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| **1**  **1**  **CHAPTER** | An Overview of Business Intelligence, Analytics, and Data Science |

Learning Objectives for Chapter 1

* Understand today’s turbulent business environment and describe how organizations survive and even excel in such an environment (solving problems and exploiting opportunities)
* Understand the need for computerized support of managerial decision making
* Recognize the evolution of such computerized support to the current state—analytics/data science
* Describe the business intelligence (BI) methodology and concepts
* Understand the various types of analytics, and see selected applications
* Understand the analytics ecosystem to identify various key players and career opportunities

# CHAPTER OVERVIEW

The business environment (climate) is constantly changing, and it is becoming more and more complex. Organizations, both private and public, are under pressures that force them to respond quickly to changing conditions and to be innovative in the way they operate. Such activities require organizations to be agile and to make frequent and quick strategic, tactical, and operational decisions, some of which are very complex. Making such decisions may require considerable amounts of relevant data, information, and knowledge. Processing these, in the framework of the needed decisions, must be done quickly, frequently in real time, and usually requires some computerized support.

This book is about using business analytics as computerized support for managerial decision making. It concentrates on the theoretical and conceptual foundations of decision support, as well as on the commercial tools and techniques that are available. This book presents the fundamentals of the techniques and the manner in which these systems are constructed and used. We follow an EEE approach to introducing these topics: Exposure, Experience, and Explore. The book primarily provides exposure to various analytics techniques and their applications. The idea is that a student will be inspired to learn from how other organizations have employed analytics to make decisions or to gain a competitive edge. We believe that such exposure to what is being done with analytics and how it can be achieved is the key component of learning about analytics. In describing the techniques, we also introduce specific software tools that can be used for developing such applications. The book is not limited to any one software tool, so the students can experience these techniques using any number of available software tools. We hope that this exposure and experience enable and motivate readers to explore the potential of these techniques in their own domain. To facilitate such exploration, we include exercises that direct the reader to Teradata University Network (TUN) and other sites that include team-oriented exercises where appropriate.

This introductory chapter provides an introduction to analytics as well as an overview of the book. The chapter has the following sections:

# CHAPTER OUTLINE

1.1 Opening Vignette: Sports Analytics—An Exciting Frontier for Learning and Understanding Applications of Analytics

1.2 Changing Business Environments and Evolving Needs for Decision Support and Analytics

1.3 Evolution of Computerized Decision Support to Analytics/Data Science

1.4 A Framework for Business Intelligence

1.5 Analytics Overview

1.6 Analytics Examples in Selected Domains

1.7 A Brief Introduction to Big Data Analytics

1.8 An Overview of the Analytics Ecosystem

1.9 Plan of the Book

1.10 Resources, Links, and the Teradata University Network Connection

# TEACHING TIPS/ADDITIONAL INFORMATION

The purpose of any introductory chapter is to motivate students to be interested in the remainder of the course (and book). The real-life cases, beginning with Magpie Sensing and continuing with the others, will show students that business intelligence is not just an academic subject; it is something real companies use that makes a noticeable difference to their bottom line. So, try to relate the subject matter to these cases. For example, consider the types of actions managers take to counter pressures, especially the list of organizational responses. The opening case about Magpie illustrates several of the options available to health care companies, such as innovation, partnerships with others in the cold chain, and the use of IT to improve data access. The other cases in the chapter offer other examples of managerial actions taken in response to pressure. By referring back to this list when discussing other cases, you demonstrate the unity of the analytics field.

All this should show students that a new professional who understands how information systems can support decision making, and can help his or her employer obtain those benefits, has a bright career path. Since students in this course are typically within a year of graduation, that will get their attention!

# ANSWERS TO END OF SECTION REVIEW QUESTIONS

Section 1.1 Review Questions

1. What are three factors that might be part of a PM for season ticket renewals?

The case provides several examples of data that may be used as a part of this analysis. Data factors may include survey responses, pricing models, and customer tweets.

2. What are two techniques that football teams can use to do opponent analysis?

In the example provided, opponent analytics was evaluated using the coach’s annotated game film to produce an analysis evaluating whether to build a cascaded decision tree model on play prediction, heat maps of passing offenses, and time series analytics on explosive plays.

3. How can wearables improve player health and safety? What kinds of new analytics can trainers use?

The case provides several examples of how wearables can be used to improve player health. Wearables can help to identify levels and variation in core body strength, mobile devices worn during play can record data on hits to assist in concussion protocols, and sleeps sensors can identify how rested players are.

4. What other analytics applications can you envision in sports?

Student responses will vary, but many potential examples are possible. Some include tracking performance over time or location.

Section 1.2 Review Questions

1. What are some of the key system-oriented trends that have fostered IS-supported decision making to a new level?

Improvements and innovation in systems in many areas have facilitated the growth of decision-making systems. These areas include:

* Group communication and collaboration software and systems
* Improved data management applications and techniques
* Data warehouses and Big Data for information collection
* Analytical support systems
* Growth in processing and storing formation storage capabilities
* Knowledge management systems
* Support of all of these systems that is always available

2. List some capabilities of information systems that can facilitate managerial decision making.

Information systems can aid decision making because they have the ability to perform functions that allow for better communication and information capture, better storage and recall of data, and vastly improved analytical models that can be more voluminous or more precise.

3. How can a computer help overcome the cognitive limits of humans?

Computer-based systems are not limited in many of the ways people are, and this lack of limits allows unique abilities to evaluate data. Examples of abilities include being able to store huge amounts of data, being able to run extensive numbers of scenarios and analyses, and the ability to spot trends in vast datasets or models.

Section 1.3 Review Questions

1. List three of the terms that have been predecessors of analytics.

Analytics has evolved from other systems over time including data support systems (DSS), operations research (OR) models, and expert systems (ES).

2. What was the primary difference between the systems called MIS, DSS, and Executive Support Systems?

Many systems have been used in the past and present to provide analytics. Management information systems (MIS) provided reports on various aspects of business functions using captured information while decision support systems (DSS) added the ability to use data with models to address unstructured problems. Executive support systems (ESS) added to these abilities by capturing understanding from experts and integrating it into systems via if-then-else rules or heuristics.

3. Did DSS evolve into BI or vice versa?

DSS systems became more advanced in the 2000s with the addition of data warehousing capabilities and began to be referred to as Business Information (BI) systems.

Section 1.4 Review Questions

1. Define BI.

*Business Intelligence* (BI) is an umbrella term that combines architectures, tools, databases, analytical tools, applications, and methodologies. Its major objective is to enable interactive access (sometimes in real time) to data, enable manipulation of these data, and provide business managers and analysts the ability to conduct appropriate analysis.

**2.** List and describe the major components of BI.

BI systems have four major components: the data warehouse (with its source data), business analytics (a collection of tools for manipulating, mining, and analyzing the data in the data warehouse), business performance management (for monitoring and analyzing performance), and the user interface (e.g., a dashboard).

1. Define OLTP.

OLTP (online transaction processing) is a type of computer processing where the computer responds immediately to user requests. Each request is considered to be a *transaction*, which is a computerized record of a discrete event, such as the receipt of inventory or a customer order.

1. Define OLAP.

OLAP (online analytical processing) is processing for end-user ad hoc reports, queries, and analysis. Separating the OLTP from analysis and decision support provided by OLAP enables the benefits of BI that were described earlier and provides for competitive intelligence and advantage as described next.

**5.** List some of the implementation topics addressed by Gartner’s report.

Gartner’s framework decomposes planning and execution into *business*, *organization*, *functionality*, and *infrastructure* components. At the business and organizational levels, strategic and operational objectives must be defined while considering the available organizational skills to achieve those objectives. Issues of organizational culture surrounding BI initiatives and building enthusiasm for those initiatives and procedures for the intra-organizational sharing of BI best practices must be considered by upper management—with plans in place to prepare the organization for change.

**6.** List some other success factors of BI.

If the company’s strategy is properly aligned with the reasons for DW and BI initiatives, and if the company’s IS organization is or can be made capable of playing its role in such a project, and if the requisite user community is in place and has the proper motivation, it is wise to start BI and establish a BI Competency Center (BICC) within the company. The center could serve some or all of the following functions.

* The center can demonstrate how BI is clearly linked to strategy and execution of strategy.
* A center can serve to encourage interaction between the potential business user communities and the IS organization.
* The center can serve as a repository and disseminator of best BI practices between and among the different lines of business.
* Standards of excellence in BI practices can be advocated and encouraged throughout the company.
* The IS organization can learn a great deal through interaction with the user communities, such as knowledge about the variety of types of analytical tools that are needed.
* The business user community and IS organization can better understand why the data warehouse platform must be flexible enough to provide for changing business requirements.
* It can help important stakeholders like high-level executives see how BI can play an important role.

Another important success factor of BI is its ability to facilitate a real-time, on-demand agile environment.

Section 1.5 Review Questions

**1.** Define *analytics*.

The term replaces terminology referring to individual components of a decision support system with one broad word referring to business intelligence. More precisely, analytics is the process of developing actionable decisions or recommendations for actions based upon insights generated from historical data. Students may also refer to the eight levels of analytics and this simpler descriptive language: “looking at all the data to understand what is happening, what will happen, and how to make the best of it.”

**2.** What is descriptive analytics? What are the various tools that are employed in descriptive analytics?

Descriptive analytics refers to knowing what is happening in the organization and understanding some underlying trends and causes of such occurrences. Tools used in descriptive analytics include data warehouses and visualization applications.

**3.** How is descriptive analytics different from traditional reporting?

Descriptive analytics gathers more data, often automatically. It makes results available in real time and allows reports to be customized.

**4.** What is a DW? How can data warehousing technology help to enable analytics?

A data warehouse, introduced in Section 1.7, is the component of a BI system that contains the source data. As described in this section, developing a data warehouse usually includes development of the data infrastructure for descriptive analytics—that is, consolidation of data sources and making relevant data available in a form that enables appropriate reporting and analysis. A data warehouse serves as the basis for developing appropriate reports, queries, alerts, and trends.

**5.** What is predictive analytics? How can organizations employ predictive analytics?

Predictive analytics is the use of statistical techniques and data mining to determine what is likely to happen in the future. Businesses use predictive analytics to forecast whether customers are likely to switch to a competitor, what customers are likely to buy, how likely customers are to respond to a promotion, and whether a customer is creditworthy. Sports teams have used predictive analytics to identify the players most likely to contribute to a team’s success.

**6.** What is prescriptive analytics? What kind of problems can be solved by prescriptive analytics?

Prescriptive analytics is a set of techniques that use descriptive data and forecasts to identify the decisions most likely to result in the best performance. Usually, an organization uses prescriptive analytics to identify the decisions or actions that will optimize the performance of a system. Organizations have used prescriptive analytics to set prices, create production plans, and identify the best locations for facilities such as bank branches.

**7.** Define modeling from the analytics perspective.

As Application Case 1.6 illustrates, analytics uses descriptive data to create models of how people, equipment, or other variables operate in the real world. These models can be used in predictive and prescriptive analytics to develop forecasts, recommendations, and decisions.

**8.** Is it a good idea to follow a hierarchy of descriptive and predictive analytics before applying prescriptive analytics?

As noted in the analysis of Application Case 1.5, it is important in any analytics project to understand the business domain and current state of the business problem. This requires analysis of historical data, or descriptive analytics. Although the chapter does not discuss a hierarchy of analytics, students may observe that testing a model with predictive analytics could logically improve prescriptive use of the model.

**9.** How can analytics aid in objective decision making?

As noted in the analysis of Application Case 1.4, problem solving in organizations has tended to be subjective, and decision makers tend to rely on familiar processes. The result is that future decisions are no better than past decisions. Analytics builds on historical data and takes into account changing conditions to arrive at fact-based solutions that decision makers might not have considered.

Section 1.6 Review Questions

1. Why would a health insurance company invest in analytics beyond fraud detection? Why is it in their best interest to predict the likelihood of falls by patients?

An insurance company would potentially want to evaluate analytics to both quantify the risk of a potential incident category (like falls) and to help identify subgroups of the population that are at-risk for this type of injury. With this type of information, the company can address clients who might be at-risk, and attempt to intervene with less expensive preventative measures.

2. What other applications similar to prediction of falls can you envision?

Student responses will vary, but could include a number of other medical conditions or types of accidents.

3. How would you convince a new health insurance customer to adopt healthier lifestyles (Humana Example 3)?

Student responses will vary, but may focus on improved customer education that is targeted at specific risk factors as well as financial or benefit inducements tied to positive changes in lifestyle.

4. Identify at least three other opportunities for applying analytics in the retail value chain beyond those covered in this section.

Many potential opportunities exist, and student responses will vary based on their experiences.

5. Which retail stores that you know of employ some of the analytics applications identified in this section?

Student responses will vary based on the retail establishments they are familiar with and the applications used at the time.

Section 1.7 Review Questions

**1.** What is Big Data analytics?

The term *Big Data* refers to data that cannot be stored in a single storage unit. Typically, the data is arriving in many different forms, be they structured, unstructured, or in a stream. Big Data analytics is analytics on a large enough scale, with fast enough processing, to handle this kind of data.

**2.** What are the sources of Big Data?

Major sources include clickstreams from Web sites, postings on social media, and data from traffic, sensors, and the weather.

**3.** What are the characteristics of Big Data?

Today Big Data refers to almost any kind of large data that has the characteristics of volume, velocity, and variety. Examples include data about Web searches, such as the billions of Web pages searched by Google; data about financial trading, which operates in the order of microseconds; and data about consumer opinions measured from postings in social media.

**4.** What processing technique is applied to process Big Data?

One computer, even a powerful one, could not handle the scale of Big Data. The solution is to push computation to the data, using the MapReduce programming paradigm.

Section 1.8 Review Questions  
  
1. List the 11 categories of players in the analytics ecosystem.

These categories include:

* Data Generation Infrastructure Providers
* Data Management Infrastructure Providers
* Data Warehouse Providers
* Middleware Providers
* Data Service Providers
* Analytics Focused Software Developers
* Application Developers: Industry Specific or General
* Analytics Industry Analysts and Influencers
* Academic Institutions and Certification Agencies
* Regulators and Policy Makers
* Analytics User Organizations

2. Give examples of companies in each of the 11 types of players.

Examples of companies by area include:

* Data Generation Infrastructure Providers (Sports Sensors, Zepp, Shockbox, Advantech B+B SmartWorx, Garmin, and Sensys Network, Intel, Microsoft, Google, IBM, Cisco, Smartbin, SIKO Products, Omega Engineering, Apple, and SAP)
* Data Management Infrastructure Providers (Dell NetApp, IBM, Oracle, Teradata, Microsoft, Amazon (Amazon Web Services), IBM (Bluemix), Salesforce.com, Hadoop clusters, MapReduce, NoSQL, Spark, Kafka, Flume)
* Data Warehouse Providers (IBM, Oracle, Teradata, Snowflake, Redshift, SAS, Tableau)
* Middleware Providers (Microstrategy, Plum, Oracle, SAP, IBM, SAS, Tableau, and many more)
* Data Service Providers (Nielsen, Experian, Omniture, Comscore, Google, Equifax, TransUnion, Acxiom, Merkle, Epsilon, Avention, ESRI.org)
* Analytics Focused Software Developers (Microsoft, Tableau, SAS, Gephi, IBM, KXEN, Dell, Salford Systems, Revolution Analytics, Alteryx, RapidMiner, KNIME, Rulequest, NeuroDimensions, FICO, AIIMS, AMPL, Frontline, GAMS, Gurobi, Lindo Systems, Maximal, NGData, Ayata, Rockwell, Simio, Palisade, Frontline, Exsys, XpertRule, Teradata, Apache, Tibco, Informatica, SAP, Hitachi)
* Application Developers: Industry Specific or General (IBM, SAS, Teradata, Nike, Sportsvision, Acxiom, FICO, Experian, YP.com, Towerdata, Qualia, Simulmedia, Shazam, Soundhound, Musixmatch, Waze, Apple, Google, Amazon, Uber, Lyft, Curb, Ola, Facebook, Twitter, LinkedIn, Unmetric, Smartbin)
* Analytics Industry Analysts and Influencers (Gartner Group, The Data Warehousing Institute, Forrester, McKinsey, INFORMS, AIS, Teradata, SAS)
* Academic Institutions and Certification Agencies (IBM, Microsoft, Microstrategy, Oracle, SAS, Tableau, Teradata, INFORMS
* Regulators and Policy Makers (Federal Communications Commission, Federal Trade Commission, International Telecommunication Union, National Institute of Standards and Technology)
* Analytics User Organizations (many topic-specific and local groups)

3. Which companies are dominant in more than one category?

It appears that several larger IT companies have products and services in several of these areas. Examples include IBM, Microsoft, SAS, Dell, and SAP.

4. Is it better to be the strongest player in one category or be active in multiple categories?

Student opinions will vary. It can be argued that cross-discipline strength provides better integration and insight, or that that domination in multiple areas reduces completion or innovation.

ANSWERS TO APPLICATION CASE QUESTIONS FOR DISCUSSION

Application Case 1.1: Sabre Helps Its Clients Through Dashboards and Analytics

**1.** What is traditional reporting? How is it used in the organization?

The traditional reporting process is a manual process of collecting and aggregating financial and other information. Organizations have used this time-consuming process as a way to obtain information for making decisions. However, the resulting presentations may be flat, slow to develop, and difficult to apply to specific situations.

**2.** How can analytics be used to transform traditional reporting?

Analytics can enable real-time decision support and deliver information to a user-friendly dashboard. Users of a dashboard such as the one provided by Sabre’s Enterprise Travel Data Warehouse can see at a glance a 360-degree view of the company’s overall health generated from various data sources. Many stakeholders in the organization can request data needed for particular types of decisions, and the graphical user interface makes the information easily understandable.

**3.** How can interactive reporting assist organizations in decision making?

When a system incorporates interactive drill-down capabilities, users can select the data they need for evaluating a specific kind of performance and making decisions in a particular function or situation. For example, the airlines using the Sabre system can focus on data about sales performance (ticketing, seats sold, etc.) and operational performance (flight movement, inventory, etc.). This flexibility encourages decision makers to use data in support of their decisions.

Application Case 1.2: Silvaris Increases Business with Visual Analysis and Real-Time Reporting Capabilities

**1.** What was the challenge faced by Silvaris?

Because of the fast-paced nature of the industry, it was necessary to create a system that provided real-time information that was coupled with its existing systems.

**2.** How did Silvaris solve its problem using data visualization with Tableau?

The use of Tableau allowed them to create real-time visualizations of data without creating a separate reporting system.

Application Case 1.3: Siemens Reduces Cost with the Use of Data Visualization

**1.** What challenges were faced by Siemens’ visual analytics group?

The group was tasked with creating comprehensive reporting systems that were to be used across multiple internal groups and systems.

**2**. How did the data visualization tool Dundas BI help Siemens in reducing cost?

The solution allowed Siemens to use multiple data dashboards that could assist users in identifying issues early, so they could be quickly addressed.

Application Case 1.4: Analyzing Athletic Injuries

**1.** What types of analytics are applied in the injury analysis?

The analytics used data about the type of injury, action taken, healing start and end dates, players’ position, activity, onset, and game location. The data were used to classify healing time into five periods and to associate healing time with players’ positions, severity of injury, and treatment offered. That provided information for creating neural network models using player and injury data to predict healing time in terms of the five categories.

**2.** How do visualizations aid in understanding the data and delivering insights into the data?

Visualizations provide a great tool for gaining the initial insights into data, which can be further refined based on expert opinions. Visualizations also aid in generating ideas for obscured business problems, which can be pursued in building predictive models.

**3.** What is a classification problem?

Classification is a technique used in developing predictive analytical applications. In this example, various kinds of data, such as severity of injury and healing time, were classified for purposes of making decisions about how to handle injuries and which players might be available to play in the future.

**4.** What can be derived by performing sequence analysis?

Drawing sequence rules can predict the relationship among types of data—in this case, the relationship among the injuries and the various body parts afflicted with injuries.

Application Case 1.5: A Specialty Steel Bar Company Uses Analytics to Determine Available-to-Promise Dates

**1**. Why would reallocation of inventory from one customer to another be a major issue for discussion?

This would be an important consideration because of promised delivery times, and potential penalties if deliveries were missed for existing/previous customers.

2. How could a DSS help make these decisions?

A DSS would have the ability to examine all current stocks of goods (as well as incoming stocks) and perform cost-benefit analysis on potential changes to existing delivery promises.

Application Case 1.6: CenterPoint Energy Uses Real-Time Big Data Analytics to Improve Customer Service

**1.** How can electric companies predict possible outage at a location?

By tracking the status of hardware, it may be possible to identify issues or clusters of issues that statistically may predict outages.

**2.** What is customer sentiment analysis?

Customer sentiment analysis categorizes and evaluates customer opinion by types of emotion.

**3.** How does customer sentiment analysis help companies provide a personalized service to their customers?

By understanding customer sentiment, the company is able to customize communications to customers.

ANSWERS TO end of chapter QUESTIONS FOR DISCUSSION

1. Survey the literature from the past six months to find one application each of DSS, BI, and analytics. Summarize the applications on one page and submit it with the exact sources.

There is no single correct answer to this question. Answers will depend on when the question is posed and on the student’s online or library search strategy. The correctness of an answer can be evaluated by examining the sources cited in it or submitted with it.

1. Distinguish BI from DSS.
   * BI uses a data warehouse, whereas DSS can use any data source (including a data warehouse).
   * Most DSS are built to support decision making directly, whereas most BI systems are built to provide information which it is believed will lead to improved decision making.
   * BI has a strategy/executive orientation whereas DSS are usually oriented toward analysts.
   * BI systems tend to be developed with commercially available tools, whereas DSS tend to use more custom programming to deal with problems that may be unstructured.
   * DSS methodologies and tools originated largely in academia, whereas BI arose largely from the software industry. Many BI tools, such as data mining and predictive analysis, have come to be considered DSS tools as well.
2. Compare and contrast predictive analytics with predictive and descriptive analytics. Use examples.

Predictive analytics is the use of statistical techniques and data mining to determine what is likely to happen in the future. For example, an airline might use predictive analytics to forecast the impact on sales and profits if it raises baggage fees by $10. It applies information from descriptive analytics, applying historical or real-time data to know what is happening in the organization and understand some underlying trends and causes of such occurrences. In the airline example, descriptive analytics would include data about ticket prices, baggage fees, ticket sales, baggage volume, and so on, applied to find relationships among these variables. Predictive analytics may be applied to prescriptive analytics, which is a set of techniques that use descriptive data and forecasts to identify the decisions most likely to result in the best performance. For example, predictive analytics could forecast the impact on profits of different baggage fees. It might show, for example, that raising baggage fees by $5 will lead to the greatest profits after the airline takes into account fee revenues, ticket sales, the amount of baggage carried, and the cost to transport the baggage. (Students may use different examples, as long as they illustrate the definitions.)

1. Discuss the major issues in implementing BI.

Major issues in implementing BI are:

* Properly appreciating the different classes of potential users of the BI applications.
* Properly aligning BI with the business strategy.
* Developing BI applications that meet users’ needs for real-time, on-demand capabilities.
* Determining whether to develop or acquire BI systems, and how to do so.
* Justifying the BI investment using cost-benefit analysis.
* Insuring the security and privacy protection
* Integrating BI applications with organizational systems, databases, and e-commerce.

ANSWERS TO END OF CHAPTER Exercises • •

Teradata University Network and Other Hands-On Exercises

1. Go to teradatauniversitynetwork.com. Using the site password your instructor provides, register for the site if you have not already previously registered. Log on and learn the content of the site. You will receive assignments related to this site. Prepare a list of 20 items on the site that you think could be beneficial to you.

Student responses will vary.

1. Go to the TUN site. Explore the Sports Analytics page, and summarize at least two applications of analytics in any sport of your choice.

Student responses will vary.

1. Enter the TUN site, and select “Cases, Projects, and Assignments.” Then select the case study “Harrah’s High Payoff from Customer Information.” Answer the following questions about this case:
   1. What information does the data mining generate?
   2. How is this information helpful to management in decision making? (Be specific.)
   3. List the types of data that are mined.
   4. Is this a DSS or BI application? Why?

Student responses will vary.

1. Go to teradatauniversitynetwork.com and find the paper titled “Data Warehousing Supports Corporate Strategy at First American Corporation” (by Watson, Wixom, and Goodhue). Read the paper, and answer the following questions:
   1. What were the drivers for the DW/BI project in the company?
   2. What strategic advantages were realized?
   3. What operational and tactical advantages were achieved?
   4. What were the critical success factors for the implementation?

Student responses will vary.

1. Go to http://analytics-magazine.org/issues/digitaleditions and find the January/February 2012 edition titled “Special Issue: The Future of Healthcare.” Read the article “Predictive Analytics—Saving Lives and Lowering Medical Bills.” Answer the following questions:
   1. What problem is being addressed by applying predictive analytics?
   2. What is the FICO Medication Adherence Score?
   3. How is a prediction model trained to predict the FICO Medication Adherence Score HoH? Did the prediction model classify the FICO Medication Adherence Score?
   4. Zoom in on Figure 4, and explain what kind of technique is applied on the generated results.
   5. List some of the actionable decisions that were based on the prediction results.

Student responses will vary.

1. Go to http://analytics-magazine.org/issues/digitaleditions, and find the January/February 2013 edition titled “Work Social.” Read the article “Big Data, Analytics and Elections,” and answer the following questions:
   1. What kinds of Big Data were analyzed in the article Coo? Comment on some of the sources of Big Data.
   2. Explain the term integrated system. What is the other technical term that suits an integrated system?
   3. What kinds of data analysis techniques are employed in the project? Comment on some initiatives that resulted from data analysis.
   4. What are the different prediction problems answered by the models?
   5. List some of the actionable decisions taken that were based on the prediction results.
   6. Identify two applications of Big Data analytics that are not listed in the article.

Student responses will vary.

1. Search the Internet for material regarding the work of managers and the role analytics plays. What kinds of references to consulting firms, academic departments, and programs do you find? What major areas are represented? Select five sites that cover one area, and report your findings.

Student responses will vary.

1. Explore the public areas of dssresources.com. Prepare a list of its major available resources. You might want to refer to this site as you work through the book.

Student responses will vary.

1. Go to microstrategy.com. Find information on the five styles of BI. Prepare a summary table for each style.

Student responses will vary.

1. Go to oracle.com, and click the Hyperion link under Applications. Determine what the company’s major products are. Relate these to the support technologies cited in this chapter.

Student responses will vary.

1. Go to the TUN questions site. Look for BSI videos. Review the video of the “Case of Retail Tweeters.” Prepare a onepage summary of the problem, proposed solution, and the reported results. You can also find associated slides on slideshare.net.

Student responses will vary.

1. Review the Analytics Ecosystem section. Identify at least two additional companies in at least five of the industry clusters noted in the discussion.

Student responses will vary.

1. The discussion for the analytics ecosystem also included several typical job titles for graduates of analytics and data science programs. Research Web sites such datasciencecentral.com and tdwi.org to locate at least three additional similar job titles that you may find interesting for your career.

Student responses will vary.