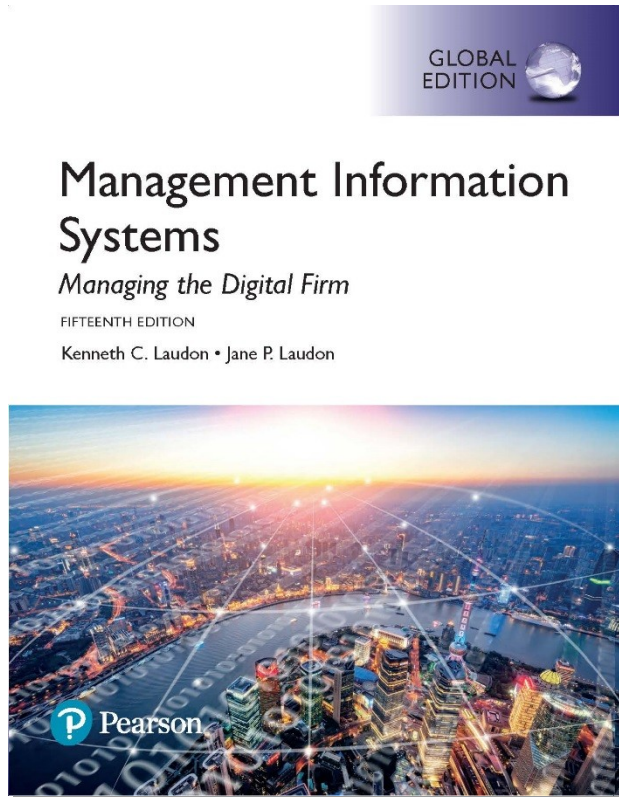


Management Information Systems: Managing the Digital Firm

Fifteenth edition



Chapter 12 Enhancing Decision Making

Learning Objectives

- **12-1** What are the different types of decisions, and how does the decision making process work?
- **12-2** How do information systems support the activities of managers and management decision making?
- **12-3** How do business intelligence and business analytics support decision making?
- **12-4** How do different decision-making constituencies in an organization use business intelligence, and what is the role of information systems in helping people working in a group make decisions more efficiently?

Video Cases

- Case 1: PSEG Leverages Big Data and Business Analytics Using GE's PREDIX Platform
- Case 2: FreshDirect Uses Business Intelligence to Manage Its Online Grocery
- Case 3: Business Intelligence Helps the Cincinnati Zoo Work Smarter

Roche: Changing Medical Care with Mobile Technology and Big Data (1 of 2)

- Problem

- Opportunities from new technology
- Aging population

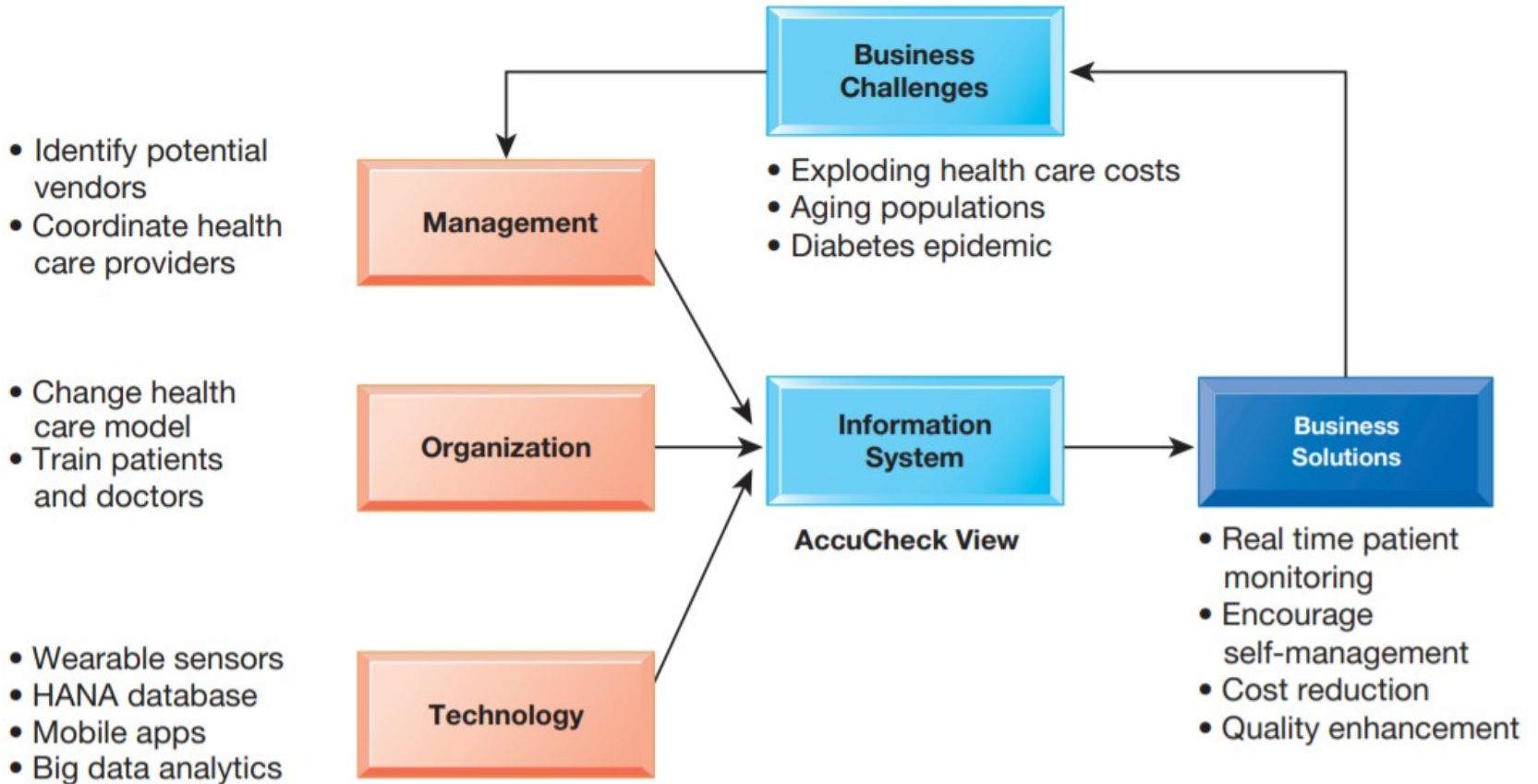
- Solutions

- Healthcare monitoring your body's vital signs in real time
- Cloud servers
- Big Data software analytics
- Smartphone connections to patients

Roche: Changing Medical Care with Mobile Technology and Big Data (2 of 2)

- The connected healthcare model collects data from smartphones and sends it to a health facility that monitors in real time.
- Demonstrates IT's role in providing information and business intelligence that help organizations improve services
- Illustrates how information systems improve decision making

AccuCheck from Roche



What Are the Different Types of Decisions, and How Does the Decision Making Process Work? (1 of 2)

- Business value of improved decision making
 - Improving hundreds of thousands of “small” decisions adds up to large annual value for the business
- Types of decisions
 - Unstructured: Decision maker must provide judgment, evaluation, and insight to solve problem
 - Structured: Repetitive and routine; involve definite procedure for handling so they do not have to be treated each time as new
 - Semistructured: Only part of problem has clear-cut answer provided by accepted procedure

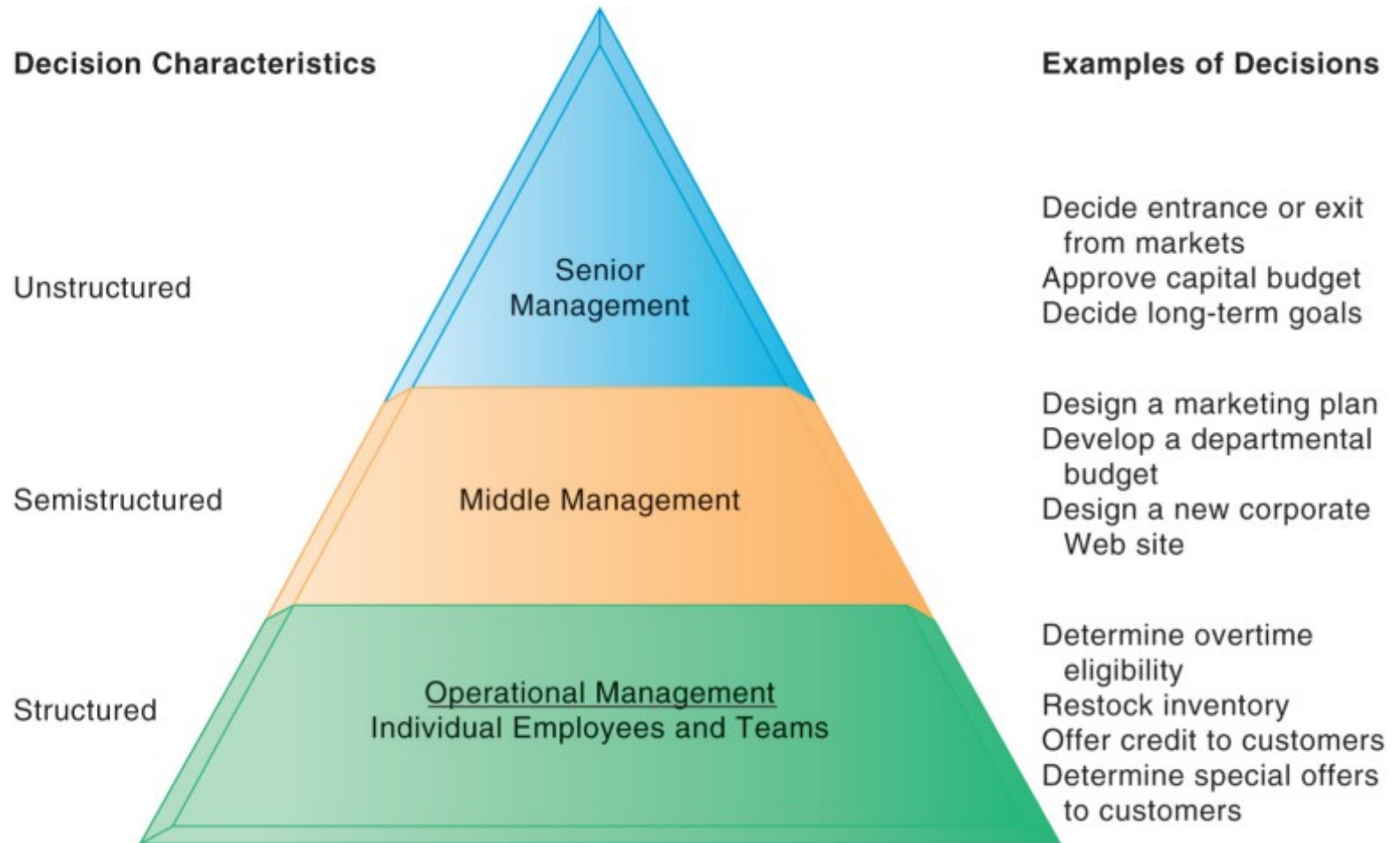
TABLE 12.1 BUSINESS VALUE OF ENHANCED DECISION MAKING

EXAMPLE DECISION	DECISION MAKER	NUMBER OF ANNUAL DECISIONS	ESTIMATED VALUE TO FIRM OF A SINGLE IMPROVED DECISION	ANNUAL VALUE
Allocate support to most valuable customers	Accounts manager	12	€100,000	€1,200,000
Predict call center daily demand	Call center management	4	€150,000	€600,000
Decide parts inventory levels daily	Inventory manager	365	€5,000	€1,825,000
Identify competitive bids from major suppliers	Senior management	1	€2,000,000	€2,000,000
Schedule production to fill orders	Manufacturing manager	150	€10,000	€1,500,000
Allocate labor to complete a job	Production floor manager	100	€4,000	€400,000

What Are the Different Types of decisions, and How Does the Decision Making Process Work? (2 of 2)

- Senior managers
 - Make many unstructured decisions
- Middle managers
 - Make more structured decisions but these may include unstructured components
- Operational managers and rank and file employees
 - Make more structured decisions

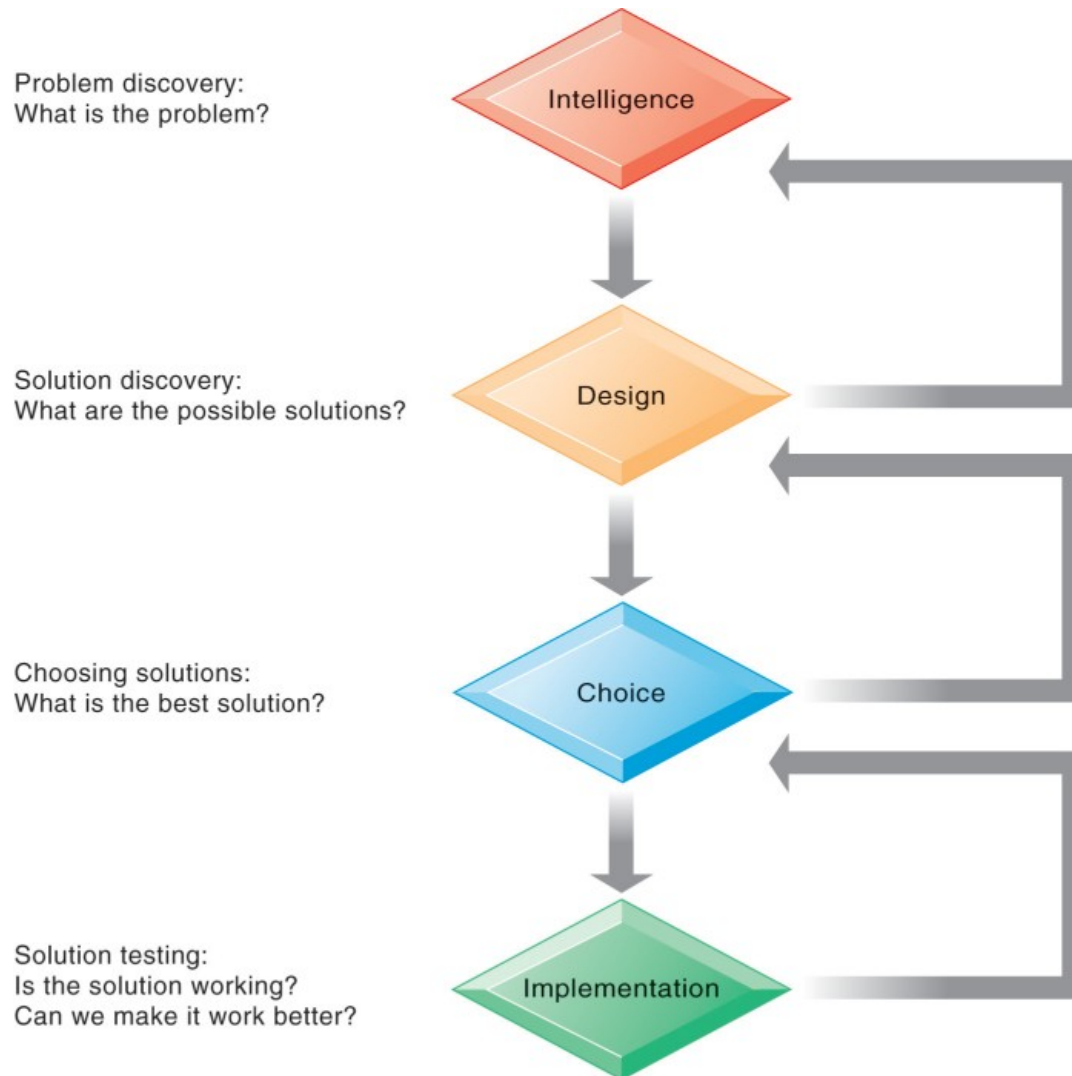
Figure 12.1: Information Requirements of Key Decision-Making Groups in a Firm



The Decision Making Process

- Intelligence
 - Discovering, identifying, and understanding the problems occurring in the organization
- Design
 - Identifying and exploring solutions to the problem
- Choice
 - Choosing among solution alternatives
- Implementation
 - Making chosen alternative work and continuing to monitor how well solution is working

Figure 12.2: Stages In Decision Making



Managerial Roles

- Information systems can only assist in some of the roles played by managers
- Classical model of management: five functions
 - Planning, organizing, coordinating, deciding, and controlling
- More contemporary behavioral models
 - Actual behavior of managers appears to be less systematic, more informal, less reflective, more reactive, and less well organized than in classical model

Mintzberg's 10 Managerial Roles

- Interpersonal roles
 - Figurehead
 - Leader
 - Liaison
- Informational roles
 - Nerve center
 - Disseminator
 - Spokesperson
- Decisional roles
 - Entrepreneur
 - Disturbance handler
 - Resource allocator
 - Negotiator

Mintzberg's 10 Managerial Roles

TABLE 12.2 MANAGERIAL ROLES AND SUPPORTING INFORMATION SYSTEMS

ROLE	BEHAVIOR	SUPPORT SYSTEMS
INTERPERSONAL ROLES		
Figurehead		Telepresence systems
Leader	Interpersonal	Telepresence, social networks, Twitter
Liaison		Smartphones, social networks
INFORMATIONAL ROLES		
Nerve center		Management information systems, executive support system
Disseminator	Information	Texting, e-mail, social networks
Spokesperson	processing	Webinars, telepresence
DECISIONAL ROLES		
Entrepreneur	Decision	None exist
Disturbance handler	making	None exist
Resource allocator		Business intelligence, decision-support system
Negotiator		None exist

Sources: Authors and Mintzberg, 1971.

Information Quality

TABLE 12.3 INFORMATION QUALITY DIMENSIONS

QUALITY DIMENSION	DESCRIPTION
Accuracy	Do the data represent reality?
Integrity	Are the structure of data and relationships among the entities and attributes consistent?
Consistency	Are data elements consistently defined?
Completeness	Are all the necessary data present?
Validity	Do data values fall within defined ranges?
Timeliness	Are data available when needed?
Accessibility	Are the data accessible, comprehensible, and usable?

Real-World Decision Making

- Three main reasons why investments in IT do not always produce positive results
 - Information quality
 - High-quality decisions require high-quality information
 - Management filters
 - Managers have selective attention and have variety of biases that reject information that does not conform to prior conceptions
 - Organizational inertia and politics
 - Strong forces within organizations resist making decisions calling for major change

High-Velocity Automated Decision Making

- Made possible through computer algorithms precisely defining steps for a highly structured decision
 - Humans taken out of decision
- For example: High-speed computer trading programs
 - Trades executed in 30 milliseconds
- Require safeguards to ensure proper operation and regulation

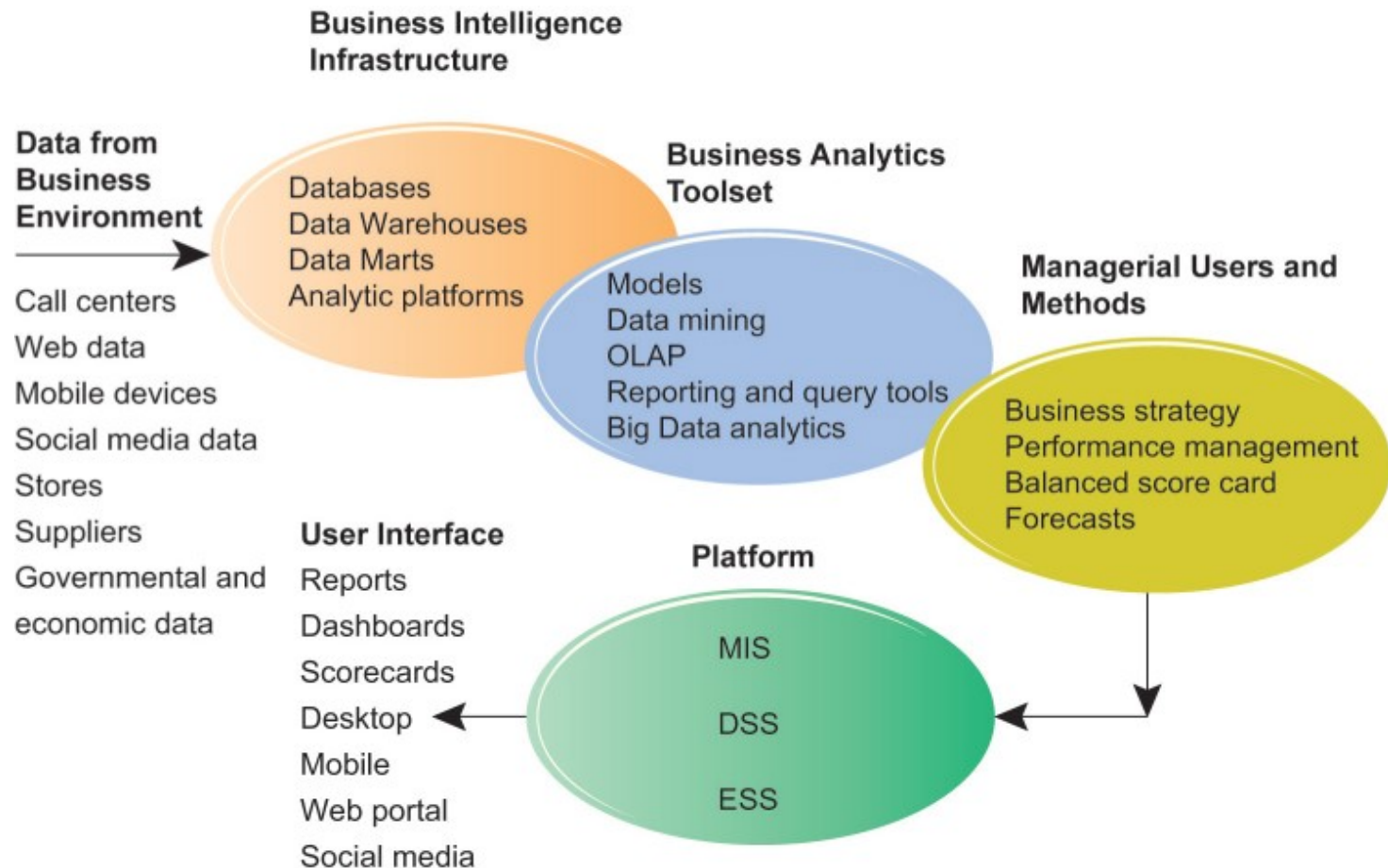
What Is Business Intelligence?

- **Business intelligence**
 - Infrastructure for collecting, storing, analyzing data produced by business
 - Databases, data warehouses, data marts
- **Business analytics**
 - Tools and techniques for analyzing data
 - OLAP, statistics, models, data mining
- **Business intelligence vendors**
 - Create business intelligence and analytics purchased by firms

The Business Intelligence Environment

- Six elements in the business intelligence environment
 - Data from the business environment
 - Business intelligence infrastructure
 - Business analytics toolset
 - Managerial users and methods
 - Delivery platform—MIS, DSS, ESS
 - User interface
 - Data visualization tools

Figure 12.3: Business Intelligence and Analytics for Decision Support



Business Intelligence and Analytics Capabilities

- Goal is to deliver accurate real-time information to decision makers
- Main analytic functionalities of BI systems
 - Production reports
 - Parameterized reports
 - Dashboards/scorecards
 - Ad hoc query/search/report creation
 - Drill down
 - Forecasts, scenarios, models

Table 12.4: Examples of Business Intelligence Predefined Production Reports

BUSINESS FUNCTIONAL AREA	PRODUCTION REPORTS
Sales	Forecast sales; sales team performance; cross-selling; sales cycle times
Service/call center	Customer satisfaction; service cost; resolution rates; churn rates
Marketing	Campaign effectiveness; loyalty and attrition; market basket analysis
Procurement and support	Direct and indirect spending; off-contract purchases; supplier performance
Supply chain	Backlog; fulfillment status; order cycle time; bill of materials analysis
Financials	General ledger; accounts receivable and payable; cash flow; profitability
Human resources	Employee productivity; compensation; workforce demographics; retention

Predictive Analytics

- Uses variety of data, techniques to predict future trends and behavior patterns
 - Statistical analysis
 - Data mining
 - Historical data
 - Assumptions
- Incorporated into numerous BI applications for sales, marketing, finance, fraud detection, health care
 - Credit scoring
 - Predicting responses to direct marketing campaigns

Big Data Analytics

- Big data: Massive datasets collected from social media, online and in-store customer data, and so on
- Help create real-time, personalized shopping experiences for major online retailers
- Smart cities
 - Public records
 - Sensors, location data from smartphones
 - Ability to evaluate effect of one service change on system

Big Data Analytics

TABLE 12.5 WHAT BIG DATA ANALYTICS CAN DO

Barclays	Analyzes transactional big data to develop customized products for customers. For example, a “smart business” application for small and medium-sized businesses enables them to see patterns in anonymized data generated by the bank’s other customers. A hairdresser in Birmingham could see what hairdressers in other locations are spending on electricity.
Vestas Wind Systems	Improves wind turbine placement for optimal energy output using IBM BigInsights software and an IBM “Firestorm” supercomputer to analyze 2.8 petabytes of structured and unstructured data such as weather reports, tidal phases, geospatial and sensor data, satellite images, deforestation maps, and weather modeling research. The analysis, which used to take weeks, can now be completed in less than one hour.
Hunch.com	Analyzes massive database with data from customer purchases, social networks, and signals from around the web to produce a “taste graph” that maps users with their predicted affinity to products, services, and websites. The taste graph includes predictions about 500 million people, 200 million objects (videos, gadgets, books), and 30 billion connections between people and objects. Helps eBay develop more finely customized recommendations on items to offer.
Germany World Cup soccer team	Big data analytics helped it win the 2014 World Cup. The German team analyzed very large amounts of video and numeric data about individual player and team performance for itself and competing teams and then used what it had learned to improve how it played. .



Operational Intelligence and Analytics

- Operational intelligence: Business activity monitoring
- Collection and use of data generated by sensors
- Internet of Things
 - Creating huge streams of data from web activities, sensors, and other monitoring devices
- Software for operational intelligence and analytics enable companies to analyze their big data

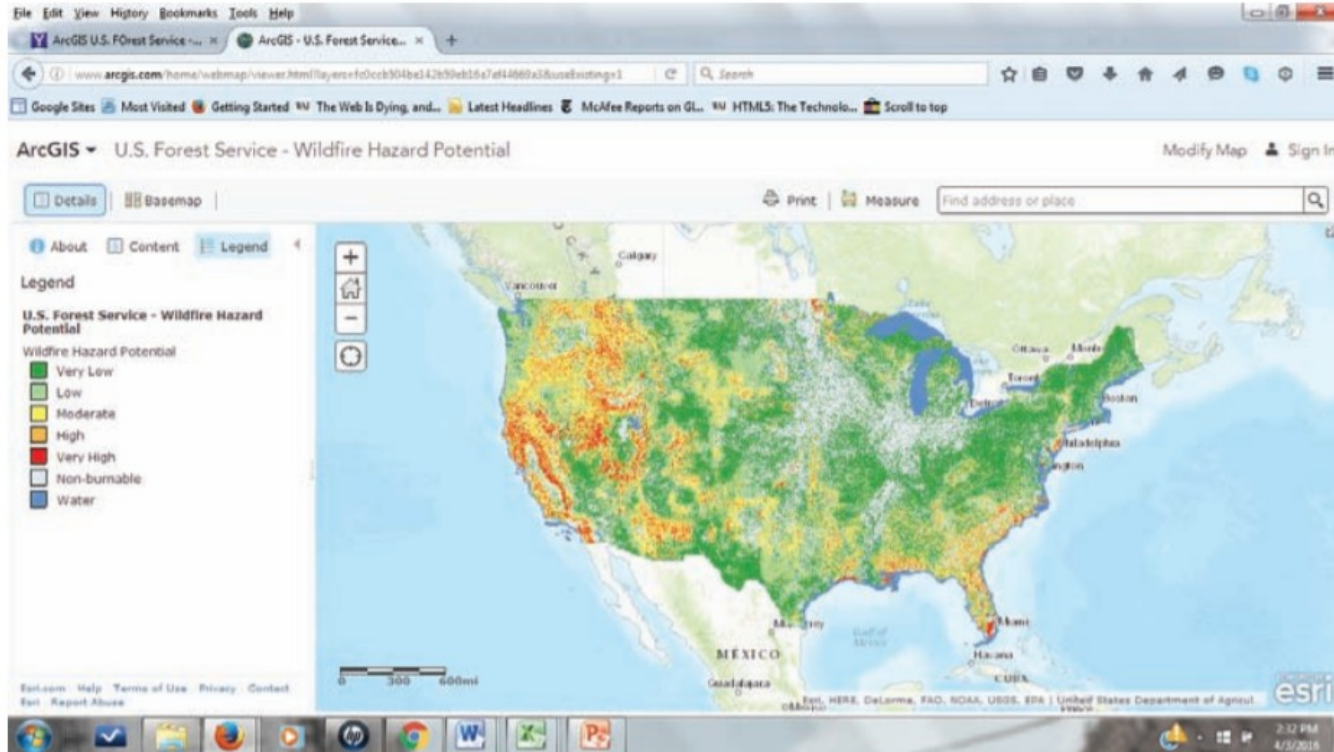
Interactive Session: Technology: Singapore Sports Institute Uses Analytics for SEA Games

- Class discussion
 - What technologies are used by SSI? What is their purpose?
 - To what extent was technology responsible for Team Singapore's success at the SEA games? Explain.
 - Search the web for SimulCam and StroMotion. How can these tools be used for video analysis?
 - Search the web for the role of big data in the German team's 2014 World Cup victory and compare it with Team Singapore's success at the SEA Games.

Location Analytics and Geographic Information Systems

- Location analytics
 - Ability to gain business insight from the location (geographic) component of data
 - Mobile phones
 - Sensors, scanning devices
 - Map data
- Geographic information systems (GIS)
 - Ties location-related data to maps
 - Example: For helping local governments calculate response times to disasters

Location Analytics and Geographic Information Systems



The U.S. Forest Service and Fire Modeling Institute created this map of Wildfire Hazard Potential (WHP) to assess wildfire risk and for prioritization of fuels management needs across large landscapes.

Interactive Session: Britain's National Health Service Jettisons Choose and Book System

- Class discussion
 - Clarify and describe the problems of the NHS Choose and Book System. What people, organization, and technology factors were responsible for those problems?
 - To what extent was Choose and Book a failure? Explain your answer.
 - What was the economic and social impact of Choose and Book?
 - Describe the steps that should have been taken to make Choose and Book more successful.

Management Strategies for Developing BI and BA Capabilities

- One-stop integrated solution
 - Hardware firms sell software that run optimally on their hardware
 - Makes firm dependent on single vendor
- Multiple best-of-breed solution
 - Greater flexibility and independence
 - Potential difficulties in integration
 - Must deal with multiple vendors
- All BI and BA systems bring high switching costs

Figure 12.4: Business Intelligence Users

Power Users: Producers (20% of employees)

Capabilities

Casual Users: Consumers (80% of employees)

IT developers

Production Reports

Customers/Suppliers
Operational employees

Super users

Parameterized Reports

Senior managers

Business analysts

Dashboards/Scorecards

Managers/Staff

Analytical modelers

Ad hoc queries; Drill down
Search/OLAP

Business analysts

Forecasts; What if
Analysis; statistical models

TABLE 12.6 EXAMPLES OF MIS APPLICATIONS

COMPANY	MIS APPLICATION
Plan International	Headquartered in Surrey, UK, with operations in over 70 countries. Human resources MIS tracks the location, skills, and job experience of all of its 10,000 workers and identifies which people have the appropriate skills and experience in medical aid, child protection, education, and shelter management to provide the necessary services for various types of emergencies..
Black & Veatch	Web-based MIS tracks construction costs for its projects in many different locations. This global company has approximately 10,000 professionals working out of more than 110 offices worldwide.
Dubai Islamic Bank	MIS reports on customer eligibility for loans. Uses data about balances in the customer's banking account and how the customer's business works to determine whether the customer can cover the amount of the loan in the future. Output from this MIS guides management decisions about whether to approve or reject the loan application.

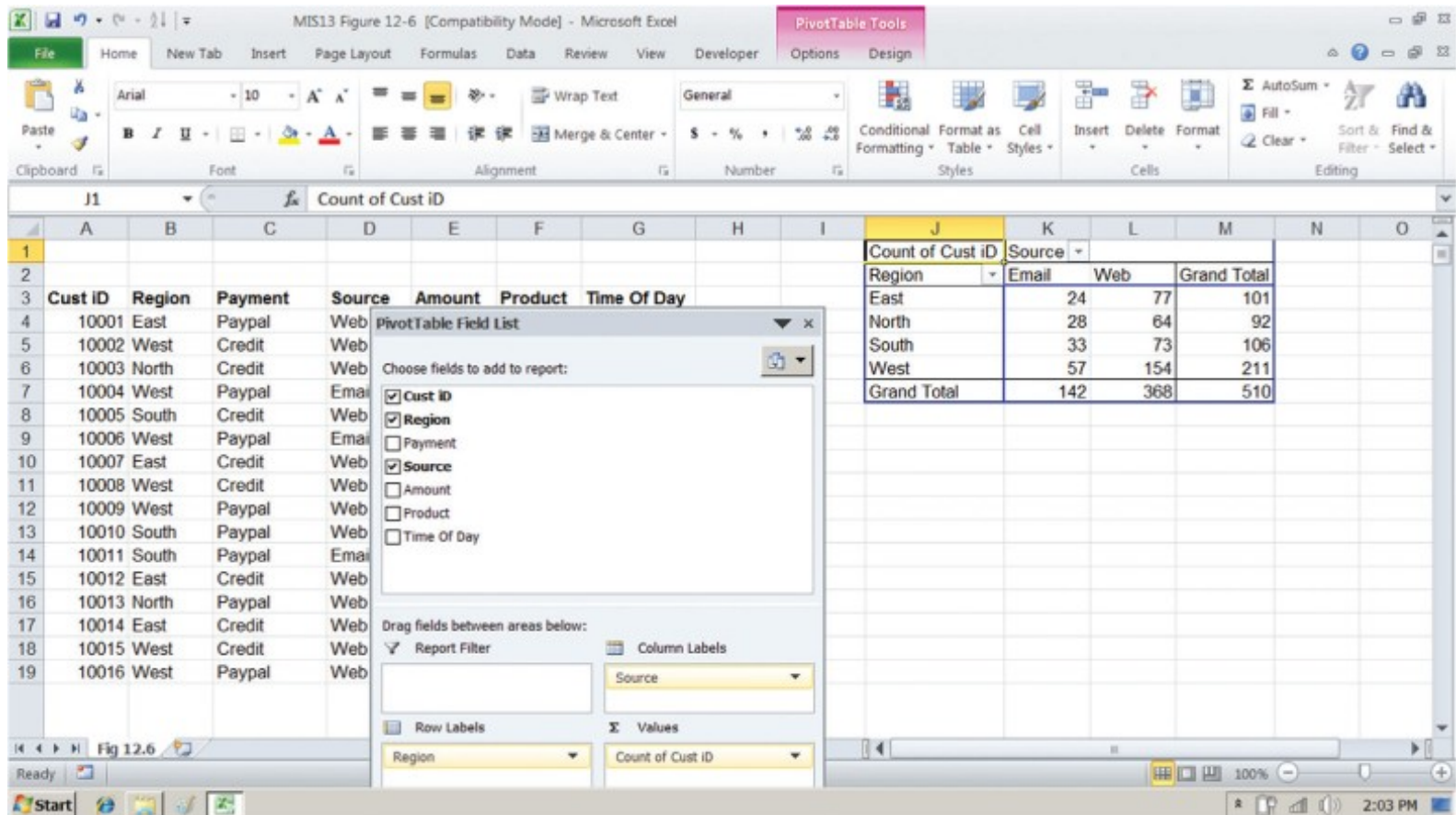
Support for Semistructured Decisions

- Decision-support systems
 - Support for semistructured decisions
- Use mathematical or analytical models
- Allow varied types of analysis
 - “What-if” analysis
 - Sensitivity analysis
 - Backward sensitivity analysis
 - Multidimensional analysis / OLAP
 - For example: pivot tables

Figure 12.5: Sensitivity Analysis

Total fixed costs	19000					
Variable cost per unit	3					
Average sales price	17					
Contribution margin	14					
Break-even point	1357					
		Variable Cost per Unit				
Sales	1357	2	3	4	5	6
Price	14	1583	1727	1900	2111	2375
	15	1462	1583	1727	1900	2111
	16	1357	1462	1583	1727	1900
	17	1267	1357	1462	1583	1727
	18	1188	1267	1357	1462	1583

Figure 12.6: A Pivot Table That Examines Customer Regional Distribution and Advertising Source



Decision Support for Senior Management (1 of 2)

- ESS: decision support for senior management
 - Help executives focus on important performance information
- Balanced scorecard method
 - Measures outcomes on four dimensions
 - Financial
 - Business process
 - Customer
 - Learning and growth
 - Key performance indicators (KPIs) measure each dimension

Figure 12.7: The Balanced Scorecard Framework



Decision Support for Senior Management (2 of 2)

- Business performance management (BPM)
 - Translates firm's strategies (e.g., differentiation, low-cost producer, scope of operation) into operational targets
 - KPIs developed to measure progress toward targets
- Data for ESS
 - Internal data from enterprise applications
 - External data such as financial market databases
 - Drill-down capabilities

Group Decision-Support Systems (GDSS)

- Interactive system to facilitate solution of unstructured problems by group
- Specialized tools
 - Virtual collaboration rooms
 - Software to collect, rank, edit participant ideas and responses
- Promotes collaborative atmosphere, anonymity
- Cisco's Collaboration Meeting Rooms Hybrid (CMR)
- Skype for Business