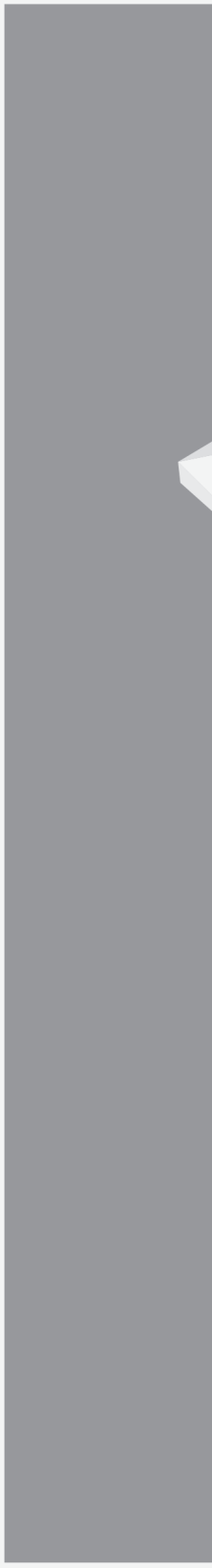
Spotlight

ARTWORK Chad Hagen
Graphic Composition No. 2
2009, digital



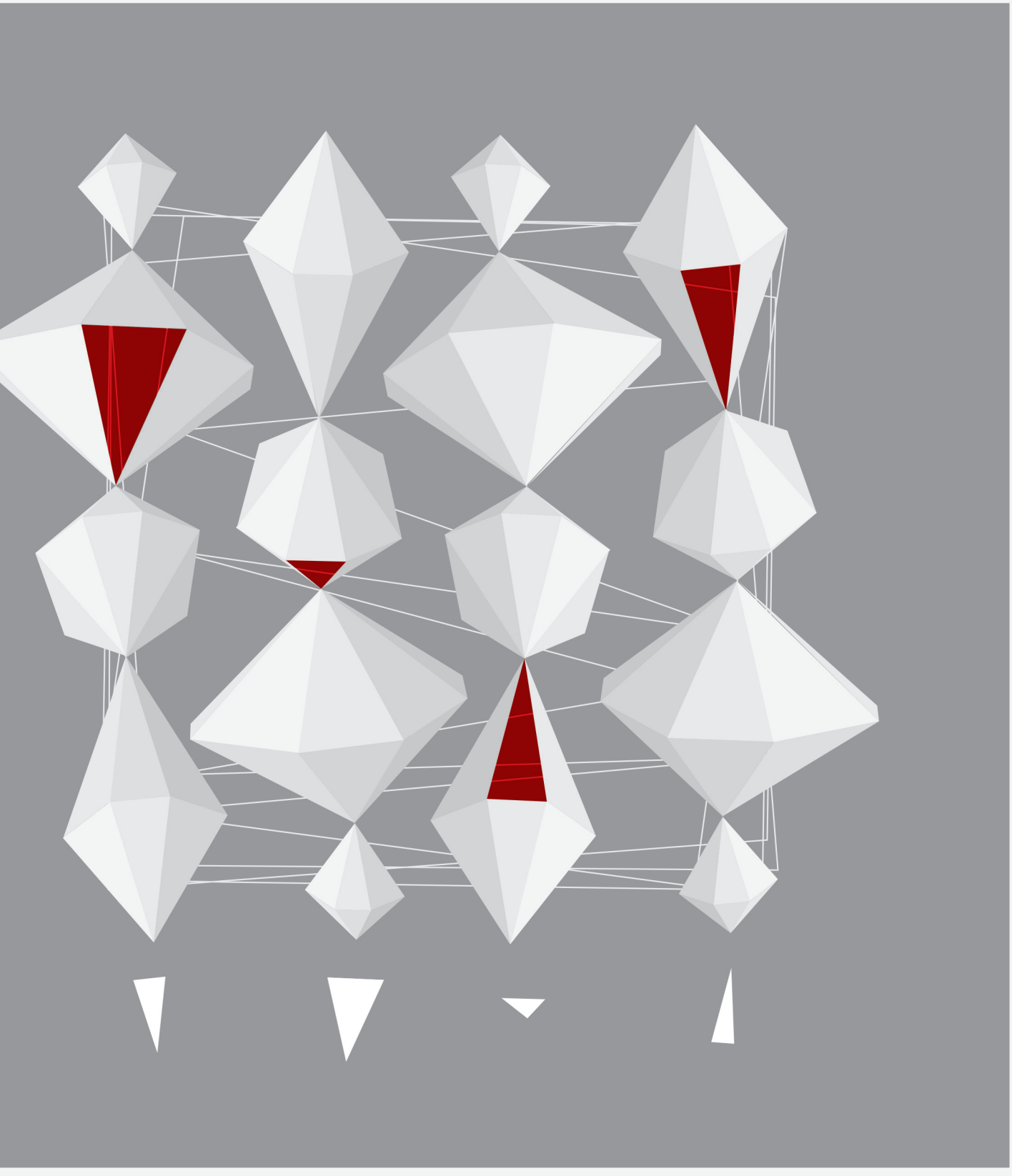
You May Not Need Big Data After All

Learn how lots of little data can inform everyday decision making. *by Jeanne W. Ross, Cynthia M. Beath, and Anne Quaadgras*

Companies are investing like crazy in data scientists, data warehouses, and data analytics software. But many of them don't have much to show for their efforts. It's possible they never will.

What's the problem? To begin with, big data has been hyped so heavily that companies are expecting it to deliver more value than it actually can. In addition, analytics-generated insights can be easy to replicate: A financial services company we studied built a model based on an analysis of big data that identified the best place to locate an ATM, only to learn that consultants had already built similar models for several other banks. Moreover, turning insights from data analytics into competitive advantage requires changes that businesses may be incapable of making. One retailer, for example, learned that it could increase profits substantially by extending the time items were on the floor before and after discounting. But implementing that change would have required a complete redesign of the supply chain, which the retailer was reluctant to undertake.

The biggest reason that investments in big data fail to pay off, though, is that most companies don't do a good job with the information they already have. They don't know how to manage it, analyze it in ways that enhance their understanding, and then make changes in response to new insights.



Companies don't magically develop those competencies just because they've invested in high-end analytics tools. They first need to learn how to use the data already embedded in their core operating systems, much the way people must master arithmetic before they tackle algebra. Until a company learns how to use data and analysis to support its operating decisions, it will not be in a position to benefit from big data. (See the sidebar "Who Benefits from Big Data?")

Over the past three years, we've conducted seven case studies and interviewed executives at 51 companies to understand how companies generate business value from data. We have found that those that consistently use data to guide their decision making are few and far between. The exceptions, companies that have what we call a culture of *evidence-based decision making,* have all seen improvements in their business performance—and they tend to be more profitable than companies that don't have that kind of culture.

The digital economy is all about capturing, analyzing, and using information to serve customers. Most companies can significantly improve their business performance simply by focusing on how operating data can inform day-to-day decision making. So why don't more companies make better use of data and analysis? One reason may be that their management practices haven't caught up with their technology platforms. Companies that installed digital platforms—ERP and CRM systems, real-time data warehouses, and homegrown core information systems—over the past 10 to 15 years have not yet cashed in on the information those platforms make available. In addition, adopting evidence-based decision making is a difficult cultural shift: Work processes must be redefined, data must be scrubbed, and business rules must be established to guide people in their work. The good news is that once companies have made the cultural change, they usually don't go back, and their operating improvements are not easily replicated by competitors.

Our research suggests that companies with a culture of evidence-based decision making ensure that all decision makers have performance data at their fingertips every day. They also follow four practices: They establish one undisputed source of performance data; they give decision makers at all levels near-real-time feedback; they consciously articulate their business rules and regularly update them in response to facts; and they provide high-quality coaching to employees who make decisions on a regular basis.

Before we explore those practices, let's look at a company that has had a culture of evidence-based decision making since its founding.

Empowering Employees to Make Good Decisions

In the 1970s Southland Corporation, known for pioneering the concept of the convenience store chain with its 7-Eleven shops, divested its Japanese stores, and Seven-Eleven Japan was born. Toshifumi Suzuki, the first CEO, decided early on that the key to profitability for the company's tiny stores would be rapid inventory turnover. So he placed responsibility for ordering—the single most important decision in the business—in the hands of the stores' 200,000 mostly part-time salesclerks. Those employees, Suzuki believed, understood their customers and, with good information, could make the best decisions about what would sell quickly.

To support salesclerks' decision making, he sent each store daily sales reports and supplemental information such as weather forecasts. The reports detailed what had sold the previous day, what had sold the previous year on the same date, what had sold the last day the weather was similar, and what was selling in other stores. Because Seven-Eleven Japan carries fresh food, Suzuki arranged for deliveries three times a day so that the clerks could base their orders on immediate needs. And he connected the clerks with suppliers to encourage the development of items that would suit local customers' tastes. The result? Seven-Eleven has been the most profitable retailer in Japan for more than 30 years.

This is not a story about big data, or even about big investments in data. This is a story about a lot of little data. More important, it's about betting your business success on the ability of good people to use good data to make good decisions. Empowering employees in this way, and arming them with the data they need, helps them make better operating decisions on a daily basis. It can also lead to a constant stream of innovation. At Seven-Eleven Japan, approximately 70% of the products on the shelves each year are new, designed by salesclerks in response to customers' preferences.

In contrast, consider the U.S. department store executive who proudly proclaimed that the company's systems alerted corporate managers instantly when a store ran out of yellow sweaters and needed

Idea in Brief

THE PROBLEM
Big-data initiatives are all the rage, but most companies don't see a return on their analytics investments.

THE REASON
Very few companies know how to exploit the data already embedded in their core operating systems.

THE SOLUTION
Evidence-based, data-driven decision making provides the answer, but it requires a big cultural shift and four changes in how operations are managed.

inventory to be shifted from stores that were overstocked. When asked, he acknowledged that his systems could not tell him how many orange sweaters would have sold if the company had carried them. Only his salesclerks would know about orange sweater demand—and he had no formal way of collecting their insights.

The Seven-Eleven Japan approach to generating big value from little data relies on providing transparent information to decision makers and setting clear expectations for how they will use it. That is the essence of evidence-based decision making. You could design a computer model to spit out predictions of what might sell quickly, but the computer would not have data on all the requests that couldn't be fulfilled or insights from casual conversations with customers. There would be far fewer opportunities to identify successful new-product concepts.

Most examples of evidence-based decision making we've seen have been in divisions and functions rather than across companies. That's probably because it's less daunting to improve how data are used in one unit than to do so throughout an organization. Now let's examine the four practices.

Agree on a Single Source of Truth

The exemplary organizations we've studied do not necessarily have a single data repository, but they do insist on using performance data from just one authorized source. When Ron Williams became the head of operations at Aetna, in 2001 (he became president in 2002 and CEO in 2006), he found that all the divisional heads could show him a spreadsheet with performance data indicating that their divisions had been profitable the previous year—even though Aetna as a whole had recorded a loss of almost $300 million! One of his first initiatives was to mandate a single information system that defined the data everyone would use to measure performance. Senior managers saw the data as seriously flawed at first—some revenue and expense items, they believed, were inaccurately calculated or allocated—but even so they got into the habit of focusing on the metrics Williams had designated. As IT and business leaders cleaned up the data, management gained a better understanding of costs and profitability. Soon executives were creating new health plans with more-targeted pricing and working their way back to profitability. In 2005 Aetna recorded profits of $1.6 billion. In 2006, reflecting on his company's success, Williams said, "When you have a pre-agreed set of numbers presented in a uniform way, you can train the company how to think about problems. It gives you the context for making choices."

> The story of Seven-Eleven Japan's success is about betting on the ability of good people to use good data to make good decisions.

Getting everyone to accept the single source of data may require appointing one executive to oversee its management. At Foxtel, Australia's largest provider of pay-TV services, CFO Peter Tonagh (now COO of News Corp Australia, one of Foxtel's parent companies) maintained primary control over the definitions of the data in the company's data warehouse. "There is only one source of truth in this business, and that's what comes out of my team," he says. Tonagh also keeps a lid on reports in order to focus everyone's attention on what matters most. "I don't want people thinking, How many customers have taken multiroom service?" he notes. "I want them to be thinking, How am I going to sell more multiroom services?" Tonagh's approach has led to a

significant decrease in the number of regular reports generated, down to 180 from a high of 600. That in itself has generated cost savings for Foxtel, but the greater benefit has been helping management focus on strategic objectives.

Universal acceptance of one source of truth is the first step in adopting a culture of evidence-based decision making. As both Aetna and Foxtel learned, it's okay if the data are initially flawed, because it takes time for people to learn how to use a single source. But over time, quality matters, so companies will want to initiate processes for improving data capture. Invariably, that means reviewing business processes and identifying where mistakes enter systems. People required to use data will take an active interest in governance processes designed to clarify data definitions and in learning how information flows through the organization.

Use Scorecards

Perhaps the best way to teach people how to use data to create business benefits is to provide them with data about their own performance. Regular scorecards clarify individual accountability and provide consistent feedback so that individuals know how they are doing.

At PepsiAmericas, a $5 billion bottling company (purchased in 2010 by PepsiCo), management instituted scorecards that informed each person of his or her performance the previous day. At one warehouse, management posted the scorecards, ranking each loader's performance on both quantity and quality. Most employees checked their rankings as they started work each day, greeting the results with either fist pumps or groans. The warehouse took on an air of friendly competition, which, coupled with new technology and powerful data, increased the accuracy of the loading process by several percentage points, to 99.8%. This approach also eliminated the need for more checkers in the warehouse.

It's important for scorecards to be based on the right metric. In June 2010, when Tim Whall and his management team took the reins of Protection One, North America's sixth-largest security provider, the company was enduring its fifth consecutive year of declining revenue. To turn the situation around, they set about switching managers' attention from P&L to recurring monthly revenue (RMR), the key metric for assessing a subscription business like theirs. Within months, CIO Don Young began distributing a scorecard every day at about 4:30 AM that reported each branch and regional manager's results in terms of changes in the prior day's RMR. The scorecard guides Whall's decisions about how to spend his time: which managers to call, what to ask, and what help to offer. Now his managers use the scorecard every morning to do the same thing. It takes time to change the entrenched habits of longtime employees, but the new management team has already turned around customer and employee

Who Benefits from Big Data?

Big data is big business. The IT research firm Gartner estimates that total software, social media, and IT services spending related to big data and analytics topped $28 billion worldwide in 2012. All estimates predict rapid growth. In addition to vendors, at least three types of organizations are harvesting value from big data.

Companies with a tradition of fact-based decision making. Procter & Gamble and UPS are exemplars. In the 1920s P&G became the first company to make significant product and advertising decisions on the basis of detailed market research data laboriously gathered during door-to-door conversations with consumers. Today P&G uses computer modeling and simulation to analyze multiple data sources—comments collected from social media, consumer sales data, RFID data, and information from the company's highly digitized processes—and makes fact-based decisions on a daily basis.

UPS started tracking the movements of its vehicles and packages in the 1980s. More recently, the company began using big data from telematics sensors installed in its vehicles together with mapping data and other real-time reports of drop-offs and pickups from its drivers. Using these data, UPS designs routes that, for example, minimize the number of left turns a driver must make to deliver a load. Such changes can generate big payoffs, because they are deployed with more than 100,000 drivers around the world. In 2011, guided by analysis of big data, UPS avoided adding more than 11,000 metric tons of CO_2 to

Perhaps the best way to teach people how to use data to create business benefits is to provide them with data about their own performance.

satisfaction scores while increasing revenue by more than 10% in an industry where 3% or 4% increases are the norm.

The most important characteristic of the scorecard is that it focuses on results that individuals can control; these are not summaries of the company's financial performance or stock price. A targeted scorecard allows the group to identify problems before they show up on the bottom line, and it helps individuals understand how their activities contribute to business success. To be sure, the metrics are more nuanced for employees at higher levels of an organization, where success on one metric (such as customer satisfaction) may come at the expense of another (negotiated price). But individuals with experience using scorecards can learn to adapt to greater ambiguity.

Explicitly Manage Your Business Rules

Little data can have a big effect on performance when managers use the data (about customers, products, transactions, and so on) to continually assess and improve the business rules that govern their operations. Business rules are the mechanism for specifying what actions should be taken in a given circumstance. They may be broad ("Do whatever it takes to make the customer happy") or quite granular ("Accept returns from customers only if they bring a receipt and the receipt shows that they purchased the item in the past 30 days").

Ideally, business rules align the actions of operational decision makers with the strategic objectives of the company. But that happens only when relevant individuals understand the rules and management regularly adjusts them in response to new information.

Companies with a culture of evidence-based decision making see to it that business rules are continually assessed and improved by articulating them clearly and ensuring consistency across the company. Consider Citrix Systems, a $2.1 billion technology firm that has 250,000 customers in 100 countries. Most of Citrix's customers are served directly by one of the company's 10,000 business partners. Citrix has traditionally offered its best partners discounts on Citrix products to encourage and

---

the atmosphere and saved $30 million in fuel costs.

Engineering and research functions. Many engineering-based companies rely on analysis of big data to make critical operating decisions. For example, as long ago as the 1960s ExxonMobil invented 3-D seismic technology, which revolutionized how the oil and gas industry decided where to drill. Collecting and processing 3-D images of geologic formations beneath the earth's surface provided more and better data for those decisions. Today the company's scientists and engineers use 4-D analysis (which shows changes in a field over time) to further reduce the costs and risks of exploration. Researchers at pharmaceutical and biotech companies are also using big data and powerful processing to help drive business decisions.

The best web-native companies. Companies that connect with customers solely via the internet can capture enormous amounts of data about customer behavior. This is the perfect big-data opportunity for making fact-based decisions. One technique, which has become almost a governing ethos for Google, Amazon, Netflix, and eBay, is A/B testing, in which some users are diverted to a slightly different version of a web page, which is presenting a new idea or product. The behavior of those users (B) is then compared with that of users on the existing page (A), and the results are often subjected to sophisticated statistical analysis. This technique transforms much product-development decision making from a subjective to an objective exercise. Product designers are often shocked to learn how bad their instincts and rules of thumb are. In a neat twist, Google and Amazon are now providing tools that will help other companies follow the same approach.

Business Rules Are Running Your Company, and You Don't Even Know It

Most companies have thousands of business rules, and as those companies become more complex, they generate more rules. It used to be that employees had to learn all the rules in order to execute their jobs. Their ongoing experience would lead to questions, which would lead to reassessment of the rules. But companies today manage the proliferation of rules by automating them in ERP and CRM systems. The upside is that the rules are consistently executed; the downside is that they can become outdated or misaligned, and only very proactive employees will notice. For example, one insurance company automated business rules for processing claims related to stolen automobiles. The process involved reimbursing the policyholder after the car had been gone for 30 days. After many years, as the company was implementing a new system, a thoughtful analyst reviewed this rule. He found that in some parts of the United States, cars that have been missing for 24 hours are almost never recovered—they are driven out of the country and sold. His analysis led to a change: Policyholders in those parts of the country are now compensated 24 hours after the theft is reported.

Rules embedded in enterprise systems basically run some companies. Two benefits of automating business rules are easier analysis and more opportunities to test and learn. But companies won't achieve those benefits unless they make two changes. First, they must specify who is responsible for a given set of rules and has the authority to change them. If no one is in charge, it's that much easier to forget rules once they've been implemented. Second, they need to introduce rules engines, which separate the rules from the enterprise software in which they're embedded. As a result, managing and changing rules no longer requires IT expertise and so is easier and less expensive.

reward their loyalty. But company executives found wide variation in managers' discounting practices and increasingly observed negative impacts on revenue. So Citrix established a new companywide set of business rules that award rebates on the basis of how many Citrix product certifications (which attest to the ability to service a product) the partner firm's employees have collectively earned. Management anticipated that these rules would optimize revenue and, by encouraging partners to earn product certifications, improve partners' capabilities.

Having instituted new business rules, Citrix can analyze their impact. If results aren't as anticipated, the company can change its rules again. That kind of analysis doesn't involve the massive processing associated with big data, nor does it engage data scientists in sophisticated statistical modeling. Instead, it involves ordinary managers' close monitoring of changes in key indicators. That is how a company uses its little data to improve performance.

Business rules become complex as they become more granular: An airline's elite customers can check a bag free of charge; other customers must pay. Some tickets are refundable; others are not. Companies address the complexity of their business rules by embedding many of them in software. For example, an airline passenger's elite status is stored electronically so that the system will calculate the accurate baggage fee. Retailers can store customers' purchase data so that computers can check whether a given return qualifies for a refund.

Embedding business rules in software—automating them—frees people from routine decisions, allowing them to focus on activities that demand individual discretion. Citrix automated its partner certification rules so that the partners are not required to track eligibility for rebates. The system does the tracking and grants the rebates. It even has a built-in grace period for partners that temporarily fall below thresholds for rebates. Automating business rules also permits increasing granularity, because systems can deal with more details than people can. It tends to be easier to test the effects of changes in automated business rules than in rules that are not

Analyzing the impact of business rules doesn't involve the massive processing or the statistical modeling associated with big data.

automated. (For more on the upside and the downside of automation, see the sidebar "Business Rules Are Running Your Company, and You Don't Even Know It.")

Use Coaching to Improve Performance

It might seem that a combination of well-defined expectations, performance data, and clearly articulated business rules would be sufficient to help people make evidence-based decisions on a daily basis. Not so! The secret sauce is continual coaching aimed at improving the performance of every individual. In fact, as far as we can tell from the companies we've studied, there is no point in addressing the first three requirements if you don't commit to coaching. It's not enough to tell people what the new rules or goals are. You have to help them shift from basing their decisions on instinct to basing them on data. With customer-facing employees, this often involves helping them realize the importance of their own behavior—teaching them that they can, for example, do more to improve customer satisfaction by watching to make sure the customer uses the product correctly and listening to what the customer has to say than by demonstrating how to use the product.

At Seven-Eleven Japan, counselors visit each of the company's 16,000 stores twice a week, helping salesclerks learn to use data effectively. The counselors compare each individual's hypotheses about what would sell during the prior week and what actually sold. They then discuss how that individual might improve his or her performance in the coming week. Counselor is a full-time position to which high-performing salesclerks can be promoted.

At Protection One, rather than creating a new role, senior executives decided that coaching should become the primary responsibility of all managers. Some managers caught on quickly; others took much longer. From the beginning, the CEO has coached senior executives tirelessly, explaining and re-explaining why RMR is important, what each manager's RMR-component responsibilities are, how to read and understand scorecards, and, crucially, what an executive can do today to improve performance by month's end. Whall also models data-driven behavior. If he hears a complaint about something, he says, "Let's look at the data." The company's leaders are focused on developing the coaching skills of first-level supervisors—such as branch managers, sales managers, and call center managers—who directly affect many people's lives but typically have little experience in motivating and teaching others. Whall has mandated monthly conversations between the managers and each of their reports. The objective of these conversations is to identify how each employee can address gaps between goals and outcomes and how the manager can help.

DO YOU HAVE AN EVIDENCE-BASED CULTURE?

Do you rely on a single source for performance data?

Do operational decision makers have clear business rules?

Do you create and revise business rules on the basis of business analytics?

Do you give operational decision makers the information they need to do their jobs?

Do individuals receive daily feedback on their performance?

Do employees openly discuss risks and work together to reduce them?

Is there a digitized platform that supports the enterprise's key business processes?

Is there a data dictionary or other data asset specifying enterprise master data, transaction data, and historical data?

Have business leaders accepted ownership of key data?

Do findings from post-implementation reviews inform future projects?

Are key stakeholders engaged in major projects throughout their life cycles?

A Gradual Shift

In a culture of evidence-based decision making, people who perform routine work suddenly find themselves more responsible for outcomes than for the number of hours they put in. Many people need to acquire coaching skills, which will lead to new and different relationships. In most organizations it will not be possible to overlay this new culture on existing structures, roles, and processes. The change will be a disruptive one.

The temptation may be to treat this cultural shift like any other major business change initiative, starting at the top by defining and communicating goals, establishing metrics, assigning accountability, and training people. But we've found that it is best to begin more modestly. Although Aetna was able to start near the top of the company, many business leaders would be wise to aim lower. Pick important repetitive work that includes some discretion and some application of rules—service work is a good example. Imagine how that work would be performed if people had clear business rules and metrics, along with all the data they needed to make good decisions. Then assign coaches to those employees and coach the coaches. These early efforts may reveal misguided business rules, low-quality data, and dysfunctional metrics.

Over time, the culture can spread to many, maybe even most, roles. Much of the hype around big data focuses on getting more information and more people to analyze it. But the opportunity presented by the information economy is best tapped by getting *all* people to use data more effectively. That may seem like an expensive and risky endeavor. But it's actually a cheap and powerful way of taking advantage of all the big—and little—data you are accumulating.

HBR Reprint R1312F

Jeanne W. Ross is the director of and a principal research scientist at the Center for Information Systems Research (CISR) at MIT Sloan School of Management. **Cynthia M. Beath** is a professor emeritus at the University of Texas at Austin. **Anne Quaadgras** is a research scientist at CISR.