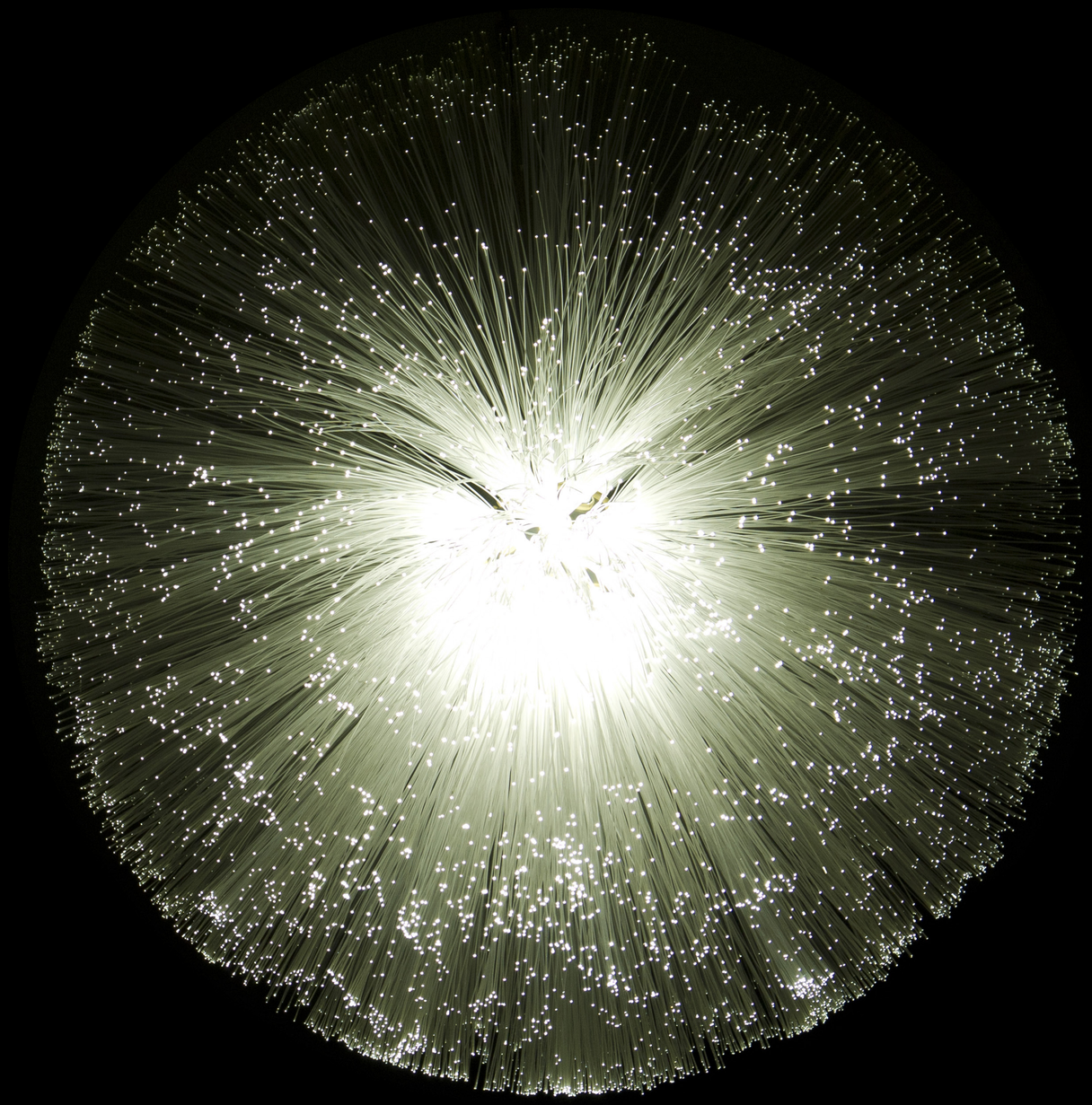
Deloitte.

The CIO agenda
A compendium of Deloitte insights

Articles published as sponsored content in *CIO Journal* from *The Wall Street Journal* from September 2015 through January 2017



Exploring exponentials

- Augmented and virtual reality: A new vision
- S&P Global taps IBM research executive for CIO role
- Exponentials help fuel social change

Augmented and virtual reality: A new vision

Enterprises are poised to fast-track augmented and virtual reality adoption and begin the process of fundamentally reimagining how work gets done.

—by Nelson Kunkel, director; Steven Soechtig, director; Jared Miniman, specialist leader; and Chris Stauch, specialist leader, Deloitte Consulting LLP

April 19, 2016

Long the objects of science fiction fascination, augmented reality (AR) and virtual reality (VR) solutions are finally hitting the market. VR makes it possible for users to immerse themselves in constructed surroundings that depict actual places or imaginary worlds. AR overlays contextual information on the immediate physical environments users see before their eyes, thus blending digital components and experiences with real life.

The hype surrounding consumer applications, particularly in entertainment and gaming, makes for good headlines. However, the real story in the coming months will likely be the potential of AR and VR to reshape enterprise business processes and tasks. The benefits of AR and VR to the enterprise are apt to outpace consumer adoption cycles, which is notable given that the market may swell to $150 billion annually by 2020.[1] As the clarity of AR and VR device display improves, standards develop, and application ecosystems begin to emerge, these disruptive technologies will likely play a role in reinventing employee and customer experiences, while introducing new opportunities in communication and collaboration, training and simulation, field operations, and customer service.

A Job with a view

Momentum around VR and AR grows with each new deployment. Noncommercial prototypes are sparking curiosity across a wide spectrum of applications. For example, the Los Angeles Philharmonic immerses audiences in the world of Beethoven.[2] The British Museum invites visitors into a Bronze Age roundhouse containing both real and virtual artifacts of the period.[3] Psychologists at the University of Louisville are creating exposure therapies to help phobia patients confront and learn to contain their fears.[4] Filmmakers are crafting first-person documentaries that place viewers in the middle of a Syrian refugee camp or an African village beset by Ebola.[5]

Meanwhile, businesses across many industries—including construction, health care, and manufacturing—are exploring applications of the technology to their operations. For example:

Communication and collaboration. VR and AR may soon replace one-to-one human interactions and offer IT opportunities to change how businesses and their employees report and share information and take action. Marketing managers are already using AR to view retail inventory and sales data. Engineering teams across the globe are deploying VR to collaborate in real

time to test and refine designs. VR is also transforming simple productivity tools like videoconferencing and live chats, permitting immersive face-to-face interactions that enable participants to see facial expressions, physical gestures, and subtle nonverbal cues.

Simulation and training. AR and VR can help IT play an active role in retooling high-cost training and simulation environments. For example, manufacturers could replicate maintenance and repair scenarios in virtual environments (and eventually may be able to remove employees from certain dangerous situations altogether through the use of remote controls and robotics). In the construction industry, commercial developers can now "walk" through complete, full-scale computer-rendered structures, gaining a sense of the width of a hallway or the impact of detailed design decisions before touching shovel to dirt. Executive teams are using simulated high-resolution stages to rehearse and refine their presentation skills.

Field and customer service. CIOs can lead VR and AR efforts to redefine how field and customer service workers approach their jobs. For example, augmented interfaces that pair with connected devices can deliver task-specific information to workers in the field in context and on demand. Augmented solutions can overlay a jet engine's service hours, component temperature, and service panel details into an aircraft mechanic's field of vision. Likewise, virtual solutions can immerse customer service agents in collaborative scenarios, enabling remote experts to see what field representatives see and provide guidance during the performance of maintenance or mechanical tasks.

Customer experience and interactive marketing. AR and VR offer potential new ways to interact with products and services and provide companies with opportunities to raise awareness, promote features, and create demand for their goods. Travel, hospitality, and leisure firms are offering immersive, interactive samplings of cruises or hotel stays that allow potential guests to explore properties and preview amenities virtually. Some of these samplings go so far as to use wind machines and olfactory stimulants to replicate not just the sights but also the sounds and smells one might experience during a day at the beach.

Getting started

Harnessing AR and VR tools can help cement a CIO's reputation in the C-suite and throughout the enterprise as a purveyor of futuristic solutions that are grounded in business realities. CIOs can consider the following points as they begin their AR and VR journey:

The time is now. Companies can begin to justify AR and VR with distinct use cases demonstrating measurable impact and value. As the market evolves, companies can reevaluate the field with each new initiative to determine where to place the next bet.

Behind the looking glass. Designing for AR and VR requires new enabling tools and services. High-definition 3D image-capture and mapping equipment are emerging, accelerating developers' abilities to re-create real-world physical environments within new AR and VR tools. Enterprises are using gaming engines to create simulations and virtual environments for AR and VR interaction. In addition, workspaces may require redesign to accommodate VR setups that need more physical space than current hardware.

Side jobs. As companies deploy AR and VR solutions, they may need to install beacons, sensors, or even quick-response tags around facilities and equipment to guide the context of augmented scenarios, especially for equipment on the move. They might also need to construct wireless and cellular infrastructure to support AR and VR connectivity in remote areas. Finally, emerging middleware platforms can help support device-specific interaction with underlying data and rules.

AR and VR are capturing the attention and the imagination of consumers, but enterprises are also in prime position to benefit substantially from these emerging technologies. It's time to put AR and VR to work—and bring enterprise IT back to the future.

1. Digi-Capital blog, "Augmented/virtual reality to hit $150 billion disrupting mobile by 2020," April 2015, accessed January 16, 2016.
2. David Ng, "L.A. Philharmonic's Van Beethoven takes virtual reality for a classical spin," *Los Angeles Times,* September 24, 2015, accessed January 16, 2016.
3. Maev Kennedy, "British Museum uses virtual reality to transport visitors to the bronze age," *Guardian*, August 4, 2015, accessed January 16, 2016.
4. Erin Carson, "10 ways virtual reality is revolutionizing medicine and health care," *TechRepublic*, April 8, 2015, accessed January 16, 2016.
5. Scott Hartley, "The innovative technology that's changing the way we watch movies," *Inc.*, September 1, 2015, accessed January 16, 2016.

S&P Global taps IBM research executive for CIO role

After a 20-year career working for IBM, Krishna Nathan is laying the groundwork to exploit the power of new technologies for S&P Global.

September 28, 2016

S&P Global has been a purveyor of financial data for more than 150 years. Across the company's four divisions—S&P Global Ratings, S&P Global Market Intelligence, S&P Dow Jones Indices, and S&P Global Platts—data is the key to revealing insights about the world's capital and commodity markets. Data, data processing, and data modeling are in the company's DNA.

Yet even a long-established data company like S&P Global, which earned $5.3 billion in revenue in 2015, faces challenges commonly associated with migrating to digital, keeping up with technology change, and transforming its business to stave off threats and find new avenues for growth.

Krishna Nathan joined S&P Global in May as CIO to help the company take advantage of technology in new ways. Nathan, who reports directly to President and CEO Doug Peterson, had previously spent his entire career at IBM, most recently as vice president of IBM Research. S&P Global's selection of Nathan speaks to its commitment to exponential technologies as a growth driver.

Although he takes seriously his responsibilities as a trusted operator of S&P Global's IT systems, Nathan is also poised to lead digital transformation as a change instigator and influence business strategy as a business co-creator. In this Q&A, Nathan discusses S&P Global's business, his transition from IT vendor to IT buyer, and the importance of emerging technologies to the company's future.

As a newly appointed CIO, what is your mandate from the executive team and board of directors?

Nathan: I have two mandates. The first is to use technology for business advantage inside S&P Global. This includes ensuring our employees have the most productive work environment and that we have best-in-class enterprise systems. The second is to leverage data and our considerable brand permission as a data company to drive the creation of new services and generate new business value. That is what the board expects from our CEO, Doug Peterson, and from me.

Many companies are currently looking to monetize their data. What does that mean at S&P Global?

Most companies—search engine companies or mapping software providers, for example—monetize their data indirectly, mainly through advertising. Our customers value the nature of the data we provide because of its uniqueness and relevance. Clearly, we have the brand permission to do this. We compete on our ability to provide our customers with high-quality, complete,

and timely data for decision-making. We have processes in place to collect, clean, curate, and analyze data and then distill it into products of value to our customers. The nature of the data and the final products varies by division, but that same sequence of activities takes place pretty much across the board. We enable our customers to uncover new insights or insights in new ways. That's our competitive advantage, but, of course, we have room to grow and evolve. Part of my mission is to think about those things, because the commercial business model strategy is very closely intertwined with the technology platform we need to build.

Where do you see opportunities to leverage new technologies to enhance S&P Global's performance?

Internally, all our divisions are experiencing exponential growth in the volume of structured and unstructured data available to them. It behooves us to embrace automation across all our internal data processes in order to keep up with those growing data volumes. Externally, increasingly sophisticated tools and techniques—for example, machine learning, artificial intelligence, and big data analytics—are becoming readily accessible, enabling us to extract different kinds of value and provide new services to our customers. Where this gets interesting is in looking beyond our traditional data sources to find and leverage complementary, or what I call orthogonal, data. Mobile devices, sensors, and the internet of things generate data that wasn't accessible even a few years ago. We can combine that data with traditional financial data to unlock new opportunities. We're actively looking for new data assets to monetize and considering ways our customers can apply them.

What lies ahead for S&P Global?

Today we provide products—for example, oil rig data—based on what we think our customers are looking for. Often our relationship with the customer ends there. Rather than providing that specific data file, imagine that we were to set up a platform—say, a website or a mobile app—where customers could explore large sets of structured and unstructured data for themselves using sophisticated but simple-to-use tools we provide. For example, our customers could take advantage of machine learning and deep neural networks to ask complex questions and visualize data. Moreover, we could expose these sophisticated tools through well-defined interfaces. Now our customers would have the opportunity not just to obtain answers to specific questions but to uncover new insights they hadn't anticipated. In that respect, we would be creating a personalized experience for each of our customers and establishing a relationship in the process.

Exponentials help fuel social change

Businesses are developing technologies that can diagnose diseases, immerse students in a virtual field trip, and aid amputees, among other social benefits.

January 5, 2017

Businesses are increasingly looking beyond the bottom line in identifying areas ripe for technology investment. Exponential technologies, whose performance relative to cost and size is rapidly accelerating, offer new ways to catalyze transformational social change. Here, three organizations demonstrate how innovative business technologies can drive positive outcomes in the social sphere.

The race to wellness

Generally, unmet consumer need drives innovation. Yet this isn't always the case in the health care industry. In an age of technology-enabled individual empowerment, patients often lack opportunities to receive medical care without going to a clinic or hospital—a limitation that can create inefficiencies and drive up prices.

To help address this challenge, in late 2011, Qualcomm Incorporated, a developer of advanced wireless technologies, products, and solutions, expanded its focus on wireless health solutions. The Qualcomm Foundation, its philanthropic arm, sponsored the Qualcomm Tricorder XPRIZE, a global competition launched and operated by the XPRIZE Foundation, in which teams are competing to develop a portable, wireless device that accurately diagnoses a set of diseases independent of a health care professional or facility. The team with the best design and diagnostic performance will pocket up to $10 million.[1]

According to Rick Valencia, president at Qualcomm Life, Inc., Qualcomm's health care subsidiary, support for this competition is driven by Qualcomm's commitment to promoting innovation in health care. "Trying to address challenges in an area like diagnostics is not easy. But we strongly believe that mobile technology has a role to play in that effort—it can help make convenient, affordable care more accessible to more people," he says.

Inspired by the medical Tricorder prop from "Star Trek," first shown to TV viewers 50 years ago, the devices are expected to accurately diagnose 13 health conditions. They should also continuously monitor five vital signs in real time and provide a compelling consumer experience. The only other design limitation is that the device must weigh under five pounds.

The Qualcomm Tricorder XPRIZE competition is nearing its final stages. An initial field of roughly 300 entrants has been narrowed to two finalists: Final Frontier Medical Devices from the U.S. and Dynamical Biomarkers Group from Taiwan. As the teams advance to the

final round of the competition, their devices will undergo consumer testing through early 2017 at the Altman Clinical Translational Research Institute at the University of California, San Diego. The winning design will be announced in early 2017, he says.

A virtual field trip of dreams

"At Google, we're often willing to experiment and innovate with leading-edge technology before we fully understand the near-term commercial viability of the product—as long as we're aiming to solve an important problem or meet a critical need," says Jonathan Rochelle, product manager for Google Education.

This approach is providing Rochelle with the resources and creative leeway he needs to pursue his latest project: Google Expeditions, a virtual reality (VR) platform built for the classroom. While its long-term ambitions are far-reaching, the first iteration takes aim at improving an educational mainstay: the field trip.

Rochelle and his team are working with teachers and content partners from around the world to create tours that will immerse students in new experiences and learning environments by enabling them to explore distant locales—from Antarctica to the International Space Station—without ever leaving their classes. A teacher acts as the guide, leading students through collections of 360-degree panoramas and 3D images supported by supplemental materials. And field trips are only the first frontier. Students who want to study shark anatomy can immerse themselves in a virtual viewing tank for five minutes to study one up close. Those interested in organic chemistry can explore the molecular compounds that are central to all living creatures.

Expeditions, which was born during a hackathon, makes it possible for one leader to guide multiple people on a virtual journey. The first iteration featured two panoramas: a tour of the Taj Mahal and a view from space. "When we tried this out for the first time, we realized we were onto something special: a VR solution that gives students the freedom to explore and delivers some basic level of control for teachers," says Rochelle. "I've never seen such immediate buy-in and agreement on the potential for a product. Everyone who tries it immediately gets excited."

Expeditions is still in its early days, but Google has already created more than 400 tours. Rochelle and his team are testing the Expeditions beta product in classrooms, where teachers and students take it for a trial run and provide feedback. "We are not educators, and we want to be sure that educators guide the development of this product," says Rochelle, adding that more than 1 million students from 11 countries have tested Expeditions.

Expeditions is a feather in the Google VR development team's cap. But, says Rochelle, it is also proof that VR innovations can move forward without an immediately viable business model. "My goal is to take incredible technologies and make them useful for educators. If they work in that capacity, they will likely work in other capacities, too," he says.

Offering a helping hand

Aware that staggering development costs had put prosthetics beyond the reach of many hand amputees, Joel Gibbard, an engineering major studying robotics, launched a project at his university to develop a low-cost robotic prosthetic.[2] Today, Gibbard is CEO of Open Bionics, a U.K. startup that is using open source 3D printing software, robotic sensors, and financial capital from crowdfunding efforts to create a bionic hand that is less costly to produce than some others on the market.

Where other robotic prosthetics take months to make and cost hundreds of thousands of dollars, Open Bionics can build one in days for thousands of dollars. This means its prosthetics are more accessible to amputees across the developing world. What's more, Open Bionics' prosthetic hands match more expensive prosthetics in terms of functionality and, because they are lighter and custom-made, they are often more comfortable for the wearer.

Open Bionics' efforts are attracting attention worldwide, which has brought in additional funding and sparked potentially beneficial partnerships. In 2015, the company took home a $200,000 prize for a second-place win in Intel's "Make it Wearable" challenge. The company's products are open source, and the company recently announced it would make that code available, which would allow individuals to download and 3D print their own prosthetics.[3]

As they explore new opportunities for exponential technologies, organizations are recognizing that these advancements can do more than simply serve the business: IT investments can benefit society as a whole.

1. Qualcomm, "Qualcomm Tricorder XPRIZE," accessed Dec. 18, 2015.
2. James Dyson Foundation, "Open Bionics," accessed Jan. 13, 2016.
3. Matthew Reynolds, "Print your own prosthetic: this code can be used by anyone to create their own bionic limbs," Nov. 5, 2016, accessed Nov. 18, 2016.

Maximizing the cloud opportunity

- How to realize the promise of the cloud
- 3 ways to ease cloud migration
- Moving to a cloud-native world
- M&A loves the cloud

How to realize the promise of the cloud

Avoidable missteps and pitfalls are slowing cloud migrations, and preventing organizations from making the most of the cloud opportunity.

July 18, 2016

Two-thirds of CIOs today view cloud computing as a principal disruptive force in their businesses.[1] Worldwide spending on cloud services is expected to grow from $70 billion in 2015 to $141 billion in 2019.[2] Moreover, demand for public infrastructure as a service (IaaS) and platform as a service (PaaS) has grown 51 percent this year; demand for private and hybrid cloud infrastructure has increased 45 percent.[3] Yet even with all this planning and spending, realizing the promise of the cloud is still a challenge for many organizations.

Only by breaking through the obstacles known to delay or derail the cloud journey can CIOs move to cloud-based delivery models that increase agility and cost transparency, improve service quality, and facilitate risk management. Proven strategies and practices can help CIOs to achieve the promise of the cloud, according to Ranjit Bawa, a principal with Deloitte Consulting LLP, and Nicholas Merizzi, a senior manager, also with Deloitte Consulting. Among them:

Making the case for change. CFOs and COOs increasingly find themselves engaged in conversations about the cloud. By working closely with these and other C-suite execs in the early stages, CIOs can develop a shared vision—including benefits, objectives, and goals—and build a cloud business case. Often, this begins with agreeing on basic definitions of the cloud ("it becomes a religious debate that slows us down," says one CIO) and providing a cloud services taxonomy for all to share.

CIOs also need to make two points abundantly clear up front. First, migrating an application portfolio to the cloud is a multiyear undertaking—not a singular event—that requires sustained help from business-side application owners and their development teams. Second, it cannot be accomplished through business-as-usual IT budgets. IT organizations should request and plan for dedicated, multiyear transformation budgets to finance cloud migrations. Likewise, business-side development teams will need to make a sustained financial commitment and dedicate people to collaborating with IT to ensure the successful migration of their applications.

Furthermore, it falls to CIOs to provide a clear-eyed financial analysis of cloud migration. This typically entails providing a before-and-after comparison of costs, taking into account the one-time costs associated with the migration and the recurring expense of running applications in a public cloud. Investing upfront

to refactor (optimize) applications can go a long way toward reining in excessive recurring costs associated with running inefficient applications in a public cloud. Additional costs savings may come from more efficient infrastructure utilization, improved orchestration, and increased productivity in applications development.

Finally, part of making the case for the cloud is exploring the opportunity cost of not adopting it. Five years from now, companies that aren't materially on the cloud will run a serious risk of obsolescence. They'll likely struggle to retain talent, integrate with the broader ecosystem, and take advantage of disruptive technologies.

Designing the future target state. CIOs are likely to encounter critical decisions in several areas as they move from making the case to designing the future state.

Vendor selection. Selecting cloud vendors—from among a vast ecosystem of new providers competing alongside and against the stalwarts that are moving their own offerings to the cloud—can be angst-inducing for large-enterprise CIOs. Only a fraction of cloud vendors existed even a decade ago. Addressing typical challenges associated with interoperability, support, and negotiating agreements with multiple vendors can help to avoid potentially significant delays in the cloud journey.

Architecture. CIOs preparing for a cloud future state will also find themselves standing at any number of architectural crossroads such as open source vs. proprietary technologies, and interim private cloud vs. straight to public cloud. Indecisiveness or prolonged debates at these junctures can increase costs, produce duplicate efforts, and cause massive delays.

IT organization structure. Realizing the promise of the cloud requires Agile practices, end-to-end visibility and accountability, close collaboration, and essentially a flat organization structure. All of this, along with target state objectives, will inform the talent model and lead to important conversations about available talent, needed skills, and how to close the gap through a combination of training, college recruiting, and strategic hiring. Of course, highlighting your organization's cloud strategy can help to attract talent.

Enabling execution. Arguably, this is the most challenging aspect of any cloud migration, and explains why it is typically a three- to five-year journey. Even companies that have managed to make the case and define a future state for a cloud-only environment, and have implemented an attractive cloud platform, still face the herculean task of moving their applications into the cloud. Most large enterprises have invested a massive amount of time, money, and energy into brownfield IT systems that are dated and quite possibly mission-critical. Application portfolios that run into the thousands are not unusual.

The process begins with understanding the application portfolio and the readiness of various applications for the cloud. This includes the notion of "fit for purpose," or choosing the best cloud platform (SaaS, PaaS, IaaS, or even private cloud) based on the application. Many journeys start with minimum viable products (MVPs) as pilots followed by adoption with applications that address immediate business needs. From there, applications are prioritized and migrated in sequence in subsequent waves (or tranches). The most beneficial migrations may also take the longest to complete (and show a very strong ROI). Pursuing these heavy hitters simultaneously with easier, quick wins can help sustain momentum along the journey, allowing CIOs to effectively chip away at the portfolio piece by piece and enable the shift to the cloud over time.

Given this complexity, a cloud migration requires the governance, structure, discipline, and dedication only a cloud center of excellence can provide.

Much more than simply another technology platform or a new form of managed services, the cloud represents a fundamental shift in how companies attain, use, and manage technology capabilities. Companies in every industry are attracted by the promise of the cloud. But moving to the cloud is a transformation that takes planning, commitment, and sustained effort. It's as much a shift in mindset as it is in technology, and no one is immune from the many challenges the journey entails.

1. "Cloud Computing in 2016: Private company issues and opportunities," Deloitte Perspectives, retrieved June 24, 2016.
2. Louis Columbus, "Roundup of Cloud Computing Forecasts and Market Estimates, 2016", Forbes, March 13, 2016.
3. Ibid.

3 ways to ease cloud migration

Moving an entire application portfolio to the cloud isn't for the faint of heart, but the right approach can help CIOs overcome the hurdles.

—by Ranjit Bawa, principal and U.S. Cloud and Infrastructure practice leader; Nicholas Merizzi, senior manager; and Eric Lam, manager, Deloitte Consulting LLP

November 17, 2016

Application migration to the cloud remains a challenge, but there are proven approaches and industry best practices to draw upon for help.

With all the many benefits promised by the cloud, it's no wonder companies large and small are eager to put it to work. But it's one thing to embrace the cloud on a limited scale; all-out migrations are a much more difficult proposition. Today's enterprises may have hundreds of applications in their portfolios, each of them linked in complex ways to databases, external services, mainframes, and other applications. Migrating all this successfully is a critical part of adopting the cloud at scale.

Within the next five years, more than 40 percent of large enterprises' workloads will run in the public cloud. Application migration remains a challenge, but there are numerous proven approaches and industry best practices to draw upon for help. Three are especially valuable.

Know your applications. Applications are often considered the core logical construct in cloud migration, so a good understanding of the application portfolio is critical. In today's highly distributed environments, applications can have thousands of interfaces and connection points, meaning that a single user request can span many parts of the application stack. A critical first step entails understanding how to look at an application and its interdependencies as well as the corresponding implications for migrating it to the cloud.

Often, one of the first struggles is how to nail down a consistent definition of the term "application." Application architectures have evolved over the years from monoliths to more modular models in order to adapt to changing technologies and customer needs. In one company, an enterprise application service may include microservices, batch jobs, external services, and more, each with its own run-time environment; in another, a batch job alone may be considered an application service. For that reason, it is important to have a consistent definition and a corresponding up-to-date application inventory across the enterprise.

It's also essential to have a clear understanding of application interdependencies. For example, say a business function has four interdependent applications and inadvertently moves only three of them to the cloud, so that what used to sit side by side on-premises is now spread across the company's on-premises infrastructure and the cloud. Latency issues can result, compromising the end user's

experience. Dependency mapping can help avoid this problem by offering a way to discover and map the components and relationships ahead of time.

It's important not to use a stale or limited configuration management database as a data baseline for application dependency mapping in order to shorten the discovery process. Cloud migration programs are very data-driven, and the accuracy and timeliness of the discovery data establishes the foundation for the transformation. All good migration programs are associated with good discovery, so using the correct discovery tool can greatly accelerate adoption.

Develop the right operating model. Successful cloud migration programs share many common traits with other large-scale IT transformation initiatives, including a strong executive sponsor and close business alignment. An operating model optimized to support migrations from planning through steady state is also critical.

The journey to the cloud will likely unfold over many years. Establishing a cloud migration center of excellence (COE) can be a good way to sustain the required momentum over the long haul. The cloud migration COE will ensure a consistent onboarding process and checkpoints in the migration's lifecycle.

Successful cloud migration COE teams include the right people and skills. Discovery engineers are at the core, using complex logic and data-driven analysis to develop affinity groups and ultimately establish the migration wave plans. Migration engineers, meanwhile, focus on execution, both minimizing business risk and achieving scalability through techniques such as automation.

A cloud migration COE does not start at full capacity; rather, it builds momentum on the heels of a successful minimum viable product (MVP). The first step is achieving readiness for the cloud, including security controls, tools, and processes. A successful MVP means having at least one business application running on a secured public cloud environment, and it allows the migration team to learn and demonstrate the viability of cloud services as well as engage all necessary stakeholders early in the process.

Even with a cloud migration COE in place, plans can still stall if there isn't an adequate level of operational readiness for the cloud. A strong cloud business and operations team can help by focusing on ensuring a consistent and positive user experience. From a financial management perspective, it's important to put controls in place to oversee cloud budgets, verify the accuracy of invoices, and ensure timely payments. Similarly, the existing operations team will benefit from updated runbooks and proper tooling to deliver consistent service levels.

Take a customized approach. Determining the right migration strategy for an application depends on several factors, including the potential benefits and risks. Migrations are not one-size-fits-all; different workloads and applications require different stacks and pose different challenges. In some cases, applications can be migrated as is, while in others they need to be transformed

first. Off-the-shelf applications, for example, can often be migrated using a simple rehost approach, in which they're moved to the cloud with minimal modification using automation and scripts. Others may first require refactoring, or modifying the underlying code to optimize it for the cloud.

Custom applications are all different and need attention, but understanding their patterns and underlying technologies can help map them to the appropriate migration method and create a repeatable, scalable approach. Depending on the path taken, the implications across the stack will vary, and so will the associated costs and effort. With the rehosting approach, companies can often simply use Infrastructure as a Service (IaaS) platforms. Refactoring generally calls for Platform as a Service (PaaS) capabilities instead.

On each of those two paths, there are additional decisions to be made. In the context of rehosting applications, companies can decide if they want to go a step further and embrace cloud-native services such as Lambda, Elastic MapReduce, or Redshift on Amazon Web Services, for instance. Such offerings can enable new capabilities, but there's also the risk of getting locked in to the provider's services.

Those refactoring using PaaS, meanwhile, have a range of options in terms of the extent to which they optimize their applications for the cloud. One common approach is to leverage microservices as a way to decompose legacy monoliths. Ultimately, it's a matter of deciding how far you can go along the cloud-native scale with the legacy footprint. Evolving application architectures for the cloud through auto-scale, self-healing, and hardware-agnostic techniques better supports business needs, but the key question is which ones to remediate and which to rebuild from scratch.

The cloud journey can be arduous, and will undoubtedly present risks along the way. But with a clear vision, executive sponsorships, stakeholder buy-in, and a meticulous migration plan, enterprises can reap significant benefits, including increased agility, faster innovation, and lower overall IT costs.

Moving to a cloud-native world

Enterprises can get more out of their cloud migration efforts by embracing a four-pronged approach to software delivery.

December 12, 2016

It's not uncommon for companies starting out in the cloud to simply "lift and shift" existing applications to the new platform with little or no modification. That strategy can work for some applications and fulfill some short-term objectives, but it won't often unlock the full suite of benefits the cloud can provide.

Many legacy applications are highly inefficient in terms of how they were architected and supported. Performance problems were often "solved" by adding infrastructure, such as more servers or storage. Lift and shift those applications to the cloud and all that inefficiency comes along.

On a more strategic level, legacy applications can also make it difficult to take advantage of agility-boosting techniques like DevOps. Such techniques have become a core part of the CIO's toolkit for enabling business transformation, which is an increasingly important part of IT's mandate. "More than ever before, businesses require the ability to rapidly deploy new business models and modify existing ones. In the digital era, it's a matter of survival," says Douglas Bourgeois, a managing director with Deloitte Consulting LLP. "IT is evolving from simply an enabler of business capability to a weapon for strategic transformation."

Cloud-native software is specifically designed to take full advantage of both the platform and the infrastructure capabilities of the cloud, adapting to changing operational conditions automatically and delivering maximal speed, resilience, and dynamic scale. Enterprises are increasingly embracing it to enable transformation and make the most of their cloud investments. A software delivery model that includes the following four core components can help ensure the best results:

An agile lifecycle. Speed is paramount in today's business climate, and an agile development lifecycle sets the pace for rapid delivery of feature-rich releases across rapidly scheduled iterations. Higher quality, predictable planning, increased stakeholder engagement, and a rich user experience are among the results.

Automation through DevOps. DevOps merges development and operations through an automated pipeline that continually builds, tests, and deploys code. By speeding the flow of code from developers into production, this technique enables rapid delivery of new business capability through software—as frequently as hourly if needed.

A microservices architecture. The monolithic nature of legacy applications can

be an obstacle for DevOps and agility, since application code typically exists as a massive, tightly coupled, and slow-moving block. The traditional data models used in such applications can be an even bigger issue. By taking a more modular approach, microservices can help address both points, delivering considerable gains in efficiency.

Platform as a Service (PaaS). Finally, PaaS technology provides a range of managed infrastructure services, enabling both a considerable increase in efficiency and self-healing, policy-driven applications through automation at the platform level.

Companies needn't try to implement all these components at once—they can start with one or two and go from there. The approach also isn't necessarily the right one for every application. But for many, the four parts work as complementary pieces of one machine, giving enterprises a way to keep ahead of competitors that are still bogged down by legacy systems and monolithic code. "The real value here lies in creating the opportunity for businesses to act and react very quickly to changing market conditions," Bourgeois says.

Adopting this approach, particularly the move to agility, will require a focused transformation of the organization's core IT process structure. Along the way, companies will likely see a gradual de-emphasis of manual and paper-based techniques thanks to increased automation. They'll also probably find it makes sense to reorganize around products rather than functions or projects to break down silos and give teams ownership of the products for their full lifecycles.

Changes will be needed on the organizational level as well. Embracing a cloud-native approach involves evaluating and optimizing structure, culture, and workforce. Application architects, developers, and IT operators will have to develop new skills. A comprehensive workforce transition includes adapting policies for talent acquisition, skill set retooling, training, and retention. It's also important to ensure that the company's existing model and culture can attract and retain the best next-generation IT talent.

CIOs can get started with a proof of concept through which they demonstrate the business value of a cloud-native approach on a single application before thinking about the bigger picture and developing a migration strategy for the whole legacy pipeline. A dedicated center of excellence can help by paving the way forward and ensuring long-term goals are met.

In many companies, IT teams have been "constrained by decades of process layers designed to protect the enterprise," says Ken Corless, a principal in Deloitte Consulting's cloud & infrastructure services group. "Done properly, a cloud-native approach can provide both the quality and agility large companies aspire to deliver."

M&A loves the cloud

Cloud capabilities are enabling many organizations to fundamentally change the way they operate and to move from traditional on-premises back-office infrastructure to an on-demand model. This shift has significant implications for M&A activity.

—by Asish Ramchandran, principal; Rick Aviles, senior manager; Chris McCormick, senior manager; Christian Saint-Onge, senior manager; and David Zager, senior manager, Deloitte Consulting LLP.

September 27, 2016

Today's competitive business environment is driving companies to focus on their core strengths and most profitable activities. Executives are increasingly looking to divestiture as a method for shedding underperforming or noncore assets.

While focusing on separation, it is often impractical to develop the infrastructure needed to support the new organization created by the divestiture, so M&A arrangements often include Transition Service Agreements (TSAs) in which the seller agrees to provide post-deal operational services or support to the buyer for a designated period of time after the transaction closes. As TSAs often stipulate severe financial penalties for failure to exit the agreement on or before the agreed-upon date, there can be considerable pressure on both sides to exit quickly and with minimal impact to the business. This can be challenging, however, if the TSA includes support services for a traditional on-premises or hosted ERP system, due to the complexity involved with ERP system configuration.

Moving to a cloud-based ERP system may help turn a potential M&A deal breaker into a deal maker. Opting for a cloud ERP solution can be a practical, less costly alternative to traditional on-premises or hosted solutions and should appeal to both seller and buyer. Because cloud-based ERP requires no hardware and nominal configuration, a medium-sized company can often be operational on it in four to seven months, while a large international firm might take up to twice as long. This is much faster than implementing a traditional on-premises solution, and thus facilitates a faster exit from the TSA. Considering that a cloud ERP typically provides regular upgrades, the ability to scale users, easy adjustments to system functionality, state-of-the-art security, and increased system capability, it may offer the ultimate in flexibility during a post-deal transition.

Selecting the right ERP platform

Choosing a cloud-based ERP platform requires the same thorough due diligence as the rest of an M&A transaction. Each vendor has its own set of strengths and weaknesses and different approaches to managing and enhancing its product. But regardless of the vendor, there are a few points a buyer should consider when selecting a cloud ERP:

Buy for the present. Prioritize the system capabilities required to exit the TSA and plan to add capabilities and functionality as needed.

Use a two-tier strategy. If a company does not plan to fully integrate a newly acquired subsidiary, running it on a cloud ERP system can be a viable option, providing the subsidiary with a level of autonomy while minimizing the impact on the current on-premises ERP solution.

Keep it simple. To maximize the true value of a cloud solution and minimize implementation timelines, consider adopting the standard process workflows (e.g., accounts receivable, accounts payable) inherent to the system and limit customization. The built-in functionality is typically based on best-in-class processes, so there may be no need to change them.

Understand price drivers. Vendors use many drivers to price a cloud ERP. Expect to evaluate: costs driven by users, typically priced in tiers; transaction volumes (data through the system) functionality (core vs. add-on); percent of revenue; and number of legal entities (a potential multiplier).

Don't forget third-party add-ons. Even the most comprehensive cloud ERP solution may not have every piece of functionality needed for the new business. In many cases, those needs can be addressed via add-on or bolt-on applications designed to work seamlessly with the cloud ERP solution. Typical bolt-on products include tax, transaction reconciliation, business intelligence, integration platform as a service, human resources, and payment services (e.g., electronic funds transfer, check-printing).

Decouple ERP from other infrastructure requirements. Pure cloud solutions require almost no infrastructure investment (capital expenditure) beyond an internet connection and a web browser. Moreover, cloud-based ERPs are hosted in advanced data centers, often with guaranteed high availability. Locally hosted ERPs typically cannot match that level of availability without significant additional engineering and major cost implications, and vendors can be penalized if the cloud ERP instance is unavailable.

Cloud ERP Isn't for everyone

While it may seem that a standard cloud-based ERP is a good fit for any M&A scenario, under some circumstances this option may not meet an organization's needs as well as an on-premises solution:

High transaction volumes exceed current cloud capabilities. While cloud ERP vendors continue to improve their ability to handle increasingly large annual transaction volumes, specific volume needs may dictate either an on-premises solution or a cloud solution with multiple instances of cloud software. When developing an ERP solution architecture, consider working with the vendor to understand what counts as a transaction, determine overall data and transaction volumes, identify the appropriate level of integrated financial reporting the organization requires, and decide if the organization needs a multiple-instance solution to accommodate future increases in transaction volume.

Subscriptions become too costly. Although a cloud subscription allows the business to ramp costs up or down based on evolving needs, that flexibility comes at a cost. At a certain business size, a cloud ERP may no longer be cost-effective. When developing a business case for cloud services, it is important to identify the inflection point at which an on-premises solution becomes a more practical option.

Storage requirements are too high. A cloud environment incurs storage costs, which can become expensive in conjunction with maintenance costs and storage device upgrades. Businesses that expect to consume large amounts of storage (10 terabytes or more) or are required to store historical data for a significant amount of time (7 years or more) should develop an archiving strategy or be prepared to pay the ERP provider for high-availability storage.

Cloud-based ERPs have advanced in the past 15 years to where they regularly compete head-on with traditional on-premises solutions. By selecting a cloud ERP solution, the buyer gains state-of-the-art technology and a subscription service with unmatched flexibility to grow with the business, often with zero to minimal infrastructure cost.

Cloud ERP may truly be a cheaper, faster, and better solution for some post-M&A implementations.

Targeting tech talent

- Digitally mature enterprises lure top talent
- 4 ways to empower millennial workers
- 6 characteristics of inclusive leaders

Digitally mature enterprises lure top talent

Digitally mature organizations have a better chance of attracting and retaining talented employees, who are seeking workplaces dedicated to using technology to transform the business.

September 9, 2015

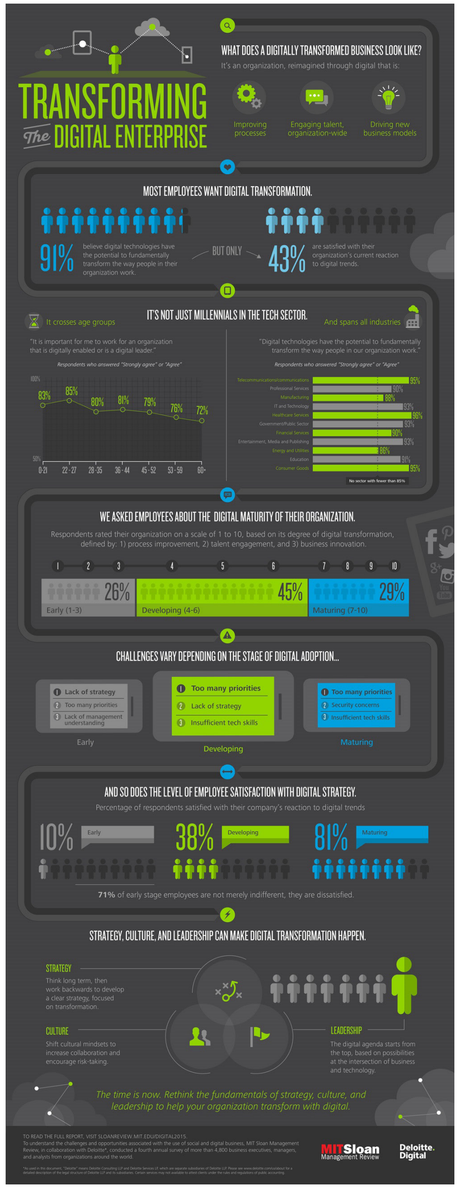
Employees across all age groups and industries want to work for businesses that are deeply committed to digital progress, according to the latest global research and analysis by *MIT Sloan Management Review* and Deloitte Digital.[1] The finding may have significant ramifications for organizations aiming to hire and keep the best talent.

Digital strategies in the most mature organizations are developed with an emphasis on transforming the business through targeted improvements in innovation, decision-making, and talent engagement. "Digital transforms not just how you work, but how you create whole new lines of business," says Anh Nguyen Phillips, a senior manager with Deloitte Services LP who co-authored this year's digital business study. By comparison, in less mature organizations, digital initiatives tend to focus more narrowly on the use of discrete technology tools to improve operations.

Digital maturity "could become a talent acquisition and retention issue," said Gerald C. Kane, *MIT Sloan Management Review* guest editor for the study, during a July Deloitte webcast unveiling the results. "Your most forward-thinking employees will actively seek opportunities to move to more mature digital organizations, so you might lose your best talent."

This isn't just a millennial issue: On average, nearly 80 percent of respondents across age groups say they want to work for a digitally-enabled company or digital leader, and are on the lookout for the best digital companies and opportunities. It is also not solely a tech sector issue: Employees in health care (96 percent), telecommunications/communications (95 percent), and consumer goods (95 percent) believe that digital has the power to fundamentally change how people work.

But whereas the vast majority of employees believe digital technologies can transform the way they work, fewer than half are satisfied with their current organization's reaction to digital trends. Among respondents from companies at early stages of digital maturity, 63 percent agree or strongly agree they know what their companies are doing in the digital domain. In maturing organizations, 90 percent do. "Leaders should ask themselves if they are doing enough to communicate the organization's digital strategy and vision to employees," says Doug Palmer, a co-author of the study and a principal in the Digital Business and Strategy practice at Deloitte Consulting LLP.



This infographic reveals what employees seek in a digital enterprise, and the challenges organizations face in achieving digital maturity.

Click here to enlarge the infographic.

1. *MIT Sloan Management Review*, in collaboration with Deloitte Consulting LLP and Deloitte Services LP, which are separate subsidiaries of Deloitte LLP, conducted its fourth annual survey of more than 4,800 business executives, managers, and analysts from organizations around the world in the fall of 2014. The survey polled individuals in 129 countries and 27 industries and involved organizations of various sizes. The sample was drawn from a number of sources, including MIT alumni, *MIT Sloan Management Review* subscribers, Deloitte Dbriefs webcast subscribers and other interested parties. In addition to the survey results, the report authors interviewed business executives from a number of industries, as well as technology vendors, to understand the practical issues facing organizations today.

4 ways to empower millennial workers

Millennials seek purpose, flexibility, collaboration, and innovation at work. To help build and nurture their organizations' young talent—while fostering an environment that can benefit employees of all ages—CIOs and their C-suite counterparts can focus on improving four areas.

—by Christie Smith, managing principal, Deloitte University Leadership Center for Inclusion & Community Impact, Deloitte LLP; and Stephanie Turner, manager, Deloitte Survey Research & Analytics Center, Inclusion Center of Excellence, Deloitte Consulting LLP

January 10, 2017

Today's companies include a growing number of millennials, and their organizational influence continues to grow. The oldest members of this generation, now in their mid-30s, are moving into positions of authority. The youngest are—or soon will be—entering the workforce. Yet despite the increasing presence of these employees, most corporate cultures have not yet shifted to represent millennial values.

For example, according to Deloitte LLP research, two out of three millennials say their organization's purpose is a reason they choose to work there; in organizational cultures without perceived purpose, only one out of five is satisfied at work. While they believe the pursuit of profit is important, less than half think it should be the most important achievement of a business. Combine those opinions with the fact that most millennials believe current leadership and organizational cultures are too traditional and inward-looking, and we begin to see a desire to revolutionize our organizations' cultures.

Beyond pursuing purpose, millennials seek to invent new ways of doing business and solving problems; create flexible careers and avoid being limited to one aspect of a business; collaborate openly, using tools to innovate; and leave behind the "this is the way we've always done it" mentality. Many are hungry for a culture of work that allows them to expand their thinking in the service of better projects, brands, science, and technology. They show interest in rotational programs that expose them to different areas of a company, and in global assignments that give them access to new experiences and ways of living. Even relatively small initiatives—such as placing a millennial leader in a foreign office for a month-long project—can have a significant impact.

CIOs can help their organizations bring these values to life by improving the following four areas to facilitate millennial-friendly work cultures and, by extension, bolster business performance:

Technology. Millennials are comfortable with technology and quick to adopt the latest tools. In the 2015 Deloitte Millennial Survey, more than a third of respondents indicate they develop mobile apps outside of work, nearly two-thirds report they use their businesses' social tools or networking applications for instantaneous collaboration, and nearly 80 percent agree that as technology develops further, their work lives will become more fulfilling.

Yet in business cultures where responsibility for technology falls squarely on the shoulders of the CIO and the

IT department, employees lack technology flexibility. They are unable to develop—and in some cases, even select—their own applications or integrate new software with the organization's infrastructure. Instead of segmenting technology into the IT organization, CIOs can develop frameworks that allow technology to be deployed freely throughout the business, while continuing to safeguard and monitor key information and assets. This brings flexibility to work product creation and enhances work connectivity.

Skill alignment. Our research finds that only 28 percent of millennials believe their organizations are making full use of their skills. Furthermore, 42 percent of respondents say they will not be able to learn the skills and gain the experience they need to achieve their career ambitions in their current organizations.

Rather than accepting turnover as inevitable, organizations can attempt to shift their cultures to better develop young talent. To close the gap, companies can evolve roles and responsibilities to enable millennials to use their skills, foster mentorship opportunities with older colleagues, encourage cross-functional collaboration, and establish immersive development opportunities.

Innovation. In both the 2014 and 2015 Deloitte millennial studies, millennials indicate they value learning innovative strategies and incorporating them into their work. However, only half say current business cultures encourage employees to come up with better ways of working, and only 23 percent think their senior leadership prioritizes developing new and innovative products and services. More than a quarter of 2015 respondents say the main barrier to innovation is the attitude of senior management, and more than a third cite financial barriers, including a lack of investment in R&D.

To drive innovation, CIOs can work with other senior leaders to permit flexibility in developing new processes and approaches to solving problems. Even if their companies cannot invest large sums of cash into R&D, CIOs can lead this effort by focusing on enabling innovation through collaborative strategies, tools, and technologies aligned with strategic business outcomes. Millennials will likely seek to innovate through purpose-driven opportunities, and these do not necessarily require a significant corporate investment.

Empowered well-being and work-life fit. In Deloitte's 2014 millennial study, respondents in Brazil, Canada, China, Germany, India, Mexico, the U.K, and the U.S. list "flexible working conditions and work-life integration" as the No. 1 way organizations will have to change if they wish to improve retention.

For many millennials, concern about work-life balance has increased as they have become parents. Most companies, especially in the U.S., are culturally unequipped to provide support, and productivity is negatively affected. The sooner organizations become comfortable offering flexible work arrangements—without sacrificing the achievement of business goals—the faster they will likely see returns on their investment in talent.

As the number of millennials in the workplace continues to climb, the division in cultural preferences between older and younger generations is getting wider. To effectively motivate the best talent, organizations can focus on narrowing the gaps between senior mandates and junior points of view, profit and purpose, and established processes and new innovations. They will likely find these efforts benefit not just their millennial employees, but all employees.

6 characteristics of inclusive leaders

Inclusive leaders tend to share six signature traits that not only promote diversity on their teams, but also improve their capacity to innovate and deal with uncertainty, according to a study of inclusive leaders from six locations worldwide, conducted by Deloitte Australia. How many of these traits do you possess?

—by Bernadette Dillon, director, and Juliet Bourke, partner, Human Capital Consulting, Deloitte Australia

May 4, 2016

The IT profession in the U.S. doesn't have a great reputation for diversity and inclusion. While Asian Indians are well represented—making up 22 percent of the workforce in computer and mathematical occupations, according to the Bureau of Labor Statistics—the underrepresentation of women, African Americans, and Latinos in IT and other STEM fields has become a concern.

It's time for CIOs to make diversity and inclusion a priority, and there may be no better place to start than with their own leadership styles.

A study of inclusive leaders from Australia, New Zealand, Singapore, Hong Kong, Canada, and the U.S., conducted by Deloitte Australia[1], shows that such leaders possess six fundamental traits that foster diversity on their teams. These traits allow executives and managers to engage much more effectively with a wide range of culturally, demographically, and attitudinally diverse stakeholders. They also help leaders access a broader spectrum of ideas and perspectives, which can improve their decision-making and their ability to innovate, handle uncertainty, and anticipate the future. What CIO doesn't want to develop in those areas?

Even if current IT teams aren't particularly diverse from a gender, cultural, or thought perspective, CIOs are otherwise surrounded by diversity. Consider the global nature of IT. Many CIOs today outsource technology services to Argentina, Brazil, Ireland, Poland, India, and Malaysia. Markets, customers, ideas, and talent are growing more diverse as businesses expand globally. And in many cases, CIOs and their IT organizations are developing technologies for employees and customers around the world.

Definitions of and approaches to inclusive leadership tend to vary worldwide, and the six characteristics listed below represent just one conceptual framework for developing inclusive behaviors and encouraging diversity.

Commitment. Cultivating a diverse, inclusive workforce takes time and energy, two of a leader's most precious commodities. So what motivates some executives to champion this issue? In addition to a belief in the business case, inclusive leaders are driven by their values, including a deep-seated sense of fairness that, for some, is rooted in personal experience. Inclusive leaders believe creating a welcoming culture begins with them, and they possess a

strong sense of personal responsibility for change. When executives devote time, energy, and resources to nurturing inclusive workforces—by investing in people and inspiring others to share their passion and goals—their actions signal a true commitment.

Courage. Inclusive leaders demonstrate courage in two ways. First, they aren't afraid to challenge entrenched organizational attitudes and practices that yield homogeneity, even if their recommendations are politically or culturally unpopular. Nor are they afraid to display humility by acknowledging their personal limitations and seeking contributions from others to overcome them. Some leaders find it difficult to admit they don't have all the answers; in that respect, courage and humility go hand in hand.

Cognizance of bias. Inclusive leaders understand that personal and organizational biases narrow their field of vision and preclude them from making objective decisions. They exert considerable effort to identify their own biases and learn ways to prevent them from influencing talent decisions. They also seek to implement policies, processes, and structures to prevent organizational biases from stifling diversity and inclusion. Without such measures, inclusive leaders understand that their natural inclination could lead them toward self-cloning, and that operating in today's business environment requires a different approach.

Curiosity. Open-mindedness, a passion for learning, and a desire for exposure to different ideas have fast become leadership traits crucial to success, especially in challenging times.[2] Curiosity and openness are hallmarks of inclusive leaders, who hunger for other perspectives to minimize their blind spots and improve their decision-making. In addition to accessing a more diverse array of viewpoints, inclusive leaders' ability to engage in respectful questioning, actively listen to others, and synthesize a range of ideas makes the people around them feel valued, respected, and represented. Inclusive leaders also refrain from making fast judgments, knowing snap decisions can stifle the flow of ideas on their teams and are frequently tinged with bias.

Cultural intelligence. Knowledge of other cultures is essential for CIOs whose work takes them, for example, to offshore development and operations centers. Beyond "book" knowledge, cultural intelligence connotes leaders' ability to change their styles in response to different cultural norms. For example, culturally intelligent leaders who are typically extroverted and demonstrative will make an effort to show restraint when doing business with individuals whose cultures value modesty or humility. They regulate the speed and tone of their speech and modify their nonverbal behaviors—gestures, facial expressions, body language, and physical interactions—as situations dictate. In addition to understanding other cultures, these leaders also demonstrate self-awareness of their

own culture, recognizing how it shapes their worldview and how cultural stereotypes can influence their expectations of others.

Collaborative. Inclusive leaders understand that, for collaboration to be successful, team members must first be willing to share their perspectives. To that end, they create an environment in which all individuals feel empowered to express their opinions freely with the group. They also realize that diversity of thinking is critical to effective collaboration; thus, they pay close attention to team composition and team processes. For example, they prevent teams from breaking into subgroups, which can weaken relationships and create conflict. They also engender a sense of "one team" by creating a group identity and shared goals, and by working to ensure team members understand and value each other's knowledge and capabilities.

1. Deloitte's research is based on experiences with more than 1,000 global leaders, including one-on-one interviews with 17 top executives and subject matter experts and a survey of more than 1,500 employees for their perceptions of inclusion. Deloitte's research also builds on existing thought leadership and applied research, as well as results from a proprietary leadership assessment tool. For more detail on the full research methodology, see "Six signature traits of inclusive leadership."
2. Berger, Warren, "Why Curious People Are Destined for the C-Suite," Harvard Business Review, September 11, 2015.

Shoring up cyber defenses

- Detecting the cyberthreats that matter
- Protecting critical assets from cybertheft
- Measuring the true impact of a cyberattack

Detecting the cyberthreats that matter

Smarter cybersecurity requires insights from across the company.

—By Adnan Amjad, partner; Mark Nicholson, principal; and Christopher Stevenson, managing director, Deloitte & Touche LLP

October 3, 2016

After morning coffee at his desk, a car rental company employee clicks on an email from an internal corporate address and unsuspectingly transfers malware onto the company's global network. Weeks later, a junior cybersecurity analyst in the company discovers the malware and classifies it as a low-level danger, given the latest known threats provided by the company's intrusion detection system.

More time passes before the company's customer loyalty rewards program team starts receiving an unprecedented flood of customer complaints about inaccuracies in their reward point balances. Separately, the fraud detection department is seeing an unusually high number of reward redemptions. After a month-long investigation, the company finally connects the dots: A criminal network has hijacked the loyalty rewards program and cashed out hundreds of thousands of dollars of gift cards.

Cybersecurity failures like these are all too common today. As use of data explodes, cybersecurity monitoring teams struggle to keep pace with proliferating opportunities for cyberattackers. One of the biggest hurdles: How to identify the most potentially harmful breaches from the stream of alerts generated by security monitoring systems. The most effective way to stay one step ahead is to get smarter by infusing greater business awareness into cybersecurity monitoring programs. Only then can companies quickly identify, understand, and respond to cyber incidents that pose the biggest business risks. Every company needs a tailored view.

Separating the signal from the noise

Collaboration between the cybersecurity program and business leadership is essential. Without the context of business criticality, differentiating between a benign cybersecurity event and a costly breach can be nearly impossible. Security protocols and practices must align with established and evolving business process management. Up-to-date classification of data and business operations sensitivity—for example, personnel with legitimate access rights, and baseline behavioral patterns—provide some context by which cyberanalysts can begin to separate the signal from the noise.

To start, business units and cybersecurity teams can discuss both today's business priorities and upcoming strategies to enable a more informed cyber monitoring plan. For example, if a digital marketing campaign is in the works, including mobile apps and other new potentially vulnerable channels, the security team should know. Then, by understanding how the application should be used, and how

transactions should occur, cyberspecialists can design ways of detecting things that look suspicious. Focusing on activity that doesn't fit expected business patterns is essential because malware detection tools alone can't keep up with the pace of change.

Lessons from common pitfalls

The following scenarios explore how improving information-sharing between cybersecurity and business teams could help prevent or blunt the impact of potentially damaging breaches:

Shape monitoring around clear business priorities. In the example above of the car rental company, the failure to evaluate cyber risks in the context of business priorities enabled malware to slip in without much notice. If instead, the cybersecurity and business units had collaborated to incorporate these priorities into cybermonitoring, any security alert related to the company's key central payment system would automatically escalate to a senior-level cybersecurity analyst for follow-up investigation. The high-priority alert would also trigger behavioral analysis of data from a range of business units, including the loyalty program and fraud departments, where anomalous spikes in customer complaints and reward redemptions could help the company stop attacks in process and contain the damage.

Know where the sensitive data is stored and how it is used. In an all-too-common scenario, a business unit might inadvertently keep sensitive information, such as employee social security numbers, in a shared file accessible to everyone in the company. In case of a breach, the business unit might blame the cybersecurity team for failing to protect them. However, the security team can't protect the right data or know it's been compromised without guidance on what data is sensitive, who should be given access, and how data is handled during normal operations. Leading practices are a process by which business users receive training needed to classify the data and lock down access according to their needs. This basic security hygiene also includes timely purges of inactive email accounts and access privileges of former employees, contractors, and business partners—a step that would have created more hurdles for the adversary in the rental car company example.

Know your behavioral patterns. Establishing a baseline of normal business patterns within key corporate functions also helps security analysts detect suspicious behavior. Say a securities broker-dealer knows that a particular client living in Kansas never logs into her online account. One day, she logs on from Korea and orders the company to sell her blue chip holdings and use the proceeds to purchase low-volume penny stocks. The order triggers a high alert, and the broker-dealer is confident enough that this is an example

of a “pump and dump” fraud to suspend the transfer. In the case of the car rental company, knowledge of usual loyalty rewards redemption patterns helped alert the fraud department to possible foul play. However, it took many precious weeks to tie the redemptions to the malware breach due to lack of coordination between the security and fraud units.

Coordination between cybersecurity and business units may not prevent breaches, but it raises the chances of detecting and blunting some of the most damaging ones. Collaborative habits also go a long way toward effective crisis response should a breach lead to business disruption.

Protecting critical assets from cybertheft

When intellectual property is at the core of a company's value, protecting it from cybertheft is a top strategic priority.

—by John Gelinne, managing director, and Emily Mossburg, principal, advisory cyber risk services, Deloitte & Touche LLP; J. Donald Fancher, principal, advisory forensic & investigation services, Deloitte Financial Advisory Services LLP

October 17, 2016

The headline-grabbing thefts of consumer credit card data, social security numbers, and health profiles in the last few years have put the spotlight on threats to consumers' personal information. Leading retail chains, banks, and health care companies have all been victims of such cyberbreaches. Now, companies are more alert to the dangers, as are government regulators.

In the rush to address the issue of consumer data theft, however, corporations risk giving short shrift to another hot target for cybercriminals—one that could be more damaging to a company's core business value and future viability. Intellectual property (IP) is a tempting quarry for cybertheft. IP assets such as trade secrets, proprietary know-how, research data, and product designs can constitute more than 80 percent of a company's value. With so much at stake, protection of IP should be a top priority. Yet many organizations don't fully account for IP in designing their cyberprograms, leaving themselves exposed to a cascade of risks.

Recognizing the value of IP to the company is an essential first step in designing tighter cyberprotections for these assets. An effective way to grasp that value is to look at the potential cost of losing it. The total costs of IP cybertheft extend beyond the loss of the value of the IP itself, which may be measured in lost future revenues and market share, foregone royalties, or other metrics. Many of the costs are not immediately obvious and can unfold for years beyond the initial incident itself.

More than meets the eye

The costs of IP cybertheft include expenses that may be expected to follow a cyberincident, including those for legal counsel, public relations, cybersecurity upgrades, and regulatory compliance. Not as obvious are less tangible impacts that can occur over time, eventually even crippling a company that is highly dependent on IP for its competitive edge.

Consider the case of a tech manufacturer that was preparing to launch a suite of networking devices supporting the internet of things when cyberthieves from a foreign nation-state stole IP important to the product line. The IP had been expected to contribute 25 percent of the company's total revenue over the next five years. The company suspended planned sales and shipments to upgrade cyberprotections on affected devices. Meanwhile, given doubts about the company's security capabilities, the federal government and other major

customers cancelled their contracts. In a few months, copycat products hit the market. The company's credit ratings eroded. The value of its trade name plummeted, as did the backing of investors.[1]

Collaborating for a better defense

To stave off such possibilities, elevating IP cyber risk within the corporation's overall enterprise risk management program is paramount. Indeed, integrating the entire cyber risk program, including the IP component, under the organization's enterprise risk framework provides leadership the ability to evaluate IP cyber risks in the context of overall corporate strategic goals.

Prioritization of cyber risk protections within a company's broader IP management strategy is also vital. Hand in hand with corporate cyber risk leaders, top IP managers can identify the company's most strategic IP, understand better where and how the company's various IP assets are safeguarded, and design IP cyberprotection as part of the overall IP management program. As a baseline, educating researchers and developers about the company's storage, data management, and retention policies can help prevent careless exposure of important information to outsiders, including cybercriminals. In addition, reducing the number of people with access to IP and identifying the most vulnerable links in the process of handling and protecting IP can help batten down the hatches.

Working together, IP and cyber risk managers can further fortify defenses by integrating cybersecurity into each stage of the IP life cycle. IP needs to be protected at every stage. Even before the decision to file for a patent, IP can be very valuable to competitors and adversaries. In deciding to file for patents and trademarks, leaders can consider the balance between the legal protection offered by these designations and the possibility that such public filings will attract greater attention from attackers. In addition, as collaborative research, development, and monetization of IP become the norm, ensuring cooperation from partners and suppliers in protecting against cyber risks helps close other potential areas of vulnerability.

When IP is a key driver of business value, prioritizing IP cyberprotections helps ensure companies' competitiveness, growth, and even future viability. IP cyber risk strategy gains greater strength when integrated into overall enterprise risk management and IP management itself through coordination among top executives across the company.

1. For a more detailed example of how direct and intangible impacts can be incurred in cases of IP cybertheft, see Deloitte Services LP, *Beneath the Surface of a Cyberattack: A Deeper Look at Business Impacts,* 2016.

Measuring the true impact of a cyberattack

Finally, some realistic numbers help to quantify the effects of a large-scale cyberattack and give business leaders an irrefutable sense of what's at stake.

June 20, 2016

High-profile cyberattacks have garnered much public and regulatory scrutiny in recent years, but the resulting attention has tended to distort many business leaders' views of the true costs associated with these crises. While credible studies have calculated the per-record cost of a data breach, the larger business impacts—not just of breaches, but of other attacks with different aims—can reverberate far longer, and in more ways, than many leaders expect. Indeed, the full range of repercussions, which includes intangible effects such as brand damage or loss of intellectual property (IP), has been much harder to tally. Until now.

New research conducted jointly by Deloitte Advisory's Cyber Risk Services, Forensics & Investigations, and Valuation teams provides a model for quantifying the myriad costs an organization typically incurs following a cyberattack. "Beneath the surface of a cyberattack: A deeper look at business impacts" describes 14 effects of a cyberincident, including direct costs like regulatory fines and public relations fees and intangible costs associated with lost customer relationships, reputation damage, and business disruption. Deloitte Advisory researchers used a variety of financial modeling, damages quantification, and business and asset valuation techniques to arrive at their estimates. A broad look at the short- and long-term effects of a cyberattack, the report is designed to help business leaders more effectively gauge cyber risks and prepare strategies for addressing them.

"Many business leaders tend to think of the costs of a cyberattack in terms of those commonly associated with data breaches, such as the costs of notifying customers, providing credit monitoring services, or paying regulatory fines and legal fees," says Emily Mossburg, a principal with Deloitte & Touche LLP and leader of the resilient practice for Deloitte Advisory Cyber Risk Services. "But in many instances, those damages are just the tip of the iceberg and, in some cases, they may not apply at all. Rarely brought into full view are the costs and consequences of other, increasingly common attacks such as IP theft, cyberespionage, data destruction, or business disruption, which are much harder to quantify and can have a more significant impact."

To illustrate hidden outcomes, the research presents two mock cyberattack scenarios. Each scenario describes a fictitious business, the cyberincident experienced, and the ripple effects from the attack in the subsequent days, months, and years.

In one scenario, a foreign nation-state steals a significant portion of a tech company's IP. The repercussions include a four-month suspension of sales while the company addresses security vulnerabilities in affected products; loss of a major customer contract, which leads to a 5 percent drop in revenue; operational disruption valued at $1.2 billion; and a devaluation of the company's trade name by over $500 million. Expressed in dollars, the overall impact to the business is more than $3.6 billion.

In the other scenario, cybercriminals steal a laptop from a health insurance provider's third-party vendor. The theft gives the cybercriminals access to millions of subscribers' personal records and provides a means to manipulate a patient care application that delivers medical alerts to practitioners. In addition to the short-term disruption to operations and HIPAA fines, the incident results in protracted revenue losses, rounds of litigation, and higher borrowing costs that lead the company to delay a strategic acquisition.

"The scenarios show that cyberattacks can have unexpected consequences, and that the process of recovering from one may play out quite differently from what we see publicly in instances of large-scale consumer data breaches," says Don Fancher, a principal with Deloitte Advisory and leader of Deloitte Forensics & Investigations. "Recovery can be far more complex, costly, and protracted than many business leaders realize."

Preparing for the inevitable

The findings in this report underscore the importance of resilience—an organization's ability to lessen the impact of a cyberattack by responding rapidly and effectively. The following measures may help improve enterprise resilience:

Convene the right team. Companies can get a firm handle on the cyberthreats to which they are most vulnerable and the specific business risks they pose by bringing together executives from business and technical domains. These teams will likely include leaders who possess deep understanding of business operations, revenue streams, the technology environment, and the organizations' broader risk profiles.

Identify top risks and assets. Consider this a three-step exercise: Prioritize the core business processes that, if impaired, would significantly disrupt operations. Inventory the technology assets supporting those processes and evaluate their level of vulnerability to attack. Finally, estimate the various costs of an attack on those assets or processes. During this evaluation of risks, don't focus narrowly on exposure of personally identifiable information; consider other possible attack objectives as well, such as IP theft, data destruction, or interruption of critical business processes.

Re-evaluate spending to decrease business impact. Because budgets will never be big enough to prevent the full range of possible incidents, adopt a risk-focused approach to allocating spending for a secure, vigilant, and resilient program. Use definitions of top risk areas and assets to model the impact of an attack more realistically and determine where and how much to budget. For some companies, this may require greater investment.

Redefine "readiness." Build incident response plans that facilitate faster and more effective recovery, and broaden these plans to account for a fuller range of possible attack scenarios. Plans built on narrow assumptions about the nature and target of attacks are likely to fall short during a crisis.

The modeling exercises detailed in "Beneath the surface..." show that a cyberattack's toll can extend for years and encompass a much broader set of repercussions than those commonly revealed in the public domain, according to Hector Calzada, a managing director in Deloitte Advisory's Business Valuation services. "Without a realistic discussion of business impact, some executives have a hard time discerning which of the many possible cybersecurity investments are most likely to improve their companies' risk posture," he says. "By understanding the true exposure a cyberattack may pose to their businesses, executives can begin to invest in a more focused manner."

Transforming to digital

- Keeping IT aligned with shifting business priorities
- How to thrive in the digital economy
- Corporate accelerators spur digital innovation
- APIs help drive digital transformation

Keeping IT aligned with shifting business priorities

CIOs are unable to build strategic IT organizations when IT capabilities, key business strategies, and leadership expectations of IT are mismatched. They can create value for their businesses by constantly evaluating and aligning the IT mandate with key business objectives and expectations.

—by Khalid Kark, research director, U.S. CIO Program, Deloitte LLP

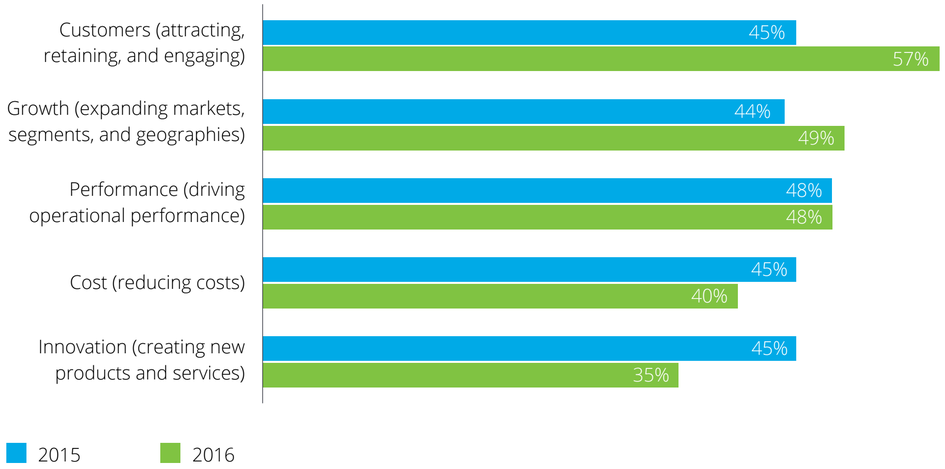
December 14, 2016

The 2016-2017 Global CIO Survey from Deloitte LLP finds that CIOs can drive business value by continually assessing and aligning IT capabilities—especially the ones that drive digital transformation and customercentric initiatives—with business priorities and expectations. While not every IT activity directly supports the business, the increasing importance of technology across the enterprise intensifies the pressure on CIOs to strategically align IT department mandates with overarching strategy. One goal of the survey was to identify gaps among key business objectives, leadership expectations of CIOs, and IT capabilities.

CIOs surveyed strongly agree on their businesses' top five priorities (Figure 1). Three of these—attracting and retaining customers; growing new markets, segments, and geographies; and creating innovative new products and services—are concerned with achieving top-line revenue growth. The remaining two, driving operational performance and reducing costs, contribute to realizing and maintaining bottom-line operational savings.

Figure 1. Shifting business priorities

What are your organization's top business priorities? (Please select up to three)



Source: Deloitte 2016-2017 CIO Survey

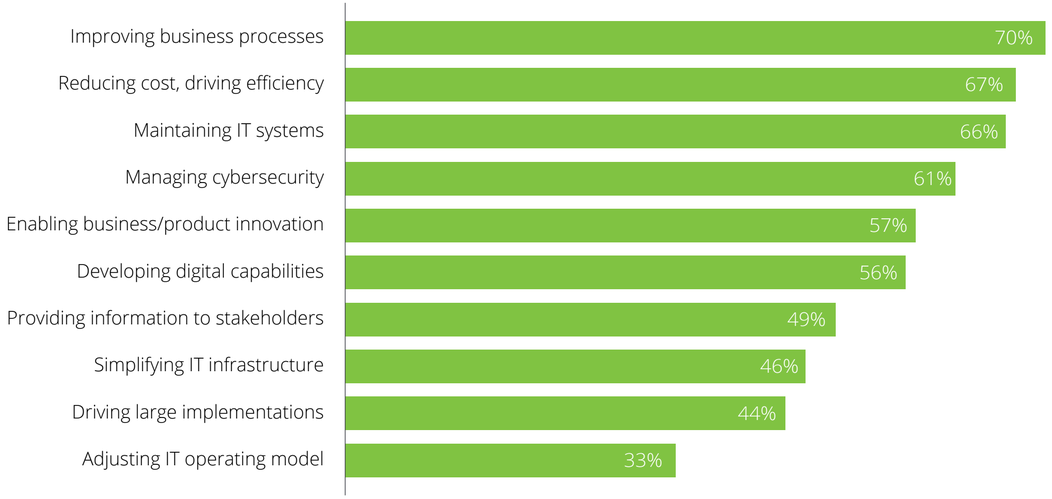
Although these top priorities are consistent with those reported in the 2015 survey, they have shifted distinctly. In 2015, respondents equally emphasized all five, but in the 2016-2017 survey, the percentage of respondents prioritizing customers jumped significantly. The importance of growth to CIOs also increased. Both priorities surpassed operational performance, the No.1 priority in 2015. Meanwhile, 2016-2017 survey respondents noticeably deprioritized cost reduction and innovation, while performance improvement remained flat.

The inevitability of digital transformation explains the emphasis on customers and growth, but how can it account for the de-emphasis on innovation, a chief driver of digital? The portion of overall IT budgets allocated to supporting business innovation has dropped 11 percent since 2015. One possible reason: Companies no longer view innovation solely as an IT line item, and instead are distributing funding for it across lines of business.

Meanwhile, despite a 12 percent increase in the importance of customer initiatives to CIOs, business leaders continue to expect them to focus predominantly on operational activities such as business process improvement, cost reduction, system maintenance, and cybersecurity (Figure 2).

Figure 2. Establishing priorities

What are the core expectations from the business of your IT organization/CIO?



Source: Deloitte 2016-2017 CIO Survey

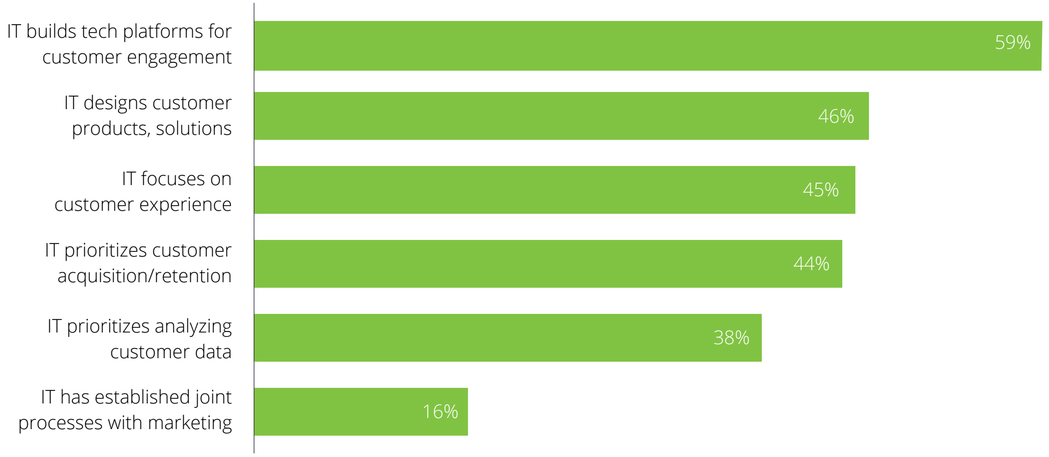
This mismatch between business priorities and expectations of IT may prevent CIOs from aligning IT activities with business strategy and performance goals—an IT capability CIOs overwhelmingly agree is critical. Although 78 percent of CIOs surveyed say strategic alignment is essential to their success, only 36 percent rank their IT organizations as "excellent" or "leading" in this capability.

CIOs likewise report they are unable to drive—or even support—innovation, disruption, and technology-enabled business growth, all of which are crucial to digital transformation and customercentric initiatives. Slightly more than half of those surveyed (52 percent) say their IT organizations lack or are still building innovation and disruption capabilities, and only 26 percent rate their IT organizations' skills in customer and digital experiences as "above average" or "leading class."

Although 59 percent of CIOs surveyed are involved in building technology platforms for their company's customers, fewer than half are involved in designing and delivering customer-facing products and services (46 percent) or experiences (45 percent). Just 16 percent report having established cross-functional teams and governance with marketing organizations (Figure 3). Understanding these gaps allows them to be bridged—and provides CIOs with a tremendous opportunity to lead technology-enabled business growth.

Figure 3. Customer-focused IT initiatives

Which of the following statements is true about your IT organization's view on the end customer?



Source: Deloitte 2016-2017 CIO Survey

In the context of top business goals, CIOs should build the appropriate IT capabilities, enhance their own personal competencies, invest in required talent and skills, and build credibility by developing relationships with C-suite leaders and other key stakeholders. By creating IT organizations that are core to developing—not just executing—strategic business decisions and priorities, CIOs can drive business value and shore up their own legacies.

How to thrive in the digital economy

Is your organization positioned to capture the benefits of today's digital economy? At the MIT Sloan CIO Symposium, CIOs and business experts shared their advice for succeeding in the age of ecosystems.

June 21, 2016

CIOs striving to help their companies compete in today's digital economy can plug into far-ranging business ecosystems, engage with customers in new and dynamic ways, and experiment with emerging technologies and operating models, according to panelists at the 13th annual MIT Sloan CIO Symposium.

"Thriving in the Digital Economy" was the theme of this year's Symposium; it dominated the discussion at the May gathering, held in Kresge Auditorium on MIT's Cambridge, Mass., campus. Panel talks throughout the day focused on managing a digital innovation portfolio, becoming the "perfect CIO," mastering a platform strategy, and other topics, and helped crystallize how organizations can operate in digitally enabled environments to achieve business goals.

The Ecosystem Advantage

The first session of the day tackled the theme head-on, with panel participants highlighting the importance of actively participating in ecosystems, communities of diverse players who create new value through increasingly productive models of collaboration and competition, like partnering with providers of complementary or competing products and services to create a better customer experience. According to moderator Peter Weill, chairman of the MIT Sloan Center for Information Systems, MIT researchers have found companies that derive at least 50 percent of their revenues from digital ecosystems, and that understand their end customers better than their average competitor, have 32 percent higher revenue growth and 27 percent higher profit margins than the industry average.[1]

Companies across industries can take advantage of these powerful enablers. Gary Scholten, executive vice president and CIO at Principal Financial Group, a global financial investment management firm, said his organization is tapping into "a really rich ecosystem," as well as partnering with large banks that have extensive ecosystems of their own. Scholten says the company is aiming to collect and provide data to others in its ecosystem but, to do so, it must create a value proposition for customers so they willingly provide their data. Accordingly, many of the company's own innovation efforts target customer engagement. For example, in its retirement business, the firm is creating an online "digital coach" to help guide individuals as they sign up for and select investments for their 401(k) portfolios—even hiring comedians to help write scripts to make the experience more

inviting. "The feedback has been wonderful. People are using their benefits more and saving more for retirement," he said.

At the same time, Principal Financial Group is looking to advance its own digital competencies. By following Agile principles, IT can rapidly experiment, adapt, and scale its findings, Scholten said. The firm is targeting IT professionals experienced in engaging customers through such methods as A/B testing, and individuals grounded in data analytics.

Data is now firmly embedded in the financial landscape, and digital innovation and customer engagement will play a large role in the industry's future, said Rob Frohwein, CEO and co-founder at Kabbage, an online platform that lends money to small businesses and consumers. Kabbage, he said, is essentially a data company that focuses on lending. "Understanding what a customer is doing at any time can guide product design and utility," he says.

And while change can be intimidating, especially for old-guard firms, established companies have certain advantages in pursuing digital solutions, said Suresh Kumar, senior executive vice president and CIO of client technology solutions at BNY Mellon. Larger firms often have money available to fund creative digital efforts and the ability to quickly scale their results. BNY Mellon is also plugging into an ecosystem to make use of blockchain technology, "an innovation that happened outside of our institution, but which we adopted and scaled," he said. Yet, Kumar acknowledged, standard-bearer companies can face obstacles as well. "We don't necessarily have in place design thinking and lean startup processes, so we are investing in adapting and adopting those processes," he said.

The bottom line, said Weill, is that organizations dedicated to being destinations in an ecosystem must be more attractive to customers than their competition, which can take many forms. Scholten agrees. "We can't compare ourselves only to our financial services competitors," he said, "not when our customers are comparing their interactions with us to those they have with the likes of Google and Amazon."

Digital dominates the day

The theme of navigating the digital economy reverberated throughout the day at MIT. In a session on best practices for managing innovation portfolios, Sean Belka, senior vice president and director of Fidelity Center of Applied Technology at Fidelity Investments, noted that "most of the innovation action happens in our business units," and that one of his organization's best practices for cementing its spot in the innovation ecosystem is participating in startup-friendly accelerators and competitions.

Later in the day, during a panel on platform strategy, George Collins, chief technology officer at Deloitte Digital, said that companies are using platforms to engage with customers in new, dynamic ways. "We are now in a service-based economy," he said. "Everything that can be offered as a service is being offered as a service, and is being monetized."

As enterprises endeavor to understand, adapt to, and thrive in today's digital economy, CIOs and their technology teams play a critical role in exploring and embracing business ecosystems, and experimenting with new tools, data capabilities, and modes of customer engagement.

1. Peter Weill and Stephanie L. Woerner, "Thriving in an Increasingly Digital Ecosystem," *MIT Sloan Management Review*, June 16, 2015.

Corporate accelerators spur digital innovation

Hungry for groundbreaking ideas? Envious of those who readily adopt the latest technologies? An emerging innovation tactic is gaining momentum.

—by John Ream, manager, Deloitte LLP; David Schatsky, managing director, Deloitte LLP

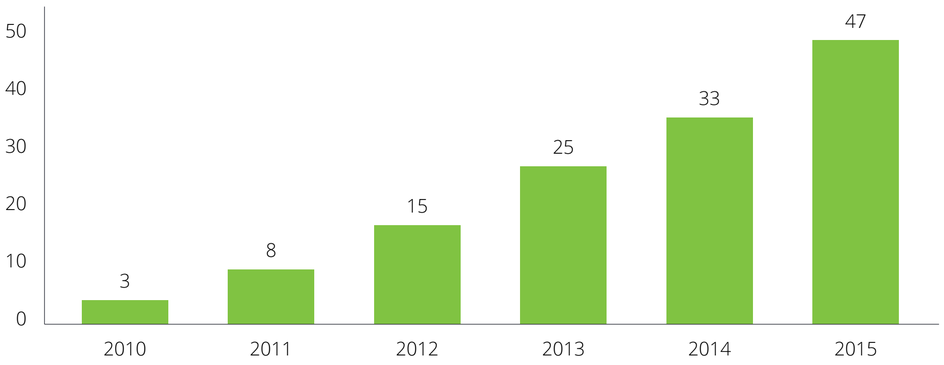
August 25, 2016

As companies increasingly focus on innovation to set themselves apart from the competition, a growing number are taking a page from the Silicon Valley playbook and setting up corporate accelerators to nurture start-ups. It's a trend that CIOs —who increasingly are expected to be innovation catalysts—may want to borrow.

How much traction is the trend gaining? In the past three years, corporations have launched more than 105 accelerators globally, with 47 of those in 2015 (Figure 1).[1] These corporate accelerators are similar to traditional accelerators in that they typically make small equity investments, up to $50,000 in a cohort of early-stage companies, in exchange for a 4 to 6 percent stake in each, and then actively support them to help them grow. Yet while traditional accelerators generally have the goal of seeing a return on their equity investments, corporate accelerators tend to be focused on gaining access to new concepts and technologies for competitive advantage.

Figure 1. Corporatte accelerator adoption, 2010-15

What are your organization's top business priorities? (Please select up to three)



Source: Corporate-accelerators.net augmented with additional research and analysis by Deloitte LLP.

As for adoption models, corporations launching accelerator programs can either run the program in-house or outsource administration to a partner such as Techstars, LMarks, or Nest. In the partnership model, the partner markets the program, reviews and selects startups for each cohort, provides mentors, and manages the program. Of corporate accelerators launched over the past three years, half used an accelerator partner, Deloitte analysis found.[2]

With investment and management considerations—and no guarantees of successful outcomes—why are corporations taking the leap? For those sponsoring an accelerator, the potential benefits include insight into emerging technologies and trends; rapid, cost-efficient research and development; economic returns (if a startup is acquired or goes public); and access to high-caliber talent. For startups, a corporate accelerator can offer some benefits that traditional accelerators typically do not, such as access to equity-free funding (in some cases), industry-focused mentors, corporate resources, and future customers.

As of now, the corporate accelerators that have launched are concentrated in two industries that are being transformed by digital technologies. Fifty percent of corporations that have launched accelerators are in the technology, media, and telecom industry, while 23 percent are in financial services.[3] Companies in those industries should pay particular attention to the trend, but corporations in other industries may want to explore the tactic as well. Though accelerators are just one way to boost innovation and the model likely will evolve, they could lead CIOs and their C-suite counterparts to their next game-changing new idea or technology.

1. Corporate-accelerators.net, augmented with additional research and analysis by Deloitte LLP.
2. ibid.
3. ibid.

APIs help drive digital transformation

CIOs can champion an API strategy that promotes business transformation by enabling self-service IT and the reuse and monetization of existing APIs.

June 27, 2016

APIs are igniting a cultural shift within many organizations, helping CIOs to drive digital transformation initiatives, build more collaborative and self-service IT environments, and derive revenues from existing IT assets, according to IT decision-makers polled in a recent survey conducted by software company MuleSoft Inc.

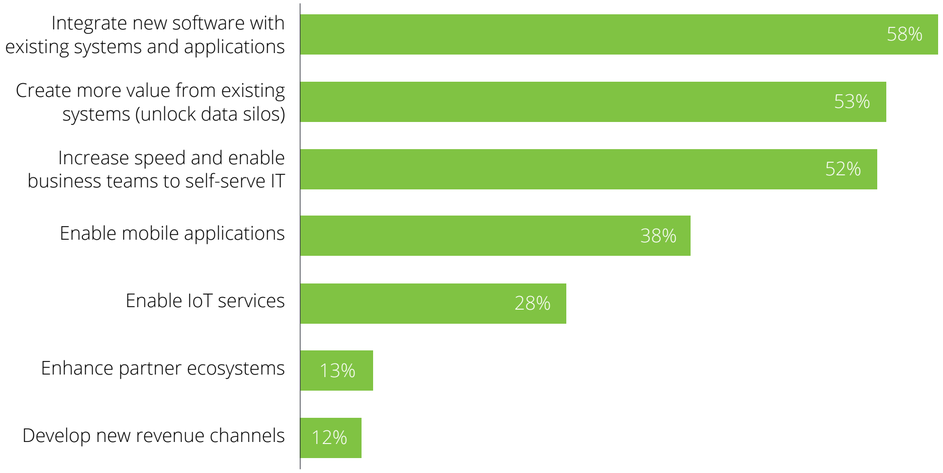
APIs, which are sets of routines, tools, and protocols for building software applications, have long been the sole territory of internal R&D and IT departments. However, APIs are increasingly moving from tactical development technique to business model driver, with companies frequently finding opportunities to reuse them, share them with players outside the organization, and monetize them.

The appeal of APIs is a prominent theme in MuleSoft's second annual Connectivity Benchmark Report,[1] which is based on the results of the company's survey. The results indicate 56 percent of IT decision-makers already have an API strategy in place, and another 35 percent plan to implement one by the end of 2016.

"IT success today is not simply about implementing technology—it's about determining how to scale technology across the entire organization to accelerate projects for lines of business," says MuleSoft founder Ross Mason. "With APIs, there is an opportunity for IT to shift its role from centralized support to business enabler responsible for supporting agility, innovation, and business outcomes."

Figure 1. The drive for APIs

If you have an API strategy in place or plan to, what business needs are driving it?



Source: MuleSoft's second annual Connectivity Benchmark Report, 2016

Survey respondents cite a range of motivations for setting an API strategy, chief among them integration of new software with existing systems and applications, and derivation of enhanced value from existing systems (Figure 1). Additionally, Mason says, CIOs can drive an API strategy focused on creating business apps that allow business units to self-serve IT. Following this approach, business teams can use APIs to create some of their own applications and processes, enabling them to meet business goals more quickly. "Your IT department can then avoid blocking business projects while still retaining governance over the data," he says.

Additionally, organizations today are increasingly reusing APIs to create new applications, data, and business processes to support their digital transformation efforts; many of these reused assets can be monetized and shared with other players within business ecosystems. "APIs offer a new way for businesses to connect existing assets with those of their customers, partners, and employees. This API strategy can enable much greater agility through accessibility and reuse," Mason says.

According to the survey findings, 44 percent of IT decision-makers believe building and managing APIs is fundamental to IT's ability to complete digital transformation projects more quickly (only "using cloud computing" and "modernizing legacy systems" ranked higher on the survey), and the same percentage said API reuse would significantly speed up digital transformation.

IT decision-makers at organizations with more than 100,000 employees saw even more value in API reuse, with 63 percent stating it would significantly affect the pace of digital transformation projects. And APIs are directly driving revenue: One-third of organizations with more than 100,000 employees expect to generate $10 million or more this year through APIs and activities directly related to API implementation, according to the survey results.

Indeed, the API economy provides IT leaders with new prospects for demonstrating their organization's value to the business, says Bill Briggs, CTO at Deloitte Consulting LLP. "CIOs and IT teams have the opportunity to leverage digital opportunities to ultimately affect business models and the bottom line," says Briggs, who has reviewed the results of MuleSoft's survey.

Confronting API challenges

APIs are all about exposing and exploiting underlying assets, says George Collins, CTO at Deloitte Digital. However, a shift to building and managing APIs as products and services for internal and external customers may present major organizational hurdles and compel the following considerations:

Cultural and institutional inertia can stymie the execution of an API strategy. Unless a company understands and clearly articulates the potential value of its APIs, some groups may be wary of sharing their assets and intellectual property or making the necessary investments to participate

with customers, partners, and members of broader ecosystems. In these cases, clearly explaining the overarching business case and setting priorities accordingly can guide the evolution of APIs, Collins says.

Developing a product/service mentality may require some companies to establish competencies in disciplines such as API marketing, ecosystem positioning, and API life cycle management. Additionally, companies must consider how to approach the direct and indirect monetization of APIs. Direct monetization refers to companies providing access to data or resources via APIs in exchange for money (e.g., by subscription). With indirect monetization, companies can use APIs to develop ecosystem relationships—for example, a hotel chain can let online travel companies access its information on room availability, Collins says.

Managing API infrastructure may be a new concept for IT teams or those specializing in products and R&D. Successful API management likely extends beyond meeting traditional service-level agreements. According to Collins, defining appropriate policies at the API layer, understanding the underlying application architecture, and monitoring and recovering APIs as needed are not trivial tasks. APIs should be treated as an "always on" platform, he adds.

To thrive in today's digital economy, businesses are increasingly shifting their focus beyond tactical technology implementations toward IT cultural transformation. As part of this shift to business enabler, IT organizations can leverage APIs to improve the way they operate, scale, and deliver reusable assets, and commit to treating APIs as a product internally and externally.

1. From March 25-28, MuleSoft surveyed 802 IT decision-makers in Australia, the Netherlands, Hong Kong, Singapore, Sweden, the U.K., and the U.S. The survey assessed how organizations of all sizes are executing on digital transformation, IT challenges, and technologies used to meet business goals. The survey's margin of error is +/- 2.85 percentage points at a 90 percent confidence interval.

The CIO Program

About Deloitte's CIO Program

CIOs lead unique and complex lives—operating at the intersection of business and IT to deliver value to their organizations. To help CIOs manage these challenges and issues, Deloitte has created the CIO Program. The program provides distinctive offerings to support the CIO career lifecycle through leadership development programs, immersive lab experiences, insight on provocative topics, and career transition support to complement the technology services and solutions we provide to our clients.

Stay connected with us:

www.deloitte.com/us/cio
USCIOProgram@deloitte.com
@DeloitteOnTech

Karen Mazer
Principal
US CIO Program Co-Lead

Karen is a principal with Deloitte Consulting LLP and co-leads Deloitte's CIO Program. Karen specializes in serving Consumer and Industrial Products clients, with a focus on large scale transformation efforts, including operations improvement and technology implementations. Prior to this, she has held various geography, industry, and alliance partner leadership roles–as well as had global responsibility for the development, deployment, and support of our methods and tools. Karen currently serves on Deloitte's US Board of Directors.

Peter Vanderslice
US Technology Transformation Leader

Peter is a principal in Deloitte Consulting LLP, leads Deloitte's Technology Transformation offering and co-leads the CIO Program. He has over 25 years of experience in high technology and strategic IT management consulting, including the alignment of business and IT strategy and the structuring of large-scale IT transformation programs. Peter has authored and driven many thought leadership programs globally to help clients take advantage of changing market forces and trends.

Irfan Saif
US Advisory Leader
Technology

Irfan is a principal in Deloitte & Touche LLP's Cyber Risk Services practice. His experience has been shaped by the opportunity to work with some of the world's most innovative technology and media companies. Irfan leads the Technology sector for Deloitte's Advisory practice and is also a leader of Deloitte's CIO program. He's interested in emerging technologies and their application in tackling key domains such as cyber analytics, advanced threat detection, cloud, and the Internet of Things.

Deloitte.