



AI transforming the enterprise

8 key AI adoption trends

Introduction

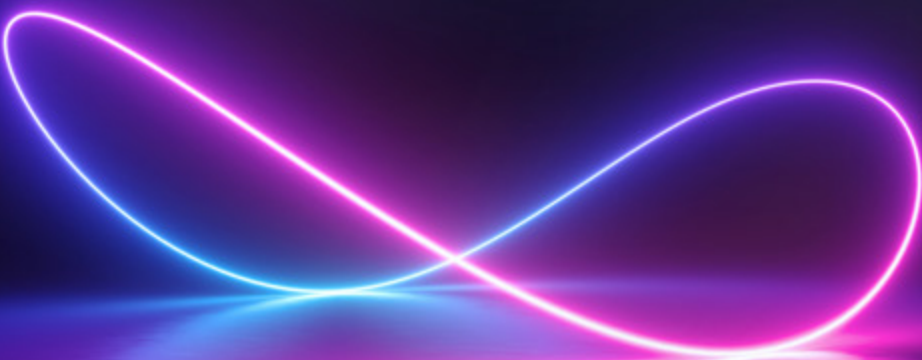
Understanding the state of AI deployment—how broadly it is being used and in what ways—is challenging for many business leaders. Machine learning and other technologies are advancing significantly faster than many anticipated just a few years ago. The pace of development is accelerating and can be hard to grasp.

In this environment, staying competitive begins with a clear view of the AI landscape: **where do some of the world's largest and most influential companies stand in terms of AI investment, deployment, and real-world outcomes?**

We conducted the KPMG 2019 Enterprise AI Adoption Study to gain insight into the state of AI deployment efforts at select large cap companies. This involved in-depth interviews with senior leaders at 30 of the world's largest companies, as well as secondary research on job postings and media coverage. These 30 highly influential, Global 500 companies represent significant economic value – collectively, they employ approximately

6.2 million people, with aggregate revenues of \$3 trillion. Together, they also represent a significant component of the AI market. We believe this group is an indicator of where very large enterprises are headed in terms of transforming their organizations with AI.

To summarize the key learnings from our interviews and our insights from working with clients, we highlight eight key trends that can serve as guideposts for your organization. If your organization is lagging in AI deployment, these insights could help you move up the activation learning curve faster. If your organization is a leader in AI deployment, these insights may help fill in gaps and afford you greater confidence along your AI journey.



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AI could shift the competitive landscape

Introduction

Our research revealed valuable insights. For example, the five companies in our sample with more mature AI capabilities have an average of 375 full-time employees working on AI today, which includes data scientists, engineers, analysts and others.¹ We estimate that, on average, each is spending \$75 million on AI talent today.² And they expect AI staffing numbers to continue to grow – each company anticipates between 500 and 600 full-time employees working on AI in the next three years.

What's at stake? **Nearly all the executives we interviewed see AI as playing a role in creating new winners and losers.** AI has broad enterprise applications and the potential to shift the competitive position of a business. The technologies under the AI umbrella are already contributing to product and service improvements—and they will be important drivers of innovation for wholly new products, services and business models.

Focusing too narrowly on specific uses cases or cost savings can keep you from seeing

and acting on the bigger picture: **AI can be a game-changer that fundamentally shifts the competitive landscape.** The winners will be the companies that use AI for the full range of benefits, from back and middle office productivity to front office product innovations and customer engagement.

Against this backdrop, it is important to ask how AI can transform your business, and deploy the right technology, organizational capital, and data strategy to achieve that vision.

Research and methodology

During the first half of 2019, KPMG conducted a two-part research study to better understand the state of AI deployment at large cap companies.

Part one of the study consisted of secondary research analyzing job postings and media coverage for 200 of the Global 500 companies. In addition, researchers conducted interviews with three major technology companies that provide AI solutions and services ('the supply-side'). Insights gleaned from the secondary research informed the types of questions asked in part two of the research program.

For part two, KPMG conducted in-depth interviews with senior executives at 30 of these Global 500 companies that buy and deploy AI ('the demand side'). Because organizational structure for AI varies by company, interviews involved a range of leaders responsible for AI deployment – individuals interviewed include Chief Information Officers (CIOs), Chief Financial Officers (CFOs), Chief Data Officers (CDOs), and Chief Digital Officers (CDOs), as well as other senior line of business executives. Researchers used a semi-structured interview format, conducting 45-minute to one-hour interviews with each respondent. Following the interviews, researchers scored each company on a scale of 1 to 5, where 1 = low and 5 = very strong on a series of six criteria: governance, investment, pace, linkages, expertise, and management. A total of 30 points were possible. Companies were then coded into four ranked categories: Mature (24 to 30 points), Evolving (17 to 23 points), Aspirational (9 to 16 points), and Early (1 to 8 points). Lastly, interviews and secondary research were aggregated, then thematically coded. Overall, eight key trends clearly emerged from the data. The following is a deep dive into each of the trends.

Key definitions

Artificial Intelligence (AI): For the purpose of this research, we used a broad definition of AI. AI is a set of technologies that can imitate intelligent human behavior.

Enterprise AI: Advanced intelligent digital systems at scale and 'as-a-service' offered to business functions with oversight around the strategic direction of AI in the enterprise. This includes AI, machine learning, natural language processing (NLP), and other systems that conduct tasks that previously required human capabilities.

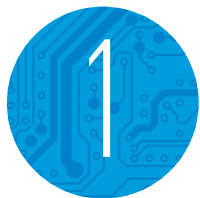
Robotic Process Automation (RPA): An application of technology that enables organizations to configure computer software or a "bot" to interact with existing applications for processing a transaction, manipulating data, and communicating with other digital systems – replicating manual work that typically would have been

performed by a person. Intelligence is programmed or rule-based; not learned. RPA is often used in conjunction with AI to operationalize solutions within the current technology environment.

Machine Learning (ML): An application of AI that provides systems with the ability to learn and improve from experience and training. Machine learning focuses on programs that can access data and use it to learn.

Low-code platforms: Next generation technology platforms that leverage visual capabilities to build and deploy enterprise applications with embedded business rules, workflow, forms, and integration. Often in conjunction with RPA, these platforms also play a role in automation and enable enterprises to operationalize AI.

The trends



Rapid shift from experimental to applied technology

Less than three years ago, many leaders in large organizations were asking themselves if AI could support their productivity and growth objectives—and many were just beginning to pilot and test AI applications.

But since then, we have seen rapid change. **AI has quickly moved from a ‘technology to watch’ to a ‘technology to deploy.’** It is increasingly able to address a wide range of business issues, and companies across industries have successfully deployed automation at the functional level and within lines of business. This shift was driven by many factors including rapid digitization, advances in machine learning (ML) and the growing availability of data, which has enabled robust natural language processing (NLP) capabilities.

Now, many enterprises are looking to convert pilot projects and drive benefits across their organizations. This involves driving scope (horizontal applications) as well as scale (vertical applications).

Although the ability to blend both scope and scale is rare today, many of the large companies we interviewed are setting this as a core objective over the next three years:³

Robotic Process Automation (RPA)

- Today, 26% of the companies we interviewed have deployed RPA at scale across the enterprise or major functions. Over half (65%) say their use of RPA today is selective and siloed by individual groups or functions.
- In three years, 83% expect to have RPA deployed at scale.

AI and Machine Learning

- Today, only 17% of the companies we interviewed reported use of AI/machine learning at scale and 30% reported selective use in functions.
- In three years, half of the companies we interviewed expect to be using AI/machine learning at scale.

AI enables insight, augmentation and full automation

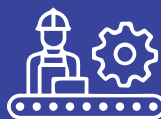
Insights

Capable of recognizing complex patterns from disparate sources of data and forming probabilistic insights



Augmentation

Software that can work alongside humans to learn patterns and augment human expertise



Automation

When combined with physical robots or software “bots,” full automation of complex tasks that typically involve human judgment is possible



Key takeaway The AI landscape has rapidly evolved in the last few years, and the technology is ready to deliver true value today. In the next three years, many enterprises are aiming to advance beyond initial, functional deployments towards true scale and scope through governance and center of excellence constructs.

2 Automation, AI, analytics, and low-code platforms are converging

Companies are deploying automation, AI, analytics, and low-code platforms in tandem, finding that these technologies work more effectively together. Key factors allowing companies to deploy these technologies together and take advantage of the benefits include:

- Rise of low-code platforms like Appian, OutSystems, Pega and ServiceNow that allow for integration and use of multiple technologies, and democratize the ability to code process automation software
- In-house talent that can work across many different technologies
- Use of ‘best of breed’ integration tools like Mulesoft
- Leadership on point to ensure a coordinated approach across technologies

Deploying automation, AI, analytics, and low-code capabilities in an integrated manner can support virtuous feedback loops: each supports the other, and together they go hand-in-hand with the scale and industrialization of AI.⁴ For example, think of the potential for ‘super-charged’ analytics—machine learning can enhance traditional analytics, making the process more data-intensive and enabling models that improve over time. This can lead to better predictions and outcomes.

In our interviews, executives consistently pointed to the power of deploying automation, AI, analytics, and low-code capabilities together. In some organizations, this approach is driven from the top. But it can also emerge from existing teams. For example, many large companies have well-established global business service (GBS) teams. We heard that many of these GBS teams on their own see the value of bringing AI to their existing automation activities, effectively creating a ‘GBS 2.0.’

GBS teams are often well-positioned to harness these technologies and drive new additional value since they already have extensive capabilities around enterprise services, deep understanding of the ‘piping’ of different functional areas and extensive data repositories. The growing availability of AI and analytics is enhancing RPA and automation solutions and allowing some organizations to move from task automation to process automation, creating an entirely new level of business value.

Key takeaway Look at automation, AI, analytics and low-code platforms as complementary technologies and services that can be mixed and matched to exponentially improve progress towards specific business goals.

Low-code platforms:

Next generation technology platforms that leverage visual capabilities to build and deploy enterprise applications with embedded business rules, workflow, forms and integration. Often in conjunction with RPA, these platforms also play a role in automation and enable enterprises to operationalize AI.

The trends



Enterprise demand is growing

In our interviews, we heard a consistent message: many large companies are making major investments in AI, aiming to vault their deployment over the functional-level bar and into other areas of their businesses. Investment in talent is a key requirement to move the AI agenda forward:

- **The five companies in our sample with more mature AI capabilities have an average of 375 full-time employees working on AI today, which includes data scientists, engineers, analysts, and others.⁵ We estimate that, on average, each is spending \$75 million on AI talent today.⁶ And they expect AI staffing numbers to continue to grow – each company anticipates between 500 and 600 full-time employees working on AI in the next three years.**
- **Across the 30 companies we interviewed, most reported that their investments in AI-related talent and supporting infrastructure will increase approximately 50% to 100% in the next three years.**

Secondary research also suggests that many large cap companies are actively recruiting technical talent to support their AI initiatives. We analyzed job postings for 200 of the Global 500 companies. Of these 200 companies, 188 companies buy and deploy AI ('the demand side'). These 188 demand side companies posted 3,573 jobs over a 12-month period—69% of all postings.


On the other hand, 12 AI tech providers ('the supply side') had 1,591 job postings—31% of all postings.⁷

While AI tech providers generally see more media coverage for driving AI talent demand, major enterprise organizations are also significant demand drivers. What types of initiatives are these companies pursuing? According to our interviews,

high-priority areas for AI initiatives over the next two to three years include:

- Customer and market insights that will refine personalization, driving sales and retention;
- Back office and shared services automation to remove repetitive human tasks;
- Finance and accounting streamlined to improve efficiency and compliance; and
- Analysis of unstructured voice and text data for specific functional use cases

Many of these companies also said they are investing in the complementary capabilities required to successfully deploy AI. We believe AI initiatives are not just about technology; they are more about augmenting processes and people—which makes transformation an enormous change management imperative, given the scope and speed of advancement.⁸ Leading firms will be the ones that mix humans and machines in new and innovative ways.

375  average number of full-time employees working on AI at the most mature companies in our sample

\$75 million  estimated amount each of these companies is spending on AI talent

Key takeaway Many large enterprises are investing heavily in AI, and most of the organizations in our sample reported their investment will increase significantly in the next three years.

4 New organizational capabilities are critical

We believe competitive advantage gains with AI require much more than just technology. Deploying AI effectively across the enterprise requires a combination of the right talent and new organizational capabilities and processes that are driven through governance. Indeed, AI is closely tied to the overall shift in value creation through intangible assets, with organizational capital as a key feature. Organizational capital is made up of four core elements: human capital, values and norms, knowledge and expertise, and business processes and practices.⁹ AI needs all of these elements to create value for the enterprise.

In our interviews, we found that the need to build specific AI organizational capital is beginning to take root at the highest levels of management, and some executives are devoting significant resources to these efforts. One large healthcare company, for example, established a \$100 million budget for AI and a steering committee comprised of senior vice presidents (SVPs) that meet twice each month to drive this investment.

Since these large companies have different structures and operate in different markets, we heard about a variety of approaches around leadership, accountability, and strategy. In addition to creating top-down approaches, such as creating SVP-driven steering committees, we also found companies that are pursuing more decentralized approaches, where functions or business lines are expected to lead initiatives.

- **Half of the companies we interviewed said the CIO has a leading role for overall AI strategy**
- **40% said a senior Line of Business (LOB) leader is taking a leading role.** Generally, among the companies we interviewed, there are multiple technology and line of business stakeholders with responsibility for AI strategy and deployment.

Centers of Excellence (COEs) for AI deployment are sprouting up at many large organizations. Approximately 30% of the companies we interviewed are in the process of formulating a COE strategy; 63% have established COEs on either a global, regional, or functional basis.

In general, however, we found that AI strategy and deployment is a shared responsibility at these large organizations. Because AI is a general purpose technology and can be deployed in many different ways, success requires extensive internal coordination and effective governance around processes. Companies with the most experience in deploying AI recognize the importance of organizational capital and aligning teams across the enterprise.

Key takeaway AI success rests on having the right organizational capabilities to develop and support new technologies. Evaluate your organization and approach to see if you have the right structure, leadership oversight, and talent in place.

What is organizational capital?

Organizational capital covers the company-specific assets that enable resources to be more productive. This includes elements that are unique to an individual company and challenging for a competitor to replicate like employee knowledge, business processes, and corporate values and norms. Managing organizational capital is crucial for competitive advantage – and enterprise AI deployment raises an entirely new set of organizational capital considerations.¹⁰

The trends

5 Internal governance emerging as key area

We believe that large enterprise companies need to create and enforce formal governance policies, processes and controls around AI technologies, service delivery models, and third-party providers. Governance around AI includes:

- Designing and deploying standard procedures around AI in many different areas, including monitoring and managing risks, performance and value;
- Helping ensure that the end-to-end AI lifecycle maintains appropriate levels of trust and transparency
- Creating new roles and responsibilities and designating accountability; and
- Training teams across an organization to understand their roles and align common procedures.

Strong governance drives better AI outcomes, helps avoid mistakes, and builds trust and credibility for AI initiatives.

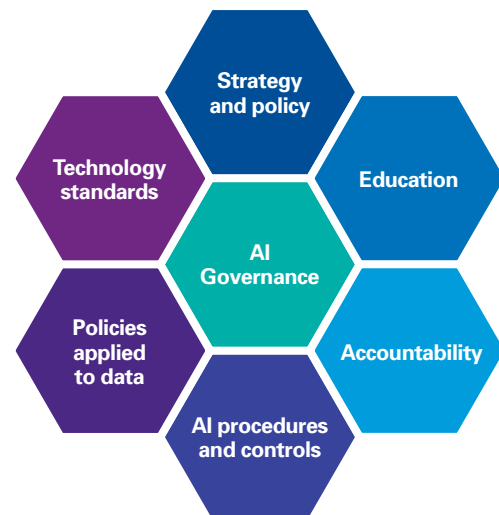
Strong governance also creates the foundation for scale and scope: to embed AI across an organization, companies need consistent, purposeful, and responsible action across different teams.

How to action governance

- ✓ **Develop AI design criteria and establish controls** in an environment that fosters innovation and flexibility.
- ✓ **Assess current governance framework and perform gap analysis** to identify opportunities and areas that need to be updated.
- ✓ **Integrate a risk management framework to identify and prioritize business-critical algorithms** and incorporate an agile risk mitigation strategy to address cybersecurity, integrity, fairness, and resiliency considerations during design and operation.

Despite its significance, only a quarter of the companies we interviewed are beginning to build out true enterprise-wide AI governance. These leaders are not leaving the success of AI up to 'unwritten' rules and are treating governance as an enterprise-wide imperative that is key for scale.

Governance requires developing a collective set of structures, capabilities, and processes



- ✓ **Design and implement an end-to-end AI governance and an operating model** across the entire lifecycle: strategy, building, training, evaluating, deploying, operating and monitoring AI.
- ✓ **Design a governance framework that delivers AI solutions and innovation** through guidelines, templates, tooling and accelerators to quickly, yet responsibly, deliver AI solutions.
- ✓ **Design and set up criteria to maintain continuous control over algorithms** without stifling innovation and flexibility.

Key takeaway Any company looking to embed AI across an organization should approach governance as an enterprise-wide imperative: Governance and scale go hand-in-hand.

6 The need to control AI

Successful AI programs rely on the ability to control algorithms that may become more powerful and opaque over time with machine learning. It can become difficult to determine why an AI-driven system made a specific decision. Where in the millions of lines of code was the decision made? The obvious risk is that continuous-learning systems can produce unintended or biased results. The cost of getting AI wrong extends far beyond the financials—lost revenue, fines from compliance failures—to reputational, brand, and ethical concerns.

Large companies often make investments in people and technology before investing in control frameworks, with the exception of heavily regulated industries like Financial Services and Healthcare/Life Sciences. **We estimate that among the large companies analyzed in this study, only 25% to 30% are investing heavily in developing control frameworks and methods to drive greater trust and transparency.**

We believe that controlling the evolution of AI is vital for success. For AI to move ahead toward the common good, for leaders to assume responsibility and accountability over the results, it's essential to establish a framework to facilitate responsible AI adoption and scale. What solutions can help?

- **Establish a control and governance framework powered by methods and tools** to facilitate responsible AI adoption and scale.¹¹ Many organizations are exploring new ways to implement controls and governance beyond traditional, manual methods. AI solutions require evolving and automated ways of measuring and monitoring risk, performance, and value. Some companies are using new tooling and dashboarding to automate and visualize design, evaluation, and ongoing monitoring – these tools and capabilities are key to identifying and monitoring for unintended AI outcomes, misuse of data, or potential algorithm bias. Digital tooling, AI control frameworks, and key risk and performance indicators can drive greater trust and transparency, improved governance, controls and compliance, and give the ability to monitor AI throughout the entire lifecycle.
- **Secure the four anchors of trust—integrity, explainability, fairness, and resilience**—and maintain them throughout the entire AI lifecycle, from strategy and use case ideation, through model build and training, through continuous monitoring and operations to evolution.

Key takeaway AI requires digital tooling and frameworks for control to provide real-time and continuous monitoring into AI's performance, risk, and compliance. Establish leading practices around AI training data and implement a framework, processes, and tools across the end-to-end AI lifecycle.

Digital tooling enables the:

- Ability to evaluate models at build and operate stages for things like data lineage and bias detection to drive greater model integrity
- Ability to identify how decisions are made by AI and machine learning models (i.e., what attributes contribute to the outcomes) to drive greater transparency
- Ability to monitor the end-to-end lifecycle
- Ability to monitor and visualize key performance and risk indicators for individual models and the overall AI program
- Ability to digitize/automate AI governance of the end-to-end lifecycle through use of tools and dashboarding

The trends

7 Rise of AI-as-a-Service

Our interviews also highlighted that a robust “as-a-service” marketplace is emerging around AI that will give enterprises more options for accessing AI capabilities. **While large companies will always need to build many foundational capabilities in-house, they will increasingly be able to also tap into the AI-as-a-service (AlaaS) market.**

Managed services represent one dimension of this growing AlaaS market: some companies are opting for managed services around AI for a specific application, process or function. For example, earlier this year, a global telecom company announced an end-to-end managed service that deploys automation into customer experience tools. Examples are also emerging in other industries with third parties offering end-to-end exception handling for finance departments and AI-enabled contract interpretation services for law firms.

Microservices and bot stores are also important trends to watch in the AlaaS market. We believe that many enterprises will access a growing number of AI microservices, which deliver AI as a collection of small, independently deployable services

around specific business requirements. Large companies can also buy prebuilt bots to automate repetitive processes – for example, companies can now access options for common email operations and image analysis through bot stores.

While this trend gives companies more options for accessing AI, it does not replace a comprehensive, enterprise-wide AI strategy. The idea that AI is a simple ‘plug-n-play’ strategy is a misconception – companies need to build extensive internal capabilities to even start to take advantage of AlaaS options. The evolving AlaaS market raises key strategic questions for large enterprise organizations:

- What internal capabilities do you need to build to effectively harness the ‘as-a-service’ market?
- What is the right balance of ‘build vs. buy’ to create a true competitive advantage?
- Under which circumstances can the use of ‘as-a-service’ delivery models accelerate AI deployment?

The idea that AI is a simple **‘plug-n-play’** strategy is a **misconception** — companies need to build extensive internal capabilities to even start to take advantage of AlaaS options.



Key takeaway Companies should design their AI strategies with ‘as-a-service’ models, modularity, and flexibility in mind.

8 AI could shift the competitive landscape

In our conversations with senior leaders at some of the world's largest companies, we heard that many believe AI could truly be a game-changer and fundamentally shift the dynamics of competition. Nearly all see AI as playing a role in creating new winners and losers.

A key question now is who will move up the AI activation learning curve the fastest, how long it will take, and at what level of investment? Many executives are unsure of the optimal way to divide spending between AI priorities such as organizational capital, technology, and data.

However, those same executives believe that investing too little will put them at risk of falling behind, potentially permanently. Still, even among the very largest companies, there remains significant variation in how companies are factoring AI into competitive positioning:

- **In our interviews, we found nearly a ten-fold gap in resources devoted to AI between the companies with more mature AI capabilities and the early stage companies.** The leading companies in our sample are already deploying AI across multiple functions, while others have limited AI activity in one or two isolated areas.
- **Companies investing in AI report achieving on average 15% productivity improvements for the projects they are undertaking.** Companies reported that improving productivity overall was the highest operational driver for AI and automation usage.
- **But only a few companies realize – let alone develop – the capabilities to use AI for full-range competitive advantage, from back office productivity, to front office product innovations and customer engagement.**

Key takeaway Making AI part of overall business strategic planning—and using it as a competitive differentiator by linking its implementation to other key technology investments—should be a top consideration for management teams.

Companies investing in AI report achieving on average **15% productivity improvements for the projects they are undertaking.**

Conclusion

AI will continue to play a major role in the development of new business, financial and operating models in the 21st Century. The investments being made today by some of the world's largest companies will have an enormous influence on both the global economy and its workforce, and has the potential to create new winners and losers.

AI technologies can inject productivity improvements across a range of functions, from supply chain management to customer service and tax compliance. On this level alone, AI can help established firms stay lean and competitive. Even more, these technologies can support growth through innovation, helping companies invent new products and drive new services and business models, elevating their brand and taking or remaining in a leadership position.

But a narrow focus on specific use cases or cost savings risks missing the bigger picture: **AI can be a game-changer that fundamentally shifts the competitive landscape.** We believe that the ability to deploy AI for the full range of benefits – across the front, middle and back office – will separate the new class of leading companies from the rest.

Instead of focusing on individual use cases, consider how you can transform your business with AI. To assess your current position and the path forward on your AI journey, consider these key questions:

- **Are your AI investments in technology and organizational capital large enough to gain competitive advantage or just enough to maintain the status quo?** Maintaining the status-quo—even being a “fast-follower”—could prove to be a risky business proposition when competitors deploy AI technologies with tremendous speed and impact.

- **Is AI deployment a C-level management priority at your organization—and, if not, how does it become one in the next six months?** Leadership that evangelizes transformation and sets a strategic direction with a funding commitment is essential to success. Assess the degree of support from the C-suite and if leadership is lacking, become an advocate for change.
- **Is a top-down or decentralized approach the right fit?** Some organizations are setting up an expert-led approach, like a CoE or an SVP-driven steering council. Another option is a decentralized approach that gives lines of business and functions the authority and responsibility to deploy AI. Ask which approach will be most effective for your organization to drive both scale and scope.
- **Are you asking strategic questions about the ways AI will transform your business?** Set business goals and build a strategic roadmap for AI, including governance considerations, to get you there. **Focusing on narrow questions alone—which use case to pursue or how to reduce costs—can detract from the bigger, more critical picture: transforming your business to stay competitive in the age of AI.**

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1 Based on interviews and secondary research, KPMG evaluated AI maturity using six criteria: AI investment, pace, linkages, management, governance and expertise.

2 This estimate covers AI-related talent; it does not include other costs related to AI deployment like third-party resources and infrastructure costs.

3 Percentages have been rounded, and may not total 100%

4 "The State of Intelligent Automation," KPMG International/HFS Research, 2019

5 Based on interviews and secondary research, KPMG evaluated AI maturity using six criteria: AI investment, pace, linkages, management, governance and expertise.

6 This estimate covers AI-related talent; it does not include other costs related to AI deployment like third-party resources and infrastructure costs.

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