

A Forrester Consulting
Thought Leadership Paper
Commissioned By IBM
December 2019

Playbook For AI-Driven Growth

Outpace The Competition By Operationalizing
AI and Machine Learning At Scale

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To support their new AI/ML initiatives, growth leaders are investing in their data science teams and deploying platforms that democratize AI and ML at scale across their organizations.

Executive Summary

Enterprises recognize that leveraging their data with machine learning (ML) and artificial intelligence (AI) will soon be the most important driver of business competitiveness, and the fastest growing firms are pursuing initiatives across their organizations. They are moving AI out of IT and into the business and leveraging AI and ML to increase data-driven decision making, better understand customers, and drive product innovation, among a host of others use cases.

To support their new AI/ML initiatives, growth leaders are investing in their data science teams and deploying platforms that democratize AI and ML at scale across the business. They are accelerating time-to-value through tighter collaboration within data science, and breaking down silos with business and IT. They are driving trust in AI with governance solutions that track model lineage, monitor them for bias and drift, and explain and even debias the results. And they are investing in platforms and solutions that can automate AI and ML to enable citizen data scientists to rapidly develop a wide array of powerful machine learning models. These best practices allow growth leaders to drive business value with AI and ML in the form of improved process efficiencies, improved customer experiences, and accelerated product innovation.

In August 2019, IBM commissioned Forrester Consulting to evaluate the current state and challenges of artificial intelligence and machine learning. Forrester conducted an online survey with 316 global decision makers responsible for AI and ML analytics or automation to explore this topic.

KEY FINDINGS

- › **Growth leaders are investing heavily in their data science organizations.** The fastest growing firms in our survey are setting up their AI programs for success by creating centers of excellence and initiatives to foster collaboration between data science and the business. They are also investing in their data science talent: 57% of high-growth firms surveyed have 50 or more full-time employees with data science skills to build AI/ML models, compared to just 27% of lower-growth companies.
- › **AI/ML platforms are crucial to build trust and democratize AI.** AI/ML platforms offer capabilities like AutoAI and ModelOps that allow organizations to quickly scale AI and ML throughout the business. They also help business users understand and interpret AI models, with explainability and governance features that provide AI transparency and reduce hidden bias in models. These capabilities are essential to scale AI efficiently and drive business value.
- › **Investment into AI platforms and initiatives bodes well for high growth.** AI/ML is the largest data investment area for one in five high-growth firms today. High-growth firms are adopting AI and ML initiatives at nearly double the rate of their lower-growth peers, and almost half of high-growth firms will invest \$10M or more in AI/ML platforms in the next year. The expected value of these investments is very significant: More than 50% of high-growth firms expect to see at least a 5x ROI on their AI and ML investments.

AI Leaders Are Growth Leaders

AI and ML are rapidly becoming the most important factors in determining your business competitiveness, and they will only become more essential in the future. This means it is time to progress from experimentation and begin to scale AI/ML initiatives across the business. High-growth companies are doing just that — they're investing heavily in AI and ML initiatives and technology solutions. A comparison of how faster-growing firms (defined for this study as companies with 10% or more annual revenue growth) utilize and prioritize AI versus their slow-growing competitors (those with less than 10% annual revenue growth) shows:

- › **For high-growth firms, future success is linked to AI and ML.** AI enables firms to make better decisions and act on them in real time. High-growth firms consider AI more important to business competitiveness today: 38% say it is the most important factor vs. just 20% of lower-growth firms, and this will only increase in the next three years (71% vs. 49%).
- › **High-growth firms already have a large head start on competitors.** While the vast majority of firms surveyed are undertaking a host of AI and ML initiatives, high-growth firms have an unquestionable lead in both implementing and operationalizing AI today. Fastest-growing firms have about double the current adoption across all AI and ML initiatives today (see Figure 1). Importantly, the greatest gaps in adoption are around converting AI to business value — increasing data-driven decisions, better understanding customers, and improving existing products. It's easy to see then why these firms are separating from the pack, and why their competitors must accelerate AI within their own organizations in order to catch up.
- › **AI is now a financial priority for most enterprises.** Almost 60% of firms surveyed note AI/ML is one of their largest, if not the largest, investment areas for data-related initiatives today (see Figure 2). Again, faster-growing firms are outpacing their competitors by putting their money where their mouths are: AI/ML is the largest data investment area for one in five high-growth firms, compared to just 2% of their slow-growing competitors.

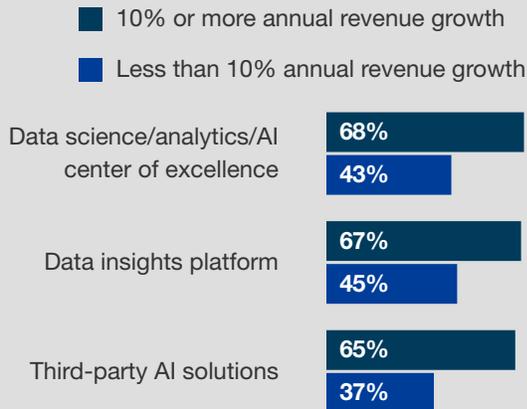


High-growth firms consider AI more important to business competitiveness today: 38% say it is the most important factor vs. just 20% of lower-growth firms.

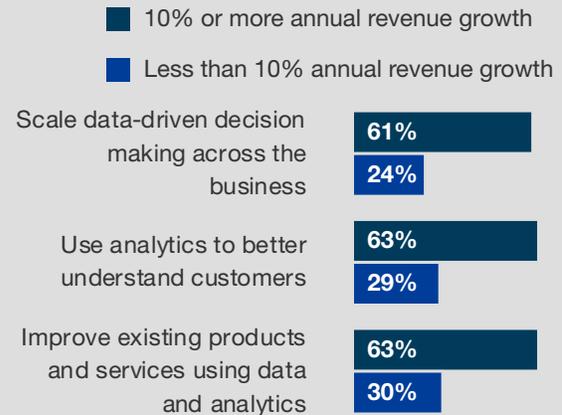
Figure 1: Fastest Growing Firms Have ~2x The Adoption Of AI And ML Initiatives

“What are your firm’s plans to adopt the following advanced analytics, ML, and AI initiatives?”
 (“Implemented” and “Expanding”; top three options shown)

Highest overall investment



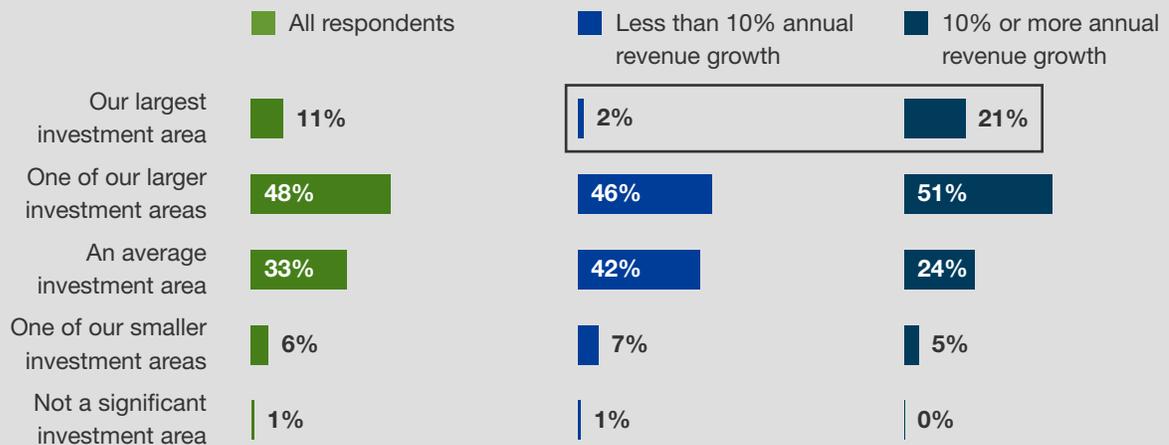
Largest investment gap



Base: 316 global decision makers responsible for AI, ML, analytics or automation
 Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, August 2019

Figure 2: Almost 60% Of Firms Note AI/ML Is One Of Their Largest, If Not The Largest, Investment Area

“How do your predictive analytics, AI, and ML initiative investments compare to your investments in other key data initiatives?”



Base: 316 global decision makers responsible for AI, ML analytics, or automation
 Note: Percentages may not total 100 because of rounding.
 Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, August 2019

SCALING AI ACROSS THE ORGANIZATION MUST BE THE GOAL NOW

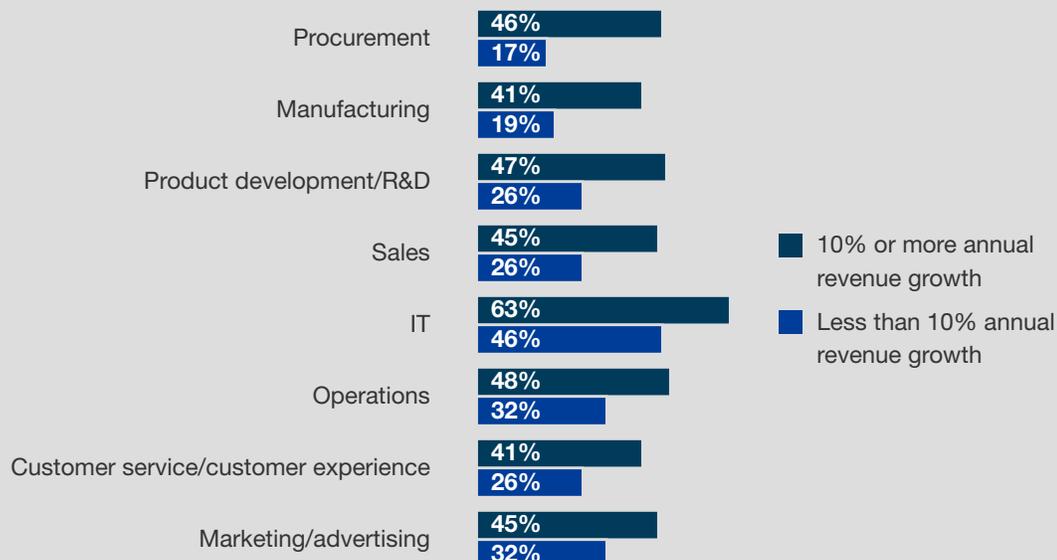
Organizations are moving beyond isolated AI experiments, and faster-growing firms are starting to scale their AI and ML initiatives across the business where they can have the greatest value: increasing data-driven decisions, better understanding customers, and innovating products. Growth leaders are also making the technology investments needed to effectively scale AI through the enterprise, indicating that the scaling gap between high- and low-growth firms may continue to grow, rather than shrink in the future. Our survey shows:

- › **Early use cases for AI/ML focus on improving operational efficiency.** The first AI and ML initiatives started in IT with the goal of improving efficiency and finding cost savings. With these initial successes, firms began to expand these efficiency use cases out of IT and into the business. Now, leading firms are transforming their AI/ML initiatives into growth engines, with top-emerging use cases focused on delivering better customer experiences, improving strategic decision making, and improving products and services.
- › **High-growth firms go beyond their peers by investing in AI and ML across more parts of the organization.** High-growth firms are ramping up investment in AI and ML capabilities in customer-facing, revenue-driving, and product-innovating roles throughout the organization (see Figure 3). Close to half of high-growth firms are increasing their investment for operations and procurement, driving internal process efficiencies and improvements. Forty-seven percent of high-growth companies are increasing their AI/ML investment for R&D in order to drive product and service innovation, and over 40% are increasing investment in revenue-driving and customer-facing roles like marketing, sales, and customer service.

Over 40% of high-growth firms are increasing AI/ML investment in revenue-driving and customer-facing roles like marketing, sales, and customer service.

Figure 3: High-Growth Firms Are Ramping investment In AI And ML Throughout The Organization

“To what degree are the following parts of your organization investing in predictive analytics, ML, and AI capabilities?”
(Showing those “Increasing Investment”; ordered by gap size between high- and low-growth organizations; not all options shown)



Base: 316 global decision makers responsible for AI, ML analytics, or automation
Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, August 2019

› **Firms start with platforms and solutions to drive business value.**

The most common initial investment for firms is a customer analytics platform or an ML platform. Other smart initial AI/ML investments to drive business value through cost savings and operational improvements include distributed messaging and natural language-understanding tools.

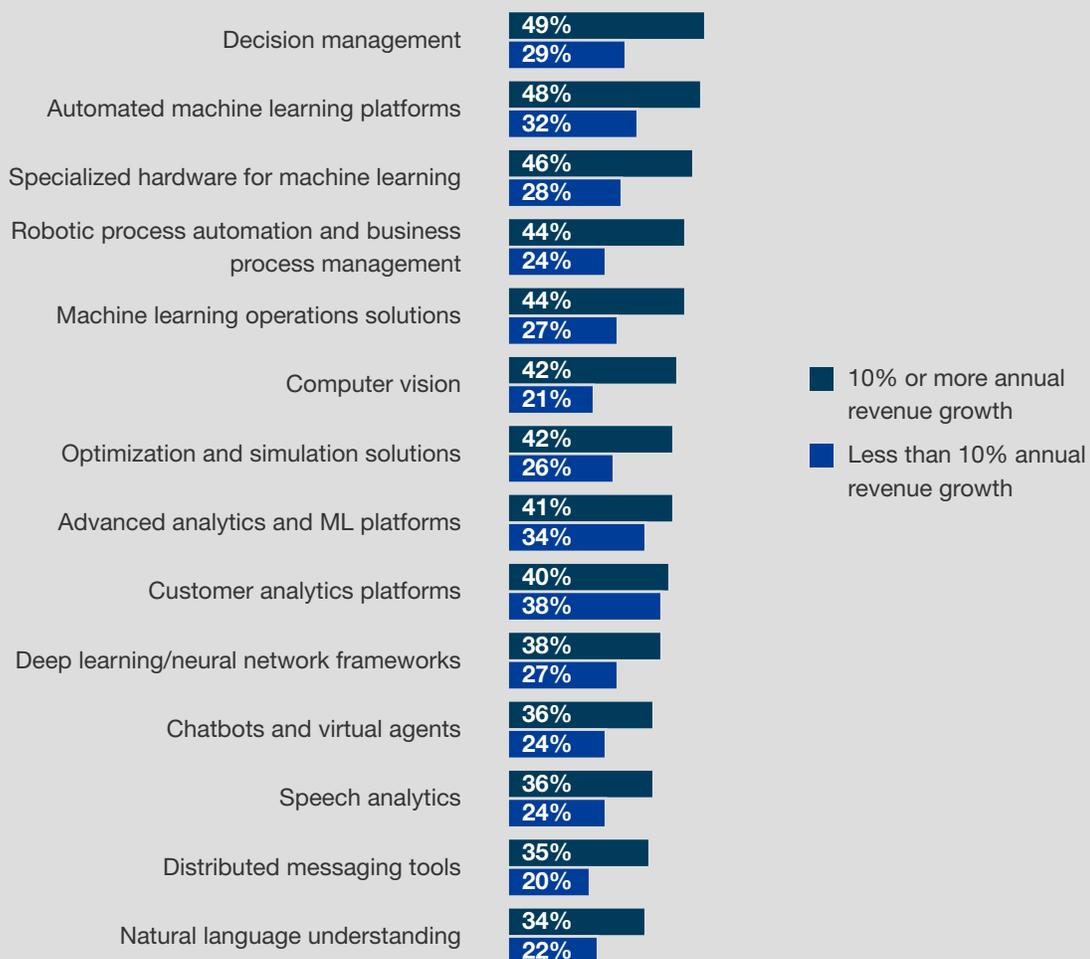
› **High-growth firms are more frequently investing in technologies that bridge the insights-to-action divide and scale AI and ML.**

Moving beyond their initial investments, high-growth firms are roughly 20 percentage points more likely to invest in decision management, automated ML platforms, robotic process automation (RPA), and business process management (BPM) — all of which are tied to driving immediate action. Automation not only facilitates faster insights to action, it also enables businesses to quickly scale AI and ML with smaller data science footprints needed.

Figure 4: High-Growth Firms Are Increasing Investment In Technologies To Bridge Insights-To-Action Divide And Scale AI And ML

“What are your plans for investing in the following data and analytics technologies?”

(Showing “Increasing Investment”; ordered by high-growth organization investment)



Base: 316 global decision makers responsible for AI, ML analytics or automation
 Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, August 2019

The Challenges Of Operationalizing AI

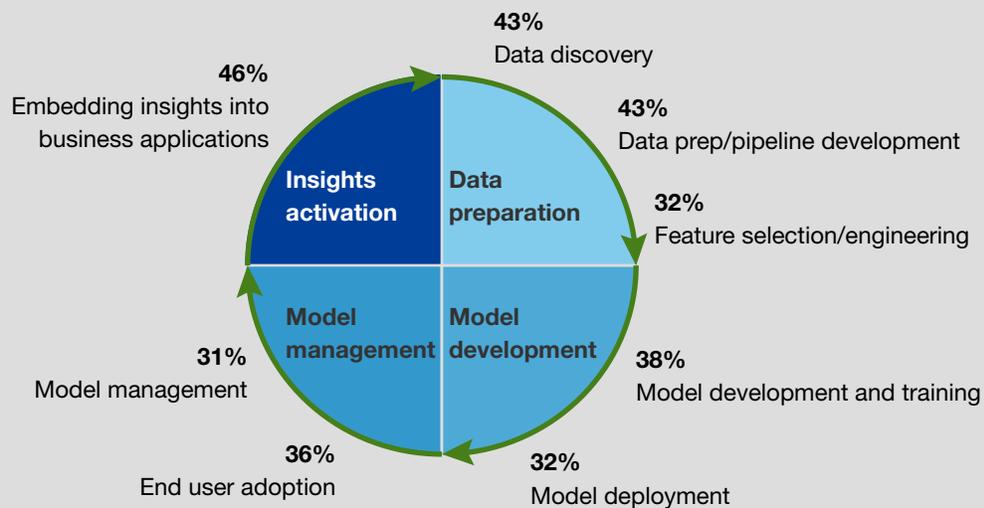
Firms understand the importance of AI, and leaders are investing in AI across their organizations. But moving from early pilot projects to driving business impact at scale with AI is difficult. Challenges with AI today span the entire AI/ML lifecycle, starting with data preparation and continuing through model deployment, management, and insight activation. Skills and expertise for AI/ML are at a premium today, and many firms struggle to find the talent needed to implement and scale AI. This means that getting models into production and making sure those models are monitored and retrained for optimum effectiveness can be difficult. Our survey shows:

- › **Challenges driving value with AI/ML start with data.** Successful and impactful AI/ML initiatives depend on quality data to develop and train models. But with data volumes growing exponentially, it's increasingly challenging to find the right data to use and make sure it's high quality. Half of the respondents in our survey said data quality is a challenge to driving value with AI — with one in five saying it is a critical challenge that stops projects or prevents them from starting. And firms report that data preparation and discovery are two of the top three phases of the AI and ML lifecycle where they see the greatest challenges (see Figure 5).
- › **Skills shortages impede model development.** One in five respondents says that a lack of data science or AI skills stops their AI/ML projects or keeps them from starting. And almost 50% say that a lack of developer support is a challenge to drive value with AI/ML. As a result, 38% rank model development and training as one of the three most-challenging phase in the AI/ML lifecycle.

One in five respondents says that a lack of data science or AI skills stops their AI/ML projects or keeps them from starting.

Figure 5: Challenges Span The AI And ML Lifecycle

“Where in the ML and AI lifecycle does your organization encounter the most challenges?” (Top three ranked)



Base: 316 global decision makers responsible for AI, ML analytics or automation
 Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, August 2019

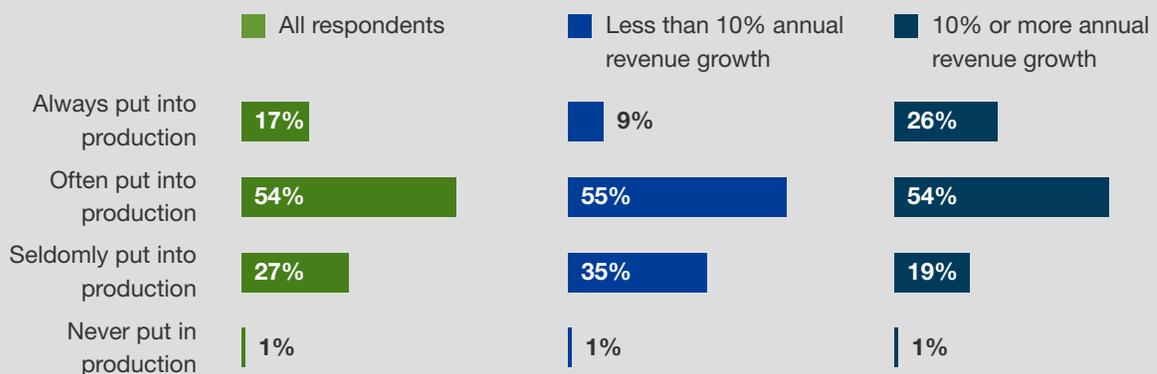
- › **Getting AI and ML models into production is a challenge, but high-growth firms are much better at it.** Less than 20% of respondents say that they are always able to put models into production that should be, and close to 30% say those models are seldom or never put into production (see Figure 6). Further, more than a third of firms admit that the majority of their AI and ML models are less accurate when put into production than when developed. High-growth firms are more successful at always getting models into production — more than 25% say they are able to do so, compared to less than 10% of their lower-growth competitors.
- › **Monitoring and retraining challenges plague model management.** While respondents in our survey rate model management as the least-challenging phase in the AI/ML lifecycle, data about model monitoring and retraining suggests firms still face significant obstacles. At over 40% of firms, most models deployed are neither monitored nor retrained regularly in order to keep them accurate (see Figure 7). And 44% of respondents say a lack of solutions for monitoring models in production is a challenge to delivering value with AI and ML. High-growth firms monitor and retrain more of their AI and ML models.
- › **Translating insights to action is the final piece of a complex puzzle.** Challenges with data quality, model health, and data science shortages culminate in an inability to take insights from AI and ML and embed them into business applications. Survey respondents say this is the most difficult phase of the AI/ML lifecycle.

Forty-four percent of respondents say a lack of solutions for monitoring models in production is a challenge to delivering value with AI and ML.

Figure 6: Getting AI And ML Models Into Production Is A Challenge, But High-Growth Firms Are Better At It

“How challenging is it to put AI/ML models into production?”

Models that should be put into production are . . .



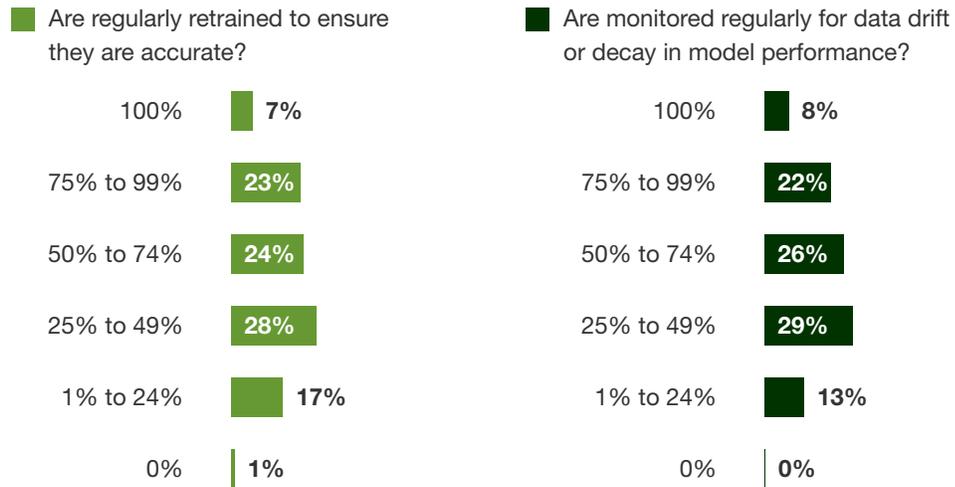
Base: 316 global decision makers responsible for AI, ML analytics, or automation

Note: Percentages may not total 100 because of rounding.

Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, August 2019

Figure 7: Close To Half Of Firms Say That Most Models Are Neither Monitored Or Retrained Regularly In Order To Keep Them Accurate

“Roughly what share of your AI/ML models put into production . . .”



Base: 316 global decision makers responsible for AI, ML, analytics or automation
 Note: Percentages may not total 100 because of rounding.
 Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, August 2019

Unlocking AI-Driven Outcomes With People, Process, And Platforms

To solve these challenges and scale AI and ML initiatives across the business, high-growth firms are investing heavily in data science skills and technology. Paired with significant investment, these growth leaders also create an organizational structure that fosters collaboration, cooperation, and democratization of AI both within the data science team but also with IT and the business. Comparing investments and initiatives between growth leaders and slower-growing firms shows:

- › **Growth leaders empower their teams with the right organizational structure.** Data science teams must work in concert with IT functions and business groups to turn insights into actions and reap the full rewards of AI and ML initiatives. To this end, almost half of the firms surveyed are undertaking initiatives to foster cooperation between data science, IT, and the business — surpassing budget and hiring initiatives. High-growth firms go beyond their peers with their efforts to drive collaboration and democratization of AI and ML at their organizations (see Figure 8). They are over 20 percentage points more likely to be creating or expanding data science centers of excellence, and they’re more than 10 percentage points more likely to be undertaking collaboration initiatives within data science teams, IT, and the business.

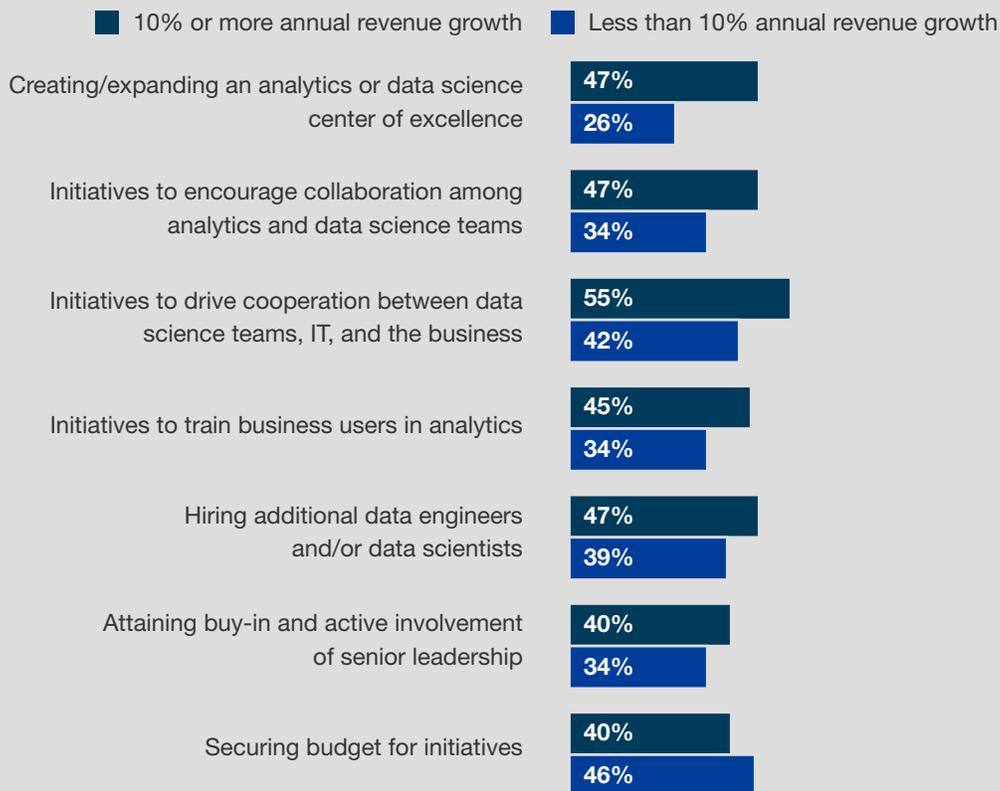


Almost half of the firms surveyed are undertaking initiatives to foster cooperation between data science, IT, and the business.

- › **Growth leaders are expanding their data science talent pools.** With AI/ML skills in high demand and limited supply, high-growth firms are making it a point to grow their data science skill sets. Fifty-seven percent of high-growth firms surveyed have 50 or more FTEs with data science skills to build AI/ML models, compared to just 27% of lower-growth companies.¹
- › **High-growth firms are investing more in their AI and ML platforms.** Sixty percent of survey respondents say their organizations will invest at least \$1 million in AI and ML platforms in 2020. This shows the financial priority firms are placing on scaling AI and ML to the business. Once again, growth leaders are going further to ensure the success of AI and ML — almost half (45%) of high-growth firms will invest \$10M or more in AI/ML platforms in the next year, compared to just 22% of low-growth firms.

Figure 8: Growth Leaders Are Creating Centers Of Excellence And Undertaking Collaboration Initiatives To Support Their AI And ML Programs

“Which of the following organizational actions are you undertaking to support your data and analytics initiatives?”



Base: 316 global decision makers responsible for AI, ML analytics, or automation
 Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, August 2019

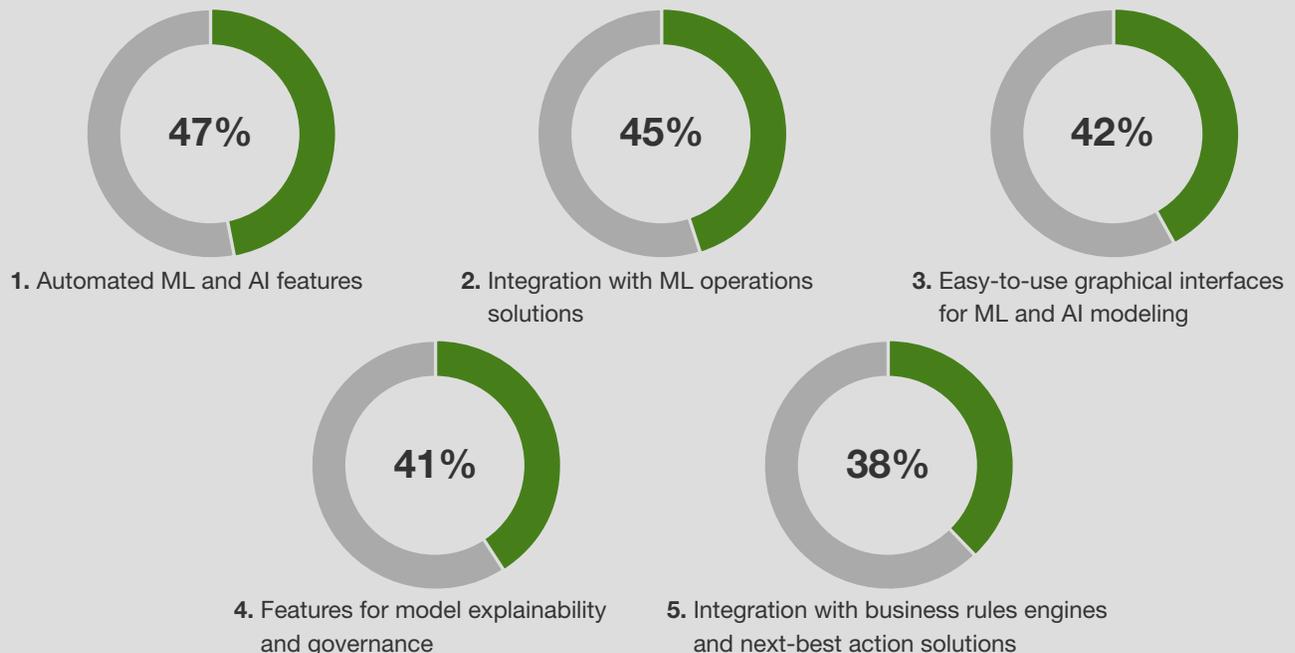
SCALE AI AND DRIVE TRUST WITH THE RIGHT TECHNOLOGY INVESTMENTS

The right AI and ML platform can drive collaboration, close the insights-to-action gap, and scale AI throughout the organization. To this end, firms are investing in technology that can democratize and accelerate the end-to-end process of developing and operationalizing AI and ML solutions with features for governance and explainability. They are bridging the insights-to-action gap with platforms that have integrated optimization and business rules engines (e.g., to suggest next-best actions) that make insights consumable and drive actions at scale. And they are choosing hybrid cloud tools that can work across (and take advantage of) all of the organization's data environments. Our survey shows firms need their AI platforms to:

- › **Democratize and accelerate the ability to develop AI and ML models.** There will never be enough data scientists to tackle all of the valuable AI and ML use cases at your organization. Instead, firms are looking to democratize the ability to leverage AI and ML across the organization using AutoAI and tools with easy-to-use graphical interfaces. AutoAI automates the data prep, feature engineering, model development, validation, and evaluation — enabling data workers to rapidly develop a wide array of powerful machine learning models. Further, they help data scientists be more productive developing new AI and ML analyses and models. Respondents ranked these capabilities the most valuable and third-most valuable AI and ML platform capabilities (see Figure 9).

Figure 9: AutoAI, Model Operations, Ease Of Use, And Governance Top The Most Valuable Platform Capabilities

“Which of the following capabilities in an AI and ML platform are most valuable for your organization?”
(Top five answers shown that ranked among the top five most valuable)

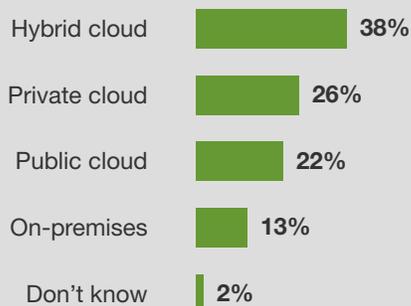


Base: 316 global decision makers responsible for AI, ML analytics, or automation
Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, August 2019

- › **Operationalize outcomes at scale with ModelOps, rules engines, and optimization.** AI and ML models can't drive value at scale if they aren't put into production. Firms are increasingly deploying ModelOps tools that help accelerate the deployment of AI and ML models, monitor them in production, and make it easier to retrain them when conditions change. Respondents ranked integration with ModelOps capabilities as the second-most valuable platform capability. However, quickly deploying models does not guarantee value by itself. Businesses must turn model insights into action through the use of rules engines — and that triggers automated processes (such as recommending next-best actions) and optimization capabilities (ranked fifth) that identify the best combinations of actions subject to constraints (such as optimizing pricing or inventory help across related products) using inputs from AI and ML models.
- › **Drive trust with features that track, monitor, and explain AI and ML solutions.** Firms see governance and regulatory concerns as two of the top barriers to driving value with AI and ML. To overcome these challenges, firms are looking for platforms with governance and explainability features (ranked fourth). And they report that features for automatically documenting models, tracking their lineage, monitoring them for bias and data-drift, and explaining them are the most important factors driving trust in AI.
- › **Support their increasing investment in hybrid environments.** AI and ML on public cloud may get a lot of attention, but enterprises are leveraging a host of different environments — on-premises, private cloud, and frequently multiple public clouds. Enterprises are looking for platforms that can support their AI and ML initiatives across all of these environments, and leverage the unique speed, scalability, or efficiency benefits that each can offer (see Figure 10).

Figure 10: Enterprises Need Platforms That Can Support Their Increasing Investment In Hybrid Cloud

“Which environment are you planning to invest in most to support your AI/ML initiatives?”



Base: 316 global decision makers responsible for AI, ML analytics, or automation

Note: Percentages do not total 100 because of rounding.

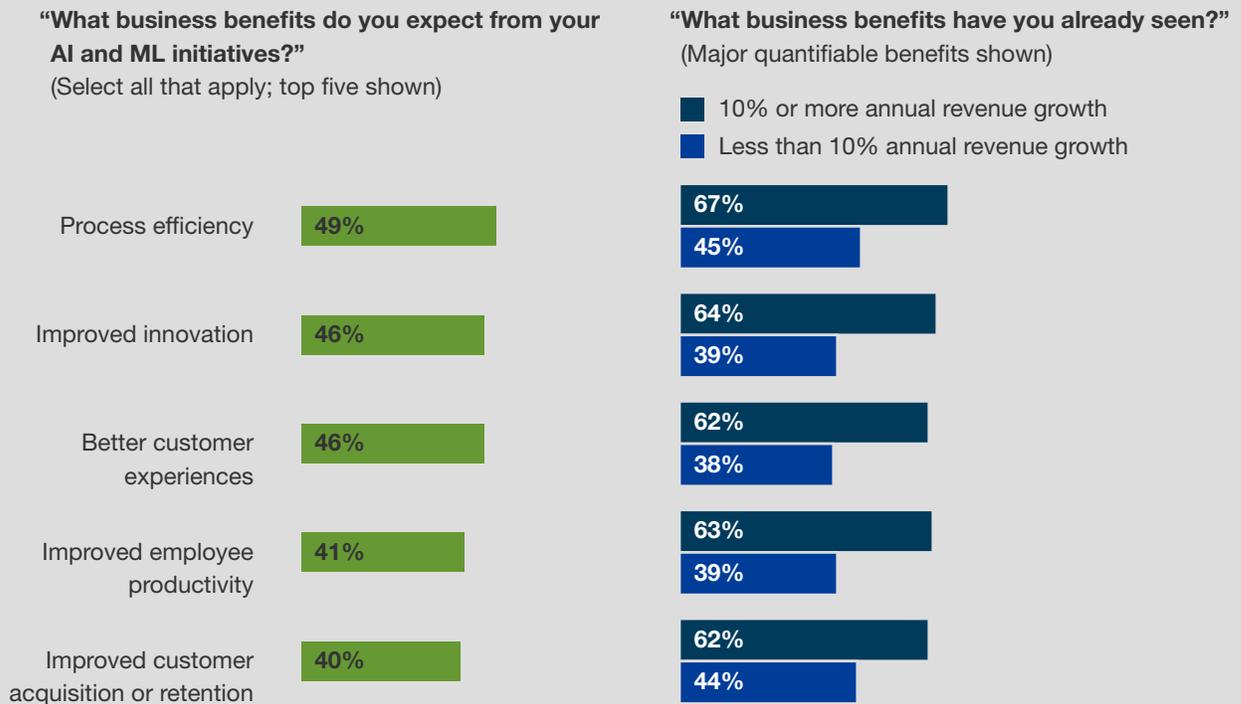
Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, August 2019

AI Leaders Are Pulling Further Ahead

High-growth firms are reaping the rewards of their investment in AI and ML, seeing business benefits from early use cases at a higher rate than their peers. They also forecast a greater ROI for their investments. Firms not investing in AI today are quickly falling behind, and they face obsolescence if they can't catch up to these high-growth leaders.

- › Growth leaders are already seeing business results from their AI use cases.** The most valuable AI/ML use cases to date have been around improving operational efficiency and customer experience. And, as organizations scale AI and ML through the business, benefits around process efficiency, innovation, and customer experience will continue to climb. Growth leaders are already seeing tangible results of their AI and ML efforts that surpass those of slower-growing competitors. Faster-growing firms are roughly 10 percentage points more likely to be seeing major quantitative business benefits as a result of their AI and ML initiatives to date (see Figure 11).

Figure 11: Enterprises Have Already Realized Major Business Benefits From Their AI And ML Initiatives

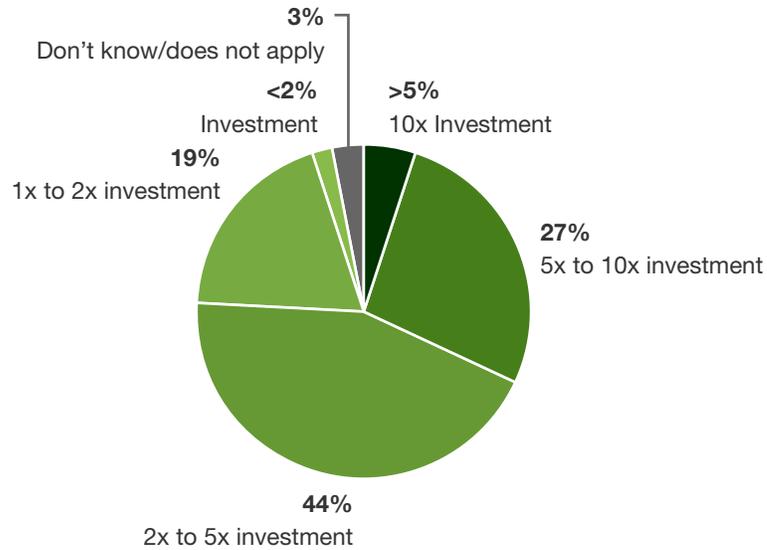


Base: 316 global decision makers responsible for AI, ML analytics, or automation
 Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, August 2019

› **The expected return on AI/ML initiatives justifies further investment.** Firms see AI as a major factor in their competitive differentiation, and they have high expectations for the value their initiatives can deliver. Almost a third of the firms we surveyed expect to see a 5x or greater return on their investment in AI and ML (see Figure 12). High-growth firms are especially bullish on their investments: More than 50% of high-growth firms expect to see at least a 5x ROI on AI and ML.

Figure 12: Almost A Third Of Firms Surveyed Expect 5x Or Greater ROI From Their AI/ML Investments

“Roughly, what is the expected ROI from investment in AI and ML?”



Base: 316 global decision makers responsible for AI, ML analytics, or automation
 Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, August 2019

Key Recommendations

Forrester's in-depth survey of AI and ML decision makers yielded several important recommendations:



Boost your organization's AI and ML expertise. Build your data science teams. But, even more importantly, grow hybrid teams of data engineers, data scientists, ML engineers, developers, and product managers that can rapidly iterate on new AI and ML solutions. Further, cultivate leaders who understand the business and have a working knowledge of AI and ML.



Organize for collaborative success. Align your organization to make best use of your growing AI and ML human capital by building an ML community, setting up (or expanding) a center of excellence, and establishing initiatives and ongoing processes to drive collaboration across teams and cooperation with business and IT stakeholders.



Democratize and accelerate the AI and ML lifecycle with AutoAI. Embrace the new advances in AutoAI that enable users throughout your organization to rapidly develop their own predictive models, regardless of skill level. Support them with training and the option to have their models reviewed by qualified data scientists.



Invest in your ability to operationalize AI and ML at scale. You can't take advantage of AI and ML if you can't get your models into production. Implement platforms with ModelOps capabilities that enable you to take models developed across a wide range of ML tools and frameworks, rapidly deploy them across hybrid environments (on-premises, private cloud, and multiple public clouds), retrain, and redeploy models as part of a continuous improvement process.



Build your AI governance capabilities. Drive trust and reduce risk while also improving business outcomes by investing in solutions for tracking model lineage, monitoring your models for data drift, and declining accuracy, as well as new techniques for providing explainability, bias detection, and mitigation features.

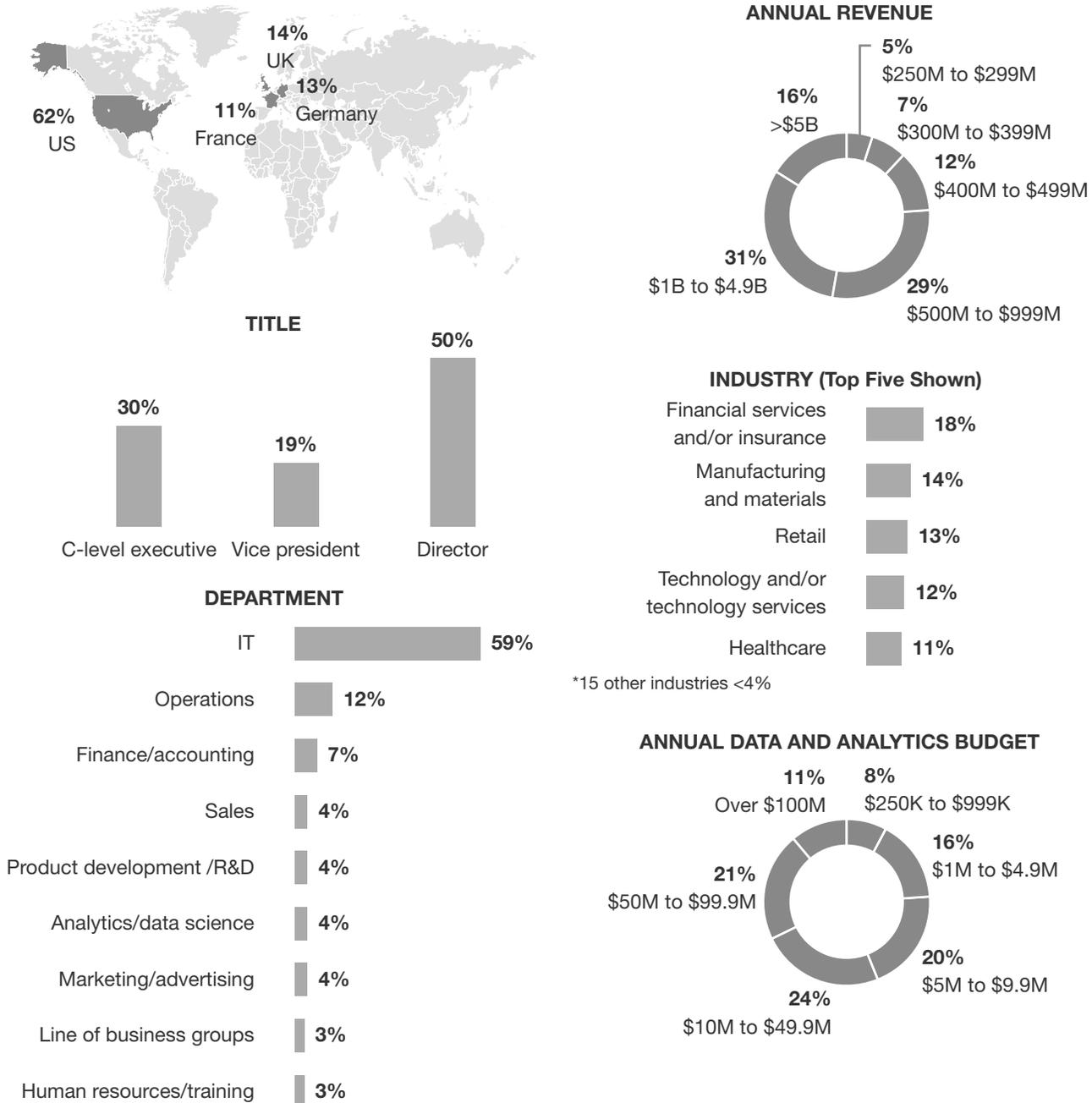


Drive home the business value. Close the insights-to-action gap with decision management, optimization capabilities, and robotic process automation technologies that drive decisions and actions using AI and ML inputs. Leverage the value created by each project to develop a virtuous cycle of business impact, investment in new capabilities, and increasingly transformative AI and ML projects.

Appendix A: Methodology

In this study, Forrester conducted an online survey of 316 firms in the US, the UK, France, and Germany with \$250M or greater annual revenue to evaluate the current state and challenges of artificial intelligence and machine learning. Survey participants included business and IT decision makers responsible for AI, ML analytics, or automation at their organizations. The study was completed in August 2019.

Appendix B: Demographics/Data



Base: 316 global decision makers responsible for AI, ML analytics, or automation
 Note: Percentages may not total 100 because of rounding.
 Source: A commissioned study conducted by Forrester Consulting on behalf of IBM, August 2019

Appendix C: Supplemental Material

RELATED FORRESTER RESEARCH

“Predictions 2020: Artificial Intelligence,” Forrester Research, Inc., October 30, 2019.

“Set Up Your Insights Center Of Excellence In Four Steps,” Forrester Research, Inc., October 15, 2019.

“The Future Of Machine Learning Is Unstoppable,” Forrester Research, Inc., April 25, 2019.

“Evoke Trust With Explainable AI,” Forrester Research, Inc., November 1, 2018.

Appendix D: Endnotes

¹ Full-time equivalent (i.e., the number of full-time employees or equivalent number of full-time and part-time employees)