

The AI-powered enterprise:

Unlocking the potential of AI at scale



Introduction

Artificial intelligence offers the chance to change the way we do business, from delivering operational efficiency to massively increasing our understanding of customers and markets. As a result, companies across sectors are engaged in an AI arms race, with investments pouring into AI startups across industries. Just in the US, AI-related firms had raised \$18.5 bn in investment by 2019.¹

Back in 2017, we took a deep dive into AI in our global research – Turning AI into concrete value: the successful implementers’ toolkit – for which we surveyed a thousand organizations that were at various stages of AI deployment. Three years on, we want to see what progress has been made in democratizing this high-potential technology and understand the short-term impact of COVID-19 on AI investments.

This report draws on a survey of 950 organizations, with at least one billion dollars in annual revenues and ongoing AI initiatives, as well as in-depth interviews with relevant executives. The research shows that over 50% of organizations have moved beyond pilots and proofs of concept. Although the ones reaching wide-scale, with use cases in production across numerous teams, are only 13%, they are able to reap substantial benefits, including growth in their topline.

This report focuses on the following areas:

1. The extent to which organizations are able to scale their AI initiatives, and the impact that COVID-19 has had on progress and investment
2. What characterizes the high-performing minority of organizations that do successfully reach scale (a cohort we call our “AI-at-scale leaders”)
3. The four principles that organizations should focus on to successfully scale AI:
 - Empower: Build strong foundations that provide easy access to trusted, high-quality data, drawing on the right data and AI platforms/tools as well as agile practices
 - Operationalize: Deploy AI through the right operating model, prioritize initiatives and ensure well-balanced governance while at the same time embedding ethics
 - Nurture: Build talent and collaboration with partners
 - Monitor and amplify: Kickstart the virtuous AI circle: Continuously monitor model accuracy and business impact to amplify outcomes.

What is Artificial Intelligence?

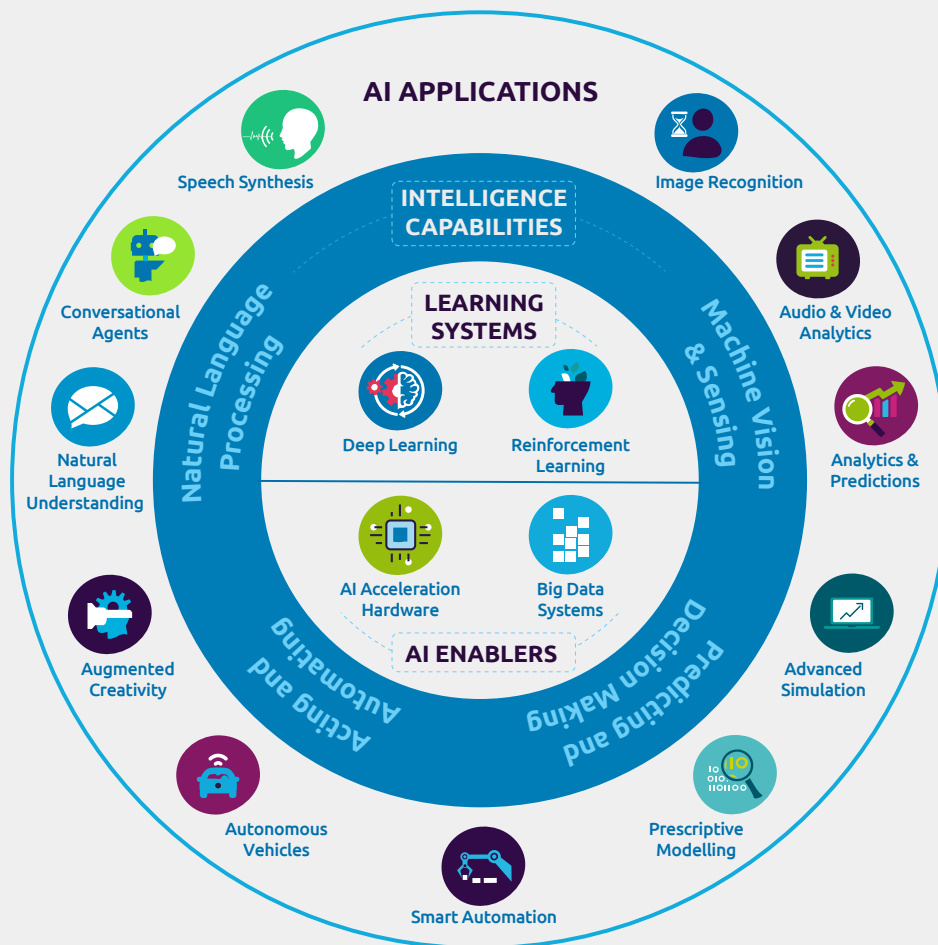
Artificial intelligence (AI) is a collective term for the capabilities shown by learning systems that are perceived by humans as representing intelligence.

These intelligent capabilities typically can be categorized into machine vision and sensing, natural language processing, predicting and decision making, and acting and automating.

Various applications of AI include speech, image, audio and video recognition, autonomous vehicles, natural language understanding and generation, conversational agents, prescriptive modelling, augmented creativity, smart automation, advanced simulation, as well as complex analytics and predictions.

Technologies that enable these applications include automation, big data systems, deep learning, reinforcement learning and AI acceleration hardware.

Figure. AI Taxonomy



Source: Capgemini Insights & Data.

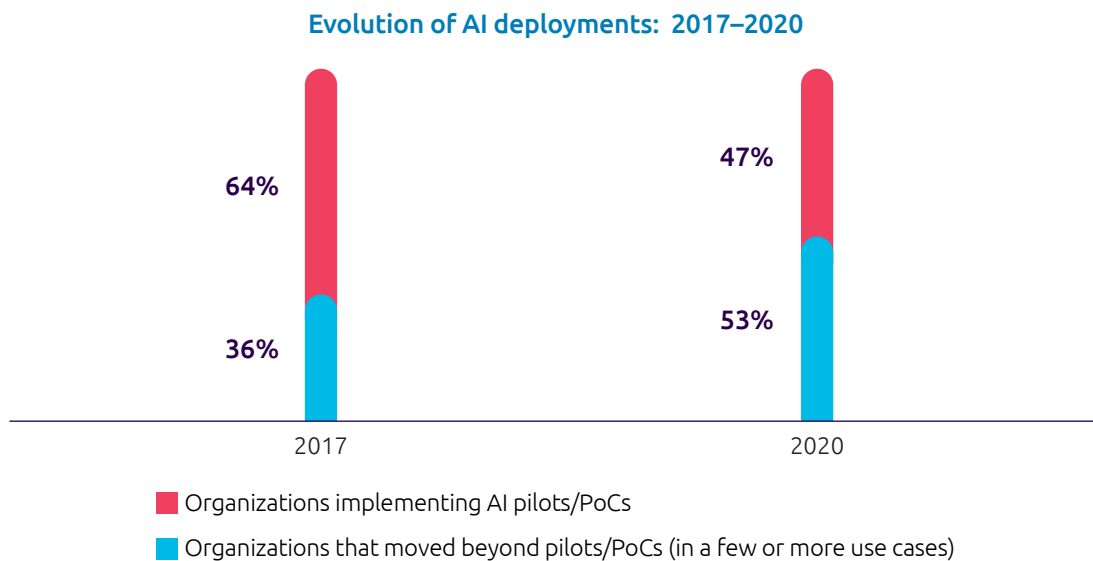
1. Scaling AI is proving to be tough, but more organizations are moving beyond pilots

Just over one in two organizations have moved beyond pilots and proofs of concept

Compared to 2017, our current research shows that AI has

penetrated further into ways of working. In our original 2017 research, we found that only around a third of organizations that had moved beyond pilots/proofs of concept were actually able to deploy a few or more AI use cases in production. Today, as Figure 1 shows, this has climbed to just over half of organizations (53%), marking an important threshold in wider-scale deployment of AI.

Figure 1. Percentage of organizations that moved beyond AI pilots/pocs increased to 53%



Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=954 organizations implementing AI; State of AI survey, June 2017, N=993 organizations implementing AI.

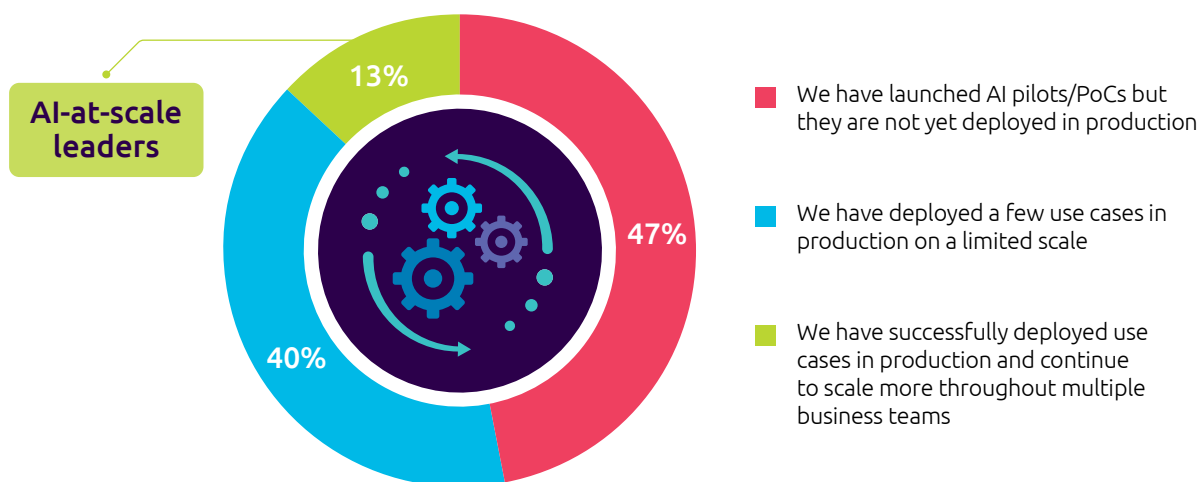
However, while progress has been made in moving beyond pilots to deployment, scaling those AI deployments across the enterprise has proven to be tough. As Figure 2 shows, only 13% have rolled out multiple AI applications across numerous teams. We call these 13% of organizations the **AI-at-scale leaders**. In contrast, we also identified a cohort of organizations that began AI pilots before 2019 but have been unable to deploy even a single application in

production. These **struggling organizations** form 72% of our sample.

To scale AI, organizations must ensure that the solution addresses both business and technology needs. This, in turn, demands collaboration between business and IT. Amith Parameshwara, leader of the global Artificial Intelligence and Data Science team at Kimberly-Clark, a US-based personal

Figure 2. Wide-scale deployment is a challenge with just 13% of organizations having scaled AI throughout multiple teams

Which of the following statements best describes AI implementation in your organization?



Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=954 organizations implementing AI.

care manufacturer, believes that the need for extensive collaboration is one of the greatest challenges to achieving scale. *“One of the challenges of productionalizing a use case beyond proof of concept is that it requires involvement of the data science team as well as many other teams, including business teams,”* he says. *“This is because, when you think of productionalizing a data science solution, it is not just about developing the technology solution. It is also about tightly integrating into business processes and, if needs be, transforming them.”*

According to our research, the top three challenges faced by organizations in achieving scaled deployment are:

1. Lack of mid- to senior-level AI talent (selected by 70% of respondents)
2. Lack of change management processes (65%)
3. Lack of strong governance models for achieving scale (63%).



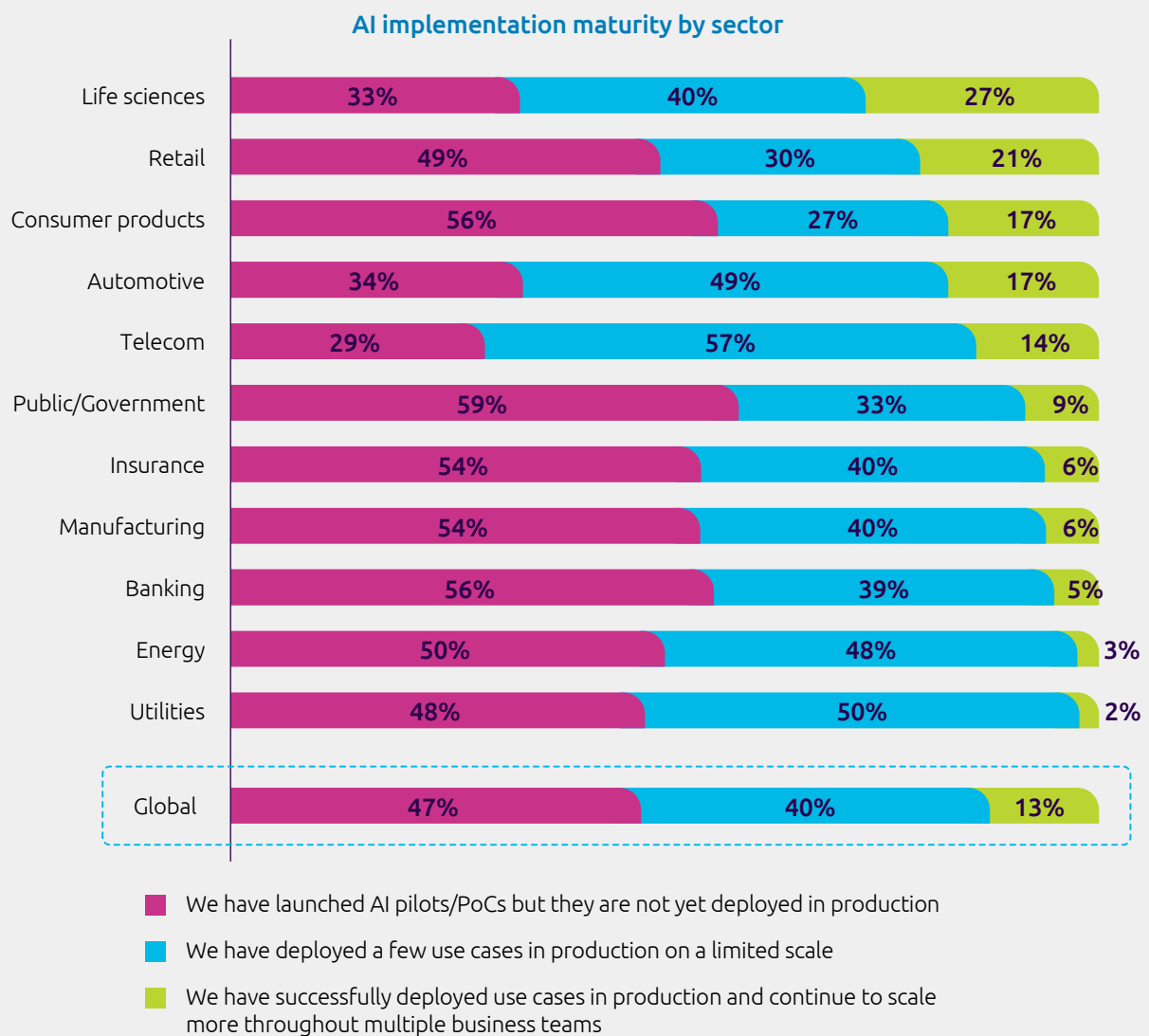
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- Amith Parameshwara,
*Leader of the global AI and Data Science team,
Kimberly-Clark*

AI implementation maturity by sector

When we looked at the maturity of AI deployment across sectors, we found that life sciences led the way. As Figure 3 shows, the sector is ahead of the pack, with 27% of AI-at-scale leaders compared to the 13% average. Retail also performs relatively well, and we look at some of the leading sectors in more detail below. We also found that majority of industries have deployed use cases in production, however, only on a limited scale.

Figure 3. Life sciences and retail lead the scaling race



Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=120 AI-at-scale leaders, N=954 organizations implementing AI.

Life sciences: On average, pharma companies spend 17% of their revenue on R&D, among the highest percentage across industries.² They have also made significant AI bets in areas such as drug development, R&D, and diagnosis. They are investing to make sense of expanding datasets, drawn from genomics and “real-world data” (e.g., data from wearables, social media, clinical trials, electronic health records, etc.).³ In diagnostics, for example, life sciences companies are using image recognition software in tandem with remote monitoring of patients.

Retail: In research we conducted into AI in the retail industry in 2018, we found that while AI penetration was quite high, many struggled to scale the use cases. We found that around nine in 10 focused on high complexity use cases, for example, leaving a large, untapped opportunity in low-complexity cases. Today, the industry is at least outperforming some other segments in the number of scale leaders it has.

Consumer products: This industry is actively using AI – not only for enhancing consumer experience, but also in targeted advertising, product safety, quality control, new product development, etc. Conagra Brands’ AI platform pulls data from social media sites and market-research companies to identify consumer preferences. The platform helped the company identify a new segment, “flexitarians” (flexible vegetarians), who were also interested in compostable packaging. This led Conagra to introduce grain-free varieties of its Healthy Choice Power Bowl in compostable containers. *“We’ve reduced the time pretty dramatically in terms of being able to see the behaviors in the market and being able to execute on them,”* says Mindy Simon, chief information officer at Conagra.⁴



The COVID-19 crisis has further widened the gap between AI-at-scale leaders and struggling organizations

The ongoing COVID-19 crisis has not derailed leaders' AI efforts:

- 78% of the AI-at-scale leaders continue to progress their AI initiatives at the same pace as before.
- Over one in five (21%) have actually increased the pace of deployment.

However, in contrast, we found that more than half of struggling organizations said the crisis has put a strain on the resources they can devote to AI. As Figure 4 shows, 43% of the struggling organizations have pulled investments and another 16% have suspended all AI initiatives as a result of heightened business uncertainty.

Interestingly, as Figure 5 shows, only 38% of life sciences organizations have either suspended or pulled investments (compared to 65% in financial services). This perhaps reflects

the importance today of eHealth. Multiple organizations, including the World Health Organization, have launched chatbots to provide information on the ongoing pandemic.⁵

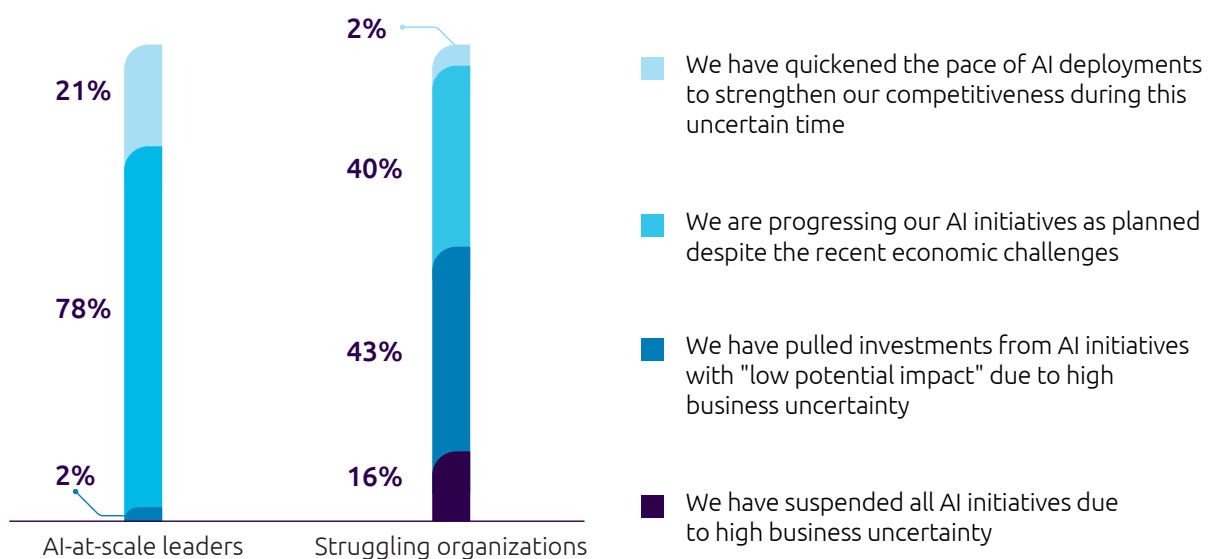
AI-led technologies are likely to become mainstream due to customer anxiety over touch-based interfaces. In our survey of 4,800 consumers in April 2020, 62% of consumers stated that post-COVID-19, they "expect to increase their use of touchless interactions, through voice assistants, facial recognition, or apps, to avoid human interactions and touchscreens."⁶

Organizations confirm this trend. When we surveyed close to 1,000 executives, 73% believed that consumer preference for non-touch practices (e.g., increase in online transactions) will persist even after the COVID-19 outbreak subsides, especially in financial services (80%), consumer products (76%), automotive (71%) and retail (69%).⁷ Examples include:

- India-based ICICI Bank introduced voice assistant services during the pandemic. Consumers can use voice-enabled smart speakers to access a range of banking services, such as account details, credit card history, or transaction details.⁸
- In China, voice-enabled elevators equipped with smart speakers are used during the pandemic, eliminating the need to touch the controls.⁹

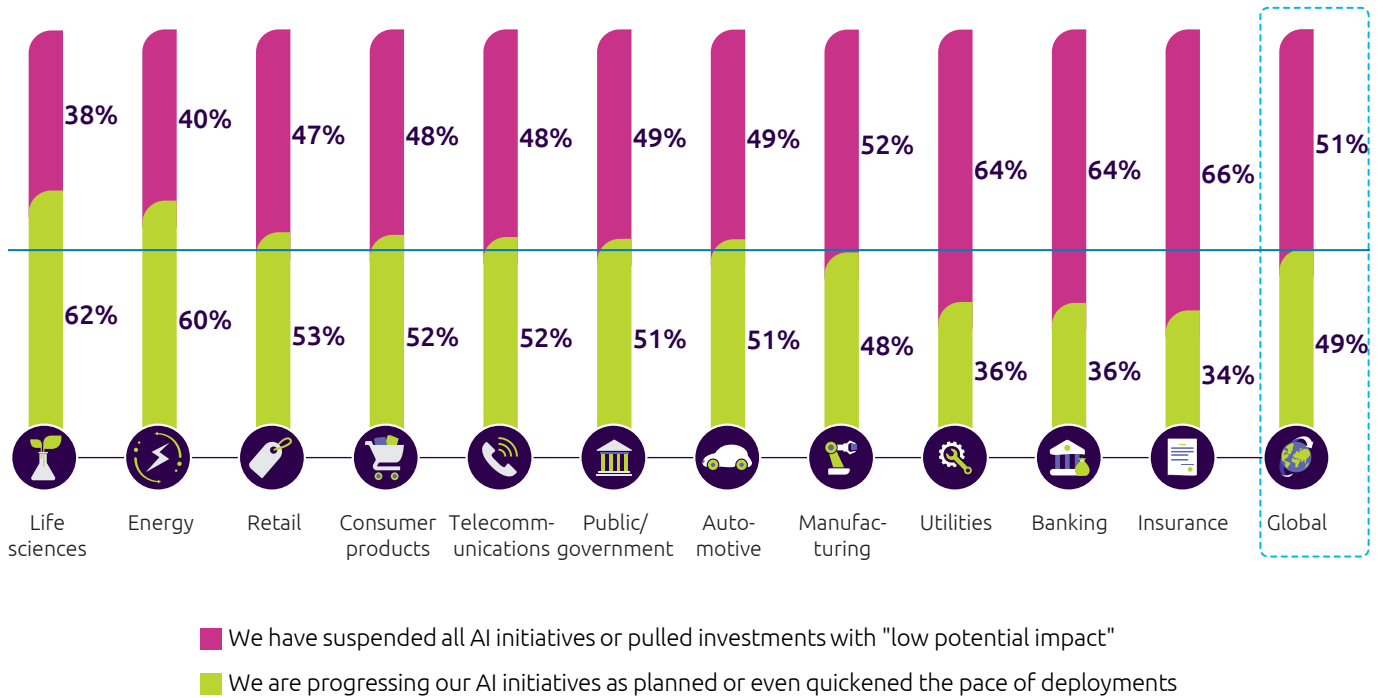
Figure 4. Almost all AI-at-scale leaders are progressing as planned or even faster on their AI deployments

How has the recent economic shutdown (due to the Coronavirus spread) in several countries impacted your investment in AI deployments?



Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=120 AI-at-scale leaders, N=690 struggling organizations.

Figure 5. Fewer Life Sciences organizations have either suspended or pulled investments than any other industry



Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=954 organizations implementing AI.

Governments in countries including the US, China, and South Korea have stepped up the use of AI technologies to contain the spread of COVID-19 and to handle citizens' concerns:

- AI models are being extensively used for contact tracing, with algorithms used to analyze overall data and identify first-, second-, and third-degree contact tracing (i.e., degree of separation between contacts).
- The US Department of Defense is using AI, machine learning, and data visualization tools to spot potential COVID-19 hotspots.¹⁰
- A number of hospitals in the US are using AI algorithms to predict which patients will become critically ill, up to 40 hours before a life-threatening event could occur.¹¹
- The State of Texas is using AI-driven chatbots to answer questions from unemployed residents in need of benefits.¹²

Furthermore, these challenging times underscore the importance of AI when it comes to boosting productivity and keeping operations running smoothly. During COVID-19, companies have been using AI to optimize their supply chains – improving demand forecasting on essential goods and eliminating supply chain delays and complexities:

- Netherlands-based retailer Ahold Delhaize said that it is speeding up the development of robotic technologies to help workers clean stores and process orders during the pandemic.¹³
- Houston Methodist Hospital in Texas applied machine-learning algorithms to visual data from cameras to create a so-called clinical command center, which has helped provide remote care for patients in intensive care units, including COVID-19 patients.¹⁴

2. Decoding the AI-at-scale leaders

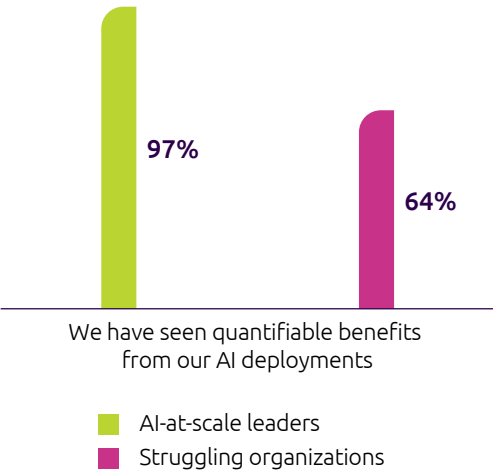
The huge benefits realized by the AI-at-scale leaders is one of the reasons they continue to progress on their AI initiatives. As seen in Figure 6, the AI-at-scale leaders are seizing a substantial advantage over struggling organizations:

- 97% of the AI-at-scale leaders have seen quantifiable benefits from their deployments, compared to 64% of the struggling organizations.
- Moreover, AI-at-scale leaders are much more likely to have achieved benefits that met or exceeded their expectations (94% compared to 59% of the struggling organizations).

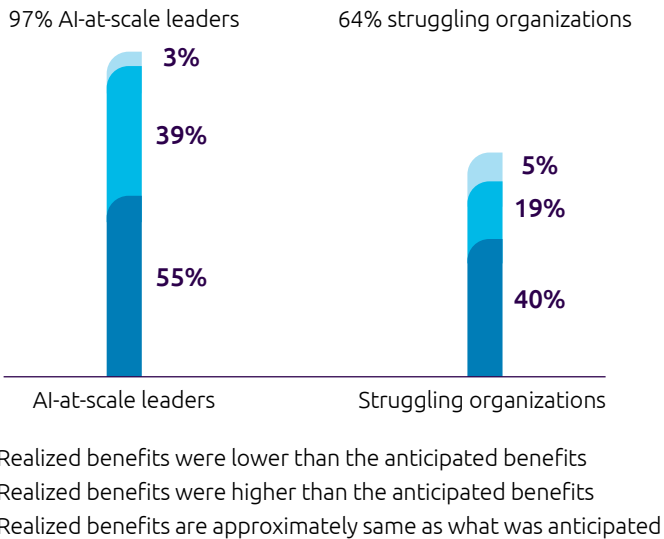


Figure 6. More than 9 out of 10 AI-at-scale leaders have realized quantifiable benefits

How would you categorize the benefits from the AI deployments so far?



Was there a difference between benefits anticipated and benefits realized?



Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=120 AI-at-scale leaders, N=690 struggling organizations.

Scaled AI in action: Colgate-Palmolive and Anheuser-Busch InBev

Colgate-Palmolive

- **AI in R&D to increase speed to market:** The company leveraged its database of over 80,000 oral care formulas, combined with the recent market trends, to drastically reduce the time to develop and market a new formulation. Using predictive analytics, the company reduced the number of experimental recipes from 896 to 23 and cut time to market a new toothpaste from several years to six months.¹⁵
- **Robotics and predictive maintenance to increase production throughput and reduce downtime:** Colgate-Palmolive has reduced production downtime with the use of predictive maintenance using wireless sensors, analytics, and AI. Machine-related data is compared with over 80,000 other machines operating globally. In one instance, AI detected rising temperatures in the drive motor of one of the tube makers and alerted the plant team in time, preventing the obstruction of the tube production line. This saved 192 hours of downtime and an output of 2.8 million tubes of toothpaste.

Anheuser-Busch InBev

- **Managing risk and compliance.** Anheuser-Busch InBev launched its analytics platform “BrewRight” in 2015. This analytics platform draws on data from more than 50 countries across the brewer’s operations to spot financial risk or even irregularity, such as suspect payments. This AI-based fraud detection platform saved hundreds of thousands of dollars in costs associated with investigating suspect payments.¹⁶ It has helped the organization’s legal and compliance teams to spot risky transactions faster than ever before, driving down investigation costs and transforming the organization’s approach to compliance.¹⁷

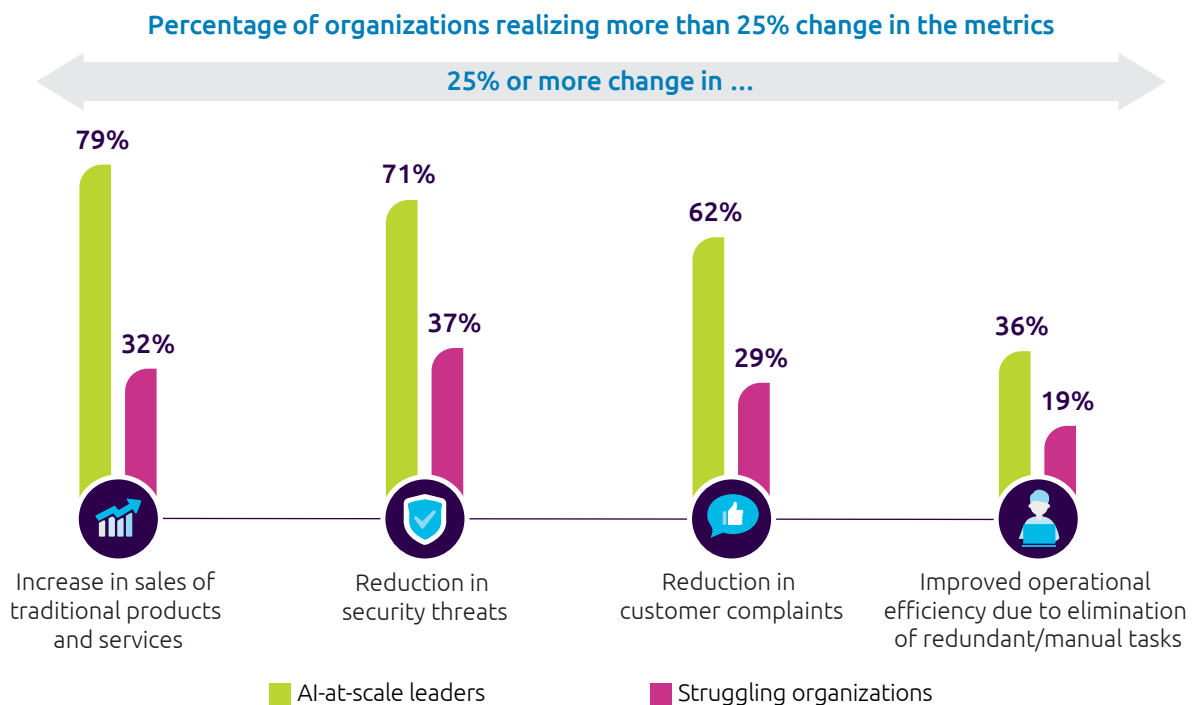
*The AI-based fraud detection platform at **Anheuser-Busch InBev** saved hundreds of thousands of dollars in costs associated with investigating suspect payments.*



AI delivers benefits across the organization, from sales to operational efficiency, with AI-at-scale leaders achieving significantly better results compared to struggling organizations. For example, we looked at areas where organizations had achieved a 25% or more uptick in performance.

Interestingly, as seen in Figure 7, a large majority (79%) of the AI-at-scale leaders have seen an increase of over 25% in sales compared to just 32% of the cohort that is struggling. In contrast, only a small subset (36%) realize comparable benefits in operational efficiency. AI's biggest benefit from the AI-at-scale leaders' point of view seems to be in generating additional sales rather than in improving operational efficiency.

Figure 7. AI-at-scale leaders realize significant benefits across functions



Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=120 AI-at-scale leaders, N=690 struggling organizations.

High-performing organizations are generating significant improvements in these areas:

Increase in sales: Through the social business analytics platform of their global “People Data Centers,” Unilever has successfully scaled an AI-powered insights service that uses consumer data from social media, searches, and online reviews across all business lines. The aim is to identify trends and uncover “whitespace” opportunities. These capabilities helped detect emerging consumer interest and preferences in “ruby chocolate” (ie, pink chocolate, as opposed to white or dark, for example). This allowed Unilever to launch the

first variant in this space ahead of its competitors. *“We’ve been able to achieve this against half the costs and twice the speed,”* says Paul van Gendt, Consumer and Market Insights director, People Data Center at Unilever.

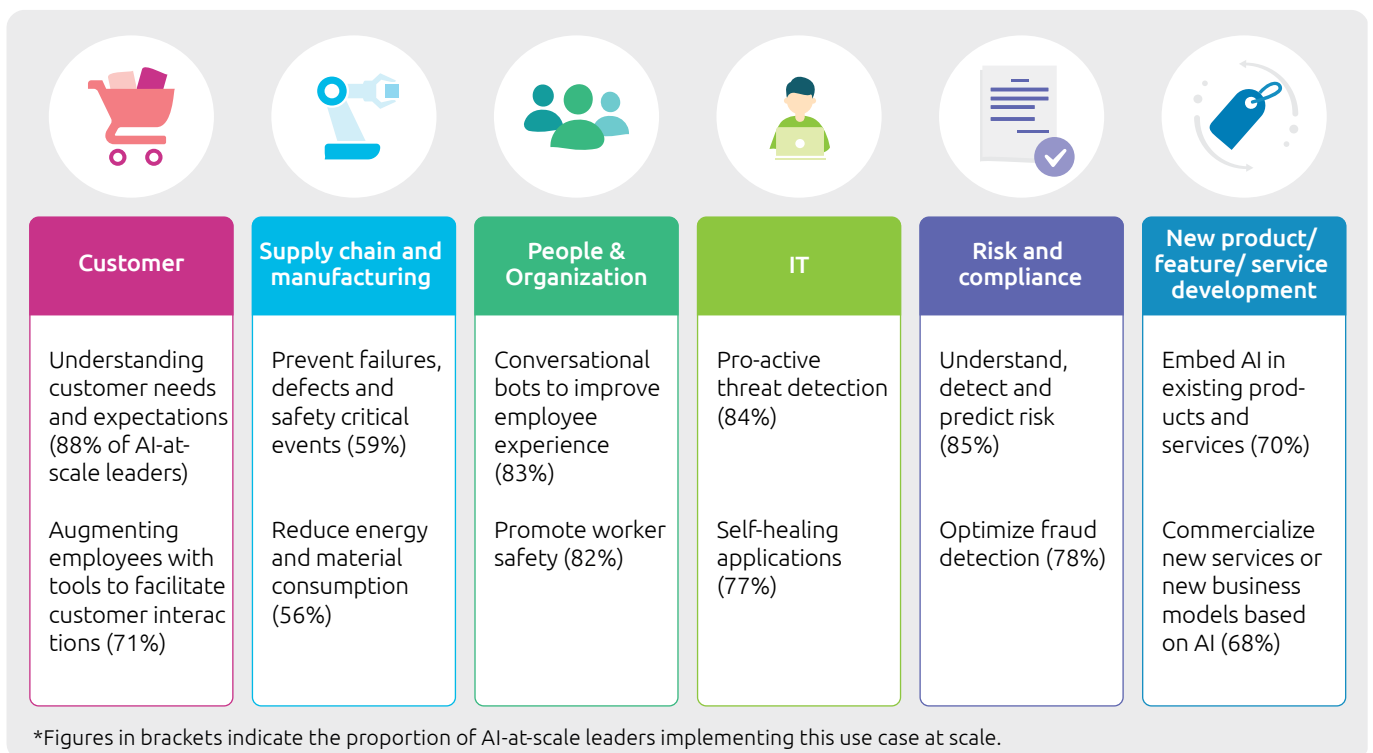
Reduction in security threats: *“I see more than 100 billion potential vulnerability scans and probes across our global backbone every single day,”* says Bill O’Hern, senior vice president and chief security officer at AT&T. Using machine learning, AT&T¹⁸ is able to detect new patterns in network traffic to identify threats that can cause network disruptions or data breaches.¹⁹

- **Reduction in customer complaints/waiting time:** Zurich UK Insurance developed Zara, a chatbot that helps customers file non-emergency home or motor claims. It collects the information online and passes it on to the human handler, significantly reducing claims-processing time to three working hours compared to the 24 hours needed for this task previously.²⁰
- **Improved operational efficiency:** A UK-based bank with global operations used AI to automate its sales quality process. The sales quality team is required to audit 10% to 15% of completed sales and look at more than 10 different data sources and 180 data points (structured and unstructured) for each review. By automating the entire process through AI, the bank not only reduced the entire compliance process by 80%, but also improved the

accuracy of the process as well as increased the speed, moving the checks closer to real time.²¹

In our research, we further identified that majority of AI-at-scale leaders work towards a large-scale deployment of at least one use case in each functional area. For instance, as seen in figure 8, 60% or more have use cases in functions spanning from customer to risk and compliance to people. This not only benefits the teams of that particular business function but also ensures that the various business units across the organization become enthusiastic stakeholders in the AI development and operationalization. Below we outline the top-most implemented use cases these AI-at-scale leaders have deployed, at scale, in different functions:

Figure 8. Top use cases implemented by AI-at-scale leaders at scale



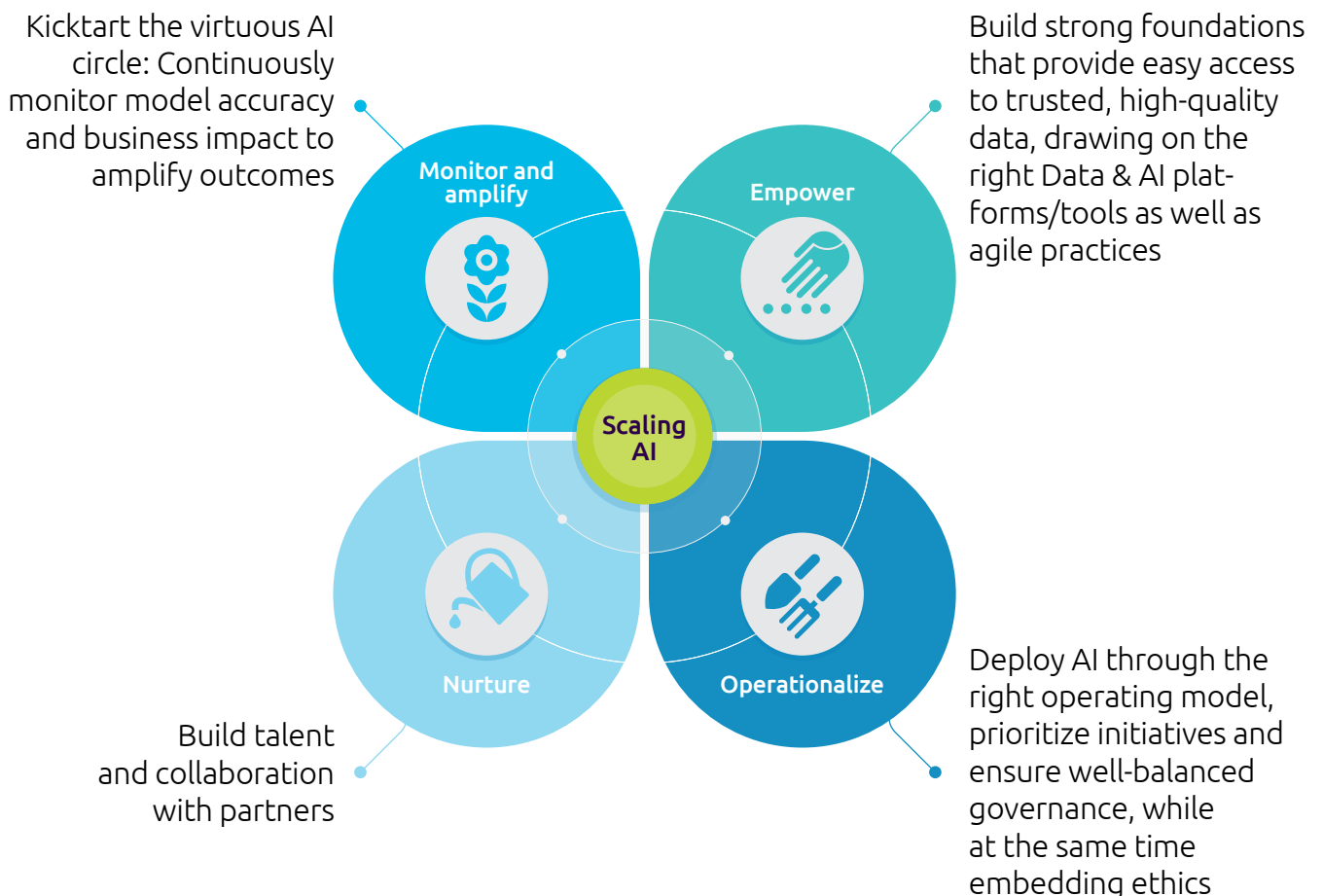
Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=120 scale leaders.

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3. Four principles for successfully scaling AI

Drawing on the best practices employed by our AI-at-scale leaders, as well as our extensive experience with clients globally, we believe that organizations should focus on four areas as they look to scale their AI initiatives. We characterize these as: Empower, Operationalize, Nurture, and Monitor and amplify. Figure 9 highlights these areas, and we look at each one in turn in the following sections.

Figure 9. How organizations can scale AI



Source: Capgemini Research Institute analysis.

Principle one: Empower

Build strong foundations providing easy access to trusted, quality data through the right data and AI platforms and tools as well as agile practices



The enthusiasm about AI initiatives and the allure of the benefit potential could make executives rush headlong into development. However, from our research and experience, we strongly believe that organizations should focus on laying the necessary foundations before they dive into wide-scale deployment.

Provide industrialized access to trusted, quality data

Data preparation takes up a large chunk of AI practitioners' time. A survey by Kaggle showed that data scientists spend at least one fifth of their time in cleaning data.²²

Set up strong data governance to build data trust and scale AI initiatives

Dealing with massive volumes of data sourced from scores of applications, internal to the organization or external (ecosystem data), presents its own challenges. Improving data quality ranks as the number-one approach that AI-at-scale leaders use to get more benefits from their AI systems. Data needs to be managed as a strategic asset and organizations should establish data governance to design, set up, scale, and continuously monitor the data and AI platform in their firms to support the scaling of AI use cases.

A data governance strategy builds data trust by defining the guidelines and helping enforce the policies on:

- Data discovery and provenance – understanding where the data is sourced and the process of discovery
- Data catalogs
 - A data catalog (essentially a collection of metadata with data management and search capabilities) helps data engineers and data scientists with collaboration efforts and reduces the time spent in data discovery. “Structuring and harmonization of complex data collected from various platforms and sources” is the third-most important reason why AI-at-scale leaders are able to successfully scale their AI use cases.
- Master data management – ensuring the consistency and accountability of master data
- Data cleansing and data quality – removing duplicates and enriching the data to improve quality
- Data privacy – protecting personal data. In our survey, 63% of AI-at-scale leaders say they have defined data access policies to enable development while controlling unauthorized access
- Data security – classifying the security level of data (public, internal, restricted, etc.)
- Identifying data owners, data stewards, etc.

Ensuring that right quality of data is available for the AI teams reduces their development time significantly and reduces the trust gap. At Morgan Stanley for instance, a data center of excellence (CoE) made up of a team of 30 experts from data architecture, infrastructure and governance ensures that AI as well as other technology applications use the right data. Katherine Wetmur, international CIO, Morgan Stanley, says, *“The reason we have the Center of Excellence is we want to continue to build on AI, and we understand this is one of the foundational areas that is needed.”*²³

Establish the necessary technology foundations to remove data silos

Organizations must also decide on how to store and manage internal as well as the external data it gathers. Legacy IT systems and monolithic applications in particular can delay the collection and the analysis of data. For regulatory reasons, data might also be restricted to on premises, leading to data silos.

Data estate modernization addresses the problems of fragmented and legacy IT systems and provides faster access to information within a secure environment. The features of such a modern data estate include:

- A hybrid cloud platform (on-premises systems, private clouds, and public clouds) can provide faster access to data without the AI teams having to ascertain where exactly the data “resides” in an organization
- Scalable – for storage as well as service-levels
- Security controls.

The entire data transformation program (data governance, data quality, master data management, and estate modernization) is an expensive journey in itself. However, aligning the data transformation roadmap with the organization’s AI roadmap will influence the success of both programs. Furthermore, proper alignment makes the self-funding of AI programs feasible, without requiring additional investments.

Democratize data access

Data in an organization is often locked into a wide range of fragmented systems, sometimes running on legacy technologies, which restricts access and ease of use. With democratization, data is harvested, stored where it can easily be found, can be understood as it is described with the right business metadata, and is readily available because it is managed with the right tools. Key steps include:

- Data lakes bring multiple, curated datasets to a unified data landscape. The critical challenge is to properly manage these modern data landscapes, ensuring data lakes do not turn into data swamps.
- Data virtualization allows organizations to use data from fragmented data sources through a logical architecture, transforming how the data is delivered and supporting algorithm training. It masks the differences in data environments (cloud, on premises, etc.) and hides the complexity of the data infrastructure from the analytics users. However, while data virtualization can certainly aid in faster deployment, as the number of sources and the volume of data increases, it can also lead to performance issues. Organizations must be cautious about scaling large AI programs using virtualization because it cannot replace a sound architecture or the modernization and rationalization of legacy data applications.

Data management platforms help manage data harvesting and storage across the organization’s data lakes, data hubs, and data warehouses. Uniper, an energy company based in Germany, created a data analytics platform with a central data lake in a cloud platform. This lake has data from nearly 100 external and internal sources. It also has a data catalog with end to end metadata management capabilities.²⁴

The real challenge is to ensure an organization looks at the entirety of its data estate, manages it as a strategic asset. It needs to be continuously managed to provide a unified “information supply chain” to all users that need it, from boards to operational employees.

Deploy agile working practices, including DataOps

With the agile methodology, business outcomes are delivered in short, continuous iterations. Agile software development is well-suited to AI applications, where end users need to be involved early to help test, refine, and improve embedded algorithms.

DataOps, building on the principles of agile, lean manufacturing as well as DevOps,²⁵ further helps in democratization of data and reduces the analytics cycle time. By facilitating data discovery, automating, and monitoring the different stages of data analytics pipelines, a DataOps team ensures that data scientists and machine learning engineers are more focused on model development and deployment. They manage the infrastructure required for data organization, including data catalogs, data pipelines, and access to data. It also supports the deployment of AI applications to production.

Disney Parks, Experiences and Products, Inc. uses DataOps to derive real-time insights and transform their operations. Equipped with a set of data management tools to collect the data, including IoT data, the company has automated its ride and show operations to enhance the experience of its guests.²⁶

This agile approach need not be limited to DataOps and should not be seen as a software development technique only. When applied to AI application development and deployment, it brings the right mix of technology tools and processes to allow for the right agility when managing the required datasets, while considering the AI application as a product with features. Developing and optimizing AI algorithms requires testing by many users to ensure they work across various scenarios, and therefore fast iterations on a variety of datasets as well as fast deployments. *“You need to stop doing POCs,”* says a senior executive at a European metals refiner. *“Typically, you’re trying to prove something, and when six months have passed and you’ve proven it, you still haven’t really implemented anything. The solution is to work closely with the business end users, designing a minimum viable product together and building a usable product that can be implemented right away. The goal from the beginning should be to implement and not just to prove something.”*

An agile culture is critical to AI deployment

In an agile organization, the leadership mindset is attuned to a test-learn-validate cycle, giving more autonomy to teams and providing more accountability. Teams are also focused on delivering real business value, defining clear problem statements, and linking each solution to an overall goal. Finally, teams are more focused on delivering a functioning business application, they progressively cut the risk of failure.

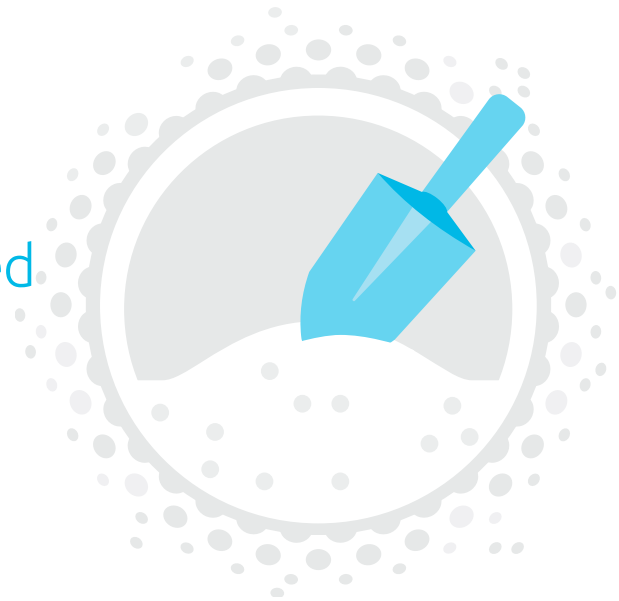
Agile working practices therefore dramatically reduce the cost and delays associated with putting AI into production. Organizations that already have mature agile practices, including those of agile software development, are at an advantage. It is advisable to lay this groundwork while starting to scale AI solutions across the organization, especially those involving multiple business functions.

Kaiser Permanente, a large healthcare entity in the US, wanted to use the power of big data and analytics for teams at the front lines of care. The goal was to better manage patient flow. However, stakeholder groups were not aligned, and culture needed to change from top-down leadership to team-led approach. Kaiser Permanente implemented the Scaled Agile Framework (SAFe) methodology to support its data and analytics implementation. *“We ... [got] everyone trained on a new way of working with SAFe,”* says Dick Daniels, executive vice president and CIO at Kaiser Permanente. *“... we increased our efforts to make sure the team felt empowered to speak up, make decisions, and step up to fill in gaps beyond what they considered their normal role if it would help move the project forward.”* After implementation, hospital managers cut the time spent on manual data preparation by an average of 323 minutes per month and dealt with 114 fewer calls and messages per month for reporting data. Kaiser Permanente will implement predictive analytics capabilities next, helping hospital leaders allocate resources based on anticipated demand.²⁷

With data democratization, data is harvested, stored where it can easily be found, can be understood as it is described with the right business metadata, and is readily available because it is managed with the right tools.

Principle Two: Operationalize

Deploy AI through the right operating model, prioritize initiatives, and ensure well-balanced governance while at the same time embedding ethics



A large majority of organizations that are successful in wide-scale deployment have one thing in common – a strong AI governance and change management. Figure 10 shows that there are five areas that are key to embedding AI in operations.

Figure 10. Operationalize AI: key initiatives



Source: Capgemini Research Institute analysis.

Deploy the right operating model to facilitate adoption and scaling, and optimization of resources

Although different organizations apply different operating models to scale AI, a hybrid approach is optimal. Such an approach comprises:

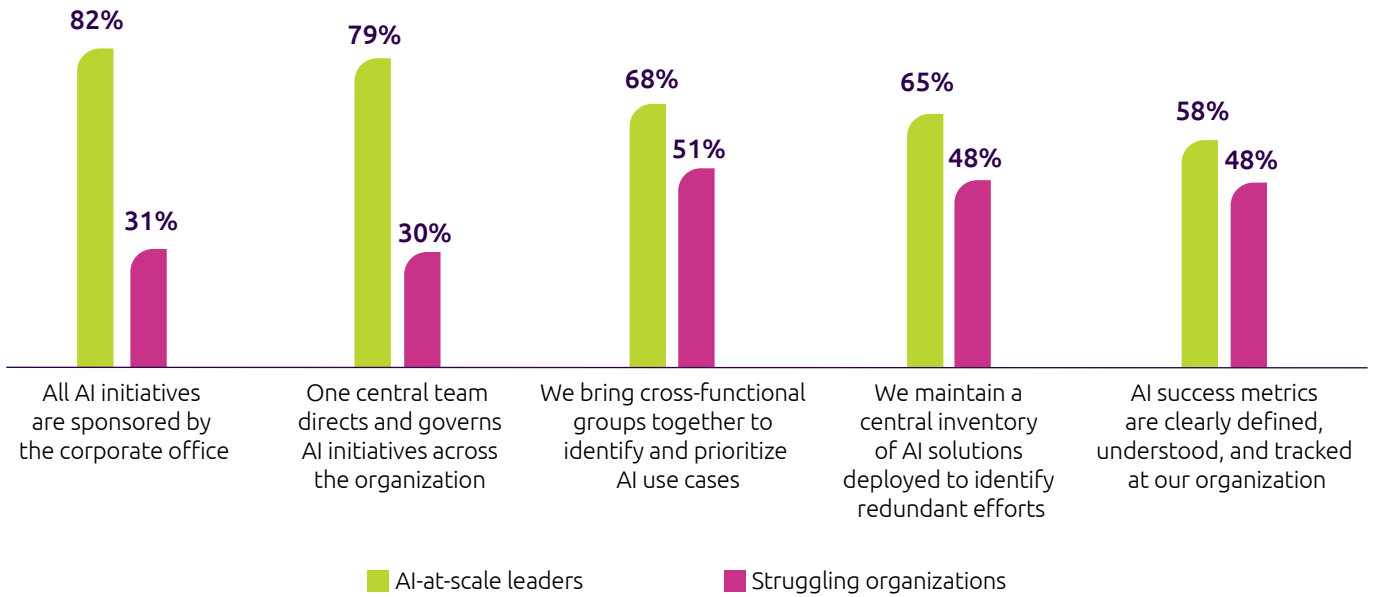
- A central team for policy and strategy

- A center of excellence (CoE) (or a network of CoEs) or dedicated team(s) for collaboration, optimizing resources, and facilitation of ideas
- A business unit for division-level strategy and execution.

Central teams create enterprise guidelines, policies, and standards, and ensure that AI strategy aligns with wider corporate objectives. In 2018, RBS formed its Technology Innovation Committee to focus on new technologies such as cloud computing, machine learning, and process automation. It is closely overseen by the CEO and board. The committee

Figure 11. A central team facilitates adoption at the AI-at-scale leaders

Governance and sponsorship of AI initiatives at AI-at-scale leaders vs struggling organizations
(% of organizations who agree)



Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=120 AI-at-scale leaders, N=690 struggling organizations.

regularly monitors innovation spend and budgets to challenge whether they are aligned to priorities.²⁸ Most of the AI-at-scale leaders have central teams to ensure strong governance and executive sponsorship:

- They have one central team governing AI initiatives (79% of AI-at-scale leaders compared to 30% of struggling organizations), who then report to top management, signaling the organization’s determination to achieve scale.
- They fund initiatives centrally, with a defined AI lead to define and track KPIs and form cross-functional teams.

At a tactical level, organizations form **a center of excellence (CoE) (or a network of CoEs)** or dedicated teams to:

- Maintain dialogue with business functions to understand process and technology pain points and emerging needs. *“We try and build ourselves into every single project or activity that is going on and influence the business case as it happens,”* says Michael Natusch, global head of AI, Prudential plc. *“... our role is to ensure that those things fit together, that the business owners see the value in what we are trying to achieve and fund it. And from an architectural or a coherence point of view, it is our role to ensure that that happens. Prudential is a highly federated organization, and business units often have some kind of initiatives in*

place already. And if you think it doesn’t agree with what we want to do, then it is really up to us to convince them.”

- Create a backlog of AI initiatives and the business value attached to each.
- Prioritize low-cost, high-value, and quick-deployment use cases as well as their linkage to business objectives.
- Set up cross-functional teams to navigate the solution from “idea to market.”
- Determine clear ownership of solutions, including funding, maintenance, ROI tracking, and scaling.
- Demonstrate the return on investment and then communicate the success achieved to build broad support for AI initiatives.

CoEs also help allocate resources and can accelerate benefits. They optimize allocation of resources when talent, data, and IT infrastructure are limited; identify areas of duplication and standardize/eliminate redundancies with the use of reusable codes, cloud solutions, and common frameworks; and focus on faster delivery of value and fund PoCs/pilots of a select group of promising use cases.

“We are convinced that AI strategy and execution must be driven within our different business lines to be close to strategic decisions and have a good knowledge of data. Yet, to improve the overall performance and consistency, we created

A hybrid approach to scaled AI at Capital One

At Capital One Financial, an AI CoE was set up in 2015, acting only as an outsourcing service for business units. Three years later, the operating model was changed to involve business units in developing solutions. The AI CoE team and business unit teams meet daily for 10–20 minutes to sort day-to-day issues, while product managers meet weekly to resolve big roadblocks.

Today, the CoE can handle 10 times the number of projects it could when first set up. And the development time to launch a minimum viable product has been reduced to 12 weeks.²⁹

a central center of expertise of data scientists with a threefold mission," says Julien Molez, Group innovation data & AI leader, Société Générale. *"The first one is to be able to help any business unit that has not yet got a dedicated setup on data science to enable them not to lag. The second one is to handle use cases that are too transversal or too risky/innovative to be handled by one single business unit. The third positioning is to be able to identify key assets that need to be factorized and shared across the group (NLP libraries, Explainability methodologies) to enhance reuse and increase efficiency."*

To ensure speedy delivery of results, roles and responsibilities are clearly divided between the center and business units. Business unit teams work closely with the CoEs to define domain-specific standards based on enterprise-guiding principles. The CoEs play the role of a facilitator – surfacing best practices, giving autonomy as well as accountability of scaling and implementation to business teams, and ensuring that new implementations are aligned with business priorities. Product owners at business-unit levels set a vision for the solution, create an autonomous cross-functional team, and see it through to scaling it across the organization.

This approach of hand-holding first and then giving autonomy is crucial for organizations to scale AI.

This model of centralized strategy and policies but decentralized execution in a hub-and-spoke manner helps organizations maintain speed as well as autonomy.

Connect your AI strategy to overall business strategy to help prioritize initiatives

In recent years, many organizations have rushed to create AI pilots, excited by its potential. However, in many instances, engagement with the business was absent and returns were disappointing. In our survey, around one in six organizations that struggled to scale AI have thus far not realized any benefits from AI deployments.

Linking AI strategy to overall business objectives is how AI-at-scale leaders address this issue. They do so by bringing AI initiatives into the enterprise's wider digital transformation fold. AI initiatives are not scaled in silo, but impact multiple business units. Plus, AI resources are limited. To scale AI, top management should oversee how the resources are directed and used. In addition, with proliferating use cases of AI, companies need to understand which ones address their real business problems, and then determine how to align those to capabilities.

The independent, bottom-up approach

Organizational context (structure, culture, processes) remains the ultimate determinant in choosing the right operating model. This is why, in those organizations with a decentralized culture, a bottom-up approach can make sense (where teams independently generate, execute, and own impact metrics of an AI implementation). For instance, Office Depot adopted a bottom-up approach to deployment, where IT staff are paired with business units – such as supply chain, sales or retail – to test business solutions. This allows teams to learn from experiments, fail fast, and scrap efforts that don't hold promise. *"Each of the business units has a certain amount of capacity allocated for experimentation,"* Office Depot's CIO Todd Hale said. *"But as we identify opportunities that look more meaningful and potentially scalable, we may move them into the mainstream."*³⁰

Teams operating at the front line, which have a day-to-day grasp of problems, can work on AI initiatives independently. For example, BMW tackled error rates in the manual inspection of car parts by using a visual inspection tool. This was a result of speaking with teams who were close to the action. *"We spoke with our foremen and asked how we could create more time to directly support our employees instead of only controlling visual inspection,"* explains BMW Group's head of Artificial Intelligence Innovation, Matthias Schindler.³¹

Top management, along with influential business unit leaders, must co-develop a roadmap of initiatives. This should account for the capabilities required at each business unit and also establish the KPIs for measuring success. Based on the selected priorities, business units should weigh the time, cost, and effort required and then focus resources on the most promising ideas. Identifying a supportive executive sponsor also helps in faster deployment and is usually a key success factor.

Create an ethical governance framework

Our previous research on ethics in AI defines the key components of ethical AI as:³²

- Ethical in purpose, design, development, and use
- Transparent, explainable, interpretable, fair, and auditable. For example, explainability and interpretability of AI is

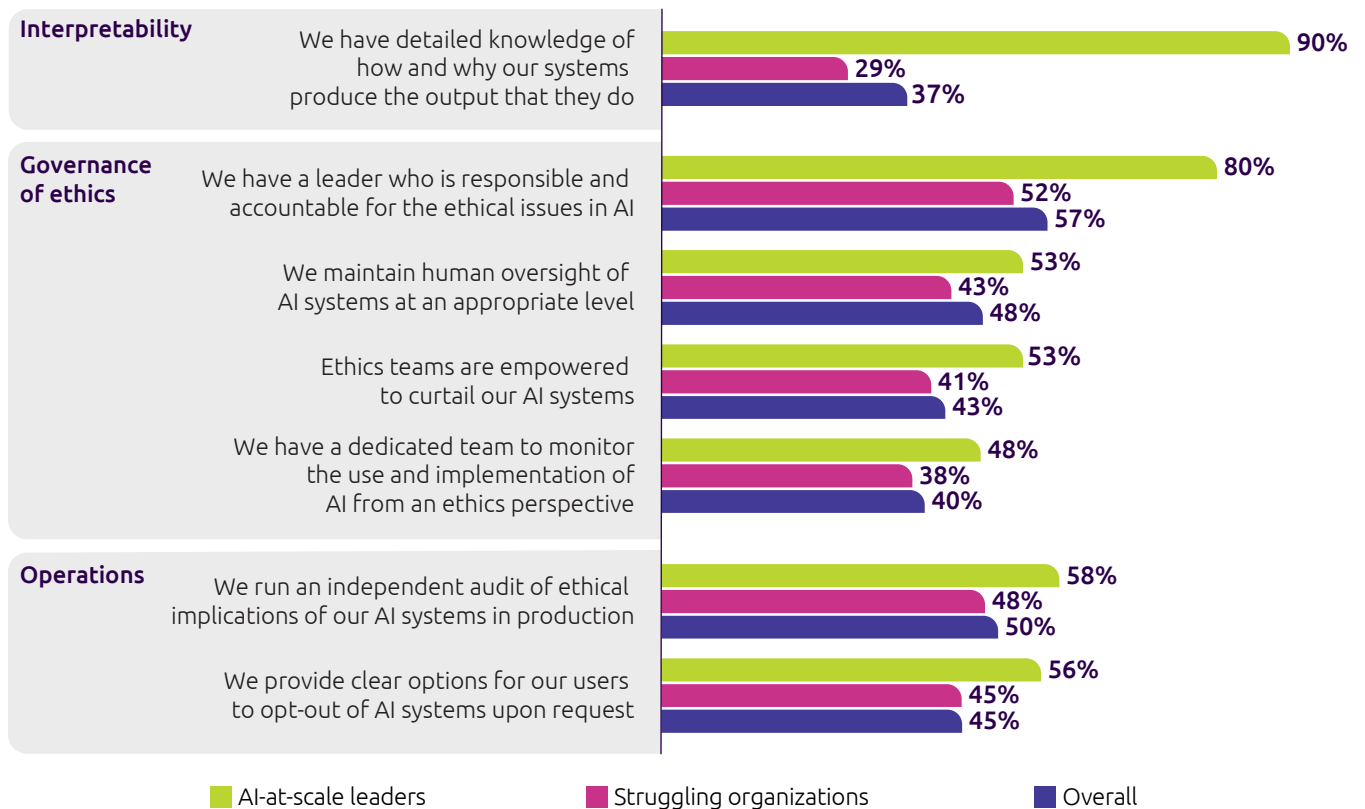
important for business executives to be able to trust the insights instead of considering the AI systems as a black box.

Ethical AI interactions play a key role in driving consumer satisfaction and trust. Our previous research on ethics in AI found that 62% of consumers who perceive their AI-enabled interaction to be ethical place higher trust in the company. In addition to ensuring happier customers, an ethical approach can help mitigate regulatory, legal, and financial risks.³³

Despite strong consumer and regulatory focus on AI ethics, our current research shows that many organizations are not actively addressing a range of ethical issues, such as the need to have empowered ethics teams. For example, as Figure 12 shows, only 29% of struggling organizations say they have detailed knowledge of how and why their AI systems produce the output they do, but this rises to 90% for the leaders.

Figure 12. Fewer than one in two organizations have a strong focus on ethics

Organizations' focus on ethics in AI



Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=120 AI-at-scale leaders, N=690 struggling organizations, N=954 organizations implementing AI.

The ethical aspect of AI is an emerging field. While the AI-at-scale leaders are marginally outperforming the struggling organizations – there is still some way to go for all organizations to understand and embed ethical practices. Key factors include:

- Introducing ethics from the start as part of the upfront design
- Appropriate governance that translates into concrete actions, processes, and technologies (such as checklists)
- Making sure decisions from AI-based system are understood and that executives are accountable
- Integrating AI ethics within day-to-day decision making.

Governance and processes must also be supported by tools that facilitate control and trust, and sometimes make it possible in the first place. For instance:

- Accountability and verification processes must rely on activity logging, providing visibility and information on the internal working of data manipulation and AI algorithms.
- Trust has to be based on explanations provided by algorithms working in cooperation with AI algorithms to extract meaning and reasons from the decisions of the machine, and also on the good understanding and reliability of the collection of data on which training is based. Trust is also built on the robustness and fault-tolerance of the deployment architecture and activity logging mechanisms.
- Automation and versioning tools that allow repeatability and reproducibility, making sure that trust and accountability is maintained over time.

Ethics in action

- H&M, the Swedish clothing-retail company has appointed a head of AI policy. The organization considers responsible AI as the top of its agenda and has created a checklist for their ongoing and new AI projects. The checklist is centered around nine areas: focused, beneficial, fair, transparent, governed, collaborative, reliable, respecting privacy, and secure. It has also created an Ethical AI debate club to get people talking about this issue.³⁴
- HSBC has built a set of global principles to address the Ethical Use of Big Data and AI.³⁵ These principles aim to increase awareness of ethical implications, bring uniformity and predictability about using big data and AI, and encourage employees to question and challenge new use cases prior to adoption.

While the AI-at-scale leaders are marginally outperforming the struggling organizations in ethical governance – there is still some way to go for all organizations to understand and embed ethical practices.

Make business units accountable for success

At 83% of AI-at-scale leaders, IT and business collaborate to drive AI, but this drops to 54% for struggling organizations (see Figure 13).

Business teams need to collaborate with IT staff at all steps: from metadata definition to master data governance, requirement definition to application testing. Engagement from the business is key to ensure that teams really buy into a solution and organizations do not find that uptake and use drops off after time. Together, business and IT teams need to establish the KPIs to track and report performance of AI models. The impact of these KPIs need to be linked to business metrics such as revenue growth, cost reduction, risk mitigation, etc.

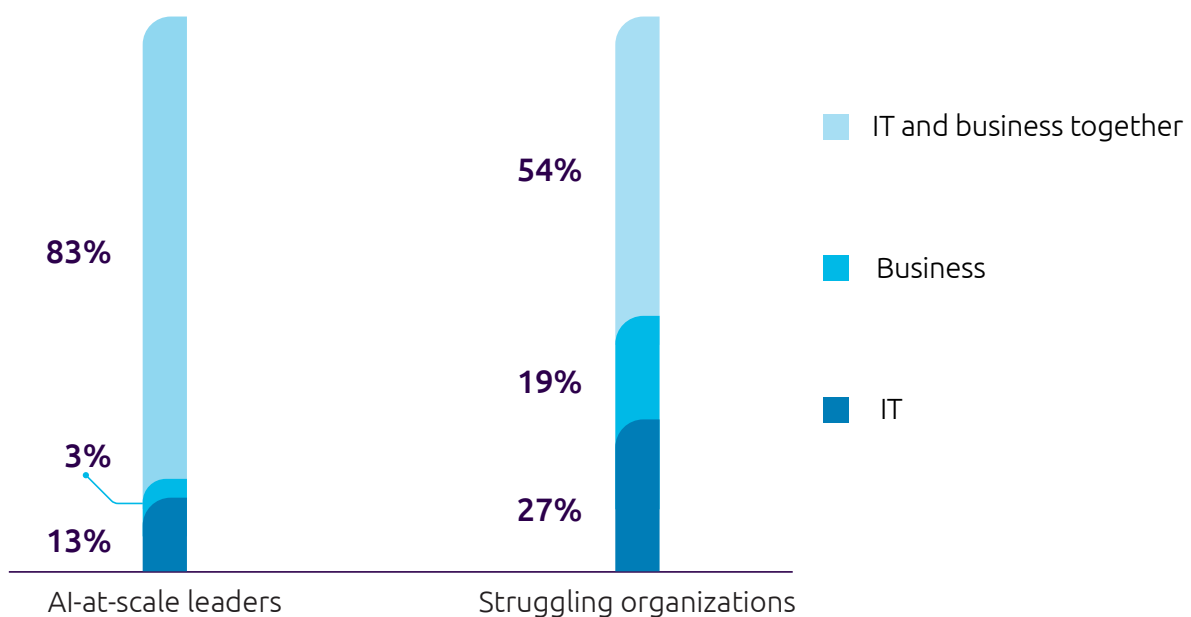
Reorient the impacted processes

Scaled AI implementations usually impact multiple functions across the organization. During the POC/pilot stage, organizations need to begin thinking about the ramifications on other processes and take a “systems view” of the entire process from start to finish. Organizations that can adapt their processes are at an obvious advantage. We found that 60% of AI-at-scale leaders have flexible processes that could be easily adapted to changing business requirements, compared to only 45% of struggling organizations. Furthermore, even before an organization considers adopting AI to improve an existing process, it needs to understand whether the process is actually redundant and should exist at all.

“Harnessing machine learning can be transformational, but for it to be successful, enterprises need leadership from the top,” says Erik Brynjolfsson, director of the MIT Initiative on the Digital Economy. *“This means understanding that when machine learning changes one part of the business — the product mix, for example — then other parts must also change. This can include everything from marketing and production to supply chain, and even hiring and incentive systems.”*³⁶

Figure 13. IT and business together drive the AI initiatives in more than 80% of AI-at-scale leaders

Who is the main driver of AI initiatives in your organization?



Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=120 AI-at-scale leaders, N=690 struggling organizations.

Principle three: Nurture

Build talent and collaboration with partners



Build talent base

AI programs require many types of talent, from architects to design the solution and its integration in the IT landscape, to data engineers to source and prepare the data to data scientists and machine learning engineers needed to develop and deploy it in production. In addition to technical skills, organizations must not forget the important range of business and change management roles, including data strategists, AI ethicists, business consultants, and process and automation engineers. Key talent initiatives include:

Fill senior roles such as AI leads

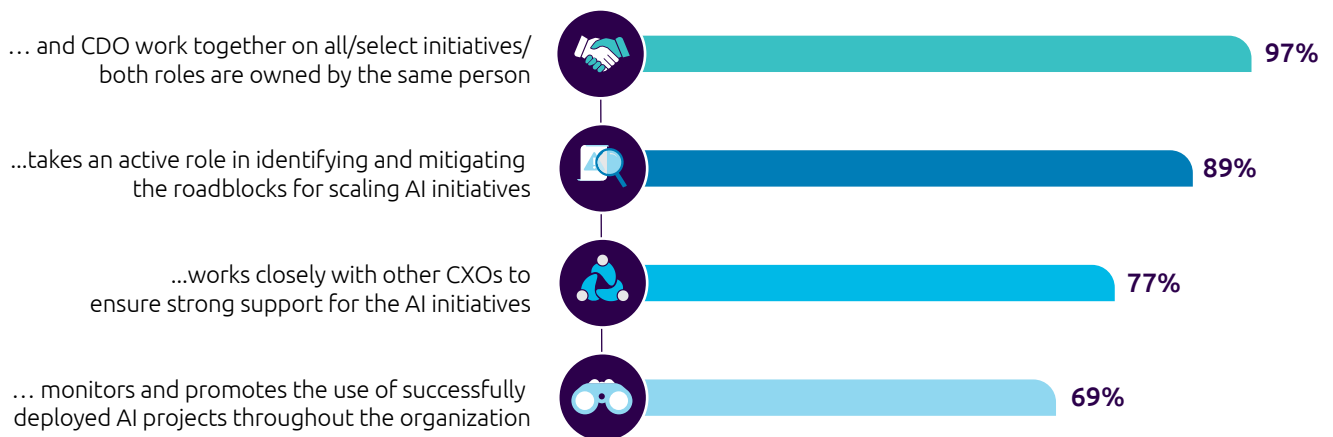
It is important that AI strategy is aligned with the overall business strategy. Hiring senior, strategic leaders is key to support this goal, and our research found that 70% of organizations find that the lack of mid to senior-level AI talent is a major challenge for scaling. Further, we found that well over half of AI-at-scale leaders (58%) have appointed an AI head/lead/chief AI officer (CAIO). An AI head:

- Provides development teams with a vision, establishes guidelines around prioritization of use cases, ethics and security, and harmonizes the use of platforms and tools used for AI development.
- Works closely with the chief data officer as well as other critical leaders.

Figure 14 shows how the majority of AI-at-scale leaders have an AI head who focuses on the strategic use of AI, from prioritizing initiatives in collaboration with other leaders to performance measurement.

Figure 14. For AI-at-scale leaders, the AI head plays a crucial role in scaling the initiatives

Proportion of respondents agreeing with "AI head..."



Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=120 AI-at-scale leaders.

Upskill to broad-based AI development

Organizations need a wide range of skill sets for scaling AI. However, as Figure 15 shows, there is a significant gap between demand and supply in key disciplines, such as machine learning. Business analysts and cloud solution architects are also in high demand.

While data literacy is a must-have skill for all executives, the AI talent should also master soft skills, such as storytelling skills, which will help them communicate about their models more efficiently. Training as well as workforce transformation programs are critical. To address these skill gaps, 76% of AI-at-scale leaders use training programs to develop the skill sets they need in-house. Shell and BMW are two leading organizations that are taking this path:

- Shell, which has 280 AI projects at various stages of implementation, has a team of 160 data scientists, but it also trained 800 of its employees with basic coding skills to work on AI projects.³⁷
- BMW is taking a multi-pronged approach to cultivate AI skill sets. It has an Innovation Lab where students can work on AI and collaborate with BMW. It also shared its network architecture code on Github, thereby promoting collaboration with industry peers. Matthias Schindler, head of AI innovation, BMW, highlights the need to educate teams, saying, *“One of our main targets for this year is to really educate managers so that they know what they can expect from AI and how it can help them in the future. We want to demystify the AI process – it’s not like a Terminator movie – and training will be important for the next 10 years and more.”*³⁸

Figure 15. Organizations face a severe talent crunch across a number of AI-related skills and roles

Skills	Demand is high	Supply is adequate	Difference in percentage points (Demand-Supply)
Machine Learning	82%	12%	70
ML/Deep Learning frameworks e.g., Tensorflow, SickItLearn	81%	13%	68
Visualization skills (Tableau, Spotfire, PowerBI, Qlikview, etc.)	75%	23%	53
Programming languages (SQL, Python, R, Scala, etc.)	72%	20%	52
Data integration e.g., Informatica	71%	24%	47
Cloud AI tools e.g., SageMaker	70%	24%	46
Big Data platforms/tools – Hadoop, Spark	66%	27%	40
Cloud native DWHs e.g., Snowflake, AWS Redshift	67%	28%	39
Applied Mathematics	64%	29%	36
UI development (JavaScript, React, etc.)	64%	31%	33
Advanced Signal Processing	59%	32%	26
Probability and Statistics	48%	47%	0
Roles			
Business analyst for AI	73%	21%	52
Cloud solution architects	72%	22%	49
AI product owners	70%	24%	46
AI ethicists	62%	31%	31
Philosophy graduates	42%	48%	-6

Source: Capterra Research Institute, State of AI survey, March–April 2020, N=954 organizations implementing AI.

Establish partnerships with service providers

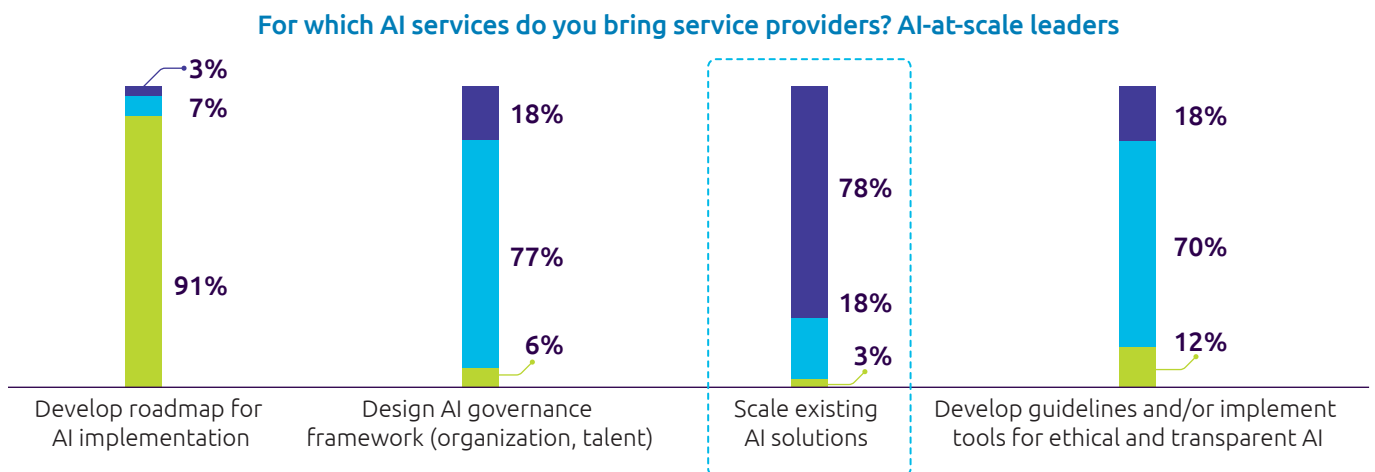
Given the complexity of achieving scaled AI, along with the significant talent crunch, many organizations are working with service providers to address the challenges of this transformation. For example, while 91% of AI-at-scale leaders develop their AI roadmap in-house, 78% outsource the scaled deployment of solutions:

- Roadmap for AI: predominantly in-house, 91% of AI-at-scale leaders vs 44% of struggling organizations

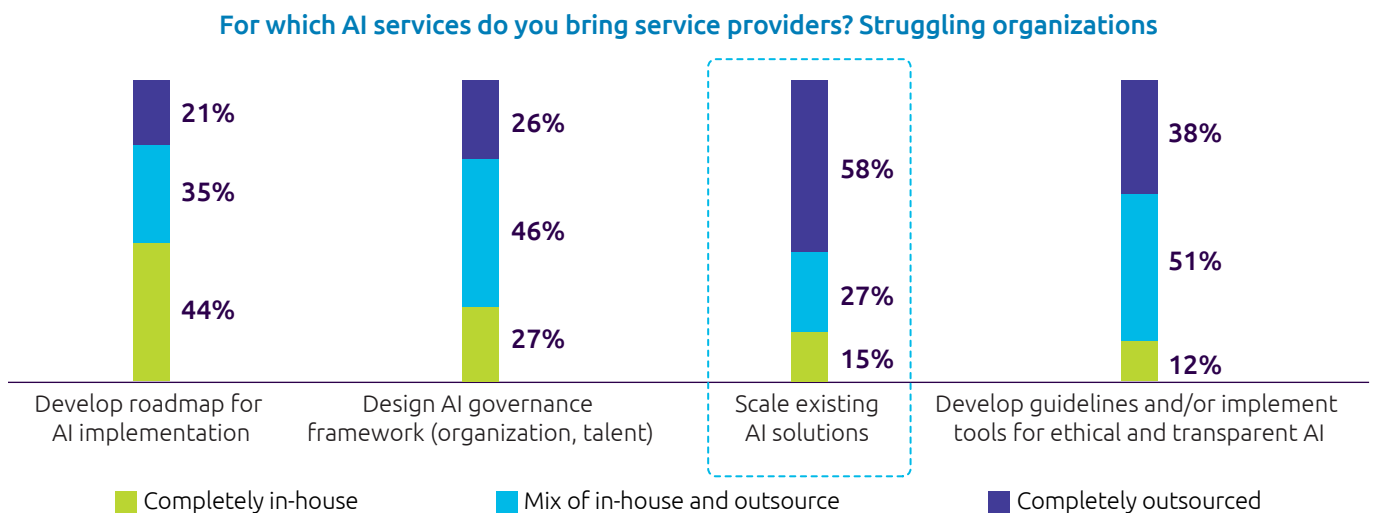
- Scaling AI solutions: majorly outsourced, 78% of AI-at-scale leaders vs 58% of struggling organizations
- Governance as well as ethical guidelines: mixed approach of in-house and outsourcing, ~70% of AI-at-scale leaders vs ~50% of struggling organizations.

The majority of AI-at-scale leaders develop their AI roadmap internally. As seen in earlier sections, these organizations mostly have a senior leader who can help on use-case prioritization as well as the business teams collaborate well with the IT in such organizations. This helps AI-at-scale leaders identify a roadmap internally. However, most of these leaders, realizing the complexities of scaling, prefer to work with service providers for wide-scale deployment.

Figure 16. Nearly 80% of AI-at-scale leaders look to service providers for scaling AI solutions



Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=120 AI-at-scale leaders.



Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=690 struggling organizations.

Principle Four: Monitor and amplify

Kickstart the virtuous AI circle: Continuously monitor model accuracy and business impact to amplify outcomes



Monitor model accuracy and business impact

Most AI models, if not monitored, can begin to deteriorate in performance once deployed into production. The phenomenon is termed as concept drift – encountering unknown or hidden relationships between variables. This is due to changes in the nature of data, assumptions or new information.

Organization with scaled AI will have a number of interconnected algorithms implemented across several functions or processes. Drift in one system can cause problems in many others. For instance, drift in the demand planning algorithm can affect current inventory, production, workforce planning, and procurement – all at the same time. Organizations need to rate models based on their vulnerability to drift and determine appropriate action-plan, such as how frequently to monitor/update, or which modelling technique to implement.

Organizational reasons can exacerbate drift in AI models:

- Expert data science teams in charge of development of models move to the next big thing, leaving a void in the skill set to maintain them. The resultant poor retraining of the models quickly makes them obsolete. Organizations need to set up processes to detect material decay in model performance during the development itself.
- **Only 48% of organizations surveyed mentioned they maintain human oversight for AI models.** Humans can help connect real-world developments with what is going on with the algorithms.

- Responsibilities to maintain the model are not clearly defined. AI teams developing systems should be made responsible for the operations of their products, and in charge of their monitoring. They should also be in charge of making sure their systems produce the right indicators and metrics. They need to periodically check if the model still delivers the intended business impact.

On a technical level, two factors can help to adjust AI models in line with fast-changing conditions:

- **Change data:** Training models with real-time or near-real-time data. Adding new and relevant data sources can also align AI models to real-world developments. For instance, in the current pandemic scenario, leading indicators such as infection rates, lockdowns etc. could serve as important features in an AI model.
- **Change approach:** Organizations can also explore changing modelling techniques from supervised learning (detecting past patterns from training data) to reinforcement learning (building scenarios without real data). The shift can be costly in the short term but can lead to more robust and resilient models.

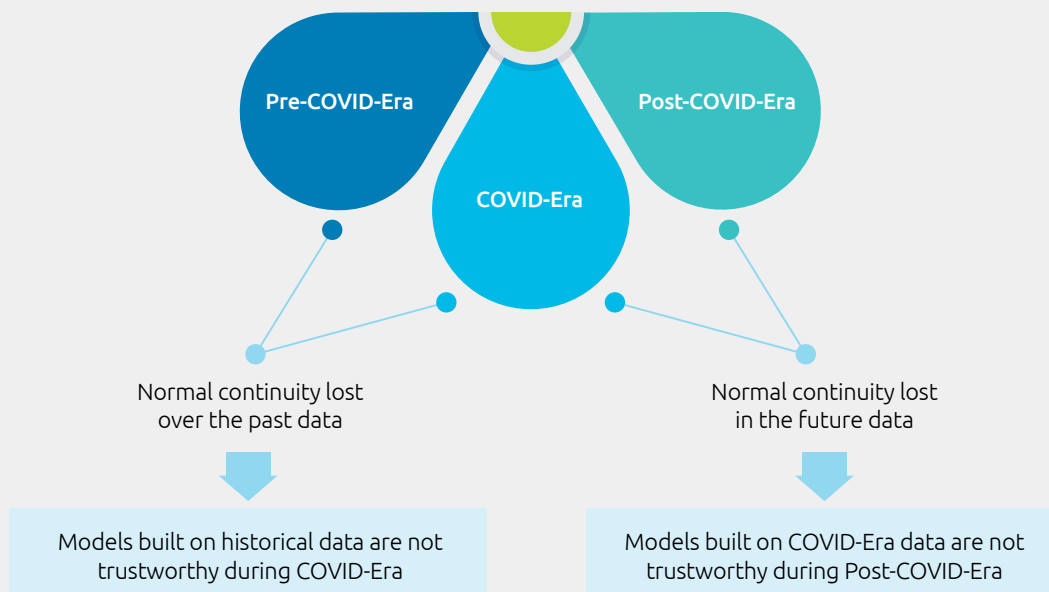
For example, Barclays Plc uses agent-based modelling (ABM), which recognizes that “agents” such as individuals or their groups and interactions among them impact the overall system, to analyze non-linear risks more quickly and less expensively. ABM accounts for feedback loops, unusual relationships between agents and complex scenarios that include external factors such as political unrest. The bank deployed this in the areas of market risk, credit risk, and operational risk.³⁹

Only **48%** of organizations surveyed mentioned they maintain human oversight for AI models.

AI model drift during COVID-19

The COVID-19 pandemic is a prime example of how an unforeseen event can affect existing AI models, with the pandemic causing shifts in customer purchase preferences (for example, reduced spend on discretionary categories and more on staples). Organizations face problems not only during the pandemic, where the current models are less relevant, but also after the pandemic if the change persists (see Figure 17).

Figure 17. Impact of COVID-19 on AI models



Source: Capgemini Insights & Data.

Some organizations perform statistical checks to detect drift and to determine whether it requires human attention. JPMorgan, for instance, monitors AI models to catch those that are deteriorating in accuracy. *"During times of economic distress and volatility, such as the pandemic, it is critical to halt some AI models or retrain them,"* says Apoorv Saxena, global head of AI technology at JPMorgan Chase.⁴⁰

Amplify outcomes

Siloed processes are a major roadblock to AI deployment. Even when a solution is deployed, it has to use ad-hoc and costly processes to update with new data, new algorithms/code, and new models. MLOps extends the agile and DevOps practices from traditional software applications to AI-based applications. It covers the entire cycle of gathering and preparing data for the models, running experiments, building and retraining models, and deploying and monitoring them. Organizations using MLOps automate these processes, resulting in fast, reliable, versioned, and better-quality applications. This helps in a variety of areas – from boosting experimentation to faster data updates – and ensures that solutions deliver better insights.

Once you have capabilities such as these in place, you can focus on those projects that really **“move the needle”**. In other words, the ones that have a visible topline or bottom-line impact. Visa, the global payments network, has used AI-driven solutions to prevent fraud totaling an estimated \$25 billion in 2018 alone. Using machine learning, Visa has:

- Developed a secure and frictionless experience for account onboarding (real-time risk scores shared with issuers such as banks based on consumer persona-based profiles)
- Authentication (using biometrics such as face, fingerprint, or voice instead of passwords or PINs)
- Authorization of payments (implementing more than 260 anomaly detectors and 15 region-, channel-, and industry-specific risk models, each optimized to identify fraud in different scenarios).⁴¹

AI-powered organizations can also respond quickly to changes in the external environment. During the COVID-19 pandemic, Walmart pushed forward the launch of its AI-driven Express delivery, which offers over 160,000 items to customers in the US within two hours. Walmart scaled this program from 100 stores in the US to over 1,000 in a month and is on track to launch in 1,000 more by June 2020. It launched an MVP in 100 stores, optimizing it in real time for scaled deployment. The underlying systems were powered with AI algorithms to account for a range of conditions in real time, determining whether a customer is eligible for express delivery and prioritizing shipments.⁴²





Conclusion

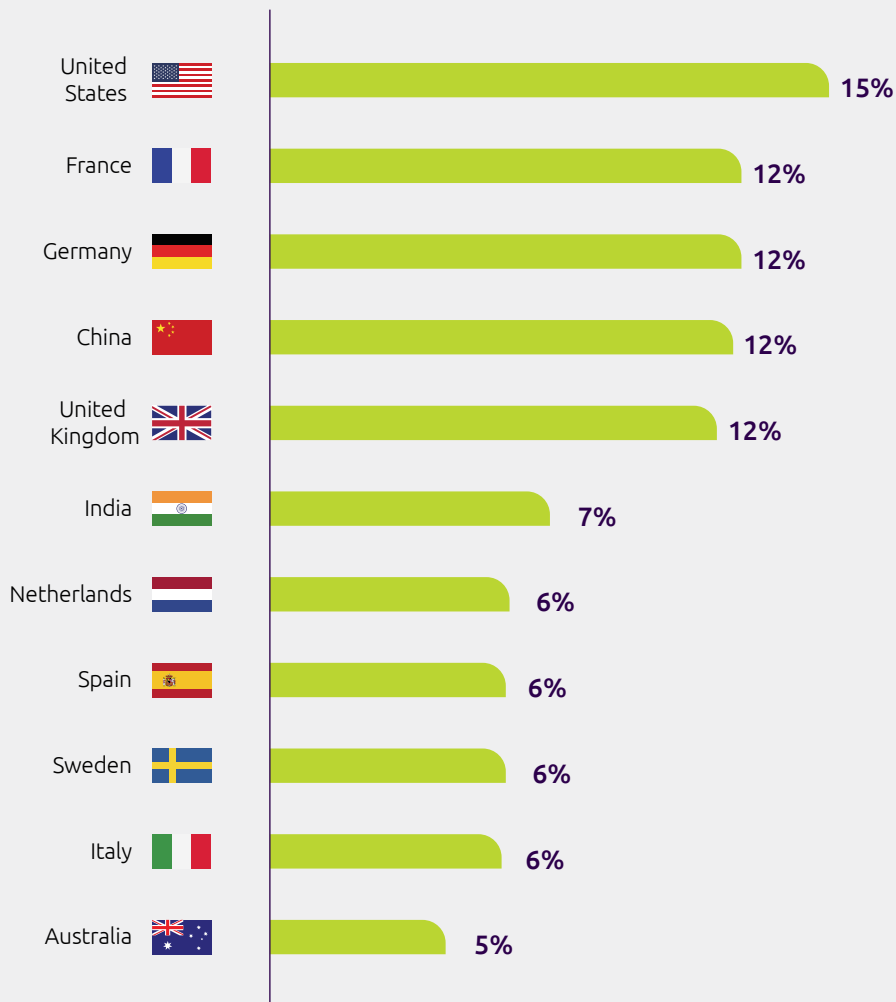
Implementing AI at scale is helping high-performing organizations to steal a march on their competition: generating additional revenues, reducing risks, engaging with customers, and optimizing costs. Organizations that have successfully achieved scale realize that this is about more than just the technology. Factors such as data management and IT infrastructure, while critical, act only as enablers. How organizations adapt their governance and operating model, transform ways of working between business and IT, and build skills is more important. AI-at-scale leaders take a much holistic view and take steps to align their strategy, adapt their processes, devise governance models, and build a talent base that together serve as strong building blocks for scaling AI. At the same time, they also realize that no organization is an island. On their journey to AI scale, they also tap into the strengths and insights of partners, academia, and innovation ecosystems. AI has lived up to its promise of delivering real business benefits for the AI-at-scale leaders, it is upon all organizations to unlock its full potential.

Research methodology

This research followed a two-pronged approach.

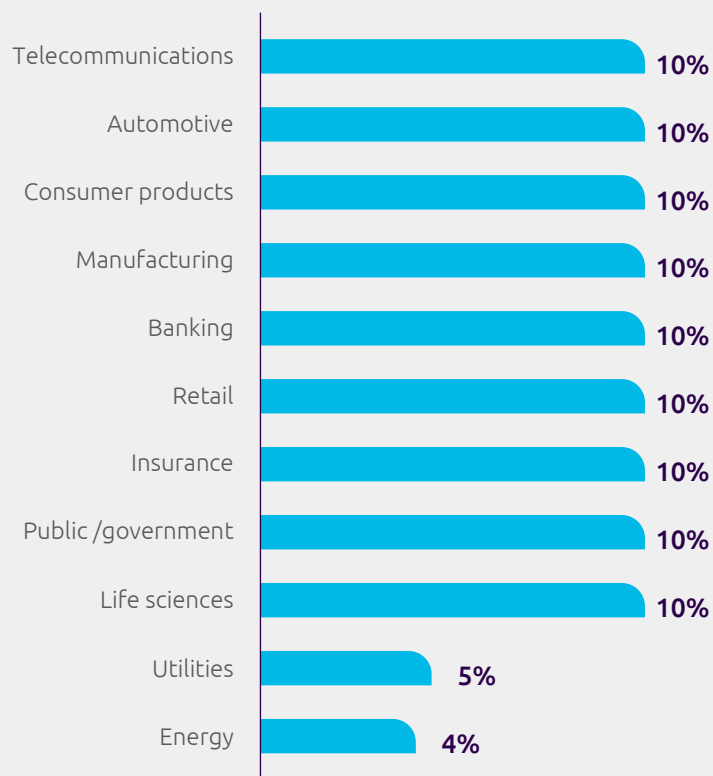
We surveyed 954 executives in organizations that had an ongoing AI initiative(s). All these organizations reported annual revenues of more than \$1 billion for the last financial year. The survey took place from March to April 2020 and covered eleven countries.

Organizations by country



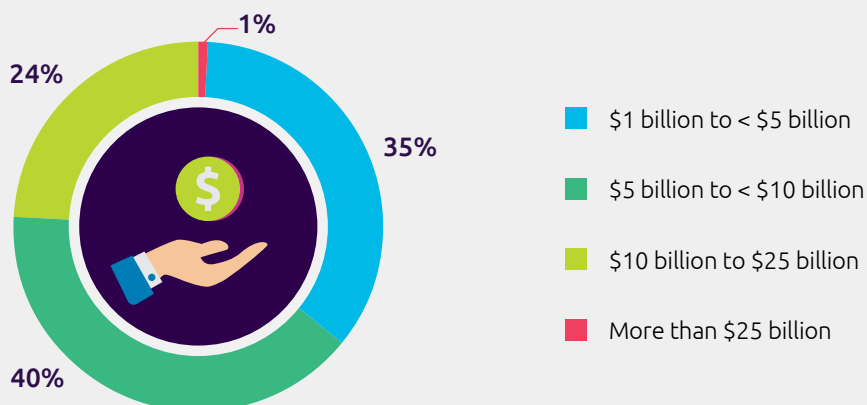
Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=954 organizations implementing AI.

Organizations by industry



Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=954 organizations implementing AI.

Organizations by revenue



Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=954 organizations implementing AI.

In addition to the survey, we conducted ten in-depth discussions with executives overseeing the AI program in their organization or function. In these interviews, we discussed on their strategy for AI, the approach for scaling initiatives, benefits, and the best practices they followed for scaling the initiatives.

References

1. VentureBeat, "AI startups raised \$18.5 billion in 2019, setting new funding record," January 14, 2020.
2. PR Newswire, "Why Pharmaceutical R&D Global Spending Could Exceed \$200 Billion by 2024," December 11, 2019.
3. Roche company presentation, May 7, 2020.
4. The Wall Street Journal Pro, "CIO Helps Conagra Turn Food Trends Into Products," July 22, 2019.
5. WHO, "WHO launches a chatbot on Facebook Messenger to combat COVID-19 misinformation," April 15, 2020.
6. Capgemini Research Institute, "COVID-19 and the age of the contactless customer experience: Winning the trust of consumers in a no-touch world," Consumer Survey, April 2020, N=4,818 consumers.
7. Capgemini Research Institute, "COVID-19 and the age of the contactless customer experience: Winning the trust of consumers in a no-touch world," Executive Survey, April 2020, N=956 executives.
8. Economic Times, "How to use ICICI Bank's voice banking services on Amazon Alexa and Google Assistant," April 20, 2020.
9. Voice Summit, "This is how people are using voice assistants during coronavirus," March 19, 2020.
10. Healthcare IT News, "Defense department puts AI on front lines against coronavirus," April 14, 2020.
11. Statnews, "Hospitals are using AI to predict the decline of COVID-19 patients – before knowing it works," April 24, 2020.
12. WSJ, "Chatbots Help Texas Officials Cope With Flood of Coronavirus Unemployment Claims; Georgia, South Carolina also use AI-based bots to answer questions from jobless people in need of benefits," April 23, 2020.
13. WSJ, "Ahold Delhaize Accelerates Automation as Coronavirus Pressures Workforce," May 15, 2020.
14. WSJ, "Hospitals Deploy Technology to Reduce ICU Staff Exposure to COVID-19; Houston Methodist Hospital in Texas is using high-resolution cameras and machine-learning algorithms to create a so-called clinical command center," May 8, 2020.
15. Call transcript, "Colgate-Palmolive Co at Consumer Analyst Group of New York Conference," February 21, 2020.
16. Wall Street Journal, "AB InBev Taps Machine Learning to Root Out Corruption," January 2020.
17. AB InBev. (2017). Annual Financial Report.
18. Arkin, B. (2019, April 5). The Eye of Cybersecurity: How Machine Learning Sees Vulnerability (via Forbes Insights). LinkedIn. <https://www.linkedin.com/pulse/eye-cybersecurity-how-machine-learning-sees-via-forbes-brad-arkin/>
19. LightReading, "AT&T's Gilbert: AI Critical to 5G Infrastructure," September 2018.
20. Plexal, "Meet Zara: the Zurich UK Insurance chatbot co-developed by Plexal member Spixii," July 2018.
21. GOV.UK, "How a UK-based bank used AI to increase operational efficiency," October 18, 2019.
22. Kaggle. (n.d.). *2018 Kaggle ML & DS Survey*. Retrieved from <https://www.kaggle.com/kaggle/kaggle-survey-2018/>
23. WSJ, "Morgan Stanley Center of Excellence Readies Bank for AI's Data Demands," April 22, 2019.
24. To create its Data Analytics Platform, Uniper selected Tableau along with Talend to integrate data into a Snowflake modern, central data lake in the Microsoft Azure Cloud Platform. Talend, "Talend Enables Energy Company Uniper to Analyze Data at Scale in the Cloud," December 11, 2018.
25. Dataopsmanifesto.org. (n.d.). *The DataOps Manifesto*. Retrieved June 18, 2020 from <https://www.dataopsmanifesto.org/>
26. The Walt Disney Company. "Hitachi Vantara Joins Strategic Alliance with Disney Parks, Helping Usher in the Next Generation of Ride and Show Analytics." Press Release, October 9, 2019. Hitachi. (n.d.). *Hitachi Vantara and Disney Parks Announce Strategic Alliance*. Retrieved June 18, 2020 from <https://www.hitachivantara.com/en-in/company/customer-stories/disney-world-disneyland-resort.html>
27. CIO.com, "Kaiser Permanente streamlines operations with analytics," May 20, 2020.
28. RBS annual report, 2019.
29. The Wall Street Journal Pro, "Capital One Gets the Entire Bank Involved in AI; Cross-team collaboration helps advance projects, multiplying the reach of its AI center of excellence," October 2019.
30. CIO, "6 machine learning success stories: An inside look," March 17, 2020.
31. Manufacturing Global, "BMW Group: AI innovation in the automotive industry," March 18, 2020.
32. Capgemini Research Institute, "Why addressing ethical questions in AI will benefit organizations," July 2019.
33. Ibid.
34. H&M group, "Meet Linda Leopold, Head of AI Policy," June 2019.
35. HSBC. (n.d.). *Our conduct*. Retrieved May 22, 2020 from <https://www.hsbc.com/our-approach/risk-and-responsibility/our-conduct>
36. Salesforce blog, "Fixing the AI Skills Shortage: What Companies Need to Know Now," March 20, 2019.
37. The Wall Street Journal Pro, "Shell's Companywide AI Effort Shows Early Returns," November 2019.
38. Manufacturing Global, "BMW Group: AI innovation in the automotive industry," March 18, 2020.
39. Barclays website, "Insights: how Barclays is predicting the future," July 2019.
40. The WSJ Pro, "Pandemic-Related Disruptions Hurt Reliability of Some AI Models; Humana and JPMorgan are among the companies watching for AI 'model drift' as lockdowns and social-distancing rules bring about unforeseen trends," June 10, 2020.
41. Visa Inc, "Transforming Payment Security Through Artificial Intelligence," 2019; "Visa Inc Investor Day transcript," February 11, 2020.
42. Venturebeat, "How Walmart uses AI to enable two-hour Express Delivery," May 11, 2020.

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Marie-Caroline leads Capgemini Invent's Artificial Intelligence offer, developing thought leadership, new frameworks and solutions, promoting a "Trusted AI" approach. She has a track record of more than 20 years in business management consulting, and is applying her experience in helping organizations leverage the full potential of AI & Data to innovate, enhance their revenues and efficiency, supporting their transformation journey from awareness and AI / Data strategy to implementation at scale within the organization.



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Ashwin is global head of Industrialization for Capgemini Group. In addition, Ashwin is also Capgemini India CEO. In his role as Head of Automation, he is responsible for developing new frameworks, methods, tools and solutions leveraging AI and emerging technologies for intelligent automation. In this role, he drives improvement of productivity, effectiveness and quality of Capgemini services and enables clients in improving the efficiency and reliability of their operations and processes. Ashwin has more than 25 years of industry experience in various enterprise applications and new generation technologies and worked internally with several large Fortune 500 companies.



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Jerry has more than 30 years of management consulting experience. He led a number of global enterprise transformation programs and specializes in Manufacturing, Hi-tech, Consumer Products, Retail, and Logistics industries. Some of his competencies include Big Data & Analytics, Artificial Intelligence, Internet of Things (IoT), Enterprise Transformation, SAP, Supply Chain Management, Shared Services, Business Process Services. He has also finished 600 hours of Japanese language training.



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The Capgemini Research Institute is Capgemini's in-house think tank on all things digital. The Institute publishes research on the impact of digital technologies on large traditional businesses. The team draws on the worldwide network of Capgemini specialists and works closely with academic and technology partners. The Institute has dedicated research centers in India, Singapore, the United Kingdom, and the United States. It was recently ranked number one in the world for the quality of its research by independent analysts.

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Leverage AI's potential with Capgemini as your partner

Perform AI

Activate Data, Augment Intelligence, Amplify Outcomes

Artificial Intelligence has crossed the threshold of pilots, proofs of concept and entered into the scale market. Fifty-three percent of organizations have scaled AI but only 13% overall have rolled out multiple AI applications across numerous teams. Scaling AI and analytics requires organizations to:

- Push the business adoption of AI throughout the organizations and the entire business, with agile practices such as DataOps and MLOps
- Put all AI use cases in production on top of modern Data & AI platforms
- Adapt the right operating model and governance for AI initiatives to be aligned to strategic corporate objectives, and measure their impact and correct course when necessary
- Develop the necessary skills and ecosystem partnerships to bring Data & AI at the heart of the culture of the organization.

Perform AI by Capgemini has a proven track record of delivering tangible business outcomes at scale across industries. For a global beverage company, our solutions have helped deliver more than \$100 mn annual savings in inventory costs. For a European government agency, we have delivered a 10X ROI on fraud detection AI-powered initiatives. For a global consumer products major, our AI solutions focused on consumer insights are helping bring €120 mn in incremental revenues.

Our teams continuously work with you to activate your data, intelligently augment processes, and amplify outcomes to bring you to the next step of your journey as a Data & AI-powered enterprise. We bring together people, processes, data, and technology to mobilize your enterprise, your talents, and your stakeholders. We help you balance operational excellence with business innovation to be resilient to current and future crisis, to overperform in your market and protect your workforce.

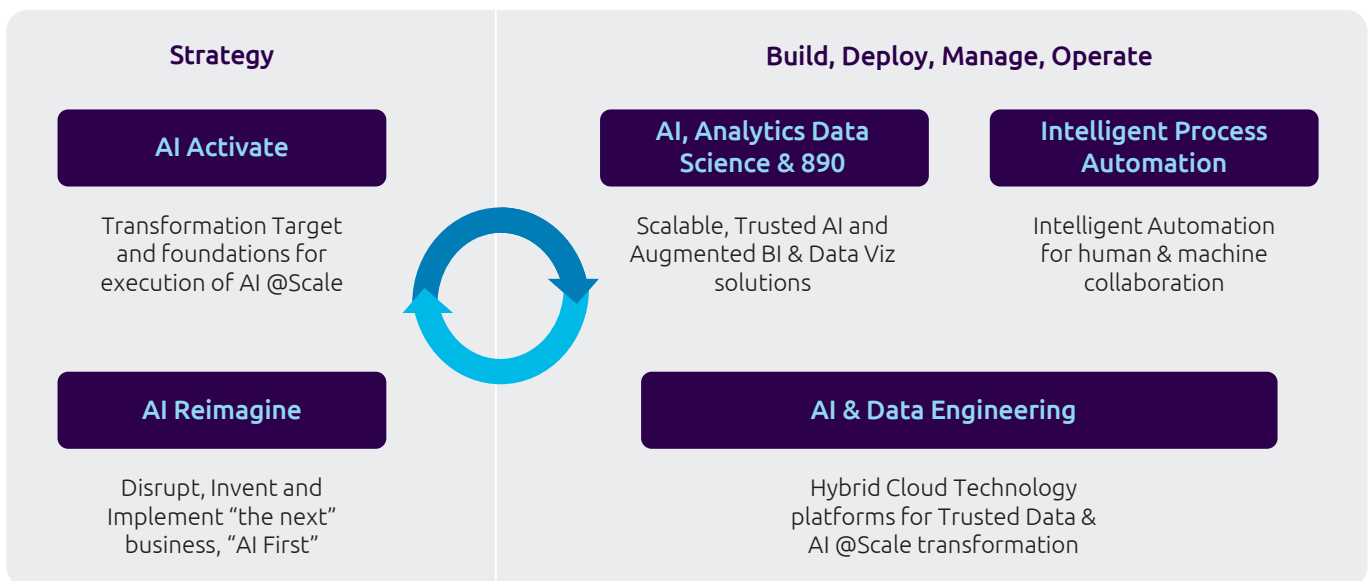
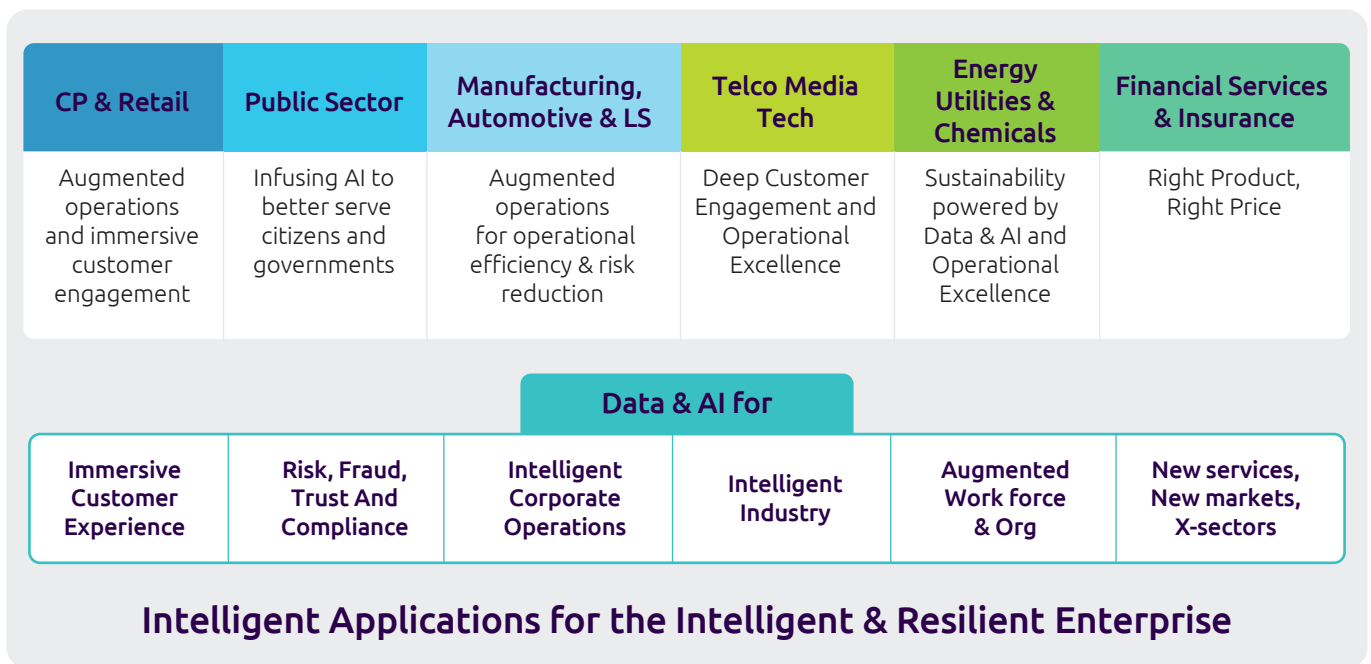
Across sectors, Perform AI offers a unified framework to deliver tangible business outcomes at scale with AI & Analytics. Our focus is to put Data, AI & Analytics technology to use in order to transform all domains and lines of business (LoBs) of your organization. From using recommendation engines or computer vision to create immersive customer experiences and drive more sales and customer engagement, to using machine learning to drive efficiencies in manufacturing operations, we deliver the real value of AI & Analytics for your business and your talents.

Our Perform AI portfolio relies on core pillars that constitutes designing principles in everything we do. Privacy, trust and ethics, security, and sustainability are core components in your organization's success on scaling AI.

With these core pillars, we provide a comprehensive portfolio from strategy and execution to operations. We define your Data & AI transformation target, and set up the right path forward in terms of intelligent applications and use cases. We bring a unified approach, bringing together intelligent automation, machine learning, analytics and data science, all powered by Data & AI platforms at scale. Through this portfolio, we bring you the best mix of expertise and capabilities from the Capgemini Group in order to help you become an AI-at-scale leader.

Capgemini Perform AI

Accelerated time to value for business outcomes with Trusted Data & AI at scale

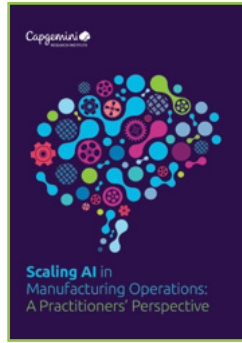


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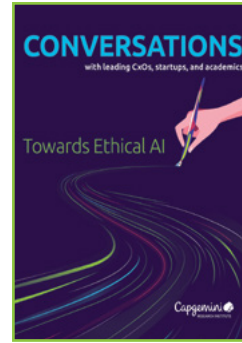
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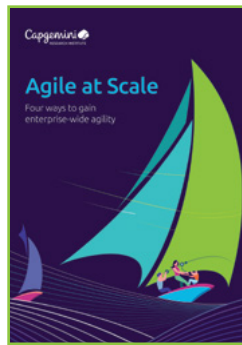
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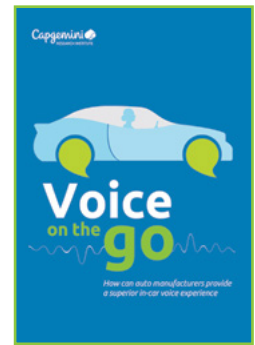
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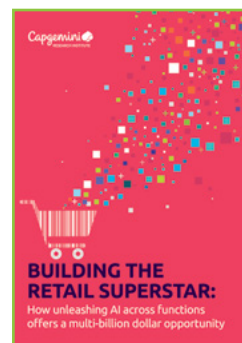
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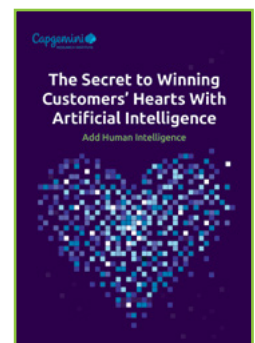
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