The CxO guide to accelerating growth at scale with modern AI

Drive breakthrough returns on AI investments in the platform era

Abstract

Disrupters in every industry have set new standards in customer experience, speed-to-market and innovation. The use of artificial intelligence (AI) has reached an inflection point where leading organizations are demonstrating groundbreaking results, reshaping the marketplace and setting themselves apart in their industries. At the heart of AI are strategic enablers: automation, prediction and optimization. Your organization's ability to automate mundane tasks, predict outcomes and optimize your resources is vital to your growth. Indeed, high-growth companies are meeting the business imperatives—creating superior customer experiences, speeding product and service delivery, streamlining operations and capitalizing on the ecosystem—as well as meeting compliance and risk management requirements at scale.

This paper explores:

- Characteristics of AI investments by high-growth leaders
- Why you need a data and AI platform
- What you should look for in a data and AI platform: automation, prediction and optimization
- Benefits of building and scaling AI with trust and transparency

By reading this paper, you will gain insights on how industry leaders are taking advantage of AI, the importance of the platform approach, and the benefits that a data and AI platform offers. Additionally, this guide highlights what actions you can take and explores the strategies that help your business succeed.

The opportunities and challenges of AI

Businesses are using AI to predict business outcomes, streamline operations, improve efficiency, protect against cyberthreats and fraud, and discover new market opportunities. These predictions can help leaders stay ahead of competitors and market fluctuations. Additionally, corporate officials face pressure to meet shareholder expectations while making significant changes to processes, technologies and organizations when implementing AI.

Furthermore, there is board-level scrutiny of data and governance related to AI models. The IBM Institute of Business Value released a C-suite Study[1] titled "Build Your Trust Advantage—Leadership in the era of data and AI everywhere" that revealed that customers' trust in brand names and institutions is quickly eroding. Customers demand transparency of data associated with products and services, and they want assurances that any personal data will be kept safe and used fairly.

"The governance of data and how we govern AI models—how they're validated and used—are now board-level issues. So, too, is the ethical use of data."[1]

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High-growth leaders are winning with AI

According to Forrester Research, high-growth leaders invest heavily in AI. More than 50 percent of respondents to a Forrester survey expect to see a greater than five times return on their investments in AI.[2] To put this in perspective, consider that high-growth leaders who have invested $10 million can expect an ROI of $60 million. Leaders also invest twice the data and analytics budget and 2.5 times more in AI and machine learning (ML) platforms compared to low-growth firms.

Forrester Research also found that firms investing in data scientists with hard-core skills—such as the expertise to build predictive, ML, deep learning, natural language processing (NLP), computer vision and other types of models—are growing faster than firms not making these investments.

For certain AI applications, such as HR, sales lead scoring, or expense management including fraud detection, organizations prefer to purchase packaged AI solutions, according to Forrester.

- 46 percent purchase packaged solutions embedded with AI for certain applications
- 20 percent develop their AI in house

In practice, you need a data and AI platform that make it easy for you to buy, build, or both based on your business needs.

Requirements to look for when evaluating a data and AI platform

Data science, a discipline that helps a business recognize meaningful patterns, predict outcomes and simplify decisions, is a key accelerator in the use of AI. Using new insights, patterns and other valuable discoveries from data can empower your business to anticipate what comes next and simplify decisions. You can optimize actions armed with the right offers and approaches, seeking to achieve the best possible outcomes based on chosen scenarios. This potential is why you need a platform enabling you to put your ideas into action and take advantage of data science progressively.

So, what is a platform? A platform is "an infrastructure that promotes value-creating interactions among participants. The platform provides an open environment for these interactions and sets governance conditions for them."[3] To succeed in modernizing your business with AI, selecting the right platform is a strategic imperative.

Build a foundation for tackling talent, data and trust

Your goal is to turn the process of prediction and optimization into iterative innovation and intelligent workflows. To fulfill this promise and let AI thrive in your operations, your workforce needs simple onboarding to a data and AI platform that can help automate development. What's more, you need to find ways to leverage your existing technology investments with your new platform instead of adding one-off tools.

Talent: Skills and staffing are vital to AI success. As shown in PwC's 2019 AI Predictions, you need an AI-ready workforce. This requires continuous learning initiatives for reskilling and upskilling your talent. Further, as job descriptions change, you must rethink an organizational structure to help train your evolving workforce.[4]

Data: Data is the lifeblood of model performance. AI models are built on data, and having the right production data determines how well a model performs. This setup means that a platform needs to enable access to a continuous flow of data. It should also detect and mitigate the inevitable drift in accuracy as your models encounter production data different from data on which they were trained. And it should provide an auditable record of models and data used throughout the AI lifecycle.

Trust: Your team needs to be able to demonstrate how bias can be detected and mitigated in your AI models and to explain individual outcomes. Your platform should also be able to track outcomes against business KPIs. And it should include embedded trust and explainability, to help you scale and sustain your AI-related efforts.

Integrate AI predictions and optimizations into applications rapidly

A data and AI platform should also support integration of insights from AI models into your modern apps. Most enterprises have already invested heavily in application development. A flexible, open data and AI platform can serve as a foundation for your application development and business teams to build model operations (ModelOps). ModelOps can work seamlessly with DevOps to help increase the success of your modern applications with AI.

Automate AI lifecycle management

Data science and AI investments have traditionally focused on using predictive analytics and ML to answer business questions or automate a small set of processes. However, most leaders are now looking to broaden the use of AI. This perspective means that your platform should be designed to help operationalize and automate the management of models and tools across your business from end to end.

Automation helps your team refocus on high-value activities that take advantage of your core differentiations. Look for a platform that can automate steps such as:

- Data preparation
- Feature engineering
- Selection of machine learning algorithms
- Hyperparameter optimization to choose the best possible ML model

This series of steps should be guided by an AI system that drives towards the most promising step at each stage of the process. This is using AI to build AI, and an example is AutoAI, a capability powered by IBM Research™.[5]

Optimize decisions based on predictive outcomes
Some high-growth leaders are skilled at tackling multiple use cases and improving decision-making with AI. You can combine AI insights and AI orchestration with human talent. To help your business see the highest ROI, a data and AI platform needs to use predictive outcomes and use them to prescribe action.

A modern data and AI platform should facilitate the workflow of selecting and editing data for your team's optimization problem. Using a natural language interface, the platform should enable your team members to run optimization models and create and share reports with Gantt charts, schedules, resource plans, and supply and demand allocations. Having decision optimization as part of the data and AI platform simplifies application of prescriptive analytics to predictive outcomes. This is decision intelligence.[6]

Boost productivity by upskilling and reskilling a workforce with diverse skills and talents
Successful data science teams in high-growth companies are diverse. No one person is likely to be an expert in the multiple fields of AI, including computation, data management, applied math, business use cases, decision science and so on. AI requires teams of people with different skill sets and perspectives to collaborate.

This is why you need a platform that supports both visual and programmatic approaches to model building, using both visual data science tools and open source tooling and programming languages such as Python or R. Additionally, the platform should help visual data scientists rapidly combine text with structured data to reveal hidden patterns and use them for prediction and optimization.

Leverage and bring together your existing big data investments
It's also crucial that a platform bring analytics closer to big data for safer and faster insight at scale. For example, a modern data and AI platform can offer a secure way to access data from and push executions to a Hadoop cluster without moving a large amount of data. This platform can also augment model development and insight generation by leveraging an existing investment in Hadoop, while taking advantage of the distributed computing environment for scale and high availability.

Promote trust and transparency in AI models
Instilling confidence in data and AI models is paramount. To be successful, you need to track and measure outcomes from AI across its lifecycle. You also need the ability to help ensure your models remain fair, explainable and compliant regardless of where they were developed or on what cloud they're running. Your business and regulators demand that you mitigate potential bias and explain outcomes and therefore these capabilities need to be part of a modern data and AI platform.

Provide an ecosystem of open source and best-in-class tools in any cloud
Your team is everywhere, and so is data. To take advantage of the innovation happening around the globe, you need to bring models to wherever your data is. Your data and AI platform must be open and support models and data running on multiple clouds, while benefiting from vibrant ecosystems. Your platform should also enable you to mitigate the cost and risk of needing to move data, which can potentially cause regulatory or legal concerns.

In addition, the platform should also provide the ability to jump-start your AI projects with industry accelerators, and offer prebuilt apps with predefined business terms and data science artifacts.[7]

Mix build and buy options in flexible licensing models
When it comes to technology, a build versus buy decision is often complex. Most high-growth companies are choosing when to buy and build in terms of data science and AI. Your needs can evolve as you progress in your lifecycle. This is why you should be looking for a flexible data and AI platform that can accommodate packaged AI applications as well as supporting enterprise class tooling that blends open source and proprietary technologies.

Put an agile AI practice to work with integrated tooling
To deliver on the promise of data science and AI, your organization needs to implement agile AI. You can draw from best practices learned from hundreds of successful AI implementations.[8]

Reviewing basic technical principles such as these will help you coach other business leaders about AI. After explaining how high-growth companies are using AI, you can emphasize how collaboration can achieve significant productivity gains at the individual and organizational levels. Maintaining and providing senior leadership support to an AI center of excellence (CoE) can help ensure a high return on your AI investment.

Watson Studio Premium for IBM Cloud Pak for Data

Watson™ Studio Premium for IBM Cloud Pak™ for Data helps you accelerate time to value with your AI investments. Watson Studio Premium consists of IBM® Decision Optimization, SPSS® Modeler and Hadoop Execution Engine.

This powerful combination helps an enterprise:

- Simplify decisions based on predictive outcomes as part of the data and AI platform.
- Empower data and analytic professionals everywhere
- Leverage your existing big data investments

The platform uniquely enables organizations to predict and optimize business outcomes in a single, unified environment.

Built on Red Hat® OpenShift® and deployable in just hours, IBM Cloud Pak for Data is easily extendable with a growing array of IBM and third-party microservices. IBM Cloud Pak for Data runs across any cloud, enabling organizations to more easily integrate their analytics and applications to speed innovation. Your enterprise can build and deploy AI and ML models, accelerate data science projects and enable an end-to-end automated lifecycle on this modern AI platform. IBM Cloud Pak for Data fully supports multicloud environments such as Amazon Web Services (AWS), Azure, Google Cloud, IBM Cloud™ and private clouds. AutoAI and Watson OpenScale™ are available as part of the base of IBM Cloud Pak for Data.

Cross-industry AI use cases

Make call centers more efficient with chatbots that can accommodate unpredictable surges in customer calls, emails, SMS and chat messages

Increase cross-selling and upselling with personalized real-time recommendations and offers

Boost loyalty by anticipating customer churn and recommending steps for retention

Optimize offerings by listening to voices of customers and anticipating future needs

Enhance marketing with targeted, personalized campaigns

Minimize inventory costs and improve resource management with accurate forecasting

Improve productivity by allocating the right employees to the right jobs at the right time and creating accurate labor forecasts

Reduce maintenance costs by anticipating faults before they occur

Mitigate risk with accurate customer credit scoring

Detect fraud by identifying suspicious behavior patterns

Unlock new business models by addressing untapped demands and integrating prediction into modern applications

Benefits of building and scaling AI with trust and transparency

You're leading and navigating your organization to AI success. Monetizing AI requires that you invest in the right data and AI platform, one that tackles challenges in data, talent and trust in a way that's transformational. The platform should integrate prediction, automation and optimization as part of your AI implementation. By building and scaling AI with trust and transparency, you can harness the power of AI for the following activities:

- Automating AI lifecycle management
- Advancing decision intelligence using predictive outcomes
- Monitoring model performance
- Promoting collaborative data science on a unified, multicloud data and AI platform

The benefits are substantial. Your organization can outperform peers in revenue and profitability, operational excellence and innovation. You can handle data and models in a way that promotes trust and engages customers and business partners in a differentiated fashion. Also, you can build confidence in data and AI models and use them to elevate experiences for customers and partners along their value chains to accelerate growth.

For more information

Discover how IBM Cloud Pak for Data can transform your business.
See how it works →

Webinar: Winning with AI playbook

Find out how to drive higher returns on your AI investments and what sets leaders apart in this three-part webinar.
Sign up for the webinar →

The ROI of enterprise AI

IBM Vice President and Chief Data Officer Seth Dobrin explains how you can get real ROI by moving from using enterprise AI for exploration and research to making enterprise AI integral to your business.
Watch the video (2:08) →

Business value assessment

Trusted AI solutions that deliver improved action can generate significant business value. The AI business value assessment shows you just how much value you can generate.
Take the assessment →

A product walkthrough

Part of accelerating the value of AI is making sure that your data is of high quality, so you get accurate, automated insights and decisions. IBM Cloud Pak for Data can help. Walk through the product to learn more.
Take the tour →

Appendix: AI use cases by industry

How are high-growth leaders investing in building their own AI models to solve specific business problems at scale? Consider these examples by industry:

Banking

- Assess market and counterparty risk on trades
- Assess credit risk for loan applications
- Detect fraudulent transactions in real time
- Accelerate loan approval and customer service while controlling risk with rapid credit risk assessments

Insurance

- Detect fraudulent claims
- Optimize quotes and premiums by assessing relevant risks for each applicant
- Predict hazardous weather events to reduce auto insurance claims

Energy and utilities

- Manage vast networks of physical assets
- Forecast production and demand patterns
- Predict outages before they happen
- Plan for supply and demand
- Streamline the process of optimizing supply and demand

Government

- Detect benefit fraud
- Predict usage patterns for public services
- Optimize waste management and traffic flows

Manufacturing

- Keep production lines running smoothly by modeling product quality and detecting defects
- Optimize warehouse management and logistics
- Develop sensors for autonomous vehicles by using ML models
- Optimize supply chain operations

Retail

- Manage customer loyalty programs
- Boost cross-selling and upselling by making targeted recommendations based on customer profiles and sophisticated propensity models
- Enable accurate demand forecasting

Food

- Automate data collection and analysis on food health
- Predict and warn of potential health outbreaks to enable rapid intervention
- Protect sensitive data, making it safe for competitors to collaborate

Healthcare

- Monitor streams of data from ECGs and other medical devices
- Predict when a patient's condition may change
- Conduct medical research
- Analyze streams of patient data in real time

Media and entertainment

- Deliver faster and deeper insight into TV audiences
- Accelerate insight into richer and more complex sets of audience data
- Enable fast, easy scaling as demand changes with flexible resources
- Focus on business enablement rather than technology or operations

Education

- Predict student achievement and retention
- Identify students who need extra support to reach their goals
- Strengthen donor relationships
- Track student movements to help reduce absenteeism

Computer services

- Deliver instant insight into a company's working practices
- Achieve unprecedented efficiency with robotic process automation (RPA)
- Help employees focus on strategic activities
- Improve customer satisfaction by creating better support experience based on customer behavioral prediction and churn models

Glossary

Algorithms are sets of rules that define a sequence of operations that can be applied to data to solve a particular problem.

Artificial intelligence (AI) is the ability of computer systems to interpret and learn from data. The term is most commonly used to describe systems built using machine learning or deep learning models. AI techniques can be used to enable computers to solve a wide range of problems that were previously considered intractable.

Bias is a common issue when designing, training and testing models that can lead to inaccurate predictions. Mitigating bias by monitoring and auditing models during runtime is an increasingly important topic as businesses seek to adopt AI more widely.

Classification models aim to put data points into categories by comparing them with a set of data points that have already been categorized. The result is a discrete value, meaning one of a limited list of options, rather than a score. For example, a classification model can give a yes or no answer on whether customers are likely to make a purchase or if they're a bad credit risk.

Content analytics is the analysis of unstructured data in documents of various formats, including text, images, audio and video files. Machine learning techniques can greatly accelerate analyzing large repositories of content that would previously have required workers hundreds or thousands of hours to review and classify.

Data science is a wide-ranging discipline that unifies aspects of statistics, data analysis and machine learning to harness data to solve business problems. It helps recognize new patterns, build predictions and optimize decisions.

Decision optimization uses advanced mathematical and artificial intelligence techniques to solve decision-making problems that involve millions of decision variables, business constraints and trade-offs.

Deep learning is a branch of machine learning that uses neural networks with large numbers of hidden layers. These highly sophisticated networks are used in cutting-edge fields of deep learning such as computer vision, machine translation and speech recognition.

Deployment is the process of integrating a model into your business applications and running that model against real-world data. Making and moving the model through test, staging and production environments requires collaboration between your data science, application developers and IT operations teams.

Predictive modeling involves the use of traditional statistical techniques or machine learning algorithms to create and refine models by training and testing them against your data sets. The development process is highly iterative; you may need to train dozens or even hundreds of models to achieve the level of accuracy you require.

Explainability provides context for each decision, making AI models transparent and auditable. It's an important attribute of any system that uses predictive models to make recommendations and assist business decision-making. A predictive model that is seen as complex and mysterious will not win the trust of business stakeholders, regulators and customers.

Exploration of data is an important part of the model-building process. This activity aims to reveal interesting features in a given data set, uncover hidden relationships, and highlight use cases where predictive modeling could deliver business value.

Geospatial analytics is the analysis of geographic data such as latitude and longitude, postal codes and addresses. This analysis is extremely useful for solving many kinds of practical data science problems. A modern data science platform should make it easy to detect, parse and calculate geospatial information, and offer easy integration with mapping tools to visualize the results.

Inference in artificial intelligence applies logical rules to the knowledge base to draw conclusions in the presence of uncertainty. With inference, users get a prediction that's simplified, compressed and optimized for runtime performance.

Linear regression is a statistical process that uses one independent variable to explain or predict a value or score. Examples include the number of SKUs of a product sold in a given week or the percentage risk of a customer closing their account.

Logistic regression is a statistical process used in predicting outcomes. The process differs from linear regression in that the one independent variable has only a limited number of possible values rather than infinite possibilities. Users employ logistic regression when the response falls into categories such as a numeric order like first, second, third and so on.

Machine learning (ML) uses statistical techniques to derive sophisticated predictive models and algorithms from large data sets, without requiring explicit programming. Typically, you start this iterative process by dividing a data set into two subsets for training and testing. You train your models against the training set and test their performance against the testing set with dozens or hundreds of variations to assess their predictions' accuracy. By running this process and basing the next generation of variations on the best performers from each iteration, the model gradually learns and improves performance.

Management of models is vital to ensure that they remain accurate over time. Retraining models regularly to take new data into account is critical, so model development, implementation, deployment and management should form a continuous cycle.

ModelOps, or model operations, is a function that integrates and deploys an AI model into application development to augment DevOps and application development lifecycles. A model to operationalize can be an ML model, decision optimization model or data transformation model—it's not limited to traditional ML models and it can consist of a variety of models.

Natural language processing (NLP) is a field of AI that focuses primarily on enabling computers to analyze unstructured textual data. Common use cases include speech recognition, natural language understanding and sentiment analysis.

Neural networks provide a framework for training models that enables complex interaction between many machine learning algorithms to help identify optimal models. The structure of interconnecting neurons in the brains of humans and other animals inspired the structure of artificial neural networks. Layers connect the artificial neurons. Data traverses the structure from the input layer through one or more hidden layers to the output layer. During this traversal, mathematical functions transform the data into a prediction whose accuracy you can assess.

Open source software has become an increasingly dominant paradigm in many areas of statistical modeling and machine learning. Languages like R, Python and Scala, big data architectures such as Apache Hadoop and Spark, and machine learning frameworks like TensorFlow and Spark MLlib, are all major players in the world of predictive analytics and data science.

Predictive analytics uses historical data to model a specific domain or problem and isolate the key factors that have driven specific outcomes in the past. Models built using this process predict likely future outcomes from new data. Predictive analytics can encompass a wide range of techniques, from classical statistical modeling to machine learning algorithms.

Predictive models are algorithms that map an input, meaning a piece of data, such as a database record, text sample or image, to an output or prediction. Outputs are typically either continuous variables, such as a number or percentage, or discrete categories, such as “yes” or “no.” There are two major types of predictive models: regression models and classification models.

Preparation of data is one of the first steps in the data science process. Most projects start by refining data sets to ensure that the quality is high enough to bear the weight of detailed analysis. In many cases, your source data may need to be cleaned and transformed into a format that’s more amenable to modeling and analysis. If you’re building a machine learning model, you may also need to invest in manually labeling the data for use in supervised learning.

Regression models are useful when you have a data set with multiple variables and want to analyze the relationship between them. Specifically, regression models can reveal how one specific variable is likely to change when other variables are altered. Linear regression can be used to predict a value or score. Examples include how many of stock-keeping units (SKUs) of a product will be sold in a given week or the percentage risk of a customer closing their account.

Statistical modeling is a domain of mathematics that involves the creation of models based on probabilistic assumptions about a set of data. Businesses have used statistical models to analyze important features of their data sets and identify correlations that can be used to classify data or generate predictions.

Supervised learning is a method of training a machine learning model using a data set where the data has already been correctly labeled. The model produces an output variable—typically a category or a value—so its accuracy can easily be assessed by comparing the output to the labeled input. Linear regression, random forests and support vector machines are all popular examples of supervised learning algorithms, and most predictive models are built using these techniques.

Testing predictive models is essential for determining the accuracy of data in AI processes along with training. Predictive models need to be tested continuously to improve accuracy. If a model fails, analysts must identify the root cause and retrain and test to improve the models.

Text analytics measures unstructured content using linguistic rules, natural language processing and machine learning. This process reviews data with approaches similar to the human brain, but at a faster rate. With text analytics, you obtain more insights and discoveries from unstructured content, which makes up approximately 90 percent of all data.

Training predictive models is a key element of machine learning, deep learning and other AI processes to determine which data is useful. A model trained to give accurate predictions can be used to score real-time data. Models must be retrained periodically to adjust for changing behavior patterns.

Unsupervised learning is a method of training machine learning models with unlabeled data. A frequent objective is to model and highlight interesting patterns or structures within the data. Clustering and association problems are common domains for unstructured learning—for example, finding interesting new ways to segment customers or identify similarities between them.

Visualization is the process of representing data graphically, often using charts and diagrams. To understand data, humans need to be able to visualize it. This process is important both when presenting your results to business stakeholders and when exploring a new data set during the early stages of a project.

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