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ANALYTIC SERVICES

Briefing Paper

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Driving Tangible Value for Business

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DOUG MERRITT
PRESIDENT AND CEO
SPLUNK

Charting a path forward with AI is an exercise in embracing and adapting to the complexity of an evolving world. Understandably, the term itself, artificial intelligence (AI), is often overused, mostly misunderstood, and often left largely unexplained to even the most technical and business-savvy. To simplify, AI is one of the latest attempts to help organizations find patterns in the chaos and randomness of their natural environments, allowing them to quickly get to meaningful business outcomes.

To get to those results, we can take a lesson from the physical world. A world that is constantly evolving, filled with endless experiments and surprising outcomes. It's no different in the digital universe. However, lacking the time lag of genetic experimentation, the digital world is facing change thousands, perhaps millions, of times faster.

Interestingly, the history of technology has predominantly focused on attempting to apply structure, hierarchy, and order to chaos. The obvious challenges in attempting to "manage chaos" coincide with the increased speed and complexity of the digital world and the increasing volumes of nonorderly data most companies create and want value from. In addition, there is the constant introduction of new data sources. We've reached the point where it is impossible to utilize systems that started with an "ordered universe" design architecture.

Instead, companies that will thrive in this digital revolution will leverage technology that originated with a design orientation that expects and honors the chaos, the randomness, the experimentation and change that are the reality of our physical and digital worlds. Increasingly, the job of our systems will not be to apply false structure to the chaos underneath, but instead to make it easy to find patterns in the sea of constant experiments—to leverage raw, unmanipulated data, no matter its origin or location.

Leveraging artificial intelligence and machine learning for business outcomes isn't about applying AI to the stagnant data lakes many companies have been amassing over time. It's not about robots taking over the world. AI today is a transition that focuses on the constant interrogation of messy, random, chaotic, and nonordered data to get immediate answers and drive automated responses to shift business outcomes.

Companies that want to get the most from artificial intelligence must also choose tools that are accessible to all types of users—business users as well as data scientists. Tools with guided assistants and intuitive configuration enable business leaders as well as technical IT and security teams to unlock the full value of AI. And for companies that have begun staffing with data scientists or other data experts, providing flexibility that goes beyond prebuilt configuration means they'll have the tools they need to fine-tune data sets when necessary.

At Splunk, our mission is to empower everyone to deliver meaningful business outcomes, no matter where the data lies or what type of person needs the answer. We're embedding artificial intelligence into the heart of our platform with a machine learning toolkit for custom use cases spanning all organizational requirements, as well as premium solutions for an out-of-the-box AI experience for IT, IoT, and security scenarios.

We've associated with Harvard Business Review Analytic Services to help you stay informed as you chart your own course forward through this evolving age of new technologies and shifting workplaces.

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Driving Tangible Value for Business

Interest in AI/ML is soaring, but confusion and hype can mask the real benefits of these technologies. Organizations need to identify use cases that will produce value for them, especially in the areas of enhancing processes, detecting anomalies and enabling predictive analytics.

HIGHLIGHTS

- Nearly half of the companies in a recent survey said they are exploring machine learning use cases, and more than a third are at the pilot or production stage.
- The benefits of AI and ML include increased flexibility, speed, scale, personalization, and improved decision making.
- Organizations are reaping the rewards of AI and ML, in business functions such as customer service, product innovation, and internal IT operations.

Long the subject of debate—not to mention sci-fi movies—artificial intelligence (AI) is finally beginning to deliver real value for organizations. Many in the business world concur with MIT professors Erik Brynjolfsson and Andrew McAfee, who argue that AI has become a "general-purpose" technology, as significant as electricity or the internal combustion engine, and will power the next wave of economic growth.[1]

Virtually every organization in every industry will see its operating model and core processes transformed by some form of AI, the umbrella term for technologies that aim to imitate intelligent human behavior. One of these technologies—machine learning—is particularly in the spotlight, accounting for 60% of all investments made in AI-focused companies, according to McKinsey.[2] Deloitte Global predicts that among large and medium-size enterprises, the number of implementations and pilot projects using ML will double this year compared with 2017, and will double again by 2020.[3] ML involves the use of self-learning algorithms that, fed with data, progressively improve performance on a specific task—such as diagnosing disease, recognizing a cybersecurity threat, predicting an IT systems outage, or detecting fraud—without having to be explicitly programmed to solve this task.

The shift from conceptual to concrete use of machine learning is already underway. Nearly half of the companies that participated in a 2017 Harvard Business Review Analytic Services survey said they are exploring ML use cases, with more than one-third already at the pilot or production stage. FIGURE 1

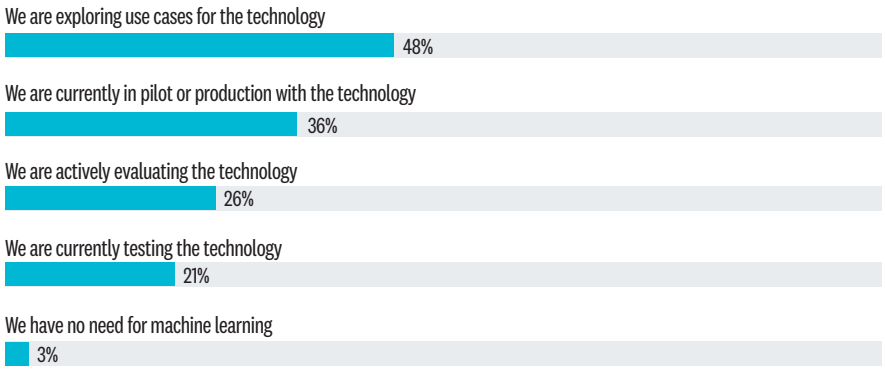
While executives have bought into the importance of AI and ML, this doesn't mean they're entirely clear on where to apply it, or what the benefits will be. Hype levels—and expectations—are high. A sizable 60% of respondents in the poll agreed that the future of their organization depended on the successful implementation of machine learning. And *Harvard Business Review* authors Thomas Davenport and Rajeev Ronanki recently noted that three-quarters of respondents to a Deloitte Analytics survey said they expected their use of AI to substantially transform their company in three years.[4]

THE SHIFT FROM CONCEPTUAL TO CONCRETE USE OF MACHINE LEARNING IS ALREADY UNDERWAY.

FIGURE 1

AI/ML: AN ORGANIZATIONAL REALITY

In what stage is your organization in terms of investigating and/or implementing machine learning? [MULTIPLE RESPONSES PERMITTED]



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, APRIL 2017

Tangible Business Benefits: Coming into Focus

Whether AI/ML can live up to these lofty expectations depends on whether organizational leaders learning more about where the technology is best applied and the real value that can be obtained.

AI/ML goes far beyond simply automating processes. FIGURE 2 According to *Harvard Business Review* authors H. James Wilson and Paul R. Daugherty, "companies that deploy [cognitive technologies] mainly to displace employees will see only short-term productivity gains."[5] The most significant performance improvements occur, they say, when humans and machines work together.

Consider that because AI/ML can quickly pore through vast volumes of data, these systems can enable organizations to more quickly and accurately do the following:

- **Detect anomalies.** ML-powered systems can detect a deviation from past or forecasted behaviors. For example, information security systems with ML capabilities can help distinguish which data patterns indicate real threats that must be addressed amid a sea of mostly benign alerts.
- **Enable predictive analytics.** ML-driven systems analyze historic and current data and behaviors, and predict events and trends to inform a proactive response, such as preventing adverse events or anticipating customer intent. For instance, a retailer's system can point to customers who recently returned three of their last four purchases, indicating a high likelihood of defection. This gives the organization an opportunity to do damage control by sending the customer an attractive order or asking for more feedback.
- **Find meaning in high volumes of data.** ML-equipped network monitoring systems can correlate events and segment data to identify situations and fix those that could jeopardize network performance—before an outage occurs.

It takes human workers to turn these capabilities into tangible value by applying them to the most relevant operational areas. Through its client experiences, for example, Accenture has defined five characteristics of processes that organizations typically want to improve. As described by Wilson and Daugherty, it's up to each organization "to determine which of these characteristics is central to the desired transformation, how intelligent collaboration could be harnessed to address it, and what alignments and trade-offs with other process characteristics will be necessary."[6]

It takes **human workers** to turn these capabilities into **tangible value** by applying them to the most relevant operational areas.

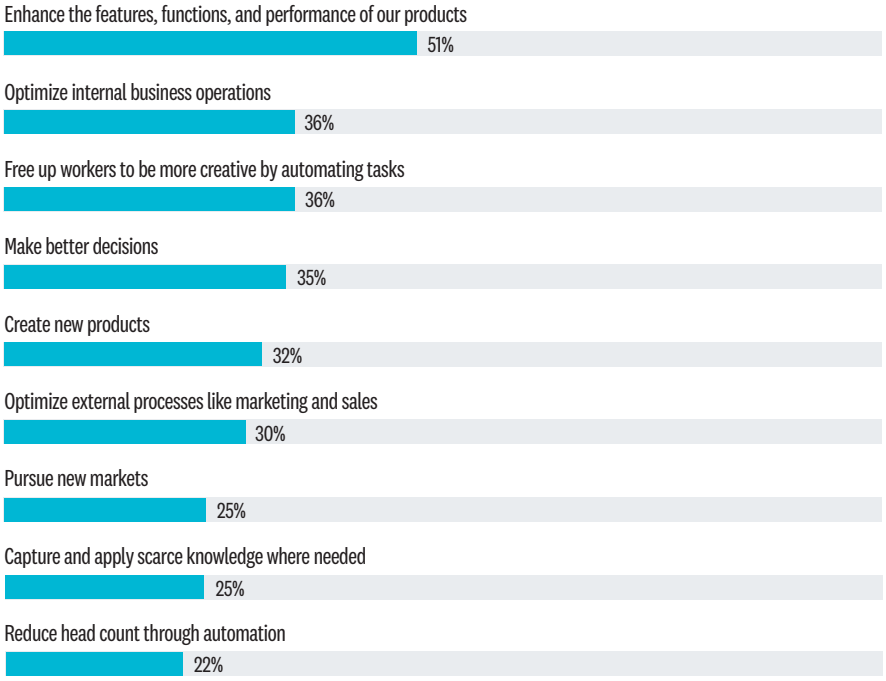
Here's how organizations could apply AI/ML to improve these five characteristics:

- **Flexibility:** Human workers can team with AI/ML-powered systems to customize products in real time, or quickly configure new product design concepts based on changing parameters, such as materials, cost, and performance requirements.
- **Speed:** AI/ML systems can execute tasks far more quickly than humans, such as vetting a consumer credit application in microseconds, enabling on-the-spot decisions.
- **Scale:** AI/ML-powered systems can streamline tasks that would require an army of humans to perform.
- **Decision making:** By producing insights, guidance, and tailored information in the exact moment this input is needed, AI/ML systems can help organizations make more impactful decisions.
- **Personalization:** AI/ML can comb through reams of customer data to unearth preferences that can be used to create relevant and personal customer experiences.

FIGURE 2

THE BENEFITS OF AI/ML

Percentage of executives who cite the following as benefits of AI technologies, including machine learning



SOURCE: THE DELOITTE STATE OF COGNITIVE SURVEY, AUGUST 2017

AI/ML GOES FAR BEYOND SIMPLY AUTOMATING PROCESSES.

“BUT YOU MUST ALSO HAVE THE RIGHT DATA—LOTS OF UNBIASED DATA, OVER THE ENTIRE RANGE OF INPUTS FOR WHICH ONE AIMS TO DEVELOP THE PREDICTIVE MODEL.”

THOMAS C. REDMAN

AI/ML Challenges

Before these benefits can be achieved, however, organizations need to overcome multiple challenges in their implementation of AI/ML. Poor data quality is arguably the biggest nemesis of AI/ML and all advanced analytics applications. In an HBR article, consultant Thomas C. Redman warns that the pitfalls of bad data are more ominous with ML than other types of analytics, because there are two opportunities for error: one when the data is used for training purposes and another when the data is used to inform decisions.

"First, the data must be right: It must be correct, properly labeled, de-deduped, and so forth," Redman explains. "But you must also have the right data—lots of unbiased data, over the entire range of inputs for which one aims to develop the predictive model."[7]

However, many ML challenges reside on the human side. FIGURE 3 Some ML systems require highly skilled data scientists to program and train the system to yield insights. Yet due to the demand for these highly sought-after professionals, they can be difficult to hire and retain, which can significantly impede organizations' use of ML.

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Real-world AI/ML Implementations

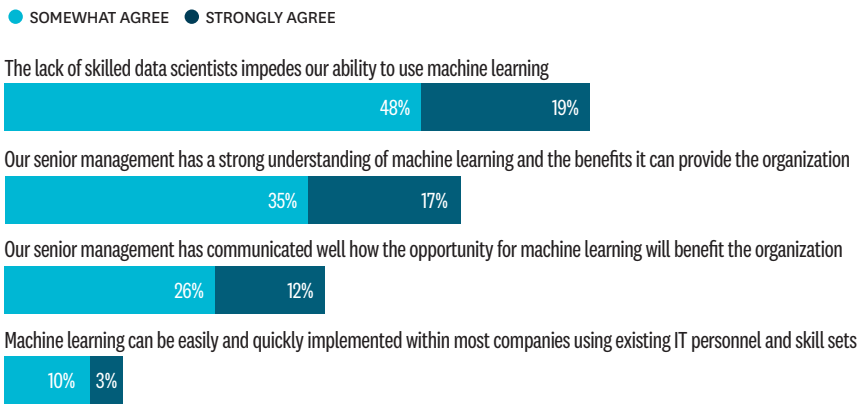
Organizations of all types and sizes are reaping the rewards of AI and ML, across many functional areas of the business, such as:

- **Customer service/customer experience.** A global hospitality company needed a centralized solution to monitor and surface server issues and improve network reliability. Since deploying ML, the company has not only improved the reliability of its network to the benefit of internal users, but it has also greatly improved its hotel guests' experience by providing better Wi-Fi uptime—a significant aspect of their stay.
- **Product/service innovation.** A large university embarked on an ML and analytics initiative to troubleshoot and manage the operational efficiency of its IT networks. With the success of that project, the university has now expanded its use of ML to identify at-risk students, using data from its learning management system (LMS). Being able to provide personalized feedback and earlier intervention to struggling students helps the university rapidly improve their performance—an unexpected but welcome boost to learner experience.

FIGURE 3

BARRIERS TO ADOPTION

Respondents rated their level of agreement with each of the following statements



SOURCE: HARVARD BUSINESS REVIEW ANALYTIC SERVICES SURVEY, APRIL 2017

AI/ML projects that **enhance organizational processes** were more likely to be successful than highly ambitious "moonshot" endeavors, according to Davenport.

- **Internal IT operations that directly support customer- and employee-facing functions.** A global financial technology company helps businesses reduce risk while also helping consumers manage their credit, personal information, and identity. Since adopting ML, the company's IT department has improved network service-level agreements. In addition, it can get to the root cause of incidents more quickly. Better performance for internal users has also resulted in higher customer satisfaction.

AI/ML: Where to Begin

With all the hype and high expectations surrounding AI/ML, many organizations are unsure of where to begin. No matter where organizations are on the AI/ML maturity curve, four considerations will ensure they are on a path to success:

- **Starting small is better.** In a Deloitte Analytics study, "low-hanging fruit" AI/ML projects that enhance organizational processes were more likely to be successful than highly ambitious "moonshot" endeavors, according to Davenport.[8] While this finding is consistent with many new technology initiatives, Davenport points out, it's easy for organizations to be seduced by the hype surrounding AI. Process automation projects (such as automatically updating customer files with address changes) are good starting choices because they are the least expensive and easiest to implement, as opposed to more advanced cognitive applications that use algorithms to review and interpret vast volumes of data.

  According to Accenture analysts Wilson and Daugherty, a like first target could be "a balky internal process, [such as employee recruitment], or it could be a previously intractable problem that can now be addressed using AI, such as quickly identifying adverse drug reactions across patient populations." It's essential to work with stakeholders to discover exactly where AI would be most effective, according to Accenture.[9]

- **Humans will not be eclipsed by machines.** AI and related tools come with baggage—fear of job displacement, mistrust in AI/ML-generated insights—but a consensus is emerging that AI will complement, rather than replace, humans. Arguably, humans will retain the most important role, according to Brynjolfsson and McAfee, which is to ask the questions for the machines to answer.

  "Computers are devices for answering questions, not for posing them. That means entrepreneurs, innovators, scientists, creators, and other kinds of people who figure out what problem or opportunity to tackle next, or what new territory to explore, will continue to be essential," they say.[10]

  Much unpleasant repetitive work has already been offloaded to computers, freeing people up for more challenging tasks.

- **Consider what skills you'll need.** AI/ML capabilities should be customizable to meet the organization's specific needs, and the tools and technologies should be usable by a wide range of professionals rather than just by data scientists. The demand for these professionals is rising precipitously, as are their salary demands. In a recent study, jobs specifying ML skills pay an average of $114,000.[11] Few organizations will be in a position to hire individuals with the most technical analytics expertise.

  A new class of AI/ML tools is now available that so-called citizen data scientists who do not have specialized training can use, enabling organizations to get the most out of them without a heavy investment in skills.

- **Bolster the capabilities of the data center.** And don't forget to use AI/ML in the data center. A robust IT infrastructure is a prerequisite for AI/ML success throughout the rest of the organization. Data science/AI advisor Monica Rogati suggests thinking of AI as the top of a pyramid of needs. At the bottom of the pyramid is data collection, and the next level up is ensuring a steady data flow via reliable networks, storage, and technology infrastructure. Only when these elements are in place can organizations move up the pyramid to data cleansing/preparation, analytics, experimentation with simple ML algorithms, and—finally—full-fledged AI.[12]

  Already many IT departments use ML to optimize IT operations, including anomaly/threat detection and systems/network monitoring/self-healing. If users can't get to the data in real time, then the technology loses a lot of value.

While the exact shape of the AI/ML-enabled future is not yet clear, these technologies are here to stay. The most agile organizations will experiment with AI and ML and learn as they go. As artificial intelligence and its progeny take hold, staying on the sidelines will no longer be an option. As Brynjolfsson and McAfee sum it up: "Over the next decade, AI won't replace managers, but managers who use AI will replace those who don't."[13]

A CONSENSUS IS EMERGING THAT AI WILL COMPLEMENT, RATHER THAN REPLACE, HUMANS.

ENDNOTES

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CONTACT US

hbranalyticservices@hbr.org

MC210360918