest banks, working together to figure out how they will employ blockchain capabilities.

That completes the final part of the action plan (see Table 4).
Table 4. Nine-Point Action Plan

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Source: Gartner (November 2016)

The Emerging Digital Society

We are now at the start of a massive surge in digital infrastructure. Today, Gartner estimates that 4 billion to 6 billion things are connected to the internet. By 2020, there will be billions of additional connected things (see "Forecast: Internet of Things — Endpoints and Associated Services, Worldwide, 2015"). Things include physical objects, such as sensor devices, asset-tracking devices, smart machines, smart grids, vehicles, 3D printing, robots, smart cities and drone delivery services. These things will play an active role and contribute value in digital businesses where physical interactions are important.

CIOs must anticipate that digital infrastructure will grow 10 times larger over the next decade. It will change the way people live and work (see "Introducing Digital Connectivism: A New Philosophy for the Digital Society"). The next innovations will require CIOs to think at the scale of civilization infrastructure (see "Think at the Scale of Civilization Infrastructure to Plan for Digital Business"). Civilization infrastructure is the convergence of the digital world with the newly connected world of critical infrastructure to meet the needs of a digital society.

Appendix

Trenitalia

Using the Digital Platform

The Italian train operator used the power of the new digital platform and reimagined a core business process. The company moved from scheduled train maintenance to predictive train maintenance by using an algorithm to draw on sensor data from its train braking systems. By doing this, the company avoids unplanned downtime, improves customer service and will decrease the cost of maintenance processes by 8% to 10%, to save around 100 million euros per year.

Trenitalia dropped the preconception that maintenance should be scheduled. Instead, the company used sensors and algorithms to essentially "listen" to the trains, letting those trains convey when a fix was in order.
Deakin University

Using Artificial Intelligence

The Australian university is using artificial intelligence to improve customer experience. Deakin deployed an IBM Watson student engagement advisor, the first of its kind in the world (see "Deakin University Uses Smart Machines to Innovate Student Engagement"). Deakin's objective was to build a virtual assistant to provide answers to typical questions from students and respond to student needs on a 24/7 basis through any device. With Watson, the university is able to answer thousands of student questions every week. Over time, Deakin expects the system to evolve: By personalizing responses and mapping an individual's academic needs, profile and preferences, the system could evolve into a personalized career advisor that can advise users on how to achieve career objectives based on their individual experience and qualifications.

Gartner Recommended Reading

Some documents may not be available as part of your current Gartner subscription.

"Three Styles of Digital Business Platforms"

"Building a Digital Business Technology Platform"

"Winning in the Platform Game, Part 1: Understand the Game and Determine Your Role"

"The 2017 CIO Agenda: Seize the Digital Ecosystem Opportunity"

"Every Organization Needs a Digital Platform Strategy"

"Think at the Scale of Civilization Infrastructure to Plan for Digital Business"

"Top Strategic Predictions for 2016 and Beyond: The Future Is a Digital Thing"

"Customer Experience Is the New Competitive Battlefield"

"Diversity's Role in an Effective Digital Workplace Program"

"Ten Absolute Truths About Talent Management in Digital Business"

"Introducing Digital Connectivism: A New Philosophy for the Digital Society"

Evidence

2017 Gartner CIO Survey

The 2017 survey respondents were placed into three categories based on self-reported IT and enterprise performance:
Top performers — These CIOs had a self-reported score of 6 or 7 (out of 7) on the question, "How effective is your company at factoring digital considerations into strategy and planning?" These performers answered "scaling or harvesting" (the two top categories) to the question, "Which of these best describes the stage of your organization’s digital initiative?" Top performers have reached "digital escape velocity" to outperform their peers.

Typical performers — This cohort performed too well to be included in trailing performers, yet not well enough to be included in top performers.

Trailing performers — These CIOs had a self-reported score of 1 or 2 (out of 7) on the question, "How effective is your company at factoring digital considerations into strategy and planning?" These performers answered "none" or "desired" (the two bottom categories) to the question, "Which of these best describes the stage of your organization’s digital initiative?"

2015 Enterprise Backbone Survey (Bimodal Projects)

Results from the enterprise survey presented are based on a Gartner online study conducted from September to December 2015 in six countries: Brazil, China, India, France, the U.K. and the United States, among 1,348 respondents whose job title is vice president or above.

Quotas were established for vertical and employee size for each country, using the Gartner-published vertical and size-of-business forecasts. The results were then weighted to be representative of the business universe in each country.

The survey was developed collaboratively by a team of Gartner analysts who follow the IT market, and was reviewed, tested and administered by Gartner’s Research Data and Analytics team.

1 "Predicts 2016: Cloud Computing to Drive Digital Business"

2 "Top 10 Strategic Technology Trends for 2017"

3 "The 2017 CIO Agenda: Seize the Digital Ecosystem Opportunity"

4 2017 Gartner CIO Survey

5 J. Bunge, "Big Data Comes to the Farm, Sowing Mistrust," The Wall Street Journal, 25 February 2014

6 See "Industry Vision: Digitalizing Engagements Evolve the Automotive Industry Toward Mobility."

7 See "Supply Chain 2025: Planning Today for Tomorrow."

8 See "Building a Digital Business Technology Platform."

9 See "Smarter Machines Will Challenge The Human Desire for Control."

10 See "Conversational AI to Shake Up Your Technical and Business Worlds."
11 "The 2017 CIO Agenda: Seize the Digital Ecosystem Opportunity"

12 Enterprise Backbone survey

13 The beginner’s mind, as introduced by Shunryu Suzuki’s "Zen Mind, Beginner’s Mind," refers to "having an attitude of openness, eagerness and lack of preconceptions when studying a subject, even when studying at an advanced level just as a beginner in that subject would."

14 See "Diversity’s Role in an Effective Digital Workplace Program."

15 DB Schenker, "DB Schenker Signs Agreement Worth Millions With uShip"