PART ONE

"Why"

CHAPTER 1

Why Analytics Will Be the Next Competitive Edge

The farther backward you can look, the farther forward you are likely to see.

—Winston Churchill

Analytics is becoming a competitive edge for organizations. Once a "nice to have," applying analytics, especially predictive business analytics, is now becoming mission-critical.

An August 6, 2009, *New York Times* article titled "For Today's Graduate, Just One Word: Statistics"[1] refers to the famous advice to Dustin Hoffman's character in his career-breakthrough movie *The Graduate*. The quote occurs when a self-righteous Los Angeles businessman takes aside the baby-faced Benjamin Braddock, played by Hoffman, and declares, "I just want to say one word to you—just one word—'plastics.'" Perhaps a remake of this movie will be made and updated with the word *analytics* substituted for *plastics*.

This spotlight on statistics is apparently relevant, because the article ranked in that week's top three e-mailed articles as tracked

by the *New York Times*. The article cites an example of a Google employee who "uses statistical analysis of mounds of data to come up with ways to improve [Google's] search engine." It describes the employee as "an Internet-age statistician, one of many who are changing the image of the profession as a place for dronish number nerds. They are finding themselves increasingly in demand—and even cool."

ANALYTICS: JUST A SKILL, OR A PROFESSION?

The use of analytics that includes statistics is a skill that is gaining mainstream value due to the increasingly thinner margin for decision error. There is a requirement to gain insights, foresight, and inferences from the treasure chest of raw transactional data (both internal and external) that many organizations now store (and will continue to store) in a digital format.

Organizations are drowning in data but starving for information. The *New York Times* article states:

> In field after field, computing and the Web are creating new realms of data to explore—sensor signals, surveillance tapes, social network chatter, public records and more. And the digital data surge only promises to accelerate, rising fivefold by 2012, according to a projection by IDC, an IT research firm. . . . Yet data is merely the raw material of knowledge. We're rapidly entering a world where everything can be monitored and measured, but the big problem is going to be the ability of humans to use, analyze and make sense of the data. . . . [Analysts] use powerful computers and sophisticated mathematical models to hunt for meaningful patterns and insights in vast troves of data. The applications are as diverse as improving Internet search and online advertising, culling gene sequencing information for cancer research and analyzing sensor and location data to optimize the handling of food shipments.

An experienced analyst is like a caddy for a professional golfer. The best ones do not limit their advice to factors such as distance, slope, and the weather but also strongly suggest which club to use.

BUSINESS INTELLIGENCE VERSUS ANALYTICS VERSUS DECISIONS

Here is a useful way to differentiate business intelligence (BI) from analytics and decisions. Analytics simplify data to amplify its value. The power of analytics is to turn huge volumes of data into a much smaller amount of information and insight. BI mainly summarizes historical data, typically in table reports and graphs, as a means for queries and drill downs. But reports do not simplify data or amplify its value. They simply package up the data so it can be consumed.

In contrast to BI, decisions provide context for what to analyze. Work backward with the end decision in mind. Identify the decisions that matter most to your organization, and model what leads to making those decisions. If the type of decision needed is understood, then the type of analysis and its required source data can be defined.

Many believe that the use of BI software and creating cool graphs are the ultimate destination. BI is the shiny new toy of information technology. The reality is that much of what business intelligence software tools provide, as just described, has more to do with query and reporting, often by reformatting data. A common observation is: "There is no intelligence in business intelligence." It is only when data mining and analytics are applied to BI within an organization that has the skills, competencies, and capabilities that deep insights and foresight are created to understand the solutions to problems and select actions for improving business operations and opportunities.

Data mining that uses statistical methods is the foundation and precursor for predictive business analytics. For example, data mining can identify similar groups and segments (e.g., customers) through cluster or correlation analysis (see Chapter 4). This allows analysts to frame their analytics to predict how their objects of interest, such as customers, new medicines, new smartphones, and so on, are likely to behave in the future—with or without interventions. This allows predictive analytics to move from being *descriptive* to being *prescriptive*.

To clarify, BI consumes stored information. Analytics produces *new* information. Predictive business analytics leverages data within an organizational function focused on analytics and possessing the mandate, skills, and competencies to drive better decisions faster, and to achieve targeted performance.

Queries using BI tools simply answer basic questions. Business analytics creates questions. Further, analytics then stimulates more questions, more complex questions, and more interesting questions. More importantly, business analytics also has the power to *answer* the questions. Finally, predictive business analytics displays the probability of outcomes based on the assumptions of variables.

The application of analytics was once the domain of quants and statistical geeks developing models in their cubicles. However, today it is becoming mainstream for organizations with the conviction that senior executives will realize and utilize its potential value.

HOW DO EXECUTIVES AND MANAGERS MATURE IN APPLYING ACCEPTED METHODS?

Here is an observation on how managers mature in applying progressive managerial methods. Roughly 50 years ago, CEOs hired accountants to do the financial analysis of a company, because this was too complex for them to fully grasp. Today, all CEOs and businesspeople know what price-earnings (P/E) ratios and cash flow statements are and that they are essential to interpreting a business's financial health. These executives would not survive or get the job without this knowledge.

Fast-forward from then to 25 years ago, when many company CEOs did not have computers on their desks. They did not have the time or skill to operate these complex machines and applications, so they had their staff do this for them. Today you will become obsolete if you do not at least personally possess multiple electronic devices such as laptops, mobile phones, tablets, and personal digital assistants (PDAs) to have the information you need at your fingertips.

FILL IN THE BLANKS: WHICH X IS MOST LIKELY TO Y?

Predictive business analytics (PBA) allows organizations to make decisions and take actions they could not do (or do well) without analytics capabilities. Consider three examples:

1. **Increased employee retention.** Which of our employees will be the most likely next employee to resign and take a job with another company? By examining the traits and characteristics

of employees who have voluntarily left (e.g., age, time period between salary raises, percent wage raise, years with the organization), predictive business analytics can layer these patterns on the existing workforce. The result is a rank-order listing of employees most likely to leave and the reasons why. This allows managements' selective intervention.

2. **Increased customer profitability.** Which customer will generate the most profit from our least effort? By understanding various types of customers with segmentation analysis based on data about them (perhaps using activity-based costing as a foundational analysis), business analytics can answer how much can optimally be spent retaining, growing, winning back, and acquiring the attractive microsegment types of customers that are desired.
3. **Increased product shelf opportunity.** Which product in a retail store chain can generate the most profit without carrying excess inventory but also not having periods of stock-outs? By integrating sales forecasts with actual near-real-time point-of-sale checkout register data, predictive business analytics can optimize distribution cost economics with dynamic pricing to optimize product availability with accelerated sales throughput to maximize profit margins.

These three examples are fill-in-the-blanks questions. One can think of hundreds of others where the goal is to maximize or optimize actions or decisions. With predictive business analytics, the best and correct decisions can be made and organizational performance can be tightly monitored and continuously improved. Without predictive business analytics, an organization operates on gut feel and intuition, and optimization cannot even be in that organization's vocabulary.

PREDICTIVE BUSINESS ANALYTICS AND DECISION MANAGEMENT

Much is being written today about big data. Big data has been defined as a collection of data sets so large and complex that it becomes difficult to process using on-hand database management tools or traditional

data processing applications. The challenges include capture, validation, storage, search, sharing, analysis, and visualization. What is needed is to shift the discussion from big data to big value. Business analytics and its amplifier, predictive business analytics, serve as a means to an end, and that end is faster, smarter decisions. Many may assume that this implies executive decisions, but the higher value for and benefit from applying analytics is arguably for daily operational decisions. Here is why.

Decisions can be segmented in three layers:

1. *Strategic decisions* are few in number but can have large impacts. For example, should we acquire a company or exit a market?
2. *Tactical decisions* involve controlling with moderate impacts. For example, should we modify our supply chain?
3. *Operational decisions* occur daily, even hourly, and often affect a single transaction or customer. For example, what deal should I offer to this customer or should I accept making this bank loan?

There are several reasons that operational decisions are arguably most important for embracing analytics. First, executing the executive team's strategy is not accomplished solely with strategy maps and their resulting key performance indicators (KPIs) in a performance scorecard and dashboards. The daily decisions are what actually move the dials. Next, although much is now written about enterprise risk management, the reality is that an organization's exposure to risk does not come in big chunks. Enterprise risk management deals more with reporting. Risk is incurred one event or transaction at a time. Finally, in the sales and marketing functions, operational decisions maximize customer value much more than do policies. For example, what should a frontline customer-facing worker do or say to a customer to gain profit lift? (Chapter 6 describes MetLife's journey to better decision management.) Operational decisions scale from the bottom up, and in the aggregate they can collectively exceed the impact of a few strategic decisions.

The baseball book (by Michael Lewis) and movie *Moneyball* highlighted the use of quantitative analysis to maximize results for the Oakland Athletics baseball team. But what many viewers, including enthusiastic analysts, did not realize is that the statistics were used in

two steps with the larger payoff in the second step. First, the statistical analysis identified which mix of lower-salaried players to acquire and trade away. But after completing that step, the team still lost games. It was not until the next step that the team educated and trained each ballplayer at the pitch-by-pitch and play situation level and the Athletics began winning games. The second step is comparable to operational decisions. Good decisions add up to achieve the enterprise's goal—execute the strategy.

PREDICTIVE BUSINESS ANALYTICS: THE NEXT "NEW" WAVE

Today many businesspeople do not really know what predictive modeling, forecasting, design of experiments, and mathematical optimization mean or do, but over the next 10 years, use of these powerful techniques will become mainstream, just as financial analysis and computers have, if businesses want to thrive in a highly competitive and regulated marketplace. Executives, managers, and employee teams who do not understand, interpret, and leverage these assets will be challenged to survive.

When we look at what kids are learning in school, then that is certainly true. We were all taught mean, mode, range, and probability theory in our first-year university statistical analytics course. Today children have already learned these in the third grade! They are taught these methods in a very practical way. If you had x dimes, y quarters, and z nickels in your pocket, what is the chance of you pulling a dime from your pocket? Learning about range, mode, median, interpolation, and extrapolation follow in short succession. We are already seeing the impact of this with Gen Y/Echo Boomers who are getting ready to enter the workforce—they are used to having easy access to information and are highly self-sufficient in understanding its utility. The next generation after that will not have any fear of analytics or look toward an expert to do the math.

There is always risk when decisions are made based on intuition, gut feel, flawed and misleading data, or politics. In the popular book by Tom Davenport and Jeanne Harris *Competing on Analytics: The New Science of Winning*,[2] the authors make the case that increasingly

the primary source of attaining a competitive advantage will be an organization's competence in mastering all flavors of analytics. If your management team is analytics-impaired, then your organization is at risk. Predictive business analytics is arguably the next wave for organizations to successfully compete and not only to predict outcomes but reach higher to optimize the use of their resources, assets, and trading partners, among other things.

It may be that the ultimate sustainable business strategy is to foster analytical competency and eventual mastery among an organization's workforce. Today managers and employee teams do not need a doctorate in statistics to investigate data and gain insights. Commercial software tools are designed for the casual user. Anyone can be chic.

GAME-CHANGER WAVE: AUTOMATED DECISION-BASED MANAGEMENT

What is the next big wave that will follow after analytics? Automated decision-based management. As organizations achieve competency and mastery with analytics, then the next step will be automated rules based on the outcomes from applying analytics. The islands of analytics emerging in an organization's various departments and processes will be unified in closed-loop ways. Communications will be in real time.

This does not mean that an organization's workforce will be reduced in size by robotlike decision making. But it does mean that algorithms, equations, and business rules derived from superior analysis will become essential to managing toward optimization. Decision-based managerial software will eventually emerge that is independent of but integrated with an organization's multitude of data storage platforms and data management stacks between the data and decisions. This future software's decisions will be aligned with the executive team's strategy and its key performance indicators. When that day comes, it will be a game-changer and the basis for a book to be written in the future.

Substantial benefits are realized from applying a systematic exploration of quantitative relationships among performance management

factors. When the primary factors that drive an organization's success are measured, closely monitored, and predicted, that organization is in a much better situation to adjust, advance, and mitigate risks. That is, if a company is able to know—not just guess—which nonfinancial performance variables directly influence financial results, then it has a leg up on its competitors and delivers real value to its shareholders, employees, and other stakeholders.

PRECONCEPTION BIAS

Weak leaders are prone to a preconception bias. They can be blind to evidence and somehow believe their intuition, instincts, and gut feel are acceptable masquerades for having fact-based information.

Psychologists refer to this as a confirmation bias. What often trips managers up is they do not start by framing a problem before beginning to collect information that will lead to their conclusions. They often subconsciously start with a preconception. That is, they seek data that will validate their bias. The adverse effect is they prepare themselves for X, and Y is actually happening! By framing a problem and considering alternative points of view, one widens the options to formulate hypotheses. And this is where the emerging discipline of analytics fits in. With fact-based information, organizations gain insights and views that they might otherwise have missed.

Mental shortcuts, gut feel, intuition, and so on typically work *except* when problems get complex. When problems or opportunities get complex, then a new set of issues arises. Systematic thinking and application of analytics are required.

In the book *Analytics at Work: Smarter Decisions, Better Results*,[3] the authors note that 40 percent of important decisions are not based on facts but rather on intuition, experience, and anecdotal evidence. An immediate impression is that this is so sad. However, one ideology can take the position that perhaps intuition and experience are reliable for decisions—if the decision maker has exceptional intuition and experience. But intuition and experience are prerequisites. What if they don't sufficiently exist? Just look at the 2008 global economic meltdown. There were many smart minds managing the global economy. And look at what happened.

ANALYSTS' IMAGINATION SPARKS CREATIVITY AND PRODUCES CONFIDENCE

In contrast, curious people (curiosity is a trait of analysts) always ask questions. They query data to answer questions, and then use analytics to ask further and more robust questions. And better yet, their analytics can answer their questions. Analysts typically love what they do. If they are good with analytics, they infect others with enthusiasm. Their curiosity leads to imagination. Imagination considers alternative possibilities and solutions. Imagination in turn sparks creativity.

Once analysts produce results, they provide an important ingredient needed by decision makers—confidence. Confidence is a feeling and belief that one can rely on someone or something to make a decision and perform at some known time in the future. Effective analysts create confidence and trust with their stakeholders.

BEING WRONG VERSUS BEING CONFUSED

Which is worse—being wrong or being confused?

Let us start with some definitions. To make a wrong decision means you were mistaken and erroneous. Your decision was incorrect for the problem to be solved or opportunity that could have been realized (there is also an immoral, unethical, and illegal connotation; but that is a different variation of a poor choice). To be confused means you are baffled, bewildered, and perplexed. You cannot be positioned to make a correct decision because your thinking is muddled and clouded.

Embracing analytics can resolve both conditions.

Cultural Issues Related to Wrong Choices

An example of being wrong might be if you purchased a large top-loading clothes washing machine that did not fit in the space that a traditional front-loading washer would have fit in. Using the same example, being confused would be if you did not understand the differences between the two types of washers in terms of benefits, water consumption rates, and so on; you would then typically postpone the decision.

Postponing a decision when confused reduces the risk and possibly the embarrassment of making a mistake, but it also can mean missing the opportunity to be gained. Both involve risks. Different cultures approach risk in different ways.

Geert Hofstede, a Dutch researcher in social psychology, has done provocative research about Eastern versus Western culture's attitudes toward risk that sheds light on multicultural differences with risk appetite and decision making. In his book, *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations across Nations*,[4] one of Hofstede's studies developed an Uncertainty Avoidance Index (UAI) that measures a nation's (or a society's or organization's) tolerance for uncertainty and ambiguity—its appetite for risk.

To abbreviate the details of the study's findings, it is convenient to describe two countries with cultures representing opposite and extreme ends of the UAI continuum. By better understanding these contrasting behavioral differences, project champions striving to successfully deploy predictive business analytics may better succeed. In Hofstede's study, UAI scores can range from 0 (pure risk takers—such as casino gamblers) to 100 (pure risk avoiders—very cautious and conservative). Of all the nations, the United States ranked lowest, implying fewer rules, fewer attempts to control outcomes, and greater tolerance for a variety of ideas, thoughts, and beliefs. In contrast, Japan ranked highest in its UAI score, implying high levels of control in order to eliminate or avoid the unexpected. A type of culture such as Japan's does not readily accept change and is risk averse.

Is Your Decision Making an Eastern or Western Type?

How can UAI apply to managing organizations? We believe there are obstacles and barriers that slow the adoption rate of predictive business analytics. They are no longer technical ones but rather involve people, culture, and human nature's resistance to change (see Chapter 5).

How would you personally assess the UAI of the organization you are employed by or one you keep an eye on or are involved with? Does it have a low UAI (U.S.-like)? This implies having self-concerned employees, less conformity, reliance on intuition and gut feel to wing

it, avoiding rigid rules, low acceptance of authority, low trust levels, and reasonable tolerance for conflict, tension, and dissent.

In contrast, is your organization at the other extreme, with a high UAI (Japan-like)? This implies being collectivist with a need for consensus, being very analytical, and having more conformity, strict and enforced rules, high acceptance of authority, high levels of trust, and little tolerance for conflict. In Chapter 4, we present a method to rank and rate choices and calculate a value score that reflects these cultural biases as well as management priorities.

Implications for Success with Analytics

Ultimately all organizations will need to create a culture for analytics and fact-based decision making. Regardless of an organization's type of culture, what this all means is we must elevate the importance of organizational change management and behavior modification. Inevitably we will need to learn change management as on-the-job training.

So which is worse—being wrong or being confused? They are both bad with adverse consequences. Why not be smarter and safer at the same time?

AMBIGUITY AND UNCERTAINTY ARE YOUR FRIENDS

On the other side of the wrong versus confused coin is the notion that ambiguity and uncertainty are your friends. Suppose you are a business analyst or are responsible for enterprise performance and risk management; then ambiguity and uncertainty are your friends. Why? If getting answers were easy, your salary would probably be lower!

Search for Surprises

Regardless of how analytics might be defined, there should be no argument about what its purpose is—better insights and better decisions. If we take this reasoning further, we realize that analytics has much to do with problem solving and testing. It is about investigation and discovery.

University accounting faculty involved with teaching students and doing research make presentations, mainly research papers that can be stimulating. Some topics are a bit esoteric, such as "the role of persistent information asymmetry and learning by doing," but there are always a few golden nuggets. For example, at a managerial accounting conference, one presentation proved that in charitable fund-raising, the announcement of a wealthy donor's matching grant substantially increases donations from others (no big surprise); however, counterintuitively, increases of the match from one-to-one to multiples of more than one have no effect.

That is an example of what analysts and researchers seek—surprises. Having a surprise is not essential. Typically, analysis simply confirms a hypothesis. But what drives analysts and researchers is to prove that just having a hunch or an intuition for decisions is not good enough. They know if you do not test something that may be intuitive, then certain others will continue to believe that it is untrue! If their hypothesis is confirmed, that is fine; but if the conclusion has surprises, then new knowledge has been uncovered.

Quest for the Truth

Make no mistake. The scholars who present at managerial accounting conferences are not financial accountants who produce external reports for investors, bankers, and regulatory agencies. These professionals have dedicated their lives to a combination of educating future CFOs and hypothesizing research and testing for results and conclusions. They explore social, economic, and political problems.

The younger faculty's career advances depend on demonstrating good research, and the older ones maintain respect from their peers by acting as "discussants" following each research paper's presentation. The latter role is basically to provide constructive criticism and describe how the research contributes to the body of knowledge.

Analytics not only proves or disproves hypothesis, but its truth-seeking tests can also reveal cause-and-effect relationships. Understanding causality serves for making better decisions. Ambiguity and uncertainty? The greater the extent to which they exist, then the more

challenging is the problem for an analyst and researcher to undertake. They can be an analyst's best friends.

DO THE IMPORTANT STUFF FIRST—PREDICTIVE BUSINESS ANALYTICS

Many of our experiences are that organizations overplan and underexecute. Now, we are not against planning. To the contrary, most of us are big believers in planning, but only up to a point. How many meetings have you been in where after what seems like endless rambling you say to yourself, "Heck, let's just start doing it"?

Plans do not have to be excessively detailed. After all, once you start acting on a plan, things rarely go perfectly according to that plan. So you begin adjusting and redirecting. Few things are not dynamic, especially in today's volatile times. In *The Art of War* (an ancient Chinese military treatise attributed to Sun Tzu), the author thought that strategy was not planning in the sense of working through an established list, but rather that it requires quick and appropriate responses to changing conditions. Planning works in a controlled environment; but in a changing environment, competing plans collide, creating unexpected situations.

However, what is important is what you do before the planning. In our mind there are two prerequisites: (1) frame the problem or opportunity that the plan addresses, and (2) perform analysis.

1. **Framing.** Framing a problem is not an easy task, except for simple plans. For example, one decides to take an umbrella if the sky has dark clouds but not if it is sunny. Is one 100 percent sure? Perhaps not, but the degree of certainly is probably good enough for the umbrella decision. But do you know or just think you know? This example gives a glimpse of the limits of planning. Mental shortcuts, gut feel, intuition, and so on typically work except when problems get complex. When problems or opportunities get complex, then a new set of issues arises. Systematic thinking is required. What often trips people up is they do not start by framing a problem before they begin collecting information that will lead to their conclusions. There is often a bias or preconception. One seeks data that will validate

one's bias. The adverse effect is we prepare ourselves for X and Y happens. By framing a problem, one widens the options to formulate hypotheses.

2. **Analytics.** Ah, the term *hypothesis*. It is critical and requires analytics, the second prerequisite, to prove or disprove the validity of the hypothesis. Much is now being written about analytics. There is a reason. The margin for error keeps getting slimmer. Also, previously accepted types of strategies (e.g., low-cost producer) are vulnerable to competitor actions. The only truly sustainable strategy is to have organizational competency with analytics.

Our suggestion is to do the important stuff first. Frame, analyze, and then plan. But plan to replan—numerous times. Reliable forecasting and probabilistic scenario planning would be nice additions to your portfolio of analytics.

WHAT IF . . . YOU CAN

Are you curious about why the following questions have not been solved? With predictive business analytics and enterprise performance management software, they can be!

- Why can't traffic intersection stoplights be more variable based on street sensors that monitor the presence, location, and speed of approaching vehicles? Then you would not have to impatiently wait at a red light when there is no cross traffic.
- Why can't a call center route your inbound phone call to a more specialized call center representative based on your phone number and previous call topics or transactions? And once connected, why can't that call rep offer you rule-based deals or suggestions most likely to maximize your customer experience? Then you might get a quicker and better solution to your call.
- Why can't dentists and doctors synchronize patient appointment schedule arrival times to reduce the amount of time so many people collectively sit idly in their waiting rooms? Then you could show up just before your treatment.

- Why can't airlines better alert their ground crews for plane gate arrivals? Then you wouldn't have to wait, sometimes endlessly, for the jet bridge crew to show up and open the door.
- Why can't hotel elevators better position the floors the elevators arrive at to pick up passengers based on when hotel guests depart their rooms? Then you wouldn't have to get stuck on a slow "milk-run" elevator stopping at so many floors while an express elevator that subsequently arrived could have quickly taken you to your selected floor.
- Why can't airport passport control managers regulate the number of agents in synchronization with the arrivals of international flights? Then you wouldn't have to wait in long queues and then later the extra staff shows up (sometimes).
- Why can't retail stores partner with credit card companies and their transaction histories and use algorithms like Amazon.com and Netflix use to suggest what a customer might want? Then you might more quickly find what you are shopping for.
- Why can't water, gas, and electrical utility suppliers to home residences provide instant monitoring and feedback so that households can determine which appliances or events (e.g., taking showers) consume relatively more or less energy? Then households could adjust their usage behavior to better manage cost and energy consumption.
- Why can't personnel and human resource departments do better workforce planning on both the demand side and the supply side? That is, for the supply side, why can't they predict in rank order the most likely next employee to resign or, based on statistical data (e.g., age, pay raise amount, or frequency), the number of employees who have resigned? For those who will retire, isn't this predictable? For the demand side, why can't improved forecasting of sales volume be translated into head count capacity planning by type of skill or job group? Then the workforce would match the needs without scrambling when mismatches occur.
- Why can't magazines you subscribe to print at the time of production a customized issue to you that has advertisements (and

maybe even articles) that you likely care more about based on whatever profile they may have about you? Then the magazine's content may be more relevant to you.

- Why can't your home's refrigerator and pantry keep track using microchips and barcode scanners of what you purchased and the rate of usage? Then you could better replenish your food supplies when out shopping.

Are these visions of the future? Not in all cases. With predictive business analytics, some if not all of these questions are already solvable. It is time that gut feel, intuition, and guessing be replaced with applying predictive business analytics to better manage organizations and better serve their customers.

NOTES

1. "For Today's Graduate, Just One Word: Statistics," the *New York Times*, available at www.nytimes.com/2009/08/06/technology/06stats.html?scp=1&sq=Graduate%20statistics&st=cse.
2. Thomas H. Davenport and Jeanne G. Harris, *Competing on Analytics: The New Science of Winning* (Boston: Harvard Business School Publishing, 2007).
3. Thomas H. Davenport, Robert Morison, and Jeanne G. Harris, *Analytics at Work: Smarter Decisions, Better Results* (Boston: Harvard Business School Publishing, 2010).
4. Geert Hofstede, *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations across Nations* (Thousand Oaks, CA: Sage, 2001).