Generating ROI with AI

Six capabilities that drive world-class results

IBM

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Key takeaways

Mature capabilities differentiate the AI projects that deliver the highest ROI.

Most AI projects aren't profitable enough—yet.

As AI matures, ROI on enterprise-wide initiatives averaged only 5.9%, well below the typical 10% cost of capital.

Data is crucial—but only one piece of the puzzle.

Building on trusted, high-quality data at scale boosted returns on AI investments to as much as 9%.

Companies can strike gold with the right approach.

Best-in-class companies that have built six mature capabilities reported average ROI of 13% on AI projects.

All eyes are on AI

Can the ROI of AI match the hype?

Artificial intelligence is suddenly sexy—again.

Generative AI has taken the business world by storm, with large language models (LLMs) such as OpenAI's ChatGPT, Baidu's ERNIE, Google's LaMDA and Facebook's LLaMA splashed across the news. And executives aren't immune to the hype. References to AI on earnings calls were up 77% year-over-year in early 2023.[1]

And the money is following. AI is becoming an ever-larger component of IT budgets, with worldwide spending on AI-centric systems expected to hit $154 billion this year—up 27% over 2022.[2]

But will enterprises spend these resources wisely? As AI models become faster, smarter, and more reliable, organizations are racing to capitalize. Can the return on investment (ROI) match expectations?

The answer: Yes—but only if organizations take a disciplined approach. To come to this conclusion, we surveyed 2,500 global executives in 34 business and technology roles across 16 countries from all major regions. We asked them to deconstruct how their companies are investing in AI today, what real-world ROI is being produced, and which elements are required to boost effectiveness. In partnership with Oxford Economics, we then analyzed what key business and technology capabilities are connected to the most successful AI initiatives. (See "Study approach and methodology" on page 31.)

Companies that develop mature AI capabilities will generate profits—not just media buzz.

Our findings reveal yawning outcome gaps across AI projects. Few deliver the financial value shareholders expect. In fact, average ROI on enterprise-wide initiatives is just 5.9%, well below the typical 10% cost of capital. Yet, there are distinct improvements as you move along the AI maturity continuum—with best-in-class companies reaping an enviable 13% ROI (see Figure 1).

So what sets these world-class performers apart? And how can leaders across sectors learn from their success? This report will outline:

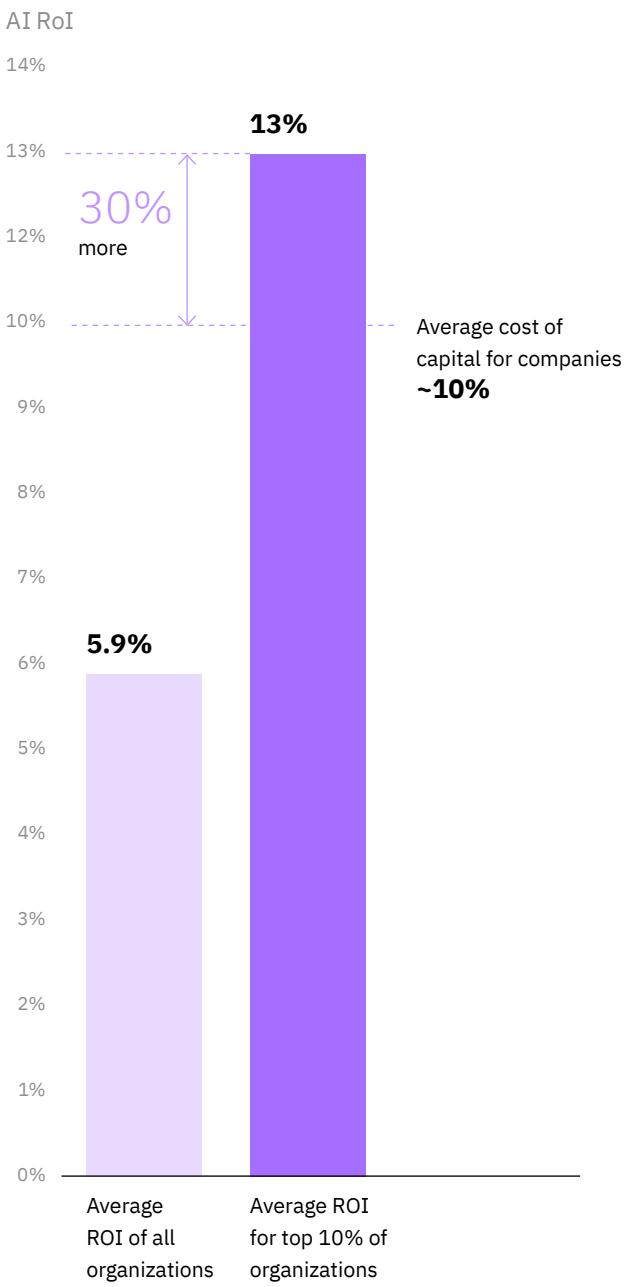
- Why ad hoc AI projects deliver less value than strategic programs
- The impact of trusted data and the virtuous cycle of AI-data symbiosis
- Six key capabilities that define and enable top-tier organizations.

Building a mature AI organization—on a solid foundation of trust—is required to unlock AI's full potential. Companies that get it right are generating significant business value—not just media buzz.

FIGURE 1

A cut above the rest

Best-in-class companies deliver AI ROI that exceeds their cost of capital.



Beyond opportunistic AI

As organizations figure out where and how to deploy AI, bold bets translate to bigger gains.

Organizations have been betting on AI for the better part of a decade—and the learning curve has been steep.[3]

Some got caught up in the "wow factor" of the technology, forgetting to align projects to strategy. Others saw AI as a hammer, and every business problem a nail. Almost all struggled to scale their implementations beyond experiments, proofs of concepts, and pilots.

The good news from our research: Many organizations have turned a corner. AI rollouts are more successful than ever, with more than twice as many executives saying their organization used AI effectively in 2021 (54%) than in 2020 (25%). They also expect AI investment to grow to 6.5% of IT spend by 2024.

Overall, return on investment has been rising steadily since 2020. For enterprise-wide AI initiatives, average ROI has grown from just over 1% in early 2020 to nearly 6% by the end of 2021.[4] This could be a result of the pandemic pushing organizations to invest in AI-driven solutions that would expedite remote working, enhance the user experience, and decrease costs.

To gauge whether AI ROI has kept pace with this trend, we surveyed more than 350 executives again in April and May 2023. We found that AI ROI has continued on the expected growth trajectory, reaching an estimated 8.3% in 2022 (see Figure 2).[5]

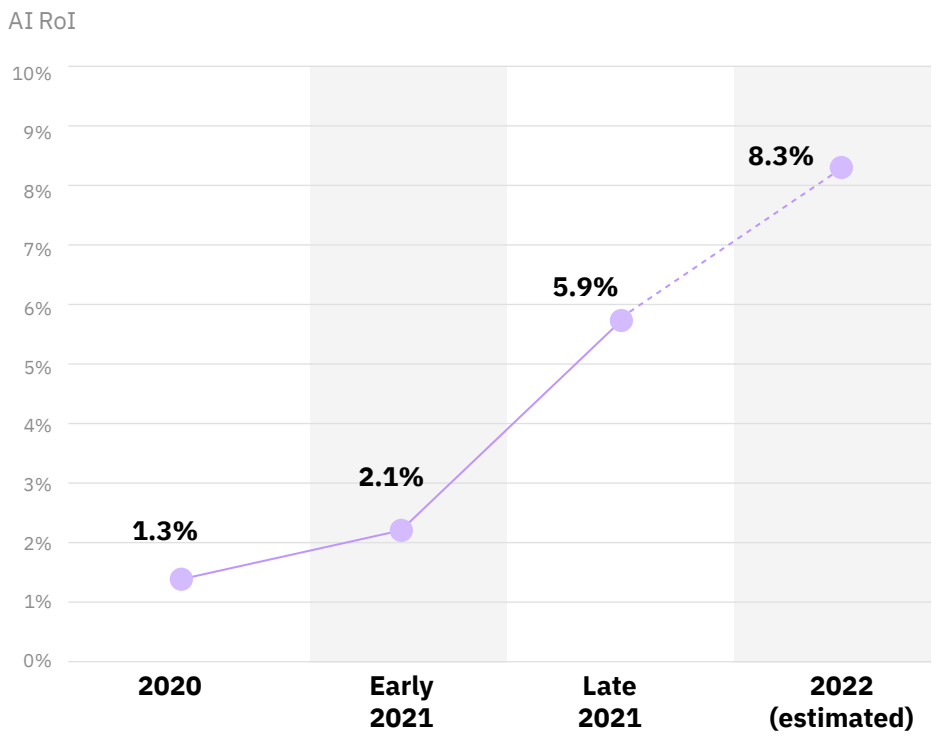
Still, these returns are lower than the cost of capital, which is typically 10% across most industries. Overall, fewer than one in four organizations in our survey say they've achieved AI ROI higher than 10%.

In essence, AI is following the "J-curve" pattern typical for transformative technologies.[6] Adopting emerging tech at scale requires reimagining business models, workflows, skills, and many other facets of business. Returns often stagnate while teams work out the kinks. Yet, as capabilities mature, performance can rise quickly. In this environment, enterprises need to have a strategic plan for scaling the impact of AI over time.

FIGURE 2

Returns are on the rise

ROI from AI projects grew more than 6 times between 2020 and 2022.



Source: 2020: Deloitte/ESL AI survey; Early 2021: IBV AI ethics survey; Late 2021: IBV AI capability survey; 2022: IBV generative AI pulse survey, April-May 2023.

Our analysis reveals how ROI improves across a continuum of AI maturity (see Figure 3). The average enterprise, which pursues ad hoc and/or opportunistic AI initiatives, is the laggard. In 2021, those that intentionally embedded AI in products, services, business units, and functions saw ROI climb above 7%. As maturity extended a step further, with AI deployed as part of a strategic business transformation, returns improved again, to 8%.

As organizations figure out where and how to deploy AI, bold bets translate into bigger and bigger gains. At the top of the curve is our best-in-class category, reporting an average ROI of 13%. By taking a steady, balanced approach to adopting AI—which includes building data and analytics skills, developing a multidisciplinary approach, creating diverse teams, and training teams through AI Centers of Excellence (CoEs)—they've developed comprehensive capabilities throughout the enterprise.

FIGURE 3

AI-centric strategies boost ROI

Aligning AI with business priorities yields much higher ROI than ad hoc projects.

AI strategic continuum	Opportunistic	Horizontally deployed	Vertically integrated	Product embedded	New business model enabler
Strategic importance of AI	Ad hoc	Customer/ operational effectiveness	Customer/ operational effectiveness	Organic growth, innovation, and differentiation	Transformation and platform strategy
Company types	Varied	Deploying AI into functions	Integrating AI within business unit(s)	Embedding AI into core products	Using AI to help achieve platform economics
ROI of organizations	4.7%	7.2%		7.4%	8.0%

Perspective

From Alphabet to Walmart: Becoming an AI-first business

Legacy enterprises are like industrial-era cities. They're connected by winding corridors that grew organically rather than straight, efficient avenues. They face persistent challenges with modernization, as progress is often hindered by century-old infrastructure.

AI-first companies start with a clean sheet of paper. Leaders can be more creative, more flexible—and make emerging technologies central to the business model. "I haven't encountered digital natives who say, 'I'm going to innovate.' I only hear those statements from legacy organizations, because they're trying to get out of that rut," said Ravi Simhambhatla, Chief Digital Officer at Avis Budget Group, in a recent IBV report. "For digital natives, it's all about disrupting themselves."[7]

Digital natives, such as Alphabet, Netflix, Amazon, and Meta—high-growth businesses with AI at the core—have seen outsized returns on AI investments.[8] Yet some legacy brands have also thrived with AI. Walmart, for instance, uses AI to match its inventory to shifting customer needs. The brand taps customer and shopping trend data to anticipate where and when people will want specific products. This lets Walmart stock each warehouse with the right items, streamlining logistics and enabling speedy delivery, even during peak shopping seasons.[9]

This capability didn't appear overnight. It was built on responsible data collection and curation, the creation of flexible algorithms, and a holistic approach to technology. Taken together, these initiatives produce AI-driven insights Walmart can trust.

Walmart, which has been a leader in data and analytics for decades, understands that AI requires measurement and optimization to achieve its full potential. Its ability to track desired outcomes and diagnose challenges enables the company to drive more value from AI—and build a scalable capability that can be leveraged across many current and future business applications.

Walmart's success demonstrates that, while a traditional enterprise can't become a digital native, it *can* transform to emulate inborn agility. Companies that focus their efforts in key areas—embedding AI into core operations—will see better results than those that spread themselves too thin.

Data and AI: Feeding a virtuous cycle

Data can close half the gap between average and world-class AI ROI.

To build a world-class AI organization, one factor comes first: How an organization chooses, collects, governs, and uses its data—that abundant but elusive resource—either enables or constrains what AI can achieve.

Data has sometimes been compared to oil: a valuable resource that's expensive to extract and difficult to process. If dirty, it can pollute an entire ecosystem. But when tapped responsibly, it's worth billions.

That's because reliable, representational, consensual data is foundational to trustworthy AI. People won't use AI solutions they don't trust—and organizations that place greater importance on AI ethics report a greater degree of trust from their customers and employees.[10]

It also helps close the ROI gap. Companies with high "data wealth" aren't yet at the world-class level, but they have large stores of high-quality data, monetize data effectively, and say their data is trusted by internal and external stakeholders. Our analysis reveals that these attributes drive higher-than-average ROI and enable more effective AI projects (see Figure 4).

FIGURE 4

Data differentiators

Companies with more holistic data practices see better business outcomes.

	All others	Data wealth outperformers
ROI realized from overall enterprise AI capabilities	4.8%	9.0%
Effectiveness of AI projects	47%	77%

Perspective

Disrupt like a digital native

Lyft has disrupted the transportation industry with data-driven processes that optimize business decisions and redefine customer experiences. By leveraging technology to tap unmet market demand, it broke $1 billion in revenue in its first year of operation. By the end of 2022, that figure had topped $4 billion.[11]

Lyft focuses on meeting customer needs in real time, using machine learning models to make hundreds of millions of decisions each day, including optimizing ride prices, matching riders with drivers, and predicting arrival times.[12]

Making real-time inferences with machine learning at scale requires access to a vast amount of data and computation resources, optimized processes, and a talented team of data scientists, engineers, and AI experts. And Lyft has tons of information: 20.3 million active riders in Q4 2022, hundreds of millions of trips per year.[13] This massive store of data powers real-time business decisions that reduce costs, optimize resources, and streamline the customer journey.

In effect, high-quality, high-value, trusted data unlocks half of the ROI improvement we see in best-in-class organizations. That said, data alone is not enough to fully realize AI's potential. While data quality, quantity, robustness, value, and trust are all important, how businesses harness data has a bigger cumulative impact on ROI than what data they have.

Today's top-performing Chief Data Officers (CDOs) specialize in getting value from their organization's data. An elite group—just 8% of CDOs in IBV's most recent survey of data leaders—reap more value than peers while spending less.[14] What's key is how they use AI to improve their data: Three out of four say that applying AI to their data helps them make faster and better business decisions.

So, it's not just about using data to improve AI—AI can also help companies make better use of data. It's a virtuous cycle. As Mirco Bharpalania, Senior Director of Cross Domain Solutions for the Lufthansa Group said, "AI is so critical because it actually opens up the world of the data that we're sitting on."[15]

Six key capabilities that enable world-class results

What enables some organizations to achieve world-class ROI from their AI investments? How do they amplify high-quality, trusted data to unlock financial and business value?

To answer these questions, we carefully analyzed our study results, looking for patterns, insights, and applicable real-world lessons. We learned that best-in-class AI performers build capabilities across six key areas, in a holistic, integrated way—with trust at the core (see Figure 5):

- Vision and strategy
- AI operating model
- AI engineering and operations
- Data and technology
- Talent and skills
- Culture and adoption

FIGURE 5

Becoming best-in-class

Companies that see the highest ROI from AI have matured 6 key capabilities—with trust at the core.

#1 Vision and strategy

Don’t throw AI at everything

Applying AI, automation, or any other technology to poorly designed processes still delivers subpar outcomes. By assessing where strategic investment is planned for core and non-core functions (for example, customer service, marketing, supply chain, finance, and so forth), as well as business units, leaders can uncover strategic opportunities to embed AI.

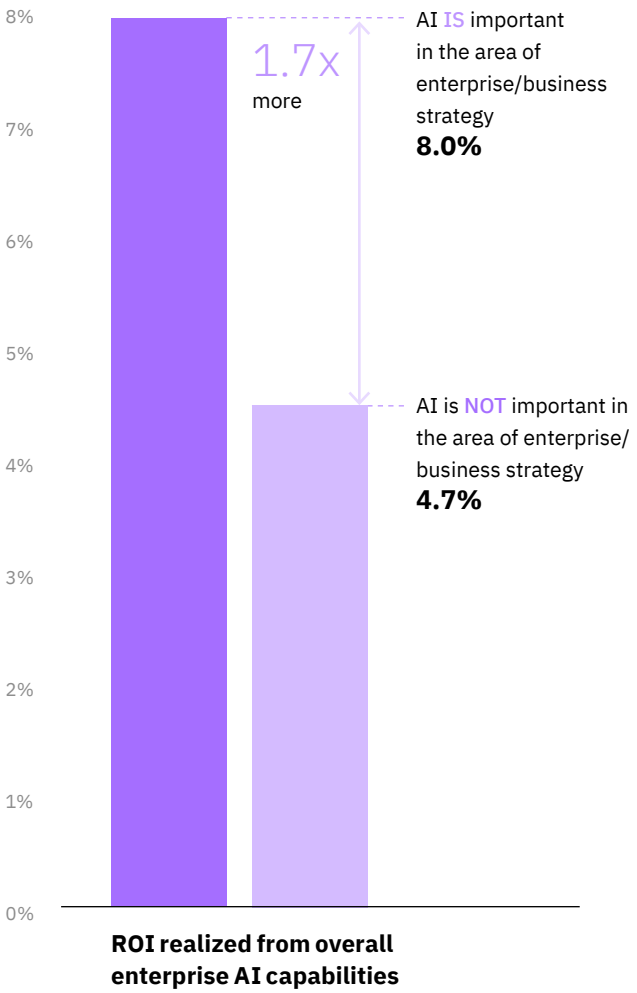
A well-thought-out AI strategy can catalyze transformation efforts and increase the ROI of individual AI projects (see “Boston Scientific spends $50,000 to save $5 million,” page 15). According to our research, organizations that view AI as important to their business strategy are 1.8 times more likely to be effective with their AI initiatives and achieve nearly twice the ROI (see Figure 6).

Leaders also balance competitive differentiation with cost optimization. Some are even leveraging publicly available and open-source AI resources to deliver faster, cheaper, and more scalable solutions to market (see “Foundation models lay the groundwork for AI’s future,” page 14). Ethical questions about how these tools have been trained will also play a part in AI’s future—so companies need to define where they stand before they push too far forward.

FIGURE 6

Strategy comes first

Companies that use AI to advance strategy see nearly twice the ROI.



Perspective

Foundation models lay the groundwork for AI's generative future

AI is getting smarter and faster every day. But most solutions are still bespoke. They're trained using a specific data set to complete a pre-defined task—a process that is both energy-intensive and time-consuming.[16]

To make AI investments more cost-effective, companies need flexible, reusable models that can be applied in a variety of ways—including generating new content. Today's foundation models are paving a path toward this future.

They offer an opportunity to accelerate and scale AI adoption, as foundation models can, in theory, be applied to many domains. For example, LLMs can transform how information is generated and shared across an organization. It just needs to be adapted for semantic search, classification, prediction, summarization, and translation.

The adoption of foundation models is also supported by a set of emerging AI engineering best practices that have gone mainstream. From model development to prompt engineering, these common practices and approaches streamline collaboration across the enterprise—and the ecosystem. A set of layered stacks and AI architectures with strong open source, ecosystem, and research contributions are also giving rise to common, re-usable development and deployment approaches.

While foundation models offer real promise and potential, they also come with new challenges. For one, they require significant compute, storage, and network resources, which makes them energy intensive. Training one large natural language processing model has roughly the same carbon footprint as running five cars over their lifetime.[17]

It is also important to consider how the usage scale of a foundation model influences ROI. A LLM that is trained to serve hundreds of millions of users may deliver more value faster than a model that is used by only thousands. In a smaller scale deployment, optimization, fine-tuning, specialization, and portability may not translate to near-term returns—even though the LLM can be used for many downstream tasks.

Other challenges that come with larger models include trustworthiness, explainability, and transparency. Addressing these issues requires additional effort, investment and, in some cases, new inventions and solutions. Teams must understand what large models can do, how they should be deployed, and what type of data curation is required. Broader data engineering skills will be critical—as will a serious focus on ethical issues.

Like any other disruptive technology, there are trade-offs that come with adopting generative AI and foundation models. Success will only come from experimentation and iteration. Especially for enterprises, this journey will involve balancing the scales between the value generative AI can create and the investment it demands. The future of AI will be defined by those who hit the right mark.

Case study

Boston Scientific spends $50,000 to save $5 million

Boston Scientific wanted to automate its stent inspection process to improve accuracy when searching for defects, such as broken links or surface imperfections. Accurate inspections are critical for successful clinical outcomes.[18]

The company has approximately 3,000 experts doing inspections, costing several million dollars each year. Boston Scientific considered a neural network model to help cut back on manual labor, but those models require much more data than it had on hand. And collecting or generating this data would be impractical and cost prohibitive.

The solution? First, teams scaled down the problem by focusing on smaller and narrower tasks. Then, they reduced data requirements to align with the new focus. Lastly, they leveraged "off-the-shelf" open-source AI models to streamline the inspection process.

The result? $5 million in direct savings—delivered on a modest budget of roughly $50,000—as well as increased accuracy. Now the company's employees can identify issues faster and focus on the important work that only humans can do.

#2 Operating model

Ditch the science fair mentality

Groundbreaking AI is built on a foundation of open innovation. However, leading companies learn to mitigate against the myth that anything goes in innovation.[19] To keep experiments and implementations in line with strategy, organizations must treat AI as a discipline. They must outline ethical principles, develop rigorous governance, and emphasize pragmatism over theory.

This starts with understanding which AI operating model best aligns with the business need (for example, centralized versus hub-and-spoke versus decentralized structures). Our research finds that organizations with high data wealth that have also embedded an AI operating model into the fabric and culture of the organization are able to generate up to 2.6 times more ROI than their peers.[20]

What does this look like? One example revolves around how companies create minimum viable products (MVPs). Leaders should outline a clear process for applying AI—starting with identifying the business problem the solution hopes to solve. By setting clear goals for even experimental rollouts, companies can choose to advance only the most effective AI projects.

#3 Engineering and operations

Agile DevOps + automated ITOps + MLOps = AIOps

AI engineering and operations (AIOps) brings big ideas to life, serving as a flywheel for the operating model. It integrates people, processes, and platforms to apply AI at speed and scale (see “Bestseller unlocks AI value in fast fashion,” page 17). And organizations that successfully design processes that help teams build to scale—while also monitoring the performance of AI applications—see up to 2.6 times higher ROI.

Engineering discipline can accelerate this AI flywheel and make it work effectively. Just as many companies use DevOps and other software engineering approaches to speed up projects without sacrificing quality, AIOps helps shorten development cycles, improve collaboration, increase operational efficiency, and deploy solutions more successfully.[21] Standardization and structured focus are essential to keep up with the pace of innovation—without sacrificing the principles of ethical AI.

Case study

Bestseller unlocks AI value in fast fashion

In the fashion industry, around 80% of merchandise is sold across two seasons each year. Everything else is highly discounted—or gets donated or dumped. This over-production translates to suboptimal profits and presents an enormous sustainability issue for clothing designers and retailers.[22]

To help teams more accurately predict demand, clothing and accessory company Bestseller took 10,000 images (one season's catalog) and developed an AI model for each of its four brands. In just three weeks, the company was able to develop and train a convolutional neural network to classify an image according to various features. Deep-learning details were then fed into traditional analysis models (for example, regression or principal component analysis) to help the company better understand the factors that drive sales.

Incorporating this information into Bestseller's core forecasting engine increased the company's selling efficiency from 78% to 82%—and reduced the number of design samples it needed to create for each brand by 15%.

#4 Data and technology

Support industrial-strength scaling

Anyone can create a proof of concept. But for AI models to be effective, useful, and trustworthy, they must be properly integrated into operational systems. What a company can do with AI is defined, in large part, by how it selects, governs, analyzes, and applies data across the enterprise. Because humans are fallible, teams need skills and processes that help ensure the right data is chosen to power AI models.

This also has a major impact on AI's ROI. At world-class organizations, data teams review governance, management, ethics, literacy, and other frameworks needed for people to access, understand—and trust—enterprise data. IT teams assess infrastructure and processes to balance AI experimentation with industrial-strength scaling (see "How IBM's Chief Analytics Officer helps boost AI ROI," page 18).

Perspective

How IBM's Chief Analytics Office helps boost AI ROI

Everyone has big ideas for AI. The office of IBM's Chief Analytics Officer (CAO) helps those visions become reality.

The CAO office partners with business units within IBM to identify opportunities to improve revenue, save time, and add a layer of intelligence to day-to-day business workflows with machine learning. It taps enterprise-trusted data and delivers business insights into the strategic platforms where work gets done.

AI can improve the business in many ways, so the CAO must be strategic about project selection. The office uses a prioritization framework based on five criteria for enterprise-level initiatives:

- Drives measurable business value
- Aligns to IBM's strategy
- Leverages the CAO's data science and AI capabilities
- Drives at-scale solutions
- Includes transformation partners.

When a project's data has already been standardized—woven into the organization's data fabric—that also helps push it to the top of the list. While these initiatives often see faster speed-to-market, the CAO doesn't discount projects that take a heavier data lift. The upfront work they require also lays the groundwork for future AI projects.

Like most enterprises that weren't born on the cloud, IBM has a complex data environment to rationalize. So, the CAO is focused on building a data foundation that makes it easier to develop insights—not project-by-project, but for everything the company does.

Discipline also helps the CAO office speed development. Using standards and best practices in experimentation, development, and deployment protects quality as the pace picks up. Reusable assets, templates, connectors, APIs, and cookbooks help projects start quickly and helps team leverage lessons learned.

This rigor also applies to the preservation of AI ethics. Each project must be built atop the five pillars that support trustworthy AI:[23]

1. *Explainability.* A layperson should be able to understand how an AI system works—and how it arrived at a specific conclusion—when given a simple explanation.
2. *Fairness.* Bias can be present in both AI algorithms and the data used to train and test AI. Creating fair systems requires building a diverse development team and seeking input from impacted communities.
3. *Robustness.* As cybersecurity threats become more advanced, AI must be able to withstand interference and defend vulnerabilities. For example, organizations need a way to guard against the use of poisoned training data in AI-powered systems.
4. *Transparency.* Transparency reinforces trust, and the best way to promote transparency is through disclosure. Users must be able to see how the service works, evaluate its functionality, and comprehend its strengths and limitations.
5. *Privacy.* Trustworthy AI systems prioritize and safeguard consumers' privacy and data rights. They provide full disclosure to users about what data is being collected, how it will be used and stored, and who has access to it.

On a quarterly basis, all CAO projects are reviewed. Goals may be adjusted—or projects terminated. Tough decisions and trade-offs must be made, but this focus and rigor drives measurable business value: The CAO office helped generate $357 million in net benefits for IBM in 2022.

$278 million in benefits were associated with developing insights that directly led to revenue growth, in part by transforming client-facing capabilities. Another $79 million was tied to automating and augmenting enterprise workflows with AI, driving faster and smarter decisions.[24] The CAO can now deploy projects up to nine weeks faster—which helps IBM bring strokes of brilliance to life with the speed and quality its enterprise clients demand.

#5 Talent and skills

Fill the jobs of tomorrow today

A lack of skilled talent and technical expertise has been a top barrier to implementing AI since its inception. To stay competitive in a tight labor market, companies must train their teams to use AI effectively—and responsibly. Our research demonstrates that when organizations help teams strengthen their AI chops, AI projects are more successful.

Organizations that actively encourage AI knowledge-sharing across the enterprise—and offer business and technical training to attract new talent—achieve ROI up to 2.6x times greater than others. HR and talent leaders—with sponsorship from the business—are driving this work. Between 2018 and 2021, the portion of CHROs with active plans to retain and reskill workers jumped notably (see Figure 7).[25]

#6 Culture and adoption

Cultivate change and co-creation

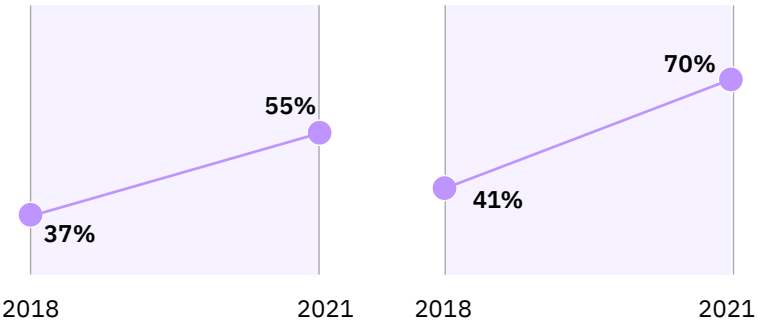
Change management is often the first line item cut when companies are facing cost pressures. But this fiscal austerity can be dangerously short-sighted: penny-wise and pound-foolish. The right culture—one that puts a premium on trust—helps anchor AI capability and maturity.

If people don't trust the work AI does—or the data it's built on—adoption will lag and returns will slump. On the flip side, our research reveals that maturity of culture is one of the greatest contributors to best-in-class ROI. When AI is part of the company's DNA and change management is a widespread skill, organizations perform better. In fact, project teams that used standardized and documented methodologies—including value realization or benefits tracking—see up to 2.5 times the ROI.

FIGURE 7

AI requires reskilling

Most CHROs have active plans to retrain workers



Retrain/reskill workers impacted by AI

Retrain/reskill workers that interact with AI

Trust at the core

Act on principle

As government leaders debate how they should regulate the development of AI, one thing is certain: How data is used will be highly scrutinized going forward.

As a result, executives are investing in AI capabilities that deliver trustworthy outcomes. This requires doubling down on data technology and platforms, in addition to building core AI capabilities. As such, executives estimate that their spend on training, teams, processes, tools, and other operational capabilities to institutionalize AI ethics doubled between 2018 and 2021. And they expect investment to increase over the next three years.[26]

Yet, few organizations have put intent into practice. While more than half of organizations have endorsed principles of AI ethics, less than a quarter have operationalized them. Fewer than 20% strongly agree that their organizations' practices and actions on AI ethics match (or exceed) their stated principles and values.[27]

To create trustworthy AI, organizations need to build their capabilities on a strong foundation of trust—a foundation that can only exist when people across the organization agree on a set of principles, processes, and practices that will drive responsible development and innovation.

The high road is longer—but it may be faster

Everyone wants to be first-to-market. But is the glory worth the risk that comes with cutting corners?

While new LLMs promise to streamline research and content creation, they also tend to hallucinate, or confidently present inaccurate or misleading information. As a result, people aren't sure if they can rely on their results.[28] As some tech leaders race to advance these bleeding-edge models, others are calling for caution and a greater focus on responsible practices.[29]

This echoes our argument for building mature capabilities on the principle of trust. While the frenzy around the latest generative AI innovations may be warranted, enterprises need to make investments for the long haul.

Building business and technical capabilities doesn't happen overnight. And quick wins won't deliver the stable returns that leaders (and shareholders) expect. Strengthening capabilities across the enterprise, however, puts organizations on the path toward transformation and growth—and puts the downslope of the J-curve behind them.

Action guide

The secret to successfully scaling AI

How can an organization become best-in-class? That depends on where it's starting from.

The first step is to identify your company's strengths—and areas where it could improve. Assess your company's own maturity across AI capabilities by answering these key questions:

Vision and strategy

- What value should AI bring to my company?
- How is AI being used to differentiate my company from its competitors?
- How are AI projects reviewed for strategic alignment?
- Do we have an enterprise-wide approach to AI—and a roadmap to deliver results?

Operating model

- Is AI embedded in our internal systems and operational processes?
- What is our process for developing MVPs to meet a specific business need?
- How are AI insights being generated and delivered to the business to create value?
- What checks and balances do we have in place to ensure we are using AI ethically?

AI engineering and operations

- How are machine learning and data models being tested, deployed, and maintained?
- How are we tracking changes made to AI solutions?
- Do we have systems and processes in place to identify and solve problems as they appear?
- Can we measure and tune AI models once they're deployed?

Data and technology

- Do we have high-volume, high-quality, trusted data?
- Do our governance processes prioritize data security and enable trustworthy AI?
- What level of data advocacy and literacy exists across the organization?
- Do we have the information architecture in place to scale AI solutions?

Talent and skills

- How is the organization attracting talent with data and AI skills?
- How are we developing AI skills and expertise across the enterprise?
- How are teams sharing knowledge to increase everyone's comfort level with AI applications?

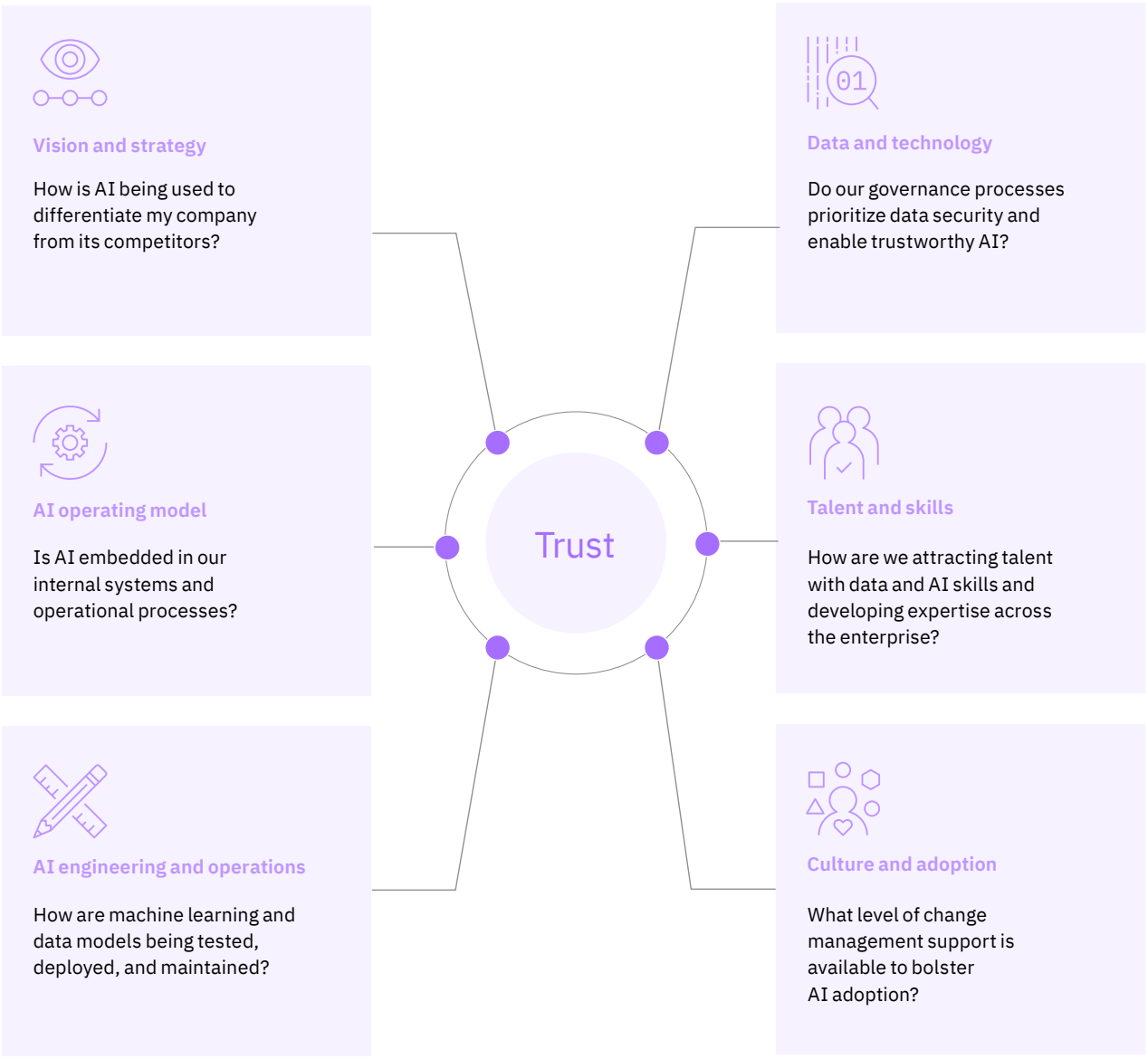
Culture and adoption

- Is the organization change-ready?
- What level of change management support is available to bolster AI adoption?
- Do all AI projects have a named executive sponsor?
- Are KPIs baked into use case adoption?

FIGURE 8

Assessing AI maturity

Questions to ask on the road to world-class ROI



With these insights in hand, here's how you can evolve your organization's capabilities across six key capabilities—keeping trust at the core:

#1 Vision and strategy

Identify where AI can boost competitiveness, innovation, and performance—and prioritize accordingly.

- *Make strategy AI's North Star.* Re-examine how projects are run, recalibrate the backlog, and reduce complexity to align AI projects with business goals. Define a vision for strategic, responsible AI that can guide teams across the enterprise. Be innovative, but don't get distracted by the latest innovation.
- *Identify value-rich, industry-leading use cases.* Examine which AI domains (for example, vision, language, prediction) and disciplines (for example, deep learning, generative AI, other machine learning techniques) would be best suited to help the organization solve its business problems.[30] Explore where foundation models could accelerate progress and add value, keeping ethical principles top of mind.
- *Demystify AI maturity.* Chart a course for building the foundational AI capabilities that underpin success across multiple projects, initiatives, and programs—and integrate this roadmap into annual operating plans and long-term strategy.[31]
- *Set the bar for success.* Develop a performance management framework that helps teams baseline, measure, and improve performance across a range of metrics, such as volume, value, speed, and efficiency.
- *Create checks and balances.* Create a governance model that lets sponsors easily monitor how AI is being used across the enterprise—and the supply chain. Be prepared to terminate projects that aren't delivering the intended value, supporting strategic goals, or following ethical guidelines.

#2 Operating model

Embed an AI operating model into the fabric and culture of the organization.

- *Consistently prioritize AI projects that align to strategy—and principles*. Introduce a formal scoring framework that considers responsible use, business value, speed to value, risk, urgency, and resource availability. Elevate projects and workstreams that are expected to deliver the highest ROI when viewed holistically.
- *Experiment often—within guardrails.* Define a clear process for developing MVPs quickly to achieve business-defined objectives. Include ethics and bias reviews of AI models in operating procedures to check that AI is being used properly. Outline policies and explicit operational guidelines for where and how generative AI can be used.
- *Feed the virtuous cycle.* Establish a mechanism for delivering insights to the business—and manage data responsibly to build trust in the insights that emerge. Set and evaluate performance benchmarks and diagnostic metrics on a regular basis.
- *Enable independence and innovation.* Co-create a governance model for AI-enabled transformation that lets business units and functions drive their own agendas while maintaining an enterprise-wide approach.
- *Avoid business interruption*. Introduce a dedicated support team for AI models with monitoring, configuring, and upgrading responsibilities. Craft a clear escalation plan to call in executive support when blockers impede engagement across business units.

#3 Engineering and operations

Deploy AI solutions that are flexible, user-friendly, and scalable.

- *Don't reinvent the wheel.* Consider where "off-the-shelf" models can provide a more cost-effective starting point for AI projects.
- *Document changes for faster troubleshooting.* Implement robust versioning in the current development lifecycle for AI solutions, tracking source code, configuration, and input data appropriately.
- *Make adoption foolproof.* Deploy a framework that automates implementation, focusing on efficiency, robustness, transparency, and scalability. Group meaningful components together and deploy them as microservices.
- *Stay vigilant.* Testing should cover functional, performance, and load tests, as well as checking incoming data for changes, such as distribution shifts. AI outputs should also be assessed for quality and appropriateness.
- *Solve problems as they appear.* Put tools and metrics in place for monitoring and bias mitigation. Make sure teams have the technology needed to do an efficient root cause analysis when AI applications experience a performance drop or security event.

#4 Data and technology

Build core capabilities that simplify, automate, control, and secure access to data.

- *Know AI's role.* Define AI use cases within a company's principles, broader technical guidelines, and architecture. Be upfront about when it is not appropriate to use AI.
- *Support AI with strong IA.* Build mature data management processes that can be commonly shared across the information ecosystem and are understood by both technical and business unit experts.
- *Put data in context.* Make sure representative data sets are curated and categorized responsibly (and consensually), so that teams can derive meaningful, trustworthy insights. Include data integration capabilities within architectural guidelines.
- *Cultivate trustworthy data.* Capture data accurately, cleanse it throughout its lifecycle, and make it available to AI teams and the business in a timely manner. Connect data scientists and domain experts to help teams select the right data set for each use case.
- *Increase data literacy.* Provide training that helps employees think critically about data and deliver better insights to the business. Make more room at the table for those with complementary skill sets to co-develop AI. This will also help teams determine when data can be trusted to train AI—and when better inputs are needed.

#5 Talent and skills

Deploy an enterprise-wide approach to develop AI ethics, skills, and talent.

- *Build AI muscle.* Define clear roles, responsibilities, and expectations, and develop growth plans that help employees strengthen key skills.
- *Create opportunities for continuous learning.* Encourage greater familiarity with AI and deliver targeted training to help employees find valuable ways to use it. Highlight the limitations and opportunities associated with new tools, such as generative AI. Collect lessons learned at the end of each project and catalog them in a central repository to encourage knowledge sharing.
- *Let technology do the heavy lifting.* Empower teams with "no-/ low-code" modeling tools—paired with robust governance that prevents improper data usage."[32]
- *Keep ethics top of mind.* Educate employees on the principles of AI ethics and be transparent about when and how they should escalate concerns. Create clear organizational structures that empower people to challenge AI use cases and raise ethical questions—regardless of who's running the project.
- *Foster a data-focused mindset.* Keep data management at the forefront. Make sure all teams understand how critical responsible data is to any AI implementation—and require them to consistently measure and report on the success of their AI projects.

#6 Culture and adoption

Develop a human-centered approach to AI—with dynamic, open feedback loops across the ecosystem.

- *Don't let AI be an afterthought.* Infuse AI into the DNA of the enterprise. Incentivize teams to look for ways to create business value with AI. Bring designers into the process early on to deliver human-centric solutions.
- *Enlist champions of change.* Engage employees by publicly recognizing individual contributions and team successes. Publicly reward the AI vanguard in your organization to inspire others to follow.
- *Empower teams to reimagine workflows.* Ignite change at the grassroots level by developing a culture of continuous collaboration and a "use-case first" mindset. Develop a communication strategy to keep people up-to-speed on what's happening with AI across the company.
- *Double down on change management.* Use standardized and documented methodologies—including value realization or benefits tracking—to successfully transform the enterprise with AI.
- *Work from the same playbook.* Maintain a centralized dashboard with the KPI's for multiple AI use cases to inform comparisons and benchmarking. Showcase teams that embody the principles of trustworthy AI.

Trust at the core

Embed ethics throughout the AI lifecycle—from design to deployment to dynamic feedback.

- *Listen up.* Establish a governance approach for ethical AI implementation that incorporates feedback from executives, employees, customers, and regulators.
- *Take a stand.* Establish organizational structures, policies, processes, and monitoring that address privacy, robustness, fairness, explainability, transparency, and other relevant principles.
- *Don't work in a vacuum.* Consider the enterprise and broader ecosystem—especially as organizations adopt generative AI.
- *Know when you're in the danger zone.* Set an AI and data risk profile and threshold level—and clearly outline what to do when risks become reality. Help teams understand the limitations and risks of foundational models. Discuss how best to use them—and when not to.
- *Operationalize integrity.* Integrate ethics into the AI lifecycle and create accountability every step of the way.

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Study approach and methodology

In partnership with Oxford Economics, the IBM Institute for Business Value surveyed 2,500 executives in 22 countries across North America, Latin America, Europe, Middle East and Africa, and Asia (including China and India) from May through July 2021. The survey scope included 34 business and technology roles—primarily executives but also IT and AI professionals—from 17 industries.

We identified a group of "data wealth outperformers" who were in the top quartile of respondents based upon their data wealth score. The data wealth score was calculated as a cumulative self-assessment score across the data dimensions. These could have taken a value of 1 to 5, wherein 1 is equivalent to significantly below peers and 5 is significantly above peers. The data dimensions were: managing volumes of data; quantity of data sources; data value / quality of data and data sources; monetization of data and data sources; trust in AI, data, and data sources by internal stakeholders; trust in AI, data, and data sources by external stakeholders; and agility in working across business units/functions and IT.

We also categorized respondents based upon their response to taking a strategic view of AI in their organization, as well as their self-assessment of ROI from enterprise-wide AI initiatives, and analyzed their responses to the survey, particularly around the six capabilities.

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Notes and sources

1 Tobin, Michael, Redd Brown, Subrat Patanik, and Bloomberg. “A.I. is the star of earnings calls as mentions skyrocket 77% with companies saying they’ll use for everything from medicine to cybersecurity.” Fortune. March 1, 2023. https://fortune.com/2023/03/01/a-i-earnings-calls-mentions-skyrocket-companies-say-search-cybersecurity-medicine-customer-service/

2 “Worldwide Spending on AI-Centric Systems Forecast to Reach $154 Billion in 2023, According to IDC.” IDC. March 7, 2023. https://www.idc.com/getdoc.jsp?containerId=prUS50454123

3 “The business value of AI: Peak performance during the pandemic.” IBM Institute for Business Value. November 2020. https://ibm.co/ai-value-pandemic

4 “Driving ROI through AI: AI best practices, investment plans, and performance metrics of 1,200 firms.” ESI Thoughtlab. September 2020. https://econsultsolutions.com/wp-content/uploads/2020/09/ESITL_Driving-ROI-through-AI_FINAL_September-2020.pdf; Goehring, Brian, Francesca Rossi, and Beth Rudden. “AI ethics in action: An enterprise guide to progressing trustworthy AI.” IBM Institute for Business Value. May 2022. Unpublished data. https://ibm.co/ai-ethics-action

5 IBV generative AI pulse survey of 369 C-suite executives in Australia, Germany, India, Singapore, United Kingdom, and United States, conducted April-May 2023.

6 Dickson, Ben. “AI’s J-curve and upcoming productivity boom.” TechTalks. January 31, 2022. https://bdtechtalks.com/2022/01/31/ai-productivity-j-curve/

7 “Pursuing transformation like digital natives: Lessons for enterprises from tech leaders who have lived it.” IBM Institute for Business Value. January 2023. https://ibm.co/digital-native-transformation

8 “Spring 2022 Snapshot Of The S&P 500’s Market Cap.” Seeking Alpha. April 12, 2022. https://seekingalpha.com/article/4500945-sp-500-spring-2022-snapshot-market-cap

9 Torres, Roberto. “How Walmart enhances its inventory, supply chain through AI.” CIO Dive. December 13, 2022. https://www.ciodive.com/news/walmart-AI-ML-retail/638582/

10 Goehring, Brian, Francesca Rossi, and Beth Rudden. “AI ethics in action: An enterprise guide to progressing trustworthy AI.” IBM Institute for Business Value. May 2022. https://ibm.co/ai-ethics-action

11 Iqbal, Mansoor. “Lyft Revenue and Usage Statistics (2023).” Business of Apps. February 20, 2023. https://www.businessofapps.com/data/lyft-statistics/

12 Mathur, Mihir and Hakan Baba. “Powering Millions of Real-Time Decisions with LyftLearn Serving.” Medium. January 30, 2023. https://eng.lyft.com/powering-millions-of-real-time-decisions-with-lyftlearn-serving-9bb1f73318dc

13 Iqbal, Mansoor. “Lyft Revenue and Usage Statistics (2023).” Business of Apps. February 20, 2023. https://www.businessofapps.com/data/lyft-statistics/

14 “2023 Chief Data Officer Study: Turning data into value.” IBM Institute for Business Value. April 2023. https://ibm.co/c-suite-study-cdo

15 Ibid.

16 “What are foundation models?” IBM Research. May 9, 2022. https://research.ibm.com/blog/what-are-foundation-models

17 Ibid.

18 “How to create business value with AI: 12 stories from the field.” IBM Institute for Business Value. August 2022. https://ibm.co/ai-examples

19 Lipp, Anthony, Anthony Marshall, and Jacob Dencik. “Open the door to open innovation: Realizing the value of ecosystem collaboration.” IBM Institute for Business Value. December 2021. https://ibm.co/open-innovation

20 In this context, “peers” refers to organizations that scored low on both data wealth and the degree to which it has an embedded AI operating model.

21 Rudden, Beth, Wouter Oosterbosch, and Eva-Marie Muller-Stuler. “Proven concepts for scaling AI: From experimentation to engineering discipline.” IBM Institute for Business Value. September 2020. https://ibm.co/scaling-ai

22 “How to create business value with AI: 12 stories from the field.” IBM Institute for Business Value. August 2022. https://ibm.co/ai-examples

23 “Artificial Intelligence: Our fundamental properties for trustworthy AI.” IBM. Accessed April 11, 2023. https://www.ibm.com/artificial-intelligence/ai-ethics-focus-areas

24 Internal IBM analysis.

25 Goehring, Brian, Francesca Rossi, and Beth Rudden. “AI ethics in action: An enterprise guide to progressing trustworthy AI.” IBM Institute for Business Value. May 2022. https://ibm.co/ai-ethics-action

26 Ibid.

27 Ibid.

28 Toews, Rob. “The Next Generation of Large Language Models.” Forbes. February 7, 2023. https://www.forbes.com/sites/robtoews/2023/02/07/the-next-generation-of-large-language-models/

29 Westfall, Chris. “Elon Musk And Other Tech Leaders Call For Slowdown On AI Development.” Forbes. March 29, 2023. https://www.forbes.com/sites/chriswestfall/2023/03/29/elon-musk-and-other-tech-leaders-call-for-slow-down-on-ai-development/?sh=1902cc5b74d9

30 “How to create business value with AI: 12 stories from the field.” IBM Institute for Business Value. August 2022. https://ibm.co/ai-examples

31 Prabhakar, Aparna, Veena Mosur, and David Cox. “Rethinking your approach to AI: How to ground artificial intelligence in business strategy.” IBM Institute for Business Value. September 2021. https://ibm.co/ai-business-strategy

32 Haydock, Michael, Steven Eliuk, and Susara van den Heever. “Dealing with the AI data dilemma: The right approach to integration, governance, and tools.” IBM Institute for Business Value. June 2021. https://ibm.co/ai-data-integration

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