Business Intelligence,

Business Intelligence, Analytics,
and Data Science
A Managerial Perspective
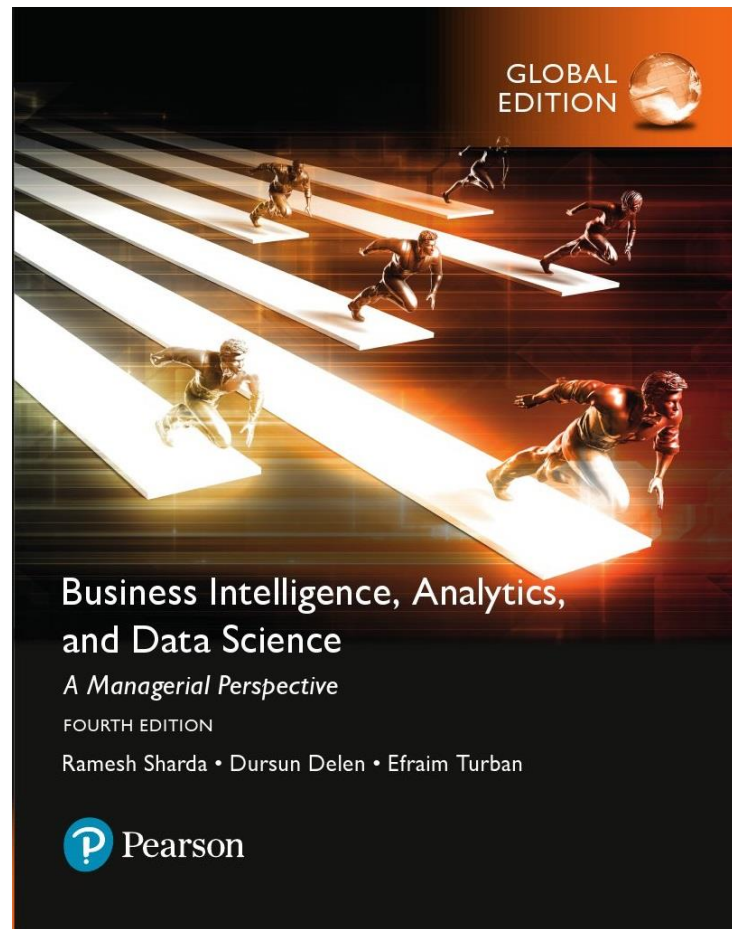FOURTH EDITION
Ramesh Sharda • Dursun Delen • Efraim Turban

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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

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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
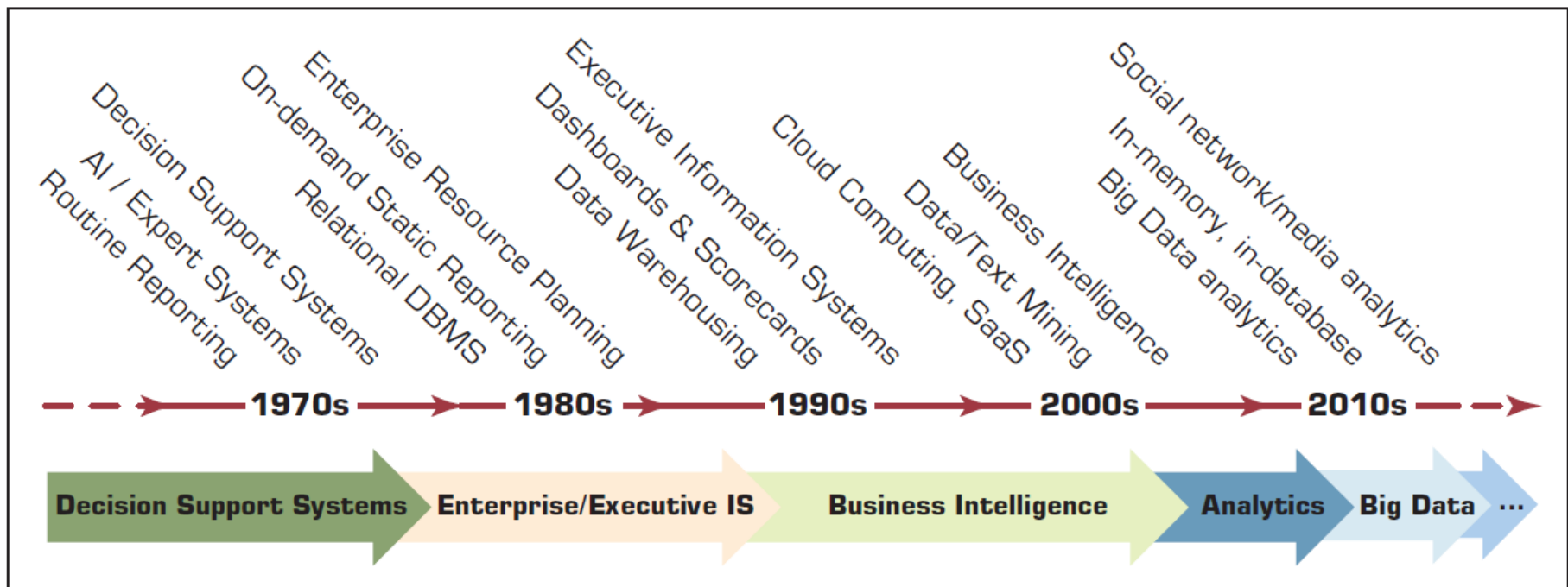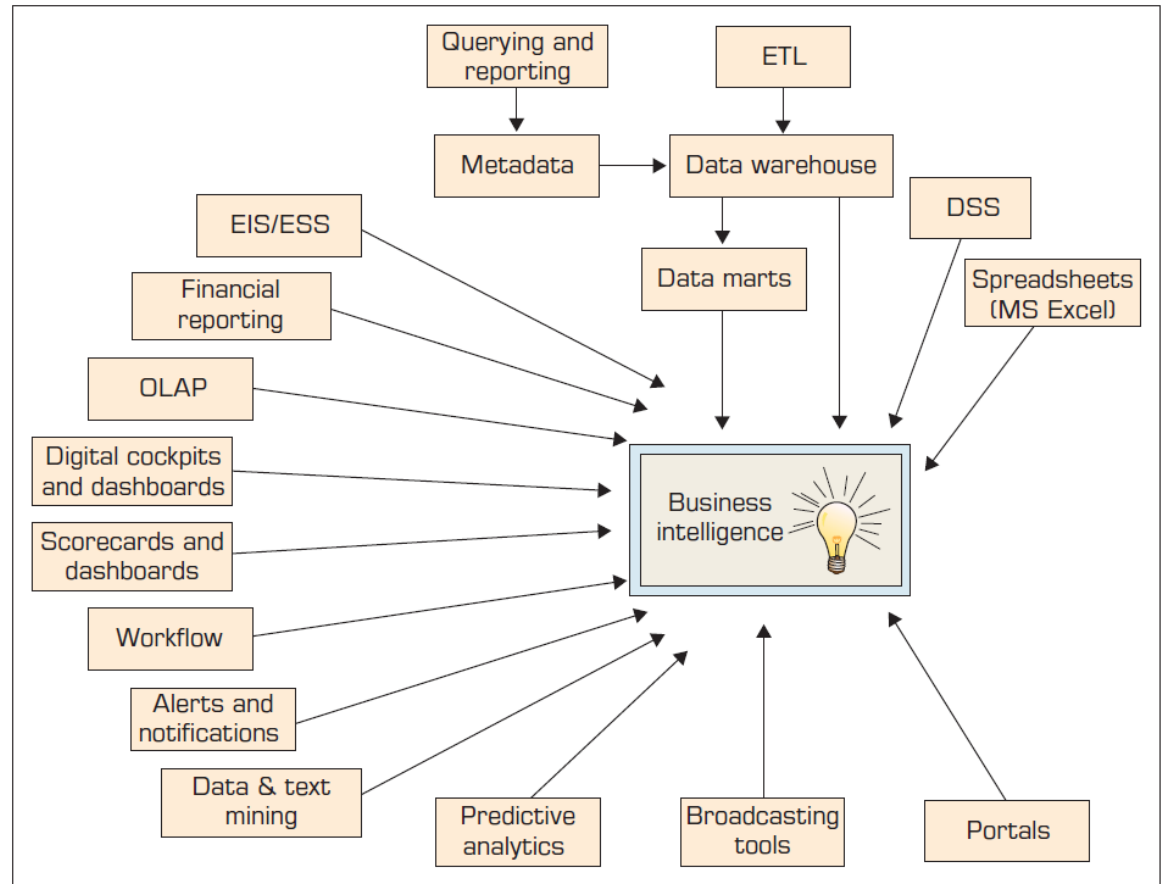
A Framework for Business Intelligence

- 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)
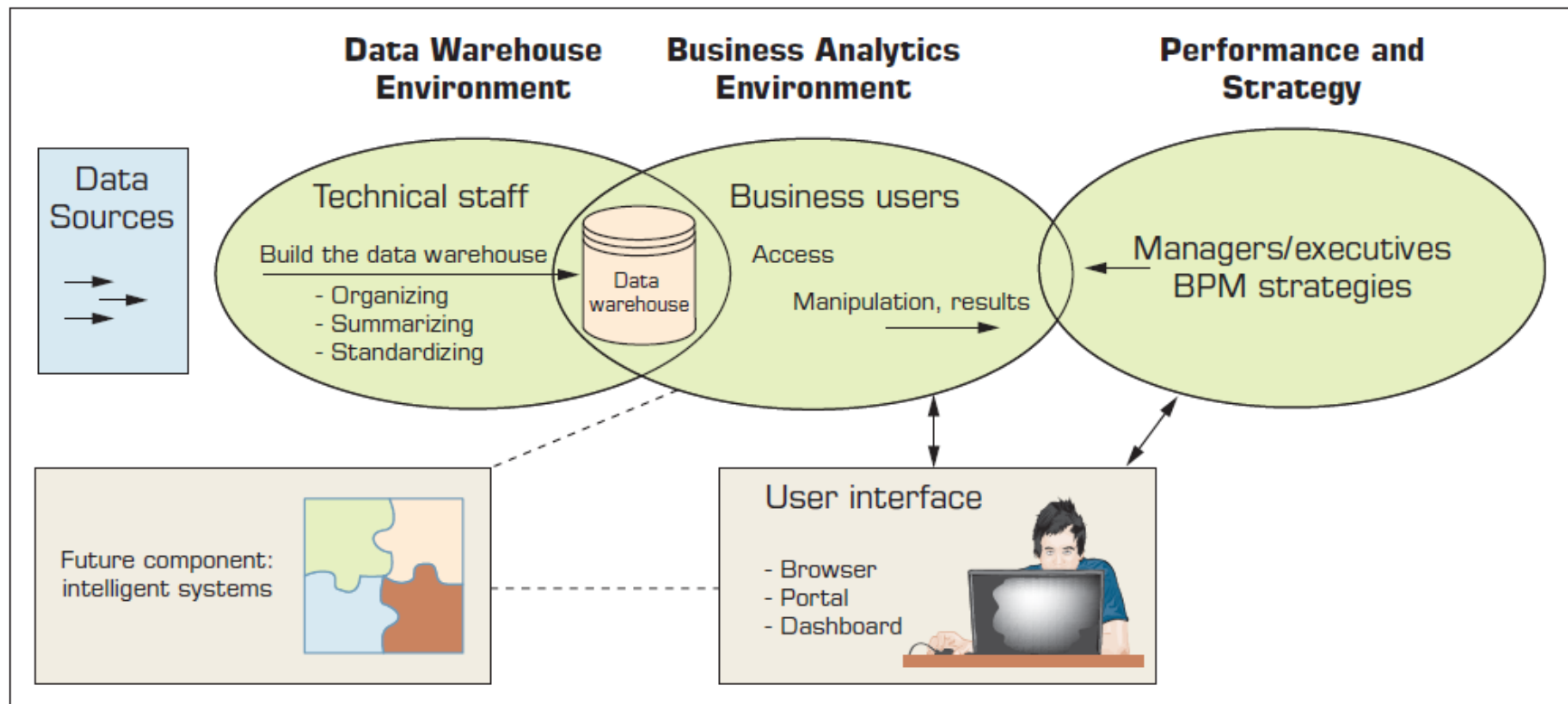
- The Architecture of BI (See Figure 1.10)

A Framework for Business Intelligence

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

A Framework/Components 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?
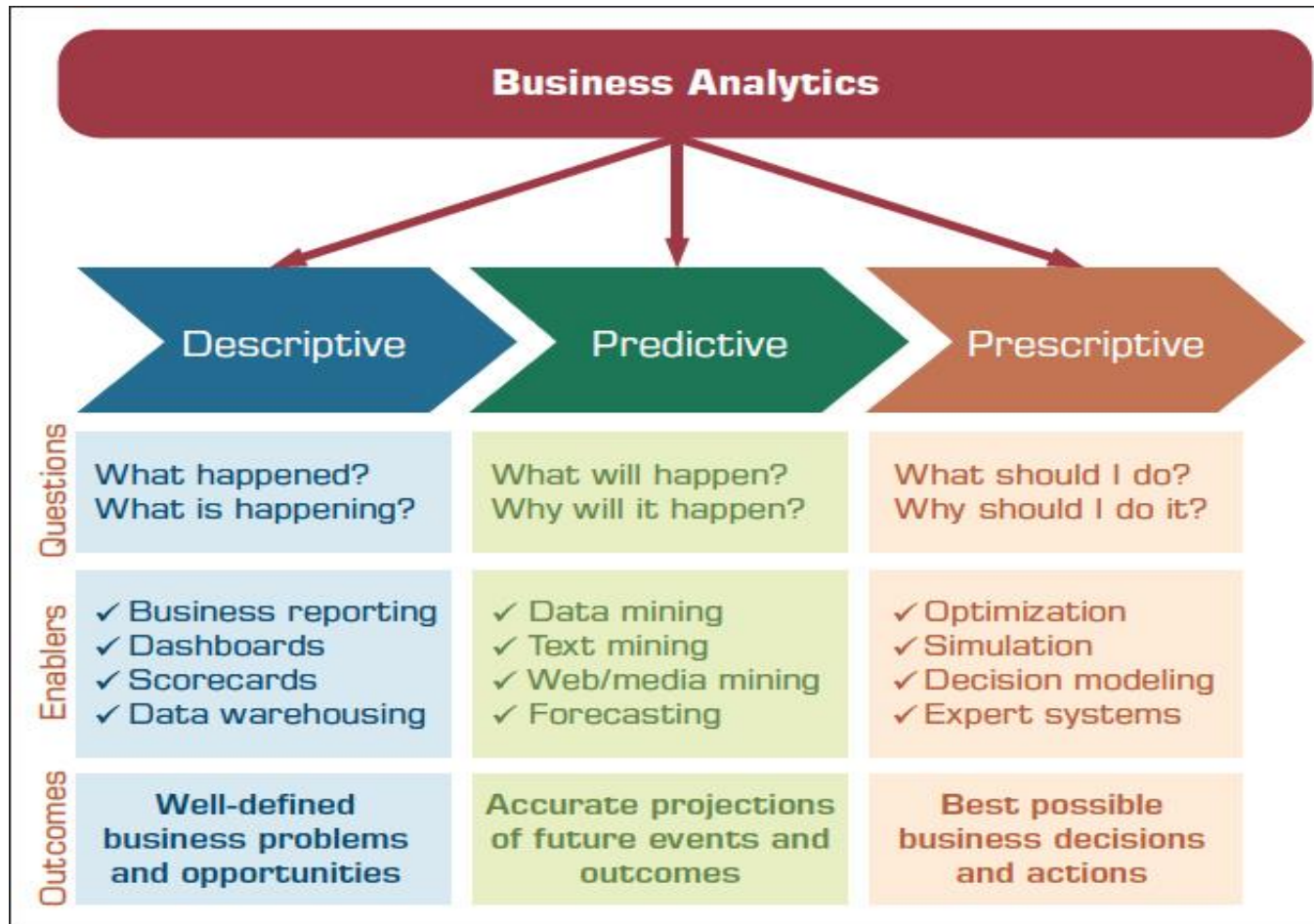
A Multimedia Exercise in Business Intelligence

- TUN (TeradataUniversityNetwork.com)
  - BSI Videos (Business Scenario Investigations)
    - Analogues to CSI (Crime Scene Investigation)

- Go To
  - www.youtube.com/watch?v=NXEL5F4_aKA

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: Eliminating Inefficiencies at Seattle Children's Hospital

QUESTIONS FOR DISCUSSION

1. Who are the users of the tool?

2. What is a dashboard?

3. How does visualization help in decision making?

4. What are the significant results achieved by the use of 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 1.2
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?

Case 3: Industrial and Commercial Bank of China (ICBC) Employs Models to Reconfigure Its Branch Network

QUESTIONS FOR DISCUSSION

1. How can analytical techniques help organizations to retain competitive advantage?

2. How can descriptive and predictive analytics help in pursuing prescriptive analytics?

3. What kinds of prescriptive analytic techniques are employed in the case study?

4. Are the prescriptive models once built good forever?

Analytics Examples in Selected Domains

- Analytics in Retail Value Chain

- FIGURE 1.12 Example of Analytics Applications in a Retail Value Chain

Retail Value Chain
Critical needs at every touch point of the Retail Value Chain

- Shelf space optimization
- Location analysis
- Shelf and floor planning
- Promotions and markdown optimization

- Trend analysis
- Category management
- Predicting trigger events for sales
- Better forecasts of demand

- Deliver seamless customer experience
- Understand relative performance of channels
- Optimize marketing strategies

Vendors — Planning — Merchandizing — Buying — Warehouse & Logistics — Multichannel Operations — **Customers**

- Supply chain management
- Inventory cost optimization
- Inventory shortage and excess management
- Less unwanted costs

- Targeted promotions Customized inventory
- Promotions and price optimization
- Customized shopping experience

- On-time product availability at low costs
- Order fulfillment and clubbing
- Reduced transportation costs

- Building retention and satisfaction
- Understanding the needs of the customer better
- Serving high LTV customers better

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Analytics Examples in Retail Value Chain

TABLE 1.1   **Examples of Analytics Applications in the Retail Value Chain**

Analytic Application	Business Question	Business Value
Inventory Optimization	1. Which products have high demand? 2. Which products are slow moving or becoming obsolete?	1. Forecast the consumption of fast-moving products and order them with sufficient inventory to avoid stock out scenario. 2. Perform fast inventory turnover of slow-moving products by combining them with one in high demand.
Price Elasticity	1. How much net margin do I have on the product? 2. How much discount can I give on this product?	1. Markdown prices for each product can be optimized to reduce the margin dollar loss. 2. Optimized price for the bundle of products is identified to save the margin dollar.
Market Basket Analysis	1. What products should I combine to create a bundle offer? 2. Should I combine product based on slow-moving and fast-moving characteristic? 3. Should I create bundle from the same category or different category line?	1. The affinity analysis identifies the hidden correlations between the products, which can help in following values: a) Strategize the product bundle offering based on focus on Inventory or Margin. b) Increase cross sell or up-sell by creating bundle from different categories or the same categories, respectively.

A Brief Introduction to Big Data Analytics

- What Is Big Data? (Is it just "big"?)
  - Big Data is data that cannot be stored or processed easily using traditional tools/means
  - Big Data typically refers to data that comes in many different forms: large, structured, unstructured, continuous
    - 3Vs – Volume, Variety, Velocity
  - Data (Big Data or otherwise) is worthless if it does not provide business value (and for it to provide business value, it has to be analyzed)

- Questions / Comments