



Trending Insights

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# Digital acceleration

Top technologies driving  
growth in a time of crisis

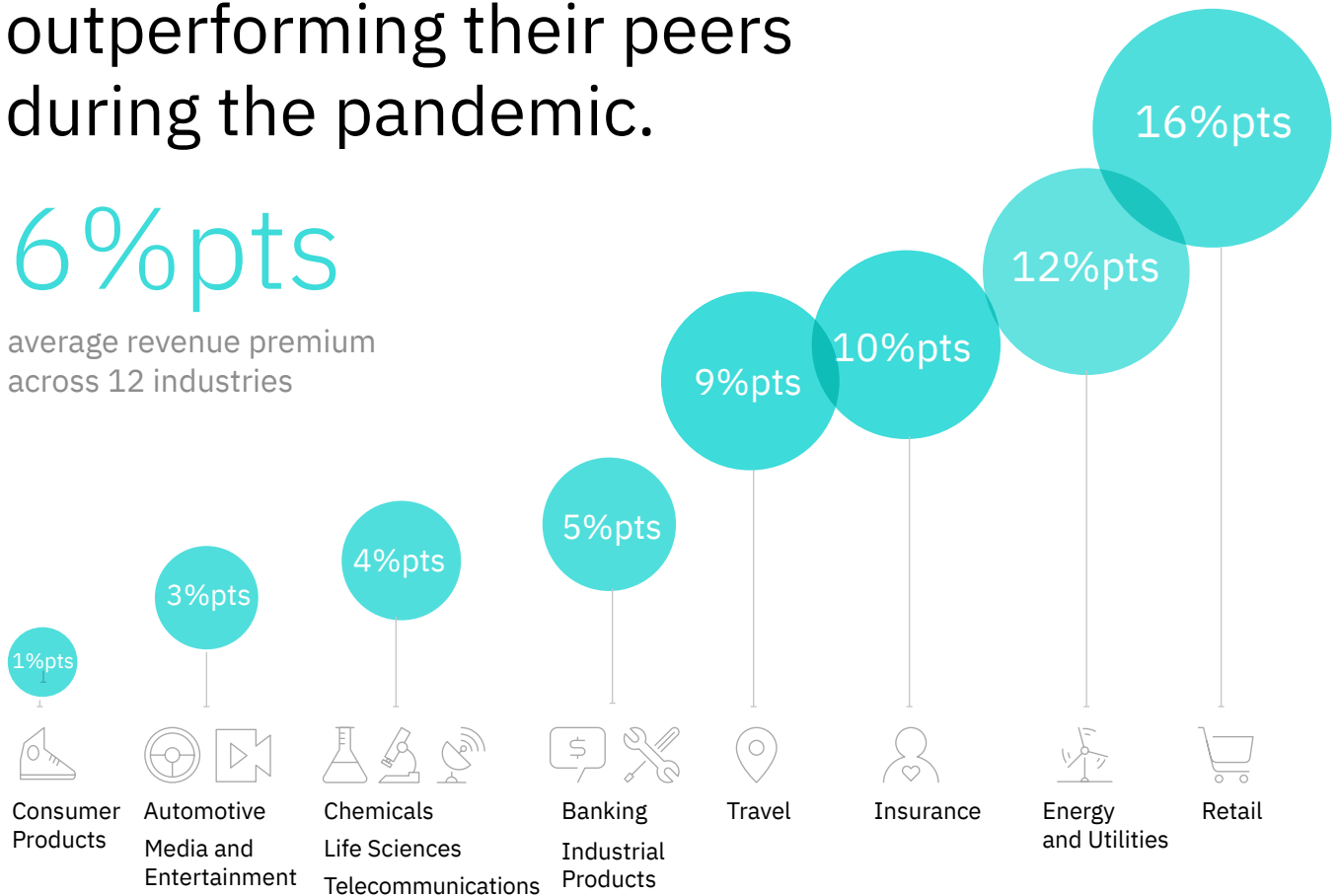
IBM Institute for  
Business Value



# Tech-savvy organizations are outperforming their peers during the pandemic.

## 6%pts

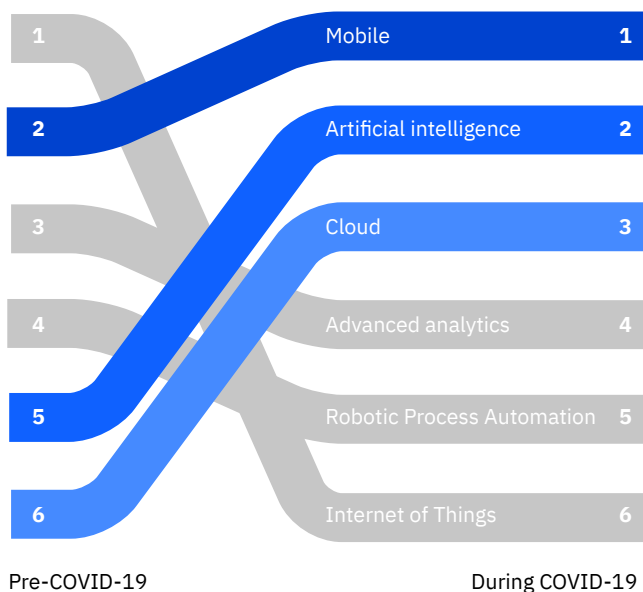
average revenue premium across 12 industries



Percentage represents the revenue growth premium between organizations with high technology adoption (cloud, AI, mobile etc.) and others in each industry. n=1,202

Across industries, the mix of critical technologies to performance contribution before and during COVID-19 has changed dramatically.

Ranking of technologies according to revenue impact



Pre-COVID-19

During COVID-19

n=5,425

Cloud and artificial intelligence have become more important as performance differentiators.

Top performers are

## 74% more

likely to use hybrid cloud to improve security and resiliency of critical business processes

n=6,163



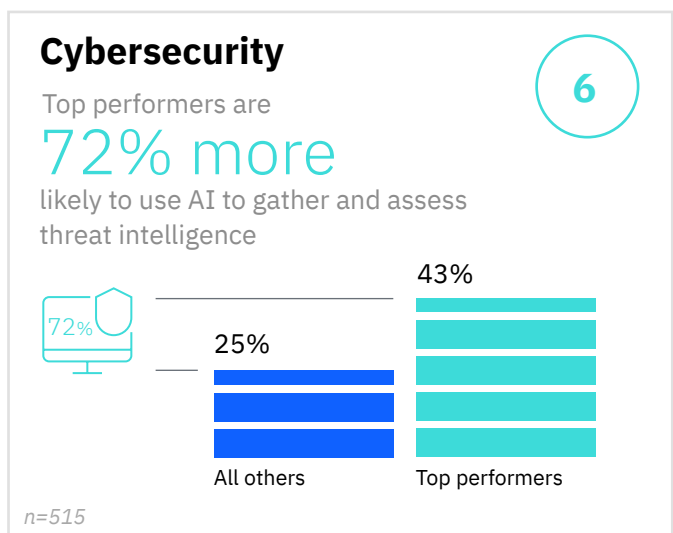
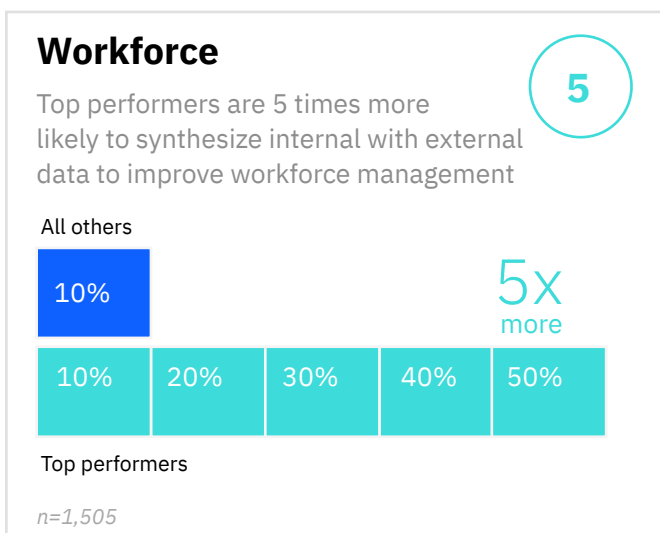
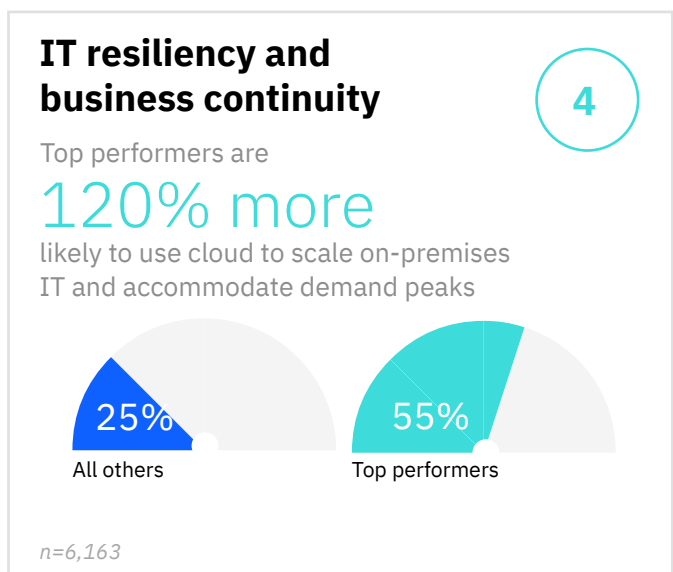
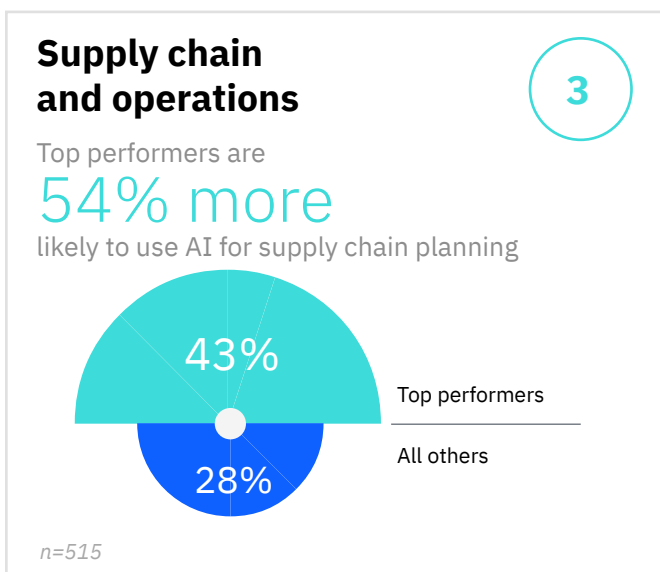
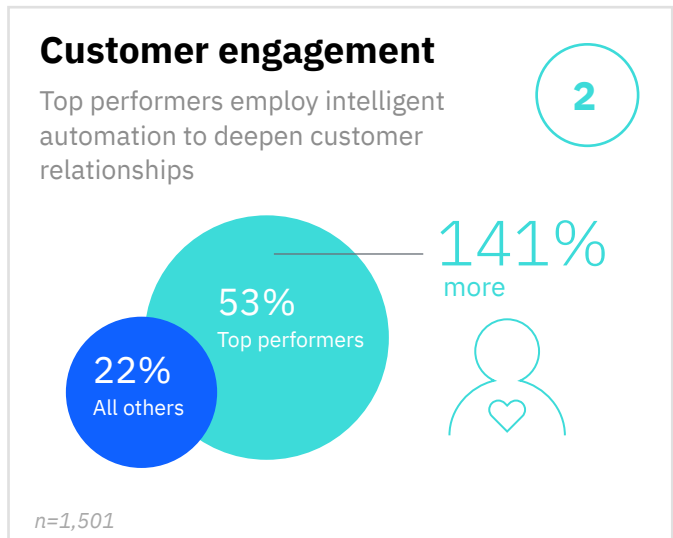
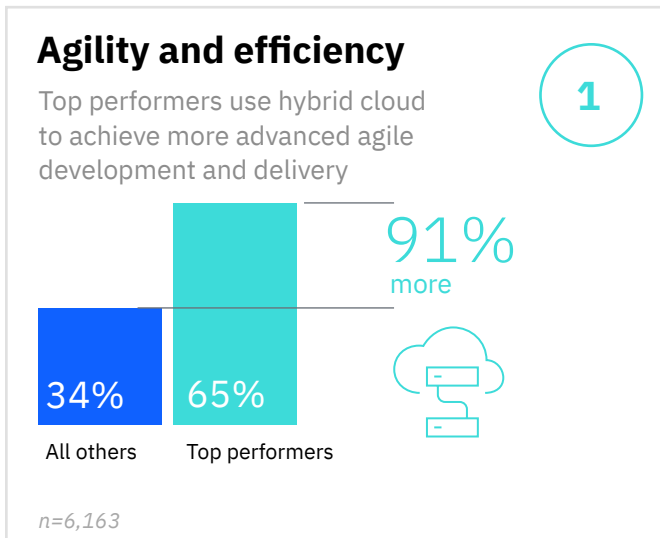
## 6 in 10

organizations adopt AI for customer satisfaction enhancement and customer retention improvement

n=6,700



# Six tech-enabled capabilities are driving success through the pandemic.



Sixty percent of surveyed executives are accelerating their company's digital transformation during the pandemic.<sup>1</sup>

## Chapter 1

### Betting the future

An uneven response to the COVID-19 pandemic has taught us that to operate effectively in the presence of unanticipated crises, organizations need to be agile, robust, and secure. They require the ability to seamlessly engage customers and employees in both physical and digital domains. As many—if not most—organizations fall short of this ideal, current events have been challenging—even painful—as industries and enterprises react and adapt.

Challenges also present opportunities. Recognizing the necessity and opportunity to transform, 60 percent of executives surveyed by the IBM Institute for Business Value (IBV) indicated that they are using this time to dramatically accelerate their company's digital transformation. And fully two-thirds said that the pandemic has allowed them to advance specific transformation initiatives that previously had encountered resistance.

Digital transformation is really all about leveraging technologies to re-invent and improve your business. We know technology is now a core strategic foundation for most enterprises and can be a key determinant of organizational survival and success. So, we asked ourselves how much of this is proving to be true during the pandemic. Which technologies make a difference between high performing and struggling businesses in this period of extraordinary change and challenges?

We used our extensive research data combined with the latest financial performance (H1 2020) to develop a new ground-breaking approach and answer the following questions:

- Are some industries more sensitive to technology adoption than others?
- Are there some key technologies that provide greater impact on performance? Do different technologies play different roles in different industries?
- How has the mix of differentiating technologies in each industry changed during this time of crisis?
- Does the impact of this technology mix vary by key business capabilities? What are the combinations that optimize performance returns?

Here are a some of the key takeaways from our analysis across 18 industries:

- Technology adoption has become a far more important performance differentiator during the COVID-19 disruption. Tech-savvy organizations outperformed their peers by 6 percentage points in revenue growth, on average, across the 12 industries where technology acted as a performance differentiator.
- The “technology mix” recipe for success is changing. Increasingly, cloud and AI are becoming performance differentiators.
- Each industry has a unique “fingerprint.” Technologies that benefit one industry are not always differentiating for another.

In two-thirds of the industries we studied, companies that embraced key technologies have gained a significant revenue premium during the pandemic.

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This is also reflected in a new study of CEOs by the IBM Institute for Business Value (IBV) due to be published later in 2020. That survey suggests that CEOs are firmly set on transforming their organization's technological architecture to achieve the agility and responsiveness needed to successfully navigate the COVID-19 pandemic.

As we have seen during the pandemic, many complex external factors are influencing the relative performance of industries, including: stay-at-home orders, travel restrictions, disruptions of global supply chains, regulatory constraints, and variation in commodity prices. Similarly, we are very clear that many factors influence the performance of a given business, not just technology. However, this research revealed some stark differences in how individual technologies shape organizational performance and how the relative importance of various technologies has changed significantly as a result of the recent disruption.

These and other findings can inform your strategy and help guide and prioritize technology investments. You can use this report to understand how and where you can apply transformational technologies against key capabilities in your business.

As you approach this digital acceleration, keep in mind the bigger picture:

- Invest in market-making business platforms, define a new business blueprint, and apply funds toward existential vs experimental decisions.
- Apply exponential technologies to re-invent the way works get done into intelligent workflows. Use real-time data to guide decision-making, improve outcomes and optimize process performance.
- Unify processes across user experiences and traditional process silos delineated by business unit and/or enterprise applications. Architect and deploy on an hybrid multicloud architecture to “build once, deploy anywhere.”
- Fundamentally change resource focus to creating experiences and human connections, elevate human technology partnerships, and cultivate a new culture of purposeful agility.

## Insight: Retail industry

The revenue premium for technology adoption in the retail industry has been high. Businesses in the top 10 percent of technology adoption outperformed their peers by 16 percentage points on revenue growth during the pandemic. For a typical USD 10 billion revenue company, this is equivalent to a revenue premium for high technology adopters of USD 1.6 billion a year.

## Context and approach

The COVID-19 pandemic has caused unprecedented economic challenges with the G7 countries recording a fall of 10.8 percent in GDP in the second quarter of 2020.<sup>2</sup> The sudden volatility in sales and disruption to supply chains have forced businesses and governments across the world to adapt and innovate (see Figure 1).

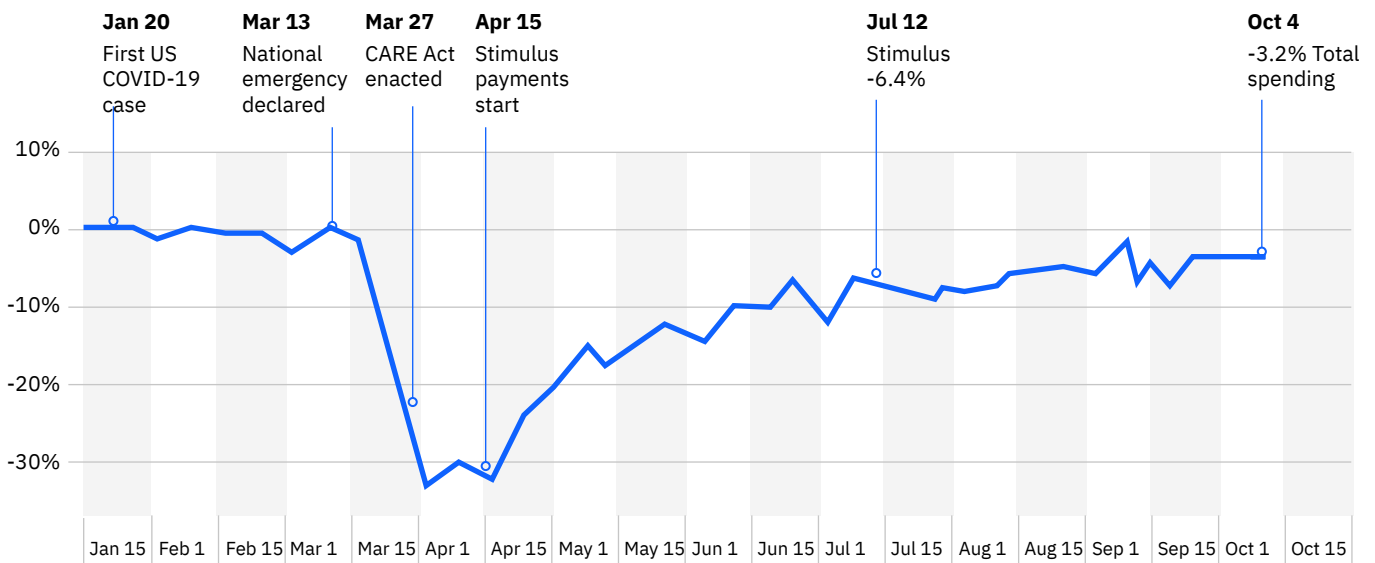
However, not all organizations start on the same footing, or from the same circumstances. And clearly, not all industries are alike. Organizations in some industries tend to be more digitally advanced than others. And the COVID-19 pandemic has affected different industries in very different ways.

Some industries, travel for example, were growing strongly in 2017–2019. Subsequent to the pandemic, however, the industry has experienced a severe decline. By contrast, insurance saw moderate growth in the years prior to COVID-19 but has shown strong resiliency since the onset of the pandemic (see Figure 2).

Similarly, the impact of the disruption on key activities has varied significantly by industry. In retail, for example, 53 percent of companies have seen their supply chains disrupted, while the same holds true for seven percent of utility companies.<sup>3</sup> Such differences in immediate and expected impact by industry have also manifested themselves in stock markets, where the information technology industry on the S&P 500 has increased by more than 25 percent year-to-date while the energy industry has declined 50 percent.<sup>4</sup>

**Figure 1**

COVID-19 causes unprecedented sales volatility

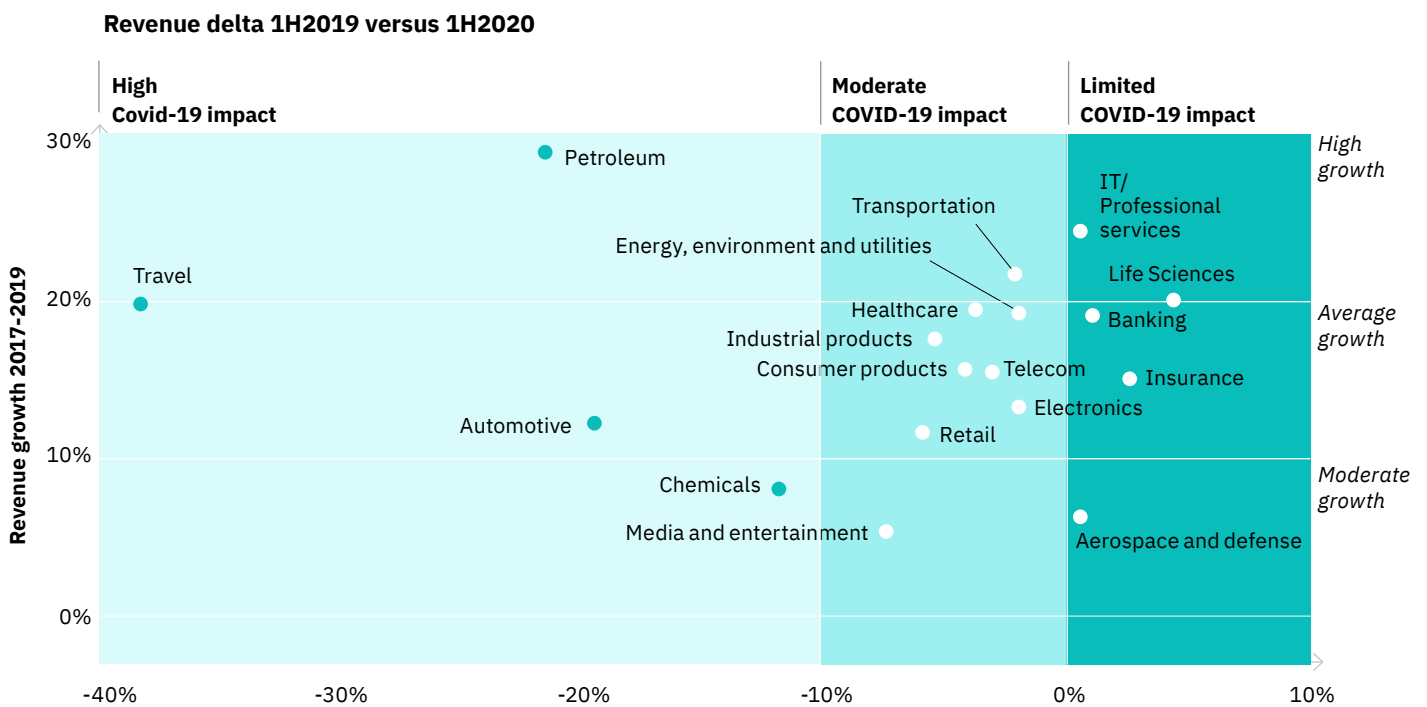


Source: <https://www.tracktherecovery.org>

The mix of critical technologies before and during COVID-19 has changed dramatically, with cloud and AI showing the largest gains.

**Figure 2**

Industries have been impacted differently by COVID-19 and were on different growth trajectories prior to disruption



Source: IBM Institute for Business Value.

In this report, we break down the objective facts and circumstances for industries and organizations. We look at different industries and capabilities, and at how technology decisions affect each of them. Specifically:

- For each major industry—and overall across industries—we ascertain the strategic role of specific major technologies in enabling success and resilience. Measured against financial performance, we examine their relative impact on business outcomes, including whether specific technologies have a bigger impact in some industries than in others. Finally, we establish whether conclusions from each of these analytic approaches remain consistent before and during the COVID-19 pandemic, or if current circumstances have revealed a change in technological relevance and importance.
- Next, diving into what we see as six key capabilities needed to successfully navigate the pandemic, we look at the role and impact of specific technologies, up to and including the recent past. Capabilities range from business continuity to workforce safety and security. This allows us to assess the importance of specific technologies to each capability that help guide organizations’ strategic investments and priorities.
- Finally, drawing from conclusions of our analysis, we present what business leaders can learn from the behavior of organizations that have outperformed their peers during this time.

# High-technology adopters outperformed their peers on revenue during COVID-19 disruption in 12 out of 18 industries analyzed.

## Chapter 2

### Summary of findings

In this section, we provide a rapid overview of the answers to the questions that framed our research.

#### Are some industries more sensitive to technology adoption than others?

Some of our findings were predictable, while others were startling. For example, it may have been predictable that some industries are, indeed, more financially sensitive to technology than others.

And yet, the scope of the sensitivity surprised us. Across the 12 industries where technology acted as a performance differentiator, technology adoption leaders outperformed the revenue growth of their peers by more than 6 percentage points, on average, during the disruption.

In industries such as retail, insurance, energy, environment, and utilities, the most advanced organizations in technology adoption outperformed their peers on revenue growth by more than 10 percentage points.

#### Do some key technologies provide greater impact on performance? How does this vary by industry?

We found that each industry has a unique mix of technologies that helps successful organizations. A “technology fingerprint,” so to speak. Our research shows that mobile, artificial intelligence (AI), and cloud are the technologies that provide the greatest performance impact across industries. Although AI has a relatively low level of adoption across industries, it presents a great opportunity as it delivers a high-performance impact in industries such as life sciences, and banking and financial markets.

Technologies aiding automation—such as robotic process automation (RPA) and robots—have also been providing high performance impact in select industries, mainly in electronics, industrial products and telecommunications.

#### How has the optimal mix of technologies in each industry changed during this time of crisis?

Our analysis of the latest financial results indicates that the technology “recipe for success” by industry is changing. In particular, cloud and AI are increasingly becoming performance differentiators.

In aggregate, Figure 3 portrays the changing dynamics of critical technologies before and after COVID-19. Later, we will show findings by specific industries.

Cloud is an essential technology across industries. The technology has seen the greatest shift in terms of performance impact during this time of crisis across industries. Cloud is now notably supporting performance in industries such as banking and financial markets, aerospace and defense, consumer products, healthcare, life sciences, media and entertainment, and petroleum.

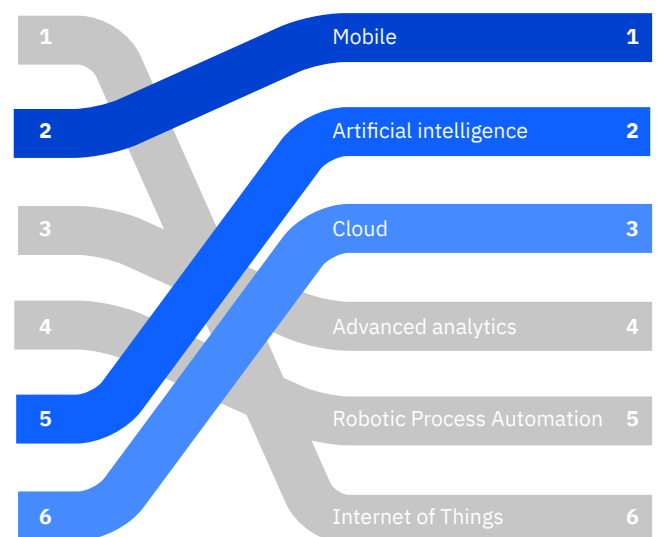
Cloud has become a more important performance differentiator in 11 out of 18 industries analyzed since the pandemic. AI has also seen its role enhanced in several industries.

Meanwhile, technologies such as IoT and robotic process automation are associated with higher performance in industries such as consumer products and electronics. Similarly, advanced analytics acts as an important contributor to performance in some industries. And mobile has increased its performance impact in nine industries.

**Figure 3**

Technologies critical to performance have changed dramatically

Ranking of technologies according to revenue impact



Pre-COVID-19

During COVID-19

Source: IBM Institute for Business Value.



## During COVID-19, AI is driving performance differentiation in 9 of 18 industries we studied.

### **Does the impact of this technology mix vary by key business capabilities? What are the potential combinations that optimize performance returns?**

Drilling down further, we found the most pronounced impact of different technologies for business performance in the supply chain and operations capability. Cloud, data management, intelligent automation and IoT are the leading differentiating technologies. Forty-two percent of executives report that intelligent automation reduced operating costs and 60 percent more outperformers than others use a hybrid cloud management platform to simplify core business processes. AI is also emerging as an important performance differentiating technology for this domain, enabling more responsive and agile supply chains.

While many organizations have prioritized greater use of data as a key area for building competitive advantage, our analysis suggests that hybrid cloud is increasingly important across business capabilities and acts as a greater performance differentiator than data alone.<sup>5</sup> For example, to create greater levels of agility and efficiency, outperformers leverage hybrid cloud almost twice as much as others.

Technologies are playing an increasingly performance-differentiating role in the way the workforce is being effectively employed, engaged, and developed. While cloud and data are important, AI is particularly differentiating for workforce, with outperformers using AI for communication with employees twice as often and almost 90 percent more frequently use AI for employee development and training.

For customer engagement, outperformers are using intelligent automation to deepen customer relationships 141 percent more often and AI to converse and engage with customers 70 percent more often than their peers. Here, too, cloud and data remain key technologies.

Technologies are also deployed within the IT function to support resiliency and cybersecurity. In addition to cloud, automation of key IT processes acts as a significant performance differentiator, with outperformers using intelligent automation to manage risks at more than double the rate of others. AI is emerging as an important technology in these domains, with 6 in 10 organizations adopting AI in their information security functions.

These and other findings can help guide and prioritize technology investments for your own business.

## TSB: Smart Agent for smart banking

TSB, a bank based in the UK, experienced a spike in customer volumes during the COVID-19 crisis for items such as requests for details on how to apply for a repayment holiday on mortgages, personal loans and business loans. The company deployed a “Smart Agent” function to its site in only 5 days, enabling customers to ask a chatbot or live agent about measures the bank is taking during the pandemic. In addition, the company enabled more than 250 employees, most of whom were working from home.

In just over a week, more than 11,000 requests had already been made through Smart Agent, and the feature freed up its branch and call center employees to focus on dealing with the most vulnerable customers and those who needed essential services. Since its launch, Smart Agent has been enhanced further to include the ability to authenticate the identity of customers and the service will also be included within the TSB mobile app.

While differences in the role of key technologies existed prior to the pandemic, the subsequent business disruption and, in some cases, chaos, made the differences much more evident.

## Chapter 3

### Digital technologies for growth and resilience

Across industries, organizations have leveraged technologies to drive competitive advantage. However, the mix of technologies and the manner in which they have been deployed varies greatly from industry to industry, suggesting different levers of success per industry. While differences in the role of key technologies existed prior to the pandemic, the subsequent business disruption and, in some cases, chaos, made the differences much more evident.

Our analysis reveals that in 12 of 18 surveyed industries, businesses with the correct mix of digital capabilities in place fared better and have shown greater resilience in their performance. In some cases, they have even thrived. However, specific technologies supporting resilience are not uniform across industries.

First, we examined if organizations' financial performance in terms of revenue growth was more sensitive to adoption of specific digital technologies than others. To do this, we created an adoption index for digital technologies and compared the financial performance of organizations in the top 10 percent of technology adoption with others in the industry. We looked at the data for both a pre-COVID period (pre-2020) and during the pandemic (the first half of 2020).

We found that not only does technology adoption vary greatly across industries, but the relationship between technology adoption and financial performance showed significant variation between industries. More importantly, technology adoption has become a far more important performance differentiator during the COVID-19 disruption than it was previously.

#### Taming turmoil with technology

In fact, while adoption of exponential technologies such as cloud and AI was only associated with superior financial performance in a few select industries prior to the disruption, recent events have made technology adoption a far more important contributor to business performance across most industries. This suggests that the role of technology in shaping successful performance and operations emerging from the COVID-19 disruption will be very different from the pre-pandemic era.

Indeed, to the extent that the recent turmoil is symptomatic of the global economy entering a new era of elevated risk—with not only pandemics but also greater environmental, political and social risks—there is likely to be a greater premium on successfully leveraging the potential of digital technologies for more resilient and agile organizations in the future.

Moreover, while technology adoption is positively associated with financial performance in most industries during the COVID-19 disruption, the magnitude of the differentiation between high technology adopters and the rest is not uniform.

In retail, for example, differentiation was high. Businesses in the top 10 percent of technology adoption outperformed their peers by 16 percentage points on revenue growth during the pandemic. For a typical USD 10 billion revenue company this is equivalent to a revenue premium for high technology adopters of USD 1.6 billion in a year.

In insurance, and energy and utilities, the revenue outperformance during the pandemic was 10 and 12 percentage points respectively, while in the badly affected travel industry the high technology adopters outperformed their peers on revenue by 9 percentage points.

Overall, across the 12 industries where technology was a significant differentiator amid the COVID-19 disruption, the average revenue premium for high technology adopters was more than 6 percentage points. These findings show that digital technologies have become an important source of competitive advantage during the pandemic.

However, not all technologies are equal, and it is important to understand the unique technology mix that leads to optimal performance within individual industries.

### **Which mix matters most?**

To ascertain the optimal technology mix, and how this mix has changed during the recent disruption, we looked at specific technologies to determine if some provide greater impact on revenue growth than others and how this impact has changed during the pandemic. We also examined how this varies by industry.

For this assessment, we looked at the financial impact of seven key technologies within and across 18 industries. This analysis revealed some stark differences in the role of individual technologies in contributing to organizations' financial performance and how the relative importance of various technologies has changed significantly as a result of the recent disruption.

Cloud has become a more important contributor to revenue performance during the pandemic in 11 of the industries analyzed, most notably in life sciences, healthcare, aerospace and defense, petroleum, and travel and transportation. In these industries, companies that have invested more in their cloud capabilities prior to the disruption have fared significantly better in terms of revenue performance during the pandemic.

AI has seen its role as performance differentiating technology enhanced in nine industries, for example in banking and financial markets, chemicals, industrial products and life sciences where companies that have made significant investment in AI gained revenue premiums during COVID-19 compared to non-adopters.

Given the relatively low adoption of AI in many industries coupled with significant performance impact, this technology offers opportunities for early-mover advantage.

Mobile makes a positive shift in performance contribution in half the industries analyzed and has been associated with improved revenue performance in industries such as retail, insurance, and automotive.

IoT is a significant performance differentiator in select industries such as electronics, energy and utilities, and consumer products. It is also a technology that increasingly is being adopted and becoming more essential in a number of industries, notably those with significant manufacturing activities such as aerospace and defense, automotive, chemicals, and industrial products.

## **Chemicals: Using cloud and AI to drive additional working capital**

COVID-19 impacts on business dynamics caused a major, multinational chemicals company to set aggressive goals for increasing working capital by the end of 2020. An important source of savings for the company is spare parts inventory management, which relies on accurate data on the state of critical inventory and future needs.

This company deployed a cloud/AI platform that uses statistical analysis, prescriptive analytics, optimization algorithms and process automation to help increase profit margins, increase service levels, and reduce unplanned downtime. With the new platform, the company expects to decrease inventory levels by 13.6 percent while improving inventory decisions through data integration, analytics and process automation. It also expects to achieve its goal of an additional USD 50 million working capital by the end of 2020.

In Figure 4, a quadrant chart lays out performance impact on one axis and level of investment on the other. This analysis yields four segments describing roles of technology before and during COVID-19. It also shows the changing dynamics of technology adoption in banking and financial markets and how investment levels and performance impact are correlated.

In banking and financial markets, for example, cloud and advanced analytics are Differentiators, helping organizations stand out in the marketplace, generate improved revenues, and optimize operations. AI is an Opportunity for early mover advantage with limited adoption across the industry, but high-performance impact. Mobile devices are Essentials, suggesting they are very important but also increasingly adopted or deployed by a larger segment of the industry, thus helping drive performance but not acting as a differentiating technology in the marketplace.

Blockchain, RPA and IoT are Emerging, indicating that these technologies have yet to mature to a level where they are significantly impacting business performance in the industry.

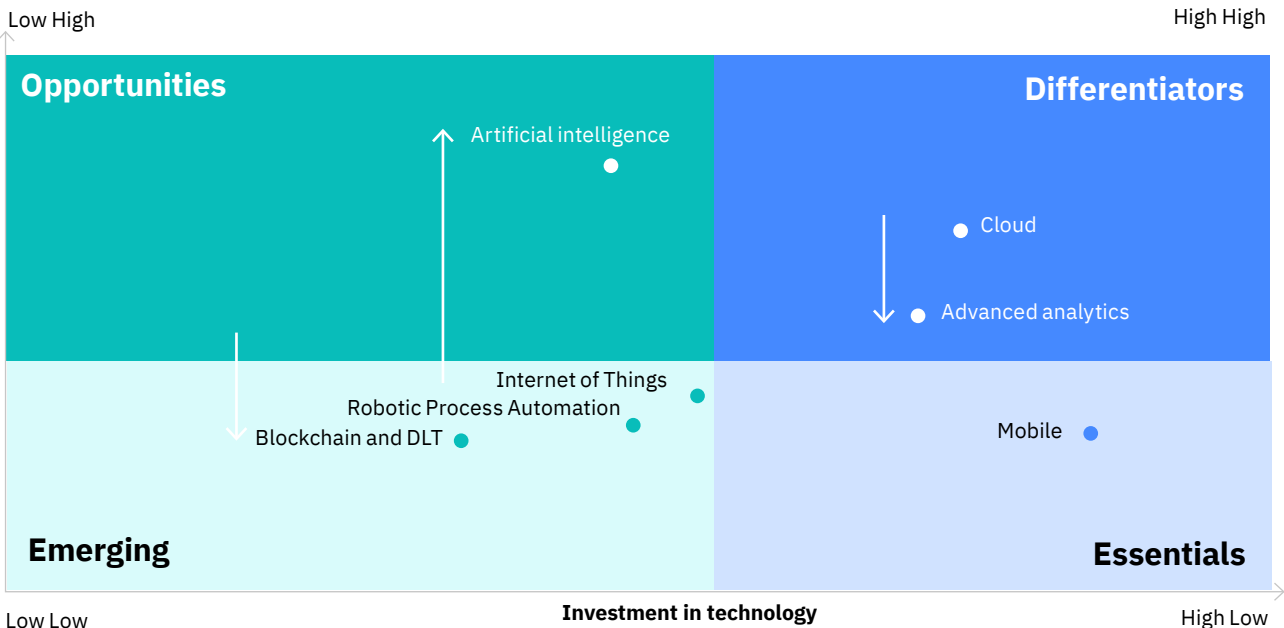
This assessment can be quite different by industry. In industrial products, many of these technologies fall into other quadrants, such as IoT and cloud as Essentials, mobile devices as Differentiators and AI and 3D printing as Opportunities for early mover advantage.

It is evident from the above that the disruption associated with the COVID-19 pandemic has caused a shift in the role of each digital technology across and within industries in shaping business performance. This is not merely a temporary diversion on the longer digital transformation journey. It constitutes a more fundamental change in the capabilities and technologies required to succeed in the future, both during future disruptions and during the next normal.

**Figure 4**

Banking and Financial Markets

**Performance impact of technology**



Source: IBM Institute for Business Value.

Figure 5 shows how each of the industries we studied map to a table of key technologies on one axis and whether they are *Differentiators*, *Opportunities*, *Essentials*, and *Emerging* on the other.

**Figure 5**

Where different technologies fit

	Differentiator	Opportunity	Essential	Emerging
Aerospace and Defense	Cloud	AI, 3D printing, Robots	Analytics, IoT	Mobile
Automotive		Mobile, AI, Autonomous transport	Cloud, IoT, Analytics	Robots
Banking and Financial Markets	Cloud, Analytics	AI	Mobile	IoT, RPA, Blockchain
Chemicals		Mobile, AI, Analytics	Cloud, IoT	RPA, Robots
Consumer Products	IoT	Analytics, RPA	Cloud	AI, Robots, Mobile
Electronics	IoT	RPA, Mobile	Cloud	AI, Analytics, Robots
Energy, Environment and Utilities	IoT, Cloud	Mobile, Analytics, Autonomous transport		AI, RPA
Healthcare	Cloud	AI, RPA, Analytics	IoT	Mobile, Wearable
Industrial Products	Mobile	AI, 3D printing	IoT, Cloud	Analytics, Robots
Insurance	Mobile	RPA	Cloud	AI, Analytics, IoT, Blockchain
Life Sciences	Cloud	AI, IoT, Wearable		Analytics, Mobile, 3D printing
Media and Entertainment	Cloud, Analytics	Virtual reality, RPA	Mobile, IoT	AI
IT and Professional Services		Analytics	Cloud, IoT, Mobile	AI, RPA, Blockchain
Petroleum	Cloud, IoT	AI, Mobile		Analytics, RPA, Robots
Retail	Cloud, IoT, Mobile	Analytics, RPA		AI, 3D printing
Telecommunications	Analytics, Mobile	5G, RPA, AI	Cloud, IoT	Robots
Transportation	Cloud, IoT	RPA, AI		Mobile, Analytics, Autonomous transport
Travel	Cloud, Mobile	RPA, Virtual reality	IoT	AI, Analytics

## Insight: Developing and reading the technology-capability heat maps

The heat maps presented in this report are based on analysis of data from multiple surveys covering different technologies, capabilities, and industries. The data from the different surveys has allowed us to map metrics for individual technologies against different capabilities, and ascertain if they are associated with improved business performance. We have done this across and within individual industries.

For the “overall” heat map, the data has been used to estimate a score of 1-10 for the adoption, use and prioritization given to a particular technology for the relevant capability. A score of 1 represents a low adoption, use, and priority, while a score of 10 is a very high adoption, use, and priority.

For the “performance” heat map, the data has been used to estimate a score of 1-10 of differences between high performers (revenue and profitability) and others in the adoption, use, and priority given to a particular technology for a relevant capability. A score of 1 represents no difference while a score of 10 represents a very high difference, with high performers showing significantly greater adoption, use and priority given to a particular technology for a relevant capability.

## Chapter 4

### Building the capabilities for success

In the prior chapter, we determined that the technology mix for success varies by industry, we are now going deeper and exploring in which specific areas these have the greatest impact.

We established six key operational focus areas that are consistently core for industries in navigating the risks and opportunities associated with COVID-19.<sup>6</sup> Developing these capabilities involves building operating models that appear to drive success in uncertain environments.

The six capabilities are:

- Agility and efficiency
- Customer engagement
- Supply chain and operations
- IT resiliency and business continuity
- Workforce
- Cybersecurity

The way in which these technologies underpin the required capabilities varies not only by industry, but also by capability.

For the first time, our ground-breaking analysis maps key exponential technology priorities against each of the six business capabilities (see Figure 6).

Figure 6 shows:

- Cloud is a foundational technology across all six capabilities. High-performing organizations across industries are making significant use of cloud to drive performance improvements.
- AI, IoT and intelligent automation are beginning to gain traction as catalysts for key capabilities (for example: IoT for supply chain and operations).
- Meanwhile, edge and blockchain are emerging technologies, only moderately explored by organizations for select capabilities.
- Data management is a critical success factor for several capabilities and less so for others.

Six key operational focus areas are consistently core for industries in navigating the risks and opportunities associated with COVID-19.

**Figure 6**

There is a wide variation in the priority given to and link to performance for different technologies by capability

Overall	Agility and efficiency	Customer experience	Supply chain and operations	IT resiliency and business continuity	Workforce	Cybersecurity
Cloud	5	6	5	5	5	6
AI	3	4	3	3	2	4
Edge	2	2	3	1	NA	1
Blockchain	2	2	4	1	NA	3
Intelligent automation	3	4	4	2	3	3
IoT	NA	4	5	NA	NA	NA
Data	8	6	10	NA	3	5

Performance	Agility and efficiency	Customer experience	Supply chain and operations	IT resiliency and business continuity	Workforce	Cybersecurity
Cloud	10	10	8	9	9	10
AI	2	4	4	4	6	5
Edge	2	2	2	3	NA	3
Blockchain	1	2	2	2	NA	1
Intelligent automation	5	7	6	6	5	6
IoT	NA	3	6	NA	NA	NA
Data	9	6	10	NA	9	3

Source: IBM Institute for Business Value.

Now let’s look at each of the key six operational capabilities individually. For each, we summarize this in a simple table: 1) the relative level of adoption of key technologies for each operational capability, and 2) the magnitude of the correlation between the use and adoption of these technologies and financial performance.

From this analysis, we can then attribute each technology to one of the following categories: Differentiating, Opportunity, Essential, or Emerging, as well as highlight key associated business opportunities.

- *Differentiating*: Technologies that are performance differentiating and widely adopted within an industry.
- *Opportunity*: Technologies that are performance differentiating but not yet widely adopted within an industry, offering opportunity for early-mover advantage.
- *Essential*: Technologies that already are widely adopted within an industry but no longer differentiating.
- *Emerging*: Technologies with potential, but have yet to become widely adopted or act as significant performance differentiators within an industry

## Agility and efficiency for a new normal

The world has changed—permanently. Businesses and their customers want stable, predictable operations that are always available and ready. Disruptions due to unexpected events will not be easily tolerated. These requirements need to be met dynamically, intelligently, and effectively.

Our analysis shows that outperformers use their cloud capabilities for more advanced agile development and delivery 93 percent more frequently than others, and 75 percent more often use advanced cloud and data usage to respond to changing expectations.

## Agility and efficiency

Technology	Use and adoption	Performance differentiating	Role	Key opportunities
Cloud	Medium	High	Differentiator	Support agile development workflows, accelerate development velocity, improve release velocity, operate with high availability
AI	Medium-Low	Low	Emerging	Explore opportunities to use for supporting faster and better operations
Edge	Low	Low	Emerging	Explore for improved real-time visibility and accelerated and localized decision making
Blockchain	Low	Low	Emerging	Automate workflows across multiple organizations while improving data integrity
Intelligent automation	Medium-Low	Medium	Opportunity	Transform workflows and decision making for improved business results
Data management	High	High	Essential	Improve visibility, responsiveness and speed-to-market

## US Open: Serving up a virtual fan experience

At the 2020 US Open in New York, fans could not attend in person due to COVID-19 protocols. But that didn't stop the United States Tennis Association from using cloud and AI to provide millions of fans with enhanced virtual experience.

The new solutions and the technology powering them include:

- *Open Questions*, which gave fans the ability to engage in tennis debates among fans on USOpen.org. Open Questions used AI to analyze millions of news and sports sources for insights. That unstructured data was analyzed, summarized and ultimately delivered as pro and con arguments. Fans were able to share their opinions on the debates.

- *Match Insights*, which used AI to allow fans to become instant “experts” about the players and the tournament matchups. Match Insights searched for and understood millions of articles, blogs, and thought leaders leading into a match, to gather the most relevant information and translate it into narrative form, giving fans fact-based insights on the players.

- *AI Sounds*, which leveraged AI to recreate crowd sounds based on hundreds of hours of video footage captured during the 2019 tournament. The AI Sounds tools were used by the production teams in-stadium and at ESPN.

The new tools were underpinned by hybrid cloud to handle the variety of workloads. This hybrid cloud architecture gave the USTA's digital operation the flexibility and hyper-scale it needed to quickly embrace remote work while maintaining productivity and ensuring the highest commercial level of data security.



## Driving deeper for better customer engagement

Organizations need to get more out of their data to empower their customers and employees and enhance their experiences in response to increasing demands for personalization—all while making marked improvements in efficiency and agility.

Outperformers use cloud technologies 60 percent more than all others to deliver consistent customer service. They are also delivering self-service user experiences on the cloud 76 percent more often.

## Customer engagement

Technology	Use and adoption	Performance differentiating	Role	Key opportunities
Cloud	Medium-High	High	Differentiator	Improve customer and user experience and use shared data to deliver integrated services and greater lifetime customer value
AI	Medium	Medium	Opportunity	Use AI for better customer engagement and satisfaction
Edge	Low	Low	Emerging	Explore for predictive sales at point-of-sale
Blockchain	Low	Low	Emerging	Provide transparency into the sourcing and production of goods consumed
Intelligent automation	Medium	High	Opportunity	Leverage automation for customer insight and real-time response
IoT	Medium	Medium-Low	Emerging	Explore for improved insight into customer behavior and use
Data management	Medium-High	Medium-High	Essential	Use data to improve customer trust

## Grocery store chain: AI-based virtual agent provides food for thought

A US-based grocery chain that operates more than 1,000 stores was inundated with questions about the impact of COVID-19. Handling these questions efficiently and effectively became a significant staffing challenge that led to conversion rates lower than pre-pandemic levels. The company deployed an AI-based virtual agent across its voice, digital, and mobile platforms.

In less than two weeks, the grocer integrated the smart assistant into the complete customer engagement experience, handling frequent COVID-19 questions. In the first 10 days of operation, the virtual agent handled 53,000 interactions and answered 16,000 questions leading to an 80 percent reduction in the customer abandonment rate.

## Nationwide Building Society: Helping members with AI

Nationwide Building Society, in the UK, wanted to improve its ability to answer questions about mortgage support for those impacted by coronavirus.

The company began using a virtual agent to support Nationwide's teams by learning how to respond to some of the most common mortgage queries. In addition to providing swift responses to tens of thousands of inquiries since late March, hundreds of hours have been freed up for human agents to handle with more complex queries during these difficult times.

Notably, Nationwide was able to build, test, and roll out the service in just four days. In addition to dialogue to respond the system learned to comprehend intent and understand how a similar question could be asked in several ways. When it is not able to answer a query, it can pass the member over to a fully trained mortgage advisor to help during the same online chat experience.

## Hyper-responsive supply chains and operations

The onset of the pandemic saw supply chains stressed, strained, or in some cases, shattered. AI and automation can help organizations sense and respond to evolving demands while driving new levels of efficiency and flexibility. This intelligence can also be applied to all core enterprise workflows.

Three in four outperforming organizations see IoT as important for their operations. That is 33 percent more than all others. And six in ten outperformers are using cloud to simplify operations, 63 percent higher than their peers.

Top performers are using AI for supply chain planning 54 percent more frequently than their peers.

## Supply chain and operations

Technology	Use and adoption	Performance differentiating	Role	Key opportunities
Cloud	Medium	High	Differentiator	Modernize core business processes, share data across SaaS applications, create and/or participate in industry ecosystems and platforms
AI	Medium-Low	Medium	Opportunity	Improve supply chain planning, resource use and forecasting
Edge	Medium-Low	Low	Emerging	Explore for improved asset management and real-time optimization of manufacturing processes
Blockchain	Medium	Low	Emerging	Digitize paper-based processes across supply chains to speed up, while improving sourcing and production of goods
Intelligent automation	Medium	Medium-High	Differentiator	Drive reduction in operating costs, improved asset management, production efficiencies and maintenance
IoT	Medium	Medium-High	Differentiator	Real-time insights and analysis of supply chain and operations
Data management	High	High	Differentiator	Improve operational efficiency and visibility

## Oil company: Delivering during the pandemic

One of the largest commercial oil companies in India knew that panic buying during the pandemic would hurt its ability to deliver essential cooking gas to customers. The company has implemented the integrated CRM and DMS platform and mobile app to mitigate disruptive effects, in addition to providing trusted delivery information and quick booking for services. Automated emergency checks monitor repeated refills, as well as demand forecasting to help state agencies balance the bookings.

The app supports marginalized communities, issuing direct relief payments from the government and alerting customers of retail locations offering free food. It also helps reduce disruptions of deliveries to consumers, sustaining the delivery of around 3.0 million cooking gas refills per day.

## Mondelez: Using AI for supply chain demand sensing

Mondelez, a multinational confectionery, food, beverage, and snack food company found that customers were more interested than ever in tracking orders and delivery during the pandemic. To respond, the company needed to improve its capabilities in planning and forecasting demand, merchandise, and its enormous supply chain.

Mondelez responded by creating a COVID-19 command center that employs AI-based machine learning for improved understanding of real-time consumer demand patterns. The company also is using machine learning in advanced analytics for on-demand consumer intelligence while eliminating substantial mundane tasks.<sup>7</sup> The command center is expected to reduce out-of-stock by 20 percent during the duration of the pandemic, driving more than a USD 20 million benefit in avoided lost sales and additional benefits on supply chain efficiency.

## Strengthening IT resiliency and business continuity

During COVID-19, organizations have been put to the test, at a massive scale, whether due to the huge spike in volume of transactions (such as financial transactions, digital commerce, or call center volume), or the stay-at-home orders requiring employees to get the same work done remotely.

High performers are leveraging more sophisticated cloud adoption as a competitive differentiator, with high performers using cloud technologies to improve security and resiliency of critical business processes 71 percent more frequently than others. They are also using intelligent automation for risk management 148 percent more than their peers. And they use AI to develop and manage IT resilience and risk more than 30 percent more often.

### IT resiliency and business continuity

Technology	Use and adoption	Performance differentiating	Role	Key opportunities
Cloud	Medium	High	Differentiator	Improve resiliency of core business systems, run applications on multiple clouds to mitigate outages and threats to business continuity, enable automatic scaling in response to spikes in demand
AI	Medium-Low	Medium	Opportunity	Manage IT resiliency and risk and improve support services
Edge	Low	Low	Emerging	Explore for securing data at point of action
Blockchain	Low	Low	Emerging	Enable buyers to work with new suppliers rapidly
Intelligent automation	Low	Medium-High	Opportunity	Improve risk management and reliability

## Retail: Challenge meets opportunity

After the pandemic hit, one of the UK's largest health retailers saw a 50 percent increase in online orders as customers switched to home deliveries. Bottlenecks in warehouse operations threatened the retailer's ability to deliver essential and healthcare products.

The company adjusted its e-commerce model prioritizing essential medicines and other healthcare products and support. It also implemented virtual queues to manage traffic on the website and double the frequency of software releases to deliver new critical capabilities which enhanced its ability to manage the new workload.

## JBM Group: Avoiding disasters with disaster recovery

JBM Group, a USD 2.2 billion global Indian conglomerate, faced a huge challenge. It needed to create a single, streamlined access sourcing point for its supply chain with no downtime for its B2B customers such as OEMs and alliances, including more than 20 renowned global companies.

The company put its disaster recovery on a cloud service model. One of JBM's objectives was to provide a sustained tool for business transactions. The entire cloud model, which now stores six terabytes of data, was implemented in five weeks.

The company says the new solution has helped it achieve "always on" enterprise, driven by disaster recovery on the cloud and IT optimization as-a-service delivery mode. JBM's improved technology compliance also has improved stakeholders' confidence.

## Reimagining workforce capabilities

It has long been said that for many organizations their most important assets walk out the door everyday: their people. When the pandemic started, many walked out and could not return. Ready or not, work-from-home became the norm for millions of employees. Now, companies want to prepare them to return to work with confidence by prioritizing the wellness of employees and the safety of workplaces. Ninety-two percent of executives state that workforce safety and security will be a high priority in the next two years, a more than two-fold increase compared to

two years ago. They can start by adjusting and optimizing the deployment of the workforce, and reimagining work and the work environment at every level.

Outperformers use cloud to improve employee experiences at nearly double the rate of others. They are using AI for employee communication, development, and training more than 85 percent more often. And they combine internal HR data with data from outside the firewall to improve workforce management five times more frequently than others.

## Workforce

Technology	Use and adoption	Performance differentiating	Role	Key opportunities
Cloud	Medium	High	Differentiator	Improve the user experience for developers and operators, improve employee-facing services, simplify workflows, improve collaboration and support for remote work
AI	Low	Medium-High	Opportunity	Identify and manage skills needs and improve employee communication, development and engagement
Intelligent automation	Medium-Low	Medium	Opportunity	Improve workforce performance, free up staff for higher value tasks and improve employee safety
Data management	Medium-Low	High	Opportunity	Improve HR insights and get visibility into skills supply and demand

## Minerals firm: Leveraging AI to keep workers safe

A mineral extraction company seeking to protect its workforce during the COVID-19 outbreak is piloting an interactive AI-powered chatbot. The chatbot is pre-trained using data from the Centers for Disease Control and Prevention to keep employees informed about the virus and its symptoms.

The AI solution identifies the symptoms associated with COVID-19, and provides recommendations aimed at ruling out or confirming the possible presence of the virus. Employees have access 24 hours a day, through voice or text, to self-monitor for COVID-19 symptoms.

## Glintt: Is this bed available?

Hospitals in Portugal had tools that told them which patient was in which bed, but were unable to predict when those beds would become available for future patients.

Glintt, an IT solutions integrator with deep healthcare expertise, based in Portugal, developed “WiseWard,” a solution that predicts when hospital patients will be discharged, five to seven days in advance, thereby helping optimize bed assignment decisions.

WiseWard automatically predicts hospital discharges five to seven days ahead. The difficulty of this task involves numerous variables, include surgery schedules, age and condition of the patient, staff schedules, and more.

Glintt has seen a 30 to 50 percent increase in bed manager productivity. Better scheduling also allows better use of resources and higher revenues. And the improved workflow creates an improved patient experience.<sup>8</sup>

## Enterprise-wide cybersecurity

The new normal has created new ways of working. It also has created new opportunities for cyber criminals. For example, it's been reported that hospitals struggling to cope with caring for COVID-19 patients have been targeted by cyber criminals seeking to exploit the strain on hospitals' resources.<sup>9</sup> Since the World Health Organization declared a pandemic on March 11, there has been a 6,000 percent increase in spam, phishing, and other cybersecurity issues related to COVID-19.<sup>10</sup> While many individuals are out of work, cyberattackers are busier than ever. Organizations

need to build their security strategy, protect their digital users, assets and data, and defend against threats—all with a modern, multicloud approach. The need to build security into the fabric of the enterprise isn't just idle talk.

High performers use AI 71 percent more frequently than others to gather and correlate business threat intelligence. Cloud is 71 percent more often used by these high performers to improve security and resiliency of critical business processes. Also, they use AI 37 percent more than their peers to respond to security incidents.

## Cybersecurity

Technology	Use and adoption	Performance differentiating	Role	Key opportunities
Cloud	Medium-High	High	Differentiator	Improve security of applications and data, enable compliance with data privacy regulations, enable compliance with enterprise security policies
AI	Medium	Medium	Opportunity	Monitor and detect security threats and respond to incidents
Edge	Low	Medium-Low	Emerging	Explore securing data at point of action
Blockchain	Medium-Low	Low	Emerging	Explore for better security against fraud and digital identity management
Intelligent automation	Medium-Low	Medium-High	Opportunity	Improve information security
Data management	Medium	Medium-Low	Essential	Improved visibility and reduced risk

## Education department: Using cloud for remote access

During the pandemic, a large US municipal education department is using cloud to quickly and securely scale up a remote learning environment. As a result, two million students, staff, and parents have been granted remote access to their devices in order to continue their day-to-day life as the department adjusts to COVID-19.

## Major hospital: Operating with remote security support

A major hospital in Spain received a ransomware attack during COVID-19. Fortunately, the hospital had engaged with a leading security supplier that provided remote security support. Working together virtually, they thwarted the attack, freeing their systems without paying ransom.

There is a need to blend technologies with the right capabilities, and the right mix of technologies varies by industry.

## It is not one-size fits all; each industry has its own optimal fingerprint

Finally, when zooming in on individual industries and the role that different technologies play, the particular challenges and opportunities of a given industry give rise to different technology priorities. For example, when conducting a similar “heat map” analysis for two industries—automotive and banking and financial markets—marked differences are found.

While cloud technologies are important for both industries, it is more of a competitive differentiator in banking and financial markets. In contrast, AI for customer engagement is a particularly differentiating use of technology within the automotive industry. High performers in the automotive industry are 257 percent more likely to be using AI to evaluate customer satisfaction and 32 percent more likely to have adopted AI in their customer service function.

In banking and financial markets, there is growing use of intelligent automation to support various capabilities and processes, and it is particularly differentiating among high performers for customer engagement. For example, high performers in banking and financial markets leverage automated processes and self-learning software to deepen customer relationships over four times more than their industry peers.

In automotive, intelligent automation is more differentiating for supply chain and operations. For this capability, automotive organizations are also using IoT for improved performance, with 71 percent of organizations identifying IoT as being important for their operations.

These findings indicate that there is a need to blend technologies with the right capabilities, and that the right mix of technologies varies by industry. Achieving the right mix for your particular industry will act as a catalyst for short-term success, as well as provide the foundation for transforming your organization for the future.

## Chapter 5

### Action guide

Recent events have shown that many of the operating assumptions underpinning organizations' business strategies have become redundant—sometimes even harmful, and, on occasion, fatal.

But despite the human tragedy of COVID-19, executives are telling us the crisis is also making transformational change easier—and faster. The pandemic has given visionary business leaders an opportunity to fundamentally rethink their business. When nothing is normal, the challenging can become the everyday.

But change requires business leaders to step outside their traditional paradigms. It requires a reassessment of an organization's purpose, culture, markets, core business, and operating model. It requires new ways of working, new processes, and new organization. And most importantly, a new vision to thrive in the post-pandemic world.

Our analysis demonstrates that over the recent past, leading organizations have not only responded faster to the challenges impacting them, they have also been more effective in developing core differentiating capabilities and—as we have seen—accelerating their transformation agenda.<sup>11</sup>

And as we indicated earlier, these conclusions are being further validated by our ongoing surveying of 3,000 CEOs around the world.

Leaders have reconsidered the importance of digital technologies to shape business and operating models for the future. Over the past year or so, the rise of the exponential technologies we cover in this report has teed up a new era of business architecture change. We call this revolutionary change “The Cognitive Enterprise.”<sup>12</sup>

During the pandemic, uncertainty has reigned, and our ability to be where we want or need to be is not assured. Leaders have started to rethink and redesign their Cognitive Enterprise transformations for a changed world that is now predominantly virtual.

In this new Cognitive Enterprise, intelligent workflows afford a new “center of gravity” that motivates seamless processes across organization and ecosystems. High-value experiences are delivered virtually to not only customers, but employees and partners, necessitating deep re-wiring, new organization, and new ways of working. Intelligent automation enabled by AI and cloud—we saw repeatedly in our analysis—revolutionizes how work gets done free of physical and location constraints, reducing the mundane and expanding customer, employee, and partner empowerment across the ecosystem.

Intelligent sensors and real-time insights augment human capabilities to deliver better, faster responses. Real-time adaptability and agility become commonplace, expanding differentiation and competitiveness.

But realizing the vision requires immediate action.

We have identified nine action areas that are crucial to making progress and creating the preconditions for success:

#### **Market-making business platforms:**

- Double down on “big bets”: Selecting core market-making platforms are existential, not experimental, decisions. New platforms and their value should be reflected in a company's external narrative.
- Create a new business blueprint: Include the target operating model, decision framework, culture and skills, roles and responsibilities, as well as how people and AI work together in a business platform context. The blueprint helps identify and execute strategic priorities, anticipate how changes ripple across the organization, and where to relocate resources.
- Orchestrate compelling change: Historic techniques are not fit-for-purpose in the environment of the Cognitive Enterprise. A control tower, which monitors environmental conditions in real time, provides alerts and tracks the moving parts of change initiatives, as well as the underlying business performance and outcomes.

### **Intelligent workflows:**

- Embed exponential technologies: AI, IoT, automation, blockchain, and 5G can be leveraged at scale and in combination to truly change the nature of workflows. A critical requirement is to work out how and where these technologies can have the most impact and drive the biggest returns
- Drive value from data: Data readiness is a pre-condition for value—and readiness includes attributes such as accuracy, cleanliness, standards, openness, and permission. It is estimated that 80 percent of the effort in deploying AI is getting data ready for use.<sup>13</sup>
- Deploy through hybrid multicloud: Hybrid cloud architectures can release the value of trapped data and functionality, along with handling the transition between old and new applications. Hybrid cloud also can de-risk architectural choices through “build once, deploy anywhere” approaches.

### **Enterprise experience and humanity:**

- Elevate human-technology partnerships: Automation will handle repetitive tasks while platforms and workflows will surface new spaces for insight, creating new areas for humans to add value. As humans adopt better tools, they will “up their game” and as the technology becomes more intuitive, their adoption of it will increase.
- Cultivate smart leadership, skills, and culture: As business platforms straddle industry boundaries, leaders will need to look outside traditional industry networks to seek insights. The ability to communicate unambiguously about the organization’s intent is more critical than ever
- Perform with purposeful agility: Agile ways of working can have huge value, but they need to be made more purposeful for greater effectiveness and efficiency. In addition, purposeful agility helps define the business architecture and other architectural choices.<sup>14</sup>

As your organization attempts to make this shift, you should consider three important guidelines:

- Organizations must work to secure both the human and machine elements along intelligent workflows, data sources, their attendant applications, and the underlying infrastructure.
- Security of business platforms will be critical to trust and their longevity, but companies need to balance this with frictionless customer and employee experiences.
- The ecosystem of business platforms requires an open network approach to security across all parties, driving collaboration and insights at speed.

The post-COVID-19 business environment will look vastly different than the beginning of 2020. The need and the opportunity for digital transformation will never be clearer. This report can help you understand how and where to apply digital transformation against key capabilities in your industry. The race to determine the next generation of outperformers has started. Is your organization ready to take the lead?



## Research methodology

Our approach to this study has drawn on data from multiple different surveys covering different aspects of technology use and its relationship to business priorities and performance.

### **Technology adoption and business performance by industry**

We have created a technology adoption index for each industry to understand its relationship to business performance. For each industry, we identified the five most important technologies based on the share of companies in the industry having made some investment in the technology. The technology adoption index is calculated as the average level of investment (scale 1-5) in this selection of technologies.

Based on the calculated technology indices, we then identified the top ten percent technology adopters within each industry. Linking the technology adoption index to financial performance (average revenue growth rate in 2017-2019) for the top ten percent of adopters and the rest we identified the difference in financial performance. The same was done against performance during the COVID-19 disruption by looking at revenue resilience estimated as the percentage change in revenue between 1H2020 and 1H2019. This was done for each industry.<sup>15</sup>

### **Technology categorization and prioritization by industry**

To get a more nuanced view of how individual technologies contribute to business performance, we conducted multivariate regression analysis.

For the first analysis, we had average annual revenue growth in the period 2017-2019 as dependent variable in order to ascertain the relationship between technology investment and revenue performance prior to COVID-19.

To test the relationship between technology investment and business performance during the COVID-19 disruption, we ran regression runs with the delta in revenue between first half of 2020 and first half of 2019 as a percentage of revenue in the first half of 2019 as dependent variable.

The findings from the regression analysis as well as the technology investment data were combined to create a categorization of technologies by industry along two principal dimensions: Investment in a given technology along the x-axis and the relationship between investment in that technology and revenue performance (as measured by the coefficient in the regression run) on the y-axis. This allowed us to categorize technologies per industry as follows: Differentiating technologies that are being invested in and are creating significant performance impact; Essential technologies that are being widely invested in but are not associated with significant differentiation in business performance; Opportunities that are not yet widely invested in but linked to significantly better business performance; Emerging technologies that are not yet widely invested in nor associated with significant business performance impact.

### **Technologies for different capabilities**

To understand the role of different technologies in shaping the relevant operational capabilities for the future, we looked in more detail at technology adoption and priorities for specific functions and operating objectives. To this end, we drew on data from multiple surveys covering different technologies and their use across functions. The relevant data for each technology was mapped against six core capabilities, creating a heat map that shows the role of different technologies by capability.

Two heat maps were created: one showing the overall adoption, prioritization, and use of technologies by capability, and one looking at the difference in adoption, prioritization, and use of technologies by capability between high performers (on revenue and profitability) and others. Looking at technology adoption, prioritization and use through these two lenses provides insight into how technologies are being used on the one hand and whether they are associated with differentiating business performance on the other.

Where data allowed, we also conducted this analysis for a selection of individual industries, to ascertain how the use and differentiating impact of technologies by capability varies by industry.

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## Trending Insights

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