

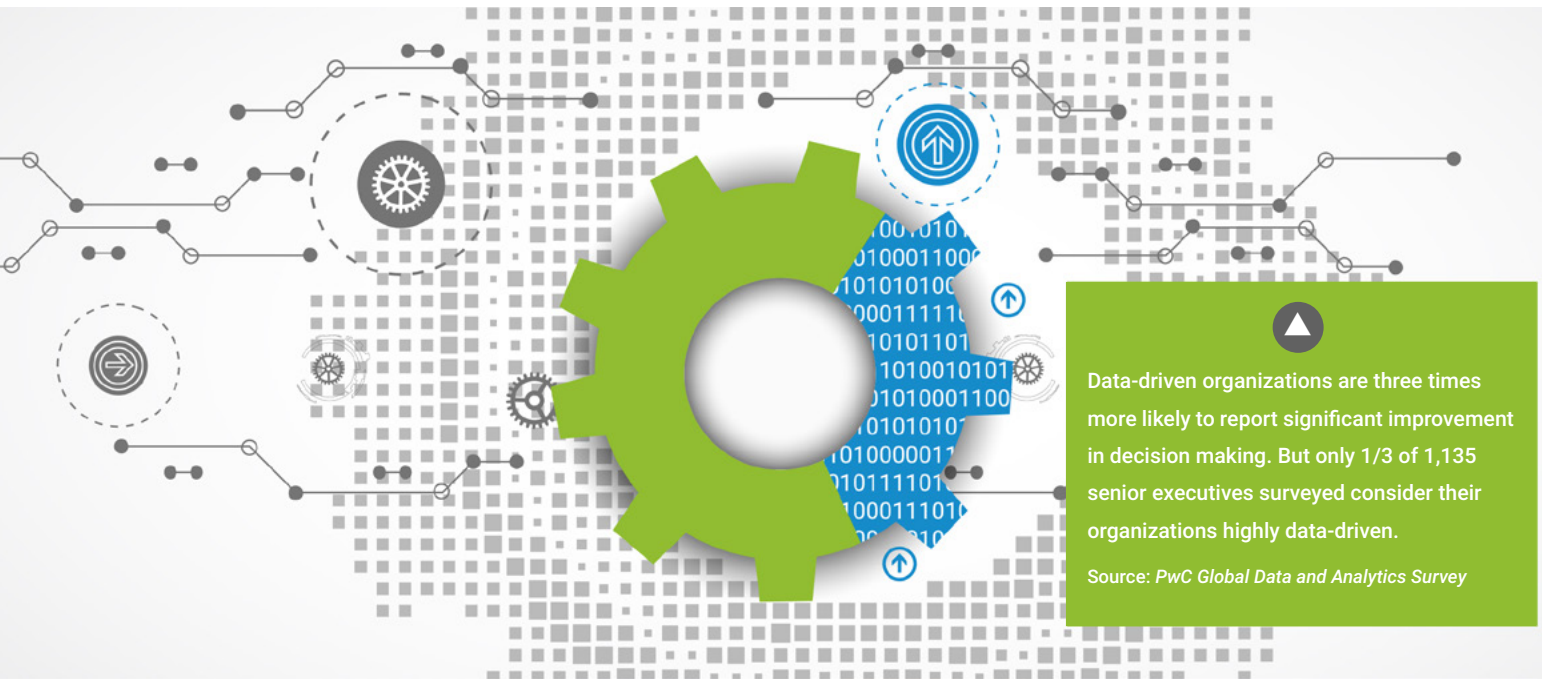
How Analytics and Machine Learning Help Organizations Reap Competitive Advantage



“We make data,” says Pawan Divakarla, data and analytics business leader for Progressive, the 79-year-old insurance giant. “Data is really the bread and butter for us. It’s all we do.”

In fact, Progressive views its data as a genuine asset. “It’s not a person or a thing; it’s virtual bits and bytes,” Divakarla acknowledges. “But we have a reverence for data, and when you think of it that way, you treat it with respect.” That philosophy is reflected in Progressive’s success in gathering, integrating, and securing data, as well as using machine learning to automatically analyze the information and then making crucial business decisions based on the insights it uncovers.

One solid example is the company’s [Snapshot](#) product, a data-gathering device that a customer plugs in to the on-board diagnostic port, typically under a car’s dashboard. As the customer travels, Snapshot captures driving-related data, such as sudden changes in speed and the length of time on the road. Analysis allows Progressive to personalize insurance rates based on the customer’s actual driving patterns, rather than on historical information or demographic factors. The best drivers earn significant discounts for the rest of their policy lives.



▲

Data-driven organizations are three times more likely to report significant improvement in decision making. But only 1/3 of 1,135 senior executives surveyed consider their organizations highly data-driven.

Source: PwC Global Data and Analytics Survey

“Speed to insight—and being able to determine what needs to go to market, and how efficiently we can get it there—allows us to stay nimble.”

—Pawan Divakarla, Data and Analytics Business Leader, Progressive

Key to that effort is Progressive’s ability to identify those patterns anonymously and act on the resulting insights faster than ever before. While Snapshot—which is responsible for collective driver savings exceeding \$500 million—has captured more than 15 billion miles of driving data, Progressive has cut the processing time for such data from one month to just nine hours by using distributed computing and sophisticated analytical tools and software, increasing the speed to insight about pricing. “Auto insurance consumers are very price sensitive, so even small improvements to our pricing models are valuable,” Divakarla notes. “Speed to insight—and being able to determine what needs to go to market, and how efficiently we can get it there—allows us to stay nimble.”

There’s good reason to follow Progressive’s lead. Data-driven organizations are three times more likely to report significant improvement in decision making, according to a [PwC Global Data and Analytics Survey](#), which polled 1,135 executives. Research by MIT’s Center for Digital Business uncovered similar results in interviews with executives at 330 North American businesses. “The more companies characterized themselves as data-driven, the better they performed on objective measures of financial and operational results,” MIT’s Andrew McAfee and Erik Brynjolfsson reported in *Harvard Business Review*. “Companies in the top third of their industry in the use of data-driven decision making were, on average, 5 percent more productive and 6 percent more profitable than their competitors.”

At the same time, 62 percent of executives participating in PwC’s global survey said they still rely more on experience and advice than on data to make business-defining decisions.

If that's the case, then what do analytics leaders—and their data-driven initiatives—need to succeed? Specifically, they need to be able to easily integrate more data sources, harness machine learning and advanced technology for faster, more sophisticated analyses, and extract insights that will improve business performance. Ultimately, they need to make the transition from data to action.



“In an era of big data, the first hurdle is simply collecting, processing, and storing an ever-growing amount of data, and then being able to integrate it.”

—Sagnik Nandy, Distinguished Engineer, Google

Changes and Challenges

Organizations that are already making the leap from data to action are transforming not only their businesses, but also, in some cases, their industries. As just one example, consider the success of Uber, which uses algorithms for real-time monitoring of traffic and trip times to balance demand and supply for ride sourcing—and to adjust fees accordingly.

That kind of transformation is no surprise to researchers like Alex “Sandy” Pentland, MIT’s Toshiba Professor of Media Arts and Sciences. Pentland has said big data’s power resides in the fact that it reflects how humans *behave* rather than what they *believe*. By using analytics and machine learning to analyze the data trail that people constantly create—whether it’s from mobile phone location records, online browsing and purchasing, or credit-card purchases—organizations can obtain more insights (and more valuable insights) to continuously improve the customer experience. In addition, they can do so faster—often without human intervention.

“Traditionally, we have relied on experts to gather these insights from data,” says Sagnik Nandy, distinguished engineer at Google. “A data-driven organization wants this to happen automatically.”

“Machine learning is figuring out all the information you’re not asking about. Once you have that information, you can generate insights even before a question is asked. That can be a huge competitive advantage.”

—Sagnik Nandy, Distinguished Engineer, Google

To achieve that speed to insight, analytics leaders face massive challenges in three areas: accumulation, analysis, and action.

Challenge #1: Accumulation

In an era of big data, the first hurdle is simply collecting, processing, and storing an ever-growing amount of data—and then being able to integrate it. Today, consumers interact with brands and companies across multiple screens, devices, touch points, and channels, and data gets created with each action. “It’s challenging to be in control of your data universe because there’s so much happening,” Nandy says. “There’s application data, customer-survey information, attribution, advertising. There are millions of pieces of data floating around.”

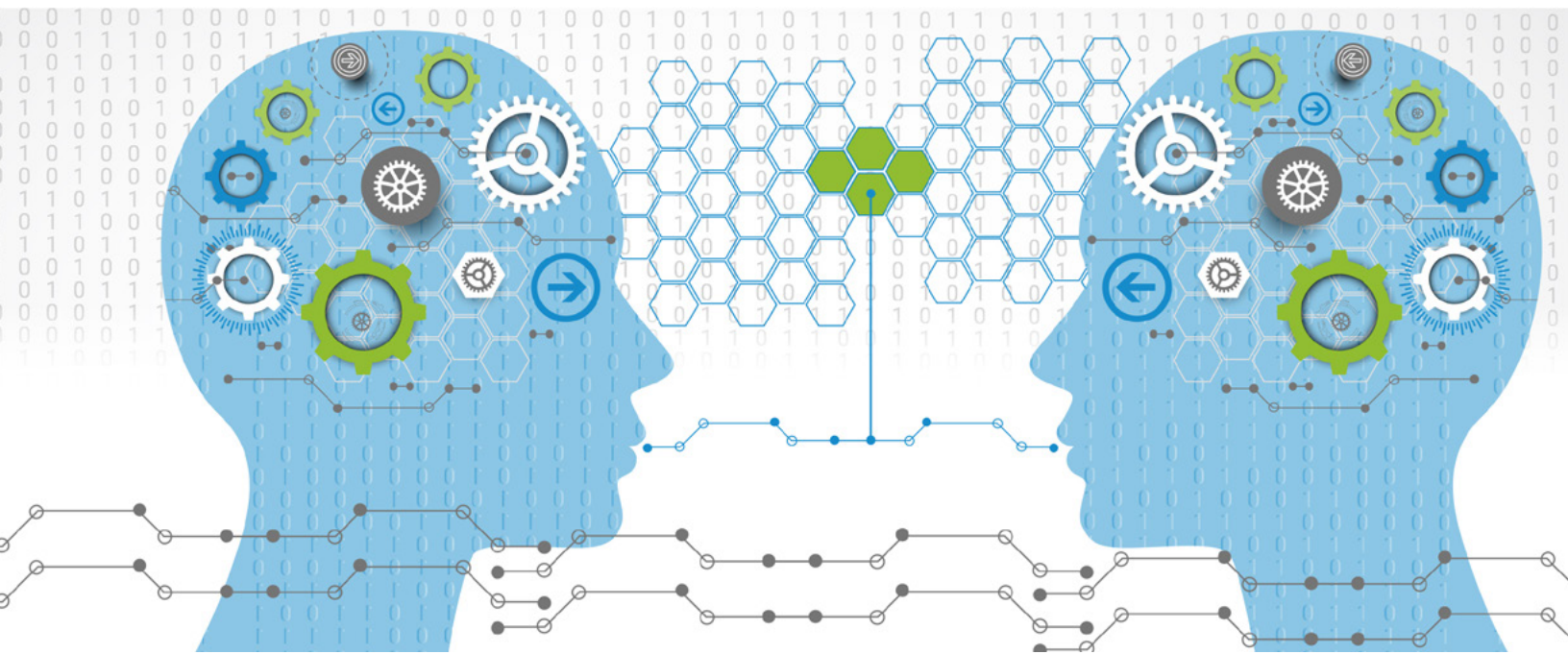
And, of course, more and more of that data is coming from mobile devices. For example, more Google searches are taking place on smartphones than on desktops and laptops globally, according to Google internal data from October 2015. Meanwhile, on the millions of websites that are using Google Analytics, more than half the web traffic comes from smartphones and tablets, according to Google Analytics U.S. data from the first quarter of 2016. Many companies struggle to understand exactly how to manage and integrate mobile data: “People are still thinking of mobile as something different,” Nandy says. “But we’re at the point where mobile is the status quo. From a thought perspective, many people haven’t made that leap yet.”

But the issue isn’t just the *volume* of data; it’s also what Randy Bean, CEO of consulting firm NewVantage Partners, has called “the variety challenge.”

In a recent [MIT Sloan Management Review article](#), Bean defined that challenge as the integration of “more sources of data than ever before—new data, old data, big data, small data, structured data, unstructured data, social media data, behavioral data, and legacy data.” For many global executives, dealing effectively with the variety challenge is their top data-related priority. Forty percent of the executives who participated in the most recent annual [NewVantage Partners Big Data Executive Survey](#) ranked data variety as a top challenge, with volume and velocity lagging well behind.

Progressive’s Divakarla understands the variety challenge all too well. “There’s a lot of data, and it’s coming from many sources,” he says. “It’s being stored in many different places and formats. We’re constantly trying to strive to bring it all together.”

As Progressive and other data-analytics pioneers have also discovered, the good news is that today’s sophisticated technologies offer new ways to integrate and use all that data.



“Ad-hoc queries encourage people to learn. There are very simple questions that a manager who is not a data scientist can ask.”

—Nur Ghani, Vice President of Marketing Analytics and Decision Sciences, Macys.com

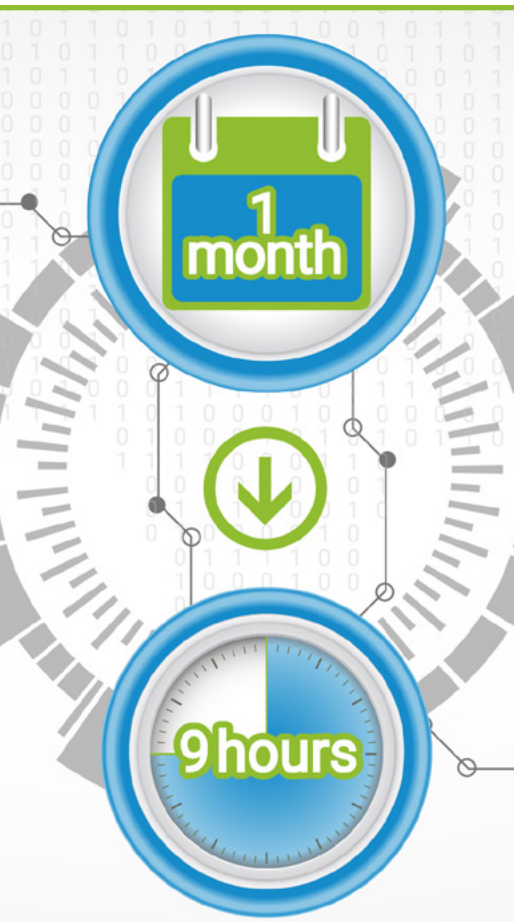
Challenge #2: Analysis

The next question involves how to analyze the information to unearth valuable insights—not just sales figures or numbers of social-media hits, but those true “aha” findings that can drive business decisions.

When Nur Ghani, vice president of marketing analytics and decision science at Macys.com, began working with analytics in the mid-1990s—at a time when the field was still called “data mining”—most of the work was done on personal computers, using smaller data sets and fewer analytical software tools. Today, of course, organizations have not only more data, but more options and tools for analyzing it. Too often, though, organizations are using the wrong tools, or using tools incorrectly, or underutilizing them so that they don’t get anywhere near the full value from them.

The answer, increasingly, involves machine learning, a type of artificial intelligence that lets computers learn without explicit programming. In analysis, the technology uses algorithms that learn from the data, and, in turn, grow and change when exposed to new information, ultimately uncovering those all-important insights.

Google’s Nandy explains how machine learning benefits business teams and analysts alike: “People have very fundamental needs when it comes to analyzing information, and machine learning can help them focus on what really matters,” he says. “For example, if there are no anomalies and nothing needs attention that day, it can save you time. Rather than just reporting information and telling you what’s wrong, machine learning technology can help you fix it.” And what if things are going well? “Machine learning can help you do more of what’s working—and do it automatically,” Nandy says.



By combining distributed computing with sophisticated analytical tools and software, Progressive was able to significantly reduce its data processing time and increase the speed to insight about pricing.

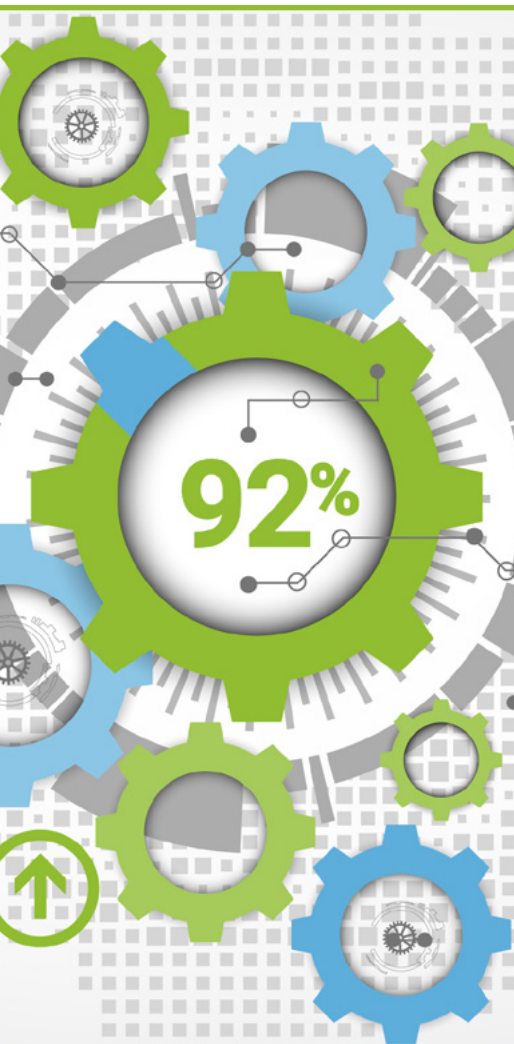
For analytics leaders, that capability provides previously unimaginable benefits. “Traditional analytics has relied on people accessing tools and knowing which questions to ask. But today, everything is changing so fast as businesses evolve, and there’s a lot going on that you might not be able to see,” Nandy says. “Machine learning is figuring out all the information you’re not asking about. Once you have that information, you can generate insights even before a question is asked. That can be a huge competitive advantage.” In fact, within Google, Nandy explains, “machine learning has allowed us to evolve our analytics solutions from serving as a data and query provider to being an insights generator.”

Progressive discovered that type of unintended benefit in being able to faster analyze data and test more hypotheses after implementing its Snapshot product. “We uncovered the fact that, using the 15 billion miles of Snapshot data we collect, we can identify an issue with a customer’s alternator before it becomes a problem,” Divakarla says. “We’re continually trying to shift from reacting to predicting.”

Machine learning can provide valuable context, Nandy says. For example: “Sometimes what you are seeing might not be the full picture, and more interesting insights could be hiding in the data. Let’s say you are looking at a top content report for your website. Based on the report, you might be thinking Web pages A and B get the most views. But what you could be missing is that things might be very different in another country,” he explains. “Imagine if we could tell you that while pages A and B might be doing well in the United States, page C is doing much better in Spain. This not only provides you with insights you didn’t see, it also allows you to optimize your site and layout in different places to maximize engagement.”

Today, data analytics is an art as well as a science, cautions Peter Gloor, research scientist at the MIT Center for Collaborative Intelligence at the MIT Sloan School of Management. “You come up with a prediction algorithm, which for 80 percent of its conclusions, predicts perfectly what you already know,” explains Gloor, also the author of several books about collaborative intelligence. “And then you trust the other 20 percent, even though it initially looks totally out of the blue and wild. In other words, you always try to train it with facts, and then you will get a few surprises—and those are the things that give you insights.”

It’s important to make information more accessible throughout any enterprise, but it’s equally important to recognize that not everyone needs—or even wants—the same level of access.



Percentage of executives reporting that their big-data initiatives have C-level champions.

Source: *NewVantage Partners Big Data Executive Survey*

Challenge #3: Action

Ultimately, the insights gained from analysis matter only if they can be converted into action. That's the metric for success, based on how quickly insights can be surfaced and put into use, driving business decisions and action. Doing that, of course, also requires communicating these insights—and their potential impact—to the business leaders who need to know about them.

In fact, Macys.com's Ghani emphasizes that a related principle should guide all data usage and analysis: "You always have to work with the business." He recommends that analytics officers collaborate with their business partners to define project goals and deliverables and then determine whether and how algorithms and sophisticated analysis can support those efforts.

In addition, it's important to make information more accessible throughout any enterprise, but it's equally important to recognize that not everyone needs—or even wants—the same level of access.

At Progressive, "some data is enterprise data; analysts should have access to it," Divakarla says. Other data is specific to individual business units. How does Progressive provide the right access to the right people? "We have our own big data cluster where we can store disparate data sources. Our analysts can stitch them together to get the insights they're seeking," he explains. "It provides a more cohesive view. It's making enterprise data accessible and useful for many people—and also providing business-unit insights for them."

At Macys.com, data and analytics specialists encourage users of all levels to seek the data they need. "Ad-hoc queries encourage people to learn," says Ghani. "There are very simple questions that a manager who is not a data scientist can ask."

That doesn't mean everyone at Macys.com has access to every type of data. "One of our biggest worries is that if someone is trained to get the data, but not trained to analyze it, that can result in misinformation," Ghani says. So Macy's uses one level for ad-hoc access and one for more advanced data needs.

While the ability to share data is critical for success in the data-to-action journey, another key component is executive support. (At Progressive, for instance, Divakarla notes that the culture of "reverence for data" starts at the very top.) In a recent [McKinsey Global Survey](#), participants ranked senior-management involvement as the factor contributing the most to their success with analytics. Nearly 92 percent of the executives who participated in the recent NewVantage Partners survey reported that their big-data initiatives had C-level champions, including the CEO, the CIO, the COO, the chief marketing officer (CMO), and the chief data officer (CDO). That's hardly surprising, given data's importance to the type of decision making that's likely to impact—or even transform—a business.



Looking Ahead

If there's one phrase that sums up where this is all headed, it's "competitive differentiation." Data-driven organizations that do analytics well will unquestionably have an edge—especially if they hire the right people, select the right tools that increase speed to insight, and work toward being able to forecast the future.

"Talented minds equipped with top analytical tools and software allow us to keep pushing into that all-important frontier of predictive analytics," says Divakarla. "We want to give our customers the most relevant experience for them. It's not personalized to the level of that individual person just yet, but that's coming. Ultimately, we want to see a higher degree of level of personalization and an ability to predict the next set of actions."

Meanwhile, as Nandy notes, machine learning and other sophisticated technologies already use benchmarking to provide insights into what *might* happen down the road. Analytics leaders can conduct experiments to validate what's most likely to occur and then plan accordingly. The bottom line is: today's smartest organizations are using analytics to focus on the future, rather than on the past.

Learn more about [how data insights helped Progressive improve customer experience and business performance](#).

Analytics leaders need solutions that provide a holistic view of the customer journey—one that easily integrates more data sources and speeds analysis—for instance, through [machine learning](#). That way, they can provide the insights needed to drive action across the organization and differentiate from competitors.

About MIT Technology Review Custom

Built on more than 115 years of excellence in technology journalism, MIT Technology Review Custom is the arm of global media company MIT Technology Review that creates and distributes custom content. Our turnkey solutions include everything from writing, editing, and design expertise to multiple options for promotional support. Working closely with clients, our expert custom-editorial staff develops a range of high-quality, relevant content, delivering it to users when and where they want it—in digital, print, online, and in-person experiences. Everything is customized to fit clients' content marketing goals and position them as thought leaders aligned with the authority on technology that matters.

www.technologyreview.com/media

Copyright © MIT Technology Review, 2016. All Rights Reserved

PRODUCED BY

**MIT
Technology
Review**

IN PARTNERSHIP WITH

Google Analytics 360 Suite