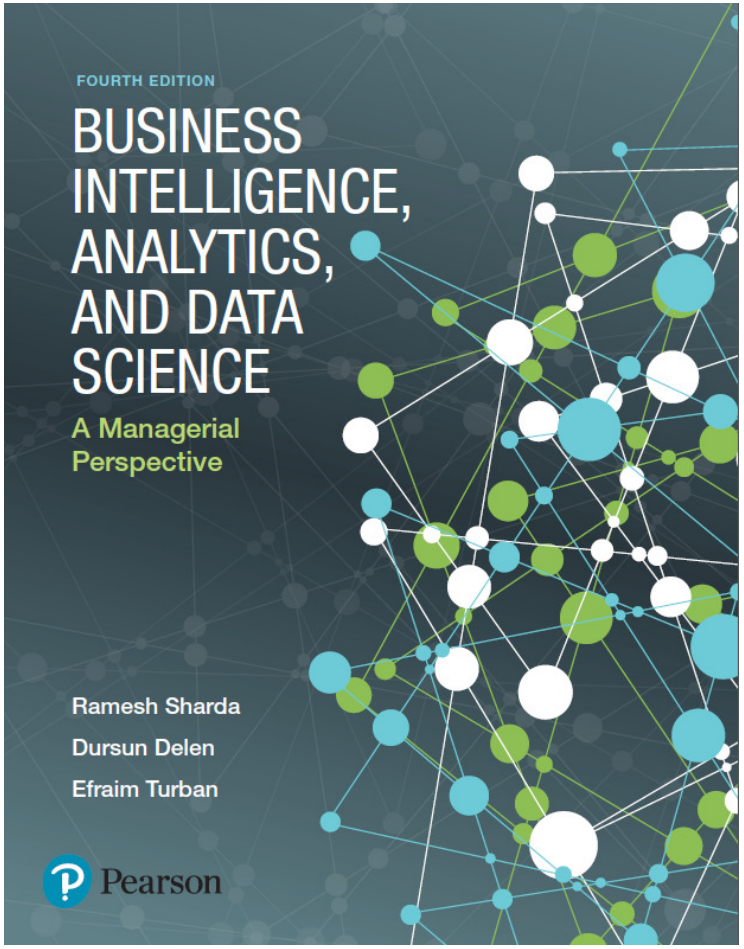
Business Intelligence, Analytics, and Data Science: A Managerial Perspective

Fourth Edition



Chapter 1 – Part A

An Overview of Business Intelligence, Analytics, and Data Science

Pearson

Learning Objectives

1.1 Understand the need for computerized support of managerial decision making

1.2 Recognize the evolution of such computerized support to the current state—analytics/data science

1.3 Describe the business intelligence (BI) methodology and concepts

1.4 Understand the various types of analytics, and see selected applications

1.5 Understand the analytics ecosystem to identify various key players and career opportunities

OPENING VIGNETTE Sports Analytics—
An Exciting Frontier for Learning and Understanding
Applications of Analytics (1 of 5)

- Sports analytics is becoming a specialty within analytics
- Sports is a big business
  - Generating $145B in revenues annually
  - Additional $100B in legal and $300B in illegal gambling
- Analytic in sports popularized by the *Moneyball* book by Michael Lewis in 2003
  - About Oakland A's
  - And the follow-on movie in 2011
- Nowadays, analytics is used in many facets of sports

OPENING VIGNETTE Sports Analytics—
An Exciting Frontier for Learning and Understanding
Applications of Analytics (2 of 5)

Example 1: The Business Office

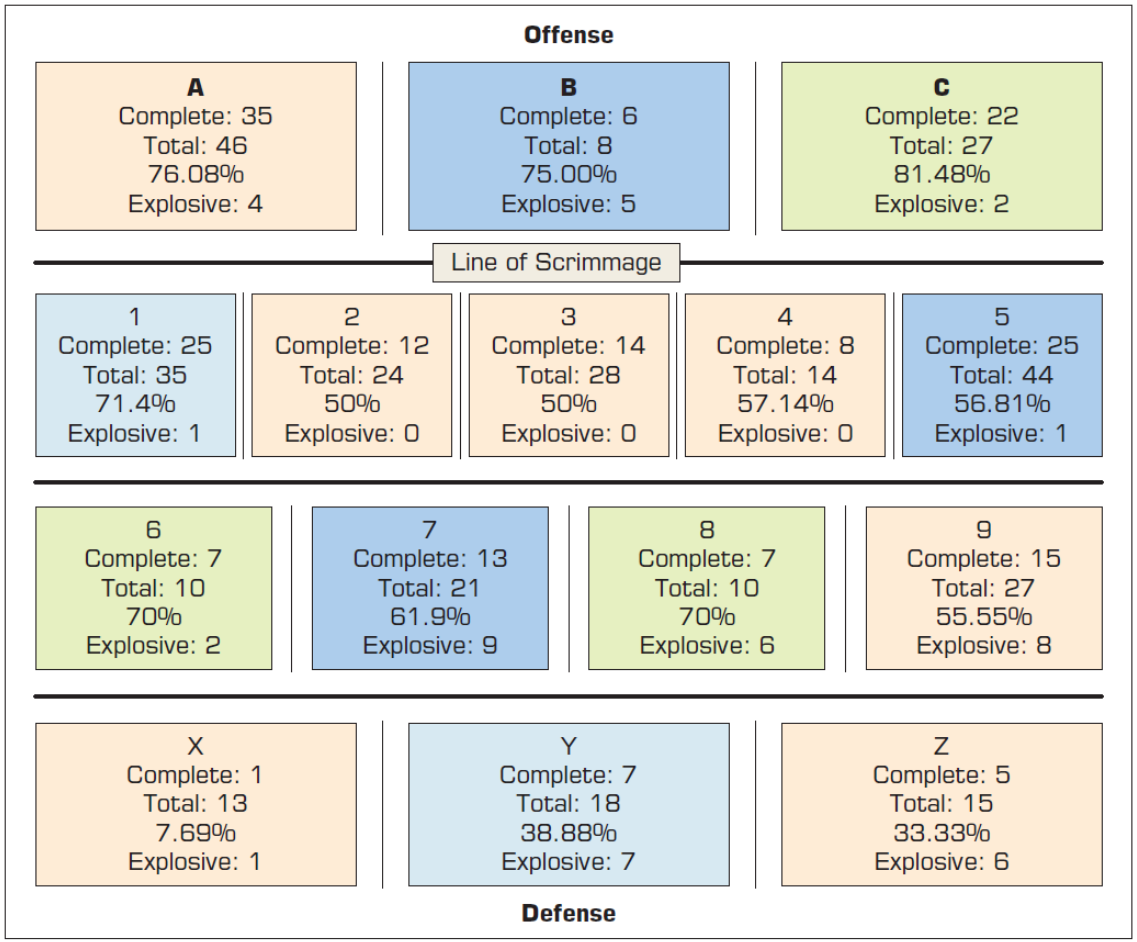
- FIGURE 1.1 Season Ticket Renewals—Survey Scores

Tier	Highly Likely	Likely	Maybe	Probably Not	Certainly Not
1	92	88	75	69	45
2	88	81	70	65	38
3	80	76	68	55	36
4	77	72	65	45	25
5	75	70	60	35	25

OPENING VIGNETTE Sports Analytics—
An Exciting Frontier for Learning and Understanding
Applications of Analytics (3 of 5)

Example 2: The Coach

- FIGURE 1.4 Heat Map Zone Analysis for Passing Plays

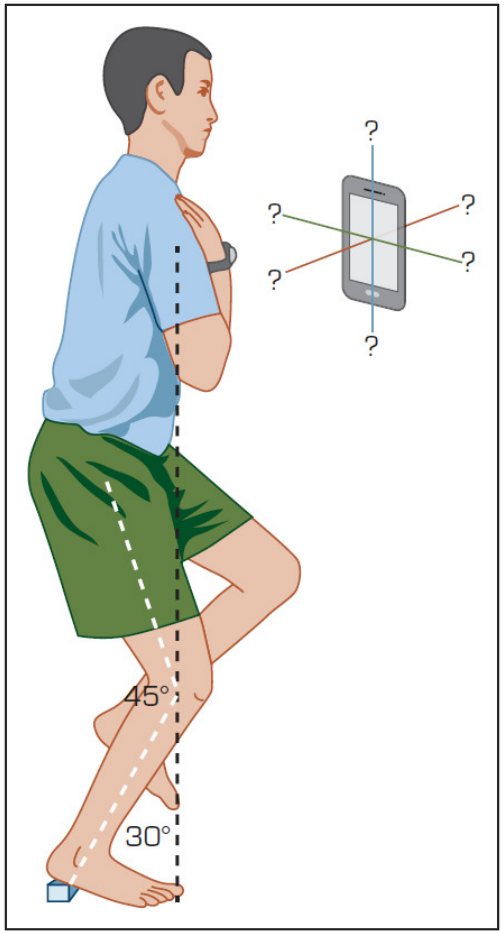


OPENING VIGNETTE Sports Analytics—
An Exciting Frontier for Learning and Understanding
Applications of Analytics (4 of 5)

Example 3: The Trainer

- FIGURE 1.7 Single Leg Squat Hold Test – Core Body Strength Test

  (Source: WILKERSON and GUPTA).



OPENING VIGNETTE Sports Analytics—
An Exciting Frontier for Learning and Understanding
Applications of Analytics (5 of 5)

Discussion Questions

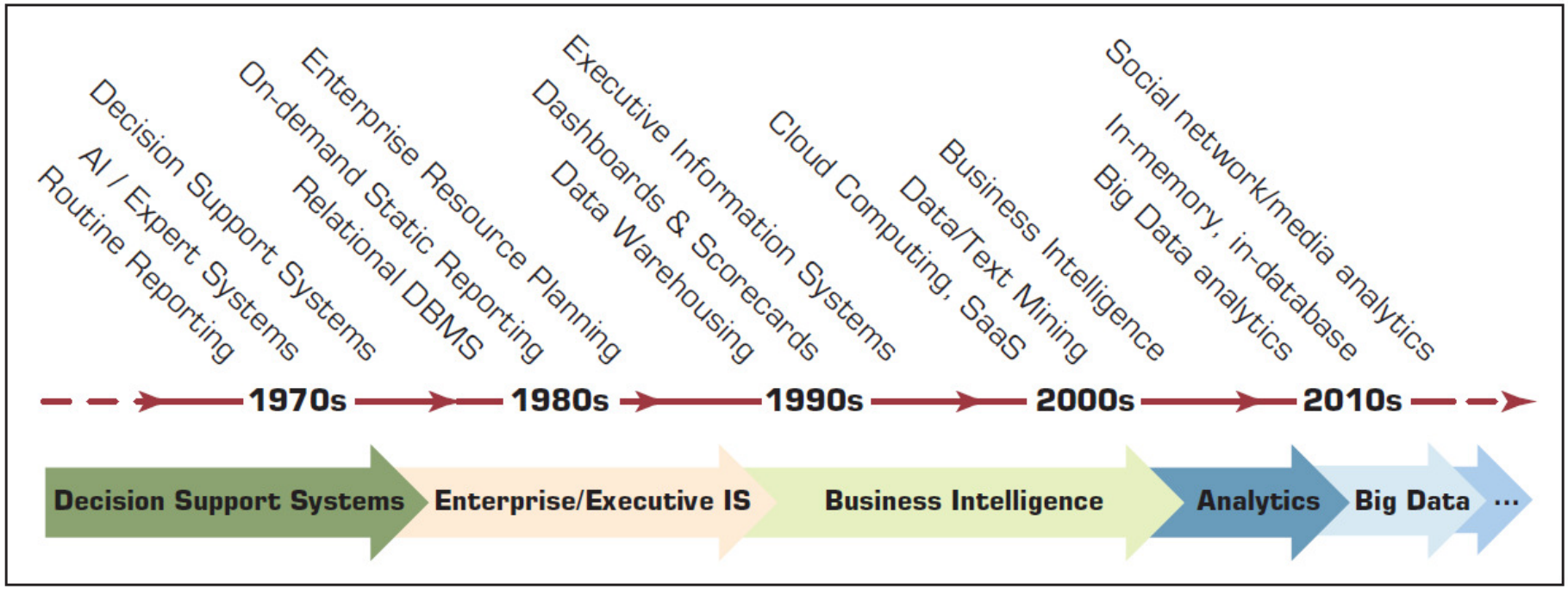
1. What are three factors that might be part of a PM for season ticket renewals?
2. What are two techniques that football teams can use to do opponent analysis?
3. How can wearables improve player health and safety? What kinds of new analytics can trainers use?
4. What other analytics applications can you envision in sports?

Changing Business Environments and Evolving Needs for Decision Support and Analytics

- Increased hardware, software, and network capabilities
- Group communication and collaboration
- Improved data management
- Managing giant data warehouses and Big Data
- Analytical support
- Overcoming cognitive limits in processing and storing information
- Knowledge management
- Anywhere, anytime support

Evolution of Computerized Decision Support to Analytics/Data Science

- FIGURE 1.8 Evolution of Decision Support, Business Intelligence, and Analytics

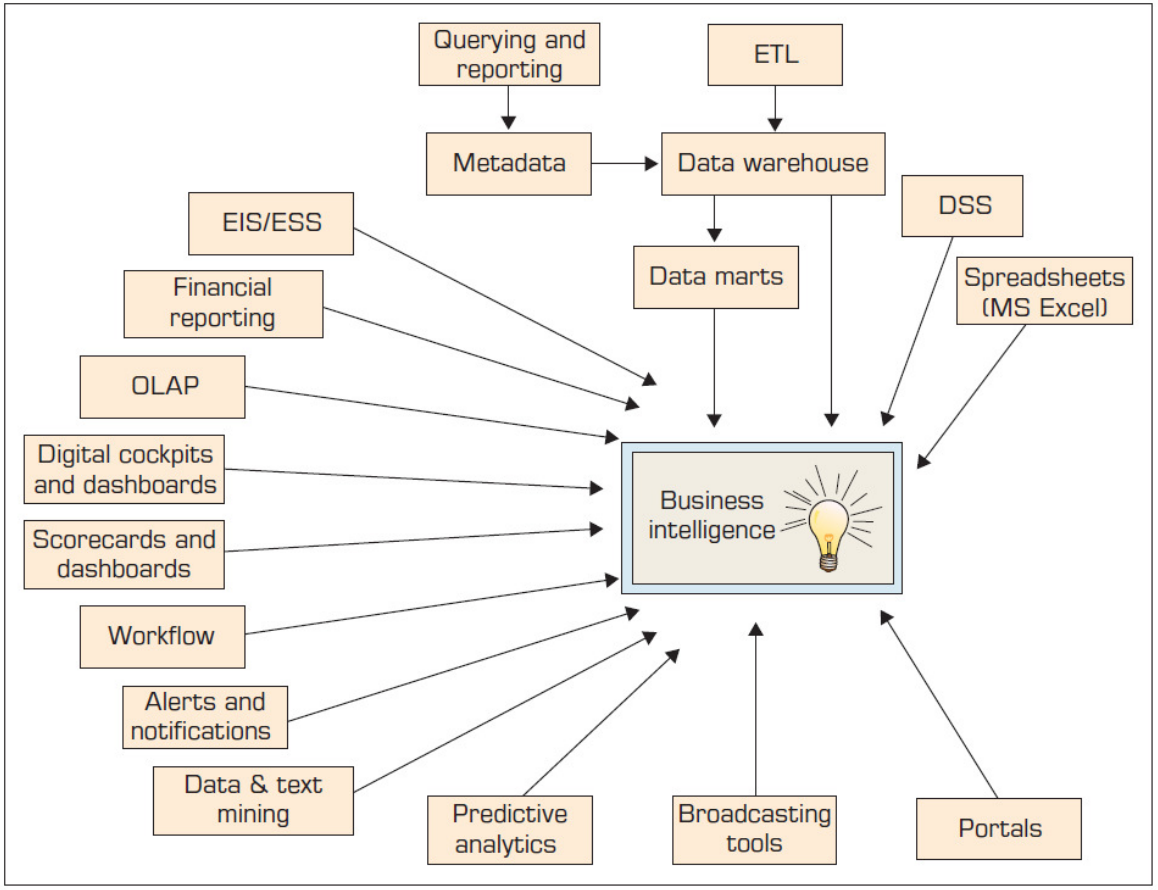


A Framework for Business Intelligence

- DSS → EIS → BI
- Definition of Business Intelligence
  - [Broad Definition] An umbrella term that combines architectures, tools, databases, analytical tools, applications, and methodologies
  - [Narrow Definition] Descriptive analytics tools and techniques (i.e., reporting tools)
- A Brief History of BI – 1970s → 1980s → 1990s …
- The Origins and Drivers of BI (See Figure 1.9)
- The Architecture of BI (See Figure 1.10)

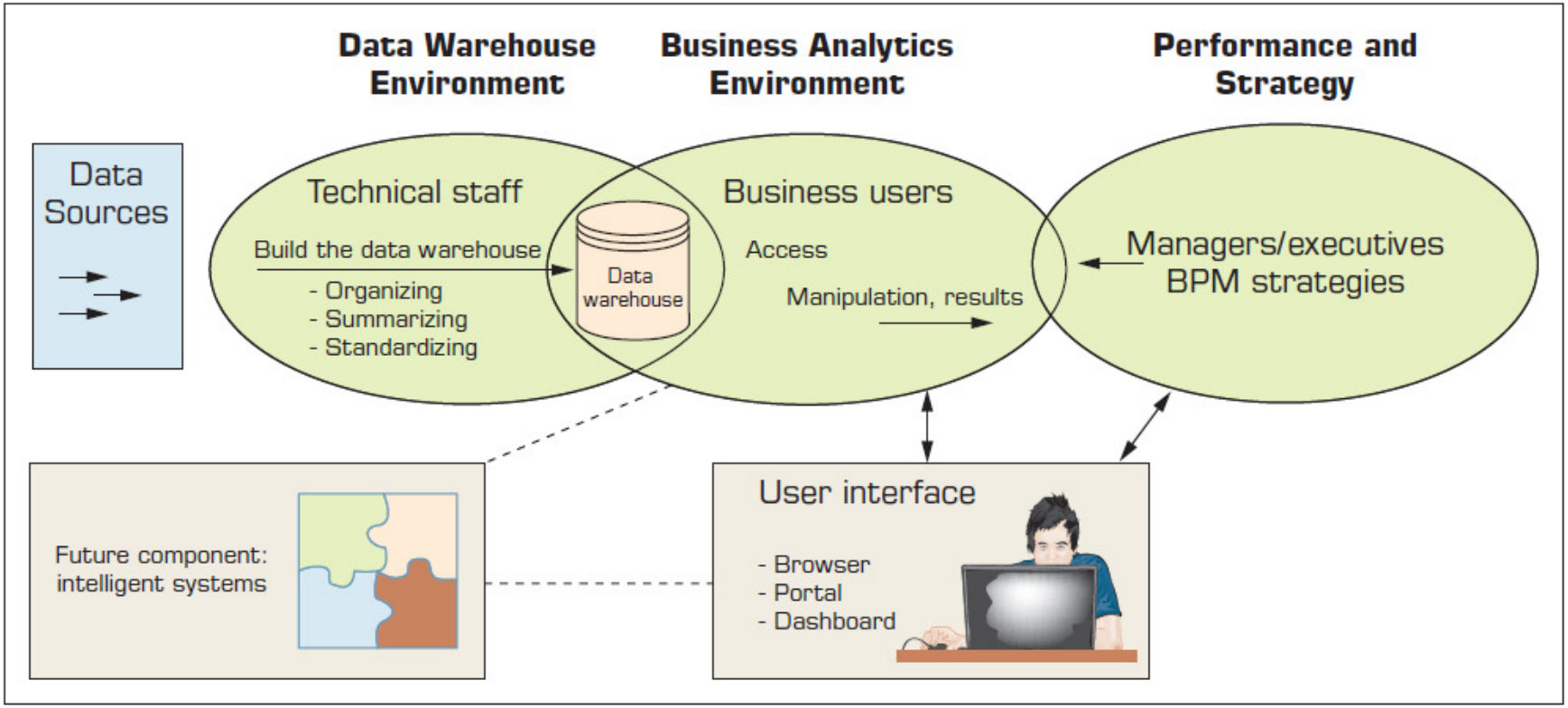
A Framework for Business Intelligence

- **FIGURE 1.9** Evolution of Business Intelligence (BI) →



A Framework for Business Intelligence

- The Architecture of BI
- **FIGURE 1.10** A High-Level Architecture of BI



Application Case 1.1

Sabre Helps Its Clients through Dashboards and Analytics

Questions for Discussion

1. What is traditional reporting? How is it used in the organization?
2. How can analytics be used to transform the traditional reporting?
3. How can interactive reporting assist organizations in decision making?

A Multimedia Exercise in Business Intelligence

- TUN (TeradataUniversityNetwork.com)
  - BSI Videos (Business Scenario Investigations)
    - Analogues to CSI (Crime Scene Investigation)
- Go To
  - www.youtube.com/watch?v=NXEL5F4_aKA
- See the
  - www.slideshare.net/teradata/bsi-how-we-did-it-the-case-of-the-misconnecting-passengers.slides
- Discuss the case presented in the video and in the slides

Transaction Processing versus Analytic Processing

- Online Transaction Processing (OLTP)
  - Operational databases
  - ERP, SCM, CRM, …
  - Goal: data capture
- Online Analytical Processing (OLAP)
  - Data warehouses
  - Goal: decision support
- What is the relationship between OLTP and OLAP?

Appropriate Planning and Alignment with the Business Strategy

- Planning and Execution → Business, Organization, Functionality, and Infrastructure
- Functions served by BI Competency Center
  - How BI is linked to strategy and execution of strategy
  - Encourage interaction between the potential business user communities and the IS organization
  - 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

Real-Time, On-Demand BI Is Attainable

- Emergence of real-time BI applications
- Justifying the need
  - Is there a need for real-time [is it worth the additional expense]?
- Leveraging the enablers
  - RFID
  - Web services
  - Intelligent agents

Critical BI System Considerations

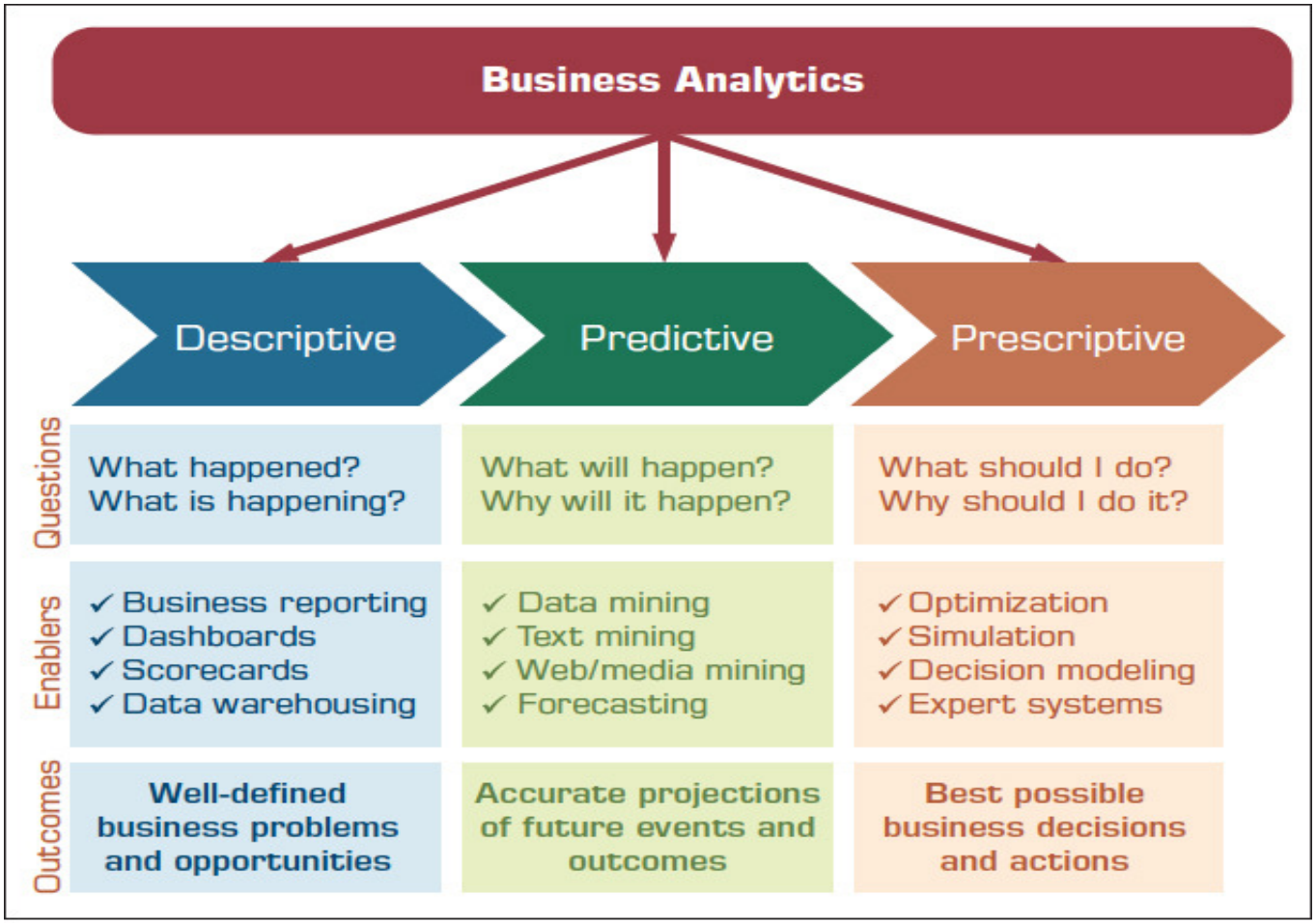
- Developing or Acquiring BI Systems
  - Make versus buy
  - BI shells
- Justification and Cost–Benefit Analysis
  - A challenging endeavor, why?
- Security
- Protection of Privacy
- Integration to Other Systems and Applications

Analytics Overview

- Analytics…a relatively new term/buzz-word
- Analytics…the process of developing actionable decisions or recommendations for actions based on insights generated from historical data
- According to the Institute for Operations Research and Management Science (INFORMS)
  - Analytics represents the combination of computer technology, management science techniques, and statistics to solve real problems.

Business Analytics

- FIGURE 1.11 Three Types of Analytics



Descriptive Analytics

- Descriptive or reporting analytics
- Answering the question of what happened
- Retrospective analysis of historic data
- Enablers
  - OLAP / DW
  - Data visualization
    - Dashboards and Scorecards
  - Descriptive statistics

Application Case 1.2

Silvaris Increases Business with Visual Analysis and Real-Time Reporting Capabilities

Questions for Discussion

1. What was the challenge faced by Silvaris?
2. How did Silvaris solve its problem using data visualization with Tableau?

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

Questions for Discussion

1. What challenges were faced by Siemens' visual analytics group?
2. How did the data visualization tool Dundas BI help Siemens in reducing cost?

Predictive Analytics

- Aims to determine what is likely to happen in the future (foreseeing the future events)
- Looking at the past data to predict the future
- Enablers
  - Data mining
  - Text mining / Web mining
  - Forecasting (i.e., time series)

Application Case 1.4
Analyzing Athletic Injuries

Questions for Discussion

1. What types of analytics are applied in the injury analysis?
2. How do visualizations aid in understanding the data and delivering insights into the data?
3. What is a classification problem?
4. What can be derived by performing sequence analysis?

Prescriptive Analytics

- Aims to determine the best possible decision
- Uses both descriptive and predictive to create the alternatives, and then determines the best one
- Enablers
  - Optimization
  - Simulation
  - Multi-Criteria Decision Modeling
  - Heuristic Programming
- Analytics Applied to Many Domains
- Analytics or Data Science?

Application Case 1.5

A Specialty Steel Bar Company Uses Analytics to Determine Available-to-Promise Dates

Questions for Discussion

1. Why would reallocation of inventory from one customer to another be a major issue for discussion?
2. How could a DSS help make these decisions?