

# BI and Big Data from the Business Side

Just as the eyes are the windows to the soul, business intelligence is a window to the dynamics of a business. It reveals the performance, operational efficiencies, and untapped opportunities. *Business intelligence* (BI) is a set of technologies and processes that allow people at all levels of an organization to access and analyze data. Without people to interpret the information and act on it, business intelligence achieves nothing. For this reason, business intelligence is less about technology than about culture, creativity, and whether people view data as a critical asset. Technology enables business intelligence and analytics, but sometimes, too great a focus on technology can sabotage business intelligence initiatives. It is the people who will most make your BI efforts a wild success or an utter failure.

## Business Intelligence by Other Names

Business intelligence means different things to different people. To one businessperson, business intelligence means market research, something I would call “competitive intelligence.” To another person, “reporting” may be a better term, even though business intelligence goes well beyond accessing a static report. “Reporting” and “analysis” are terms frequently used to describe business intelligence. Others will use terms such as “business analytics” or “decision support,” both with varying degrees of appropriateness. In talking to a leader in the public sector, she said most of her stakeholders shy away from the term “business intelligence” because with the global financial crisis largely precipitated by Wall Street, “business” has become a tainted word. Instead, she prefers to refer to initiatives in this area simply as “data.”



How these terms differ matters very little unless you are trying to compare market shares for different technologies. What matters more is to use the terminology that is most familiar to intended users and that has a positive connotation. No matter which terminology you use, keep the ultimate value of business intelligence in mind:

Business intelligence allows people at all levels of an organization to access, interact with, and analyze data to manage the business, improve performance, discover opportunities, and operate efficiently.

## BI

The acronym for business intelligence is BI, and as information technology (IT) people like to use a plethora of acronyms, BI is one more that can sometimes cause confusion. BI as in “business intelligence” is not to be confused with “business investments” (although BI is something the business may invest in), “business insight” (although it is something BI may provide), or “bodily injury” (if you are using BI in the context of insurance). Even within the BI industry, confusion abounds as some people use BI to refer to the whole technical architecture (including the data warehouse, described in Chapter 2) as well as the user front-end tools (described in Chapter 3). Others think of BI as referring only to the front-end tools.

## Business Analytics

Business analytics as a terminology has gained in popularity in recent years, perhaps because analytics sounds so much more exciting than simply intelligence. In fact, a few vendors and consultants (usually who are trying to sell you something new), will try to pigeon-hole BI as being only historical and simplistic reporting. It's not. Most people will differentiate BI with “advanced analytics” to refer to statistical analysis and predictive modeling. But here, too, some general BI solutions and consultants will use the term “business analytics,” regardless if it includes predictive analytics or not.

I confess, I was willing to jump on this bandwagon too, suggesting to the publisher that we rename the book *Successful Business Analytics*, but it seems designating a book a second edition prohibits changing the main title, and having a second edition anything is more important in reaching the right readers. Let's hope so!



## Big Data

Some have referred to data as the new oil in the 21st century. Those who mine it well will hit pay dirt, and those who don't will be sitting on wells of untapped potential, data wastelands. Others are a bit more wary, thinking the whole concept of big data is like the gold rush of the 1840s in which people invested and lost fortunes. I've heard one pundit decry the comparison of big data to oil, as oil has gotten us into trouble on multiple fronts, whether global warming or wars in the Middle East or disaster in the Gulf Coast. Big data, like oil, can provide enormous benefit, yet there will be risks to privacy and security, as well as dangers not yet identified.

The term "big data" was first used by a computer scientist at Silicon Graphics in the mid-1990s.<sup>1</sup> A few tech industry magazines began using the term in 2008 to refer to larger data volumes, generally in the petabyte range, but it was really 2012 when "big data" hit the mainstream. Stories on big data were front and center in everyday news outlets, including the *New York Times*, the *Washington Post*, the *Economist*, *Forbes*, and the *World Economic Forum*. I am seeing the term big data increasingly being used for anything data related, even when it's small. I suspect that with its appearance in mainstream media, big data as a term will eventually replace BI and business analytics in the general lexicon. However, within the technology profession, big data is distinct and has three main characteristics that differentiate it from general BI: volume, velocity, and variety.

- **Volume** While many traditional BI deployments have gigabytes and terabytes of data, big data runs in the petabytes.
- **Velocity** Early data warehouses may have been updated weekly and evolved to daily updates. With big data, both the velocity of new incoming data and the pace of decision-making have led to new technologies to handle the speed of incoming data. Machine-generated data from smart meters, RFID (radio frequency identification) devices, web logs on e-commerce sites, and social data, for example, show the velocity of new data.
- **Variety** Much of BI's early days related to analyzing data from transaction systems. As new types of data have been digitized, there is a greater variety of content to analyze, such as textual data in the form of tweets, social comments, blogs, medical record notes, photos and images, and video.



Gartner research analyst Doug Laney first laid out the 3Vs of big data in the late 1990s (then at Meta Group) that are now part of the big data lexicon.<sup>2</sup> With these characteristics in mind, it's not surprising that some of the initial big data applications were developed in and used by startup companies such as Yahoo!, Google, and Facebook. Early adopters of big data technologies included the gaming industry and electronic commerce. However, we are also seeing uses in the medical community to find cures for diseases. Terror and crime prevention also use big data, which played a role in identifying the Boston Marathon terrorists as the FBI sifted through millions of photos, pressure cooker purchases, and digitized clues.

Just as “business analytics” has become a popular term, with “big data” becoming a mainstream term, it is sometimes used more broadly than it should be. As one BI director lamented about the recent hype, “Big data is not our challenge. It's still the complexity of the data.” There also have been some “big data” implementations on Hadoop I've reviewed that measure only in the gigabytes.

## What Business Intelligence Is Not

A data warehouse may or may not be a component of your business intelligence architecture (see Chapter 2), but a data warehouse is not synonymous with business intelligence. In fact, even if you have a data warehouse, you can only say your company is using business intelligence once you put some tools in the hands of the users to transform data into useful information.

## How Business Intelligence Provides Value

Business intelligence cuts across all functions and all industries. BI touches everyone in a company and beyond to customers, suppliers, and with public data, to citizens. As stated earlier, though, business intelligence can only provide value when it is used effectively by people. There is a correlation between the *effective* use of business intelligence and company performance.<sup>3,4</sup> However, simply having better *access* to data does not improve performance;<sup>5</sup> the difference is in what companies *do* with the data.

## BI for Management and Control

In its most basic sense, business intelligence provides managers information to know what's going on in the business. Without business



intelligence, managers may talk about how they are “flying blind” with no insight until quarterly financial numbers are published. With business intelligence, information is accessible on a timelier and more flexible basis to provide a view of

- Sales in various regions and by various product lines
- Expenses compared to budget
- Warehouse inventory for a particular product or raw materials
- Sales pipeline versus forecast

When any particular metric is not where it should be, business intelligence allows users to explore the underlying details to determine why metrics are off target and to take action to improve the situation. In the past, if managers monitored the business via paper-based reports or a fixed screen in a transaction system, they had no flexibility to explore *why* the business was operating a certain way. For example, many companies use BI to monitor expenses to ensure costs do not exceed budgets. Rather than waiting until the close of the quarter to discover that excessive expenses have reduced profitability, timely access to expense data allows managers first to identify which business unit is over budget and then to take immediate steps to reduce overtime pay or travel expenses, or to defer purchases, for example.

## BI for Improving Performance

Used effectively, business intelligence allows organizations to improve performance. Business performance is measured by a number of financial indicators, such as revenue, margin, profitability, cost to serve, and so on. In marketing, performance gains may be achieved by improving response rates for particular campaigns by identifying characteristics of more responsive customers. Eliminating ineffective campaigns saves companies millions of dollars each year. Business intelligence allows companies to boost revenues by cross-selling products to existing customers. Accounting personnel may use BI to reduce the aging of accounts receivable by identifying late-paying customers. In manufacturing, BI can facilitate a gap analysis to understand why certain plants operate more efficiently than others.

In all these instances, accessing data is a necessary first step. However, improving performance also requires people's interaction to analyze the data and to determine the actions that will bring about improvement. Taking action on findings should not be assumed. People have political, cultural, and financial reasons for not taking the next



step. To leverage business intelligence to improve performance, you need to consider all these issues. A company may implement a BI solution that provides intuitive access to data. If this data access is not leveraged for decision-making and acted upon, then BI has done nothing to improve performance. The reverse is also true—when BI is used in a company without a sound business strategy, performance will not improve. Incorrect alignment of incentives can also sabotage desired performance improvement.

A key sign of successful business intelligence is the degree to which it impacts business performance, linking insight to action.

Measuring the business impact of business intelligence can be difficult, as improvements in performance are attributable to factors beyond business intelligence. How to measure business intelligence and big data success is discussed in Chapter 4.

## Operational BI

While early business intelligence deployments focused more on strategic decisions and performance, BI increasingly plays a critical role in the daily operations of a company. In this regard, accessing detailed data and reviewing information may be necessary to complete an operational task. For example, as part of accepting a new order, a customer service representative may first check available inventory. Such an inventory report may be a standard report developed within an order entry system, or it may come from a BI solution, whether stand-alone or embedded in the order entry application. Other examples of operational BI include the following:

- Travel agents and airlines use operational BI to monitor flight delays so they can proactively reaccommodate passengers with connections.
- Hospitals and emergency rooms use business intelligence to determine optimum staffing levels during peak periods.
- Restaurants use BI to estimate the wait time for a table based on the number of current patrons and average length to dine.
- Walt Disney World's Magic Kingdom uses business intelligence for its service that issues park visitors FastPass tickets to avoid standing in long lines for rides.<sup>6</sup> The business intelligence tools monitor waiting



times at the most popular rides to balance the number of tickets issued in given periods throughout the day.

- Call centers use BI to monitor call volume and hold times.
- Distributors and supply chain personnel use BI to find the most optimal delivery route and methods. For example, FreshDirect, a supermarket chain in the New York metro area, uses dashboards to track truck routes and determine aging of produce and alternate routes in severe traffic situations, such as when the president is in town.<sup>7</sup>

Operational business intelligence most differs from BI for management and control purposes in both the level of detail required and in the timeliness of the data. Operational BI may involve accessing a transaction system directly or through a data warehouse (see Chapter 2) that is updated in near real time multiple times throughout the day. Business intelligence for management and control purposes may also be in near real time, but can also be based on weekly or monthly data. The role that operational BI plays in decision-making and how successful BI companies are using it is discussed further in the section “Right-Time Data” in Chapter 8.

## BI for Process Improvement

The operations of a business are made up of dozens of individual processes. BI may support the decisions individuals make in every step of a process. It also may be used to help streamline a process by measuring how long subprocesses take and identifying areas for improvement. For example, manufacturing-to-shipment is one process. In the absence of business intelligence, a company may only realize there is a problem when a customer complains: “My order is late” or “I can get that product faster from your competitor.” By analyzing the inputs, the time, and the outputs for each step of the process, BI can help identify the process bottlenecks.

- Mail-order companies monitor the number of packages prepared by hour and day. Any changes in these metrics may lead to a process review to see how the workflow can be optimized.
- At an oil and gas company, cash flow was problematic. A review of the process showed that gas was being delivered to customers on time, but an invoice was only sent a week later. Reducing the time in the delivery-to-invoice process helped the company solve cash-flow problems. Business intelligence tools allowed the company to identify the



problem and then to ensure compliance with a new rule of invoicing within one day of delivery.

- Boeing uses near-real-time dashboards to track assembly of its 787 Dreamliners. The dashboards are visual representations of key assembly, shop order instance, status and critical production constraints, emergent process documents, and part shortages of each production aircraft.<sup>8</sup>

## BI to Improve Customer Service

The quality of customer service eventually manifests itself in the financials of a company. Business intelligence can help companies deliver high customer service levels by providing timely order processing, loan approvals, problem handling, and so on. For example:

- Whirlpool uses business intelligence to monitor its warranty program to understand root causes for warranty problems and improve customer satisfaction with its products.<sup>9</sup>
- United Airlines uses business intelligence to monitor how full business-class cabins are and to ensure its most valued customers receive complimentary upgrades when space permits.<sup>10</sup>
- FlightStats provides real-time travel information on delays so that if a passenger is en route and might miss a connecting flight, the travel agent can automatically rebook them.
- Netflix tracks how often a customer gets their first-choice DVD.<sup>11</sup>

## BI to Make the World Better

Business intelligence for management and control and performance improvement gets a fair amount of media attention. An increasingly important value in business intelligence, though, is in empowering people to improve the world.

- Police departments in Richmond, Virginia,<sup>12</sup> Charlotte, North Carolina,<sup>13</sup> and Humberside, England,<sup>14</sup> for example, have used business intelligence to help police officers respond better to call-outs and to reduce crime rates.
- School systems use business intelligence to understand the effects and trends in student test results and grades based on gender, attendance rates, and teaching methods.
- A number of hospitals, including Cleveland Clinic,<sup>15</sup> Barnes-Jewish Hospital in Missouri,<sup>16</sup> Seattle Children's Hospital, and many in



Northern New Jersey operated by Emergency Medical Associates, use business intelligence to reduce patient wait times, improve care, and manage costs.<sup>17</sup>

- The Austin, Texas, fire department uses dashboards to balance budget constraints while ensuring safety of its firefighters and citizens by monitoring response times to emergency calls.<sup>18</sup>
- Second Harvest Food Bank of Florida uses BI to track food donations, pantry levels, and community needs.<sup>19</sup>
- Medtronic, maker of medical devices such as pacemakers, uses BI to measure and monitor how its devices are improving the lives of its customers. Currently, every three seconds a person's life is saved or improved by a Medtronic device.<sup>20</sup>
- At the University of Ontario Institute of Technology, greater collection of streaming data in neonatal intensive care units allows real-time data on vital signs to save lives and to understand the interaction of infection, medication, and conditions like sleep apnea or irregular heartbeats.<sup>21</sup>

## BI in Sports, Politics, and Everyday Life

The book and subsequent movie *Moneyball* put a face to the concept of using data to gain a competitive advantage. At its heart is the idea of doing more with less. Without the same budget for salaries as the New York Yankees and Boston Red Sox, Oakland A's General Manager Billy Beane turned to deep data analysis to evaluate players and assemble the best possible team. Beane's approach, based on a statistical baseball practice known as *sabremetrics*, strives to assess talent by a number of metrics more complex than the high-level measures such as batting average, home runs, and earned run average. This pioneering approach challenged old-school thinking in which baseball executives and coaches relied on gut feel and surface metrics to put together a team by free-agent signings, trades, and call-ups of minor leaguers. As depicted in the film *Moneyball*, when the new approach seems to have the team continue on its losing streak, Beane's statistical colleague replies, "We don't have enough data... the sample size is too small." Frankly, as a BI practitioner, I would have caved at that point, no matter the sample size. It's a great scene that reflects the importance of staying the course, learning from mistakes, and trusting facts. Beane and the statistician proved they were right, statistically speaking. Beane was an early adopter of mining the rich troves of statistical data that's collected in major league baseball data to put together the best possible team, but such data analysis is increasingly common in all forms of sports.



For example, the NFL team the San Francisco 49ers announced it would be using iPads to collect and compare player data in real-time while scouts evaluate players at college visits. In European soccer, Chelsea Football club is using player data and statistics in its recruiting process.<sup>22</sup>

The value of big data is in its analysis, but it starts with the ability to collect more data, more rapidly. To that end, many runners now track their pacing and run data with an iPod armband and specialized wristwatches. Both Nike and Under Armour, for example, are developing clothing that captures athlete performance data.

Nate Silver, meanwhile, has become a kind of oracle for politics, sports, and gambling. He initially developed and sold a forecasting model to Baseball Prospectus to analyze and predict player performance.<sup>23</sup> In the 2008 presidential race, he correctly predicted the outcome for 49 out of 50 states, giving him mainstream recognition. In the 2012 presidential race, he correctly predicted the presidential race for all 50 states. ESPN acquired Silver's blog, FiveThirtyEight, from the *New York Times*.<sup>24</sup>

The Open Government Initiative set out by President Obama in 2008 required that the chief technology officer (CTO) and chief information officer (CIO) of the United States publish a dashboard that showed citizens the progress toward openness by each major federal agency. As part of that effort, more and more public data has been made directly accessible to citizens. While the raw data is often now available, I would argue that still so much more can be done to make it *useful*. Media outlets have been the first line in presenting public data in a more consumable form. A number of states in the United States have open data initiatives, allowing citizens to track everything from education progress to health patterns, crime rates, and economic issues.

## BI for Discovering New Business Opportunities

Business intelligence helps businesses assess and uncover new business opportunities by exploring data and testing theories. For example:

- Companies use data to understand the value proposition of pursuing joint ventures and mergers and acquisitions.
- A hospitality company uses business intelligence to explore hotel capacity rates as a way of developing the time-share business.



## The Business Intelligence Market

With business intelligence providing significant benefits across so many industries and all business functions, it's not surprising that BI has bubbled to the top of many companies' IT investment priorities. Many analyst firms and surveys cite BI as the number one or number two IT investment priority. From a market perspective, the business intelligence market (which includes the data warehouse platforms discussed in Chapter 2 and the front-end tools discussed in Chapter 3) is a \$34.9 billion market, according to analyst firm IDC.<sup>25</sup> Its growth rate for 2012 was 8.7 percent, a slowing down from 15% growth in 2011 and what had been double digits for many years. Even so, considering the global economic downturn and other information technology markets whose growth has been anemic, BI remains a hot software segment.

As a set of technologies, business intelligence emerged in the early 1990s. Of course, decision-making processes existed long before the information technology to support them. Historically, businesses could rely more on gut-feel decisions because they may have been closer to their customers and the products. The cost to support decisions with facts was high and usually involved gathering data manually. More recently, business and technology forces have converged to make business intelligence mission-critical and an essential part of doing business.





## Business Forces Driving BI

The business landscape has changed dramatically in the last 20 years. Many businesses now operate and compete on a global basis with 24/7 operations. The wealth of information at consumers' and businesses' fingertips puts greater pressure on pricing and makes customer churn a constant threat across industries. The pace of change is rapid. Companies compete on time-to-market and product innovations at a frenetic pace. With mobile phone apps, customers can be served up loyalty coupons the moment they enter a store. And if your store fails to have the best price or the right product on hand, comparison shopping is done in real time on the same device.

With the global financial crisis and numerous accounting scandals, shareholders demanded more transparency and accountability. The Sarbanes-Oxley Act of 2002 makes inaccurate financial reporting a criminal offense.

Businesses can't afford not to know what's going on, internally and externally, and in levels of detail never before imagined or required.

## Shift Within the Workforce

Changing workforce demographics also play a role in the growing use of business intelligence. A sizeable portion of senior managers did not grow up with computers. Technology for these people was once viewed with a wary eye. Giving workers too much access to information was often perceived as a threat to power. Data was something to be hoarded. Contrast that with schoolchildren today who learn the value of data analysis early by graphing demographics and sales data in spreadsheets to identify trends. College graduates newly entering the workforce grew up in a time when the Internet was becoming mainstream. They have never not had immediate access to data. Data analysis and business intelligence is increasingly standard curriculum in many MBA programs. Technology literacy is assumed, whether at work or play.

Social networking, initially embraced by generation Y, has raised people's expectations for self-assembled work teams and collaboration. Send someone a picture? Click! Share an article? Click. Contrast the immediacy of Facebook and Twitter with access to corporate data that usually involves applying for security, getting permission from the data owner, and so on. The next generation of workers is not accustomed to barriers to knowledge. This rise of social networking in the consumer



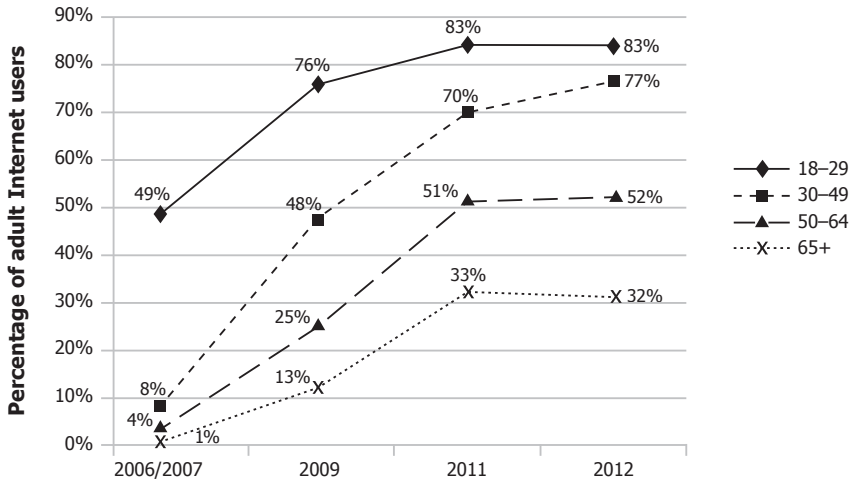


Figure 1-1 Use of social networking by generation

world is influencing the enterprise with a range of new applications geared toward the social enterprise.

Figure 1-1 shows the growing usage of social networking by age group, according to the Pew Research Center.<sup>26</sup> Notice that for workers under the age of 29, adoption is highest. More than 77 percent of workers under the age of 50 use social networking.

## Technology Changes Enabling BI

Rapid change in technology has been one driver of this frenetic pace of business change; it also has enabled business intelligence for everyone—all employees in a company, as well as external stakeholders—not just information technology experts, programmers, and power users. Figure 1-2 shows how technology and BI tools have changed over time to extend the reach of business intelligence.

There is one crucial aspect of extending the reach of business intelligence that has nothing to do with technology, and that is relevance. Understanding what information someone needs to do a job or to complete a task is what makes business intelligence *relevant* to that person. Much of business intelligence thus far has been relevant to power users and senior managers but not to frontline workers, customers, and suppliers.



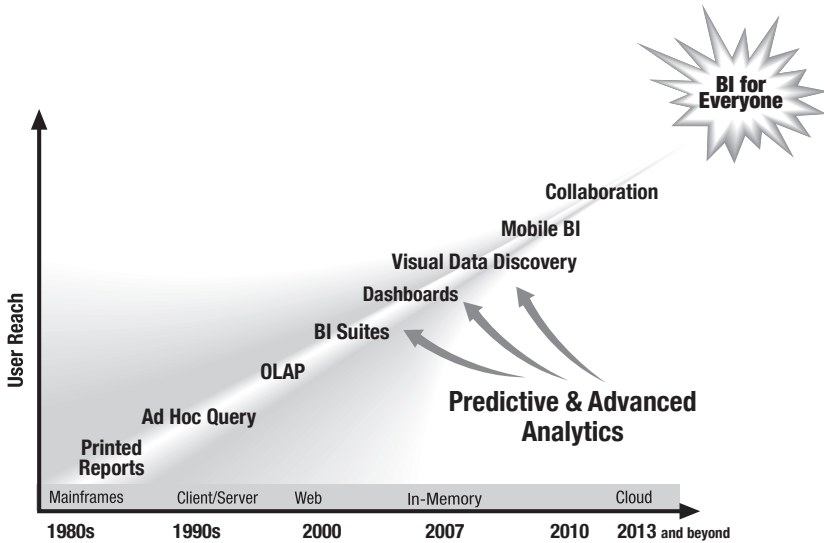


Figure 1-2 Evolution of BI technology

**Data Explosion Contributes to Information Overload** The volume of digital data has exploded. What once was handwritten or typed onto a piece of paper to process an order is now entered into a system with increasing detail. In 1990, only 1,000 terabytes (TB) of disk storage was sold worldwide. In 2012, an estimated 2.8 zettabytes (ZB) of digital information was created . . . the equivalent of 2.7 trillion GB (for the zero-challenged like myself, that's 12 zeros), according to IDC estimates.<sup>27,28</sup> Digitizing text, images, and video is not enough. That information also needs to be tagged and structured in a way that it can be used in analysis. Although we are capturing and storing vast volumes of information, only a small portion of data is ready for analysis.

The average manager spends two hours a day simply looking for data, and half of the information found is later determined to be useless.<sup>29</sup>

If you feel like you are drowning in information, it's because you are. You have to manage the data deluge and focus on a fast time to insight for optimum business value.

While data has gotten bigger, ensuring a fast time to insight has gotten harder. Researchers at one university have noted that when



decision-makers are presented with more data, decision-making is slowed.<sup>30</sup> We want to make a perfect decision and to be sure we have assessed every relevant input.



When business intelligence is deployed effectively, all that data becomes a strategic asset to be exploited. The proverbial needle in the haystack may be the single insight about a customer that locks in their loyalty. Or it may be the secret to lowering production costs.

**At the Speed of Thought** It might seem that with the explosion of data, accessing more data would get slower. Yet computer processing power and addressable memory have increased to the point that accessing large volumes of data can now be done at the speed of thought. Twenty years ago, you might have waited a month for a complex, printed report that ran on a mainframe computer for days. Ten years ago, that same report might have taken hours, a marginal improvement. Today, the same report may run in subseconds on a purpose-built business intelligence appliance and be delivered to a smartphone. The rise of in-memory computing as an analytic platform is discussed in Chapter 2.



**Cloud and Web-Based BI** Web-based business intelligence allows tools to be deployed across corporate intranets and extranets to thousands of employees and external customers in a matter of hours. With the client/server computing of the early 1990s, it took days to install and configure PCs for just a handful of users. The Web has simultaneously broadened the reach of BI while allowing IT to lower the cost of ownership of BI. The cloud has further allowed BI teams to spin up new data centers and application servers in a matter of hours. The cloud as an infrastructure and approach for applications such as Salesforce.com has shown that not all enterprise software needs to be installed on-premise. In the BI world, cloud is still in its infancy, but showing signs of momentum.

**BI Industry Consolidation** In 2007, Oracle acquired Hyperion, best known at the time for its performance management software and Essbase online analytical processing (OLAP) technology (defined in Chapter 3). This marked the beginning of a period of fierce industry consolidation, later followed by SAP's acquisition of Business Objects and IBM's of Cognos, both completed in early 2008. Industry consolidation raised both the level of awareness and conversations about business intelligence. What once may have been treated as optional and departmental was now viewed as part of the overall company infrastructure and as much more strategic. With larger-scale deployments and increasing data volumes, the analytic appliance market segment also went through a period of consolidation in 2010 with EMC acquiring Greenplum, IBM acquiring Netezza, Teradata acquiring AsterData, and HP acquiring Vertica.

**Evolution of BI Platforms and Tools** BI platforms include multiple front-end components, such as business query tools, dashboards, and visual data discovery (discussed in Chapter 3). These components are optimized for different users' needs and usage scenarios. Previously, companies had to buy these multiple modules from separate vendors. Interoperability was nonexistent, and the cost to deploy was high. As a single vendor now offers a full platform or suite—either from innovation or acquisition—the components are integrated from an infrastructure point of view. With broader capabilities on an integrated platform, business intelligence can reach more users based on their unique requirements. As BI platforms have gotten broader in their scope and capabilities, they are more often managed and owned by a central IT or a central BI team. This has sometimes made BI enhancements and improvements slow.



Somewhat in response to slow BI deliverables, visual data discovery tools have rapidly become synonymous with self-service BI and business agility. Their rapid growth has also been in part due to greater scalability of in-memory computing. This market segment is expected to grow at three times the pace of the overall BI market as illustrated by specialty vendors such as QlikTech and Tableau Software. In 2012, most BI platform vendors added visual data discovery to their tool portfolios.

Visual data discovery tools have reinvigorated and reengaged disillusioned business users who were frustrated by slow and monolithic solutions, but I can't help but think this is simply the BI pendulum swinging between line-of-business-led BI versus centralized, corporate BI. In the mid-1990s, much of the excitement about OLAP technologies, particularly Essbase (now Oracle) and Cognos PowerPlay (now IBM) was about that business unit autonomy. Users didn't have to go to IT to create a report; instead, they could load all that data into a cube and explore the information via a graphical user interface. When success grew like wildfire, IT was asked to support these OLAP deployments, which were forced to evolve to become more enterprise grade. That enterprise grade led to greater complexity and slower delivery times. Will the same happen with visual data discovery tools? Time will tell, but for now, I am hoping this generation of technology will strike that happy medium: for users to be agile and autonomous, with just enough control.

**Mobile BI** The wild success of the Apple iPad should serve as an important lesson for all BI evangelists: Nobody asked for a tablet computer. Instead, Apple identified some latent needs and an opportunity to bridge the portability and utility gap between a laptop and a smartphone. Some of the most successful BI applications have not been from a strict requirements document. Instead, they've been inspired from someone who believed in the value of data and saw a problem that BI could solve.

The Apple iPad was first released in June 2010. The iPad 3 was released in March 2012, selling three million units in three days, one of the most successful technology launches in the industry. It's being blamed for threatening the likes of such established companies as Dell, HP, and even Microsoft, as global PC shipments have declined. By 2014, analysts estimate that sales of tablet computers will be only 14 percent lower than that of personal computers.<sup>31</sup>

The iPad's influence in the BI space was initially with managers and executives. Portable dashboards, touch-enabled and simply beautiful on this new device, have re-engaged executives who have long sought an easier, more engaging BI interface. Vendors have scrambled to improve support for tablets, and the industry is once again debating the best



technology approach: native applications or HTML5. Anyone who bet on Adobe Flash or BlackBerry has suffered the consequences of changing technology and leadership. As the adoption of tablets has expanded beyond early adopters, it's enabled new classes of BI users who are mobile workers, particularly field sellers, technicians, and delivery personnel.

Extending BI and information to mobile workers and traveling executives has only further accelerated the pace of business as people are always connected, 24 hours a day, seven days a week.

**Open Source** Open-source software is software whose source code is made publicly available for others to extend and distribute.<sup>32</sup> The use of open-source software can both lower a company's cost of software, because a company is not paying a vendor for a license, and at the same time can speed innovation as the public enhances the software. Open source in the BI world has given rise to new companies such as Jaspersoft, Pentaho, and Talend, but it has also permeated many BI platforms. For example, the open-source database MySQL is now used as a BI repository for several vendors. The open-source search technology Lucene is leveraged in many BI vendors' search engines. And in the big data software segment, Hadoop is the leading open-source big data project.

**Social Networking** The data generated by social networking tools, whether Facebook, Twitter, or YouTube, has brought new data sources to be analyzed and contributed to the growth of big data. Furthermore, it's changed the expectations for how people want to work in a collaborative way. BI user interfaces have been influenced by social networking, bringing collaboration features into the BI platform.

## Battle Scars

Business intelligence is a catalyst for change. Anyone with a vested interest in preserving the status quo may not welcome a business intelligence initiative. Expect some battle scars. One CIO described his company's business intelligence initiative as an emotional process to get through, but necessary to execute the business's vision. Those who keep the value of business intelligence and the greater good of the company always in their vision will ultimately succeed.

Some of the BI battle scars include the following:

- Power struggles between IT and the business when either loses areas of control or disagrees on the scope and approach



- Jobs eliminated when custom report developers were no longer needed
- A marketing manager fired when a company realized just how badly the manager was performing campaign management
- Software and technology that does not always work as expected, and vendors who merge, get acquired, or change strategy in ways that affect your BI deployment

## The Research

As a consultant and industry analyst, I did not want only my own experiences, opinions, and customers to be the primary influence on identifying those aspects that most enable organizations to unleash the full potential of BI and big data. Instead, I wanted these lessons to come from a larger sample of visionary companies and survey respondents. The research for this book then had four main components: a survey, in-depth case studies, a review of literature on award winners and early adopters of big data, and my own insights. In addition to consulting on this topic, I have judged The Data Warehousing Institute (TDWI) Best Practices awards for multiple years and teach a course on the topic at their conferences.

## The Successful BI Survey

The Successful BI survey was conducted in June through September 2012, with 634 qualified respondents. Survey demographics are included in Appendix A. The survey was promoted through TDWI newsletters and articles, *Information Week* newsletters, BI Scorecard newsletters, and social media.

**Survey Demographics** There were 634 qualified responses, from a mixture of large companies (36 percent of respondents) with annual revenues greater than \$1 billion, medium-sized companies (27 percent), and small businesses (26 percent).

The majority of survey responses were from the United States (67 percent), followed by Europe (14 percent), Asia/Pacific (10 percent), and Canada (3 percent).

In terms of functional area, the largest percentage of survey respondents came from corporate IT (43 percent), with responses from a mixture of other functional areas. When asked to describe their role within the company, 24 percent described themselves as a hybrid business/IT person, and another 13 percent were business users.

Survey respondents came from a mix of industries.



## The Successful BI Case Studies

Surveys are an ideal method for providing statistical information on trends and insights for explicit questions. However, if the survey fails to pose a question or provide a ranking option as to something that contributed to a success or failure, such omissions can mask the true drivers of success. As a way of unearthing these drivers, I scanned the market for companies consistently recognized for their business intelligence initiatives and honored by magazines, industry analysts, and software vendors. Such industry recognition, though, is often a self-selecting process: If a company does not submit an application or call for presentation, analyst firms and magazines are not aware of their achievements. As a way of addressing this limitation, I looked through years of notes from the dozens of industry conferences I attend each year for companies who had wowed me with their stories. I also investigated companies who were recognized for their sustained business value in books and lists such as *Good to Great* and *Fortune's* fastest-growing companies to understand what role business intelligence played in their company's success. As big data is a theme to the second edition of this book, I looked for companies that were investigating and deploying new technologies in this area.

For in-depth case studies, I pruned the list to a cross-section of industries, company sizes, BI applications, and technology used. The final list of companies highlighted in depth in this book are leaders in business intelligence whose BI initiative has had a significant impact on business performance and who could speak officially about their experiences. Throughout the book, I refer collectively to this final group as the "Successful BI Case Studies." It is a term that some are uncomfortable with; they argue they have not achieved all that is possible. Several, in fact, purposely elect not to apply for any industry awards for this reason. Some of the case studies may not be award winners, but I have included them because of their unique stories and the profound impact BI has had on their companies.

- **1-800 CONTACTS** The company won TDWI's Best Practices Award for BI on a Limited Budget, demonstrating that BI does not have to be expensive. While many companies start with BI in finance and marketing, 1-800 CONTACTS began their BI efforts with front-line workers in their call centers. 1-800 CONTACTS was profiled in the first edition of the book and was since acquired by WellPoint, a health benefits company.



- **Constant Contact** As a small business owner, I have been using Constant Contact for email marketing for ten years. The company has experienced rapid growth and now handles email marketing for more than 500,000 businesses. Their initial product of email marketing has expanded to any tool that facilitates customer engagement including social networking, event management, and digital storefronts. Their use of BI has evolved too to include self service, an analytic appliance, and Hadoop with the goal of improving the time to insight.
- **The Dow Chemical Company** While Dow has received some vendor recognition awards, they are quite humble and quiet about their BI achievements. It's rare to hear them speak at an industry conference. I began my career in business intelligence at Dow, and while I have been privileged to work with a number of visionary customers throughout my consulting career, I continue to refer back to some of the best practices garnered from Dow's business intelligence project. Dow was profiled in the first edition of the book, and since that time has gone through another major acquisition of Rohm & Haas and is on its next-generation BI architecture.
- **Emergency Medicine BI (EMBI)** Emergency Medicine BI is an evolution from a project that started at Emergency Medical Associates (EMA). This company provides dashboards to emergency room physicians, nurses, and administrators to improve patient care, manage wait times, and control costs.
- **FlightStats** This company was profiled in the first edition of the book when it was in its early stages of its business intelligence journey. Having demonstrated success with internal customers, they now have a large scale solution for consumers leveraging big data, open source, and mobile. FlightStats is a unique company whose entire business model is based on business intelligence.
- **Learning Circle** Learning Circle helps school districts and communities analyze data to improve student outcomes. I heard representatives from Nationwide Insurance, who sponsored the initiative that evolved to an independent nonprofit organization, speak at an Information Builders conference several years ago, with a lofty vision of improving inner-city high school graduation rates, then at 50 percent. As a parent and believer in the value of education, their vision and journey inspired me. The initial project has expanded to other school districts and communities and is a clear case of BI making the world a better place.



- **Macy's** I confess, I don't like to shop. Oh, I love gorgeous clothes all right, but the process of shopping is not my idea of fun. Call me a female anomaly or just plain busy! This retailer caught my attention at a Tableau user conference, with some innovative analysis of big data and social data. This company also most reflects that investments in BI and, in particular big data, sometimes require a leap of faith.
- **Medtronic** Medtronic is the world's largest medical device manufacturer. I first met BI team members back in 2008 when they were evaluating visual data discovery tools to complement their BI platform. Then in 2012, during an SAP Sapphire keynote, Medtronic's early adoption of in-memory and text analytics was mentioned as a way of mining data that previously had been inaccessible. Few companies are able to access and analyze what some refer to as "dark data," data that is collected but not structured in a way that allows for analysis. Medtronic is ahead of the industry in its efforts to do so.
- **Netflix** Movie watching has never been more cutthroat, with more choices for DVD viewing and streaming of movies, TV shows, and now Netflix-original content. I first met Netflix at a TDWI chapter meeting and at several MicroStrategy conferences. As content viewing has moved from disc to streaming, their use of the cloud to deliver content is bleeding edge.
- **Norway Post** I was honored to meet Norway Post at Hyperion's 2005 user conference. The story of their transformation from a public entity, with both terrible financial performance and poor customer service, to a private postal service with stellar performance is at times equally painful and inspiring. Just how bad it was and how far it has come serves as a lesson that no matter how conservative a company or the industry in which you operate, having a solid business intelligence platform and performance oriented culture can lead to incredible success. This case study was in the book's first edition. As many of the original BI team members have moved on, I have made only minor updates to this case study.

To gather these stories, I relied on open-ended questions as to how successful they considered their business intelligence initiative, how much it contributed to business performance, and to what they attributed their ultimate success and interim failures. In studying these companies, I asked to speak to the usual suspects—BI program managers, sponsors, and users—but in addition, I asked to speak to the skeptics who did not believe in the value of business intelligence or who resisted using the solution internally. What would it take for them



to use business intelligence? Finally, while all the companies could cite measurable business benefits from the use of business intelligence, we analyzed how and if these business benefits were reflected in various performance measures such as financial reports, or in the case of Learning Circle, state published school report cards.

Without the time and insights these companies willingly shared, this book would not have been possible. I, and no doubt, the business intelligence community, thank them for letting us learn from their lessons!

**Where Are They Now?** If you read the first edition of this book, you might be wondering what happened to some of those initial case study companies.

- **Corporate Express** Corporate Express was acquired by Staples in 2008, and most of my contacts for the original case study have moved onto other companies.
- **Continental Airlines** Continental Airlines was acquired by United Airlines in 2010. Since that time, their customer service measures have gone from first to worst. In talking to some members of the original BI team, they lamented the culture clash of United's waterfall approach to development versus Continental's agile approach. A number of those key members eventually left the company. United is clearly mid-journey in its integration, but is not at a point that reflects an effective use of data.

## Then and Now

When I looked back at the 2007 edition of this book, at the time, many BI practitioners were frustrated by business stakeholders who didn't understand the real value of business intelligence. Others cited the greatest challenge as being not in the data warehouse or in BI tools, but rather, in the 100+ source systems and the frequency with which source systems change.

Fast forward six years to 2013, and the challenges have shifted. Today, most BI projects have strong executive sponsorship (see Chapter 6), but the influence of culture seems to be playing a bigger role between moderate and wild success. The pace of change and users' voracious appetite for new data and new capabilities is outpacing the bandwidth of many BI teams. As a fallout of the great recession, cost as a concern has displaced the notions of control and integration. More visionary, nimble BI teams are looking to new technologies, such as the cloud, open source, in-memory computing, and solutions from startups, to help them respond faster and cheaper.



## Best Practices for Successful Business Intelligence

Based on this research, following are the top ten secrets to successful business intelligence and unlocking the full value of BI and big data. Some of these items are not secrets at all. In fact, they are such well-known drivers of BI success that some practitioners will walk away from projects that do not, for example, have executive-level sponsorship. The secret then is not always in the *what*, but rather, in the *how*—how to get and keep executive-level sponsorship, how to foster an analytic culture, or how to organize BI teams for better business alignment.

- Measure success in multiple ways, using objective measures when available and recognizing the importance of benefits that cannot be readily quantified.
- Understand the effect of Luck, Opportunity, Frustration, and Threat (LOFT) to catapult your BI initiative from moderate success to wild success. Use the LOFT effect to identify BI applications that address your organizations biggest pain points, biggest opportunities, or biggest threats.
- Garner executive support to ensure BI infiltrates all corners of an organization to provide competitive advantage and business value. Use the executive support to foster an analytic culture. Openly sharing data about poor performance takes a strong executive who needs to support those who so bravely share bad news and second guess decisions not based on facts.
- Align the BI strategy with the goals of the business by ensuring IT and business personnel work more as partners and less as adversaries.
- Start with a solid data foundation and add to it incrementally and continuously to improve the quality, breadth, and timeliness of data. Recognize that data does not have to be perfect to be useful.
- Evangelize the use of BI and find the relevance for BI for every worker in the company, as well as for customers and suppliers.
- Use agile development processes to deliver BI capabilities and improvements at a pace commensurate with the pace of business change.
- Organize BI teams and experts for success and build a solution that balances departmental needs while maximizing economies of scale of an enterprise solution.
- Choose appropriate BI tools that meet the user and business needs and that work within the technology standards that IT can effectively support.



- There are several other secrets, such as embracing innovation, promoting your successes and the applications, and investing in training.
- Deal with the present and be pragmatic in your approach, but keep an eye to the future of where you want to take your BI and big data analytic capabilities. Monitor your evolution and maturity across the various factors for impact.