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The AI-powered enterprise

Unlocking the potential of AI at scale

Country deck – Germany

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Research objectives, scope, and methodology

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Research objectives

Main objectives

In 2017, we conducted a research on the state of AI across industries. The current research aims:

- To understand the progress over the last three years in scaling their AI initiatives
- To determine characteristics of the high-performing set of organizations who scaled AI
- To identify best practices for scaling AI initiatives

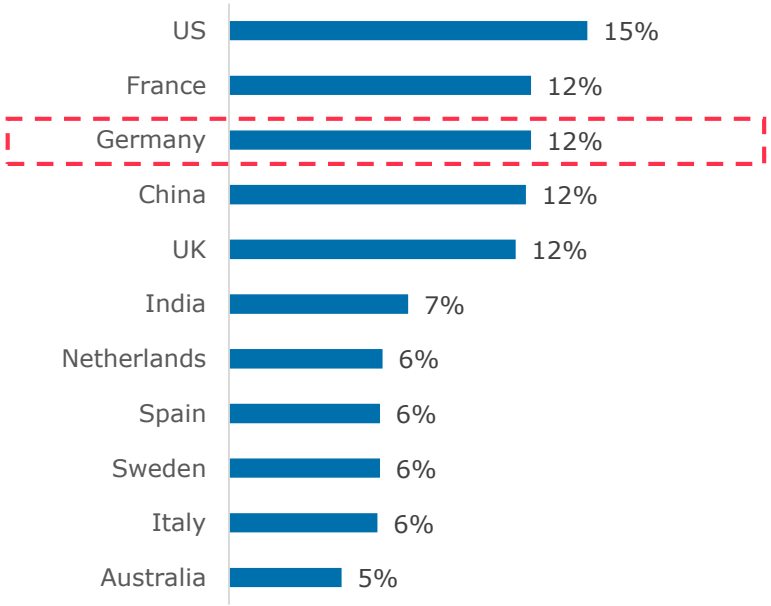
Key questions raised in the research

- What is the current status of AI adoption?
- How successful are organizations today in scaling their AI initiatives?
- What should organizations do to scale AI?
- Are organizations focused on ethical aspects of AI design and development?
- Do organizations face an AI talent gap?

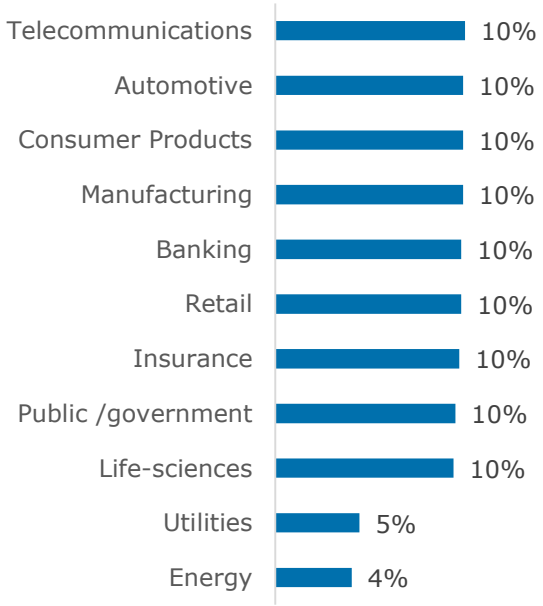
Research scope and methodology

We surveyed 954 organizations that had on-going AI initiative(s). The survey took place from March to April 2020. All these organizations have revenues of more than $1 billion for the last financial year. We also conducted around ten in-depth discussions with executives overseeing AI program in their organizations.

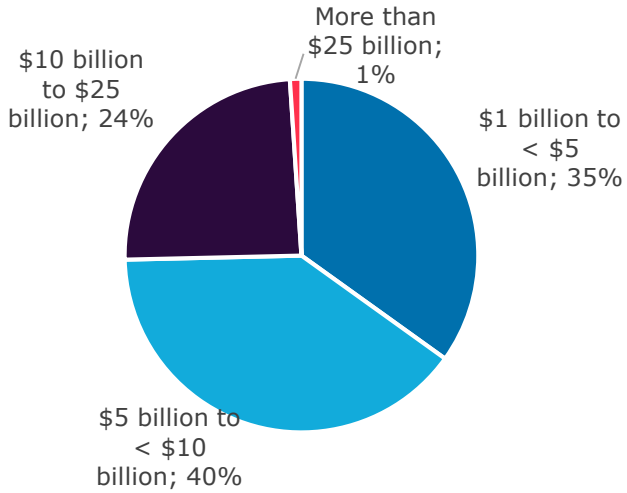
Organizations by country



Organizations by sector



Organizations by revenue

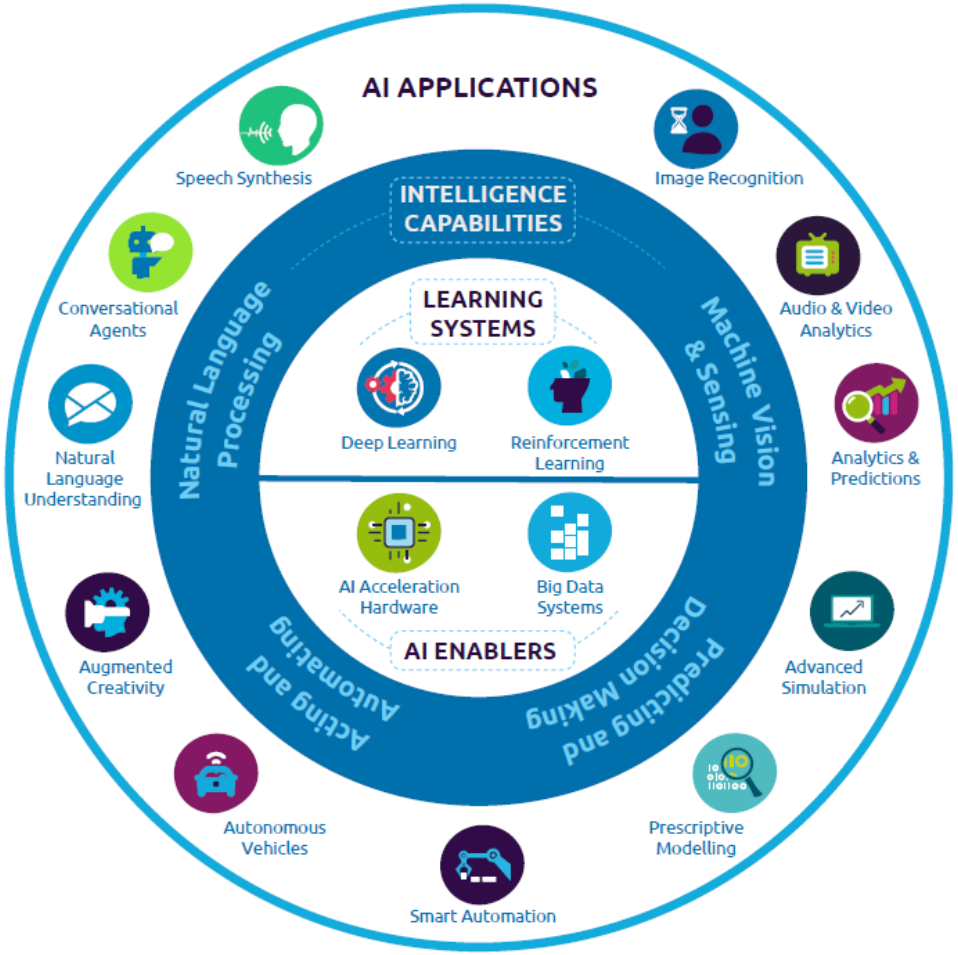


Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=954 organizations implementing AI.

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
- 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



Source: Capgemini Insights & Data.

02

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

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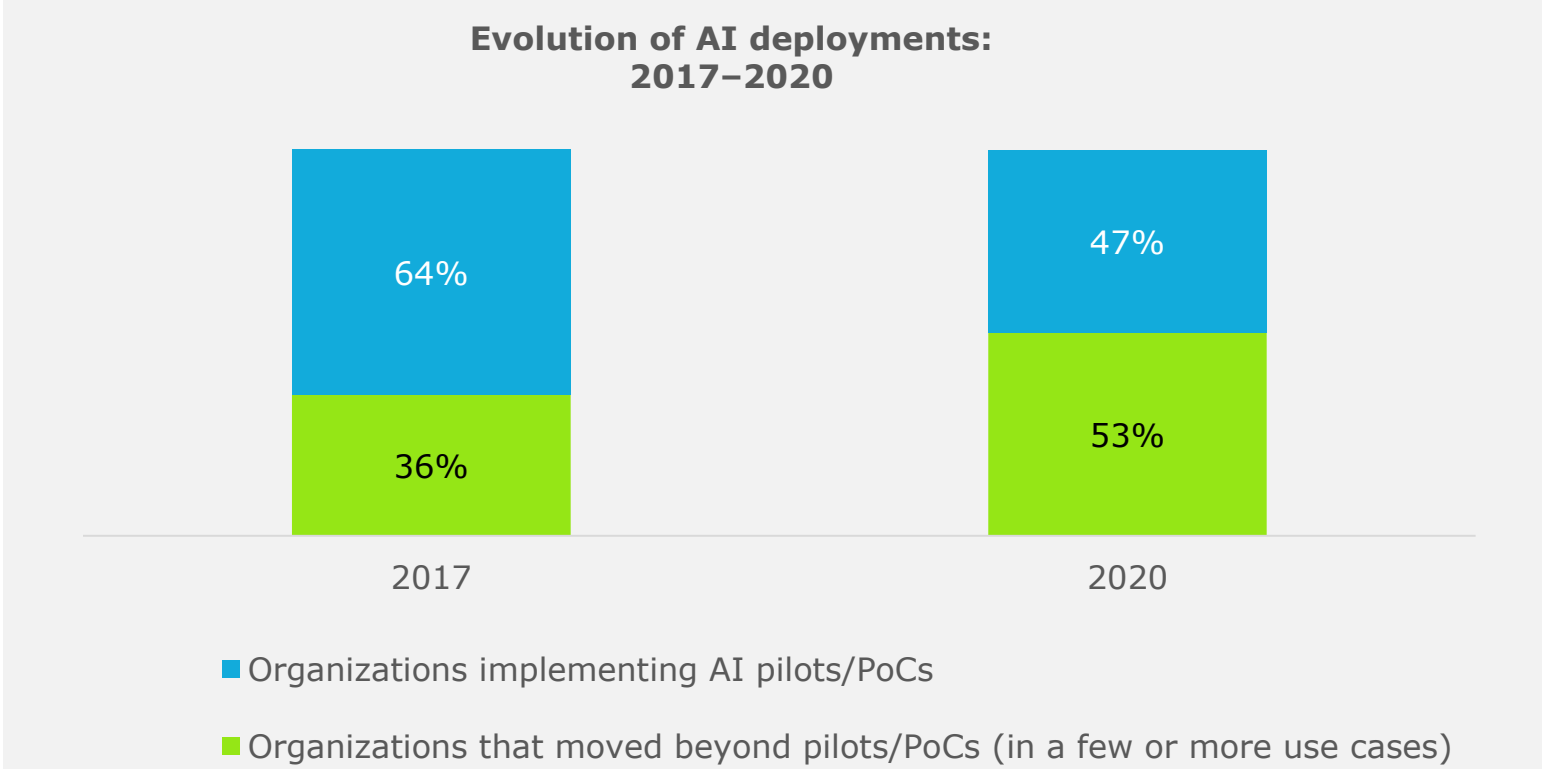
Globally, just over one in two organizations have moved beyond pilots and proofs of concept

Organizations reached an important threshold of wide-scale deployment of AI (53% of them) in the last three years

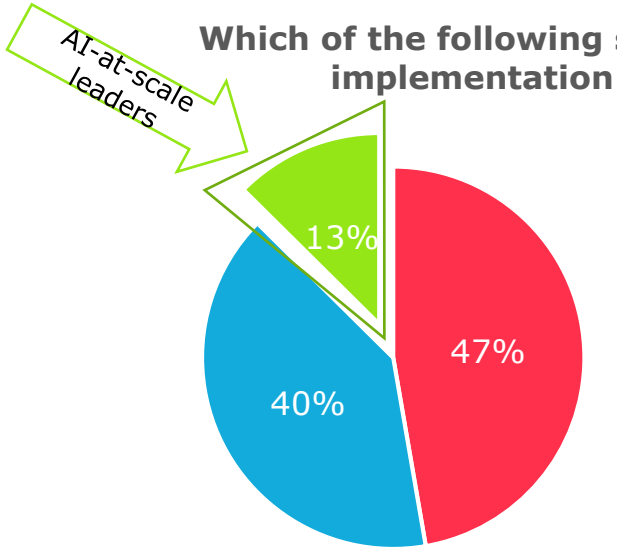


Source: Capgemini Research Institute, Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=954 organizations implementing AI; State of AI survey, June 2017, N=993 organizations implementing AI.

One in six organizations in Germany have scaled AI throughout multiple teams

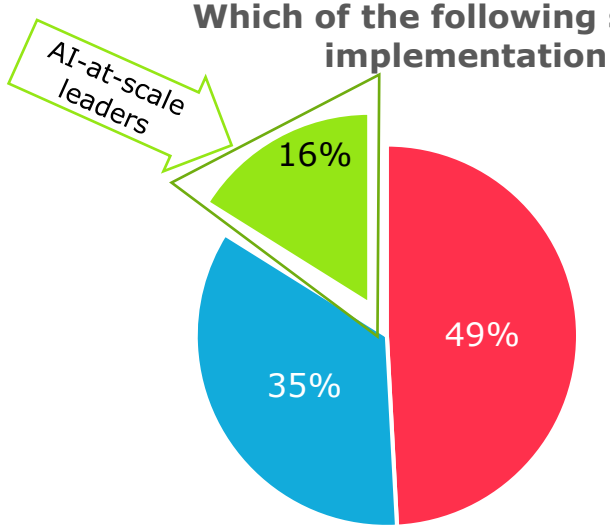
Around 16% organizations in Germany have scaled AI throughout multiple teams

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



- We have launched AI pilots/PoCs but they are not yet deployed in production
- We have deployed a few use cases in production on a limited scale
- We have successfully deployed use cases in production and continue to scale more throughout multiple business teams

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



- We have launched AI pilots/PoCs but they are not yet deployed in production
- We have deployed a few use cases in production on a limited scale
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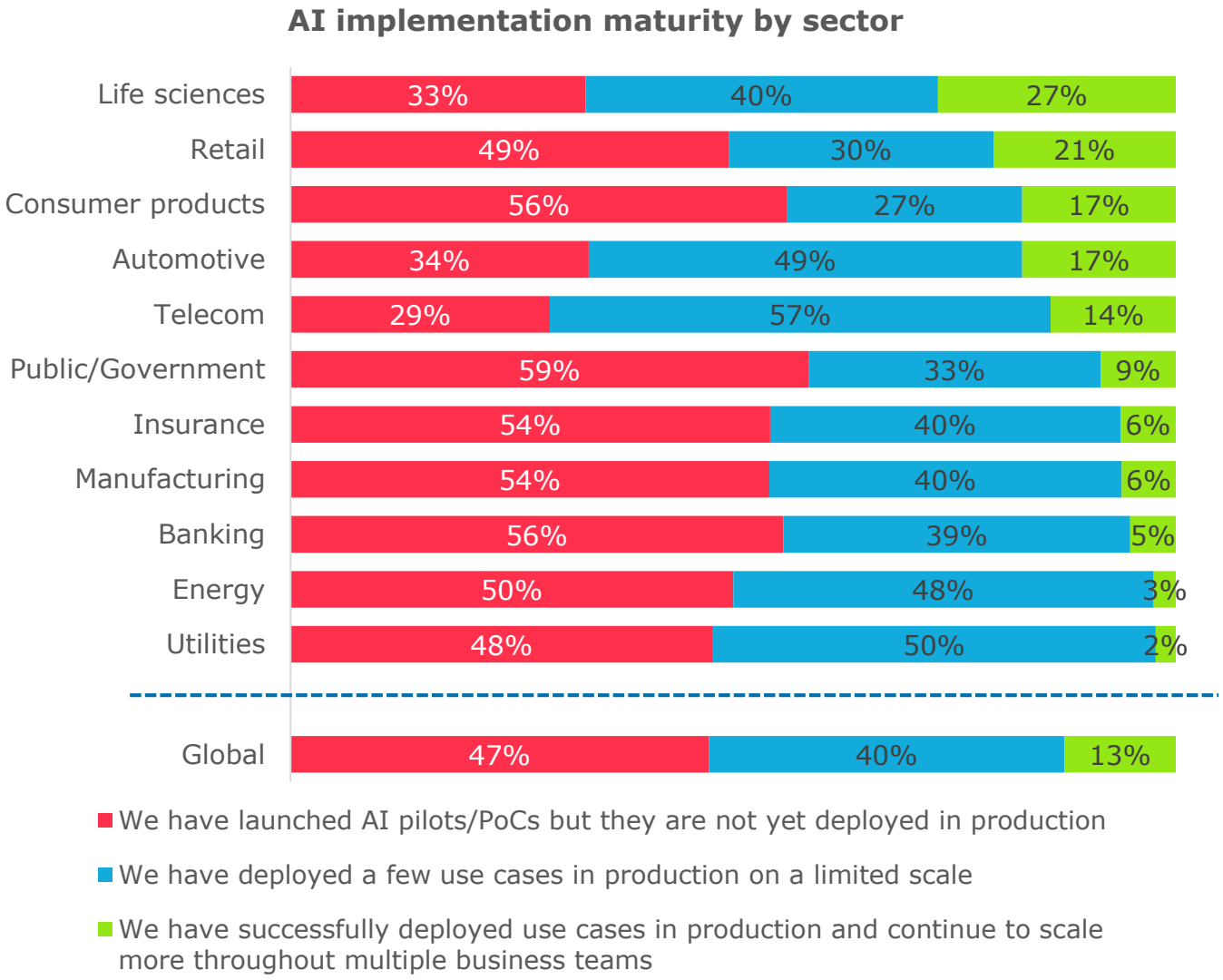
In contrast to the "AI-at-scale leaders" we also identified a cohort of organizations that began AI pilots before 2019 but have been unable to deploy even a single application in production. These "**struggling organizations"** form 72% of our sample.

Source: Capgemini Research Institute, Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=954 organizations implementing AI, N=118 organizations from Germany.

Life sciences and retail lead the scaling race



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

Life sciences:

- Made significant AI bets in areas such as drug development, R&D, and diagnosis
- 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.).

Retail:

- Though sector-wide AI penetration was high in 2017, it struggled to scale use cases as around nine in 10 focused on complex use cases
- Refocusing on low-complexity and high impact use cases helped the sector outperform

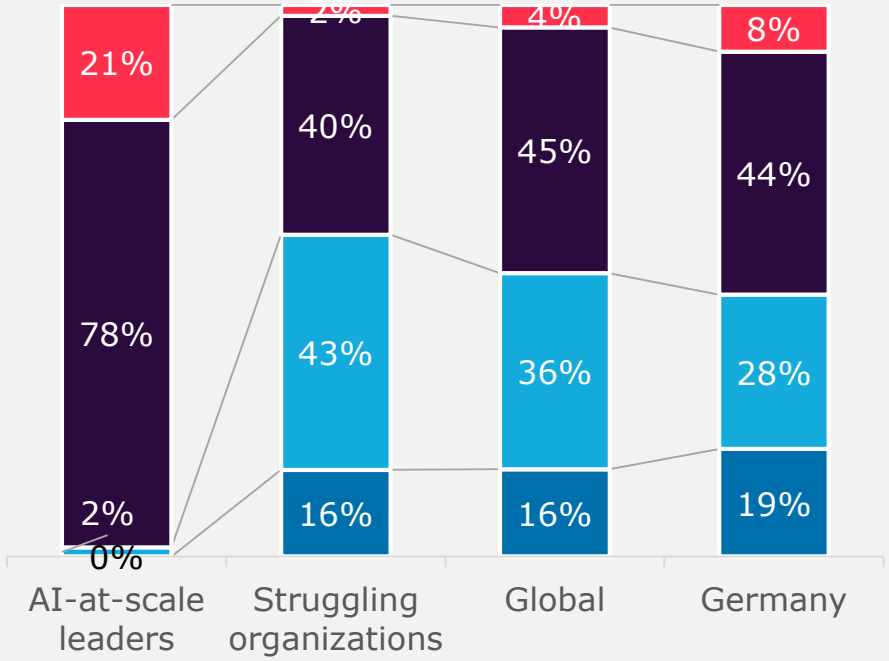
Consumer products

- Using AI for enhancing consumer experience, targeted advertising, product safety, quality control, new product development, etc.

Almost all AI-at-scale leaders are progressing as planned or even faster on their AI deployments despite the COVID-19 crisis

Nearly half (47%) of the organizations in Germany have either suspended all AI initiatives or pulled investments as a result of business uncertainty

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

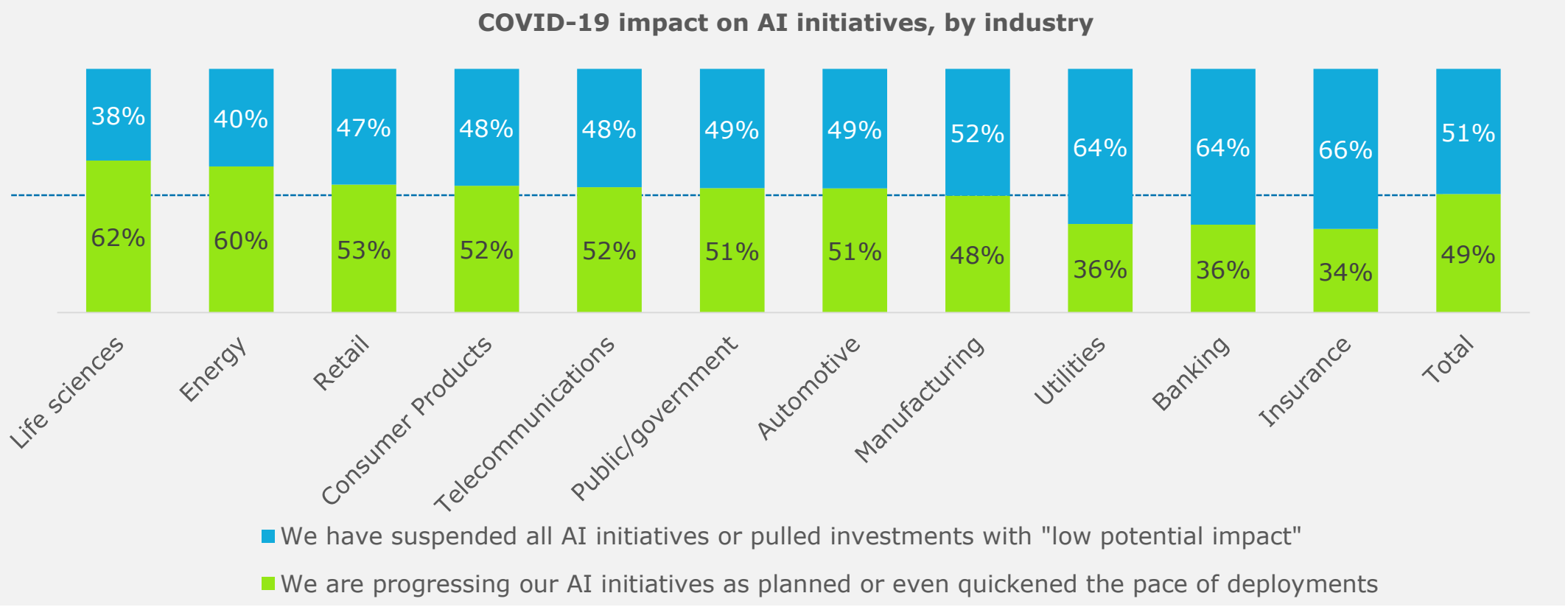


- We have quickened the pace of AI deployments to strengthen our competitiveness during this uncertain time
- We are progressing our AI initiatives as planned despite the recent economic challenges
- We have pulled investments from AI initiatives with 'low potential impact' due to high business uncertainty
- We have suspended all AI initiatives due to high business uncertainty

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, N=118 organizations from Germany.

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

Only 38% of life sciences organizations have either suspended or pulled investments in AI



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

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Decoding the AI-at-scale leaders

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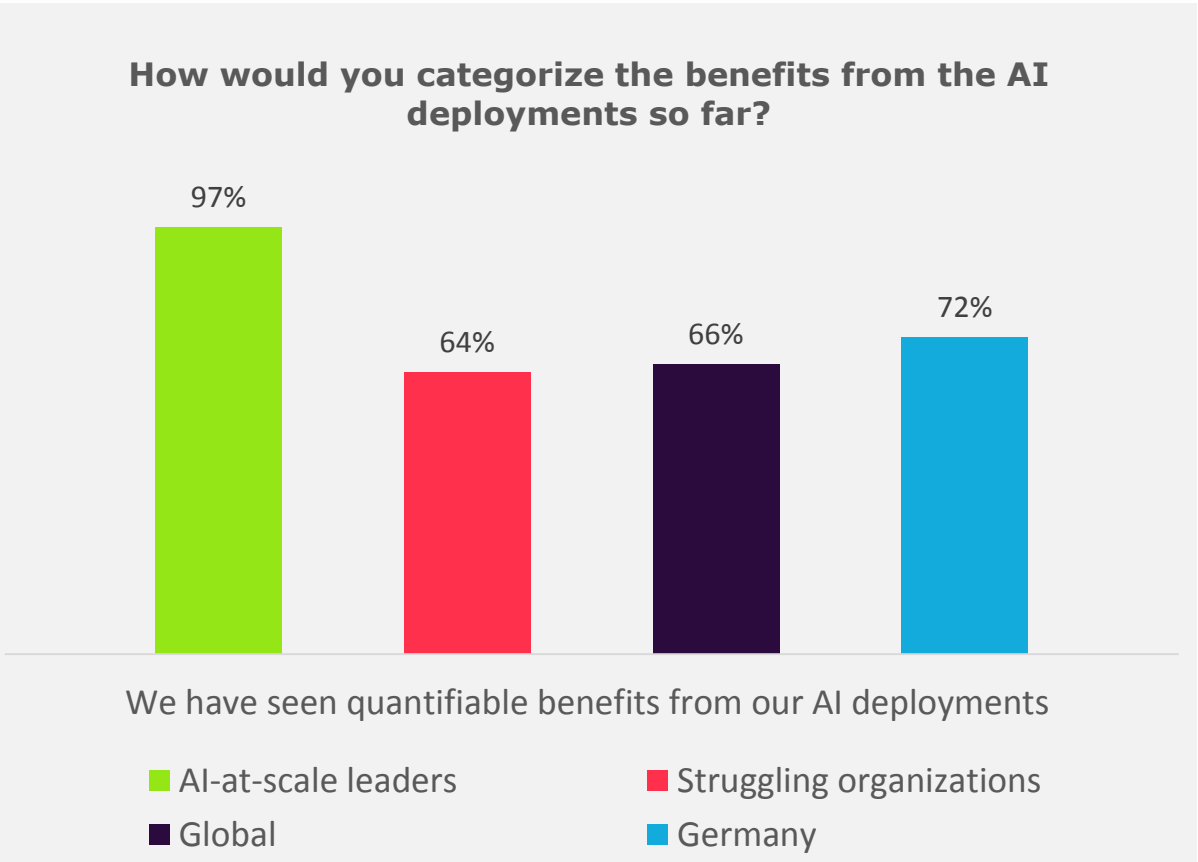
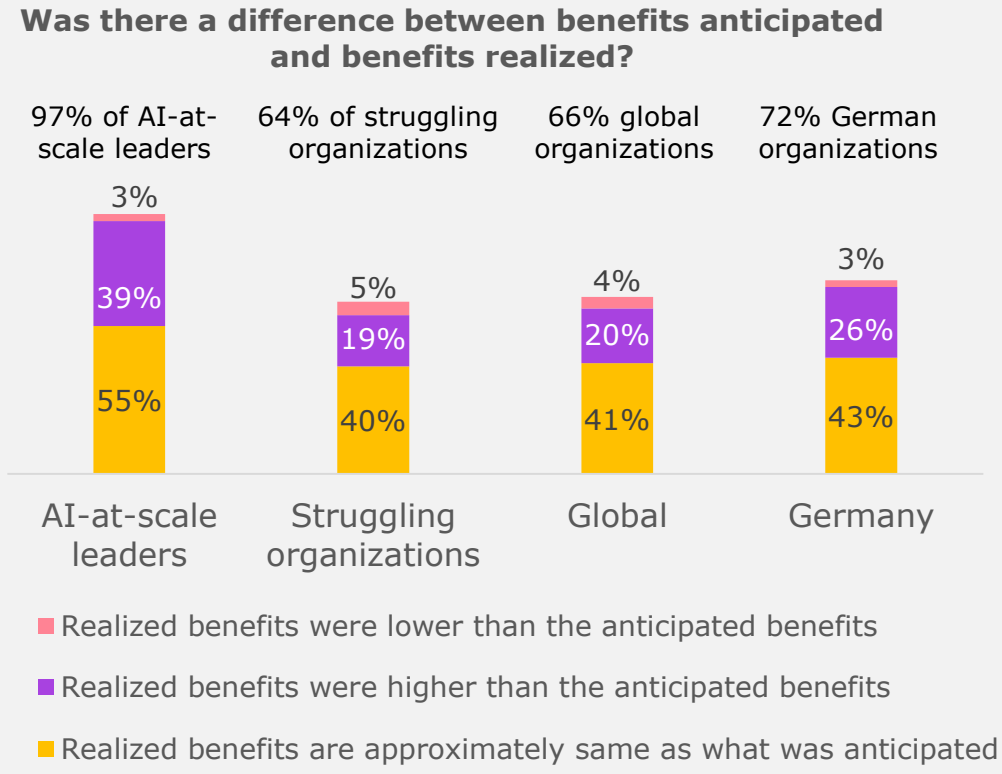
The AI-at-scale leaders are seizing a substantial advantage over struggling organizations

Three in four German organizations have realized quantifiable benefits from AI deployments



69% of German organizations achieved benefits that met or exceeded their expectations



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, N=118 organizations from Germany.

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

COLGATE-PALMOLIVE

AI in R&D to increase speed to market

- Leveraged its database of over 80,000 oral care formulas, combined with the recent market trends.
- Used predictive analytics to reduce the number of experimental recipes from 896 to 23
- Cut time to market a new toothpaste from several years to six months

Robotics and predictive maintenance to increase production throughput and reduce downtime

- Reduced production downtime with the use of predictive maintenance with wireless sensors, analytics, and AI.
- Machine-related data is compared with over 80,000 other machines operating globally.
- In one instance, AI alerted the plant team about faulty part:
  - Saved 192 hours of downtime and an output of 2.8 million tubes of toothpaste

AB InBev

AI in compliance to spot risky transactions faster and cut investigation costs

- Launched an AI-based fraud detection platform "BrewRight" in 2015
- Draws data from more than 50 countries to spot financial risk or even irregularity
- Saved hundreds of thousands of dollars in costs associated with investigating suspect payments

Sources: Call transcript, "Colgate-Palmolive Co at Consumer Analyst Group of New York Conference," February 21, 2020; AB InBev (2017) *Annual Financial Report.*

AI-at-scale leaders realize significant benefits across functions

AI's biggest benefit seems to be in generating additional sales rather than in improving operational efficiency

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, N=118 organizations from Germany.

AI-at-scale leaders deploy use cases in as many functional areas as possible

- Majority of AI-at-scale leaders work towards a large-scale deployment of at least one use case in each functional area
- 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.

Customer

- Understanding customer needs and expectations (88% of AI-at-scale leaders)
- Augmenting employees with tools to facilitate customer interactions (71%)

Supply chain and manufacturing

- Prevent failures, defects and safety critical events (59%)
- Reduce energy and material consumption (56%)

People & Organization

- Conversational bots to improve employee experience (83%)
- Promote worker safety (82%)

IT

- Pro-active threat detection (84%)
- Self-healing applications (77%)

Risk and compliance

- Understand, detect and predict risk (85%)
- Optimize fraud detection (78%)

New product/ feature/ service development

- Embed AI in existing products and services (70%)
- Commercialize new services or new business models based on AI (68%)

*Figures in brackets indicate the proportion of AI-at-scale leaders implementing this use case at scale.

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

04

Four principles for successfully scaling AI

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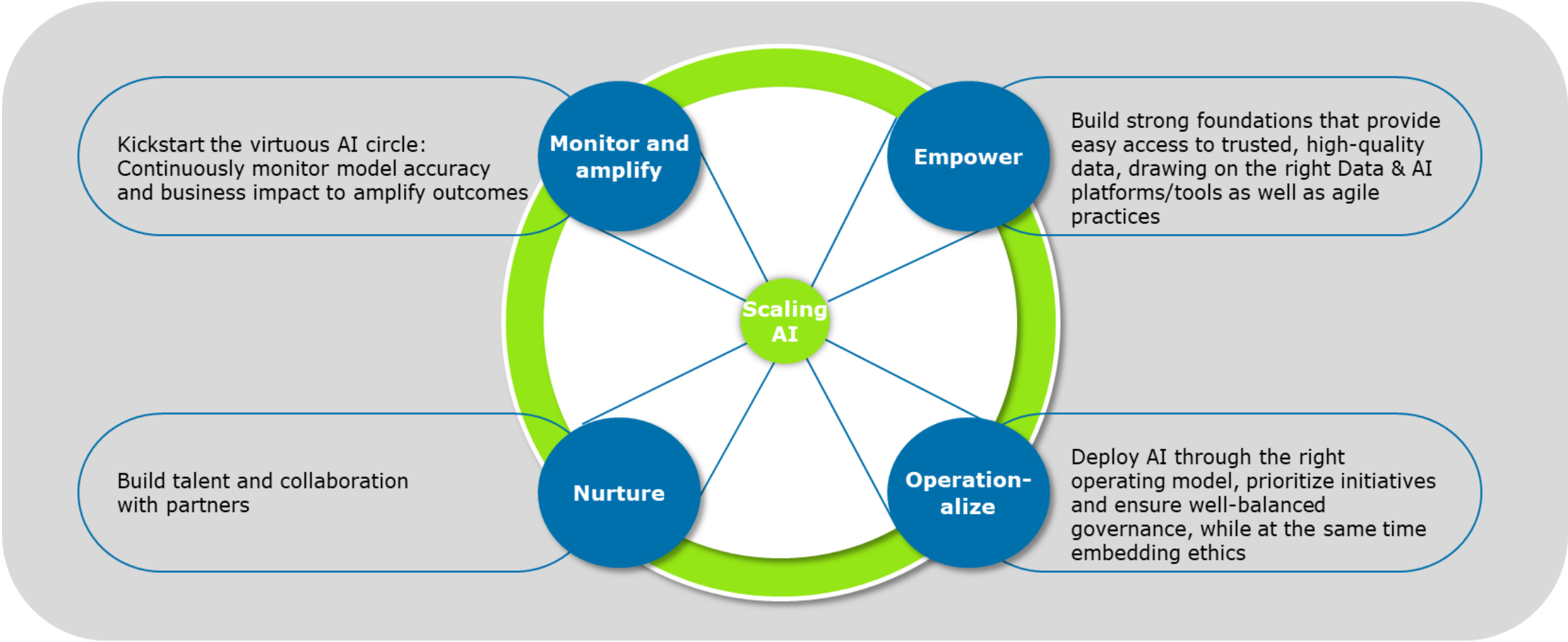
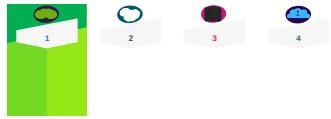
How organizations can scale AI



Source: Capgemini Research Institute analysis.

1 Empower: Build strong foundations providing easy access to trusted, quality data through the right Data & AI platforms and tools along with agile practices



Provide industrialized access to trusted, quality data

01

Set up strong data governance to build data trust and scale AI initiatives. Define guidelines and enforce the policies on: 1) Data discovery and provenance – understanding where the data is sourced and the process of discovery; 2) Data catalogs, or a collection of metadata with data management and search capabilities; 3) Master data management – ensuring the consistency and accountability of master data; 4) Data cleansing and data quality; 5) Data privacy; 6) Data security, and 7) Data stewards/owners

02

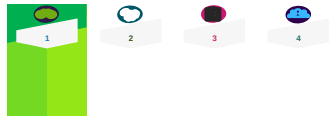
Establish the necessary technology foundations to remove data silos. Data estate modernization addresses the problems of fragmented and legacy IT systems and provides faster access to information within a secure environment. Key features include, 1) a hybrid cloud platform (on-premises systems, private clouds, and public clouds), 2) scalable – for storage as well as service-levels, and 3) security controls.

03

Democratize data access. With this step - data is harvested, stored where it can easily be found, can be understood as it is described with the right business metadata. Data management platforms help manage data harvesting and storage across the organization's data lakes, data hubs, and data warehouses.

Source: Capgemini Research Institute analysis.

1 Empower: Build strong foundations providing easy access to trusted, quality data through the right Data & AI platforms and tools along with agile practices



Deploy agile working practices, including DataOps

Implement DataOps

- DataOps 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.

Disney Parks 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, it has automated its ride and show operations to enhance guest experience.

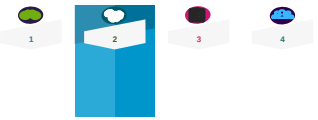
An agile culture is critical to AI deployment

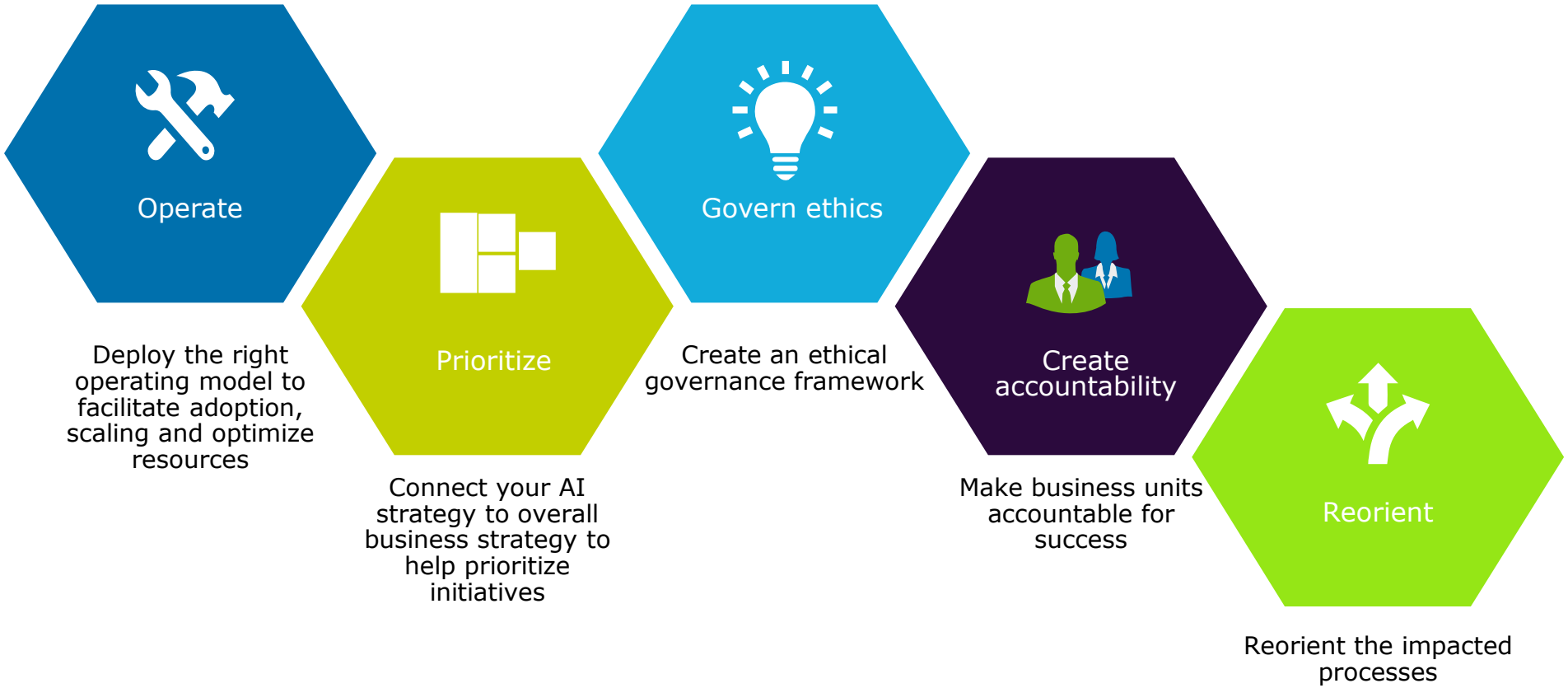
- In an agile organization, the leadership mindset is attuned to a test-learn-validate cycle, giving more autonomy to teams and providing more accountability.
- Teams are also focused on delivering real business value, defining clear problem statements, and linking each solution to an overall goal.
-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

"We … [got] everyone trained on a new way of working with SAFe (an agile practice)," 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."*

Source: Capgemini Research Institute analysis.

2 Operationalize: Deploy AI through the right operating model, prioritize initiatives and ensure well-balanced governance while embedding ethics

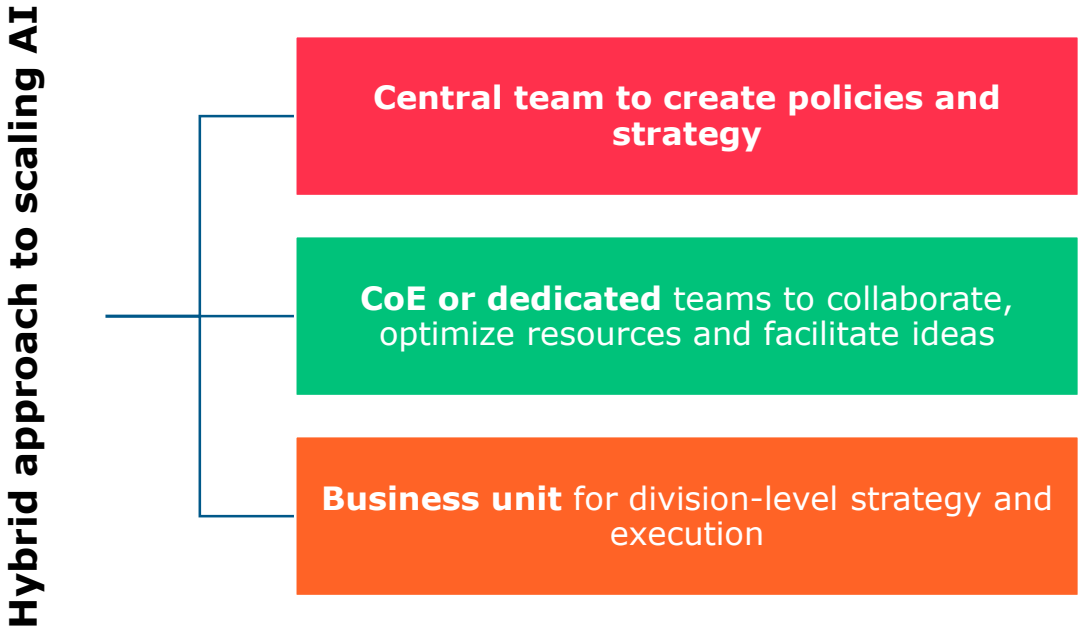




Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=954 organizations implementing AI.

2 Operationalize: Deploy the right operating model to facilitate adoption, scaling and optimize resources

A hybrid approach with a clear demarcation of central and business team's responsibilities is the recommended approach

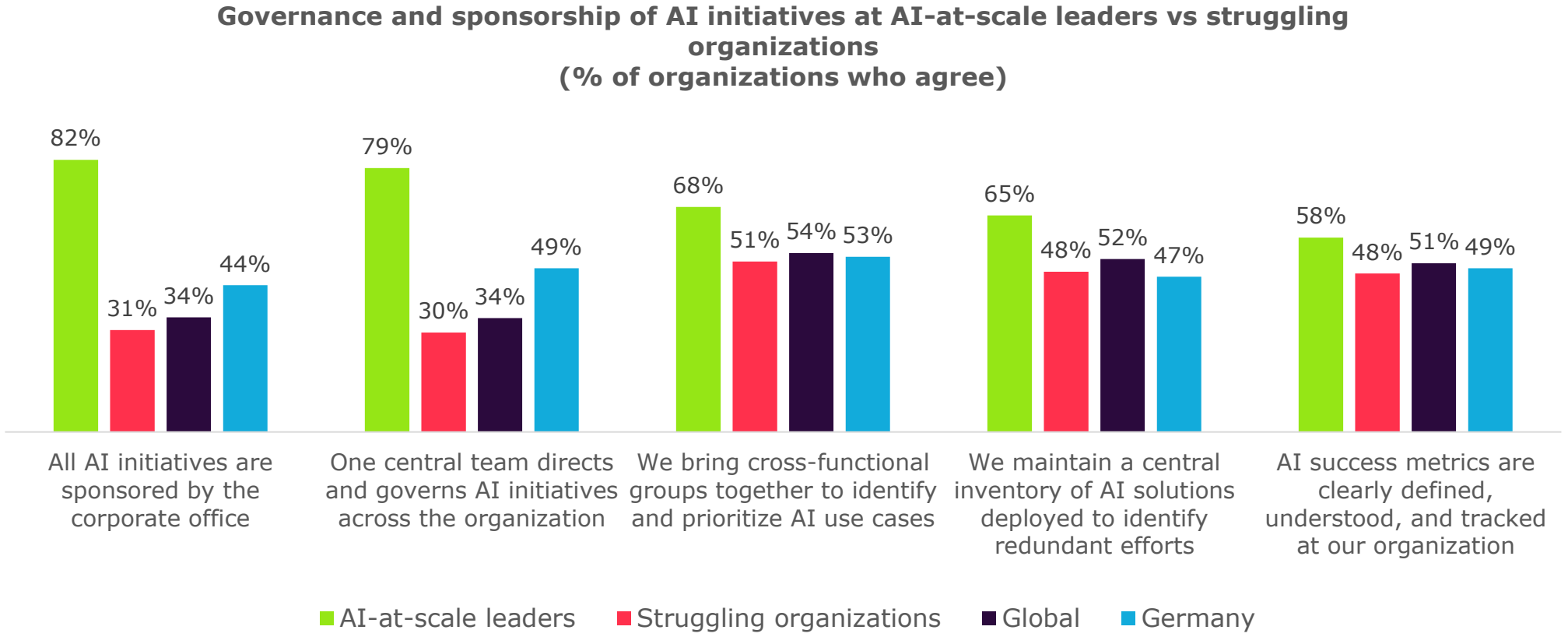


However, organizational context (structure, culture, processes) ultimately determines the right operating model. In organizations with a decentralized culture, a bottom-up approach can make sense (where teams independently generate, execute, and own impact metrics of an AI implementation).

Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=120 AI-at-scale leaders, N=690 struggling organizations, N=118 organizations from Germany.

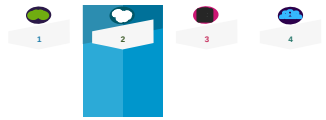
2 Operationalize: Deploy the right operating model to facilitate adoption, scaling and optimize resources (contd..)

Most of the AI-at-scale leaders have central teams to ensure strong governance and executive sponsorship



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, N=118 organizations from Germany.

2 Operationalize: Deploy the right operating model to facilitate adoption, scaling and optimize resources (contd..)



Role of COEs/dedicated teams

- Maintain dialogue with business functions to understand process and technology pain points and emerging needs
- Create a backlog of AI initiatives and the business value attached to each
- Prioritize low-cost, high-value, and quick-deployment use cases
- 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 market the success

Role of business units

- Business unit teams work closely with the CoEs to define domain-specific standards based on enterprise-guiding principles.
- 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.
- The approach of hand-holding first and then giving autonomy is crucial for organizations to maintain speed as well as autonomy

Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=120 AI-at-scale leaders, N=690 struggling organizations, N=118 organizations from Germany.

2 Operationalize: Connect your AI strategy to overall business strategy to help prioritize initiatives

Blend AI strategy into enterprise-wide objectives and form autonomous teams to execute

Centralized strategy, decentralized execution

Select each BU selects AI use cases based on time, cost, and effort

Establish the KPIs for measuring success

Co-develop with influential business unit leaders, a roadmap of initiatives, based on capabilities

Prioritize use cases of AI which address your real business problems

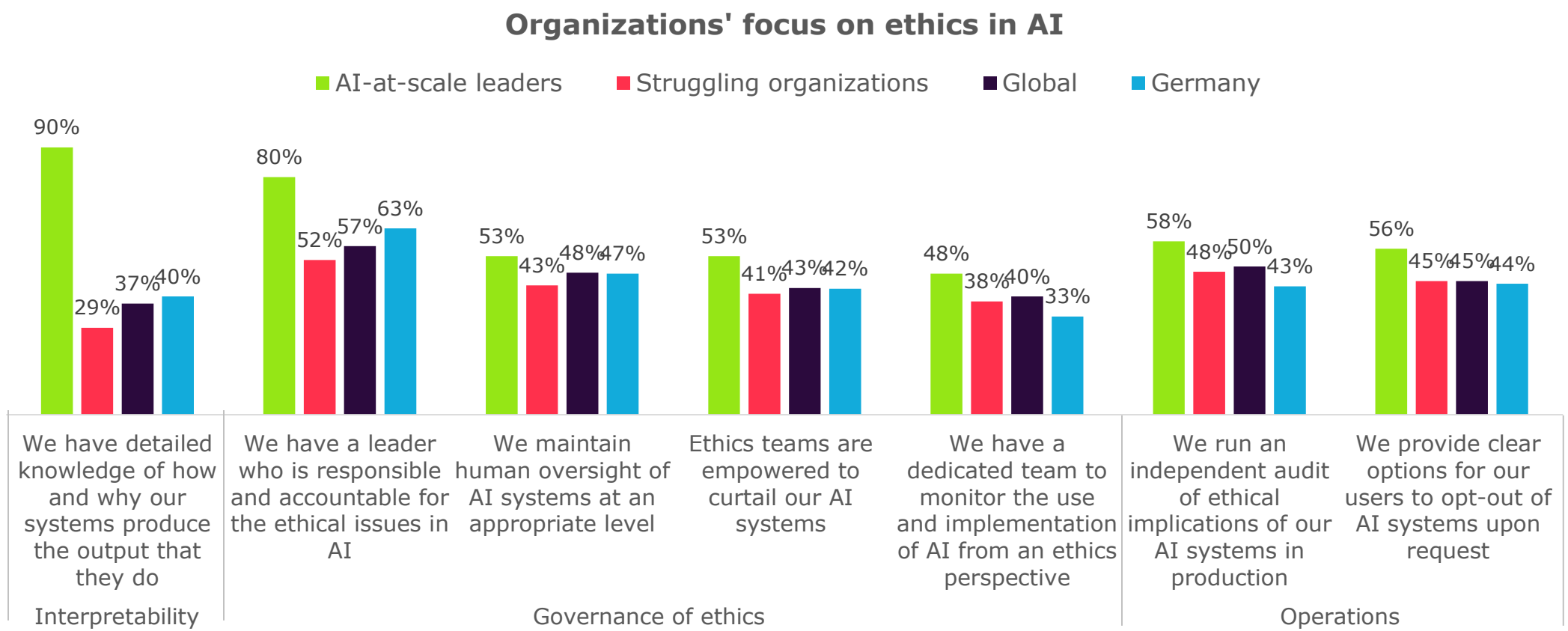
Link your AI strategy to overall business strategy. Bring AI initiatives to wider digital transformation fold

Identifying an executive sponsor is a critical factor for the success of AI initiatives

Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=120 AI-at-scale leaders, N=690 struggling organizations, N=118 organizations from Germany.

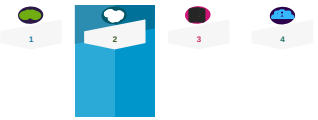
2 Operationalize: Create an ethical governance framework

Companies with strong focus on ethics build trust internally with business teams, invite less regulatory risks and are trustworthy for consumers.



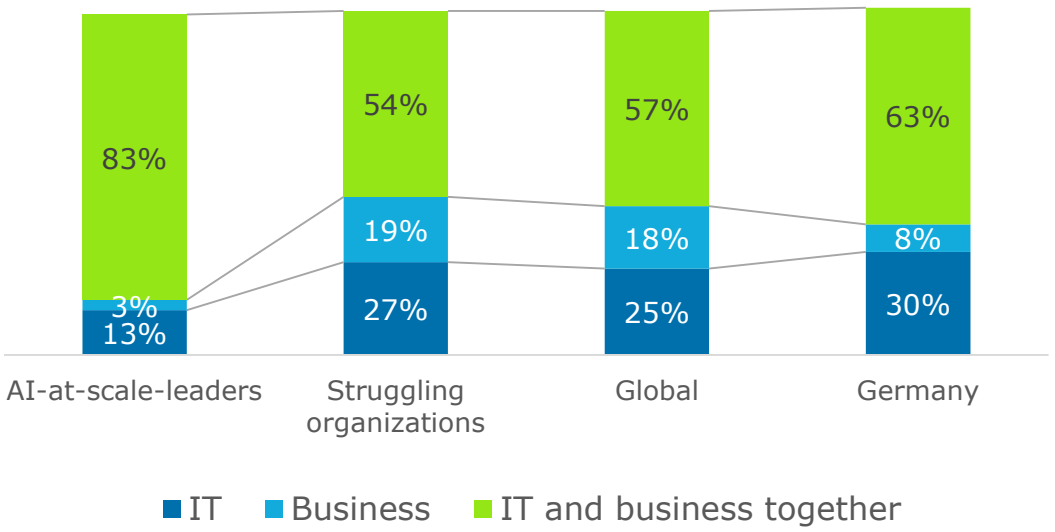
Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=120 AI-at-scale leaders, N=690 struggling organizations, N=954 organizations implementing AI, N=118 organizations from Germany.

2 Operationalize: Make business units accountable for success and reorient the impacted processes



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?



Reengineer the impacted processes

- Scaled AI implementations impact multiple functions across the organization. Almost 60% of AI-at-scale leaders have flexible processes that could be easily adapted to changing business requirements, compared to only 45% of organizations at struggling organizations.

"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."*

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, N=118 organizations from Germany; Salesforce blog, "Fixing the AI Skills Shortage: What Companies Need to Know Now," March 20, 2019.

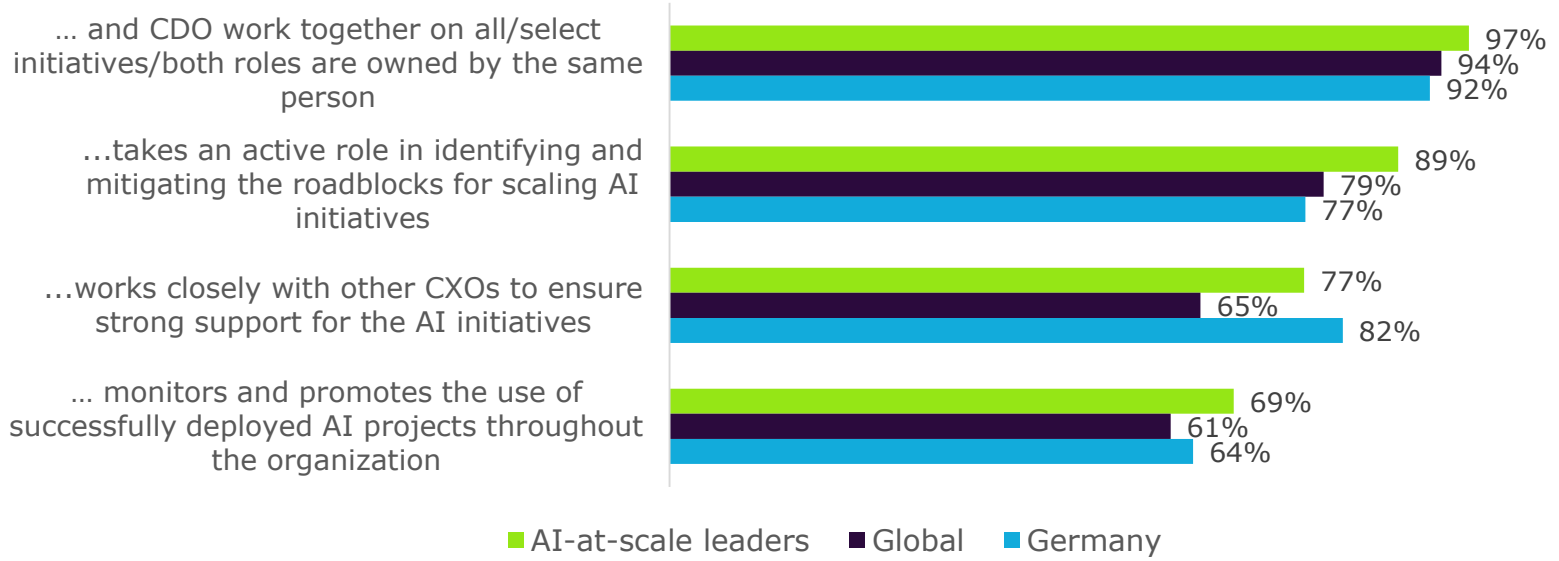
3 Nurture: build talent and collaboration with partners

Build the AI talent base

Fill in senior roles such as AI leads

58% of AI-at-scale leaders have appointed an AI head/lead/chief AI officer (CAIO)

AI head plays a crucial role in scaling the initiatives
Proportion of respondents agreeing with "AI head..."



Upskill to broad-base AI development

76% of AI-at-scale leaders use training programs to develop skillsets in-house

Shell with over 280 live AI projects, has a team of 160 data scientists and it also trained 800 of its employees with basic coding skills to work on these AI projects.

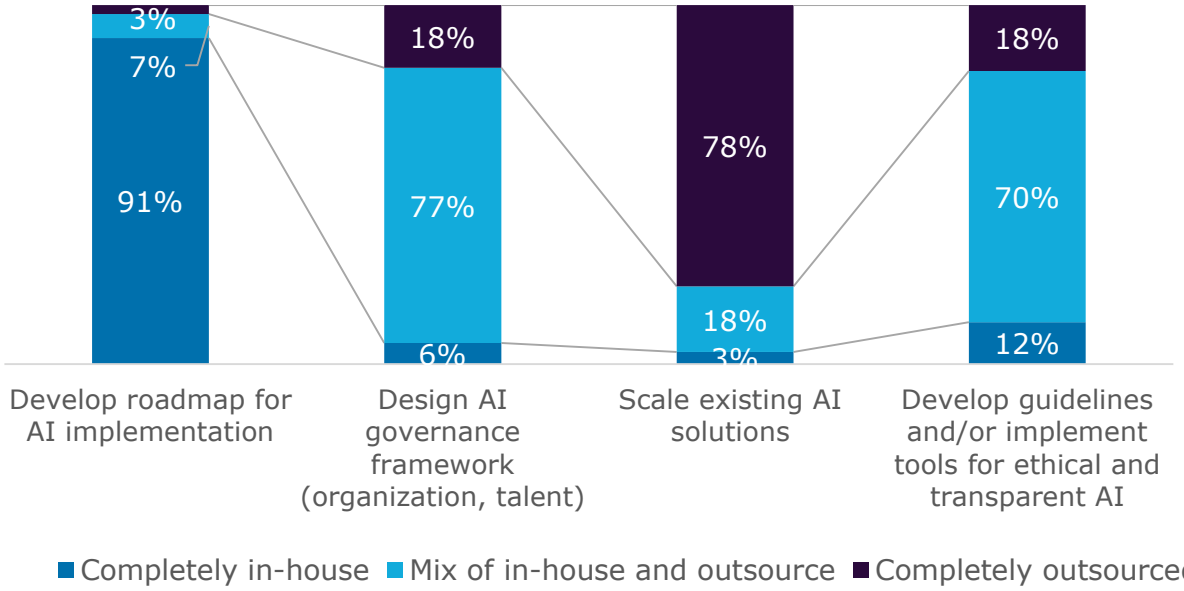
BMW has an Innovation Lab where students can work on AI. It also shared its network architecture code on Github, thereby promoting collaboration with industry peers.

Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=120 AI-at-scale leaders, N=954 organizations implementing AI, N=118 organizations from Germany.

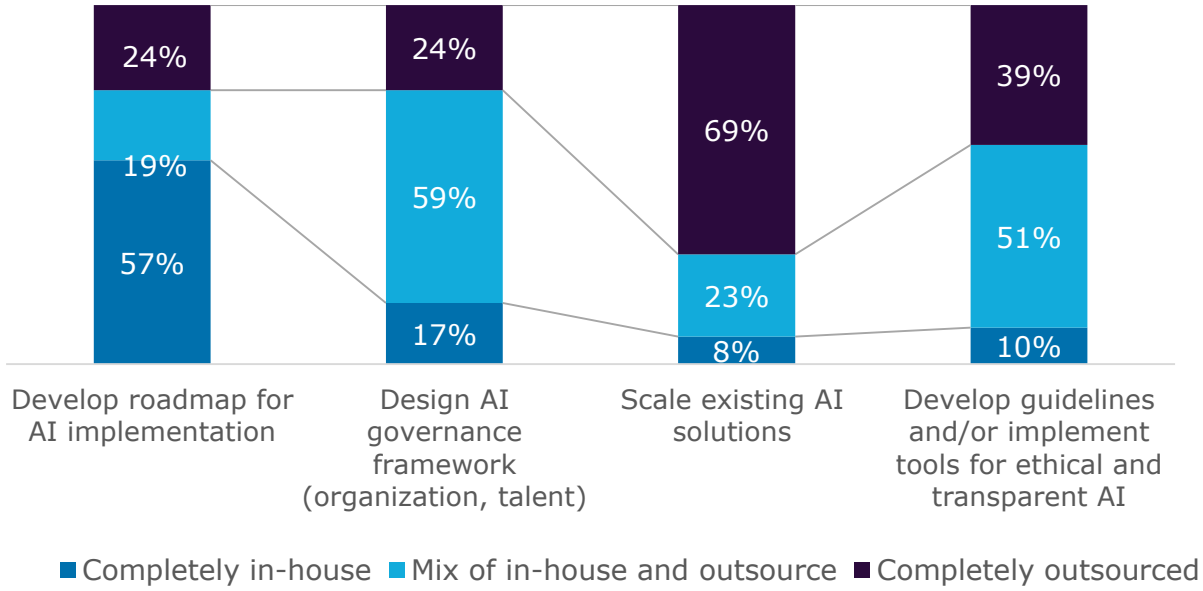
3 Nurture: build talent and collaboration with partners

Establish partnerships with service providers – 78% of AI-at-scale leaders look to service providers for scaling AI solutions, compared to 69% of German organizations

For which AI services do you bring service providers? AI-at-scale leaders



For which AI services do you bring service providers? Germany



Source: Capgemini Research Institute, State of AI survey, March–April 2020, N=120 AI-at-scale leaders, N=118 organizations from Germany.

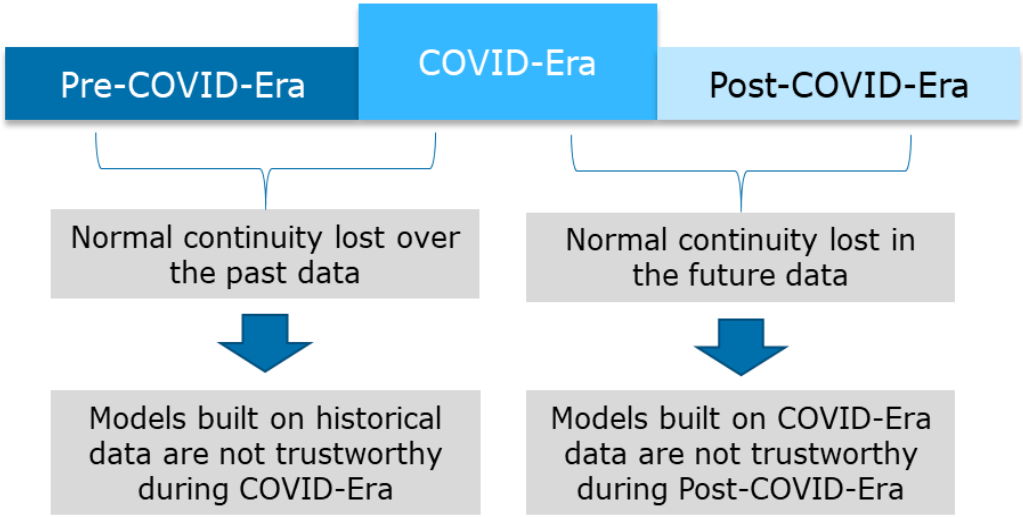
4 Monitor and Amplify: Kickstart the virtuous AI circle: Continuously monitor model accuracy and business impact to amplify outcomes

Most AI models, if not monitored, can begin to deteriorate in performance once deployed into production

Ways to monitor and prevent drift in AI models

- Set up **processes** to detect material decay in model performance during the development itself
- Maintain **human oversight** to connect real-world developments with what is going on with the algorithms
- Make AI teams developing systems **responsible for the operations** of their products, and in charge of their monitoring.
- Ensure AI systems produce the **right indicators and metrics**. Check if the model still delivers the intended business impact.

Impact of COVID-19 on AI models



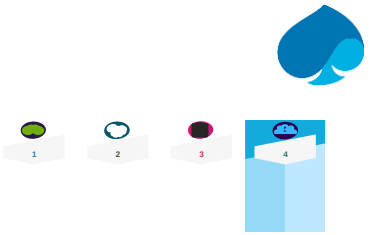
Source: Capgemini Insights & Data.

Adjusting AI models in line with fast-changing conditions:

- **Change data:** Train models with real-time or near-real-time data. Add 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, death rates, etc. could serve as important features in an AI model.
- **Change approach:** Change 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 models.

Source: Capgemini Research Institute analysis.

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



Amplify outcomes

- **Implement MLOps:** 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 with benefits such as:
  - Fast, reliable, versioned, and better-quality applications
  - From boosting experimentation to faster data updates – and ensuring solutions deliver better insights

- **Quickly focus on projects that "move the needle":** At this point when business units are independently prototyping AI solutions and putting AI models into production, organizations test transformative business models - revisit processes, rethink business models and relationships with customers/suppliers.

VISA

Visa's AI-driven solutions prevented fraud of an estimated $25 billion in 2018 alone. It developed a secure and frictionless experience for account onboarding, authentication and authorization of payments

Source: Capgemini Research Institute analysis; Visa Inc, "Transforming Payment Security Through Artificial Intelligence," 2019; "Visa Inc Investor Day transcript," February 11, 2020.

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