Harvard Business Review

REPORT FROM HBR LIVE EVENT SERIES

Putting Artificial Intelligence to Work

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Few topics are of greater interest to senior business executives than the potential impact of artificial intelligence (AI). Articles about AI generate great interest among Harvard Business Review readers, who want to know about the current state of AI adoption and how companies are generating value from AI.

With this in mind, HBR—in conjunction with SAS and Intel—conducted a series of discussions about the status and impact of AI. Sessions were held in New York City, Boston, Dallas, San Francisco, Washington DC, Atlanta, Seattle, and Chicago.

At each session Michael Chui, a partner at the McKinsey Global Institute, shared research findings from McKinsey on the state of AI adoption, discussed how companies are realizing value from AI, described challenges organizations face in implementing AI at scale, and offered observations on leading practices. Practitioners and session participants added their experiences and perspectives.

Key themes from these discussions are summarized below.

Context for AI

While people talk about artificial intelligence as if it is a mysterious new thing, AI is far from new. The term "artificial intelligence" was first used over 50 years ago and SAS publicly discussed AI at user conferences going back to the 1980s.

From SAS's perspective, the buzz about AI is attributable to two factors coming together:

1. **Data.** Data is the raw material for AI. In recent years the volume, variety, and complexity of data has exploded. Now, with billions of devices connected to the Internet, the amount of data being produced will continue to accelerate.

2. **Compute power.** At the same time that the amount of data has grown exponentially, so too has the compute power to process this data. Compute power makes possible the building blocks of AI, which are machine learning, deep learning, and neural networks.

In recent years, data and compute power have resulted in AI systems that have matched—and at times exceeded—human performance. Just two examples of AI applications are self-driving cars and faster, more accurate medical diagnoses. AI is making possible a new era of machine-assisted decision making.

> "We agree with those who realize that AI is a transformative force."
> —Tamara Dull, SAS

Key Themes

While AI isn't new, interest in AI at the C-level is.

Among technologists the idea of artificial intelligence has been discussed for decades, yet AI was not a C-suite topic. An ongoing joke was that AI stood for "almost implementable," since it always seemed to be technology that didn't yet work.

But AI technologies have evolved dramatically over time. Digital natives such as Amazon and Google have used AI technologies to create tremendous value, strengthen their market position, and create competitive advantage. Companies like SAS are now embedding AI into all of their technologies.

As AI capabilities have grown and as AI now figures more prominently into peoples' lives, the interest in and hype surrounding AI has reached a fever pitch. Articles about AI appear in the mainstream press on almost a daily basis.

And AI is now on the agenda in many C-suites. CEOs and other executives want to know:

- How will AI affect my industry and company?

- How can we use AI to create value and competitive advantage?

- How will AI affect the workforce?

- Where should we invest in AI and what are best practices for AI-related activities?

> "Executives are realizing that AI is a real thing. They are asking, 'How am I going to make this work? How are we going to use AI to increase productivity and efficiency, and to create new products and services to impact the bottom line?'"
>
> —Angelia Herrin, *Harvard Business Review*

In many instances business leaders fear that "others are ahead of us." While this may be true in some industries, McKinsey's research found that only about 1% of companies are currently using artificial intelligence at scale. Those early adopters tend to be digital companies, built with a foundation of AI.

However, seeing the urgent need to gain AI-related experience, McKinsey found that more than 50% of companies are "doing something" related to AI, which typically consists of pilots. But in general, most AI pilots do not move the needle on company performance, as companies have a difficult time taking successful pilots to scale. The result is that many companies are doing pilots to show some type of activity but are in "pilot purgatory."

> "The opportunity is so huge, but we are very, very early."
>
> —Michael Chui, McKinsey Global Institute

In the near term, deriving value from AI will come from improving performance of existing use cases.

To determine how companies are creating value from AI, McKinsey looked at over 400 use cases that use AI, across different sectors and functional areas. McKinsey's conclusion was the majority of value being created by AI at this time comes from improving the performance of existing use cases.

For example, if a company already creates value through marketing and sales, AI can be used to further improve the company's marketing and sales performance. For consumer-facing companies, AI can improve the marketing mix, enhance customer segmentation, and automatically generate effective recommendations for "next product to buy."

Likewise, for companies that derive value through operations or through their supply chain, AI can be leveraged to further improve operational effectiveness and supply chain performance.

> "The ways that AI will drive value creation are in how your company already creates value."
>
> —Michael Chui, McKinsey Global Institute

McKinsey also found that when applying AI to the core business, the hardest part of realizing value is changing processes, practices, and behaviors.

Widespread adoption of AI requires overcoming many challenges, which will take years.

Many people have fear that AI will drive a "robot job apocalypse." McKinsey's research suggests this is not an immediate concern because adoption will take time and multiple challenges must be overcome.

- **Significant AI-based job automation won't occur for decades.** McKinsey estimates that across all occupations, employees spend about 50% of their time on tasks and activities that could potentially be automated using technologies that already exist today. However, in most cases, those technologies have not been integrated into products or services; doing so could take decades. That's because even if an AI technology exists, investing in and broadly adopting that technology requires a compelling business case, which is often lacking.

  Further, even when a positive business case exists, there is still a natural technology adoption curve. In general, the time between the commercial availability of a new technology and the full adoption of that technology can take decades. McKinsey predicts that a significant number of jobs won't be automated due to AI until 2055.

- **Training AI systems requires enormous amounts of labor and data.** Machine learning doesn't just happen on its own, as systems don't train themselves. A huge army of labor is needed to manually label information and train AI systems. In addition, large amounts of data are required to train these systems.

"You don't program these systems, you train them."
—Michael Chui, McKinsey Global Institute

- **Technological work is needed to make AI systems explainable.** Even after systems are trained, they are "black boxes." But regulators don't like black boxes and may ask questions such as, "Why did the car decide to turn right in that instance, instead of hitting the brakes and going straight?" It is essential to be able to explain the decisions and actions driven by AI.

- **Bias challenges must be addressed.** At times an AI system yields a result that appears to have introduced bias in some way. It is not the programmer or the algorithm that has bias; it is typically the data that has a latent bias. However, for AI systems to be used and accepted, bias must be understood and eliminated.

Importantly, while many people fear job loss from AI, McKinsey believes that productivity gains from AI are actually needed to drive future economic growth. When looking at the top 20 economies over the past 50 years, economic growth averaged about 3.5%. About 50% of economic growth was due to increases in productivity, with the other 50% attributable to more people in the workforce.

However, as the population ages in many countries, their workforces are declining in size. Countries simply aren't adding enough workers to drive future economic growth at historic rates. Therefore, future economic growth must come from further advances in productivity and from mass redeployments of existing workers. Redeployment and reskilling of existing workers is a massive challenge that societies must confront. Today, for example, America spends huge amounts educating kids but spends very little reeducating adults.

"We don't yet know how to retrain people for the rest of their lives. I think that is one of the challenges that we have to figure out."
—Michael Chui, McKinsey Global Institute

Thus, in McKinsey's view, AI is not the societal threat that many imagine; in light of looming demographic challenges, AI along with redeployment of workers is a necessity to drive future economic growth.

Organizations leading the way with AI demonstrate many common practices.

While it is too early in the adoption of AI to identify best practices, companies leading the way often demonstrate similar "next practices." These include:

- **Executive leadership.** It is hard to move the needle on AI unless senior management is driving it. The executive team must make a strategic commitment to AI and data analytics.

- **Infrastructure.** For companies to have success with AI they need a modern digital infrastructure. This "digital backbone" must be accompanied by a data strategy and by policies around data governance.

- **Talent.** Organizations need AI and data science talent, which is in short supply. In addition to experts, companies also need "translators" who work with the technology and data experts as well as the business to make AI a practical reality.

   In many organizations there is a center of excellence with AI/analytics experts, along with efforts to federate analytical capabilities throughout the business.

"There is value to have a center of excellence, but the more you can federate this capability into the business, into functions, the more you can change things at the front line."

—Michael Chui, McKinsey Global Institute

Other Comments from Discussions

Competitive dynamics drive adoption. Often, adoption of AI by a company or an industry will be based on the competitive landscape rather than the industry's characteristics. For example, a retailer competing against a digital native firm that uses AI will feel greater pressure than a company with no competitors that are leveraging AI.

- **Combine multiple data sources.** There is value to organizations in pulling in data from multiple sources, including internal data as well as external data.

- **Combatting HiPPO.** Decisions in organizations have often been made based on "HiPPO"—the highest paid person's opinion. But data-driven organizations have a different culture and a different dialogue; decisions are driven by data, analysis, and conversations that reflect everyone's perspective, without regard to level or position.

- **Blended teams.** Due to the shortage of analytical talent, it is often difficult to find one person who has all of the skills that an organization desires. An alternative is to form blended teams composed of people with different skills.

- **AI in health care.** Two areas in health care where AI has the potential to deliver major benefits are: 1) predictive health care; and 2) fraud prevention. People often wait until they are sick to visit a doctor. But many conditions have markers that flag when an episode may occur. It is possible to train systems to predict when certain conditions like diabetes may occur. With fraud prevention, AI can be applied to spot fraudulent claims and can help expedite claims processing.

- **Advice for executives.** At one session Michael Chui was asked for his thoughts on what both senior and junior executives can do to succeed in an AI environment.

ADVICE FOR SENIOR EXECUTIVES	ADVICE FOR JUNIOR EXECUTIVES
• Develop a basic working knowledge of AI and analytics	• Learn details about AI and analytics
• Get the talent you need	• Learn about change so you can influence others
• Drive change	• Actively manage your own career

The recent McKinsey report which found that broad leadership support is essential for AI transformation to be successful is right on target. Time and time again, technological advances seem to only take root and become transformative when they create value by solving business problems or realizing opportunities, and AI is no different.

With all the hype surrounding AI, figuring out how AI can be applied in practical and reliable solutions can be challenging. The key is to focus on ensuring that the strategy around it feeds into your larger business strategy, always taking into account the convergence of people, process and technology.

People. First and foremost, humans are the most important resource an organization has. You must invest in data scientists who have skills focused around machine learning to build your applications; systems engineers who ensure the appropriate infrastructure is in place to support those applications; solution architects who oversee enterprise implementation; and business advisers who understand unique factors within the data and the business value that will be derived from the application.

Process. Consider what organizational (and possibly cultural) changes will have to be made within your business. There must be cohesion between developers and IT to ensure that models are able to be put into production in a timely manner. There are expectations within both groups that must be clearly defined and agreed upon. A great deep learning model has no value if it cannot be put into production. And, you need lots of rich data. You must identify what data you want to analyze, what factors must be captured in your data collection and the method you will use to bring that data into your AI system. Make sure that users understand the expectations of working with output from the AI applications, and create a simple process for capturing input so the solution can be tailored for more accuracy and increased relevance to meet each business need.

Technology. Finally, technology can seem the simplest part of a strategy only because barriers to adoption and implementation often sit within people and processes. Our view is that a single analytics platform that enables the full lifecycle from data to discovery and deployment offers the most advantages. And ongoing innovation and value creation from AI deployments are maximized when they are part of a trusted, scalable and flexible data and analytics ecosystem.

Advances in machine learning have allowed us to create computers that can see, hear and speak to us in a very human way. Indeed, computers can learn, understand and make assessments about the world based on information we provide to them. But we have evolved beyond telling these machines what to do with our data. Now, machines can learn from patterns and anomalies they find in data on their own – in essence fulfilling the promise of AI. A computer's strength comes from its ability to reliably, efficiently and accurately analyze large volumes of data without fatigue. Yet it still requires humans to take those insights and determine what role they will play in a larger strategy that accomplishes our identified objectives.

And that's precisely how AI could boost your top and bottom line — by pairing the respective strengths of machines and the humans that run them to solve real business problems and realize the opportunities before us.

To read more about AI, please visit www.sas.com/ai, for more on the SAS Platform, please visit www.sas.com/platform.