
THE INFORMATION SYSTEMS STRATEGY TRIANGLE

National Linen Service, a supplier of linen for restaurants and hotels, found itself facing poor earnings due to increased competition and a weak economy. The company decided to create a strategic systems department in an attempt to increase its competitiveness and lower costs. The new systems department installed a program called Boss. Unfortunately, rather than notifying the contract department when customer contracts expired, Boss was programmed to simply drop expired customers from the database. Needless to say, National Linen's bottom line worsened. National Linen Service failed to take into account the unintended consequences of installing an information system and the effects it would have on its business strategy and organizational design.

This case emphasizes the point made in the Introduction: It is imperative that general managers take a role in decisions about information systems (IS). Even though it is not necessary for a general manager to understand all technologies, it is necessary to aggressively seek to understand the consequences of using technologies relevant to the business's environment. General managers who leave the IS decisions solely to their IS professionals often put themselves and their companies at a disadvantage. Although IS can facilitate the movement and exchange of information, an information system that is inappropriate for a given operating environment can actually inhibit and confuse that same exchange. A management information system (MIS) is not an island within a firm. MIS manages an infrastructure that is essential to the firm's functioning.

This chapter introduces a simple framework for understanding the impact of IS on organizations. This framework is called the **Information Systems Strategy Triangle** because it relates business strategy with IS strategy and organizational strategy. This chapter also presents key frameworks from organization theory that describe the context in which MIS operates, as well as the business imperatives that MIS supports. Students with extensive background in organizational behavior and business strategy will find this a useful review of key concepts. The Information Systems Strategy Triangle presented in Figure 1.1 suggests three key points about strategy.

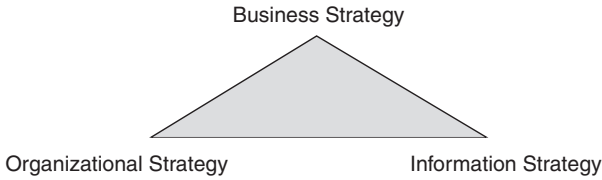


FIGURE 1.1 The Information Systems Strategy Triangle

Successful firms have an overriding business strategy that drives both organizational strategy and IS strategy. The decisions made regarding the structure, hiring practices, and other components of the organizational strategy, as well as decisions regarding applications, hardware, and other IS components, are all driven by the firm's business objectives, strategies, and tactics. Successful firms carefully balance these three strategies—they purposely design their organization and their IS strategies to complement their business strategy.

IS strategy can itself affect and is affected by changes in a firm's business and organizational strategies. In order to perpetuate the balance needed for successful operation, changes in the IS strategy must be accompanied by changes in both the organizational and overall business strategy. If a firm designs its business strategy to use IS to gain strategic advantage, the leadership position in IS can only be sustained by constant innovation. The business, IS, and organizational strategies must constantly be adjusted.

IS strategy always involves consequences—intended or not—within business and organizational strategies. Avoiding harmful unintended consequences means remembering to consider business and organizational strategies when designing IS deployment. For example, placing computers on employee desktops without an accompanying set of changes to job descriptions, process design, compensation plans, and business tactics will fail to produce the anticipated productivity improvements. Success can only be achieved by specifically designing all three components of the strategy triangle.

A word of explanation is needed. This chapter and subsequent chapters in this book address questions of IS strategy squarely within the context of business strategy. Studying business strategy alone is something better done in other texts and courses. However, to provide foundation for IS discussions, this chapter summarizes several key business strategy frameworks, as well as organizational theories. Studying IS alone does not provide general managers with the appropriate perspective. In order to be effective, managers need a solid sense of how IS are used and managed within the organization. Studying details of technologies is also outside the scope of this text. Details of the technologies are relevant, of course, and it is important that any organization maintain a sufficient knowledge base to plan for and operate applications. However, because technologies change so rapidly, keeping a text current is impossible. Therefore this text takes the perspective that understanding what questions to ask is a skill more fundamental to the general manager than understanding any particular technology. This text provides readers with

an appreciation of the need to ask questions, a framework from which to derive the questions to ask, and a foundation sufficient to understand the answers received. The remaining book chapters all build upon the foundation provided in the Information Systems Strategy Triangle.

► BRIEF OVERVIEW OF BUSINESS STRATEGY FRAMEWORKS

A strategy is a plan. A **business strategy** is a well-articulated vision of where a business seeks to go and how it expects to get there. It is the form by which a business communicates its goals. Management constructs this plan in response to market forces, customer demands, and organizational capabilities. Market forces create the competitive situation for the business. Some markets, such as those faced by airlines, makers of personal computers, and issuers of credit cards, are characterized by many competitors and a high level of competition such that product differentiation becomes increasingly difficult. Other markets, such as those for package delivery, automobiles, and petroleum products, are similarly characterized by high competition, but product differentiation is better established. Customer demands comprise the wants and needs of the individuals and companies who purchase the products and services available in the marketplace. Organizational capabilities include the skills and experience that give the corporation a currency that can add value in the marketplace.

Several well-accepted models frame the discussions of business strategy. We review (1) the Porter generic strategies framework and two variants of its differentiation, and (2) D'Aveni's hypercompetition model.¹ The end of this section introduces key questions a general manager must answer in order to understand the strategy of the business.

The Generic Strategies Framework

Companies sell their products and services in a marketplace populated with competitors. Michael Porter's framework helps managers understand the strategies they may choose to build a competitive advantage. In his book *Competitive Advantage*, Porter claims that the "fundamental basis of above-average performance in the long run is sustainable competitive advantage."² Porter identifies three primary strategies for achieving competitive advantage: (1) cost leadership, (2) differentiation, and (3) focus. These advantages derive from the company's relative position in the marketplace, and they depend on the strategies and tactics employed by competitors. Figure 1.2 summarizes these three strategies for achieving competitive advantage.

Cost leadership results when the organization aims to be the lowest-cost producer in the marketplace. The organization enjoys above-average performance by

¹ Another popular model by Michael Porter, the value chain, provides a useful model for discussing internal operations of an organization. Some find it a useful model for understanding how to link two firms together. This framework is used in Chapter 4 to examine business process design. For further information, see Michael E. Porter, *Competitive Advantage* (New York: Free Press, 1985).

² Michael E. Porter, *Competitive Advantage* (New York: Free Press, 1985).

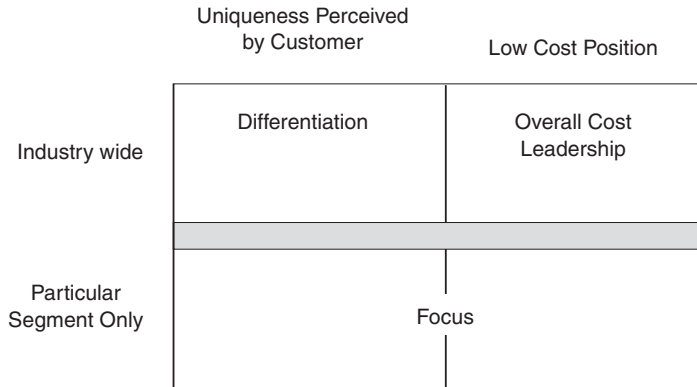


FIGURE 1.2 Three strategies for achieving competitive advantage

Source: M. Porter, *Competitive Strategies* (New York: Free Press, 1998).

minimizing costs. The product or service offered must be comparable in quality to those offered by others in the industry so that customers perceive its relative value. Typically, only one cost leader exists within an industry. If more than one organization seek advantage with this strategy, a price war ensues, which eventually may drive the organization with the higher cost structure out of the marketplace. Through mass distribution, economies of scale, and IS to generate operating efficiencies, Wal-Mart epitomizes the cost-leadership strategy.

Through **differentiation**, the organization qualifies its product or service in a way that allows it to appear unique in the marketplace. The organization identifies which qualitative dimensions are most important to its customers, and then finds ways to add value along one or more of those dimensions. In order for this strategy to work, the price charged customers by the differentiator must seem fair relative to the price charged by competitors. Typically, multiple firms in any given market employ this strategy. Progressive Insurance is able to differentiate itself from other automobile insurance companies by breaking out of the industry mold. Its representatives are available 24/7 (i.e., 24 hours a day, 7 days a week) to respond to accident claims. They arrive at an accident scene shortly after the accident with powerful laptops, intelligent software, and the authority to settle claims on the spot. This strategy spurred Progressive's growth and widened its profit margins.

Focus allows an organization to limit its scope to a narrower segment of the market and tailor its offerings to that group of customers. This strategy has two variants: (1) *cost focus*, in which the organization seeks a cost advantage within its segment, and (2) *differentiation focus*, in which it seeks to distinguish its products or services within the segment. This strategy allows the organization to achieve a local competitive advantage, even if it does not achieve competitive advantage in the marketplace overall. As Porter explains:

The focuser can thus achieve competitive advantage by dedicating itself to the segments exclusively. Breadth of target is clearly a matter of degree, but the essence of focus is the exploitation of a narrow target's differences from the balance of the industry. Narrow focus in and of itself is not sufficient for above-average performance.³

Marriott International demonstrates focus in the business and related IS strategies of two of its ten hotel chains. To better serve its business travelers and, at the same time, cut operational expenses, the Marriott chain is considering expanding the Marriott Reward system to include check-in kiosks. A guest could swipe a Marriott Rewards card at the kiosk in the lobby and receive a room assignment and keycard from the machine. The kiosk system would be integrated with other systems such as billing and customer relationship management (CRM) to generate operating efficiencies and enhanced corporate standardization. The kiosks would help the Marriott chain implement its cost focus.

In contrast, kiosks in the lobby would destroy the homey feeling that the Ritz-Carlton chain, acquired by Marriott in 1995, is trying to create. To the Ritz-Carlton chain, CRM means capturing and using information about guests, such as their preference for wines, a hometown newspaper, or a sunny room. Each Ritz-Carlton employee is expected to promote personalized service by identifying and recording individual guest preferences. To demonstrate how this rule could be implemented, a waiter, after hearing a guest exclaim that she loves tulips, could log the guest's comments into the Ritz-Carlton CRM system called "Class." On her next visit to a Ritz-Carlton hotel, tulips could be placed in the guest's room after querying Class to learn more about her as her visit approaches. Class, the CRM, is instrumental in helping the Ritz-Carlton chain implement its differentiation focus.⁴

Variants on the Differentiation Strategy

Porter's generic strategies are fundamental to an understanding of how organizations create competitive advantage. Several variations of his differentiation strategy, including the shareholder value model and the unlimited resources model, are useful for further analyzing sources of advantage. D'Aveni also describes these "arenas of competition" as the timing and knowledge advantage and the deep pockets advantage.

The **shareholder value model** holds that the timing of the use of specialized knowledge can create a differentiation advantage as long as the knowledge remains unique.⁵ This model suggests that customers buy products or services from an organization to have access to its unique knowledge. The advantage is static, rather than dynamic, because the purchase is a one-time event.

³ Michael E. Porter, *Competitive Strategies* (New York: Free Press, 1998).

⁴ Scott Berinato, "Room for Two," CIO.com (May 15, 2002), available at http://www.cio.com/archive/051502/two_content.html.

⁵ William E. Fruhan, Jr., "The NPV Model of Strategy—The Shareholder Value Model." In *Financial Strategy: Studies in the Creation, Transfer, and Destruction of Shareholder Value* (Homewood, IL: Richard D. Irwin, 1979).

The **unlimited resources model** utilizes a large base of resources that allow an organization to outlast competitors by practicing a differentiation strategy. An organization with greater resources can manage risk and sustain losses more easily than one with fewer resources. This deep-pocket strategy provides a short-term advantage only. If a firm lacks the capacity for continual innovation, it will not sustain its competitive position over time.

Porter's generic strategies model and its variants are useful for diagnostics or understanding how a business seeks to profit in its chosen marketplace, and for prescriptions, or building new opportunities for advantage. They reflect a careful balancing of countervailing competitive forces posed by buyers, suppliers, competitors, new entrants, and substitute products and services. As is the case with many models, they offer managers useful tools for thinking about strategy. However, the Porter models were developed at a time when competitive advantage was sustainable because the rate of change in any given industry was relatively slow and manageable. Since the late 1980s when this framework was at the height of its popularity, several newer models were developed to take into account the increasing turbulence and velocity of the marketplace. In particular, the hypercompetition model offers managers an especially useful tool for conceptualizing their organization's strategy in turbulent environments.

Hypercompetition and the New 7 Ss Framework

Discussions of hypercompetition⁶ take a perspective different from the previous models. Those models focus on creating and sustaining competitive advantage, whereas **hypercompetition** models suggest that the speed and aggressiveness of the moves and countermoves in any given market create an environment in which advantages are "rapidly created and eroded."⁷ This perspective works from the following assumptions:

- Every advantage is eroded. Advantages only last until competitors have duplicated or outmaneuvered them. Once an advantage is no longer an advantage, it becomes a cost of doing business.
- Sustaining an advantage can be a deadly distraction. Some companies can extend their advantages and continue to enjoy the benefits, but sustaining an advantage can take attention away from developing new ones.
- The goal of advantage should be disruption, not sustainability. A company seeks to stay one step ahead through a series of temporary advantages that erode competitors' positions, rather than by creating a sustainable position in the marketplace.
- Initiatives are achieved with a series of small steps. Competitive cycles are shorter now, and new advantages must be achieved quickly. Companies focus on creating the next advantage before the benefits of the current advantage erode.

⁶ R. D'Aveni, *Hypercompetition: Managing the Dynamics of Strategic Maneuvering* (New York: Free Press, 1994).

⁷ Ibid.

D'Aveni identified four arenas in which firms seek to achieve competitive advantage under hypercompetition: (1) cost/quality, (2) timing/know-how, (3) strongholds, and (4) deep pockets. His framework suggests seven approaches an organization can take in its business strategy. Figure 1.3 summarizes this model.

D'Aveni's model describes the strategies companies can use to disrupt competition, depending on their particular capabilities to seize initiative and pursue tactics that can create a series of temporary advantages. For the purposes of this book, we briefly summarize his 7 Ss^s in Figure 1.4.

The 7 Ss are a useful model for identifying different aspects of a business strategy and aligning them to make the organization competitive in the hypercompetitive arena of business in the millennium. This framework helps assess competitors' strengths and weaknesses, as well as build a roadmap for the company's strategy itself. Using this model, managers can identify new organizational responses to their

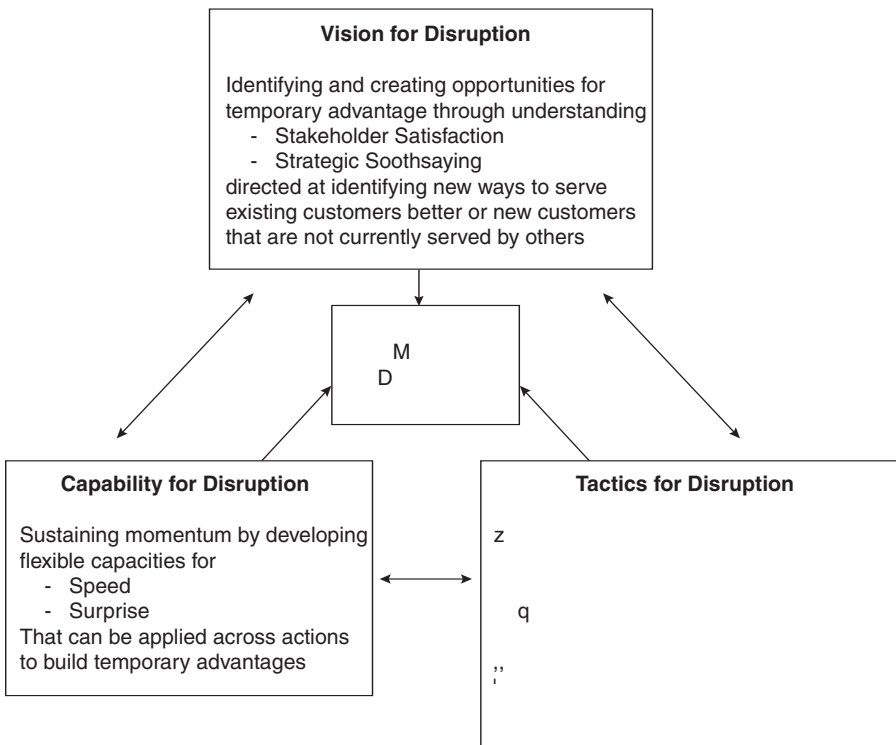


FIGURE 1.3 Disruption and the new 7 Ss

Source: R. D'Aveni, *Hypercompetition: Managing the Dynamics of Strategic Maneuvering* (New York: Free Press, 1994).

^s The "old" 7 Ss of competitive advantage—structure, strategy, systems, style, skills, staff, and super-ordinate goals—entered business literature in a paper by R. Waterman, T. Peters, and J. Phillips, "Structure Is Not Organization," in *Business Horizons* (June 1980). D'Aveni used these as a point of reference in deriving his "new" 7 Ss under hypercompetition.

Approach	Definition
Superior stakeholder satisfaction	Understanding how to maximize customer satisfaction by adding value strategically
Strategic soothsaying	Seeking out new knowledge that can predict or create new windows of opportunity
Positioning for speed	Preparing the organization to react as quickly as possible
Positioning for surprise	Preparing the organization to respond to the marketplace in a manner that will surprise competitors
Shifting the rules of competition	Finding new ways to serve customers which transform the industry
Signaling strategic intent	Communicating the intended actions of a company, in order to stall responses by competitors
Simultaneous and sequential strategic thrusts	Taking a series of steps designed to stun and confuse competitors in order to disrupt or block their efforts

FIGURE 1.4 D’Aveni’s new 7 Ss.

competition, as well as new opportunities that extend their current strengths. This model is particularly useful in markets where the rate of change makes sustaining a business strategy difficult. It suggests that a business strategy must be continuously redefined in order to be successful.

An application of the hypercompetition model is the destroy your business (DYB) approach to strategic planning that was implemented by Jack Welch at General Electric (GE). Welch recognized that GE could only sustain its competitive advantage for a limited time as competitors attempted to outmaneuver GE. He knew that if GE didn’t identify its weaknesses, its competitors would relish doing so. DYB is an approach that places GE employees in the shoes of their competitors. Through the DYB lenses, GE employees develop strategies to destroy GE’s competitive advantage. Then, in light of their revelations, they apply the grow your business (GYB) strategy to find fresh ways to reach new customers and better serve existing ones. The goal of the DYB planning approach is the complete disruption of current practices, so that GE can take actions to protect its business before competitors hone in on its weaknesses. The implicit assumption underlying DYB is that GE would not be able to sustain its position in the marketplace over the long term.

GE’s Medical Systems Division used DYB to respond to the challenges posed by the Internet.⁹ In doing so it applied four of D’Aveni’s 7 Ss: positioning for speed,

⁹ M. Levinson, “Destructive Behavior,” *CIO Magazine* (July 15, 2000), available at http://www.cio.com/archive/071500_destructive_content.html.

superior stakeholder satisfaction, shifting the rules of competition, and strategic soothsaying. In 1999, this manufacturer was leading its industry in sales of MRI, CT scan, ultrasound, and mammography machines. Web sites such as WebMD, Neoforma, and MediBuy were aggregating unbiased information about machines manufactured by GE Medical Systems and its competitors into a single Web site that reached both current and potential GE customers. In the Web sites of these dot-coms, GE appeared to be just another vendor. To offer an alternative to these third-party Web sites, GE Medical Systems reacted as quickly as possible (positioning for speed) to bring GEMedicalSystems.com online with services specifically designed for the Internet. For example, the Web site allowed medical technicians to download and test software for upgrading their MRIs. If pleased at the end of the 30-day trial period, these customers could buy the upgrade. The Web site also enabled GE Medical Systems to monitor the productivity of its customers' equipment in real time via the Web, to provide personalized capacity management analysis, and to offer the services of its specialists to remedy mechanical problems that they observed. These services created superior stakeholder satisfaction and shifted the rules of competition in their industry.

Strategic soothsaying was demonstrated when Tip TV, GE Medical Systems' satellite television network that broadcasts programs to teach doctors and clinicians how to use GE equipment to perform medical procedures, went online. Originally, doctors and clinicians signed up six weeks prior to a Tip TV class and then waited several weeks to get their exam results at the end of the course. After Tip TV went online, those seeking to take the class could sign up online anytime, take tests in real-time, and get their results immediately. More importantly, content was expanded by partnership with an Internet start-up, Health Dream, to provide access to educational material offered by the *New England Journal of Medicine*.

Why Are Strategic Advantage Models Essential to Planning for Information Systems?

A general manager who relies solely on IS personnel to make IS decisions may not only give up any authority over IS strategy, but also may hamper crucial future business decisions. In fact, business strategy should drive IS decision making, and changes in business strategy should entail reassessments of IS. Moreover, changes in IS potential should trigger reassessments of business strategy—as in the case of the Internet, where companies that failed to understand or consider its implications for the marketplace were quickly outpaced by competitors who had. For the purposes of our model, the Information Systems Strategy Triangle, understanding business strategy means answering the following questions:

1. What is the business goal or objective?
2. What is the plan for achieving it? What is the role of IS in this plan?
3. Who are the crucial competitors and cooperators, and what is required of a successful player in this value net?

Porter's generic strategies and D'Aveni's hypercompetition and 7 Ss frameworks (summarized in Figure 1.5) are revisited in the next few chapters. They are especially helpful in discussing the role of IS in building and sustaining competitive advantages (Chapter 2), and for incorporating IS into business strategy. The next section of this chapter establishes a foundation for understanding organizational strategies.

► BRIEF OVERVIEW OF ORGANIZATIONAL STRATEGIES

Organizational strategy includes the organization's design as well as the choices it makes to define, set up, coordinate, and control its work processes. The organizational strategy is a plan that answers the question: "How will the company organize in order to achieve its goals and implement its business strategy?" A few of the many models of organizational strategy are reviewed in this section.

A simple framework for understanding the design of an organization is the business diamond, introduced by Leavitt and embellished by Hammer and Champy.¹⁰ Shown in Figure 1.6, the **business diamond** identifies the crucial components of an organization's plan as its business processes, its values and beliefs, its management control systems, and its tasks and structures. This simple framework is useful for designing new organizations and for diagnosing organizational troubles. For example, organizations that try to change their cultures but fail to change the way they manage and control cannot be effective.

A complementing framework to the business diamond for organizational design can be found in the book by Cash, Eccles, Nohria, and Nolan, *Building the Information Age Organization*.¹¹ This framework, shown in Figure 1.7, suggests that the successful execution of a business's organizational strategy comprises the best combination of organizational, control, and cultural variables. Organizational variables include decision rights, business processes, formal

Framework	Key Idea	Application to Information Systems
Porter's generic strategies framework	Firms achieve competitive advantage through cost leadership, differentiation, or focus.	Understanding which strategy is chosen by a firm is critical to choosing IS to complement that strategy.
D'Aveni's hypercompetition model	Speed and aggressive moves and counter-moves by a firm create competitive advantage.	The 7 Ss give the manager suggestions on what moves and countermoves to make. IS are critical to achieve the speed needed for these moves.

FIGURE 1.5 Summary of key strategy frameworks.

¹⁰ M. Hammer and J. Champy, *Reengineering the Corporation*. (New York: HarperBusiness, 1994).

¹¹ Cash, Eccles, Nohria, and Nolan, *Building the Information Age Organization* (Homewood, IL: Richard D. Irwin, 1994).

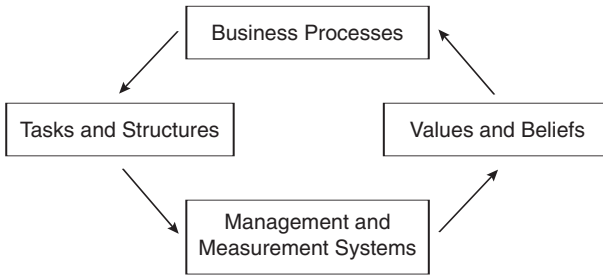


FIGURE 1.6 The business diamond.

Source: M. Hammer and J. Champy, *Reengineering the Corporation* (New York: Harper Business, 1994).

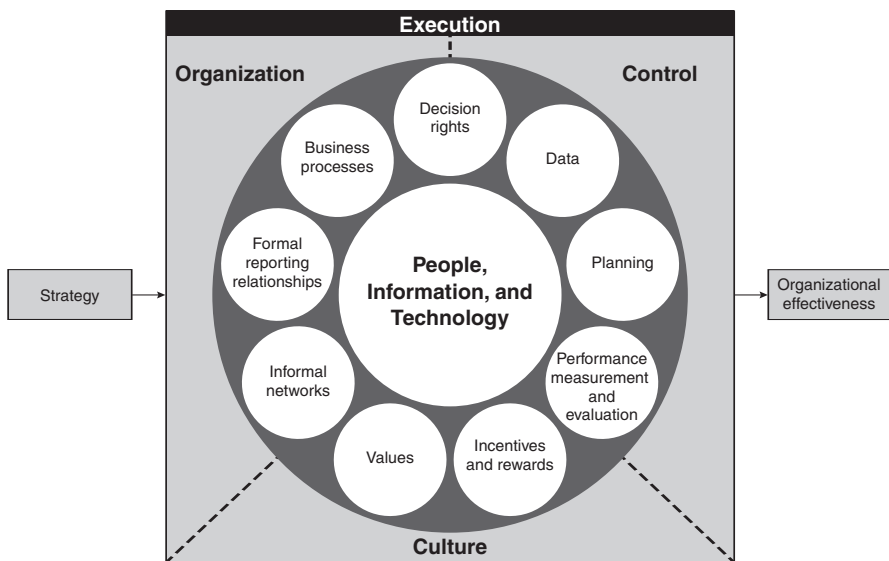


FIGURE 1.7 Managerial levers

Source: Cash, Eccles, Nohria, and Nolan, *Building the Information Age Organization* (Homewood, IL: Richard D. Irwin, 1994).

reporting relationships, and informal networks. Control variables include the availability of data, the nature and quality of planning, and the effectiveness of performance measurement and evaluation systems, and incentives to do good work. Cultural variables comprise the values of the organization. These organizational, control and cultural variables are **managerial levers** used by decision makers to effect changes in their organizations.

Our objective is to give the manager a set of frameworks to use in evaluating various aspects of organizational design. Using these frameworks, the manager can review the current organization and assess which components may be missing and

what options are available looking forward. Understanding organizational strategy means answering the following questions:

1. What are the important structures and reporting relationships within the organization?
2. What are the characteristics, experiences, and skill levels of the people within the organization?
3. What are the key business processes?
4. What control systems are in place?
5. What is the culture of the organization?

The answers to these questions inform any assessment of the organization's use of IS. Chapters 3, 4, and 5 use the organizational theory frameworks, summarized in Figure 1.8, to assess the impact of MIS on the firm.

► **BRIEF OVERVIEW OF INFORMATION SYSTEMS STRATEGY**

IS strategy is the plan an organization uses in providing information services. IS allows a company to implement its business strategy. Business strategy is a function of competition (What does the customer want and what does the competition do?), positioning (In what way does the firm want to compete?), and capabilities (What can the firm do?); IS help determine the company's capabilities. An entire chapter is devoted to IT architecture, but for now a more basic framework will be used to understand the decisions related to IS that an organization must make.

Framework	Key Idea	Usefulness in IS Discussions
Business diamond	There are 4 key components to an organization: business processes, values and beliefs, management control systems, and tasks and structures.	Using IS in an organization will affect each of these components. Use this framework to identify where these impacts are likely to occur.
Managerial levers	Organizational variables, control variables, and cultural variables are the levers managers can use to affect change in their organization.	This is a more detailed model than the Business diamond and gives specific areas where IS can be used to manage the organization and to change the organization.

FIGURE 1.8 Summary of organizational strategy frameworks.

The purpose of the matrix in Figure 1.9 is to give the manager a high-level view of the relation between the four IS infrastructure components and the other resource considerations that are key to IS strategy. Infrastructure includes hardware, such as desktop units and servers. It also includes software, such as the programs used to do business, to manage the computer itself, and to communicate between systems. The third component of IS infrastructure is the network, which is the physical means by which information is exchanged among hardware components, such as through a modem and dial-up network (in which case the service is actually provided by a vendor such as AT&T), or through a private digital network (in which case the service is probably provided by an internal unit). Finally, the fourth part of the infrastructure is the data. The data are the actual information, the bits and bytes stored in the system. In current systems, data are not necessarily stored alongside the programs that use them; hence, it is important to understand what data are in the system and where they are stored. Many more detailed models of IS infrastructure exist, and interested readers may refer to any of the dozens of books that describe them. For the purposes of this text, the matrix will provide sufficient information to allow the general manager to assess the critical issues in information management.

	What	Who	Where
Hardware	List of physical components of the system	Individuals who use it Individuals who manage it	Physical location
Software	List of programs, applications, and utilities	Individuals who use it Individuals who manage it	What hardware it resides upon and where that hardware is located
Networking	Diagram of how hardware and software components are connected	Individuals who use it Individuals who manage it Company from whom service is obtained	Where the nodes are located, where the wires and other transport media are located
Data	Bits of information stored in the system	Individuals who own it Individuals who manage it	Where the information resides

FIGURE 1.9 Information systems strategy matrix.

► **FOOD FOR THOUGHT: ECONOMICS OF INFORMATION VS. ECONOMICS OF THINGS**

In their book, *Blown to Bits*, Evans and Wurster argue that every business is in the information business.¹² Even those businesses not typically considered to be information businesses have business strategies in which information plays a critical role. The physical world of manufacturing is shaped by information that dominates products as well as processes. For example, a high-end Mercedes automobile contains as much computing power as a midrange personal computer. Information-intensive processes in the manufacturing and marketing of the automobile include market research, logistics, advertising, and inventory management.

As our world is reshaped by information-intensive industries, it becomes even more important for business strategies to differentiate the timeworn economics of things from the evolving economics of information. Things wear out; things can be replicated at the expense of the manufacturer; things exist in a tangible location. When sold, the seller no longer owns the thing. The price of a thing is typically based on production costs. In contrast, information never wears out, though it can become obsolete or untrue. Information can be replicated at virtually no cost without limit; information exists in the ether. When sold, the seller still retains the information, but this ownership provides little value if the ability of others to copy it is not limited. Finally, information is often costly to produce, but cheap to reproduce. Rather than pricing it to recover the sunk cost of its initial production, its price is typically based on the value to the consumer. Figure 1.10 summarizes the major differences between the economics of goods and the economics of information.

Evans and Wurster suggest that traditionally the economics of information has been bundled with the economics of things. However, in this Information Age, firms are vulnerable if they do not separate the two. The Encyclopædia Britannica story serves as an example. Bundling the economics of things with the economics of information made it difficult for Encyclopædia Britannica to gauge the threat posed by Encarta, the encyclopedia on CD-ROM that was given away to promote the sale of computers and peripherals. Britannica focused on its centuries-old tradition of

Things	Information
Wear out	Doesn't wear out, but can become obsolete or untrue
Are replicated at the expense of the manufacturer	Is replicated at almost zero cost without limit
Exist in a tangible location	May exist in the ether
When sold, seller ceases to own	When sold, seller may still possess and sell again
Price based on production costs	Price based on value to consumer

FIGURE 1.10 Comparison of the economics of things with the economics of information.

¹² Philip Evans and Thomas Wurster, *Blown to Bits* (Boston, MA: Harvard Business School Press, 2000).

providing information in richly bound tomes sold to the public through a well-trained sales force. Only when it was threatened with its very survival did Encyclopædia Britannica grasp the need to separate the economics of information from economics of things, and sell bits of information online. Clearly Encyclopædia Britannica's business strategy, like that of many other companies, needed to reflect the difference between the economics of things from the economics of information.¹³

► SUMMARY

The Information Systems Strategy Triangle represents a simple framework for understanding the impact of IS on businesses. It relates business strategy with IS strategy and organizational strategy and implies the balance that must be maintained in business planning. The Information Systems Strategy Triangle suggests the following management principles:

Business Strategy

Business strategy drives organizational strategy and IS strategy. The organization and its IS should clearly support defined business goals and objectives.

- Definition: A well-articulated vision of where a business seeks to go and how it expects to get there
- Models: Porter's generic strategies model; D'Aveni's hypercompetition model

Organizational Strategy

Organizational strategy must complement business strategy. The way a business is organized either supports the implementation of its business strategy or it gets in the way.

- Definition: The organization's design, as well as the choices it makes to define, set up, coordinate, and control its work processes
- Models: Business diamond; managerial levers

IS Strategy

IS strategy must complement business strategy. When IS support business goals, the business appears to be working well. IS strategy can itself affect and is affected by changes in a firm's business and organizational strategies. Moreover, information systems strategy always has consequences—intended or not—on business and organizational strategies.

- Definition: The plan the organization uses in providing information systems and services
- Models: A basic framework for understanding IS decisions relating architecture (the “what”) and the other resource considerations (“who” and “where”) that represent important planning constraints

Strategic Relationships

Organizational strategy and information strategy must complement each other. They must be designed so that they support, rather than hinder each other. If a decision is made to change one corner of the triangle, it is necessary to evaluate the other two corners to ensure

¹³ Ibid.

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that balance is preserved. Changing business strategy without thinking through the effects on the organizational and IS strategies will cause the business to struggle until balance is restored. Likewise, changing IS or the organization alone will cause an imbalance.

► KEY TERMS

business diamond (p. 00)	IS strategy (p. 00)	shareholder value model (p. 00)
business strategy (p. 00)	Information Systems Strategy Triangle (p. 00)	unlimited resources model (p. 00)
cost leadership (p. 00)	managerial levers (p. 00)	
differentiation (p. 00)	organizational strategy (p. 00)	
focus (p. 00)		
hypercompetition (p. 00)		

► DISCUSSION QUESTIONS

1. Why is it important for business strategy to drive organizational strategy and IS strategy? What might happen if business strategy was not the driver?
2. Suppose managers in an organization decided to hand out laptop computers to all salespeople without making any other formal changes in organizational strategy or business strategy. What might be the outcome? What unintended consequences might occur?
3. Consider a traditional manufacturing company that wanted to take advantage of the Internet and the Web. What might be a reasonable business strategy and how would organizational and IS strategy need to change?
4. This chapter describes key components of an IS strategy. Describe the IS strategy of a consulting firm using the matrix framework.
5. What does this tip from *Fast Company* mean: “The job of the CIO is to provide organizational and strategic flexibility”?¹⁴

CASE STUDY 1-1

ROCHE’S NEW SCIENTIFIC METHOD

For years, the Swiss pharmaceutical giant, Roche Group, pitted veteran scientific teams against one another. The competing teams were mandated to fight one another for resources. That proud, stubborn culture helped Roche develop blockbuster drugs such as Valium and Librium. But, Roche’s ultracompetitive approach made it almost impossible to abandon faltering projects, because scientists’ careers were so wrapped up in them. Researchers were tempted to hoard the technical expertise they picked up along the way, since sharing might allow others to catch up. In 1998, the company replaced its gladiator mentality with a more collaborative style of teamwork—especially in the chaotic, booming

¹⁴ “20 Technology Briefs: What’s New? What’s Next? What Matters,” *Fast Company* (March 2002), available from <http://www.fastcompany.com/online/56/fasttalk.html>.

new field of genomics. So Roche began running ads in the back pages of *Science* magazine, looking for a new breed of researcher—people who were starting out, who could reinvent themselves as job opportunities changed.

For Roche, these are thrilling times. Week by week, new breakthroughs in genomics and molecular biology are upending the way it hunts for new drugs. It's now possible to pursue new drug targets with a speed and gusto that would have been unimaginable a few years ago. It's possible to size up toxicity risks earlier than ever. And it's becoming possible to match up drugs with the people who are best suited for them, ushering in an era of customized medicines.

But the genomics revolution is incredibly jarring as well. In fact, reckoning with its impact demands a fresh start in the fundamentals of innovation and R&D. Old ways of managing projects don't make sense. Roche can now run *1 million* genomics experiments a day, churning out enough data to overwhelm every computer it owns. Research teams that once spent years looking for a single good idea now face hundreds or even thousands of candidates. Without a clear way to handle all of this information, it's possible to drown in the data.

Still, at the highest levels of Roche, there is real excitement about what lies ahead. At a media briefing last August, Roche Group chairman and CEO Franz Humer declared, "Look at this revolution of genetics, genomics, and proteomics. It's becoming ever clearer that we will be able to identify early the predisposition of people to disease—and to monitor and treat them more effectively. We'll develop markers for cancer. That will lead to better test kits and to new pharmaceuticals."

So what is the right way to reconfigure a company when breakthrough technology shows up on its doorstep? Step inside Roche's U.S. pharmaceuticals headquarters, and you'll see how that adjustment is taking place. It begins with something as basic—and hard—as embracing the excitement of having way too much data, too fast. It goes on to include new thinking about the best ways to build teams, hire people, and create a culture where failure is all right, as long as you fail fast. The only way to embrace a technological revolution, Roche has discovered, is to unleash an organizational revolution.

Learning to Swim in a Deluge of Data

In the genomics explosion, think of the GeneChip as the detonator. To the unaided eye, it is merely a carefully mounted piece of darkened glass, barely bigger than your thumbnail. Look closely, though, and you can see countless tiny markings on that glass. Each mark represents the essence of a human gene—assembled one amino acid at a time on to the glass. All told, there may be as many as 12,000 different genes on a single chip. Run the right experiments, and the GeneChip will light up the specific genes that are activated in a medically interesting tissue sample. Suddenly, hundreds of brilliant white and blue dots burst forth against the chip's dark background. Each time a chip lights up, you behold a glimpse of which genes might be markers for disease. Yet for all of the ingenuity involved in making the GeneChip, it has required cleverness on Roche's part to use the chips effectively within a big organization.

Take something as basic as computer capacity. Each sample run on a GeneChip set generates 60 million bytes of raw data. Analyze that data a bit, and you need another 180 million bytes of computer storage. Run 1,000 GeneChip experiments a year, which Roche did in both 1999 and 2000, and pretty soon you run the risk of collapsing your data systems. "Every six months, the IT guys would come to us and say, 'You've used up all of your storage,'" recalls Jiayi Ding, a Roche scientist. Some of those encounters were outright testy. At one point in early 1999, Roche's computer-services experts pointed out that they were supposed to support 300 researchers in Nutley—and that the 10 people working on GeneChips were hogging 90% of the company's total computer capacity.

Fail Fast, So You Can Succeed Sooner

One of the biggest challenges in drug research—or in any field—is letting go of a once-promising idea that just isn't working anymore. Without strict cutoff rules, months and even years can slip away as everyone labors to keep a doomed project from dying. Meanwhile, much brighter prospects sit dormant, with no one able to give them any attention.

New hire, Lee Babiss, head of preclinical research, arrived from arch rival Glaxo with a simple message: Fail fast. Babiss wanted successes as much as anyone. But he also knew that the best hope of finding the right new drugs involved cutting down the time spent looking at the wrong alternatives.

For example, screening was becoming a bottleneck for Roche. An ultra-high-throughput screening was installed at a cost of more than \$1 million. “We can test 100,000 compounds a day,” says Larnie Myer, the technical robotics expert who keeps the system running. Nearly all of those compounds will turn out to be useless for the mission at hand. But that's fine. If his team can get the losers out of consideration for that trial in a hurry and identify a handful of “hits” within a few weeks of testing, that speeds Roche's overall efforts.

What's more, the Zeiss machine represents the gradual retooling of Roche's overall research efforts. Processes farther down the pipeline must be upgraded and reworked in order to handle much greater volume. That is hard and disruptive work—but it is vital.

Change Everything—One Piece at a Time

Peek into almost any aspect of Roche's business, and you will find someone who is excited about the ways that genomics could change things. In Palo Alto, researcher Gary Peltz has built a computerized model of the mouse genome that allows him to simulate classical lab studies in a matter of minutes.

In Iceland, Roche is teaming with a company called Decode, which researches genealogical records from the Icelandic population. That data has helped Decode identify and locate genes that are associated with stroke as well as schizophrenia and other diseases, giving Roche new research leads that otherwise might never have surfaced with such clarity.

And in Nutley, there is talk that genomic data will make it possible to size up a drug's side effects with much greater clarity before embarking on lengthy animal experiments. It will be possible to run simulations or GeneChip experiments with potential new drugs to find out whether they might interact in troublesome ways with the functioning of healthy genes.

Each of those initiatives is running on a different timeline. Some parts of Roche's business will be aggressively reshaped in the next year or two; others may take five years or more to feel the full effects of the most recent genomics breakthroughs. “This isn't just a matter of turning on a light switch,” says Klaus Lindpaintner, Roche's global head of genetics research.

Yet eventually, Roche executives believe, all of the retooling within their company will be mirrored by even bigger changes in the ways that all of us get our medical care.

Discussion Questions

1. How does the business strategy affect information systems and organizational decisions?
2. What generic strategy does Roche appear to be using based upon this case? Provide a rationale for your response.
3. Apply the hypercompetition model to Roche? Which of the 7 Ss are demonstrated in this case?
4. How do information systems support Roche's business strategy?

Source: Excerpted from G. Anders, “Fresh Start 2002: Roche's New Scientific Method,” *Fast Company* (January 2002), available at <http://www.fastcompany.com/online/54/roche.html>.

CASE STUDY 1-2**COMAIR AIRLINES**

Comair, a regional airlines owned by Delta Air Lines, ran into a problem. Their network system crashed because their legacy crew management application failed, bringing down the entire airlines over the holidays, canceling or delaying more than 3,000 flights and stranding nearly 200,000 passengers. The failure cost an estimated \$20 million, damaged the airline's reputation, and prompted an investigation by the Department of Transportation. Why did this happen?

A replacement for the crew management system was on the list of systems to be funded, but managers were comfortable with the old system, and many of the business processes were inextricably linked to it. It had been in use for 15 years, and the business was accustomed to it. Even pilot contracts were tied to metrics specifically measured in the system, making replacement very difficult.

IT management changed frequently during this time, and Comair was acquired by Delta, giving upper management a more pressing set of priorities. A pilot strike forced Comair to shut down for almost 3 months. This refocused the flight operations group, the primary users of the crew scheduling system, on getting the planes flying again when the strike ended. According to the former IT director, "the tendency in the IT department was to 'keep your head down' and not draw attention to anything. There was clearly a lack of commitment to this project. Everyone was expecting someone else to move projects along. The business units were expecting IT to push a project through and IT was waiting for the business units."

Despite the fact that everyone knew the system was old and needed replacement, management was distracted by other urgent business matters, and the decision to upgrade the crew management system came too late. The legacy system failed, and management was left to both handle the consequences and explain why the failure occurred.

Discussion Questions:

1. Where did the misalignment between the business strategy and the information systems occur?
2. What might you have done, as the manager of flight operations, to make sure your system was in proper shape to support your organization? Why do you think it didn't happen in this case?
3. Was there anything Delta executives could have done during the merger to have avoided this type of exposure from their new acquisition?
4. What could the Comair IT executives have done to get the proper funding and priority for upgrading this legacy system? What would the general managers have had to hear in order to respond appropriately?

Source: Adapted from Stephanie Overby, "Found to Fail" *CIO Magazine*, May 1, 2005, pp. 49–54.