





decisions + processes: value driven business

What's in IT for me? Working faster and smarter has become a necessity for companies. A firm's value chain is directly affected by how well it designs and coordinates its business processes. Business processes offer competitive advantages if they enable a firm to lower operating costs, differentiate, or compete in a niche market. They can also be huge burdens if they are outdated, which impedes operations, efficiency, and effectiveness. Thus, the ability of management information systems to improve business processes is a key advantage.

The goal of Chapter 2 is to provide an overview of specific MIS tools managers can use to support the strategies discussed in Chapter 1. After reading this

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CHAPTER OUTLINE

SECTION 2.1 >>

Decision Support Systems

- Making Business Decisions
- Measuring Business Decisions
- Using MIS to Make Business Decisions
- Using AI to Make Business Decisions

SECTION 2.2 >>

Business Processes

- Managing Business Processes
- Business Process Modeling
- Using MIS to Improve Business Processes

operational level

Employees develop, control, and maintain core business activities required to run the day-to-day operations.

structured decision

Involves situations where established processes offer potential solutions.

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chapter, you, the business student, should have detailed knowledge of the types of information systems that exist to support decision making and business process reengineering, which in turn can improve organization efficiency and effectiveness and help an organization create and maintain competitive advantages. ■

{SECTION 2.1} Decision Support Systems

LEARNING OUTCOMES

- LO2.1** Explain the importance of decision making for managers at each of the three primary organization levels along with the associated decision characteristics.
- LO2.2** Define critical success factors (CSFs) and key performance indicators (KPIs), and explain how managers use them to measure the success of MIS projects.
- LO2.3** Classify the different operational support systems, managerial support systems, and strategic support systems, and explain how managers can use these systems to make decisions and gain competitive advantages.
- LO2.4** Describe artificial intelligence, and identify its five main types.

MAKING BUSINESS DECISIONS LO2.1

Porter's strategies outlined in Chapter 1 suggest entering markets with a competitive advantage in either overall cost leadership, differentiation, or focus. To achieve these results, managers must be able to make decisions and forecast future business needs and requirements. The most important and most challenging question confronting managers today is how to lay the foundation for tomorrow's success while competing to win in today's business environment. A company will not have a future if it is not cultivating strategies for tomorrow. The goal of this section is to expand on Porter's Five Forces Model, three generic strategies, and value chain analysis to demonstrate how managers can learn the concepts and practices of business decision making to add value. It will also highlight how companies today are taking advantage of advanced MIS capable of generating significant competitive advantages across the value chain.

As we discussed in Chapter 1, decision making is one of the most important and challenging aspects of management. Decisions range from routine choices, such as how many items to order or how many people to hire, to unexpected ones such as what to do if a key employee suddenly quits or needed materials do not arrive. Today, with massive volumes of information available, managers are challenged to make highly complex decisions—some involving far more information than the human brain can comprehend—in increasingly shorter time frames. Figure 2.1 displays the three primary challenges managers face when making decisions.

LO2.1 Explain the importance of decision making for managers at each of the three primary organization levels along with the associated decision characteristics.

FIGURE 2.1 Managerial Decision-Making Challenges

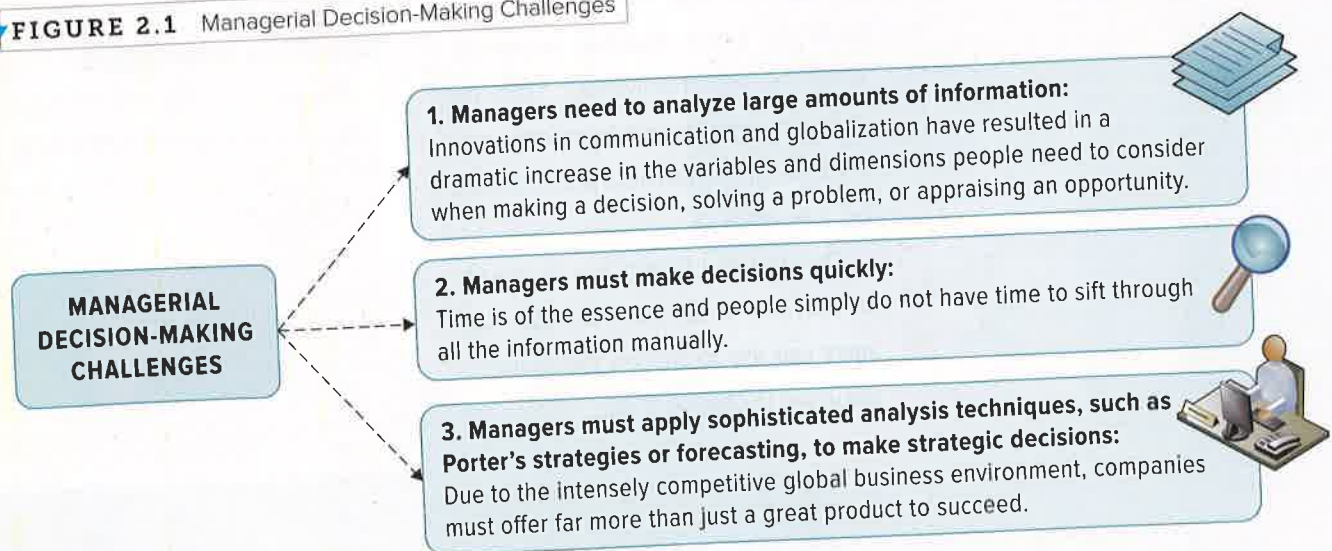


FIGURE 2.2 The Six-Step Decision-Making Process

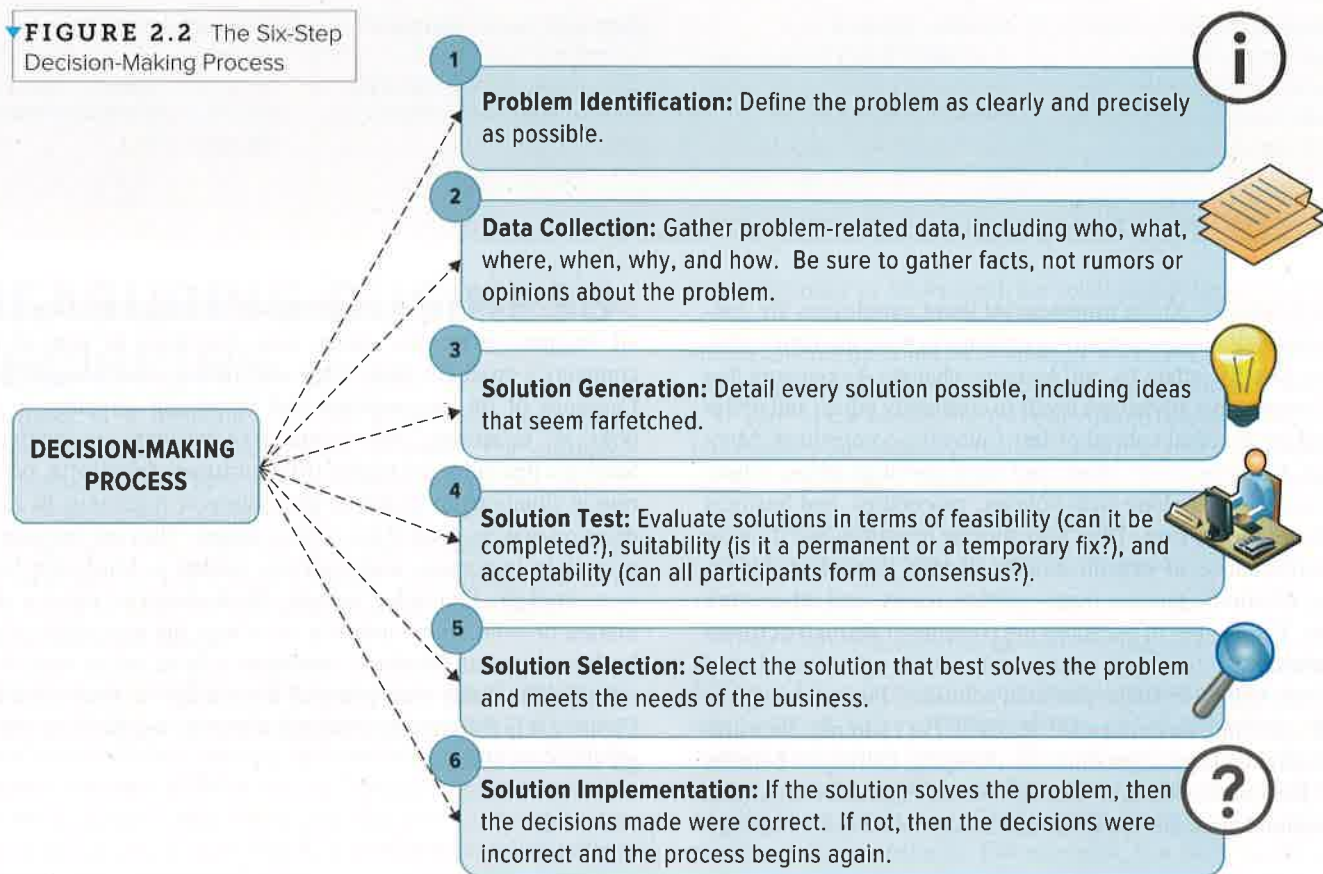


FIGURE 2.3 Common Company Structure



The Decision-Making Process

The process of making decisions plays a crucial role in communication and leadership for operational, managerial, and strategic projects. Analytics is the science of fact-based decision making. There are numerous academic decision-making models; Figure 2.2 presents just one example.¹

Decision-Making Essentials

A few key concepts about organizational structure will help our discussion of MIS decision-making tools. The structure of a typical organization is similar to a pyramid, and the different levels require different types of information to assist in decision making, problem solving, and opportunity capturing (see Figure 2.3).

Operational At the **operational level**, employees develop, control, and maintain core business activities required to run the day-to-day operations. Operational decisions are considered **structured decisions**, which arise in situations where established processes offer potential solutions. Structured

decisions are made frequently and are almost repetitive in nature; they affect short-term business strategies. Reordering inventory and creating the employee staffing and weekly production schedules are examples of routine structured decisions. Figure 2.4 highlights the essential elements required for operational decision making. All the elements in the figure should be familiar, except metrics, which are discussed in detail below.

managerial level Employees are continuously evaluating company operations to hone the firm's abilities to identify, adapt to, and leverage change.

semistructured decision Occurs in situations in which a few established processes help to evaluate potential solutions, but not enough to lead to a definite recommended decision.

strategic level Managers develop overall business strategies, goals, and objectives as part of the company's strategic plan.

unstructured decision Occurs in situations in which no procedures or rules exist to guide decision makers toward the correct choice.

Managerial At the **managerial level**, employees are continuously evaluating company operations to hone the firm's abilities to identify, adapt to, and leverage change. A company that has a competitive advantage needs to constantly adjust and revise its strategy to remain ahead of fast-following competitors. Managerial decisions cover short- and medium-range plans, schedules, and budgets along with policies, procedures, and business objectives for the firm. They also allocate resources and monitor the performance of organizational subunits, including departments, divisions, process teams, project teams, and other work groups. These types of decisions are considered **semistructured decisions**; they occur in situations in which a few established processes help to evaluate potential solutions, but not enough to lead to a definite recommended decision. For example, decisions about producing new products or changing employee benefits range from unstructured to semistructured. Figure 2.4 highlights the essential elements required for managerial decision making.

Strategic At the **strategic level**, managers develop overall business strategies, goals, and objectives as part of the company's strategic plan. They also monitor the strategic performance of the organization and its overall direction in the political, economic, and competitive business environment. Strategic decisions are highly **unstructured decisions**, occurring in situations in which no procedures or rules exist to guide decision makers toward the correct choice. They are infrequent, extremely important, and typically related to long-term business strategy. Examples include the decision to enter a new market or even a new industry over, say, the next three years. In these types of decisions, managers rely on many sources of information, along with personal knowledge, to find solutions. Figure 2.4 highlights the essential elements required for strategic decision making.

FIGURE 2.4 Overview of Decision Making

	Strategic Level	Managerial Level	Operational Level
Employee Types	Senior management, presidents, leaders, executives	Middle management, managers, directors	Lower management, department managers, analysts, staff
Focus	External, industry, cross company	Internal, crossfunctional (sometimes external)	Internal, functional
Time Frame	Long term—yearly, multiyear	Short term, daily, monthly, yearly	Short term, day-to-day operations
Decision Types	Unstructured, nonrecurring, one time	Semistructured, ad hoc (unplanned) reporting	Structured, recurring, repetitive
MIS Types	Knowledge	Business intelligence	Information
Metrics	Critical success factors focusing on effectiveness	Key performance indicators focusing on efficiency, and critical success factors focusing on effectiveness	Key performance indicators focusing on efficiency
Examples	- How will changes in employment levels over the next 3 years affect the company? - What industry trends are worth analyzing? - What new products and new markets does the company need to create competitive advantages? - How will a recession over the next year affect business? - What measures will the company need to prepare for due to new tax laws?	- Who are our best customers by region, by sales representative, by product? - What are the sales forecasts for next month? How do they compare to actual sales for last year? - What was the difference between expected sales and actual sales for each month? - What was the impact of last month's marketing campaign on sales? - What types of ad hoc or unplanned reports might the company require next month?	- How many employees are out sick? - What are next week's production requirements? - How much inventory is in the warehouse? - How many problems occurred when running payroll? - Which employees are on vacation next week? - How many products need to be made today?

project Temporary activity a company undertakes to create a unique product, service, or result.

metrics Measurements that evaluate results to determine whether a project is meeting its goals.

critical success factors (CSFs) Crucial steps companies perform to achieve their goals and objectives and implement their strategies.

key performance indicators (KPIs) Quantifiable metrics a company uses to evaluate progress towards critical success factors.

market share The proportion of the market that a firm captures.

MEASURING BUSINESS DECISIONS LO2.2

A **project** is a temporary activity a company undertakes to create a unique product, service, or result. For example, the construction of a new subway station is a project, as is a movie theater chain's adoption of a software program to allow online ticketing. Peter Drucker, a famous management writer, once said that if you cannot measure something, you cannot manage it. How do managers measure the progress of a complex business project?

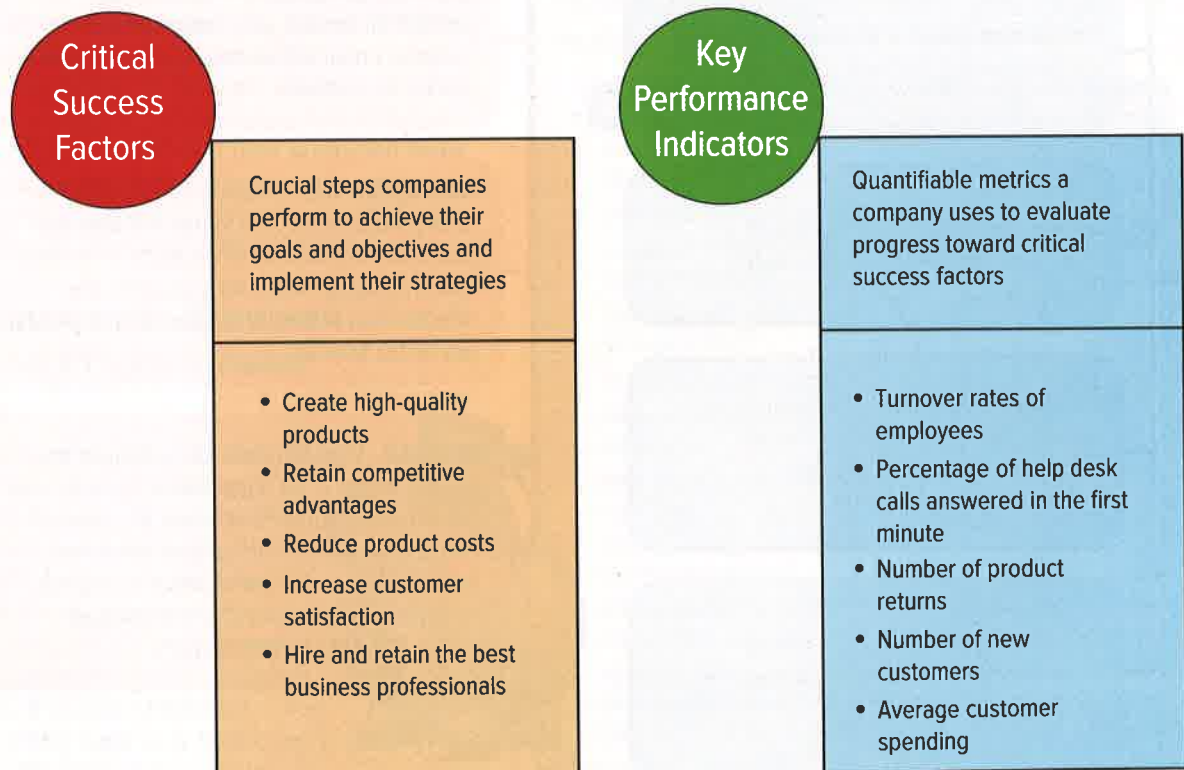
Metrics are measurements that evaluate results to determine whether a project is meeting its goals. Two core metrics are critical success factors and key performance indicators. **Critical success factors (CSFs)** are the crucial steps companies perform to achieve their goals and objectives and implement their strategies (see Figure 2.5). **Key performance indicators (KPIs)** are the quantifiable metrics a company uses to evaluate progress toward critical success factors. KPIs are far more specific than CSFs.

It is important to understand the relationship between critical success factors and key performance indicators. CSFs are elements crucial for a business strategy's success. KPIs measure the progress of CSFs with quantifiable measurements, and one CSF can have several KPIs. Of course, both categories will vary by company and industry. Imagine *improve graduation rates* as a CSF for a college. The KPIs to measure this CSF can include:

- Average grades by course and gender.
- Student dropout rates by gender and major.
- Average graduation rate by gender and major.
- Time spent in tutoring by gender and major.

KPIs can focus on external and internal measurements. A common external KPI is **market share**, or the proportion of the market that a firm captures. We calculate it by dividing the firm's sales by the total market sales for the entire industry. Market share measures a firm's external performance relative to that of its competitors. For example, if a firm's total sales (revenues) are \$2 million and sales for the entire industry are \$10 million, the firm has captured 20 percent of the total market ($2/10 = 20\%$) or a 20 percent market share.

FIGURE 2.5
CSF and KPI
Metrics



return on investment (ROI)

Indicates the earning power of a project.

best practices The most successful solutions or problem-solving methods that have been developed by a specific organization or industry.

A common internal KPI is **return on investment (ROI)**, which indicates the earning power of a project. We measure it by dividing the profitability of a project by the costs. This sounds easy, and for many departments where the projects are tangible and self-contained it is; however, for projects that are intangible and cross departmental lines (such as MIS projects), ROI is challenging to measure. Imagine attempting to calculate the ROI of a fire extinguisher. If the fire extinguisher is never used, its ROI is low. If the fire extinguisher puts out a fire that could have destroyed the entire building, its ROI is astronomically high.

Creating KPIs to measure the success of an MIS project offers similar challenges. Think about a firm's email system. How

could managers track departmental costs and profits associated with company email? Measuring by volume does not account for profitability, because one sales email could land a million-dollar deal while 300 others might not generate any revenue. Non-revenue-generating departments such as human resources and legal require email but will not be using it to generate profits. For this reason, many managers turn to higher-level metrics, such as efficiency and effectiveness, to measure MIS projects. **Best practices** are the most successful solutions or problem-solving methods that have been developed by a specific organization or industry. Measuring MIS projects helps determine the best practices for an industry.

LO2.2 Define critical success factors (CSFs) and key performance indicators (KPIs), and explain how managers use them to measure the success of MIS projects.

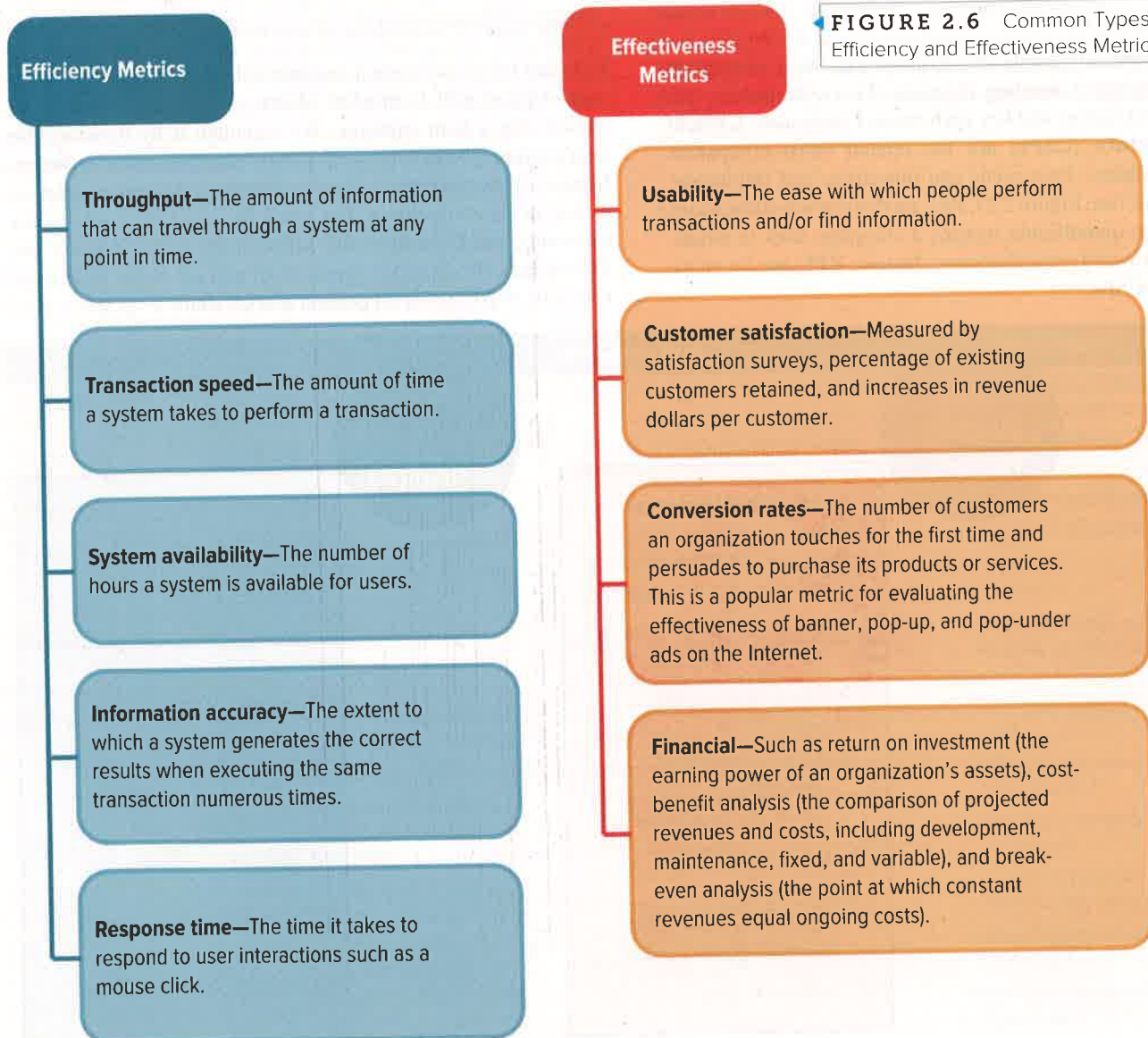


FIGURE 2.6 Common Types of Efficiency and Effectiveness Metrics

Efficiency and Effectiveness Metrics

Efficiency MIS metrics measure the performance of MIS itself, such as throughput, transaction speed, and system availability.

Effectiveness MIS metrics measure the impact MIS has on business processes and activities, including customer satisfaction and customer conversion rates. Efficiency focuses on the extent to which a firm is using its resources in an optimal way, while effectiveness focuses on how well a firm is achieving its goals and objectives. Peter Drucker offers a helpful distinction between efficiency and effectiveness: Doing things right addresses efficiency—getting the most from each resource. Doing the right things addresses effectiveness—setting the right goals and objectives and ensuring they are accomplished. Figure 2.6 describes a few of the common types of efficiency and effectiveness MIS metrics. KPIs that measure MIS projects include both efficiency and effectiveness metrics. Of course, these metrics are not as concrete as market share or ROI, but they do offer valuable insight into project performance.²

Large increases in productivity typically result from increases in effectiveness, which focus on CSFs. Efficiency MIS metrics are far easier to measure, however, so most managers tend to focus on them, often incorrectly, to measure the success of MIS projects. Consider measuring the success of automated teller machines (ATMs). Thinking in terms of MIS efficiency metrics, a manager would measure the number of daily transactions, the average amount per transaction, and the average speed per transaction to determine the success of the ATM. Although these offer solid metrics on how well the system is performing, they miss many of the intangible or value-added benefits associated with ATM effectiveness. Effectiveness MIS metrics might measure how many new customers joined the bank due to its ATM locations or the ATMs' ease of use. They can also measure increases in customer satisfaction due to reduced ATM fees or additional ATM services such as the sale of stamps and movie tickets, significant time savers and value added features for customers. Being a great manager means taking the added viewpoint offered by effectiveness MIS metrics to analyze all benefits associated with an MIS project.

The Interrelationship Between Efficiency and Effectiveness MIS Metrics

Efficiency and effectiveness are definitely related. However, success in one area does not necessarily imply success in the other. Efficiency MIS metrics focus on the technology itself. While these efficiency MIS metrics are important to monitor, they do not always guarantee effectiveness. Effectiveness MIS metrics are determined according to an organization's goals, strategies, and objectives. Here, it becomes important to consider a company's CSFs, such as a broad cost leadership strategy (Walmart, for example), as



well as KPIs such as increasing new customers by 10 percent or reducing new-product development cycle times to six months. In the private sector, eBay continuously benchmarks its MIS projects for efficiency and effectiveness. Maintaining constant website availability and optimal throughput performance are CSFs for eBay.

Figure 2.7 depicts the interrelationships between efficiency and effectiveness. Ideally, a firm wants to operate in the upper right-hand corner of the graph, realizing significant increases in both efficiency and effectiveness. However, operating in the upper left-hand corner (minimal effectiveness with increased efficiency) or the lower right-hand corner (significant effectiveness with minimal efficiency) may be in line with an organization's particular strategies. In general, operating in the lower left-hand

efficiency MIS

metrics Measure the performance of MIS itself such as throughput, transaction speed, and system availability.

effectiveness MIS

metrics Measure the impact MIS has on business processes and activities including customer satisfaction and customer conversion rates.

show me the MONEY

Is It Effective Or Is It Efficient?

Making business decisions is a key skill for all managers. Review the following list and, in a group, determine whether the question is focusing on efficiency, effectiveness, or both.

Business Decision	Efficiency	Effectiveness
What is the best route for dropping off products?		
Should we change suppliers?		
Should we reduce costs by buying lower-quality materials?		
Should we sell products to a younger market?		
Did we make our sales targets?		
What was the turnover rate of employees?		
What is the average customer spending?		
How many new customers purchased products?		
Did the amount of daily transactions increase?		
Is there a better way to restructure a store to increase sales?		

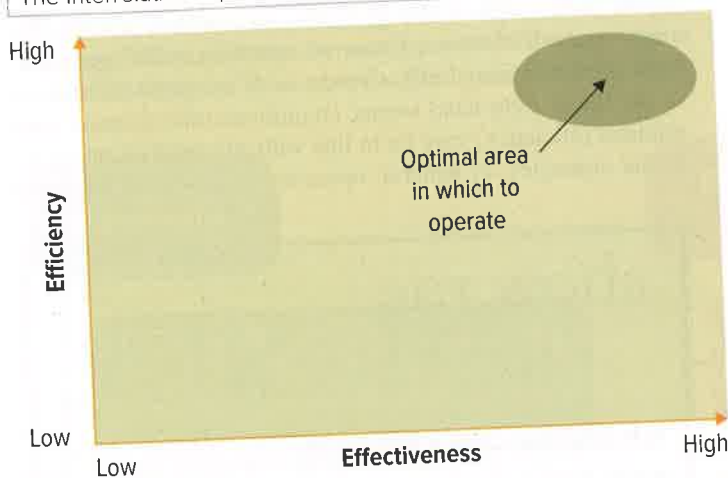
benchmark Baseline values the system seeks to attain.

benchmarking A process of continuously measuring system results, comparing those results to optimal system performance (benchmark values), and identifying steps and procedures to improve system performance.

model A simplified representation or abstraction of reality.

system performance. Benchmarks help assess how an MIS project performs over time. For instance, if a system held a benchmark for response time of 15 seconds, the manager would want to ensure response time continued to decrease until it reached that point. If response time suddenly increased to 1 minute, the manager would know the system was not functioning correctly and could start looking into potential problems. Continuously measuring MIS projects against benchmarks provides feedback so managers can control the system.

FIGURE 2.7
The Interrelationships Between Efficiency and Effectiveness



corner (minimal efficiency and minimal effectiveness) is not ideal for the operation of any organization.

Benchmarks Regardless of what process is measured, how it is measured, and whether it is performed for the sake of efficiency or effectiveness, managers must set **benchmarks**, or baseline values the system seeks to attain. **Benchmarking** is a process of continuously measuring system results, comparing those results to optimal system performance (benchmark values), and identifying steps and procedures to improve

USING MIS TO MAKE BUSINESS DECISIONS LO2.3

Now that we've reviewed the essentials of decision making, we are ready to understand the powerful benefits associated with using MIS to support managers making decisions.

A **model** is a simplified representation or abstraction of reality. Models help managers calculate risks, understand uncertainty, change variables, and manipulate time to make decisions. MIS support systems rely on models for computational and analytical routines that mathematically express relationships among variables. For example, a spreadsheet program, such as Microsoft Office Excel, might contain models that calculate market share or ROI. MIS have the capability and functionality to express far more complex modeling relationships that provide information, business intelligence, and knowledge. Figure 2.8 highlights the three primary types of management information systems available to support decision making across the company levels.

LO2.3 Classify the different operational support systems, managerial support systems, and strategic support systems, and explain how managers can use these systems to make decisions and gain competitive advantages.

Due Diligence //: Get the Cow Out of The Ditch

Fortune magazine asked Anne Mulcahy, former Chairman and CEO of Xerox, what the best advice she had ever received in business was. She said it occurred at a breakfast meeting in Dallas, to which she had invited a group of business leaders. One of them, a plainspoken, self-made, streetwise guy, came up to Mulcahy and said:

When everything gets really complicated and you feel overwhelmed, think about it this way. You gotta do three things. First, get the cow out of the ditch. Second, find out how the cow got into the ditch. Third, make sure you do whatever it takes so the cow doesn't go into the ditch again.³

You are working for an international app developer that produces games. For months, you have been collecting metrics on usage by players from all over the world. You notice the metrics on the Asian and European players are falling sharply and sales are dropping. The United States and Canada metrics are still growing strongly, and sales are increasing. What can you do to get this cow out of the ditch?

transactional information

Encompasses all of the information contained within a single business process or unit of work, and its primary purpose is to support the performing of daily operational or structured decisions.

online transaction processing (OLTP)

The capturing of transaction and event information using technology to (1) process the information according to defined business rules, (2) store the information, and (3) update existing information to reflect the new information.

transaction processing system (TPS)

The basic business system that serves the operational level (analysts) and assists in making structured decisions.

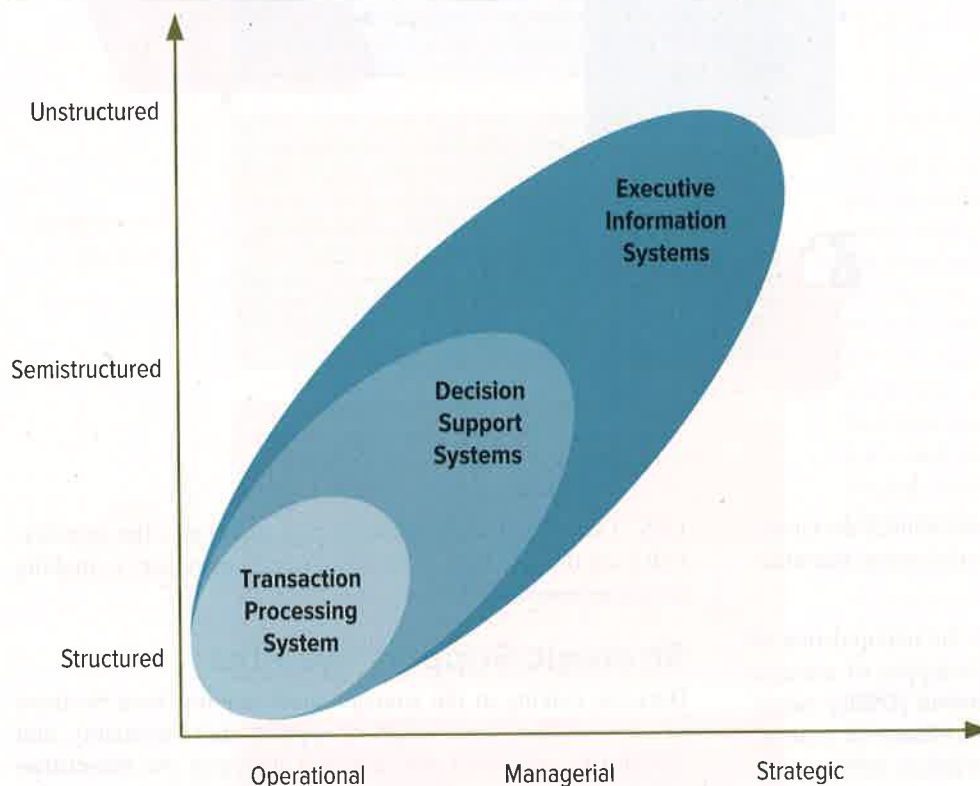
source document

Describes the original transaction record along with details such as its date, purpose, and amount spent and includes cash receipts, canceled checks, invoices, customer refunds, employee time sheet, etc.

analytical information

Encompasses all organizational information, and its primary purpose is to support the performing of managerial analysis or semistructured decisions.

FIGURE 2.8 Primary Types of MIS Systems for Decision Making



Operational Support Systems

Transactional information encompasses all the information contained within a single business process or unit of work, and its primary purpose is to support the performance of daily operational or structured decisions. Transactional information is created, for example, when customers are purchasing stocks, making an airline reservation, or withdrawing cash from an ATM. Managers use transactional information when making structured decisions at the operational level, such as when analyzing daily sales reports to determine how much inventory to carry.

Online transaction processing (OLTP) is the capture of transaction and event information using technology to (1) process the information according to defined business rules,

(2) store the information, and (3) update existing information to reflect the new information. During OLTP, the organization must capture every detail of transactions and events. A **transaction processing system (TPS)** is the basic business system that serves the operational level (analysts) and assists in making structured decisions. The most common example of a TPS is an operational accounting system such as a payroll system or an order entry system.

Using systems thinking, we can see that the inputs for a TPS are **source documents**, which describes the original transaction record along with details such as its date, purpose, and amount spent and includes cash receipts, canceled checks, invoices, customer refunds, employee time sheet, etc. Source documents for a payroll system can include time sheets, wage rates, and employee benefit reports. Transformation includes common procedures such as creating, reading,

updating, and deleting (commonly referred to as CRUD) employee records, along with calculating the payroll and summarizing benefits. The output includes cutting the paychecks and generating payroll reports. Figure 2.9 demonstrates the systems thinking view of a TPS.⁴

Managerial Support Systems

Analytical information encompasses all organizational information, and its primary purpose is to support the performance of managerial analysis or semistructured decisions. Analytical information includes transactional information along with other information such as market and industry information. Examples of analytical information are trends, sales, product statistics, and future growth projections. Managers use analytical

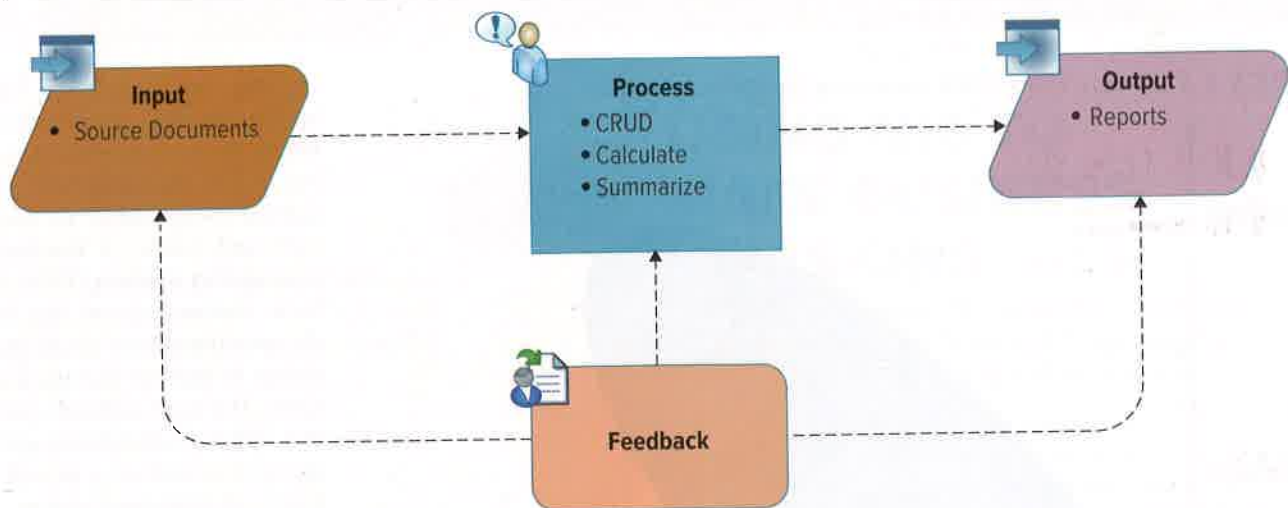
online analytical processing (OLAP) The manipulation of information to create business intelligence in support of strategic decision making.

decision support system (DSS) Model information using OLAP, which provides assistance in evaluating and choosing among different courses of action.

executive information system (EIS) A specialized DSS that supports senior-level executives and unstructured, long-term, nonroutine decisions requiring judgment, evaluation, and insight.

granularity Refers to the level of detail in the model or the decision-making process.

FIGURE 2.9 Systems Thinking Example of a TPS



information when making important semistructured decisions, such as whether the organization should build a new manufacturing plant or hire additional sales reps.

Online analytical processing (OLAP) is the manipulation of information to create business intelligence in support of strategic decision making. **Decision support systems (DSSs)** model information using OLAP, which provides assistance in evaluating and choosing among different courses of action. DSSs enable high-level managers to examine and manipulate large amounts of detailed data from different internal and external sources. Analyzing complex relationships among thousands or even millions of data items to discover patterns, trends, and exception conditions is one of the key uses associated with a DSS. For example, doctors may enter symptoms into a decision support system so it can help diagnose and treat patients. Insurance companies also use a DSS to gauge the risk of providing insurance to drivers who have imperfect driving records. One company found that married women who are homeowners with one speeding ticket are rarely cited for speeding again. Armed with this business intelligence, the company achieved a cost advantage by lowering insurance rates to this specific group of customers. Figure 2.10 displays the common DSS analysis techniques.

Figure 2.11 shows the common systems view of a DSS. Figure 2.12 shows how TPSs supply transactional data to a

DSS. The DSS then summarizes and aggregates the information from the different TPSs, which assist managers in making semistructured decisions.

Strategic Support Systems

Decision making at the strategic level requires both business intelligence and knowledge to support the uncertainty and complexity associated with business strategies. An **executive information system (EIS)** is a specialized DSS that supports senior-level executives and unstructured, long-term, nonroutine decisions requiring judgment, evaluation, and insight. These decisions do not have a right or wrong answer, only efficient and effective answers. Moving up through the organizational pyramid, managers deal less with the details (“finer” information) and more with meaningful aggregations of information (“coarser” information). **Granularity** refers to the level of detail in the model or the decision-making process. The greater the granularity, the deeper the level of detail or fineness of data (see Figure 2.13).

A DSS differs from an EIS in that an EIS requires data from external sources to support unstructured decisions (see Figure 2.14). This is not to say that DSSs never use data from external sources, but typically DSS semistructured decisions rely on internal data only.

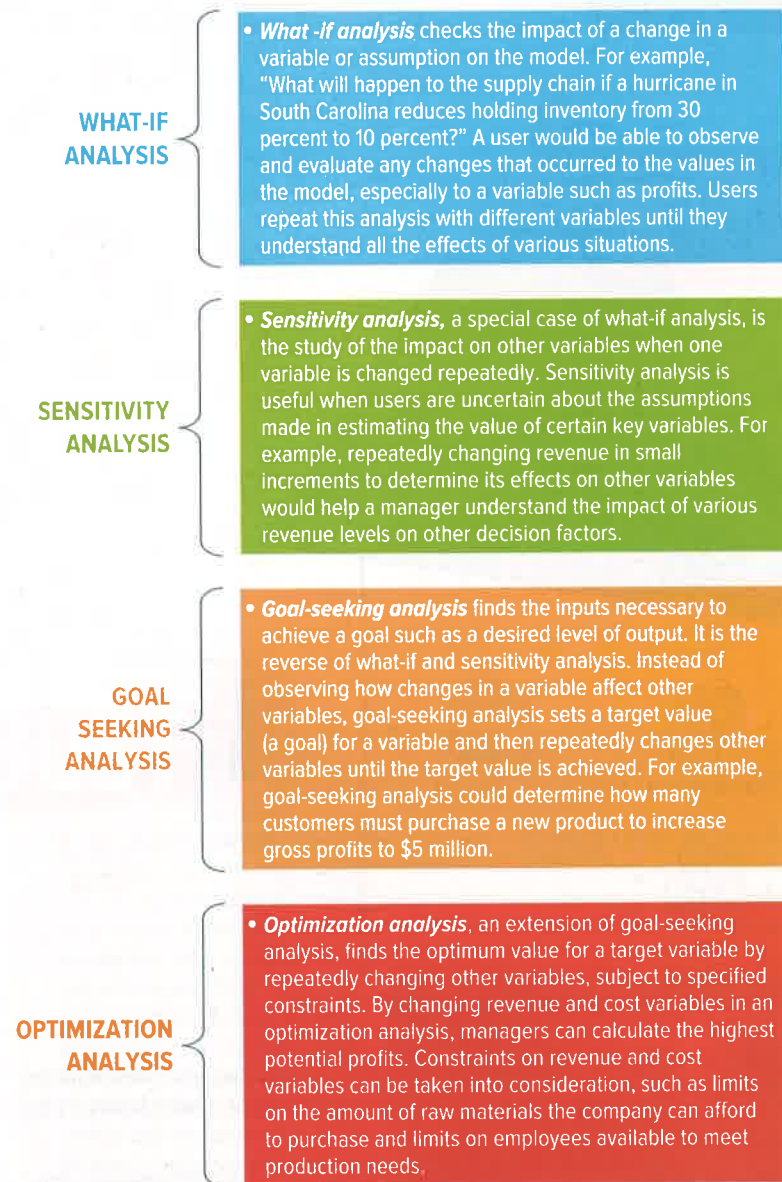
visualization Produces graphical displays of patterns and complex relationships in large amounts of data.

digital dashboard Tracks KPIs and CSFs by compiling information from multiple sources and tailoring it to meet user needs.

artificial intelligence (AI) Simulates human thinking and behavior such as the ability to reason and learn.

intelligent system Various commercial applications of artificial intelligence.

FIGURE 2.10 Common DSS Analysis Techniques



included in a dashboard designed for a manufacturing team:

- A hot list of key performance indicators, refreshed every 15 minutes.
- A running line graph of planned versus actual production for the past 24 hours.
- A table showing actual versus forecasted product prices and inventories.
- A list of outstanding alerts and their resolution status.
- A graph of stock market prices.

Digital dashboards, whether basic or comprehensive, deliver results quickly. As they become easier to use, more employees can perform their own analyses without inundating MIS staff with questions and requests for reports. Digital dashboards enable employees to move beyond reporting to using information to directly increase business performance. With them, employees can react to information as soon as it becomes available and make decisions, solve problems, and change strategies daily instead of monthly. Digital dashboards offer the analytical capabilities illustrated in Figure 2.15.

One thing to remember when making decisions is the old saying, "Garbage in, garbage out." If the transactional data used in the support system are wrong, then the managerial analysis will be wrong and the DSS will simply assist in making a wrong decision faster. Managers should also ask, "What is the DSS *not* telling me before I make my final decision?"

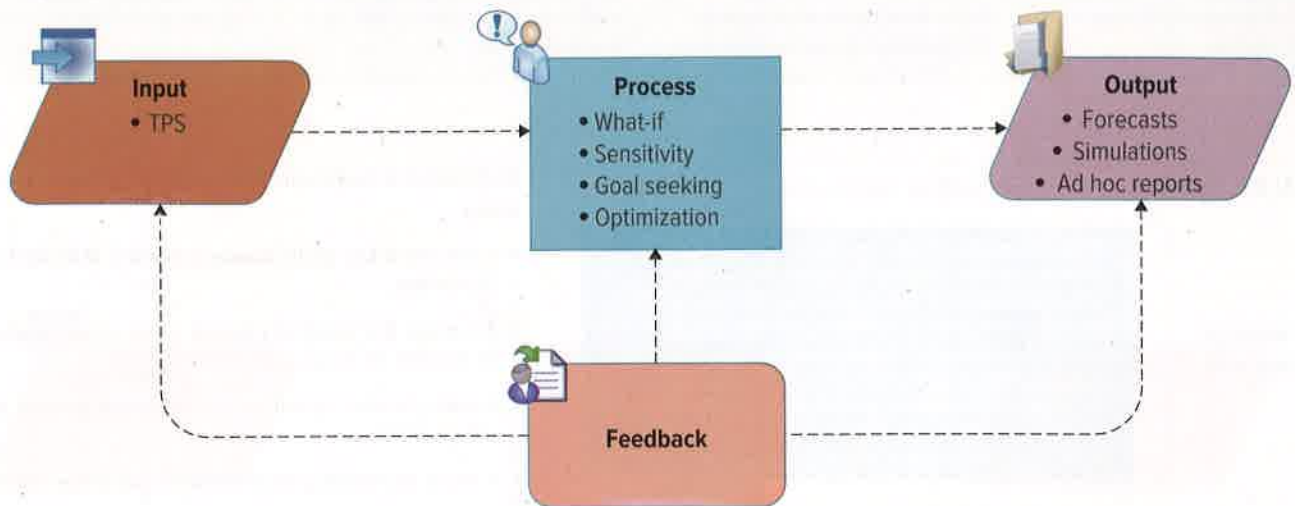
USING AI TO MAKE BUSINESS DECISIONS LO2.4

Executive information systems are starting to take advantage of artificial intelligence to facilitate unstructured strategic decision making. **Artificial intelligence (AI)** simulates human thinking and behavior, such as the ability to reason and learn. Its ultimate goal is to build a system that can mimic human intelligence.

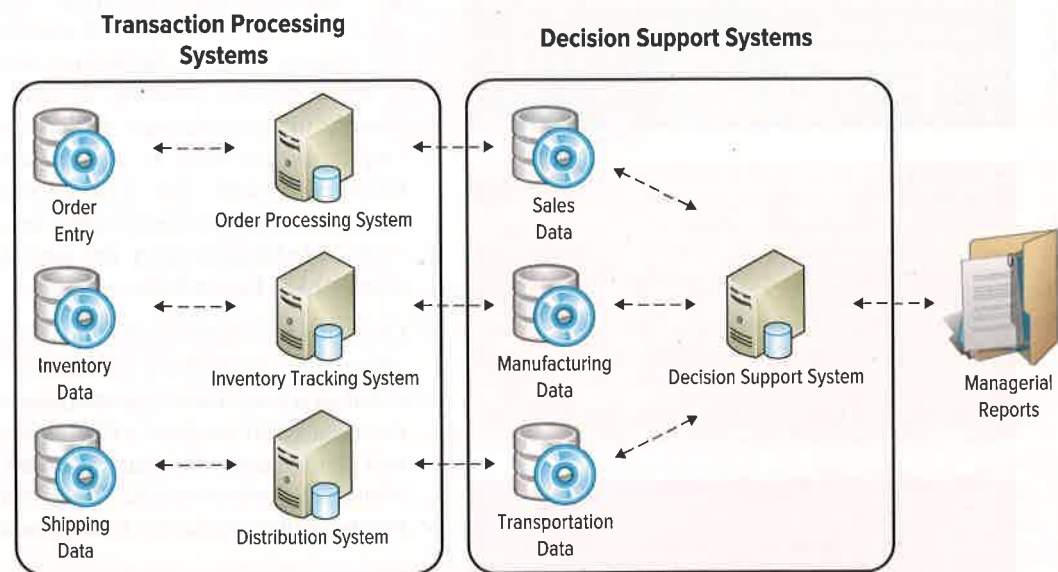
Intelligent systems are various commercial applications of artificial intelligence. They include sensors, software, and devices that emulate and enhance human capabilities, learn

Visualization produces graphical displays of patterns and complex relationships in large amounts of data. Executive information systems use visualization to deliver specific key information to top managers at a glance, with little or no interaction with the system. A common tool that supports visualization is a **digital dashboard**, which tracks KPIs and CSFs by compiling information from multiple sources and tailoring it to meet user needs. Following is a list of potential features

▼ **FIGURE 2.11** Systems Thinking Example of a DSS



▼ **FIGURE 2.12** Interaction Between TPS and DSS to Support Semistructured Decisions



or understand from experience, make sense of ambiguous or contradictory information, and even use reasoning to solve problems and make decisions effectively. Intelligent systems perform such tasks as boosting productivity in factories by monitoring equipment and signaling when preventive maintenance is required. They are beginning to show up everywhere:

- At Manchester Airport in England, the Hefner AI Robot Cleaner alerts passengers to security and nonsmoking rules while it scrubs up to 65,600 square feet of floor per day. Laser scanners and ultrasonic detectors keep it from colliding with passengers.⁷
- Shell Oil's SmartPump keeps drivers in their cars on cold, wet winter days. It can service any automobile built after 1987

that has been fitted with a special gas cap and a windshield-mounted transponder that tells the robot where to insert the pump.

- Matsushita's courier robot navigates hospital hallways, delivering patient files, X-ray films, and medical supplies.
- The FireFighter AI Robot can extinguish flames at chemical plants and nuclear reactors with water, foam, powder, or inert gas. The robot puts distance between human operators and the fire.

AI systems increase the speed and consistency of decision making, solve problems with incomplete information, and resolve complicated issues that cannot be solved by conventional computing. There are many categories of AI systems; five of the

most familiar are (1) expert systems, (2) neural networks, (3) genetic algorithms, (4) intelligent agents, and (5) virtual reality (see Figure 2.16).

LO2.4 Describe artificial intelligence, and identify its five main types.

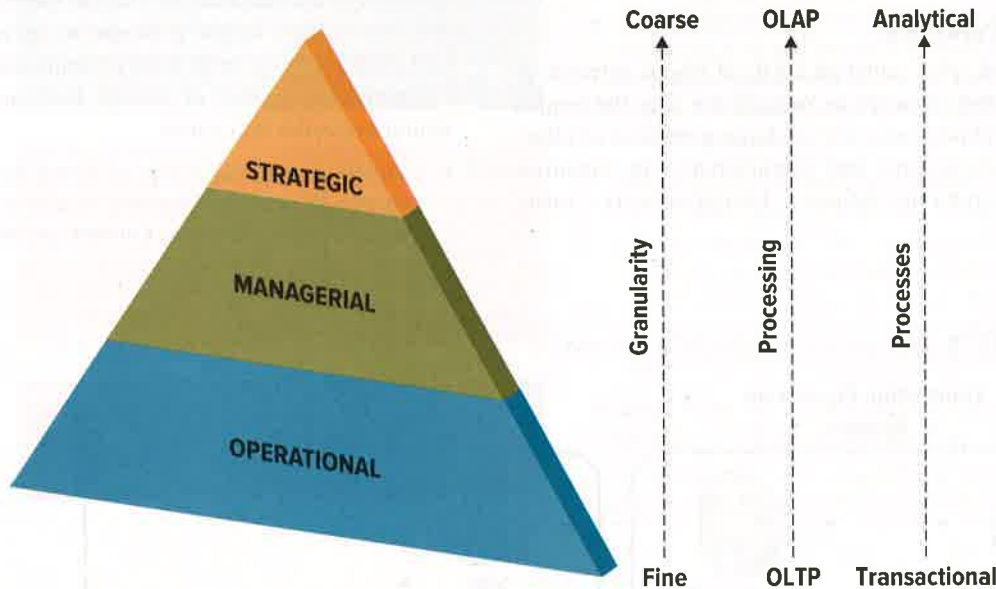
Expert Systems

Expert systems are computerized advisory programs that imitate the reasoning processes of experts in solving difficult problems. Typically, they include a knowledge

expert system

Computerized advisory programs that imitate the reasoning processes of experts in solving difficult problems.

FIGURE 2.13 Information Levels Throughout an Organization



BUSTED

The Criminal in the Cube Next Door⁵

What if the person sitting in the cube next to you was running a scam that cost your company \$7 billion? An employee at a French bank allegedly used his inside knowledge of business processes to bypass the systems and make roughly \$73 billion in bogus trades that cost the bank more than \$7 billion to unwind.

Findings from the U.S. Secret Service and its examination of 23 incidents conducted by 26 insiders determined that 70 percent of the time, insiders took advantage of failures in business process rules and authorization mechanisms to steal from the company. Seventy-eight percent of the time, insiders were authorized and active computer users, and a

surprising 43 percent used their own username and passwords to commit their crime.

This is a daunting reminder that every employee has the potential to become a

knowledgeable insider, and if they ever turned bad in a fraudulent, criminal, even destructive way, they could do tremendous damage to your company. You need to protect your company's assets, and many of your DSS and EIS systems contain the business intelligence your company needs to operate effectively. What types of sensitive information is housed in a company's TPS, DSS, and EIS? What issues could you encounter if one of your employees decided to steal the information housed in your DSS? How could you protect your EIS from unethical users? What would you do if you thought the person sharing your cube was a rogue insider?



© Melvin Dockrey/Getty Images

neural network A category of AI that attempts to emulate the way the human brain works.

base containing various accumulated experience and a set of rules for applying the knowledge base to each particular situation. Expert systems are the most common form of AI in the business arena because they fill the gap when human experts are difficult to find

or retain or are too expensive. The best-known systems play chess and assist in medical diagnosis.

Neural Networks

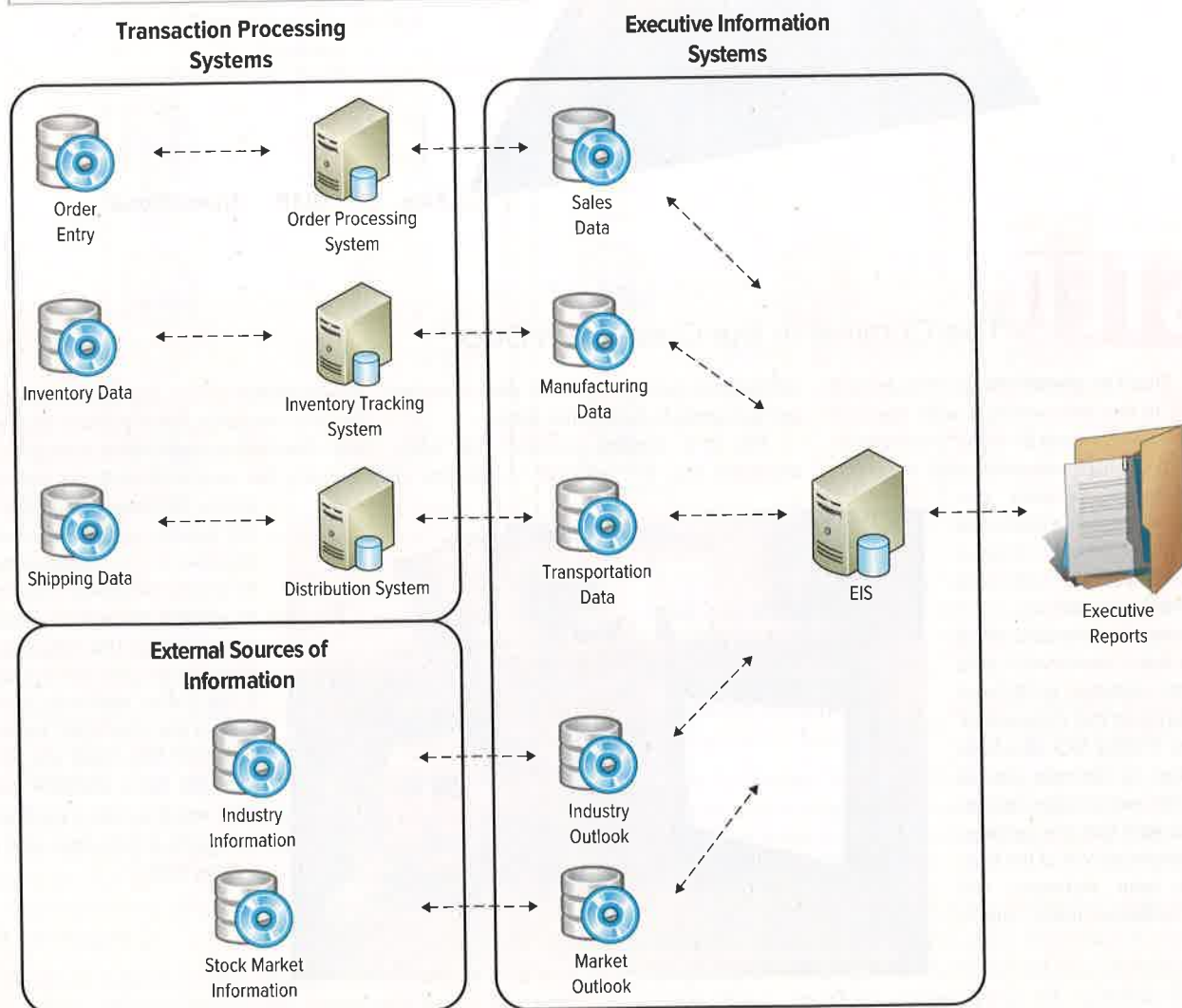
A **neural network**, also called an artificial neural network, is a category of AI that attempts to emulate the way the human brain works. Neural networks analyze large quantities of information to establish patterns and characteristics in situations where the logic or rules are unknown. Neural networks' many features include:

- Learning and adjusting to new circumstances on their own.
- Lending themselves to massive parallel processing.
- Functioning without complete or well-structured information.
- Coping with huge volumes of information with many dependent variables.
- Analyzing nonlinear relationships in information (they have been called fancy regression analysis systems).

The finance industry is a veteran in the use of neural network technology and has been relying on various forms for over two decades. It uses neural networks to review loan applications and create patterns or profiles of applications that fall into two categories—approved or denied. Here are some examples of neural networks in finance:

- Citibank uses neural networks to find opportunities in financial markets. By carefully examining historical stock market data with neural network software, Citibank financial managers learn of

FIGURE 2.14 Interaction Between a TPS and EIS



▼ **FIGURE 2.15** Digital Dashboard Analytical Capabilities

CONSOLIDATION

- **Consolidation** is the aggregation of data from simple roll-ups to complex groupings of interrelated information. For example, data for different sales representatives can then be rolled up to an office level, then a state level, then a regional sales level.

DRILL-DOWN

- **Drill-down** enables users to view details, and details of details, of information. This is the reverse of consolidation; a user can view regional sales data and then drill down all the way to each sales representative's data at each office. Drill-down capability lets managers view monthly, weekly, daily, or even hourly information.

Slice-and-Dice

- **Slice-and-dice** is the ability to look at information from different perspectives. One slice of information could display all product sales during a given promotion. Another slice could display a single product's sales for all promotions. Slicing and dicing is often performed along a time axis to analyze trends and find time-based patterns in the information.

Pivot

- **Pivot** (also known as rotation) rotates data to display alternative presentations of the data. For example, a Pivot can swap the rows and columns of a report to show the data in a different format.

interesting coincidences or small anomalies (called market inefficiencies). For example, it could be that whenever IBM stock goes up, so does Unisys stock, or that a U.S. Treasury note is selling for 1 cent less in Japan than in the United States. These snippets of information can make a big difference to Citibank's bottom line in a very competitive financial market.⁹

- Visa, MasterCard, and many other credit card companies use a neural network to spot peculiarities in individual accounts and follow up by checking for fraud. MasterCard estimates neural networks save it \$50 million annually.
- Insurance companies along with state compensation funds and other carriers use neural network software to identify fraud. The system searches for patterns in billing charges, laboratory tests, and frequency of office visits. A claim for which the diagnosis was a sprained ankle but treatment included an electrocardiogram would be flagged for the account manager.

Fuzzy logic is a mathematical method of handling imprecise or subjective information. The basic approach is to assign values between 0 and 1 to vague or ambiguous information. Zero represents information not included,

fuzzy logic A mathematical method of handling imprecise or subjective information.

fyi

Got Junk? Get a Hunk!®

Do you enjoy kidnapping your rival's team mascot or toilet-papering their frat houses? If so, you might find your ideal career at College Hunks Hauling Junk. The company launched in 2005 and hires college students and recent college grads to pick up junk. The founder, Nick Friedman, had a goal of capturing that friendly rivalry so often associated with college life and turn it into profits. When the company first launched, the haulers from Virginia found that their truck had been lathered in shaving cream and draped with a University of Maryland flag. The Virginia haulers retaliated and, soon after, dead fish were found coating the seats of the Maryland's truck. Friedman decided to use this energy as incentive instead of reprimanding the rather unorthodox behavior. "We wanted to harness that competitive, prankster enthusiasm and channel it for good," states Friedman.

Friedman made a bold move and decided that instead of tracking typical key performance metrics such as revenue, average job size, customer loyalty, etc., he would track volume of junk collected and amount of junk donated or recycled. The winning team gains such things as bragging

rights and banners, modest monetary prizes, and "first table to eat" at the annual company meeting. Most employees check the dashboard daily to view their own and rivals' latest standings.

Why do you think competition is helping College Hunks Hauling Junk exceed its revenue goals? If you were to build a team competition dashboard for your school or your work, what types of metrics would it track? What types of motivators would you use to ensure your team is always in the green? What types of external information would you want tracked in your dashboard? Could an unethical person use the information from your dashboard to hurt your team or your organization? What can you do to mitigate these risks?



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genetic algorithm

An artificial intelligence system that mimics the evolutionary, survival-of-the-fittest process to generate increasingly better solutions to a problem.

mutation

The process within a genetic algorithm of randomly trying combinations and evaluating the success (or failure) of the outcome.

while 1 represents inclusion or membership. For example, fuzzy logic is used in washing machines that determine by themselves how much water to use or how long to wash (they continue washing until the water is clean). In accounting and finance, fuzzy logic allows people to analyze information with subjective financial values (intangibles such as goodwill) that are very important considerations in economic analysis. Fuzzy logic and neural networks are often combined to express complicated and subjective concepts in a form

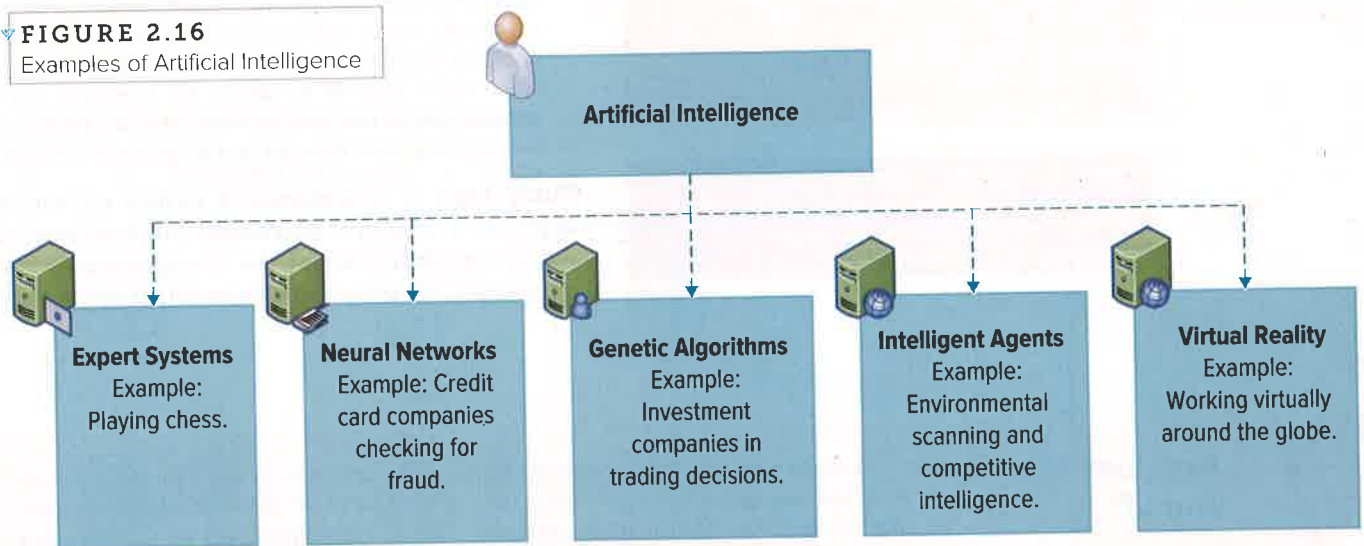
that makes it possible to simplify the problem and apply rules that are executed with a level of certainty.

Genetic Algorithms

A **genetic algorithm** is an artificial intelligence system that mimics the evolutionary, survival-of-the-fittest process to generate increasingly better solutions to a problem. A genetic algorithm is essentially an optimizing system: It finds the combination of inputs that gives the best outputs. **Mutation** is the process within a genetic algorithm of randomly trying combinations and evaluating the success (or failure) of the outcome.

Genetic algorithms are best suited to decision-making environments in which thousands, or perhaps millions, of solutions are possible. Genetic algorithms can find and evaluate solutions with many more possibilities, faster and more thoroughly than

FIGURE 2.16
Examples of Artificial Intelligence



Living the DREAM

Track Your Life

With wearable technology, you can track your entire life. Nike's Fuelband and Jawbone's Up tracks all of your physical activity, caloric burn, and sleep patterns. You can track your driving patterns, tooth-brushing habits, and even laundry status. The question now becomes how to track all of your trackers.

A new company called Exist incorporates tracking devices with weather data, music choices, Netflix favorites, and Twitter activity all in one digital dashboard. Exist wants to understand every area of your life and provide

correlation information between such things as your personal productivity and mood. As the different types of data expand, so will the breadth of correlations Exist can point out. For instance, do you tweet more when you are working at home? If so, does this increase productivity? Exist wants to track all of your trackers and analyze the information to help you become more efficient and more effective.⁸

Create a digital dashboard for tracking your life. Choose four areas you want to track and determine three ways you would measure each area. For example, if you track eating habits, you might want to measure calories and place unacceptable levels in red and

acceptable levels in green. Once completed, determine whether you can find any correlations among the areas in your life.



© Friedrich Stark / Alamy Stock Photo

intelligent agent A special-purpose knowledge-based information system that accomplishes specific tasks on behalf of its users.

shopping bot Software that will search several retailer websites and provide a comparison of each retailer's offerings including price and availability.

virtual reality A computer-simulated environment that can be a simulation of the real world or an imaginary world.

augmented reality The viewing of the physical world with computer-generated layers of information added to it.

a human. Organizations face decision-making environments for all types of problems that require optimization techniques, such as the following:

- Business executives use genetic algorithms to help them decide which combination of projects a firm should invest in, taking complicated tax considerations into account.
- Investment companies use genetic algorithms to help in trading decisions.
- Telecommunication companies use genetic algorithms to determine the optimal configuration of fiber-optic cable in a network that may include as many as 100,000 connection points. The genetic algorithm evaluates millions of cable configurations and selects the one that uses the least amount of cable.



Intelligent Agents

An **intelligent agent** is a special-purpose knowledge-based information system that accomplishes specific tasks on behalf of its users. Intelligent agents usually have a graphical representation, such as "Sherlock Holmes" for an information search agent.

One of the simplest examples of an intelligent agent is a shopping bot. A **shopping bot** is software that will search several retailer websites and provide a comparison of each retailer's offerings including price and availability. Increasingly, intelligent agents handle the majority of a company's Internet buying and selling and complete such processes as finding products, bargaining over prices, and executing transactions. Intelligent agents also have the capability to handle all supply chain buying and selling.

Another application for intelligent agents is in environmental scanning and competitive intelligence. For instance, an intelligent agent can learn the types of competitor information users want to track, continuously scan the web for it, and alert users when a significant event occurs.

Multiagent Systems and Agent-Based Modeling What do cargo transport systems, book distribution centers, the video game market, and a flu epidemic have in common with an ant colony? They are all complex adaptive systems. By observing parts of Earth's ecosystem, like ant colonies, artificial intelligence scientists can use hardware and software models that incorporate insect characteristics and behavior to (1) learn how people-based systems behave, (2) predict how they will behave under a given set of circumstances, and (3) improve human systems to make them more efficient and effective. This process of learning from ecosystems and adapting their characteristics to human and organizational situations is called biomimicry.

show me the MONEY

If It Ain't Broke, Don't Fix It

Do you hate waiting in line at the grocery store? Do you find it frustrating when you go to the video store and cannot find the movie you wanted to rent? Do you get annoyed when the pizza delivery person brings you the wrong order? This is your chance to reengineer the annoying process that drives you crazy. Choose a problem you are currently experiencing, and reengineer the process to make it more efficient and effective. Be sure to provide an As-Is and To-Be business process model.

In the past few years, AI research has made much progress in modeling complex organizations as a whole with the help of multiagent systems. In a multiagent system, groups of intelligent agents have the ability to work independently and to interact with each other. Agent-based modeling is a way of simulating human organizations using multiple intelligent agents, each of which follows a set of simple rules and can adapt to changing conditions.

Agent-based modeling systems are being used to model stock market fluctuations, predict the escape routes people seek in a burning building, estimate the effects of interest rates on consumers with different types of debt, and anticipate how changes in conditions will affect the supply chain, to name just a few.

Virtual Reality

Virtual reality is a computer-simulated environment that can be a simulation of the real world or an imaginary world. Virtual reality is a fast-growing area of artificial intelligence that had its origins in efforts to build more natural, realistic, multisensory human-computer interfaces. Virtual reality enables telepresence where users can be anywhere in the world and use virtual reality systems to work alone or together at a remote site. Typically, this involves using a virtual reality system to enhance the sight and touch of a human who is remotely manipulating equipment to accomplish a task. Examples range from virtual surgery, where surgeon and patient may be on opposite sides of the globe, to the remote use of equipment in hazardous environments such as chemical plants and nuclear reactors.

Augmented reality is the viewing of the physical world with computer-generated layers of information added to it.

customer-facing process Results in a product or service that is received by an organization's external customer.

business-facing process Invisible to the external customer but essential to the effective management of the business; they include goal setting, day-to-day planning, giving performance feedback and rewards, and allocating resources.

Virtual Workforce At Microsoft's headquarters in Redmond, Washington, traffic congestion occurs daily for the 35,000 commuters. To alleviate the congestion Microsoft is offering its employees the ability to work virtually from home. Over 42 percent of IBM's 330,000 employees work virtually, saving over \$100 million per year in real estate-related expenses. Working virtually offers several advantages such as fewer cars on the road, increases in worker productive, and decreased real estate expenses. Drawbacks include the fear among workers that they will jeopardize their careers by working

from home, and some workers need a busy environment to stay productive. Virtual workers also tend to feel alone, secluded, and deprived of vital training and mentoring.

{SECTION 2.2}

Business Processes

LEARNING OUTCOMES

- LO2.5** Explain the value of business processes for a company, and differentiate between customer-facing and business-facing processes.
- LO2.6** Demonstrate the value of business process modeling, and compare As-Is and To-Be models.
- LO2.7** Differentiate among automation, streamlining, and reengineering.

MANAGING BUSINESS PROCESSES LO2.5

Most companies pride themselves on providing breakthrough products and services for customers. But if customers do not receive what they want quickly, accurately, and hassle-free,

even fantastic offerings will not prevent a company from annoying customers and ultimately eroding its own financial performance. To avoid this pitfall and protect its competitive advantage, a company must continually evaluate all the business processes in its value chain. A business process is a standardized set of activities that accomplish a specific task, such as processing a customer's order. Business processes transform a set of inputs into a set of outputs—goods or services—for another person or process by using people and tools. Understanding business processes helps a manager envision how the entire company operates.

Improving the efficiency and effectiveness of its business processes will improve the firm's value chain. The goal of this section is to expand on Porter's value chain analysis by detailing the powerful value-adding relationships between business strategies and core business processes. Figure 2.17 illustrates several common business processes.

The processes outlined in Figure 2.17 reflect functional thinking. Some processes, such as a programming process, may be contained wholly within a single department. However, most, such as ordering a product, are cross-functional or cross-departmental processes and span the entire organization. The process of "order to delivery" focuses on the entire customer order process across functional departments (see Figure 2.18). Another example is "product realization," which includes not only the way a product is developed, but also the way it is marketed and serviced. Some other cross-functional business processes are taking a product from concept to market, acquiring customers, loan processing, providing post-sales service, claim processing, and reservation handling.

Customer-facing processes, also called front-office processes, result in a product or service received by an organization's external customer. They include fulfilling orders, communicating with customers, and sending out bills and marketing information. **Business-facing processes**, also called back office processes, are invisible to the external customer but essential to the effective management of the business; they include goal setting, day-to-day planning, giving performance feedback and rewards, and allocating resources. Figure 2.19 displays the different categories of customer-facing and business-facing processes along with an example of each.¹¹

A company's strategic vision should provide guidance on which business processes are core, that is, which are directly linked to

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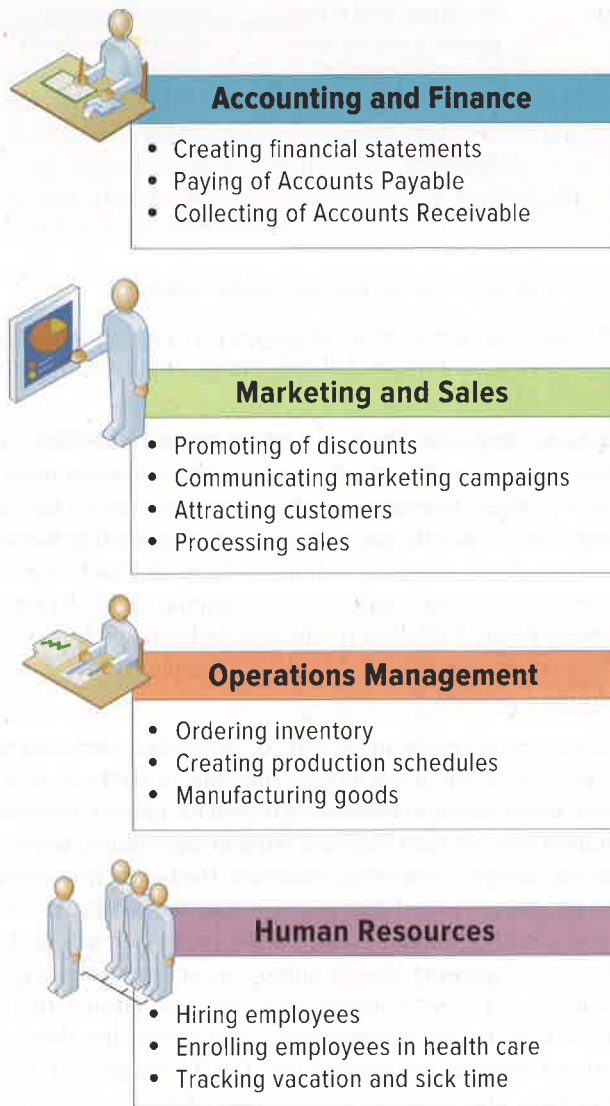
Long-Distance Hugs

Haptic technology digitizes touch. CuteCircuit created the Hug shirt that you can hug and send the exact hug, including strength, pressure, distribution, and even

heartbeat, to a long-distance friend who is wearing the partner to your Hug shirt. Ben Hui at Cambridge University is creating hand-squeezes that can be sent by mobile phones. You simply squeeze the phone and your friend feels it, in some form, at the other end. The value of these haptic devices is based on the idea that

physical touch is an important element to all human interactions, and if you can transfer the physical touch, you can replicate the emotion. In a group, create a new business product that uses a haptic interface. Share your product idea with your peers.¹⁰

▼ **FIGURE 2.17** Sample Business Processes



the firm's critical success factors. Mapping these core business processes to the value chain reveals where the processes touch the customers and affect their perceptions of value. This type of map conceptualizes the business as a value delivery system, allowing managers to ensure all core business processes are operating as efficiently and effectively as possible.

A **business process patent** is a patent that protects a specific set of procedures for conducting a particular business activity. A firm can create a value chain map of the entire industry to extend critical success factors and business process views beyond its boundaries. **Core processes** are business processes, such as manufacturing goods, selling products, and providing service, that make up the primary activities in a value chain.

A **static process** uses a systematic approach in an attempt to improve business effectiveness and efficiency. Managers constantly attempt to optimize static process. Examples of static processes include running payroll, calculating taxes, and creating financial statements. A **dynamic process** is continuously changing and provides business solutions to ever-changing business operations. As the business and its strategies change, so do the dynamic processes. Examples of dynamic processes include managing layoffs of employees, changing order levels based on currency rates, and canceling business travel due to extreme weather.

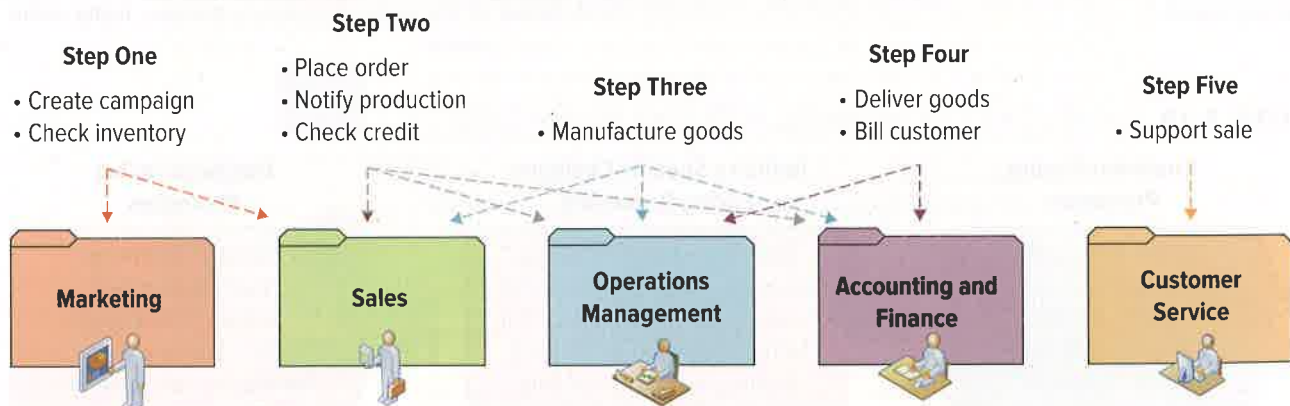
business process patent A patent that protects a specific set of procedures for conducting a particular business activity.

core process Business processes, such as manufacturing goods, selling products, and providing service that make up the primary activities in a value chain.

static process A systematic approach in an attempt to improve business effectiveness and efficiency.

dynamic process A continuously changing process that provides business solutions to ever-changing business operations.

▼ **FIGURE 2.18** Five Steps in the Order-to-Delivery Business Process



business process modeling (or mapping) The activity of creating a detailed flowchart or process map of a work process that shows its inputs, tasks, and activities in a structured sequence.

business process model A graphic description of a process, showing the sequence of process tasks, which is developed for a specific purpose and from a selected viewpoint.

business process model and notation (BPMN) A graphical notation that depicts the steps in a business process.

As-Is process model Represents the current state of the operation that has been mapped, without any specific improvements or changes to existing processes.

To-Be process model Shows the results of applying change improvement opportunities to the current (As-Is) process model.

Systems thinking offers a great story to help differentiate between static and dynamic processes. If you throw a rock in the air, you can predict where it will land. If you throw a bird in the air you can't predict where it will land. The bird, a living dynamic, system, will sense its environment and fly in any direction. The bird gathers and processes input and interacts with its environment. The rock is an example of a static process and the bird is an example of a dynamic process. Organizations have people and are characteristically dynamic, making it difficult to predict how the business will operate. Managers must anticipate creating and deploying both static and dynamic processes.

LO2.5 Explain the value of business processes for a company, and differentiate between customer-facing and business-facing processes.

BUSINESS PROCESS MODELING LO2.6

Business process modeling, or **mapping**, is the activity of creating a detailed flowchart or process map of a work process that shows its inputs, tasks, and activities in a structured sequence. A **business process model** is a graphic description of a process, showing the sequence of process tasks, which is developed for a specific purpose and from a selected viewpoint. A set of one or more process models details the many functions of a system or subject area with graphics and text, and its purpose is to:

- Expose process detail gradually and in a controlled manner.
- Encourage conciseness and accuracy in describing the process model.

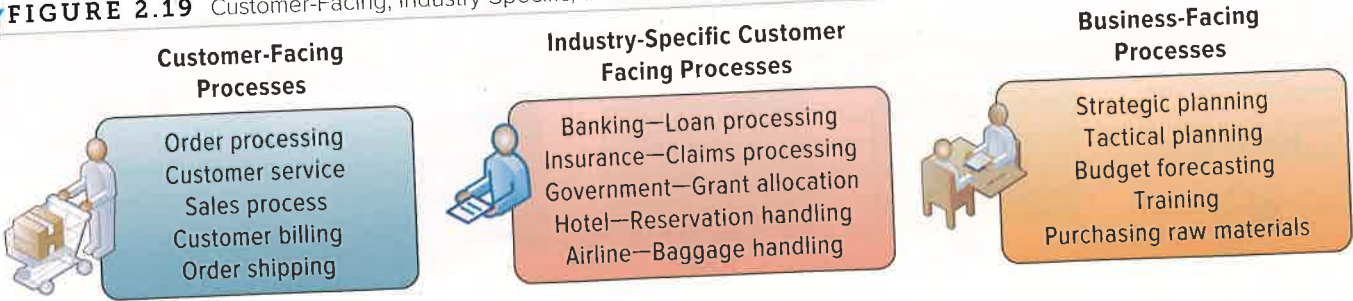
- Focus attention on the process model interfaces.
- Provide a powerful process analysis and consistent design vocabulary. (See the end of the chapter for business process model examples.)¹²

Business Process Model and Notation (BPMN) is a graphical notation that depicts the steps in a business process. BPMN provides businesses with a graphical view of the end-to-end flow of their business processes. Diagramming business processes allows for easy communication and understanding of how core business processes are helping or hindering the business. Figure 2.20 displays the standard notation from www.BPMN.org and Figure 2.21 displays a sample BPMN diagram for hiring a taxi cab.¹³

Business process modeling usually begins with a functional process representation of the process problem, or an **As-Is process model**. **As-Is process models** represent the current state of the operation that has been mapped, without any specific improvements or changes to existing processes. The next step is to build a **To-Be process model** that displays how the process problem will be solved or implemented. **To-Be process models** show the results of applying change improvement opportunities to the current (As-Is) process model. This approach ensures that the process is fully and clearly understood before the details of a process solution are decided on. The To-Be process model shows how “the what” is to be realized. Figure 2.22 displays the As-Is and To-Be process models for ordering a hamburger.

As-Is and To-Be process models are both integral in business process reengineering projects because these diagrams are very powerful in visualizing the activities, processes, and data flow of an organization. Figure 2.23 illustrates an As-Is process model of the order-to-delivery process, using swim lanes

FIGURE 2.19 Customer-Facing, Industry-Specific, and Business-Facing Processes



to represent the relevant departments. The **swim lane** layout arranges the steps of a business process into a set of rows depicting the various elements.

You need to be careful not to become inundated in excessive detail when creating an As-Is process model. The primary goal is to simplify, eliminate, and improve the To-Be processes. Process improvement efforts focus on defining the most efficient and effective process identifying all of the illogical, missing, or irrelevant processes.

Investigating business processes can help an organization find bottlenecks, remove redundant tasks, and recognize smooth-running processes. For example, a florist might have a key success factor of reducing delivery time. A florist that has an inefficient ordering process or a difficult distribution process will be unable to achieve this goal. Taking down inaccurate orders, recording incorrect addresses, or experiencing shipping delays can cause errors in the delivery process. Improving order entry, production, or scheduling processes can improve the delivery process.

Business processes should drive MIS choices and should be based on business strategies and goals (see Figure 2.24). Only after determining the most efficient and effective business process should an organization choose the MIS that supports that business process. Of course, this does not always happen, and managers may find themselves in the difficult position of changing a business process because the system cannot support the ideal solution (see Figure 2.24). Managers who make MIS choices and only then determine how their business processes should perform typically fail.

USING MIS TO IMPROVE BUSINESS PROCESSES

LO2.7

Workflow includes the tasks, activities, and responsibilities required to execute each step in a business process. Understanding workflow, customers' expectations, and the competitive environment provides managers with the necessary ingredients to design and evaluate alternative business processes in order to maintain competitive advantages when internal or external circumstances change. **Workflow control systems** monitor processes to ensure tasks, activities, and responsibilities are executed as specified.

Alternative business processes should be effective (they deliver the intended results) and efficient (they consume the least amount of resources for the intended value). They should also be adaptable or flexible and support change as customers, market forces, and technology shift. Figure 2.25 shows the three primary types of business process change available to firms and the business areas in which they are most often effective. How does a company know whether it needs to undertake the giant step of changing core business processes? Three conditions indicate the time is right to initiate a business process change:

swim lane Layout arranges the steps of a business process into a set of rows depicting the various elements.

workflow Includes the tasks, activities, and responsibilities required to execute each step in a business process.

workflow control systems Monitor processes to ensure tasks, activities, and responsibilities are executed as specified.

LO2.6 Demonstrate the value of business process modeling, and compare As-Is and To-Be models.

FIGURE 2.20 BPMN Notation

BUSINESS PROCESS MODEL AND NOTATION (BPMN)		
EVENT		BPMN event is anything that happens during the course of a business process. An event is represented by a circle in a business process model. In Figure 2.21, the events include customer requests, time requests, or the end of the process.
ACTIVITY		BPMN activity is a task in a business process. An activity is any work that is being performed in a process. An activity is represented by a rounded-corner rectangle in a business process model. In Figure 2.21, the activities include checking availability, picking up the customers, and confirming the booking.
GATEWAY		BPMN gateway is used to control the flow of a process. Gateways handle the forking, merging, and joining of paths within a process. Gateways are represented by a diamond shape in a business process model. In Figure 2.21, the gateways include determining availability status or accepting/declining the request.
FLOW		BPMN flows display the path in which the process flows. Flows are represented by arrows in a business process model. In Figure 2.21, the arrows show the path the customer takes through the taxi cab booking process.

FIGURE 2.21 BPMN Sample Diagram for Hiring a Taxi Cab

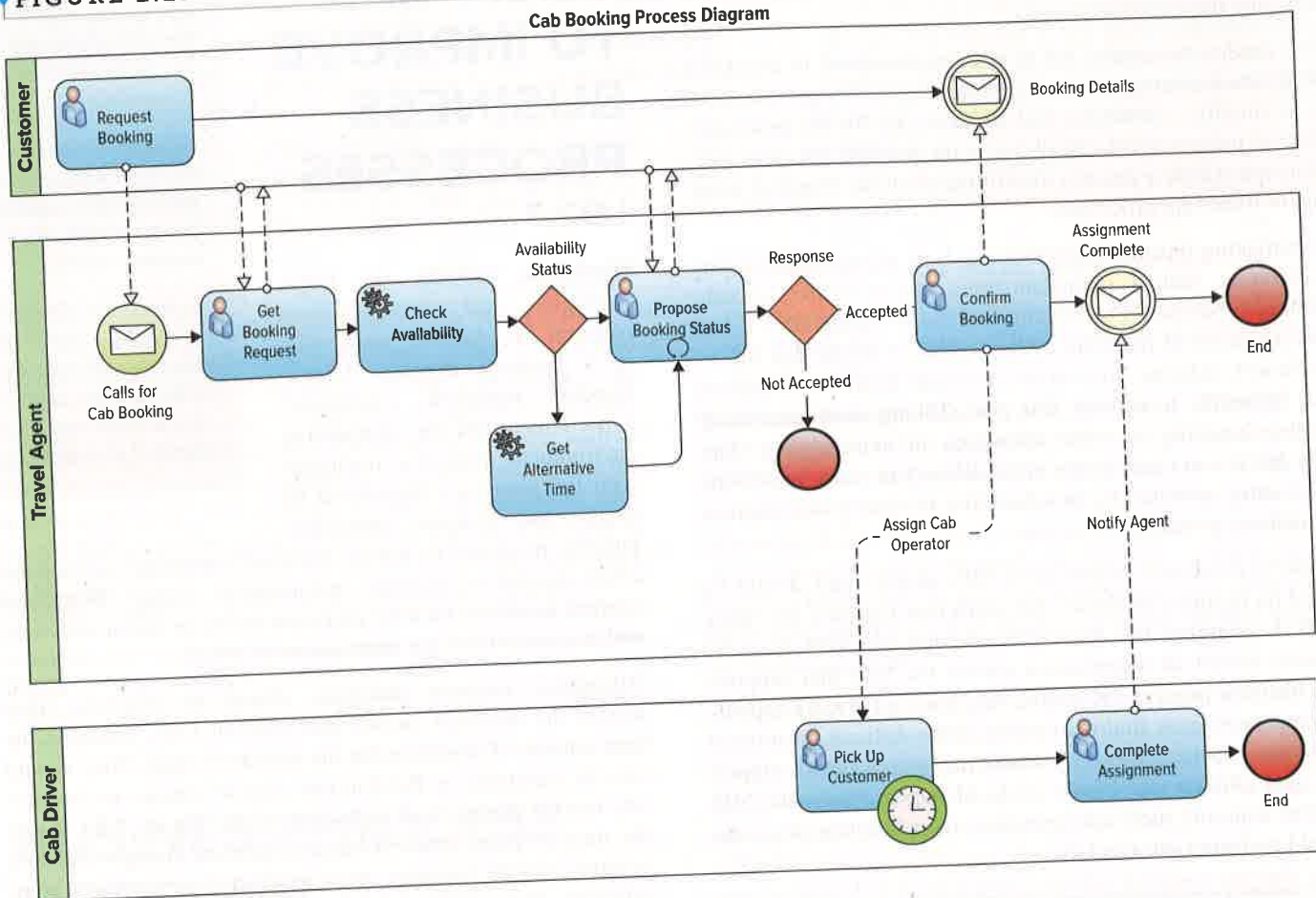
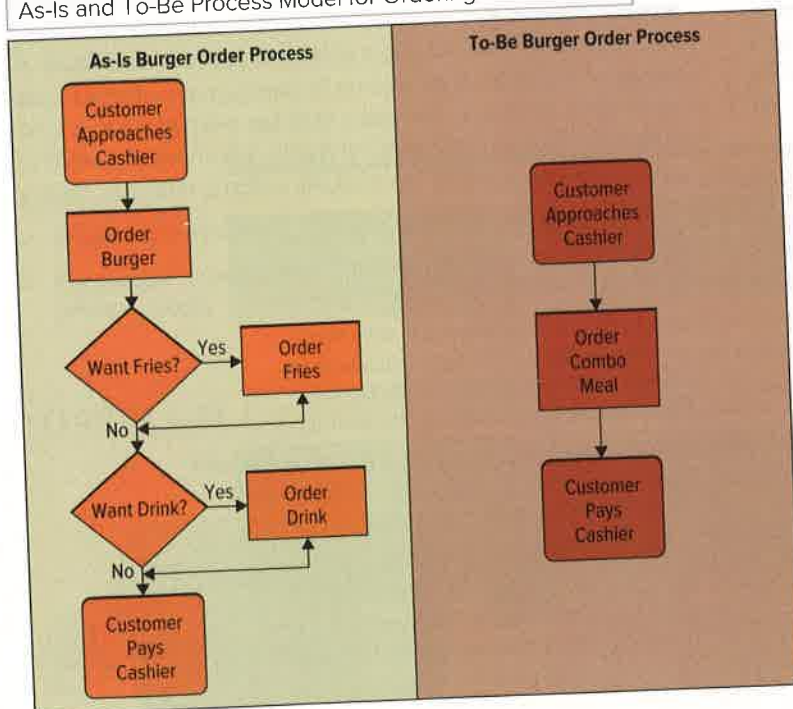


FIGURE 2.22 As-Is and To-Be Process Model for Ordering a Hamburger



1. There has been a pronounced shift in the market the process was designed to serve.
2. The company is markedly below industry benchmarks on its core processes.
3. To regain competitive advantage, the company must leapfrog competition on key dimensions.¹⁴

LO2.7 Differentiate among business process improvements, streamlining, and reengineering.

Operational Business Processes—Automation

Operational business processes are static, routine, daily business processes such as stocking inventory, checking out customers, or daily opening and closing processes. Improving business processes is critical to staying competitive in today's electronic marketplace. Organizations must improve their business processes because customers are demanding better products and services; if customers do not receive what they want from one supplier, often they can simply click a mouse to find many other choices. **Business process improvement**

attempts to understand and measure the current process and make performance improvements accordingly. Figure 2.26 displays a typical business process improvement model.¹⁵

Early adopters of MIS recognized that they could enhance their value chain through automation, which reduces costs and increases the speed of performing activities. **Automation** is the process of computerizing manual tasks, making them more efficient and effective and dramatically lowering operational costs. Payroll offers an excellent example. Calculating and tracking payroll for 5,000 employees is a highly labor-intensive process requiring 30 full-time employees. Every two weeks accounting employees must gather everyone's hours worked, cross-check with wage rates, and then calculate the amount due, minus taxes and other withholding such as pension contributions and insurance premiums, to create the paychecks. They also track benefits, sick time, and vacation time. If the payroll process is automated, however, one employee can easily calculate payroll, track withholding and deductions, and create paychecks for 5,000 people in a few hours, since everything is performed by the system. Automation improves efficiency and effectiveness and reduces head count, lowering overall operational costs. Transaction processing systems (TPS) are primarily used to automate business processes.

Figure 2.27 illustrates the basic steps for business process improvement. Organizations begin by documenting what they currently do; then they establish a way to measure the process, follow the process, measure the performance, and finally identify improvement opportunities based on the collected information. The next step is to implement process improvements and measure the performance of the new improved process. The

loop repeats over and over again as it is continuously improved.¹⁶

This method of improving business processes is effective for obtaining gradual, incremental improvement. However, several factors have accelerated the need to radically improve business processes. The most obvious is technology. New technologies (such as wireless Internet access) rapidly bring new capabilities to businesses, thereby raising the competitive bar and the need to improve business processes dramatically. For example, Amazon.com reinvented the supply chain for selling books online. After gaining from automation, companies began to look for new ways to use MIS to improve operations, and managers recognized the benefits of pairing MIS with business processes by streamlining. We look at this improvement method next.

operational business processes

Static, routine, daily business processes such as stocking inventory, checking out customers, or daily opening and closing processes.

business process improvement

Attempts to understand and measure the current process and make performance improvements accordingly.

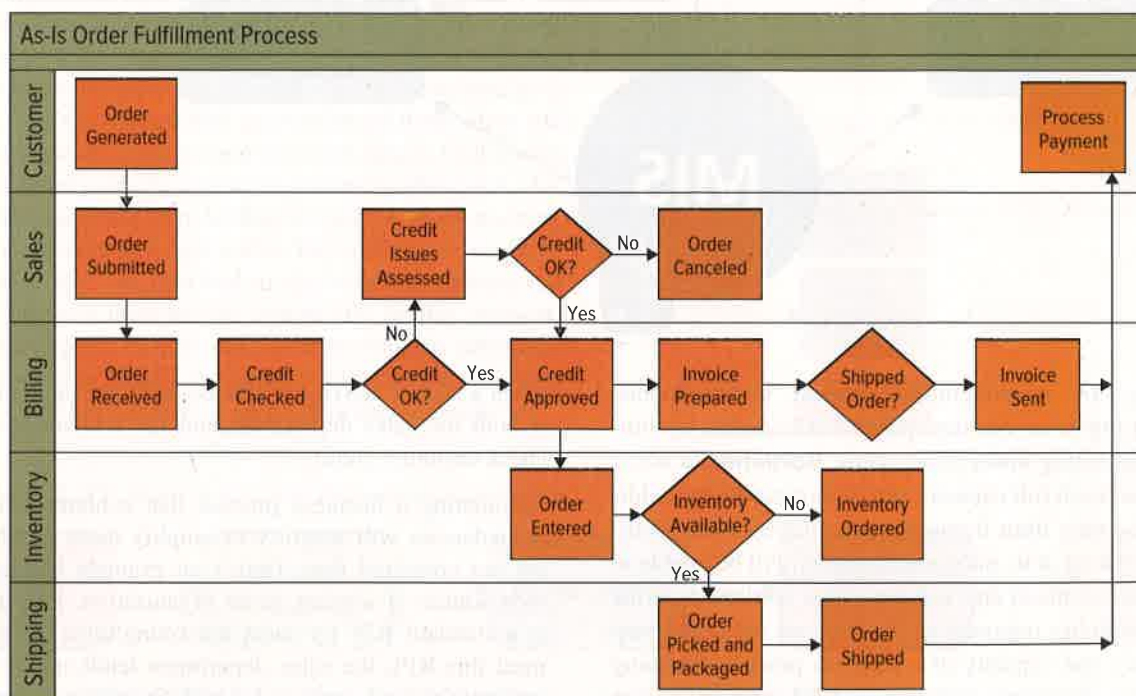
automation

Involves computerizing manual tasks making them more efficient and effective and dramatically lowering operational costs.

Managerial Business Processes—Streamlining

Managerial business processes are semidynamic, semiroutine, monthly business processes such as resource allocation,

▼ **FIGURE 2.23** As-Is Process Model for Order Fulfillment



managerial business processes Semidynamic, semi-routine, monthly business processes such as resource allocation, sales strategy, or manufacturing process improvements.

streamlining Improves business process efficiencies simplifying or eliminating unnecessary steps.

bottleneck Occurs when resources reach full capacity and cannot handle any additional demands; they limit throughput and impede operations.

redundancy Occurs when a task or activity is unnecessarily repeated.

A)

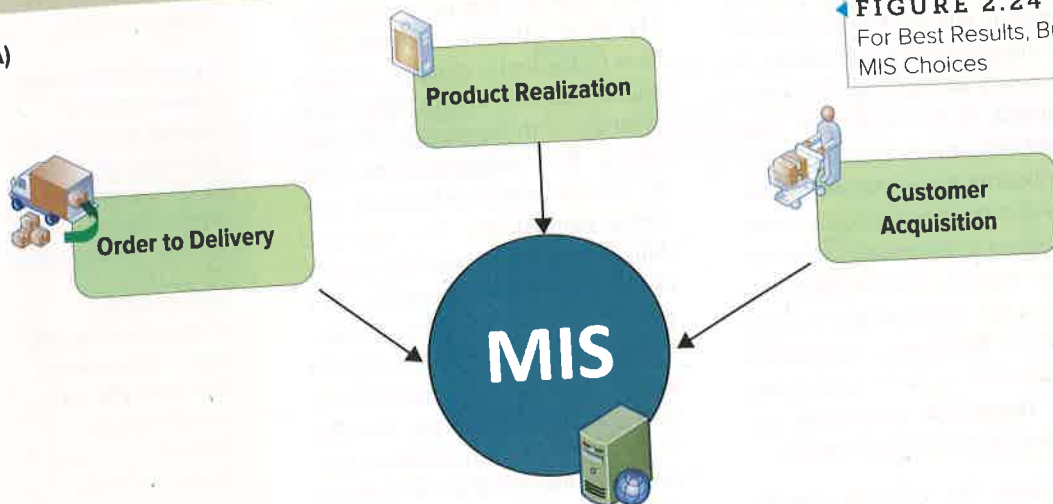
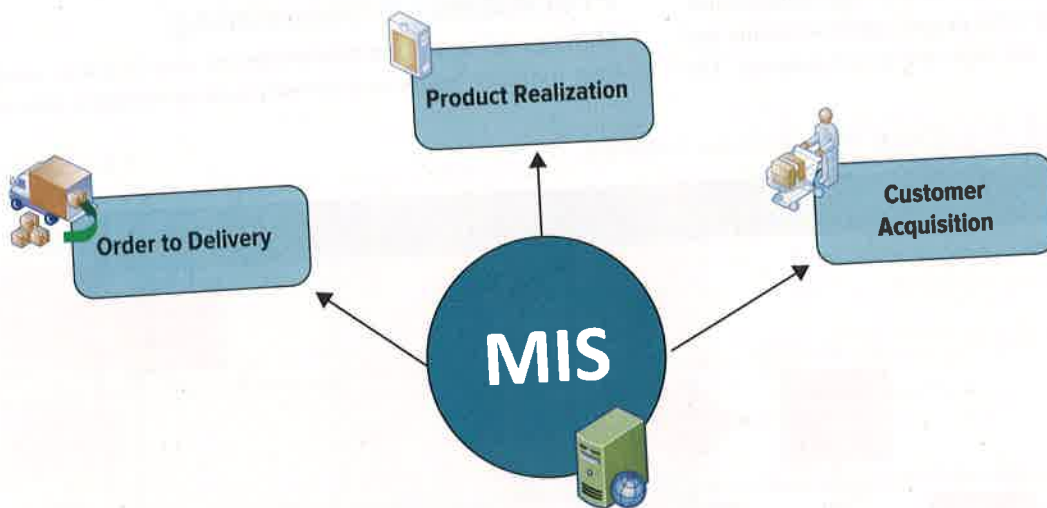


FIGURE 2.24

For Best Results, Business Processes Should Drive MIS Choices

B)

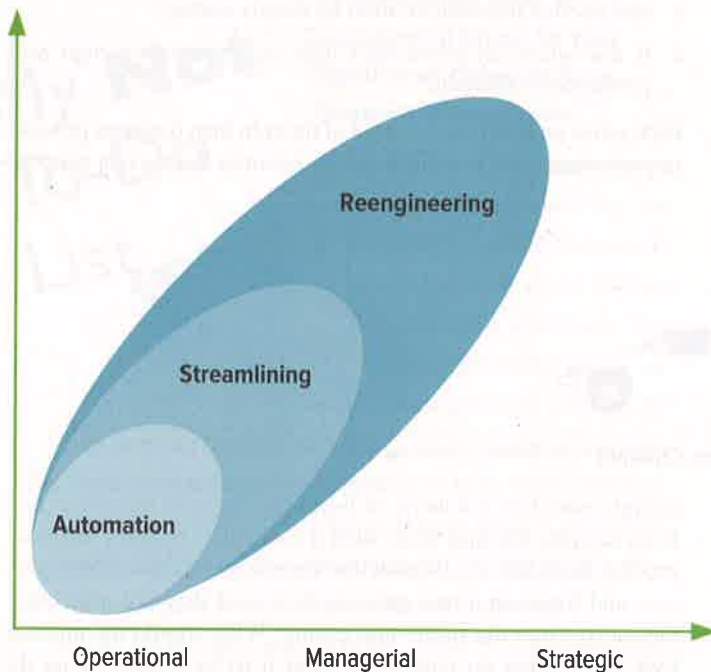


sales strategy, or manufacturing process improvements. **Streamlining** improves business process efficiencies by simplifying or eliminating unnecessary steps. **Bottlenecks** occur when resources reach full capacity and cannot handle any additional demands; they limit throughput and impede operations. A computer working at its maximum capacity will be unable to handle increased demand and will become a bottleneck in the process. Streamlining removes bottlenecks, an important step if the efficiency and capacity of a business process are being increased. It also eliminates redundancy. **Redundancy** occurs

when a task or activity is unnecessarily repeated, for example, if both the sales department and the accounting department check customer credit.

Automating a business process that contains bottlenecks or redundancies will magnify or amplify these problems if they are not corrected first. Here's an example based on a common source of tension in an organization. Increasing orders is a standard KPI for most marketing/sales departments. To meet this KPI, the sales department tends to say yes to any customer request, such as for rush or custom orders. Reducing

▼ **FIGURE 2.25** Primary Types of Business Process Change



cycle time, the time required to process an order, is a common KPI for operations management. Rush and custom orders tend to create bottlenecks, causing operations to fall below its benchmarked cycle time. Removing these bottlenecks, however, can create master streamlined business processes that deliver both standard and custom orders reliably and profitably. The goal of streamlining is not only to automate but also to improve by monitoring, controlling, and changing the business process.

FedEx streamlined every business process to provide a CSF of speedy and reliable delivery of packages. It created one central hub in Memphis, Tennessee, that processed all its orders. It purchased its own planes to be sure it could achieve the desired level of service. FedEx combined MIS and traditional distribution and logistics processes to create a competitive advantage. FedEx soon identified another market segment of customers who cared a little less about speed and were willing to trade off early-morning delivery for delivery any time *within* the next day at a significantly lower price. The firm had to reevaluate its strategy and realign its business processes to capture this market segment. Had Federal Express focused only on improving its traditional delivery process to handle increased volume faster and more reliably, it could have missed an entire customer segment.¹⁸

▼ **FIGURE 2.27** Steps in Business Process Improvement



Strategic Business Processes—Reengineering

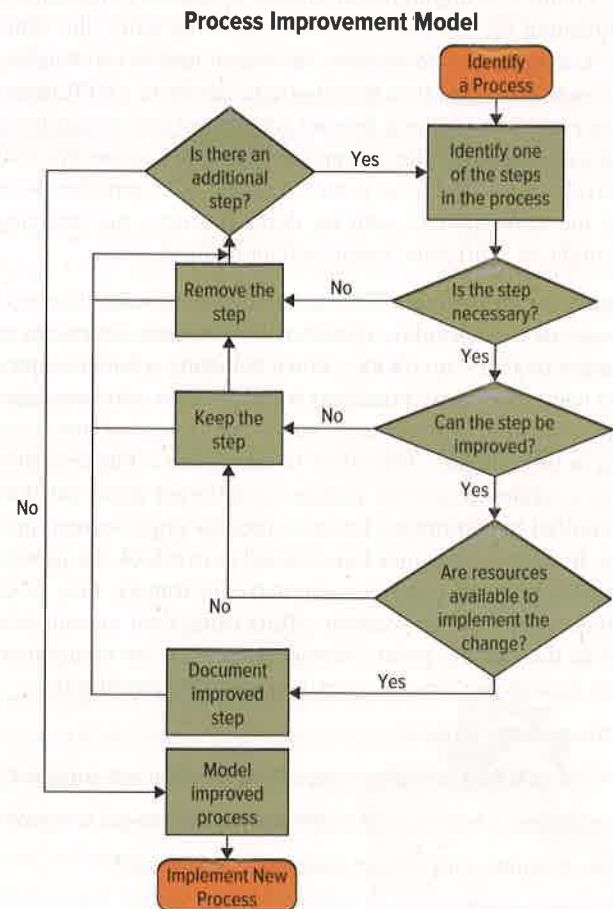
Strategic business processes

are dynamic, nonroutine, long-term business processes such as financial planning, expansion strategies, and stakeholder interactions. The flat world is bringing more companies and more customers into the marketplace, greatly increasing competition. Wine wholesalers in the United States must now compete globally, for instance, because customers can just as easily order a bottle of wine from a winery in France as from them. Companies

cycle time The time required to process an order.

strategic business processes Dynamic, nonroutine, long-term business processes such as financial planning, expansion strategies, and stakeholder interactions.

▼ **FIGURE 2.26** Business Process Improvement Model



business process reengineering (BPR)

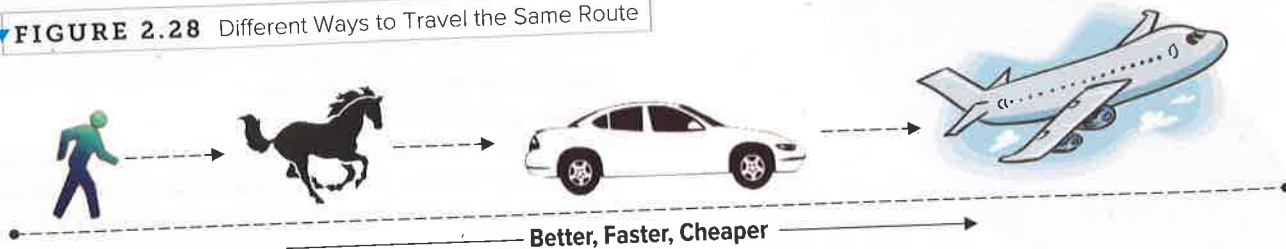
The analysis and redesign of workflow within and between enterprises.

need breakthrough performance and business process changes just to stay in the game. As the rate of change increases, companies looking for rapid change and dramatic improvement are turning to **business process reengineering (BPR)**, the

- Is it crucial for productivity improvement?
- Will savings from automation be clearly visible?
- Is the return on investment from implementation high and preferably immediate?

BPR relies on a different school of thought than business process improvement. *In the extreme*, BPR assumes the current process

▼ **FIGURE 2.28** Different Ways to Travel the Same Route



analysis and redesign of workflow within and between enterprises. Figure 2.28 highlights an analogy to process improvement by explaining the different means of traveling along the same route. A company could improve the way it travels by changing from foot to horse and then from horse to car. With a BPR mind-set, however, it would look beyond automating and streamlining to find a completely different approach. It would ignore the road and travel by air to get from point A to point B. Companies often follow the same indirect path for doing business, not realizing there might be a different, faster, and more direct way.

An organization can reengineer its cross-departmental business processes or an individual department's business processes to help meet its CSFs and KPIs. When selecting a business process to reengineer, wise managers focus on those core processes that are critical to performance, rather than marginal processes that have little impact. The effort to reengineer a business process as a strategic activity requires a different mind-set than that required in continuous business process improvement programs. Because companies have tended to overlook the powerful contribution that processes can make to strategy, they often undertake process improvement efforts using their current processes as the starting point. Managers focusing on reengineering can instead use several criteria to identify opportunities:

- Is the process broken?
- Is it feasible that reengineering of this process will succeed?
- Does it have a high impact on the agency's strategic direction?
- Does it significantly impact customer satisfaction?
- Is it antiquated?
- Does it fall far below best-in-class?

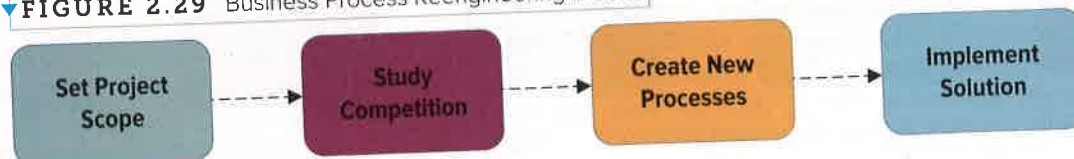
is irrelevant, does not work, or is broken and must be overhauled from scratch. Starting from such a clean slate enables business process designers to disassociate themselves from today's process and focus on a new process. It is as if they are projecting themselves into the future and asking: What should the process look like? What do customers want it to look like? What do other employees want it to look like? How do best-in-class companies do it? How can new technology facilitate the process?

Figure 2.29 displays the basic steps in a business process reengineering effort. It begins with defining the scope and objectives of the reengineering project and then takes the process designers through a learning process with customers, employees, competitors, and new technology. Given this knowledge base, the designers can create a plan of action based on the gap between current processes, technologies, and structures and their vision of the processes of the future. It is then top management's job to implement the chosen solution.²⁰

System thinking plays a big role in BPR. Automation and streamlining operate departmentally, whereas BPR occurs at the systems level or company-wide level and the end-to-end view of a process.

Creating value for the customer is the leading reason for instituting BPR, and MIS often plays an important enabling role. Fundamentally new business processes enabled Progressive Insurance to slash its claims settlement time from 31 days to four hours, for instance. Typically, car insurance companies follow this standard claims resolution process: The customer gets into an accident, has the car towed, and finds a ride home. The customer then calls the insurance company to begin the claims process, which includes an evaluation of the damage, assignment of fault,

▼ **FIGURE 2.29** Business Process Reengineering Model





You Accidentally Sent Your Confidential Email to Your Significant Other to Your Grandmother—Ouch!¹⁷

If someone at your work currently looked through your email, would they find anything unacceptable? There is a 99 percent chance that at some point you have been guilty of using your work email for personal use. Not only are you wasting company time and resources, but you are also putting yourself at serious risk of violating company policies. There is no doubt some of these mistakes are funny, like the embarrassing story of how a woman sent a racy email to her husband, only to have accidentally sent it to her boss instead. However, you stop laughing when you are fired because it was you who sent the unsuitable email!

You do not own your email; it is that simple. Your employer owns your email, and they have every right to read every single piece of email

that you send or is sent to you. Some people argue that it is an invasion of privacy to read someone else's email, but it is not private when you are sitting in the company's office building, at the company's desk, using the company's computer equipment and email software. Technology is so advanced that your employer can flag anything with inappropriate language or keywords such as "résumé," "job search," or "confidential."

How do you prevent email blunders? It is a good idea to create a free Google Gmail account or a Hotmail account for your personal email. Also, before sending any email, ask yourself: If my boss was looking over my shoulder right now, would he or she approve? This is the true litmus test that can be applied to anything an employee does at work.

Now, here comes the hard part: What if you are working from home, using your own computer? Does the company still have a right to monitor your email? If you are using your own personal smartphone to work remotely and you receive the company's emails on your device, is it still company property? What do you think? What additional dilemmas do you see being created as innovative technologies continue to change the fundamental business process of how we work?

and an estimate of the cost of repairs, and which usually takes about a month (see Figure 2.30). Progressive Insurance's innovation was to offer a mobile claims process. When a customer has a car accident, he or she calls in the claim on the spot. The Progressive claims adjuster comes to the accident site, surveying the scene and taking digital photographs. The adjuster then

offers the customer on-site payment, towing services, and a ride home. A true BPR effort does more for a company than simply improve a process by performing it better, faster, and cheaper. Progressive Insurance's BPR effort redefined best practices for an entire industry. Figure 2.31 through Figure 2.33 provide additional examples of business process modeling.²¹

show me the MONEY

Streamlining Your Email

The biggest problem with email is that it interferes with workflow. Many employees stop what they are working on and begin checking new email as soon as it arrives. If they do not have the time or capacity to answer it immediately, however, they leave it in the inbox, creating a bottleneck. This process continues all day, and eventually the inbox is overflowing with hundreds of emails, most of which require a response or action. Employees begin dreading email and feel stressed because their workflow process is off track, and they do not know which tasks need to be completed and when.

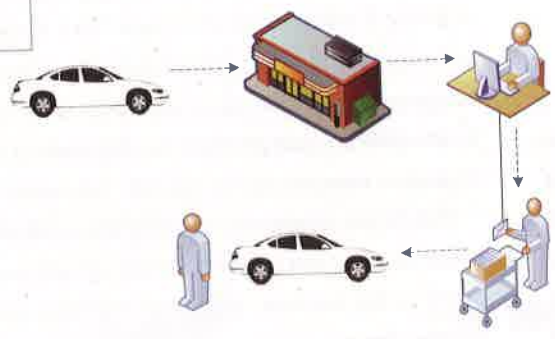
To streamline workflow, you can designate certain times for email processing (at the top of the hour or for 30 minutes at three set times a day, for example). Turning off email notification also ensures you are not interrupted during your workflow. When you do begin to check your emails, review them one at a time from top to bottom and deal with each one immediately. Reply, put a note on your to-do list, forward the email, or delete it. Now you are working far more efficiently and effectively, and you are less stressed because your inbox is empty.¹⁹

Choose a process in your life that is inefficient or ineffective and causing you stress. Using the principles of streamlining, remove the bottlenecks and reduce redundancies. Be sure to diagram the As-Is process and your newly created To-Be process.



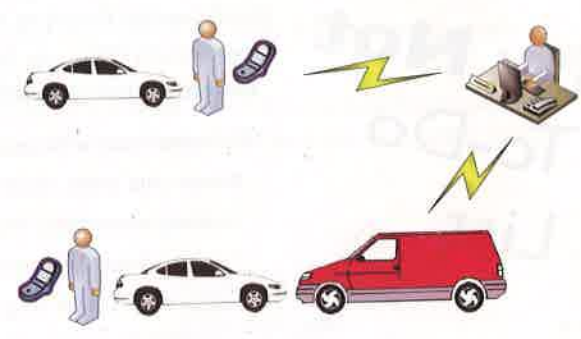
FIGURE 2.30
Auto Insurance
Claims Processes

Company A: Claims Resolution Process



Resolution Cycle Time: 3–8 weeks

Progressive Insurance: Claims Resolution Process



Resolution Cycle Time: 30 minutes–3 hours

FIGURE 2.31
Online Sales Process Model

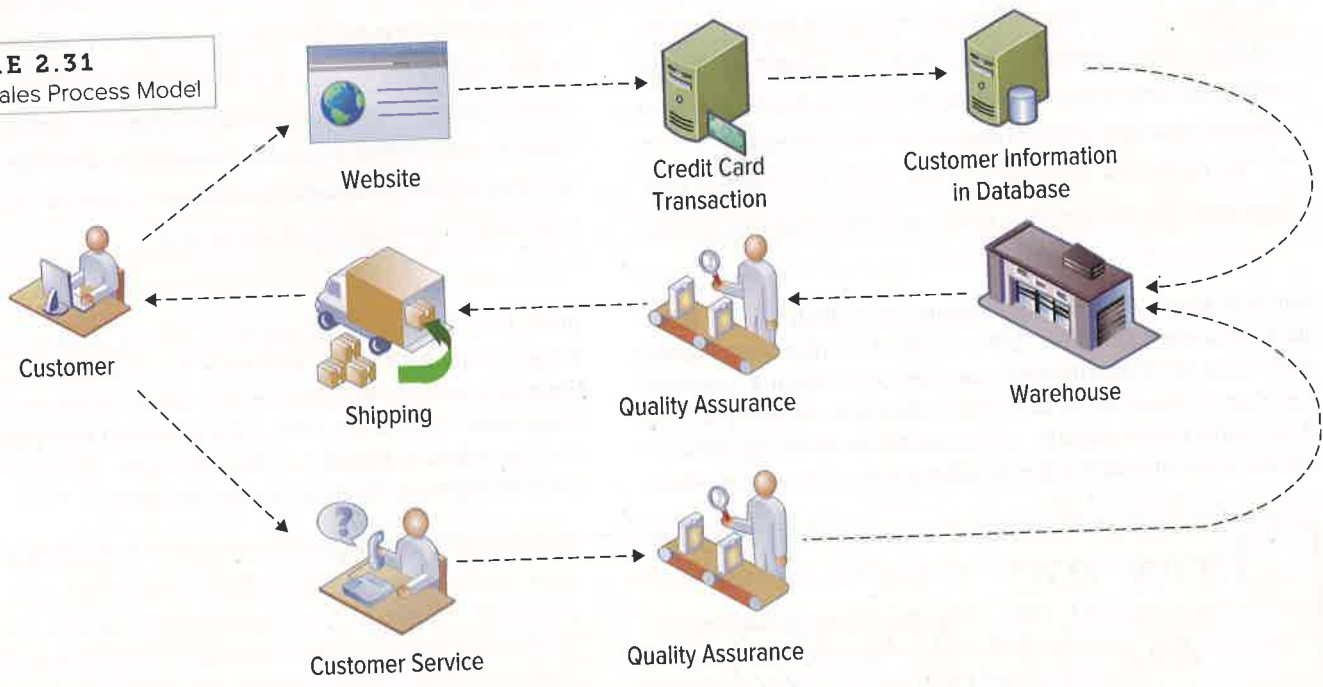


FIGURE 2.32 Online Banking Process Model

