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David Kiron and Rebecca Shockley

Creating Business Value with Analytics

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A proprietary information system helped make Carmax the largest specialty retailer of used cars in the U.S. and the fastest retailer in U.S. history to $1 billion in revenues.

Creating Business Value with Analytics

Our new survey suggests that companies experienced in analytics use are increasingly gaining competitive advantage — but their approaches vary.

BY DAVID KIRON AND REBECCA SHOCKLEY

SEVERAL PROMINENT technology companies recently predicted that a zettabyte of data will soon be racing about the Internet.[1]

This raises several important questions, including, just what is a zettabyte? The answer: a nearly unfathomable quantity of data, roughly equivalent to the information contained in 100 million Libraries of Congress.

The next big data measure after zettabyte is a yottabyte. It is not named after a Star Wars character. Describing the size of a yottabyte makes you sound like a 5-year-old: "You know, it's a thousand trillion billion bytes…" It would take billions of years to download a yottabyte file at current high-speed broadband speeds.

If Internet traffic continues to grow at current rates, we will likely approach the yottabyte milestone before the end of this century.[2] At that point or, more likely, long before, we will have to invent some new words for what comes next. The International Organization for Standardization and the

THE LEADING QUESTION

What kinds of organizations are gaining a competitive advantage from analytics, and how?

FINDINGS

- **There is a widening gap between organizations that are gaining advantage.**
- **Management support for analytics, including sponsors and top-down mandates, is critical.**
- **Data-oriented cultures have three key characteristics that can be developed and refined.**

International Electrotechnical Commission — the official name givers for this sort of thing — have no words for chunks of data that large.

It is no small problem when words fail to capture the world's immensity. When old concepts fail to keep up with change, traditions and past experience become inadequate guides for what to do next. When the normal ties between what is known and what is wise, between knowledge and practical wisdom tease apart, a gap emerges and the routes to wisdom shift.

For managers, the pressure is on to find new approaches to their portion of the zettabyte — to develop new data-oriented management systems that make sense of the enormous amount of data their organizations are generating. The increasing trend toward the use of analytics in business is driven by the need — and the ability — to use data to create not just business value but also competitive advantage.

One sign of this trend? This year, 58% of the more than 4,500 respondents to a survey conducted by *MIT Sloan Management Review*, in partnership with the IBM Institute for Business Value, said their companies were gaining competitive value from analytics — up from just 37% who said that last year. (See "About the Research" and "Analytics as a Source of Competitive Advantage.") However, this gain comes entirely from those companies that already use data analytics for more than financial forecasting, budgeting and supply chain management — the baseline for analytics use in today's organizations. Companies that are still focused only on baseline uses of analytics are falling behind.

Using categories we developed in the first year of our survey, we categorized this year's survey respondents' organizations into three levels of reported analytics prowess: Aspirationals, Experienced and Transformed.[3] Aspirational companies are basic analytics users; they typically rely on analytics for financial and supply chain management and primarily use spreadsheets and structured, siloed data that support targeted activities. In addition to these basic uses, Experienced companies rely on analytics to guide strategy as well as day-to-day activities in marketing and operations. This group also has experience with analytic tools, such as data visualization and advanced modeling techniques and, in some organizations, data integration efforts are underway. Transformed companies, meanwhile, are strong and sophisticated analytics users. They rely on analytics in most activities to guide both day-to-day operations and strategy, and their enterprise data creates an integrated view of the business — and includes a growing focus on unstructured data. Transformed companies typically use a comprehensive portfolio of tools to support advanced analytic modeling.

In the 2011 survey, the percentage of Experienced and Transformed organizations reporting competitive advantage from analytics grew substantially, whereas Aspirationals slipped by 5%. (See: "Who is Gaining a Competitive Advantage from Analytics," p. 60.) The existence of a widening gap is only part of this year's story. We also took a close look at how the Experienced companies say they are using analytics to create competitive advantage and, in the process, discovered two very different approaches to analytics. Managers need to understand these differences to identify what kind of analytics user their organization is and what they can do to improve their analytics efforts.

The Importance of Organizational Factors

Are organizations with more, rather than fewer, resources and capabilities devoted to analyzing their reserves of data better off, other things being equal?

Common sense says, "Of course!" But what is it

ABOUT THE RESEARCH

To deepen our understanding of the challenges and opportunities associated with the use of business analytics, *MIT Sloan Management Review*, in partnership with the IBM Institute for Business Value, has for the second year in a row conducted a survey to which more than 4,500 business executives, managers and analysts responded from organizations located around the world. This year's survey saw a 50% increase in the number of respondents, broadening our analysis to include individuals in 122 countries and more than 30 industries. Participating organizations also ranged widely in size. Respondents included MIT alumni and *MIT Sloan Management Review* subscribers, IBM clients and other interested parties.

In addition to these survey results, we interviewed academic experts and subject matter experts from a number of industries and disciplines to understand the practical issues facing organizations today in their use of analytics. Our interviewees' insights contributed to a richer understanding of the data and the development of recommendations that respond to strategic and tactical questions senior executives address as they implement analytics within their organizations. We also drew upon a number of case studies to further illustrate how organizations are using business analytics as a competitive asset.

In this article, the term "analytics" refers to the use of data and related business insights developed through applied analytical disciplines (e.g., statistical, contextual, quantitative, predictive, cognitive and other models) to drive fact-based planning, decisions, execution, management, measurement and learning.

about these analytics-oriented resources and capabilities that produce value? And what can companies that do not already have these resources and capabilities do to reap the benefits of analytics? Both questions have surprising answers.

For one thing, it's not all about tools or having the right people to analyze the data. In fact, our research suggests that organizational factors are important predictors of whether an organization will be able to create a competitive advantage with analytics. According to our survey, managers who say their organizations are most successful with analytics disproportionately describe their companies as having management support for analytics throughout the organization, including top-down mandates for analytics, sponsors and champions; being open to change and new ideas; having a unified focus on the customer that is driven by analytics; and using analytics to identify and address strategic threats to the organization.

In effect, the most advanced users of analytics typically have a strong data-oriented culture that supports and guides analytics use. Having the right combination of tools, data and people, while necessary, is usually not enough, according to our data. Without strong cultural commitments, the success of an analytics program can be easily shortchanged or derailed.

But this kind of culture doesn't come easily. Changing the way people think, interact with one another and perform their jobs is hard, and much harder than developing the technology expertise behind analytics sophistication. Respondents were more than twice as likely to consider organizational challenges to be difficult to resolve (44%) rather than easy (21%). Transformed organizations have found ways to work through these organizational issues. Less than one-third of respondents from Transformed organizations (30%) consider organizational issues to be difficult to resolve, compared with three 3 of 5 respondents from Aspirational organizations (60%).

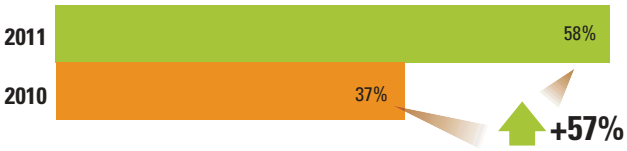
Competitive Analytics

Organizations that have moved beyond baseline analytics — Transformed and Experienced users — are disproportionately using analytics to focus on the future, on the customer and on increasing efficiencies at greater depth and scope than Aspirationals.

Transformed companies tend to have a data-oriented culture as well as competency in two areas:

ANALYTICS AS A SOURCE OF COMPETITIVE ADVANTAGE

Using analytics to achieve a competitive advantage is on the rise.



Percent of all respondents who cited a competitive advantage with analytics year-over-year

information management and analytic expertise. Both of these competencies require capabilities and resources beyond what is typically invested in baseline analytics. Together, a data-oriented culture, information management and analytic expertise foster what we call competitive analytics — analytics that delivers advantage in the marketplace. The majority of Transformed organizations display a level of mastery in each of these areas.

What does competitive analytics look like in practice? Consider the case of CarMax. With $9 billion in 2011 revenues, CarMax is the largest U.S. specialty retailer of used cars, and at one time, was the fastest retailer in U.S. history to reach $1 billion in revenues.[4] How? Although several factors play a role, including a compelling customer offer — no-haggle prices and quality guarantees backed by a 125-point inspection that became an industry benchmark — and a lucrative financing arm, CarMax's business model relies upon a proprietary information system that captures, analyzes, interprets and disseminates data about the cars CarMax sells and buys.

CarMax's data analytics help track "every purchase, number of test drives and credit applications per car and color preferences in every demographic and region," states Katharine W. Kenny, CarMax vice president of investor relations. Behind the scenes, CarMax's proprietary store technology provides its management with real-time information about every aspect of store operations, such as inventory management, pricing, vehicle transfers, wholesale auctions and sales consultant productivity. This advanced inventory management system provides the company with the ability to anticipate future inventory needs and manage pricing. CarMax continues to enhance and refine its information systems, which it believes to be a core competitive advantage.

Three Elements of a Data-Oriented Culture

According to our research, a data-oriented culture at the enterprise level has three key characteristics:

1. Analytics is used as a strategic asset;

2. Management supports analytics throughout the organization;

3. Insights are widely available to those who need them.

(See "Key Elements of a Data-Oriented Culture," p. 62, for the percentage of Transformed organizations with these characteristics.)

By culture, we mean a pattern of practices, behaviors and norms organized around a set of shared aims and beliefs. A data-oriented culture is a pattern of behaviors and practices by a group of people (in a department, line of business or enterprise) who share a belief that having, understanding and using certain kinds of data play a critical role in the success of their business. Explicit codes of conduct, norms, principles of use and incentives are aligned to support these patterns.

The role of a data-oriented culture may vary. Data and analytics may be at the core of an organization's everyday operations (as with CarMax). Or it can be on equal footing with other cultures that predominate in an organization, coexisting comfortably or uncomfortably with others. From its beginnings, Huffington Post, the online newspaper cofounded in 2005 by Arianna Huffington and sold to AOL for $315 million in 2011, has used analytics to track the popularity of its stories, blogs and other content; moving, tweaking or removing content in real time depending on what is resonating most with readers. Before its merger with AOL, Huffington Post began hiring journalists from traditional newspapers, which did not employ such tools. To succeed, the online paper had to manage a potential clash between its data-oriented culture and the culture of its new hires.[5]

The path to a data-oriented culture may vary. In some cases, this culture may exist from the very beginnings of an organization; more often than not, a data-oriented culture evolves over time. Here's how one executive described the way his organization's culture has become more data-oriented:

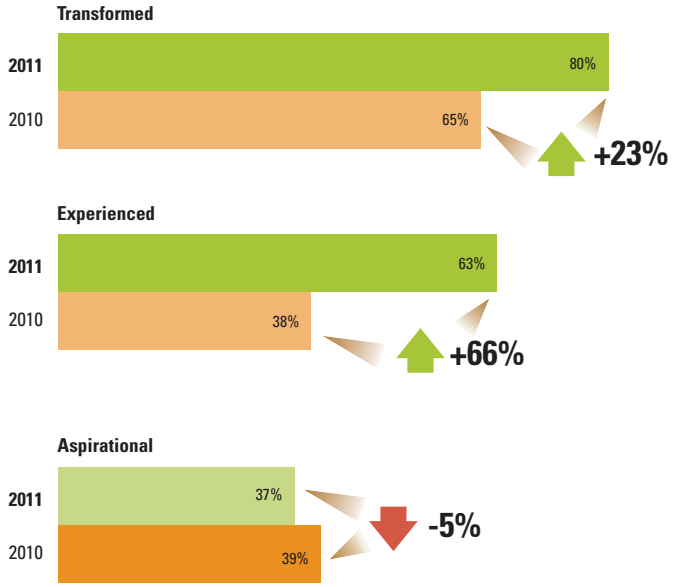
> *What I'm seeing, from an organization perspective, is more of a focus on understanding what the data are telling us in order to use resources in the most efficient and effective way possible. People would have hypotheses or strategies that they would want to pursue through numbers. They would quantitatively analyze them, but for the most part, unless there was a glaring difference between the hypothesis and the analytics, people would pursue their strategies as long as they were compliant with our legal and regulatory requirements. That's pretty much going away. Because we're at a point where we can't ignore any data telling us about the effectiveness of our business strategies.*

Foundations of Analytic Competence

In addition to creating a data-oriented culture, organizations that excel at using analytics to create a competitive advantage must also excel at two other competencies: information management and analytics expertise. Without a strong proficiency in both, any data-oriented culture will lack critical supports and be vulnerable to organizational and economic change. Culture, information management and analytic expertise are mutually reinforcing.

WHO IS GAINING A COMPETITIVE ADVANTAGE FROM ANALYTICS

Experienced users show the biggest gains among all groups.



Percentages of respondents who cited a competitive advantage with analytics year-over-year

Building these competencies takes time, and each poses distinct challenges. Analytic expertise is built from talent, tools and technology, whereas a solid information management agenda is built from strong data governance, data management practices and the capability to deliver the right information to the right people at the right time.

Our analysis of responses from Transformed organizations, who make up 24% of all respondents, showed that a majority of Transformed organizations are strong on both competencies.

A natural question would be: Which competency should a manager tackle first?

To answer that question we looked at response patterns from a representative sample of 1,200 Experienced users, using a set of key questions within the survey. We found that there is no "typical" sequential evolution of competencies and culture.

Interestingly, this deeper examination revealed patterns that show most Experienced organizations are taking one of two distinct approaches to analytics. Just under half are taking an approach focused on developing their information management competency, with attention focused on creating an enterprise-wide information platform to support broad and consistent use of analytics; we call these Collaborative organizations. On the other hand, slightly more than half are focused on building their analytics expertise. With this specialized line-of-business or functionally focused approach to analytics, leaders are deepening analytic skills within operations, finance and marketing to optimize and predict specific business processes. We call these Specialized organizations.

Collaborative Organizations Emphasize Information Management Collaborative and Specialized organizations have taken different approaches to creating an information management competency, which typically involves a single integrated analytic platform that shares data across product lines and functional channels. Many Collaborative organizations have developed capabilities that enable silo-busting data creation and sharing. Twice as many Collaborative enterprise-focused organizations as Specialized users report strong data integration practices and skills.

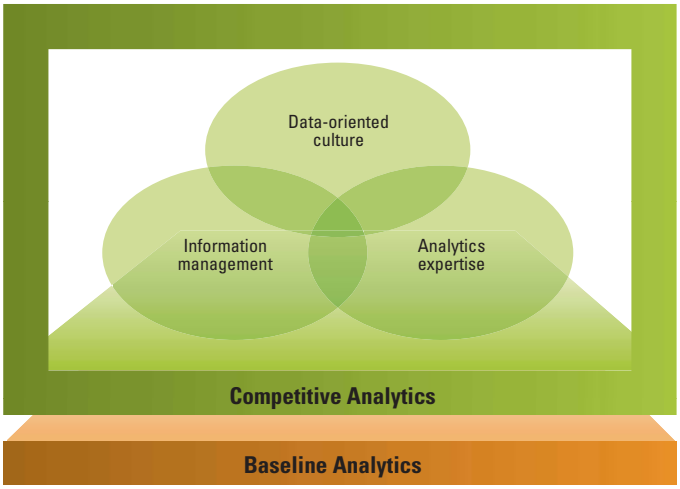
Such integration can have important benefits. For example, several years ago, when the U.K.'s BT (formerly British Telecom) was transitioning from a telephone company to a 21st-century broadband company, the company had well-developed data systems, but poor data integration across functions.[6] Their customer service was notorious, with the speed to completion of customer service calls more important in certain functions than whether a customer had his or her problem resolved. By linking together its data silos, creating broadband-related management incentives and cultivating a new culture of collaboration across functions, the company's broadband venture was able to improve its customer service dramatically. And, in less than two years, BT's broadband customer base grew from 1 million to 5 million customers.[7]

Collaborative organizations are almost three times more likely to use analytics to guide future strategies than Specialized organizations and are shifting to rely on analytics in day-to-day operations as well, at twice the rate of Specialized organizations. Collaborative organizations are more than twice as likely to deliver insights to customer-facing employees to drive sales and productivity, and twice as likely to provide insights to anyone in the organization who needs them.

Specialized Organizations Emphasize Analytics Expertise On the other hand, many organizations taking a Specialized approach have deepened their analytic skills beyond basic spreadsheets and visualizations; they are applying advanced modeling

THREE CHARACTERISTICS OF COMPETITIVE ANALYTICS

Successfully competing on analytics depends on capabilities in three critical areas.



techniques to data to create simulations, prototypes and scenarios to better understand how changes — from internal investments or external forces — will impact processes, revenue growth and operating costs. These predictive analytic techniques help managers understand what is probable rather than just what is possible.

Robert Gooby, vice president of process redesign at McKesson, the North American pharmaceutical distributor, is developing a data system that tracks every element in its pharmaceutical distribution supply chain:

> *It gives us a model of the whole operation. Most models are simplifications of the physical world. You have to hope that the assumptions are valid. What makes this model different is that it is not a simplification. It has all of the complexities and all of the data of our reality. What it does is it allows us to restate history. If we wanted to do scenarios on changes to our policies, changes to our structure, whatever scenarios we have, we can run those scenarios and restate what the last year would have looked like under that different operational scenario. This allows us to see, at least in the restating of history, what it would have been worth to us had we done this in the past. It allows us to quantify in extreme detail the impacts of making fundamental changes to our operation.*

A majority of Specialized organizations that have focused on building their functional foundation also have begun to automate tasks using complex algorithms that range from mundane report development to complex data analysis. Almost half of this group is leveraging algorithms to optimize activities such as call center interactions and inventory systems. For some companies, building an expertise with analytics can deliver dramatic results. McKesson uses data and analytics to drive efficiency into every part of its value chain, from order placement to fulfillment and shipping to delivery; analytics are a core part of day-to-day activities, Gooby said.

> *If you ask people generally how good is good, they say 99% is good. But when you're $110 billion, 1% of $110 billion is $1.1 billion; 99% is not good enough. 99.9% is $100 million. It's still not good enough. When you're talking about that level of accuracy that you need to achieve, you have to rely on data and analytics. We carry, at any point in time, in the ballpark of $8 billion in inventory. So, in the course of a year, we will have write-offs in inventory you can count in the millions, not hundreds of millions.*

So, which competency you tackle first depends on what kind of company you are, what kind of industry you are in and what kind of company you want to become.

What This Means for Your Company

What does all this mean for your organization? If you're a relative newcomer to competitive analytics, the choice of which path to take depends largely on the decision-making culture of your organization. Managers and midlevel executives who often encounter resistance from senior executives to new ideas or changes in the status quo may create more momentum by taking a specialized approach and extending the use of analytics within their own departments or functions — whether to address new business issues or using more advanced tools — to create the proof-of-value needed to gain executive

KEY ELEMENTS OF A DATA-ORIENTED CULTURE

Organizations with a data-oriented culture recognize analytics as a strategic asset, have strong leadership support for analytics and make insights from data widely available within the organization.

KEY CHARACTERISTICS	PERCENT OF RESPONDENTS FROM TRANSFORMED ORGANIZATIONS WHO REPORT THIS IS TRUE OF THEIR COMPANIES
Analytics as strategic asset	
•Core part of business strategy and day-to-day operations	72%
Leadership support	
•Analytic champions	59%
•Top-down mandate to leverage analytics	57%
Insights from data widely available	
•Open to new ideas that challenge current practices	77%
•Make insights available to employees	67%
•Provide customer-facing employees access to insights	67%
•Executives have the data they need to make decisions	65%
•Executives have the data they need to do their jobs effectively	67%

attention. But managers and mid-level executives whose upper management responds well to initiative, innovation and creativity can lead the charge toward a collaborative enterprise approach.

If you are part of an Experienced organization that already engages in competitive analytics, determining which path you are on requires an honest assessment of your organization's strengths and weakness regarding data-oriented culture, information management and analytics expertise. Achieving a strong data-oriented culture may be more difficult for Specialized organizations than Collaborative organizations. The reason? Collaborative organizations have already addressed the difficult organizational hurdles that often occur with building an enterprise analytics platform — and organizational hurdles tend to be more difficult than the technological challenges facing Collaborative organizations.

Transformed organizations, meanwhile, need to be deeply aware of industry challenges arising from a pervasive, always-on digital environment. They need to understand how today's digital environment affects their employees, customers and partners, now and in the future. That requires vigilance in detecting challenges and customer expectations that are just emerging or have never been fully addressed. New forms of collaboration with customers and partners need to be understood and explored. As we approach the zettabyte era, even those companies with the most advanced analytics capabilities can't afford complacency.

***David Kiron** is executive editor of* MIT Sloan Management Review*'s Innovation Hubs. **Rebecca Shockley** is the business analytics global lead for the IBM Institute for Business Value. Comment on this article at http://sloanreview.mit.edu/x/53112, or contact the authors at smrfeedback@mit.edu.*

More findings, as well as more detailed recommendations to help organizations gain the most value from competitive analytics, will be included in the joint *MIT Sloan Management Review* and IBM Institute for Business Value report from which these findings are drawn. The report will be available online in October.

THE QUESTION OF VALUE

Any claim that a dollar spent on analytics will produce a certain value must be weighed against alternative uses of that dollar. Will that same dollar invested elsewhere produce more value or less, and over what time frame? More broadly, does the company or line of business have the resources and capabilities to take advantage of a financial investment in analytics?

We interviewed the leader of a centralized analytics support group in a multibillion dollar British manufacturer. After he touted the valuable benefits his group had delivered to his organization, we asked why his nine-member group was not larger. His answer was despondent: "It's deeply frustrating, but that's the world we live in." Proving value need not move analytics up on anyone's priority list if other priorities are more valuable still.

So, under what conditions are companies putting a premium on analytics' business value? At the enterprise level, analytics can help reduce costs, improve quality or both, but whether a business views, and invests in, data and analytics as strategic assets that can help it achieve these goals depends on the questions leaders ask and the capabilities they are looking to cultivate. According to Dr. David Kreutter, vice president of U.S. Commercial Operations at Pfizer:

> *I actually think that the spending question is misplaced. The question isn't how much money do we spend on data and analytics. It's how much value are we getting from data and analytics. If the literal amount of value that you get exceeds the cost, then finance theory would say, "Yep. Do it. Keep doing it." If it's not, it's not necessarily a question of do we cut it. It's a question of what can we do to get more value out of it. But the reality is that there's a pretty intense focus at the moment on cost. Demonstrating the value of analytics on an ongoing basis is part of building the organizational support. I do think there are two schools of thought around this. One is the top-down and the other is bottom-up. I think they're both valid, but I just think they require different approaches.*

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1. A 2011 research study conducted by the research firm IDC (sponsored by EMC) declares that we have already passed the zettabyte threshold. IDC predicts that global data volumes will increase by 29 times over the next 10 years. A more conservative growth figure has been offered by Cisco, which predicts we will achieve a zettabyte of Internet traffic by 2015. See "The 2011 IDC Digital Universe Study," June 2011, www.emc.com.

2. This claim is based on IDC's growth rate projections. Even if the yottabyte never appears on the Internet, it may be created elsewhere.

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