

A new framing for cloud innovation

Four potential scenarios for the
future of cloud innovation strategy

About the Deloitte Center for Integrated Research

Deloitte's Center for Integrated Research focuses on developing fresh perspectives on critical business issues that cut across industries and functions, from the rapid change of emerging technologies to the consistent factor of human behavior. We look at transformative topics in new ways, delivering new thinking in a variety of formats, such as research articles, short videos, in-person workshops, and online courses.

Connect

To learn more about the vision of the Center for Integrated Research, its solutions, thought leadership, and events, please visit www.deloitte.com/us/cir.

Deloitte Cloud Consulting Services

Cloud is more than a place, a journey, or a technology. It's an opportunity to reimagine everything. It is the power to transform. It is a catalyst for continuous reinvention—and the pathway to help organizations confidently discover their possible and make it actual. Cloud is your pathway to possible. To learn more, visit Deloitte.com.

Contents

Introduction	2
Cloud innovation and why it matters	3
A new framing for cloud innovation	5
Four potential cloud innovation scenarios	10
Scenario 1: Reactive responders	13
Scenario 2: Experience innovators	17
Scenario 3: Proactive data defenders	21
Scenario 4: AI-fueled entrepreneurs	25
Conclusion	29
Endnotes	30

Introduction

What if a large hospital system could aggregate all of its data for opioid prescriptions—how many milligrams were prescribed, for what demographic patients, to achieve what types of outcomes—in the last 30, 60, or 90 days? What if by doing so, the hospital could build up months of data and start to understand prescribing habits for opioids, when a physician might be overprescribing or underprescribing, and what kind of correlation does or could that have on patient outcomes? Could it help to stop an epidemic? Would that allow the hospital to solve other challenges? Perhaps streamline insurance claims, better manage predictability around the prescription supply chain, or expand the technology to innovate around other approaches, such as cardiovascular disease data analysis or precision medicine? Some companies are asking these questions and building cloud-enabled solutions in an attempt to create this future today.¹ This can be made a reality using cloud and artificial intelligence (AI). Cloud technology is expected to be a cornerstone of innovation strategies like this one.

CLOUD IS ALREADY set to drive significant transformation in every industry, sector, and domain over the next five years.² That transformation—or innovation—will come from business agility, new products, data strategies, intelligent solutions, breakthroughs in software engineering and platforms, or ecosystems enabled by cloud. However, cloud investment isn't keeping pace with these innovation goals.

The future of cloud appears to demand a new approach, one that aligns cloud innovation strategy with future business goals, enables leaders to make the financial and technical decisions today to create the innovative futures of tomorrow, and reconciles competing business needs with technical and financial considerations.

In essence, organizations are looking to use the cloud to drive secure, data-driven innovation and advance key business initiatives, but they have a number of competing business priorities. Therefore, by taking an approach that considers business, technical, and financial priorities together, they can gain greater value from their cloud innovation strategies.

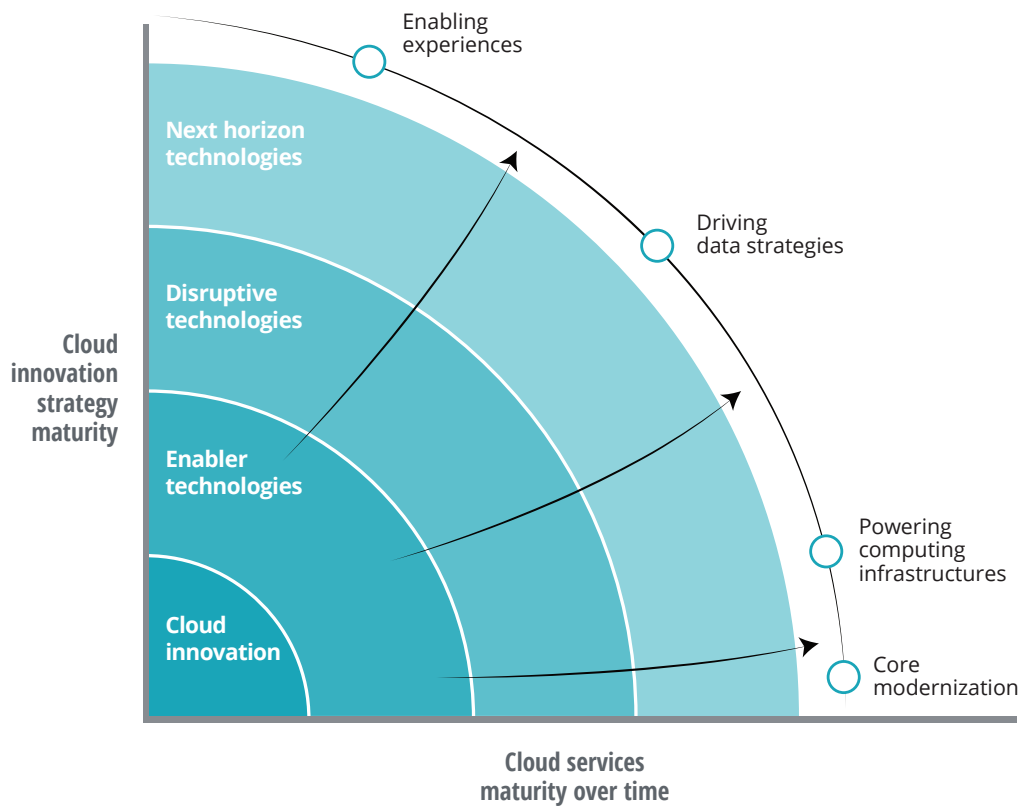
Cloud innovation and why it matters

CLOUD IS AN innovation enabler, but as disruptor (blockchain, IoT, edge) and next horizon (quantum) computing technologies kick in,³ cloud architectures are becoming increasingly complex.⁴ The cloud is being stretched

to process and coordinate information across all of these other computing options.⁵ Cloud technology can help modernize the business core, power computing infrastructures, drive data strategies, and enable experiences across today's enabling,

FIGURE 1

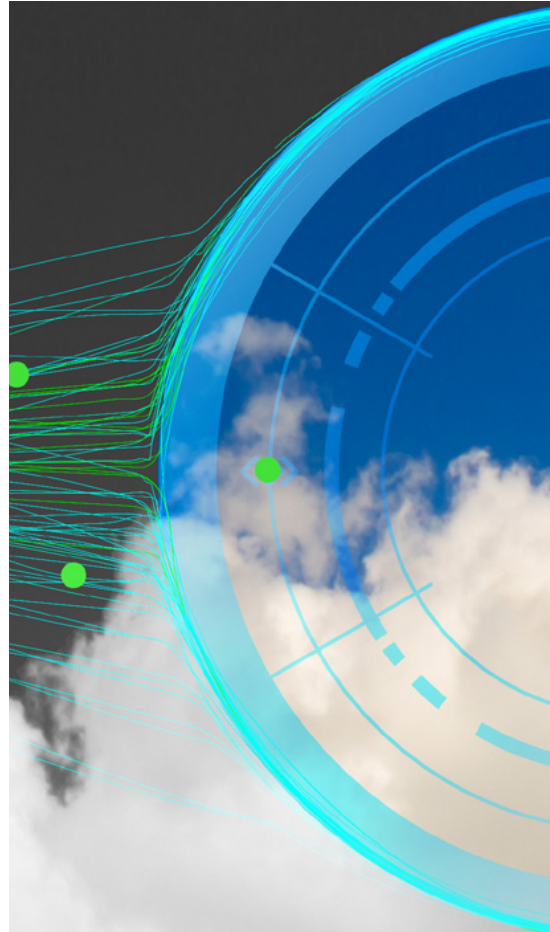
Cloud: An innovation enabler



Source: Deloitte analysis.

tomorrow's disruptive, and future next horizon technologies (figure 1). As organizations use cloud technology to innovate, they should think about where cloud can support them and how, and the chief information officer (CIO) should guide them on that journey.

Business strategy needs to inform the cloud innovation strategy,⁶ but technical realities also have a part to play. For many CIOs, it can be a challenge to coordinate competing priorities across the business when the CEO, the chief marketing officer (CMO), the chief data officer (CDO), the chief information security officer (CISO), and practically every leader in the organization wants a piece of the cloud team to innovate their business. All of these competing needs, varied expectations, and budgeting conversations tend to happen in different pockets of the organization without a unifying way of assessing them as part of a broader strategy. By taking a more intentional approach to understand the business, technical, and risk sides of the innovation equation, CIOs can help their organizations gain greater mileage from their cloud investments.



A new framing for cloud innovation

Business factors driving the future of cloud innovation

On the business side, there are four major innovation areas where certain market forces and desired business outcomes are *driving* the business to the cloud. These are IT operations, data strategy, customer experience management, and distributed ecosystems (figure 2). Each of these *drivers* can be thought of as a continuum with certain desired business outcomes. Each business driver and outcome will then have corresponding technical requirements. That said, there is no one “right” cloud innovation approach as organizations are striving to achieve several, if not all, of these business outcomes. Gaining a deeper understanding of the relationship among business drivers, desired business outcomes, and the technical requirements at the innovation strategy level can help to prioritize competing initiatives and gain economies of scale.

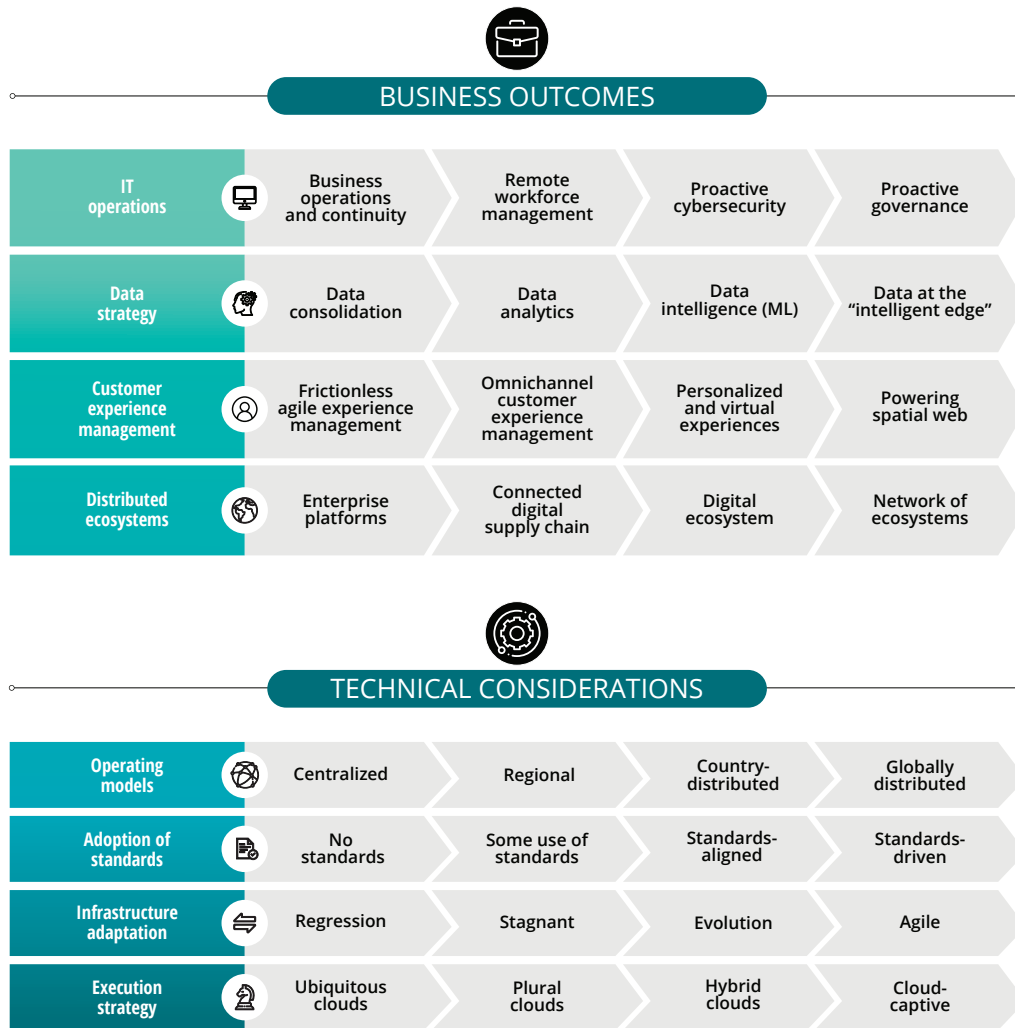
IT operations: Many organizations are doubling down on cloud technologies to support business continuity, remote workforce management, proactive cybersecurity, and proactive governance because the pandemic has illustrated the need to be prepared for future business disruption.⁷ Nearly all legacy applications will be migrated to the public cloud by 2024,⁸ and analysts expect the cloud-based conferencing market to grow to over US\$6.3 billion by 2024 (from US\$5 billion in 2020)⁹ to support the remote work trend. To

address the IT operations business driver, we’ll touch on four corresponding outcomes that all focus on building resilient and secure cloud applications, networks and infrastructures:

- **Business operations and continuity:** Looks to achieve automated business operations and redundancy for greater organizational resilience and to protect the integrity of core business services
- **Remote workforce management:** Aims to meet or exceed baseline operations and continuity requirements to enhance operations supporting the workforce (whether internal/external workers or technology that enables work) in achieving work outcomes
- **Proactive cybersecurity:** Uses intelligent automation to build on business continuity and optimized workforce requirements to streamline cybersecurity monitoring, threat detection, and remediation, particularly in light of secure cloud infrastructure requirements necessary to enable the remote workforce
- **Proactive governance:** Expands proactive cybersecurity automation strategies to automate a wide array of business operations, including cyber; risk; IT; compliance; and governance, via a DevOps culture that accelerates time to production by contemplating security and risk early

FIGURE 2

A new framing for cloud innovation



Source: Deloitte analysis.

Data strategy: Data is the backbone of strategic decision-making in a digital world.¹⁰ With data volumes growing at a dramatic rate and despite going through a “big data” decade, some organizations still struggle to gain meaningful business intelligence. A Deloitte survey of US-based analytics professionals reveals that 63% of surveyed organizations are aware of analytics, but lack the necessary infrastructure, and are still

working in silos or are expanding ad hoc analytics capabilities.¹¹ Cloud and data modernization strategies are inextricably linked¹² and, therefore, to harness actionable data intelligence, organizations can use cloud to enable data consolidation, analytics, intelligence through machine learning (ML), and insight at the “intelligent edge.”¹³ The secure cloud’s role in supporting data strategies could be significant,

with the global cloud analytics market expected to grow by 25% to US\$65.4 billion by 2025,¹⁴ cloud ML expected to reach US\$13 billion by 2025,¹⁵ and cloud-adjacent technologies, including edge and quantum, on the rise.¹⁶ Given this data strategy driver, we'll focus on four corresponding business outcomes:

- **Data consolidation:** Tries to bring together and secure data from across the organization whether related to workforce, customers, industries, or geographies
- **Data analytics:** Aims to gain meaningful, actionable business intelligence from secure data, whether consolidated or not, to aid decision-making
- **Data intelligence (ML):** Focuses on creating artificial intelligence (AI)-enabled, predictive business strategies with data security across a range of potential stakeholders (workforce, client, etc.), and internal and external use cases
- **Data at the “intelligent edge”:** Looks to harness data from across a more distributed data ecosystem and a more distributed range of computing devices (mobile, cloud, edge, and batteryless platforms) to gain meaningful business intelligence while securing data

Customer experience management: Many organizations have placed—or are looking to place—the customer at the center of their business strategy. Research suggests this to be a sound approach—companies that focus on “human-centric marketing” have been found to grow up to 17 times faster with double the 3-year revenue growth of their peers.¹⁷ Regardless of the business outcome, cloud technology can create seamless, immersive, and impactful experiences. To support the customer experience management business

driver, we can focus on four corresponding business outcomes:

- **Frictionless agile experience**
management: Attempts to deliver speed and usability to customers with secure, trusted solutions
- **Omnichannel customer experience**
management: Focuses on securely optimizing the experience across every point of interaction with the customer, whether mobile, online, or offline
- **Personalized and virtual experiences:**
Looks to use a number of possible technologies—AI, augmented reality (AR)/ virtual reality (VR), consumer identity, etc.—to create more personalized experiences and user journeys where individuals are empowered to consent and note preferences as to what information they share and when
- **Powering spatial web:** Attempts to build interconnected, fully immersive, and data-driven experiences, bringing in technologies, such as AR and digital twins, to engage and delight users

Distributed ecosystems: The distributed cloud market is expected to grow by as much as 24% to reach US\$3.9 billion, by 2025.¹⁸ Digital ecosystems have gained attention, with 52% of CIOs in an industry survey saying their “deep and integrated digital ecosystems” greatly enhance innovation.¹⁹ Academic research has shown that creating a large network of ecosystems can help harness distributed innovation to better solve externally driven problems.²⁰ While platform and ecosystem models have been around for decades, the continued rise of *disruptive* and *next-generation* technologies we discussed in Figure 1 have pushed

organizations to take a closer look at whether these strategies are ripe for innovation. For the distributed ecosystems business driver, we can focus on four corresponding business outcomes:

- **Enterprise platforms:** Supports a centralized data or product delivery strategy with a consistent experience and secure, centralized data collection across users²¹
- **Connected digital supply chain:** Streamlines supply chain operations and enables secure, predictive supply chain planning for greater business resilience and profitability²²
- **Digital ecosystem:** Enables secure data strategies across distributed business networks to increase transparency, streamline operations, reduce fraud, and address other ecosystem concerns
- **Network of ecosystems:** Aids with solving complex, externally driven problems if they reach beyond the organization's business ecosystem of direct individuals (workers, customers) and organizations (partners, suppliers) to individuals or organizations that are loosely connected (or networked) to its ecosystem, and thereby might impact it

Once established and prioritized, these business drivers and outcomes can provide a useful starting point to think through the corresponding technology priorities.

Technical considerations impacting the future of cloud innovation

CIOs can be an important partner for the CDO and cloud-innovation business stakeholders to align multiple innovation programs across shared goals and where solutions may be extensible. Conversely, CIOs are well-positioned to offer guidance on where cloud innovation programs require vastly different solutions. These conversations can be streamlined by thinking through four technical factors:

1. The operating model and how centralized or distributed it is
2. Adoption of standards
3. The infrastructure-adaptation potential and how restrained by legacy technology it is
4. The execution strategy and how cloud(s)-centric it is

As with the business drivers, each of these technical factors can be thought of as a continuum, with technical decisions aligned to business requirements—consciously making trade-offs all the while.

Operating models for cloud today are largely *centralized*. This may be appropriate for product strategies—build this solution for a defined market—but could pose a challenge for programs

that cut across teams, business units, industries, and geographies. In those cases, more *distributed* operating models—such as a committee or center of excellence—might work better; 75% of surveyed organizations with cloud-first strategies are already operating in this way.²³

Adoption of standards varies. Standards can be technical (e.g., security), data-driven, or industry-specific. Some organizations prefer open-source software.²⁴ Others follow specific cloud or technical standards, of which there are hundreds, if not thousands.²⁵ There may even be a mandate to use certain standard toolkits, coding languages, or vendors. Think about when standard tools might speed development, when they may constrain future options, and what the trade-offs are.

Infrastructure adaptation is about how easy (or difficult) it is for an organization to modernize technology today and into the future. A *regression* approach retrofits new technologies into old contexts, and while it may work for modernizing an old building to become energy efficient, it doesn't

typically work well for IT. A *stagnant* approach tries to make incremental change to improve the solution over time. Cloud strategies, however, tend to thrive when they trend toward *evolutionary* (migrating and modernizing solutions) or *agile* (developing iteratively). This allows organizations to eliminate historical constraints and create a stronger foundation for change.²⁶

Execution strategy can have a range of options: *Ubiquitous clouds* (with flexible computing anytime and anywhere), *plural clouds* (which bring together multiple cloud solutions), *hybrid cloud* (which requires a coordinated public/private cloud strategy), and *cloud captive* (where organizations are locked into a cloud-only strategy, for better or worse). While hybrid cloud is the current standard approach,²⁷ certain scenarios may require something different.

And that's the important point—to ground business strategy in a concrete technical reality, the CIO and the chief cloud officer can think through these cloud innovation scenarios across the C-suite.

Four potential cloud innovation scenarios

CLOUD INNOVATION CAN support a multitude of different business strategies and scenarios, but how can organizations achieve those possibilities? This is where scenario thinking can help compare and reconcile competing priorities, break silos, and drive collaboration—all to achieve better outcomes and value.

To illustrate, think back to the business drivers (IT operations, data strategies, customer experience management, and distributed ecosystems). These drivers can help organizations to start to innovate differently. We're going to show a few examples to help place you in the framing and help you see how it can be used to ground overlapping business and technical requirements of four C-suite cloud innovation scenarios.

First, a short explanation of our methodology.

We plotted the two more operational drivers on the x-axis (i.e., the organization's propensity to prioritize internal operations or external customer experience management) and data maturity on the y-axis. These produce four scenarios: *reactive responders for the CEO*; *experience innovators for the CMO/CxO*; *proactive data defenders for the CISO*; and *AI-fueled entrepreneurs for the CDO/ chief data scientist* (figure 3).

These scenarios are not necessarily mutually exclusive, though. An organization might attempt to achieve just one scenario or have a road map that includes all of them in some variance. While each of these scenarios could potentially be achieved to some extent, with enough time, budget, and resources, the organization will need to decide what is *most* important, what is feasible to tackle first in a three- to five-year road map, and what trade-offs it's making in the process (figure 4).

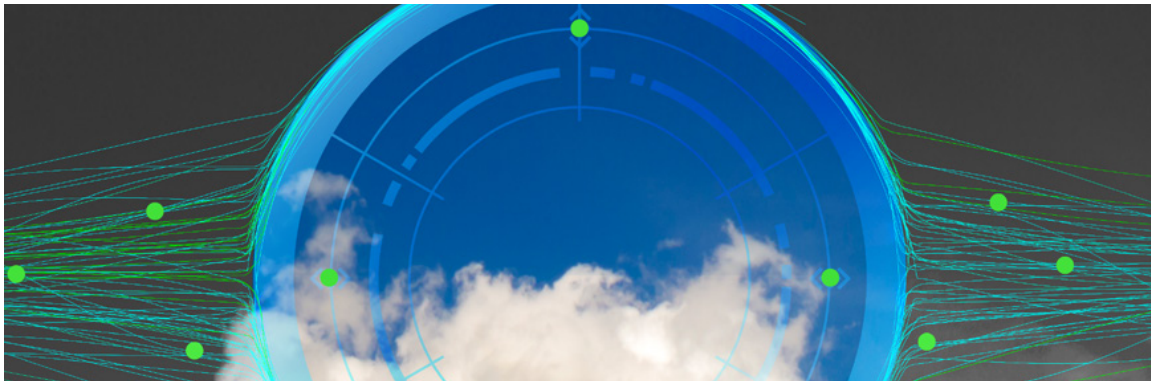
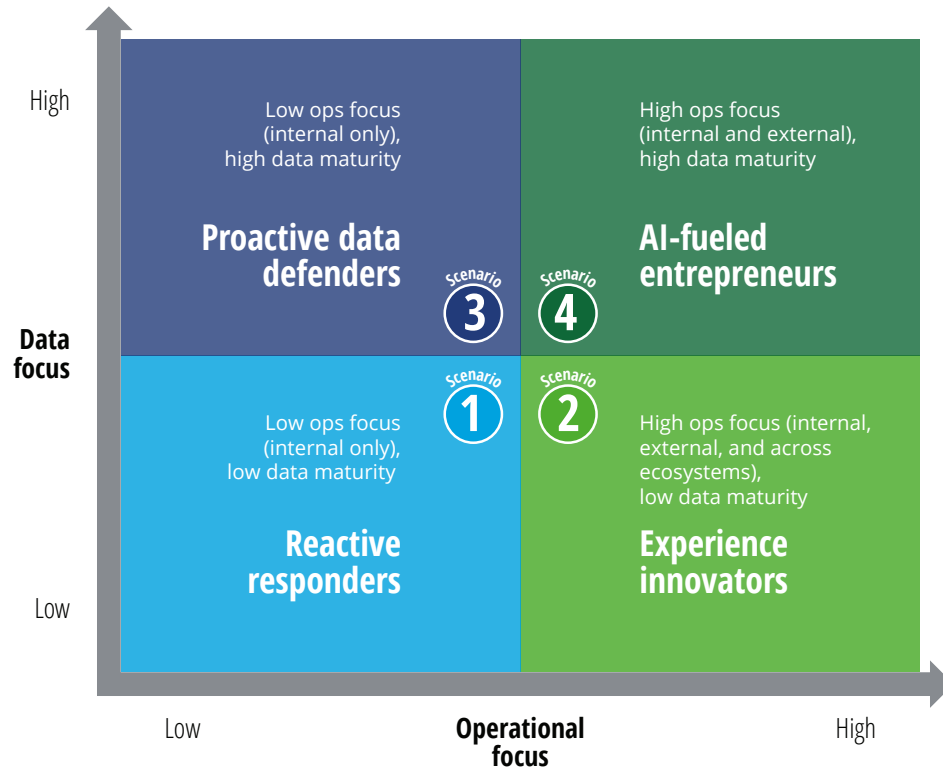


FIGURE 3

The interplay of operational drivers and data maturity yields four scenarios

Data strategy maturity across data consolidation, analytics, intelligence, the intelligent edge



Strategic drivers: IT operations focus from internal to internal and external with increased focus on customer experience driver across product and ecosystem models

Source: Deloitte analysis.

For example, **reactive responders** and **AI-fueled entrepreneurs** can both benefit from being standards-aligned, but **proactive data defenders** may configure their cloud solutions with only some use of standards. Knowing this can help create economies of scale and more finely tune cloud innovation strategies. That said, it will likely require the CIO to work across the C-suite to

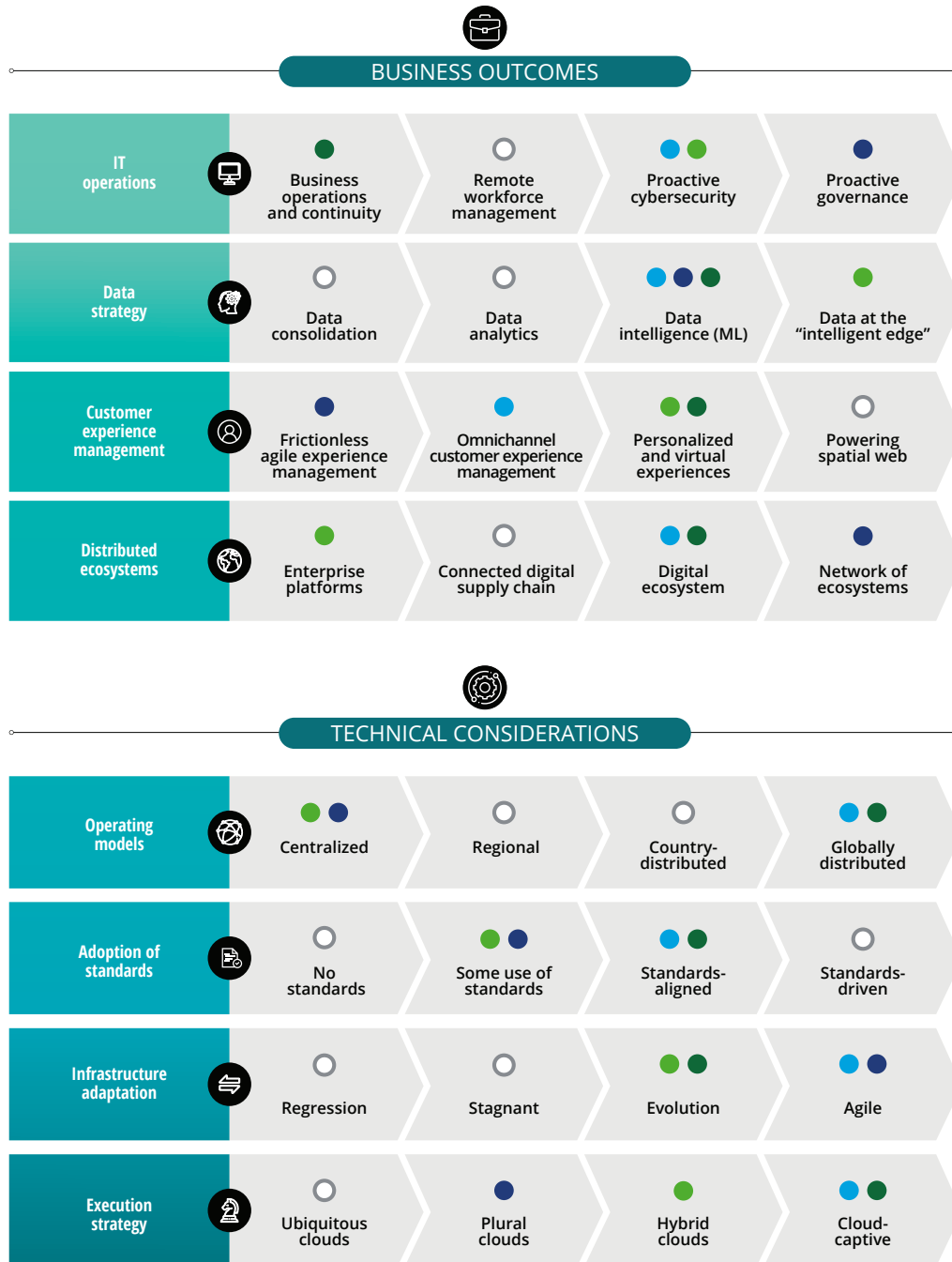
understand, and perhaps reconcile, business drivers and outcomes with technical considerations to create these futures. For example, it is more than likely that the CIO and the chief cloud strategy officer have numerous programs that need to be addressed simultaneously.

Now, on to the scenarios!

FIGURE 4

Business factors driving cloud innovation strategies and technical factors impacting cloud architecture choices

- Scenario 1: Reactive responders
- Scenario 2: Experience innovators
- Scenario 3: Proactive data defenders
- Scenario 4: AI-fueled entrepreneurs



Source: Deloitte analysis.

Scenario 1: Reactive responders

Wedefiti CEO Ana Pardo studied the map. Hurricane Xavier, a powerful Atlantic storm, was on track to barrel up the coast from Washington DC to Boston. She gave the order to shutdown East Coast operations and evacuate employees. Her decision automatically triggered a series of events: Business systems command seamlessly transferred from Manhattan to the Paris office. Simultaneously, talent systems rebalanced and redistributed work assignments from evacuating employees to colleagues in other locations to support vital functions. Call center AI models predicted the storm would lead to a spike in customer service requests overnight that would exceed the capacity of the Manila office to manage. An alert was sent to a small satellite office in Hyderabad to standby for overflow calls to be autorouted to their location. As she prepared to evacuate, her CISO messaged: The BooBerry hacking collective had attempted to breach their network under the cover of the disruption, but the proactive AI cybersecurity system had recognized and thwarted the attack.

THIS VISION OF the reactive responder sounds ideal. However, 70% of CxOs surveyed don't have confidence in their organization's ability to pivot and adapt to disruptive events.²⁸

The reactive responder scenario is a current imperative for many CEOs and chief human resources officers (CHROs). And, while all organizations clearly want to be responsive, those that pursue this category likely choose to prioritize resilient internal operations above other business needs. They may be willing to sacrifice customer experience strategies in the short term to achieve greater operational efficiencies more quickly (figure 3, x-axis) and data would be a priority, but not *the* priority (y-axis).

There are still a number of possible business outcomes that could correlate with this scenario

Reactive responders may be willing to sacrifice customer experience strategies in the short term to achieve greater operational efficiencies more quickly and data would be a priority, but not *the* priority.

based on how much or how little data, customer, and ecosystem strategies are prioritized or

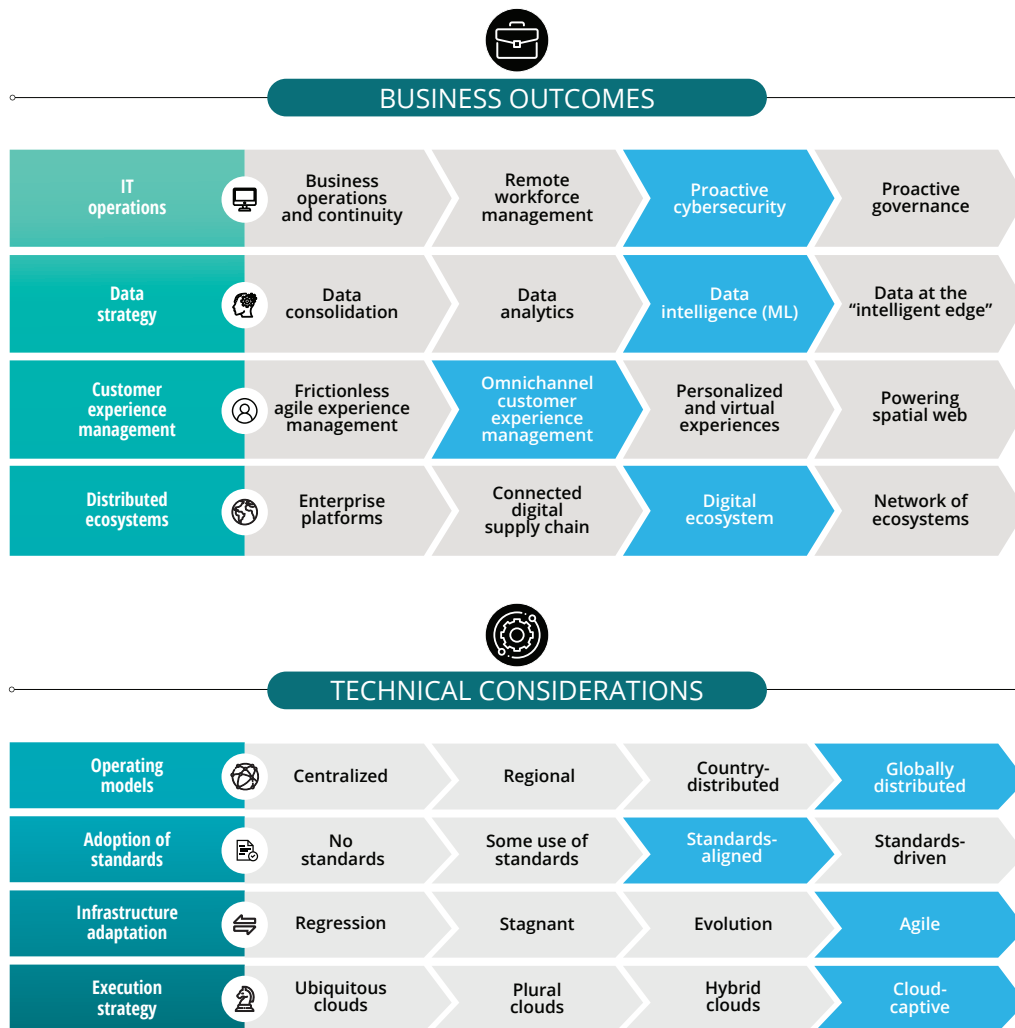
deprioritized on the continuum, but one permutation that fits into this quadrant is: proactive cybersecurity, data intelligence, omnichannel customer experience (though frictionless agile experiences could be equally

likely), and digital ecosystem requirements. Given these desired outcomes, the CIO can then work with business partners to track technical requirements (figures 5 and 6).

FIGURE 5

Scenario 1: Reactive responders

- Scenario 1 business outcomes and aligned technical considerations
- Excluded from scenario 1



Source: Deloitte analysis.

FIGURE 6

Reactive responder

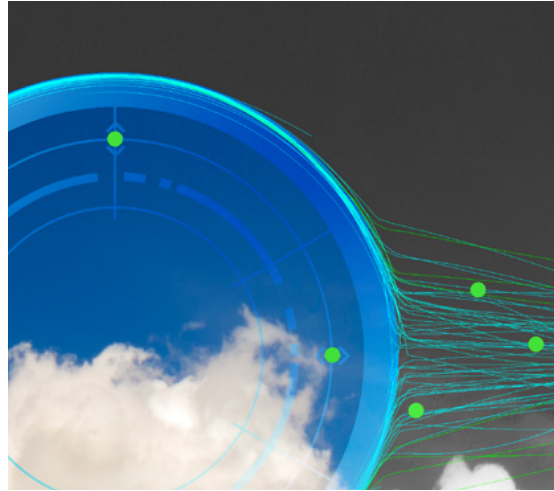


Note: * Carsten Brockmann et al., *Stepping stones to an agile enterprise: From small beginnings to organizationwide adoption*, Deloitte Insights, July 29, 2019.

Source: Deloitte analysis.

BEYOND THE SCENARIO

Cloud-captive strategies and automation can introduce cloud complexity of levels beyond human capability to manage and even introduce technical and dark debt. However, strong, standards-aligned systems can help manage various cloud infrastructures uniformly to generate insights from abstracted data (i.e., data removed from its source), drive proactive solutioning, and improve operations. In this way, organizations can create a feedback loop where data, automation, and ML can streamline operations to become increasingly responsive over time.



Scenario 2: Experience innovators

FutureBevCo hit a sales milestone, but CMO Latoya Bradley has a target to double revenue over the next two years by rolling out one new flavor, launching a new customer engagement strategy, and expanding into the Asia-Pacific market. Latoya opens her Business Intelligence dashboard. Its ML algorithm analyzes anonymized data from customer purchases, smartphones, smart watches, and social media and detects a strong correlation between customers with increased heart rates (indicative of physical activity) ordering lime flavors, a trend with women aged 18–34 tagging their lime drink on social media disproportionately on posts #atthegym, and a consistent spike in “lime” sales in the morning. With this insight, Latoya gets to work.

A few months later, Li Xiu Ying enters the gym for her morning workout. She sees a promotion for a new Raspberry-Lime beverage and receives a push notification from her gym app for a discounted offer. Intrigued, she purchases the drink that has instructions to look under the cap for a QR code to launch a mobile experience. She curiously clicks and finds an AR exercise card appears on the wall. The bottle explains that each drink includes a different fitness routine. It looks like someone has a new daily workout drink.

PRODUCT AND EXPERIENCE innovation can clearly be a powerful customer motivator. For every single point gained on a customer experience index, an organization could gain US\$200–500 million in annual revenue.²⁹ According to Deloitte’s *2021 global marketing trends*, 57% of respondents said their organization significantly altered digital platforms to better meet customer needs in response to the pandemic,³⁰ with agile product and experience strategies enhanced by CMO-CIO collaboration.³¹

Having a mature customer strategy should be important to every organization, but the experience innovator places the customer experience as *the* top priority, directing cloud resources more externally (figure 3, x-axis) and focusing their data

and computing needs on customer-centric goals (y-axis). For product companies, this might be an especially high priority. Equally, analog businesses looking to “go digital or go home” may be banking

The Experience innovator places the customer experience as *the* top priority.

on this strategy. Key stakeholders may include the CMO, the chief customer experience officer, the chief product officer, and others.

Several variations can exist for this scenario. For the purpose of this exercise, we’ve selected

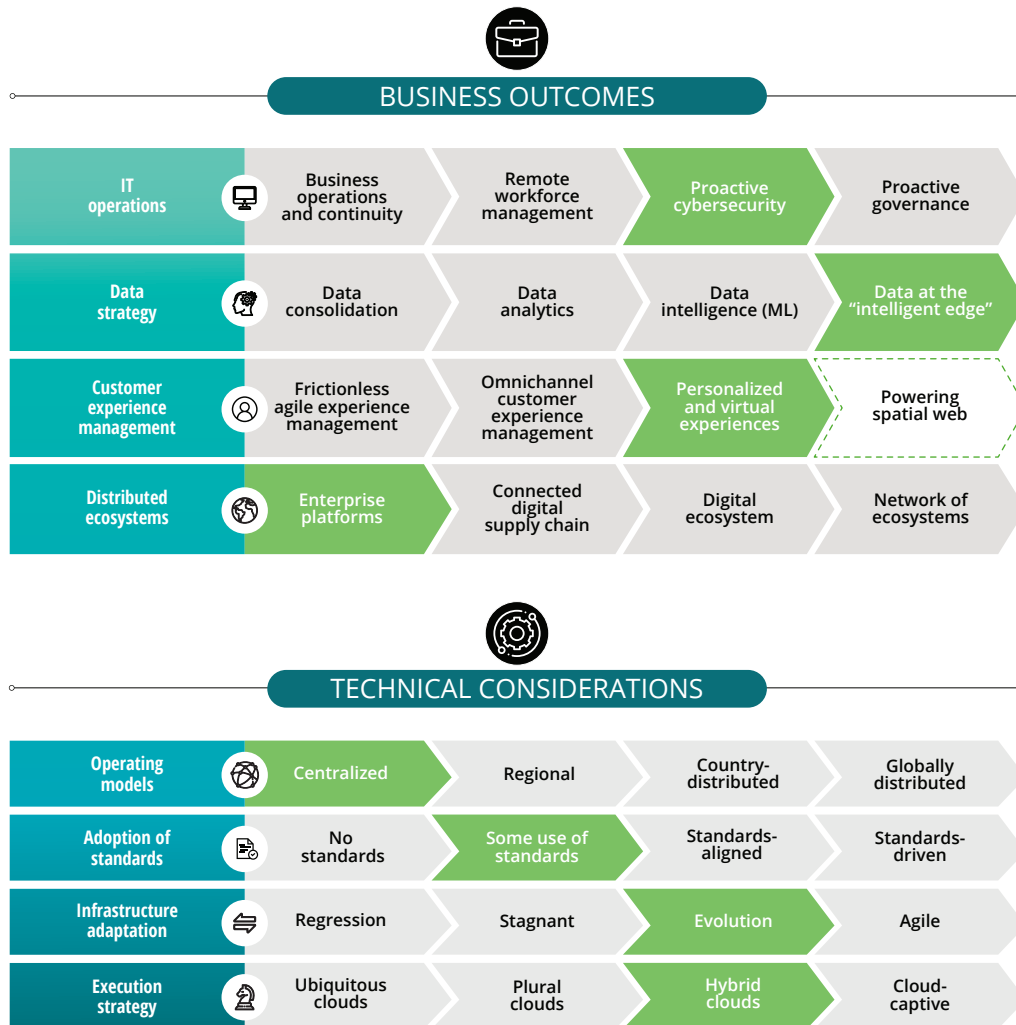
proactive cybersecurity as the priority business outcome for the use case. Depending on what data is available across what type of devices, the data strategy too can vary. So, to push the customer experience to the edge of what’s possible, we’ll focus on *the intelligent edge*, personalized virtual experiences, and the spatial web. A platform versus

ecosystem strategy too could be equally relevant, but we’ve chosen enterprise platforms, given that today’s tech behemoths take a platform approach to customer products and services.³² Given this scenario, the CIO can track the corresponding technical requirements (figures 7 and 8).

FIGURE 7

Scenario 2: Experience innovators

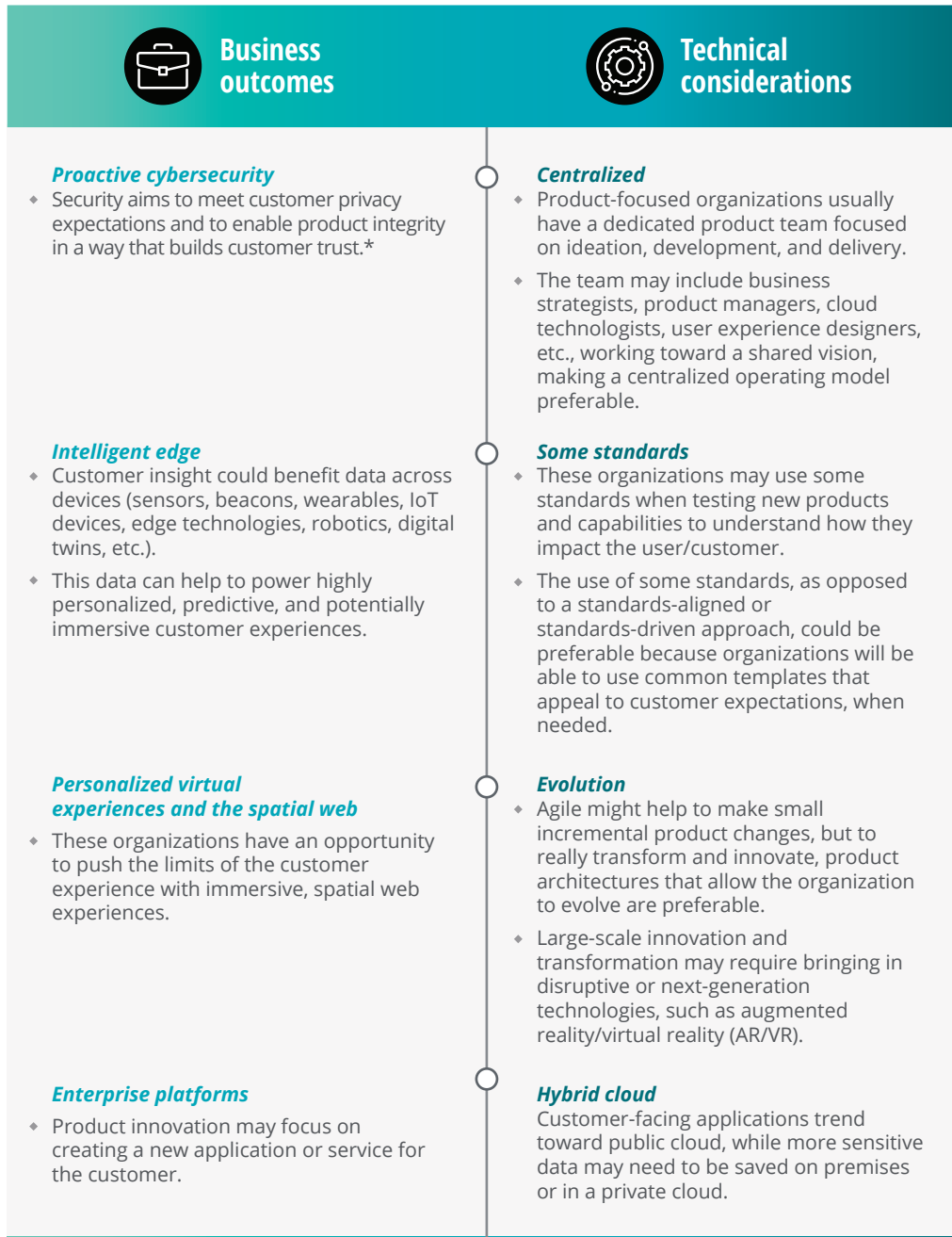
- Scenario 2 business outcomes and aligned technical considerations
- Excluded from scenario 2
- Included partially



Source: Deloitte analysis.

FIGURE 8

Experience innovator

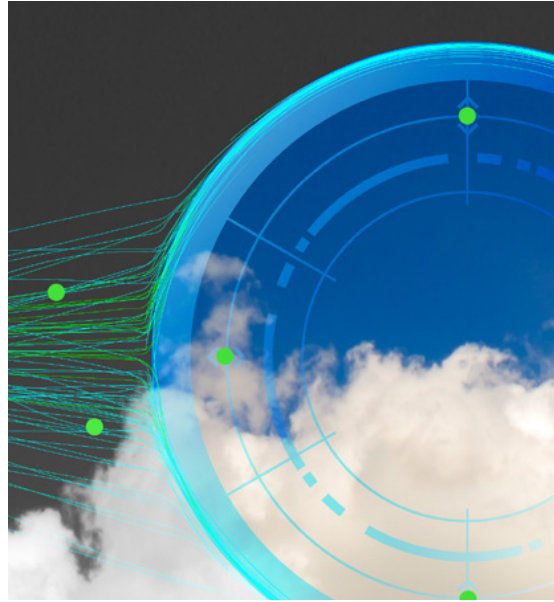


Notes: * EC-Council, "Why cybersecurity is vital to business trust," May 9, 2019; Chon Abraham et al., "How digital trust drives culture change," *MIT Sloan Review*, March 18, 2019.

Source: Deloitte analysis.

BEYOND THE SCENARIO

A mature data strategy can push what's possible in terms of customer understanding, but having data spread out with a hybrid cloud strategy (both local and in the cloud) creates data silos, and gaining a single view of the customer may be a challenge. Certain cloud services can create greater consistency across the hybrid infrastructure (local, private, cloud), so that no matter where the data is being stored, customers still have a consistent experience. Further, with applications now able to access data in a more consistent way, the next frontier is expected to be about managing data flows across devices (mobile, wearables, IoT, edge, etc.) with equal consistency to power experiences and insights.



Scenario 3: Proactive data defenders

The security team was braced for chaos: Evacuation orders meant employees would be logging in from unfamiliar locations, and new people would be accessing sensitive systems. Even a year ago, they would have been flooded with automated alerts. But CISO Torben Hsu was confident his system could handle the upheaval. Within minutes, ML identified which anomalous events were consistent with disaster protocols and weather data coming in from outside the system. New automated replies addressed common log-in issues. That's why Torben's team was ready when the real threat hit: A Trojan horse embedded in the firmware of a back-office system was triggered to siphon customer data to a site on the dark web. Self-healing AI in the machine identified its own abnormal behavior and quarantined itself from the rest of the network. Pattern analysis identified signatures that tied the virus to a distributed network of known hackers, and Torben's team alerted authorities of the widespread attack.

WHILE AI CAN help address a multitude of enterprise business goals, cybersecurity and governance are a top focus for the CISO, particularly in the context of cloud innovation. A Deloitte analysis found 75% of surveyed organizations with a mature cloud *and* cyber strategy report doing well or very well in using advanced technologies to become more resilient and agile, and 70% sure to predict potential future risks and threats.³³ Given this, some organizations are turning to AI-enabled cybersecurity and governance in the cloud to better manage perceived and real threats.

While maintaining cloud security and managing cyber risk should be a priority for every organization, this scenario is focused on

organizations that see AI as a unique way to innovate their cybersecurity and governance programs with an internal operations focus on the (figure 3, x-axis) and a mature data strategy on the (y-axis). To be proactive data defenders, the CISO and CDO are critical partners.

This scenario could apply across industries. However, highly regulated industries, such as government, financial services, and life sciences and health care, which have heavy cybersecurity, governance, and data privacy requirements, might favor this one especially.³⁴ The mature IT operations focus on proactive governance would be complemented by a high level of data intelligence to power predictive capabilities, such as fraud, threat detection, and supply chain risk. This

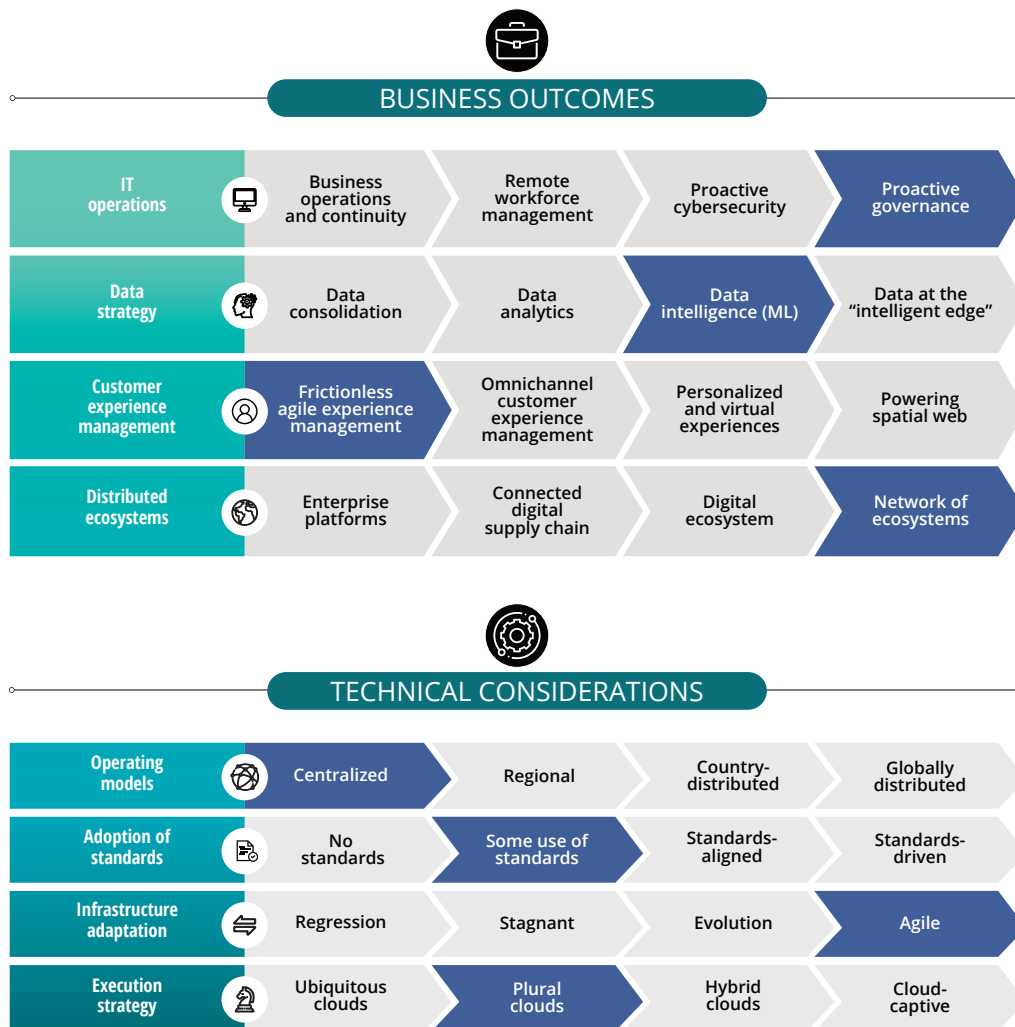
mature operations focus would extend to the customer mindset with the desire to create frictionless agile experiences. As these organizations look to understand new and emergent risk categories, reaching out across not just their ecosystem but their network of

ecosystems can enable them to better understand the impact of relationships *outside* their network *on* their network. Once again, the CIO can use these drivers to track corresponding technical requirements (figures 9 and 10).

FIGURE 9

Scenario 3: Proactive data defenders

- Scenario 3 business outcomes and aligned technical considerations
- Excluded from scenario 3



Source: Deloitte analysis.

FIGURE 10

Proactive data defender



Source: Deloitte analysis.

BEYOND THE SCENARIO

The organization that views cybersecurity governance as its core mission must have complete situational awareness with the ability to respond to known and unknown threats. As systems become more complex, the full panoply of ways in which things could go awry becomes ever larger and, thus, vigilance becomes ever more critical. By analyzing historical threats to understand patterns, predictive threat monitoring can improve over time to enhance all kinds of processes. This hyper-automation could dramatically impact work—bringing humans and AI together as “super teams” working together to solve problems.³⁵ For cloud and cybersecurity professionals responsible for system monitoring and integrity, this could mean increased freedom to focus on innovating new solutions and executing predictive recommendations.



Scenario 4: AI-fueled entrepreneurs

Rodrigo Gonzalez's SustainoMobile dashboard sends an alert. The car's digital maintenance system analyzed its telemetric data and has noticed a potentially concerning pattern that could result in a high chance of an accident without maintenance. The system alerts Rodrigo to visit a certified service station within the next 200 miles. The issue is logged with SustainoMobile, and its certified service centers automatically appear on the GPS—15 minutes away. The next available appointment is in 30 minutes. Accept! Rodrigo changes course. His car insurance information automatically populates. He's preapproved for the required part, and the company's inventory management system shows it's currently available. On the backend, it removes the part from inventory and uses real-time service data to predict upcoming ordering needs with suppliers. When entering, Rodrigo receives an alert predicting a 20-minute wait based on similar jobs completed. While waiting, based on his purchases of all-weather mats and a high chance of rain, his app suggests he might want to buy an umbrella. Good call. He clicks yes. The digital payment is made, and he watches the car's digital twin run predictive safety simulations while he waits.

ANY CLOUD INNOVATION strategy discussion would almost certainly include AI. In Deloitte's *2020 state of AI 3rd edition*, 83% of respondents said AI will be very or critically important to their organization's success in the next two years.³⁶ For its part, use of the cloud for AI and ML applications results in better decision-making and "significant" competitive advantage relative to noncloud-based configurations. Organizations focused on becoming AI-fueled entrepreneurs will need to understand the needs and priorities of the CDO/ chief data scientist and where the CIO can best provide support.

As expected, an AI-fueled entrepreneur would have a more mature data strategy focused on data intelligence (i.e., ML) or data at the intelligent edge, if relevant (figure 3, y-axis). The IT operations focus could vary considerably for AI-fueled entrepreneur, but to offer a scenario that falls into the top right quadrant—a mature data strategy directed at both internal and external operations—we'll choose business operations and continuity (trending toward smart workforce management) as a baseline with the desire to also use AI for increasingly personalized virtual experiences (x-axis).

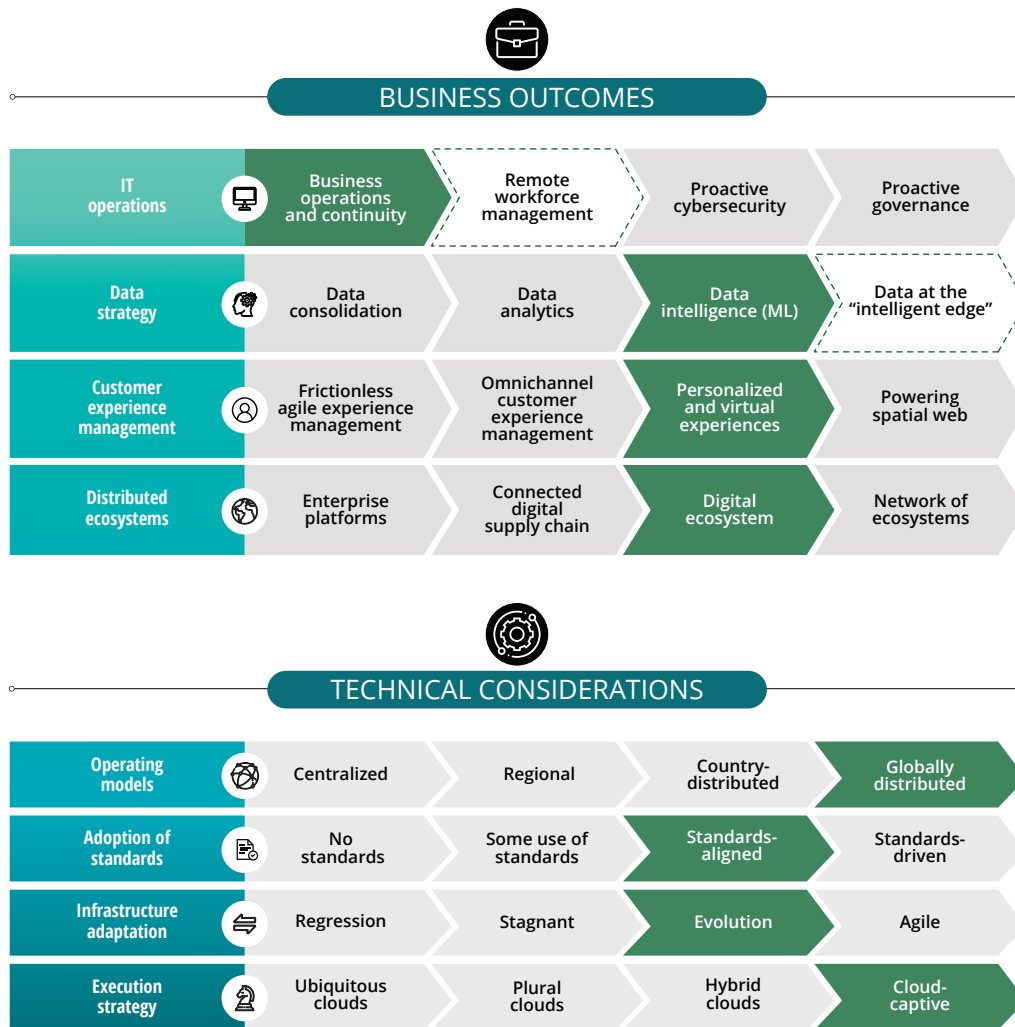
This scenario shows an organization at the early phases of an AI-everything strategy. It might, therefore, also look to use a *digital ecosystem* as a way to access and generate new data across its

ecosystem. Given the business scenario, the CIO can then track the corresponding technical requirements (figures 11 and 12).

FIGURE 11

Scenario 4: AI-fueled entrepreneurs

- Scenario 4 business outcomes and aligned technical considerations
- Excluded from scenario 4
- ▨ Included partially



Source: Deloitte analysis.

FIGURE 12

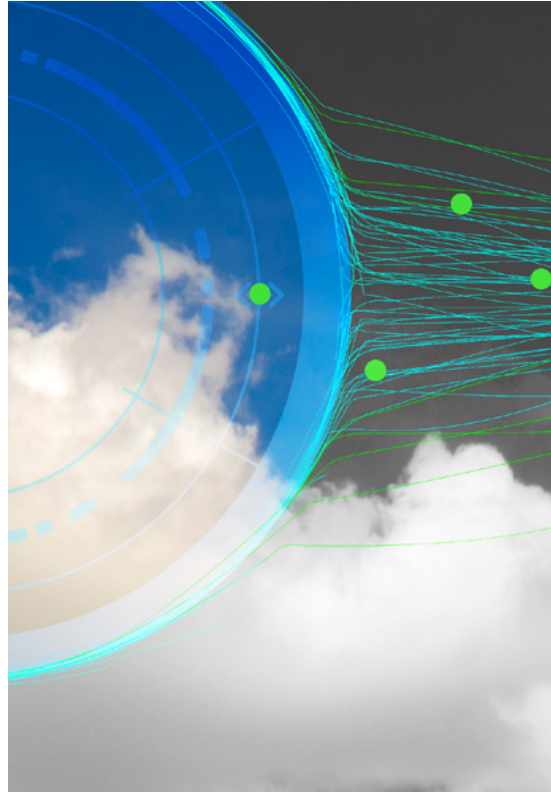
AI-fueled entrepreneurs



Source: Deloitte analysis.

BEYOND THE SCENARIO

Organizations are collecting data to understand all aspects of their businesses: workforce, customers, partners, industries, and regions. While microsegmentation and microtargeting can be beneficial, they can make achieving a more holistic perspective—the big picture—challenging, especially with data privacy concerns in mind. Therefore, organizations may avoid data segmentation, which is reliant on personal information and with greater data privacy concerns, and opt instead for abstracting the data (removing identifying details). This way, organizations can preserve personal anonymity and establish ways to create and use protected, unchangeable data with a clear chain of custody. This abstracted data could be a powerful resource for “big picture” insights and strategy. In place of targeting strategies, other approaches, such as gamification, could be used to drive more personalized experiences by enabling their own unique user journeys.



Conclusion

AS ORGANIZATIONS LAY out their innovation plans for the next 5–10 years, cloud technology is not expected to be an afterthought. Rather, it could serve as core to the entire innovation value proposition. The cloud will likely become the context within which innovation programs are evaluated and decisions are made throughout all aspects of an organization, including the entirety of the C-suite. Indeed, the business innovation strategy is evolving into the cloud innovation strategy, bringing together the business and technical considerations that reflect this changing reality.

We've proposed a set of key business and technical drivers as well as factors that companies may apply as they pursue their cloud innovation programs. These drivers and factors—that we applied in four specific scenarios—offer an approach into how organizations may use them across a full spectrum of situations.

What follows is a set of recommendations that may serve an organization as it pursues its own cloud innovation strategies and unique scenarios:

- Assess the four **business drivers** that we identified and weigh the corresponding business factors against each other within the context of your unique circumstances. Be willing to make technical and financial tradeoffs in the process.
- Seek out opportunities to leverage **technical** choices that can be shared across an array of different business scenarios, allowing for greater flexibility to address scenarios simultaneously or in succession. Conversely, identify scenarios that require separate infrastructure considerations, configuration, and budgeting.
- Assess each cloud innovation program for its unique **economic implications** and perform a corresponding cost-benefit analysis, with a focus on cost reduction and value. This can serve as a guide to decision-making for potential economies of scale.
- Apply **scenario thinking** to your organization's cloud innovation strategy to clearly define the desired and priority future state outcomes. In doing so, place particular emphasis on data and operational computing needs throughout the organization and across all stakeholders.

Indeed, there is no single approach to a successful cloud innovation initiative. Each path is distinct and informed by an organization's unique priorities and constraints. Still, there can be little doubt that, no matter the technical and financial constraints and accompanying trade-offs, the journey will likely prove to be one worth taking in creating real value for the company and its bottom line.

Endnotes

1. This example is based on an interview conducted with Avalon.ai.
2. Andrew Lerner, "Summary translation: The future of cloud in 2025: From technology to innovation," Gartner Research, November 27, 2020.
3. Scott Buchholz, Mike Bechtel, and Bill Briggs, *Macro technology forces: A taxonomy for emerging tech*, Deloitte Insights, 2021.
4. David Linthicum, "Tackle cloud complexity," Deloitte on Cloud Blog, February 14, 2020.
5. Diana Kearns-Manolatos, Myke Miller, and David Linthicum, *The edge of cloud*, Deloitte Insights, March 25, 2021.
6. Gerald C. Kane et al., *Strategy, not technology, drives digital transformation: Becoming a digitally mature enterprise*, Deloitte Insights and *MIT Sloan Management Review*, 2015.
7. David Linthicum et al., *The future of cloud-enabled work infrastructure: Making virtual business infrastructure work*, Deloitte Insights, September 23, 2020.
8. Laurence Goasduff, "How CIOs can optimize IT costs," Gartner Research, March 4, 2019.
9. Gartner, "Gartner says worldwide end-user spending on cloud-based web conferencing solutions will grow nearly 25% in 2020," press release, June 2, 2020.
10. Todd Konersmann et al., *Innovating R&D with the cloud: Business transformation could require cloud-enabled data, ecosystems, and services*, Deloitte Insights, December 2, 2020.
11. Tom Davenport et al., *Analytics and AI-driven enterprises thrive in the Age of With: The culture catalyst*, Deloitte Insights, July 25, 2019.
12. Tom Davenport, Ashish Verma, and David Linthicum, *Data modernization and the cloud: Which trend is driving the other?*, Deloitte Insights, 2019.
13. Chris Arkenberg et al., *Unbundling the cloud with the intelligent edge: How edge computing, AI, and advanced connectivity are enabling enterprises to become more responsive to a fast-moving world*, Deloitte Insights, September 8, 2020.
14. Markets and Markets, "Cloud Analytics Market," accessed March 31, 2021.
15. Sudi Bhattacharya et al., *Time, technology, talent: The three-pronged promise of cloud ML*, Deloitte Insights, December 10, 2020.
16. IDC, "Worldwide spending on edge computing will reach \$250 billion in 2024, according to a new IDC spending guide," September 23, 2020; Frost & Sullivan, "Global edge analytics market to hit \$1.18 billion by 2025, driven by manufacturing, energy and logistics sectors," December 15, 2020; Markets and Markets, "Quantum computing market," accessed March 31, 2021.
17. Deloitte, "Customer strategy: Human-centric marketing strategies," accessed March 31, 2021.
18. IndustryARC, "Distributed cloud market – Forecast (2021–2026)," accessed March 31, 2021.
19. Bala Kasisviswanathan, "How an API-powered digital ecosystem can drive innovation and efficiency," Google Cloud, July 7, 2020.
20. Elizabeth J. Altman and Frank Nagle, "Accelerating Innovation Through a Network of Ecosystems," *MIT Sloan Management Review*, June 9, 2020.

21. Market Research Future, *Global enterprise high-productivity application platform as a service Market Research report*, April 2020.
22. Paul Wellener et al., *Accelerating smart manufacturing: The value of an ecosystem approach*, Deloitte Insights, October 21, 2020.
23. Flexera, *2021 state of the cloud report*, March 15, 2021.
24. Business Wire, "\$66.84 billion open source services market by industry, service type, and geography - global forecast to 2026," press release, November 13, 2020.
25. Paul Kirvan, "Top cloud compliance standards and how to use them," TechTarget, December 17, 2020.
26. Gerald C. Kane et al., *Accelerating digital innovation inside and out: Agile teams, ecosystems, and ethics*, Deloitte Insights, June 4, 2019.
27. Tanner Luxner, *Cloud computing trends: 2021 state of the cloud report*, Flexera, March 15, 2021.
28. Punit Renjen, *Building the resilient organization—2021 Deloitte Global resilience report*, Deloitte Insights, January 25, 2021.
29. Forrester, "How customer experience drives business growth, 2020," December 3, 2020.
30. Deloitte, *2021 global marketing trends*, 2020.
31. Ibid.
32. Feng Zhu and Nathan Furr, "Products to platforms: Making the leap," *Harvard Business Review*, April 2016.
33. Deborah Golden et al., *An integrated cyber approach to your cloud migration strategy: Why cloud migration programs should consider a cyber-forward cloud strategy*, Deloitte Insights, March 2, 2021.
34. Meredith Ward and Srini Subramanian, *States at risk: The cybersecurity imperative in uncertain times*, Deloitte Insights, October 14, 2020.
35. Erica Volini et al., *Superteams: Putting AI in the group*, Deloitte Insights, May 15, 2020.
36. Beena Ammanath et al., *Thriving in the era of pervasive AI: Deloitte's State of AI in the Enterprise, 3rd edition*, Deloitte Insights, July 14, 2020.

Acknowledgments

The authors would like to thank **Christopher Malter, Terrence Mulry, and Marshall Saffer** from Avalon.ai for sharing their thoughts and ideas. The authors would also like to thank the following individuals for contributing to this article: **Mike Kavis, Sarah Jersild, Amy Golem, Raquel Buscaino, Mudit Gupta, Mykolaj Ondrej Suchy, Yufan Wang, Lisa Beauchamp, Negina Rood, and Samantha Fletcher**. A special thanks to **Jay Parekh, Abha Kulkarni, and Jonathan Holdowsky** for their research contributions.

About the authors

Lars Cromley | lcromley@deloitte.com

Lars Cromley is a technology fellow with Deloitte Cloud Consulting practice. He has more than 10 years of experience working with cloud-native technologies and their implementations. Cromley works with engineers and product teams to adopt cloud native technologies, drive cultural change, solve client delivery issues, and speed up the delivery of business value. His focus lies on driving quality, well-architected solutions that automate business processes and eliminate waste. Prior to Deloitte, Cromley was a director at a cloud consultancy and has served several industries, including airlines and transportation, beverage and hospitality, financial services, technology, and pharmaceuticals.

Diana Kearns-Manolatos | dkearnsmanolatos@deloitte.com

Diana Kearns-Manolatos is a senior manager in the Deloitte Center for Integrated Research, where she analyzes market shifts and emerging trends across industries. Her research focuses on cloud and the future of workforce. Additionally, Kearns-Manolatos draws on almost 15 years of award-winning marketing communications expertise to align insights with business strategy. She speaks on technology and women in leadership and holds bachelor's and master's degrees from Fordham University.

David Linthicum | dlinthicum@deloitte.com

As the chief cloud strategy officer for Deloitte Consulting LLP, David Linthicum is responsible for building innovative technologies that help clients operate more efficiently while delivering strategies that enable them to disrupt their markets. Linthicum is widely respected as a visionary in cloud computing—he was recently named the No. 1 cloud influencer in a report by Apollo Research. For more than 20 years, he has inspired corporations and startups to innovate and use resources more productively. As the author of more than 13 books and 5,000 articles, his thought leadership has appeared in *InfoWorld*, *Wall Street Journal*, *Forbes*, NPR, Gigaom, and Lynda.com. Linthicum is a graduate of George Mason University.

Mike Bechtel | mibechtel@deloitte.com

Mike Bechtel is a managing director and chief futurist for Deloitte Consulting LLP, where he helps clients develop strategies to thrive in the face of discontinuity and disruption. Bechtel and his team research the novel and exponential technologies most likely to affect the future of our clients' businesses and build relationships with the enterprises, entrepreneurs, and research institutions creating them.

Contact us

Our insights can help you take advantage of change. If you're looking for fresh ideas to address your challenges, we should talk.

Deloitte Canada

Kevin Young

Partner | Cloud Transformation Lead | Deloitte Consulting LLP
keyoung@deloitte.ca

Practice leadership

David Linthicum

Managing director | Chief cloud strategy officer | Deloitte Consulting LLP
dlinthicum@deloitte.com

The Deloitte Center for Integrated Research

Diana M. Kearns-Manolatos

Senior manager | Subject matter specialist | Deloitte Services LP
dkearnsmanolatos@deloitte.com

Deloitte.

Insights

Sign up for Deloitte Insights updates at www.deloitte.com/insights.



Follow @DeloitteInsight

Deloitte Insights contributors

Editorial: Kavita Saini, Rupesh Bhat, Aparna Prusty, and Emma Downey

Creative: Kevin Weier, Molly Woodworth, and Anoushriya S. Rao

Promotion: Alexandra Kawecki

Cover artwork: Jaime Austin

About Deloitte Insights

Deloitte Insights publishes original articles, reports and periodicals that provide insights for businesses, the public sector and NGOs. Our goal is to draw upon research and experience from throughout our professional services organization, and that of coauthors in academia and business, to advance the conversation on a broad spectrum of topics of interest to executives and government leaders.

Deloitte Insights is an imprint of Deloitte Development LLC.

About this publication

This publication contains general information only, and none of Deloitte Touche Tohmatsu Limited, its member firms, or its and their affiliates are, by means of this publication, rendering accounting, business, financial, investment, legal, tax, or other professional advice or services. This publication is not a substitute for such professional advice or services, nor should it be used as a basis for any decision or action that may affect your finances or your business. Before making any decision or taking any action that may affect your finances or your business, you should consult a qualified professional adviser.

None of Deloitte Touche Tohmatsu Limited, its member firms, or its and their respective affiliates shall be responsible for any loss whatsoever sustained by any person who relies on this publication.

About Deloitte

Deloitte refers to one or more of Deloitte Touche Tohmatsu Limited, a UK private company limited by guarantee ("DTTL"), its network of member firms, and their related entities. DTTL and each of its member firms are legally separate and independent entities. DTTL (also referred to as "Deloitte Global") does not provide services to clients. In the United States, Deloitte refers to one or more of the US member firms of DTTL, their related entities that operate using the "Deloitte" name in the United States and their respective affiliates. Certain services may not be available to attest clients under the rules and regulations of public accounting. Please see www.deloitte.com/about to learn more about our global network of member firms.