

Organization Theory and Design

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Decision-Making Processes

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Pepsi-Cola

When claims began surfacing across the country that syringes and hypodermic needles had been found in cans of Pepsi, Pepsi-Cola Company made the choice to not close plants or conduct a recall. Instead, the company mounted a major public relations campaign.

Pepsi-Cola's CEO Craig Weatherup and his staff prepared video footage demonstrating the tamperproof features of Pepsi's canning process and sent the footage by satellite to television stations across the nation. Weatherup himself took to the airwaves, appearing on "Nightline," "The McNeil-Lehrer Newshour," and "Larry King Live," to explain how implausible it was for syringes to have been put into Pepsi cans at the canning plants. At one point, Weatherup appeared on "Nightline" together with Food and Drug Administration Commissioner David Kessler. Though the FDA was cautioning consumers to pour Pepsi into a glass before drinking, the agency did not feel that consumers were in danger, nor was there evidence of nationwide tampering. The evidence that Pepsi, and separately, the FDA presented went a long way toward quelling public fears.

Explaining the decision not to issue a product recall, Weatherup said, a recall would be "dishonest" since there had been no injuries and not a single confirmed case of a syringe found in an unopened can of Pepsi. A recall would also have been extremely expensive for the company—but then, loss of consumer trust could have been even more expensive in the long run. At Pepsi-Cola's headquarters, a twelve member crisis management team was working nearly around the clock. At least two dozen employees staffed phone lines to take calls from worried customers and bottlers. Some bottlers took their own steps to quiet local fears. "Hell, we opened up our plant to everybody," said James C. Lee, Jr., chairman of Buffalo Rock Bottling Company in Birmingham, Alabama. "The TV stations came over, and we showed 'em we got 28 people doing quality control 'round the clock."

Pepsi managers made the right choice, believing that syringes couldn't appear in unopened cans of Pepsi. By allying itself with the FDA and responding quickly and openly to consumer fears, Pepsi weathered the syringe-scare crisis with little damage. In fact, all the publicity associated with the hoax, and the extra publicity Pepsi received in response to it, may have benefited the company in the long run.¹

The syringe scare at Pepsi-Cola provides several insights into organizational decision making. First, managers must sometimes make decisions very quickly in response to circumstances out of the control of the organization. Second, decisions can be risky and uncertain, without any guarantee of success. Weatherup knew his decision not to conduct a recall could backfire if the company were unable to convince consumers that Pepsi products were truly safe. Third, major decisions are not made all at once. After Pepsi decided not to recall their product and instead mount a massive public relations campaign, subsequent decisions had to be made about how to do it. Decision implementation is crucial. Pepsi-Cola set up a crisis management team, provided constant updates to bottlers and customers nationwide, set up consumer phone lines, ran ads, and decided that Weatherup was the best person to appear publicly. The Pepsi-Cola example also shows that major organizational decisions are usually not made by a single manager. Though Craig Weatherup was at the forefront, he was talking daily with other managers and with his boss, Pepsi-Co Chairman Wayne Calloway.

PURPOSE OF THIS CHAPTER

Decision-making processes can be thought of as the brain and nervous system of an organization. Decision making is the end use of the information and control systems described in Chapter 9. Decisions are made about organization strategy, structure, innovation, and acquisitions. This chapter explores how organizations can and should make decisions about these issues.

Although Pepsi's decision worked well, many organizational decisions are complete failures. RCA intended to capture the video recorder market with its Videodisc but instead lost nearly \$500 million because the machine couldn't tape television shows. The successful bike maker Huffy made a \$5 million mistake by assuming its traditional sales outlets, such as K Mart and Toys 'R' Us, were appropriate for its new "Cross Sport" bike, priced 15 percent higher than other Huffy models and aimed at adults looking for a specialty bike. Miller Brewing decided to construct a \$412 million, fully equipped brewery in Trenton, Ohio, which never opened because the demand for Miller beer did not increase as managers expected.²

At any time, an organization may be identifying problems and implementing alternatives for hundreds of decisions. Organizations somehow muddle through these processes.³ The purpose here is to analyze these processes to learn what decision making is actually like in organizational settings.

The first section of this chapter defines decision making. The next section examines how individual managers make decisions. Then several models of organizational decision making are explored. Each model is used in a different organizational situation. The final section in this chapter combines the models into a single framework that describes when and how they should be used and discusses special issues, such as decision mistakes.

DEFINITIONS

Organizational decision making is formally defined as the process of identifying and solving problems. The process contains two major stages. The **problem identification** stage is where information about environmental and organizational conditions is monitored to determine if performance is satisfactory and to diagnose the cause of shortcomings. The **problem solution** stage is where alternative courses of action are considered and one alternative is selected and implemented. At Pepsi-Cola, problem identification was easy—Craig Weatherup realized the claims that syringes had been found in cans of Pepsi could potentially devastate the company's sales. The problem solution stage involved examining various courses of action, deciding to launch a massive public relations campaign, and making subsequent decisions about implementation.

Organizational decisions vary in complexity and can be categorized as programmed or nonprogrammed.⁴ **Programmed decisions** are repetitive and well defined, and procedures exist for resolving the problem. They are well structured because criteria of performance are normally clear, good information is available about current performance, alternatives are easily specified, and there is relative certainty that the chosen alternative will be successful. Examples of programmed decisions include decision rules, such as when to replace an office copy machine, when to reimburse managers for travel expenses, or whether an applicant has sufficient qualifications for an assembly-line job. Many companies adopt rules based

on experience with programmed decisions. For example, general pricing rules in the restaurant industry are that food is marked up three times direct cost, beer four times, and liquor six times. A rule for large hotels staffing banquets is to allow one server per thirty guests for a sit-down function and one server per forty guests for a buffet.⁵

Nonprogrammed decisions are novel and poorly defined, and no procedure exists for solving the problem. They are used when an organization has not seen a problem before and may not know how to respond, as happened with the Pepsi-Cola syringe scare. Clear-cut decision criteria do not exist. Alternatives are fuzzy. There is uncertainty about whether a proposed solution will solve the problem. The decision at Pepsi-Cola against a recall and in favor of a campaign to calm consumer fears was clearly a nonprogrammed decision. Pepsi Cola executives faced a dilemma: clear evidence of danger, such as the traces of poisonous benzene found in unopened Perrier several years earlier, would have required a recall, but such evidence didn't exist. Typically, few alternatives can be developed for a nonprogrammed decision, so a single solution is custom-tailored to the problem.

Individual Decision Making

Individual decision making by managers can be described in two ways. First is the **rational approach**, which suggests how managers should try to make decisions. Second is the **bounded rationality perspective**, which describes how decisions actually have to be made under severe time and resource constraints. The rational approach is an ideal managers may work toward but never reach.

RATIONAL APPROACH

The rational approach to individual decision making stresses the need for systematic analysis of a problem followed by choice and implementation in a logical step-by-step sequence. The rational approach was developed to guide individual decision making because many managers were observed to be unsystematic and arbitrary in their approach to organizational decisions. According to the rational approach, the decision process can be broken down into the following eight steps.⁶

1. *Monitor the decision environment.* In the first step, a manager monitors internal and external information that will indicate deviations from planned or acceptable behavior. He or she talks to colleagues and reviews financial statements, performance evaluations, industry indices, competitors' activities, and so forth. For example, during the pressure-packed five-week Christmas season, Linda Koslow, general manager of Marshall Fields's Oakbrook, Illinois, store, checks out competitors around the mall, eyeing whether they are marking down merchandise. She also scans printouts of her store's previous day's sales to learn what is or is not moving.⁷
2. *Define the decision problem.* The manager responds to deviations by identifying essential details of the problem: where, when, who was involved, who was affected, and how current activities are influenced. For Koslow, this means defining

whether store profits are low because overall sales are less than expected or because certain lines of merchandise are not moving as expected.

3. *Specify decision objectives.* The manager determines what performance outcomes should be achieved by a decision.
4. *Diagnose the problem.* In this step, the manager digs below the surface to analyze the cause of the problem. Additional data may be gathered to facilitate this diagnosis. Understanding the cause enables appropriate treatment. For Koslow at Marshall Fields, the cause of slow sales may be competitors' marking down of merchandise or Marshall Fields's failure to display hot-selling items in a visible location.
5. *Develop alternative solutions.* Before a manager can move ahead with a decisive action plan, he or she must have a clear understanding of the various options available to achieve desired objectives. The manager may seek ideas and suggestions from other people. Koslow's alternatives for increasing profits could include buying fresh merchandise, running a sale, or reducing the number of employees.
6. *Evaluate alternatives.* This step may involve the use of statistical techniques or personal experience to assess the probability of success. The merits of each alternative are assessed as well as the probability that it will reach the desired objectives.
7. *Choose the best alternative.* This step is the core of the decision process. The manager uses his or her analysis of the problem, objectives, and alternatives to select a single alternative that has the best chance for success. At Marshall Fields, Koslow may choose to reduce the number of staff as a way to meet the profit goals rather than increase advertising or markdowns.
8. *Implement the chosen alternative.* Finally, the manager uses managerial, administrative and persuasive abilities and gives directions to ensure that the decision is carried out. The monitoring activity (step 1) begins again as soon as the solution is implemented. For Linda Koslow, the decision cycle is a continuous process, with new decisions made daily based on monitoring her environment for problems and opportunities.

The first four steps in this sequence are the problem identification stage, and the next four are the problem solution stage of decision making, as indicated in Exhibit 11.1. All eight steps normally appear in a manager's decision, although each step may not be a distinct element. Managers may know from experience exactly what to do in a situation, so one or more steps will be minimized. The following case illustrates how the rational approach is used to make a decision about a personnel problem.

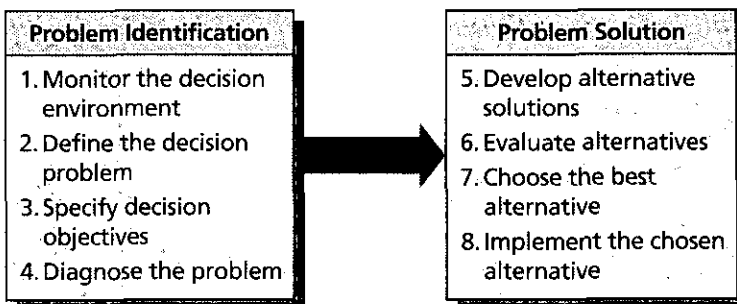


Exhibit 11.1
Steps in Rational
Approach to
Decision
Making.

IN PRACTICE ♦ 11.1***Alberta Manufacturing***

1. *Monitor the decision environment.* It is Monday morning, and Joe DeFoe, one of Alberta's most skilled cutters, is absent again.
2. *Define the decision problem.* This is the sixth consecutive Monday DeFoe has been absent. Company policy forbids unexcused absenteeism, and DeFoe has been warned about his excessive absenteeism on the last three occasions. A final warning is in order but can be delayed, if warranted.
3. *Specify decision objectives.* DeFoe should attend work regularly and establish the production and quality levels of which he is capable. The time period for solving the problem is two weeks.
4. *Diagnose the problem.* Discreet discussions with DeFoe's co-workers and information gleaned from DeFoe indicate that DeFoe has a drinking problem. He apparently uses Mondays to dry out from weekend benders. Discussion with other company sources confirms that DeFoe is a problem drinker.
5. *Develop alternative solutions.* (1) Fire DeFoe. (2) Issue a final warning without comment. (3) Issue a warning and accuse DeFoe of being alcoholic to let him know you are aware of his problem. (4) Talk with DeFoe to see if he will discuss his drinking. If he admits he has a drinking problem, delay the final warning and suggest that he enroll in Alberta's new employee assistance program for helping with personal problems, including alcoholism. (5) Talk with DeFoe to see if he will discuss his drinking. If he does not admit he has a drinking problem, let him know that the next absence will cost him his job.
6. *Evaluate alternatives.* The cost of training a replacement is the same for each alternative. Alternative 1 ignores cost and other criteria. Alternatives 2 and 3 do not adhere to company policy, which advocates counseling where appropriate. Alternative 4 is designed for the benefit of both DeFoe and the company. It might save a good employee if DeFoe is willing to seek assistance. Alternative 5 is primarily for the benefit of the company. A final warning might provide some initiative for DeFoe to admit he has a drinking problem. If so, dismissal might be avoided, but further absences will no longer be tolerated.
7. *Choose the best alternative.* DeFoe does not admit that he has a drinking problem. Choose alternative 5.
8. *Implement the chosen alternative.* Write up the case and issue the final warning.⁸

In the preceding case, issuing the final warning to Joe DeFoe was a programmable decision. The standard of expected behavior was clearly defined, information on the frequency and cause of DeFoe's absence was readily available, and acceptable alternatives and procedures were described. The rational procedure works best in such cases, when the decision maker has sufficient time for an orderly, thoughtful process. Moreover, Alberta Manufacturing had mechanisms in place to implement the decision, once made.

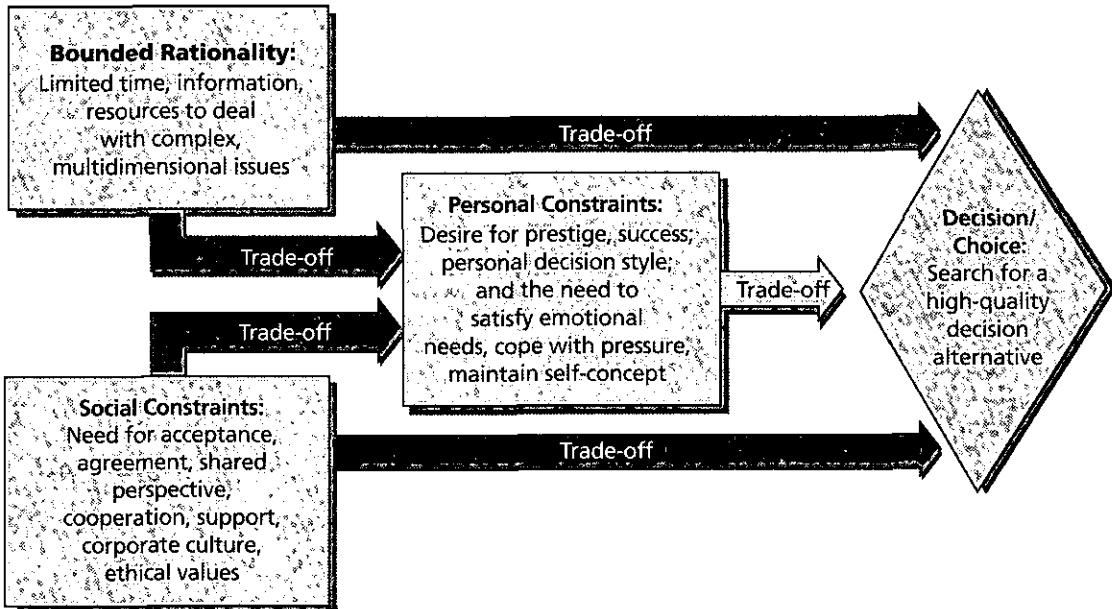
When decisions are nonprogrammed, ill defined, and piling on top of one another, the individual manager should still try to use the steps in the rational approach, but he or she often will have to take short cuts by relying on intuition and experience. Deviations from the rational approach are explained by the bounded rationality perspective.

BOUNDED RATIONALITY PERSPECTIVE

The point of the rational approach is that managers should try to use systematic procedures to arrive at good decisions. When organizations are facing little competition and are dealing with well-understood issues, managers generally use rational procedures to make decisions.⁹ Yet research into managerial decision making shows managers often are unable to follow an ideal procedure. In today's competitive environment, decisions often must be made very quickly. Time pressure, a large number of internal and external factors affecting a decision, and the ill-defined nature of many problems make systematic analysis virtually impossible. Managers have only so much time and mental capacity and, hence, cannot evaluate every goal, problem, and alternative. The attempt to be rational is bounded (limited) by the enormous complexity of many problems. There is a limit to how rational managers can be. For example, an executive in a hurry may have a choice of fifty ties on a rack but will take the first or second one that matches his suit. The executive doesn't carefully weigh all fifty alternatives because the short amount of time and the large number of plausible alternatives would be overwhelming. The manager simply selects the first tie that solves the problem and moves on to the next task.

Large organizational decisions are not only too complex to fully comprehend, but many other constraints impinge upon the decision maker, as illustrated in Exhibit 11.2. The circumstances are ambiguous, requiring social support, a shared perspective on what happens, and acceptance and agreement. For example, in a study of the decision making surrounding the Cuban missile crisis, the executive committee in the White House knew a problem existed but was unable to specify

Exhibit 11.2 Constraints and Trade-offs during Nonprogrammed Decision Making.



Source: Adapted from Irving L. Janis, *Crucial Decisions* (New York: Free Press, 1989); and A. L. George, *Presidential Decision Making in Foreign Policy: The Effective Use of Information and Advice* (Boulder, Colo.: Westview Press, 1980).

exact goals and objectives. The act of discussing the decision led to personal objections and finally to the discovery of desired objectives that helped clarify the desired course of action and possible consequences.¹⁰ In addition, personal constraints—such as decision style, work pressure, desire for prestige, or simple feelings of insecurity—may constrain either the search for alternatives or the acceptability of an alternative. All of these factors constrain a perfectly rational approach that should lead to an obviously ideal choice.¹¹ Recent research on the importance of personal decision style is discussed in Book Mark 11.0. Even seemingly simple decisions, such as selecting a job upon graduation from college, can quickly become so complex that a bounded rationality approach is used. Graduating students have been known to search for a job until they have two or three acceptable job offers, at which point their search activity rapidly diminishes. Hundreds of firms may be available for interviews, and two or three job offers are far short of the maximum number that would be possible if students made the decision based on perfect rationality.

The bounded rationality perspective is often associated with intuitive decision processes. In **intuitive decision making**, experience and judgment rather than sequential logic or explicit reasoning are used to make decisions.¹² Intuition is not arbitrary or irrational because it is based on years of practice and hands-on experience, often stored in the subconscious.¹³ Long experience with organizational issues provides managers with a gut feeling or hunch about which alternative will solve a problem. Indeed, many universities are offering courses in creativity and intuition so business students can learn to understand and rely on these processes.

In a situation of great complexity or ambiguity, previous experience and judgment are needed to incorporate intangible elements.¹⁴ The intuitive processes may be associated with both the problem identification and problem solution stages of a decision. A study of manager problem finding showed that thirty of thirty-three problems were ambiguous and ill defined.¹⁵ Bits and scraps of unrelated information from informal sources resulted in a pattern in the manager's mind. The manager could not "prove" a problem existed but knew intuitively that a certain area needed attention. A too simple view of a complex problem is often associated with decision failure,¹⁶ and research shows managers are more likely to respond intuitively to a perceived threat to the organization than to an opportunity.¹⁷

Although IDS Financial Services was very profitable and grew rapidly in the early 1990s, a manager perceived a high turnover rate among the company's financial planners. He interpreted this as a weakness that could seriously threaten IDS's position in the increasingly competitive financial services industry. Other examples of problems that might be discovered through informal, intuitive processes are the possibility of impending legislation against the company, the need for a new product, customer dissatisfaction, and a need for reorganization by creating new departments.¹⁸

Intuitive processes are also used in the problem solution stage. A survey found that executives frequently made decisions without explicit reference to the impact on profits or to other measurable outcomes.¹⁹ As we saw in Exhibit 11.2, many intangible factors—such as a person's concern about the support of other executives, fear of failure, and social attitudes—influence selection of the best alternative. These factors cannot be quantified in a systematic way, so intuition guided the choice of a solution. Managers may make a decision based upon what they sense to be right rather than upon what they can document with hard data.

A number of important decisions, some quite famous, have been based on hunch and intuition. One was film director George Lucas's choice of *Star Wars* as the

BOOKMARK

11.0

HAVE YOU READ ABOUT THIS?

The Dynamic Decisionmaker

by Michael J. Driver, Kenneth R. Brousseau, and Philip L. Hunsaker

The *Dynamic Decisionmaker* discusses the thought processes and decision styles managers use when making decisions. The authors develop a model based on two decision factors that combine into five decision styles:

Two Key Factors

The basic decision style model presented by the authors is based on two decision elements—the amount of information used in making a decision (called information use) and the number of alternatives considered (called focus). With respect to information use, managers may be maximizers or satisficers. The maximizer wants as much relevant information as possible before making a decision; the satisficer, in contrast, is a fast-action person who wants just enough information to get on with the decision.

Moreover, some decision makers are unifocused, which means they look at the problem with the idea of coming up with a single solution. Others are multifocused, wanting to develop a variety of options and related pros and cons before deciding.

Five Decision Styles

The underlying elements can appear in various combinations to form five decision making styles.

The **decisive style** is satisficing and unifocused. This style uses minimum information and perhaps a single alternative to solve a problem quickly. Attention quickly shifts to the next problem.

The **flexible style** is satisficing and multifocused. This style moves fast also but often changes focus, interpreting information to see multiple alternatives.

The **hierarchical style** is maximizing and unifocused. This style uses lots of information and analy-

sis to create a detailed, specific solution to a problem. This style exerts control with emphasis on quality and perfection to reach the “best” solution.

The **integrative style** is maximizing and multifocused. Lots of information is collected but is used to develop many possible solutions. Emphasis is on creativity and exploration and on openness to new options.

The **systemic style** is the most complex of all. This style is both multifocused and unifocused and prefers maximum information while looking at different perspectives and alternative solutions. This style sees the big picture and handles complex decisions well.

Conclusion

Learning one’s personal style and the style of co-workers will increase a manager’s effectiveness as a leader and in interpersonal relationships. For example, a supervisor and employee may have a “style clash.” A multifocused manager is seen by a unifocused subordinate as wishy-washy, and the unifocused subordinate is seen by the manager as having tunnel vision.

While the authors suggest there is no best style, people should adapt their style to the decision. Managers fail not because they make wrong decisions but because they use the wrong style for the situation—deciding too quickly and impulsively, gathering too much information, or postponing action too long.

The Dynamic Decisionmaker by Michael J. Driver, Kenneth R. Brousseau, and Phillip L. Hunsaker is published by Ballinger.

title of his film. Researchers who analyzed hard data warned him that the title would turn away crowds at the box office.²⁰ In another example, Ray Kroc felt that purchasing the McDonald name for \$2.7 million was highway robbery, but he knew intuitively that he should pay whatever price was demanded, and he did.²¹

Remember that the bounded rationality perspective applies mostly to nonprogrammed decisions. The novel, unclear, complex aspects of nonprogrammed decisions mean hard data and logical procedures are not available. A study of executive

decision making found that managers simply could not use the rational approach for nonprogrammed decisions, such as when to buy a CT scanner for an osteopathic hospital or whether a city had a need for and could reasonably adopt a data processing system.²² In those cases, managers had limited time and resources, and some factors simply couldn't be measured and analyzed. Trying to quantify such information could cause mistakes because it may oversimplify decision criteria. When Michael Eisner was president of Paramount Pictures, he learned to rely on intuition for making nonprogrammed decisions. His decision approach was astonishingly successful at Paramount and, more recently, at Disney.

IN PRACTICE ♦ 11.2

Paramount Pictures Corporation

When Barry Diller and Michael Eisner went to the movies, it wasn't for entertainment. They were checking audience reaction on one of their new movies. Barry Diller was chairman and Michael Eisner was president of Paramount Pictures Corporation.

Some of Paramount's successes under their leadership were *Indiana Jones and the Temple of Doom*, *Raiders of the Lost Ark*, *An Officer and a Gentleman*, *Trading Places*, *48 Hours*, *Flashdance*, and *Terms of Endearment*. A major reason for the string of hits was the excellent choice of films. Paramount decision makers were attuned to the tastes of eighteen- to twenty-four-year olds, who count most. Paramount had also gotten into other ventures, such as selling its films to Showtime. And "Entertainment Tonight," Paramount's entertainment-news TV show, was also hugely successful.

Why was Paramount so successful at selecting films? Diller and Eisner claim they relied on gut reaction when picking films or other projects. Their tastes were shaped while they were executives at ABC, where they were responsible for the "Movie of the Week." Their experience paid off. Columbia Pictures, then a division of Coca-Cola, used market research to identify what people want to see. "We don't use Coca-Cola type research. We think it's junk," said Eisner. He thinks about what he likes, not what the public likes. "If I ask Miss Middle America if she wants to see a movie about religion, she'll say yes. If I say, 'Do you want to see a movie about sex,' she'll say no. But she'll be lying."

Experience is so important, Eisner said, because "you tend not to make the same mistakes twice." Eisner and Diller made their share of mistakes, and they frequently disagreed about the right path. They hammered out the best decision and combined their intuition through intense arguments. One bomb was *The Keep*, which ran for only three weeks. *Flashdance* went the other way because no one realized it would be a smash. The experience of both successes and failures helped Diller and Eisner develop an intuition for projects the public wanted.

Eisner's remarkable success led to his selection as president of Disney. After he took over, Disney's studio, Touchstone, moved from last place to being a top studio in the industry. Eisner's intuitive decision skills have made two studios successful, an incredible record in an unpredictable business.²³

Organizational Decision Making

Organizations are composed of managers who make decisions using both rational and intuitive processes; but organization-level decisions are not usually made by a

single manager. Many organizational decisions involve several managers. Problem identification and problem solution involve many departments, multiple viewpoints, and even other organizations, which are beyond the scope of an individual manager.

The processes by which decisions are made in organizations are influenced by a number of factors, particularly the organization's own internal structures as well as the degree of stability or instability of the external environment.²⁴ Research into organization-level decision making has identified four types of organizational decision-making processes: the management science approach, the Carnegie model, the incremental decision process model, and the garbage can model.

MANAGEMENT SCIENCE APPROACH

The **management science approach** to organizational decision making is the analog to the rational approach by individual managers. Management science came into being during World War II.²⁵ At that time, mathematical and statistical techniques were applied to urgent, large-scale military problems that were beyond the ability of individual decision makers. Mathematicians, physicists, and operations researchers used systems analysis to develop artillery trajectories, antisubmarine strategies, and bombing strategies such as salvoing (discharging multiple shells simultaneously). Consider the problem of a battleship trying to sink an enemy ship several miles away. The calculation for aiming the battleship's guns should consider distance, wind speed, shell size, speed and direction of both ships, pitch and roll of the firing ship, and curvature of the earth. Methods for performing such calculations using trial and error and intuition are not accurate, take far too long, and may never achieve success.

This is where management science came in. Analysts were able to identify the relevant variables involved in aiming a ship's guns and could model them with the use of mathematical equations. Distance, speed, pitch, roll, shell size, and so on could be calculated and entered into the equations. The answer was immediate, and the guns could begin firing. Factors such as pitch and roll were soon measured mechanically and fed directly into the targeting mechanism. Today, the human element is completely removed from the targeting process. Radar picks up the target, and the entire sequence is computed automatically.

Management science yielded astonishing success for many military problems. This approach to decision making diffused into corporations and business schools, where techniques were studied and elaborated. Today, many corporations have assigned departments to use these techniques. The computer department develops quantitative data for analysis. Operations research departments use mathematical models to quantify relevant variables and develop a quantitative representation of alternative solutions and the probability of each one solving the problem. These departments also use such devices as linear programming, Bayesian statistics, PERT charts, and computer simulations.

Management science is an excellent device for organizational decision making when problems are analyzable and when the variables can be identified and measured. Mathematical models can contain a thousand or more variables, each one relevant in some way to the ultimate outcome. Management science techniques have been used to correctly solve problems as diverse as finding the right spot for a church camp, test marketing the first of a new family of products, drilling for oil, and radically altering the distribution of telecommunications services.²⁶ Other problems amenable to management science techniques are the scheduling of airline

employees, telephone operators, and turnpike toll collectors.²⁷ As illustrated in the following case, management science techniques can also be applied to a situation as complicated as scheduling ambulance technicians.

IN PRACTICE ♦ 11.3

Urgences Santé

Urgences Santé, the public agency responsible for coordinating ambulance service in the Montréal area, schedules vehicle time and working hours for approximately 80 ambulances and 700 technicians. The agency does not own any of the vehicles or directly employ any technicians, but rents these services from 15 private companies. Urgences Santé wanted to optimize the schedule to keep costs as low as possible, realizing that, with ambulance rental fees at \$55 an hour, a daily excess of 10 hours represents more than \$200,000 a year.

Two types of calls require ambulance service—emergency calls from the public, which occur randomly throughout the day and require immediate attention, and calls from hospitals, which are concentrated in specific time periods and are generally not urgent. In addition, demand for ambulance service is generally higher in the winter, but with more emergency calls on weekends during the summer months. Besides meeting shifting demand, a number of other constraints governed the design of a new schedule, for example, the fair distribution of work hours among the 15 service companies; the provisions of the union contract; the number of ambulances available; and the quality and consistency of work schedules for technicians.

Urgences Santé applied mathematical formulations and techniques to first build workday schedules for each type of day (weekday or weekend) for each season, then equitably assign workdays to the 15 service companies, and finally to build individual schedules for the 700 service technicians. The agency is able to create at least 85 percent of the individual schedules automatically. Implementing the new system has had two positive effects. First, Urgences Santé was able to meet ambulance demand while cutting rental hours per week by up to 110 hours, thus saving approximately \$250,000 a year. Second, the quality of the ambulance technicians' schedules has been vastly improved. This has led to an increase in the number of full-time rather than part-time technicians and a decrease in turnover for the service companies. Impressed with these results, Urgences Santé continues to use management science techniques to adapt to new demands and shifts in operational methods.²⁸

Management science can accurately and quickly solve problems that have too many explicit variables for human processing. This system is at its best when applied to problems that are analyzable, are measurable, and can be structured in a logical way.

Management science has also produced many failures.²⁹ Part of the reason, as discussed in Chapter 9, is that quantitative data are not rich. Informal cues that indicate the existence of problems have to be sensed on a more personal basis by managers.³⁰ The most sophisticated mathematical analyses are of no value if the important factors cannot be quantified and included in the model. Such things as competitor reactions, consumer "tastes," and product "warmth" are qualitative dimensions. In these situations, the role of management science is to supplement manager decision making. Quantitative results can be given to managers for discussion and interpretation along with their informal opinions, judgment, and intuition. The final decision can include qualitative factors as well as quantitative calculations.

CARNEGIE MODEL

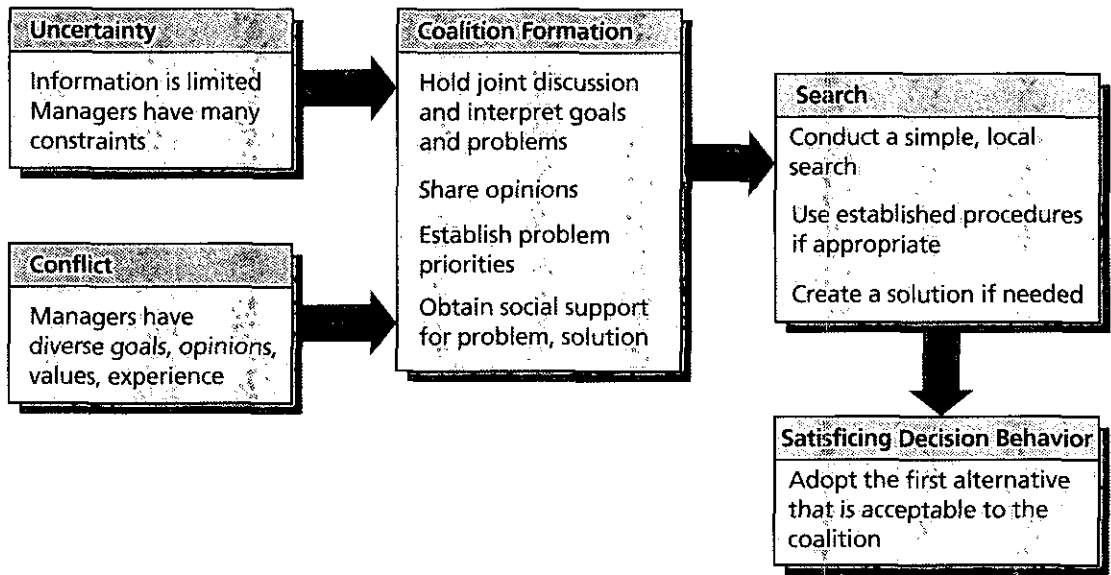
The **Carnegie model** of organizational decision making is based upon the work of Richard Cyert, James March, and Herbert Simon, who were all associated with Carnegie-Mellon University.³¹ Their research helped formulate the bounded rationality approach to individual decision making as well as provide new insights about organization decisions. Until their work, research in economics assumed that business firms made decisions as a single entity, as if all relevant information were funneled to the top decision maker for a choice. Research by the Carnegie group indicated that organization-level decisions involved many managers and that a final choice was based on a coalition among those managers. A **coalition** is an alliance among several managers who agree about organizational goals and problem priorities.³² It could include managers from line departments, staff specialists, and even external groups, such as powerful customers, bankers, or union representatives.

Management coalitions are needed during decision making for two reasons. First, organizational goals are often ambiguous, and operative goals of departments are often inconsistent. When goals are ambiguous and inconsistent, managers disagree about problem priorities. They must bargain about problems and build a coalition around the question of which problems to solve. For example, months of discussion, bargaining, and planning took place before Chrysler decided not to abandon small-car production and began working on the new Neon.³³

The second reason for coalitions is that individual managers intend to be rational but function with human cognitive limitations and other constraints, as described earlier. Managers do not have the time, resources, or mental capacity to identify all dimensions and to process all information relevant to a decision. These limitations lead to coalition-building behavior. Managers talk to each other and exchange points of view to gather information and reduce ambiguity. People who have relevant information or a stake in a decision outcome are consulted. Building a coalition will lead to a decision that is supported by interested parties.

The process of coalition formation has several implications for organizational decision behavior. First, as discussed in Chapter 2 on goals, decisions are made to satisfice rather than to optimize problem solutions. The coalition will accept a solution that is perceived as satisfactory to all coalition members. Second, managers are concerned with immediate problems and short-run solutions. They engage in what Cyert and March called problemistic search.³⁴ **Problemistic search** means managers look around in the immediate environment for a solution to quickly resolve a problem. Managers don't expect a perfect solution when the situation is ill defined and conflict-laden. This contrasts with the management science approach, which assumes that analysis can uncover every reasonable alternative. The Carnegie model says search behavior is just sufficient to produce a satisfactory solution and that managers typically adopt the first satisfactory solution that emerges. Third, discussion and bargaining are especially important in the problem identification stage of decision making. Unless coalition members perceive a problem, action will not be taken. The decision process described in the Carnegie model is summarized in Exhibit 11.3.

The Carnegie model points out that building agreement through a managerial coalition is a major part of organizational decision making. This is especially true at upper management levels. Discussion and bargaining are time-consuming, so search procedures are usually simple and the selected alternative satisfices rather than optimizes problem solution. When problems are programmed—are clear and

Exhibit 11.3 Choice Processes in the Carnegie Model.

have been seen before—the organization will rely on previous procedures and routines. Rules and procedures prevent the need for renewed coalition formation and political bargaining. Nonprogrammed decisions, however, require bargaining and conflict resolution.

One of the best and most visible coalition builders of recent years was former President George Bush, who would seek a broad-based coalition at the start of an important decision process. During the decision process regarding the Persian Gulf War, President Bush kept up a barrage of personal calls and visits to world leaders to gain agreement for his vision of forcing Saddam Hussein from Kuwait and for shaping a “new world order.”³⁵

When senior managers are unable to build a coalition around goals and problem priorities, the results can be a disaster, as illustrated by the case of Arp Instruments.

IN PRACTICE ♦ 11.4

Arp Instruments, Inc.

When Arp Instruments was founded by Alan Pearlman in the late 1960s, it quickly became the premier manufacturer of musical synthesizers (instruments that produce electronic music). Arp provided synthesizers to the stars, including Stevie Wonder, Paul McCartney, Elton John, The Bee Gees, Kiss, and The Who. By the mid-1970s, Arp had 40 percent of the market, ahead of Moog synthesizers, and enjoyed preeminence in the marketplace. By the early 1980s, Arp Instruments was dead, the victim of management disagreement and infighting.

Arp was shaped by three individuals: Pearlman, chairman of the board; Louis G. Pollock, legal counsel and chairman of the executive committee; and David Friend, president. Each individual brought distinct goals and backgrounds to the company. Pearlman was concerned with new technology and planning, Pollock was an entrepreneur who

pushed new products, and Friend was a technical and musical whiz. The egos and goals of the three frequently clashed. The men disagreed about which products to invest in, whether the disco market would change the demand for synthesizers, and expense budgets.

As time passed, the division among the three intensified. Each man pursued his own vision and would align himself with whoever would support his own ideas. Pearlman became increasingly alienated from his own company. The three managers kept one another in the dark about their own plans.

The problem crystallized when Arp embarked on the development of a guitar synthesizer despite an uncertain demand and having only skills accumulated on keyboard synthesizers. Friend pushed the idea, and Pearlman couldn't stop it, having lost his voice at Arp. The infighting continued, and the guitar synthesizer, called the Avatar, was marketed. The Avatar was an excellent product, but it flopped for lack of demand.

The disagreements among executives led to bitter compromises and more product failures. Lower-level managers and employees experienced chaos and conflicting signals. The company could not focus itself sufficiently to adapt to the changing music world. The lack of agreement translated into lousy management. A management consultant who also served as a director knew where the blame should rest: "It's a sin. It's a tragedy to see a beautiful little company, and two hundred jobs, go under because of bad management. . . . All three of them—honest to God—they should physically have to go to jail and serve six months for screwing up a beautiful thing like that."³⁶

The point of the Carnegie model and the Arp case is that coalitions are needed for strong performance. When top managers perceive a problem or want to make a major decision, they need to reach agreement with other managers to support the decision.³⁷

INCREMENTAL DECISION PROCESS MODEL

Henry Mintzberg and his associates at McGill University in Montreal approached organizational decision making from a different perspective. They identified twenty-five decisions made in organizations and traced the events associated with these decisions from beginning to end.³⁸ Their research identified each step in the decision sequence. This approach to decision making, called the **incremental decision process model**, places less emphasis on the political and social factors described in the Carnegie model, but tells more about the structured sequence of activities undertaken from the discovery of a problem to its solution.³⁹

Sample decisions in Mintzberg's research included choosing which jet aircraft to acquire for a regional airline, developing a new supper club, developing a new container terminal in a harbor, identifying a new market for a deodorant, installing a controversial new medical treatment in a hospital, and firing a star announcer.⁴⁰ The scope and importance of these decisions are revealed in the length of time taken to complete them. Most of these decisions took more than a year, and one-third of them took more than two years. Most of these decisions were nonprogrammed and required custom-designed solutions.

One discovery from this research is that major organization choices are usually a series of small choices that combine to produce the major decision. Thus, many organizational decisions are a series of nibbles rather than a big bite. Organizations move through several decision points and may hit barriers along the way. Mintzberg

called these barriers *decision interrupts*. An interrupt may mean an organization has to cycle back through a previous decision and try something new. Decision loops or cycles are one way the organization learns which alternatives will work. The ultimate solution may be very different from what was initially anticipated.

The pattern of decision stages discovered by Mintzberg and his associates is shown in Exhibit 11.4. Each box indicates a possible step in the decision sequence. The steps take place in three major decision phases: identification, development, and selection.

Identification Phase The identification phase begins with *recognition*. Recognition means one or more managers become aware of a problem and the need to make a decision. Recognition is usually stimulated by a problem or an opportunity. A problem exists when elements in the external environment change or when internal performance is perceived to be below standard. In the case of firing a radio announcer, comments about the announcer came from listeners, other announcers, and advertisers. Managers interpreted these cues until a pattern emerged that indicated a problem had to be dealt with.

The second step is *diagnosis*, which is where more information is gathered if needed to define the problem situation. Diagnosis may be systematic or informal, depending upon the severity of the problem. Severe problems do not have time for extensive diagnosis; the response must be immediate. Mild problems are usually diagnosed in a more systematic manner.

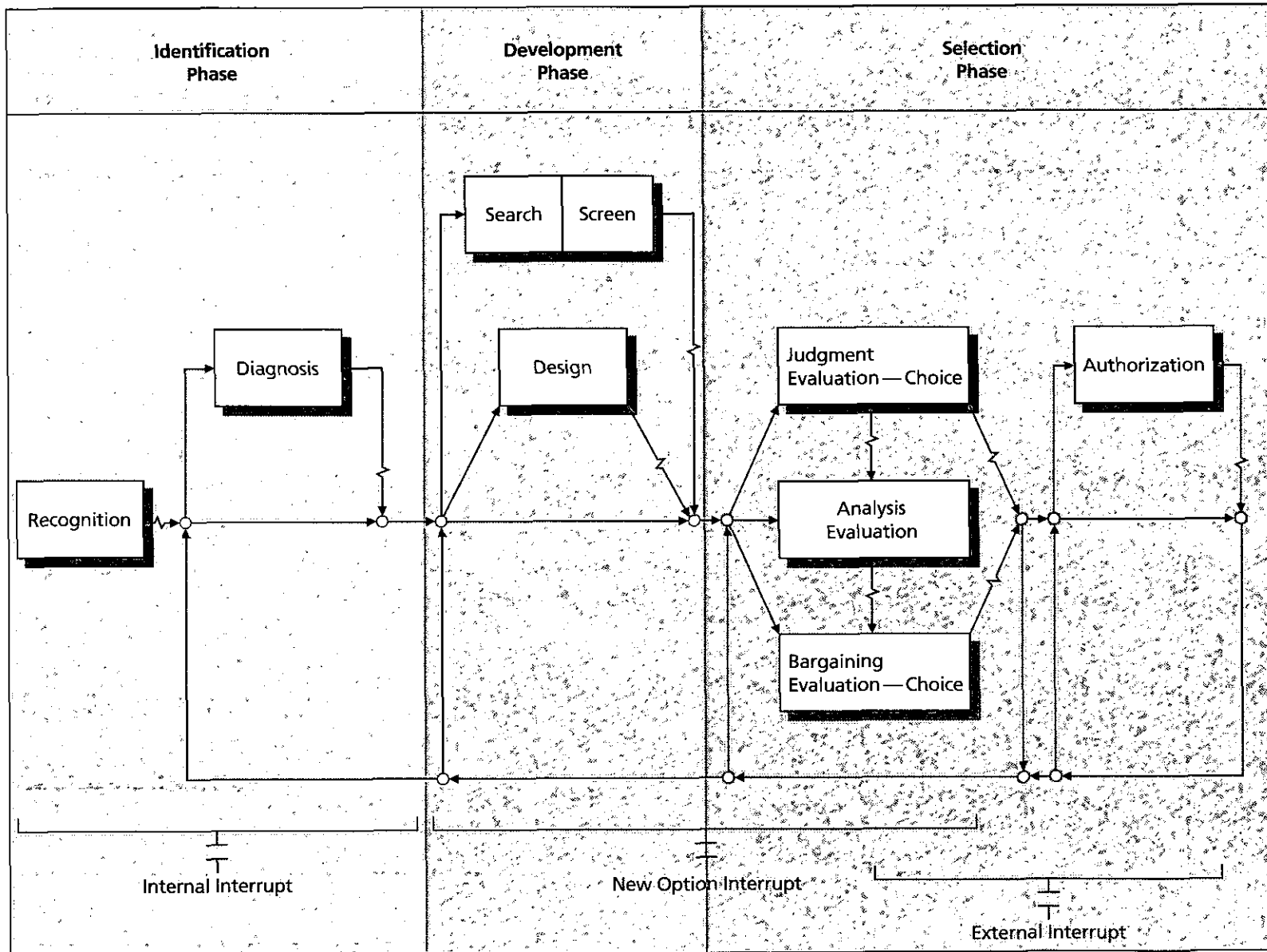
Development Phase The development phase is when a solution is shaped to solve the problem defined in the identification phase. The development of a solution takes one of two directions. First, *search* procedures may be used to seek out alternatives within the organization's repertoire of solutions. For example, in the case of firing a star announcer, managers asked what the radio station had done the last time an announcer had to be let go. To conduct the search, organization participants may look into their own memories, talk to other managers, or examine the formal procedures of the organization.

The second direction of development is to *design* a custom solution. This happens when the problem is novel so that previous experience has no value. Mintzberg found that in these cases, key decision makers have only a vague idea of the ideal solution. Gradually, through a trial-and-error process, a custom-designed alternative will emerge. Development of the solution is a groping, incremental procedure, building a solution brick by brick.

Selection Phase The selection phase is when the solution is chosen. This phase is not always a matter of making a clear choice among alternatives. In the case of custom-made solutions, selection is more an evaluation of the single alternative that seems feasible.

Evaluation and choice may be accomplished in three ways. The *judgment* form of selection is used when a final choice falls upon a single decision maker, and the choice involves judgment based upon experience. In *analysis*, alternatives are evaluated on a more systematic basis, such as with management science techniques. Mintzberg found that most decisions did not involve systematic analysis and evaluation of alternatives. *Bargaining* occurs when selection involves a group of decision makers. Each decision maker may have a different stake in the outcome, so conflict

Exhibit 11.4 The Incremental Decision Process Model.



Source: Adapted and reprinted from "The Structure of Unstructured Decision Processes" by Henry Mintzberg, Duru Raisinghani, and André Théorêt, published in *Administrative Science Quarterly* 21, no. 2 (1976), 266, by permission of *The Administrative Science Quarterly*. Copyright © 1976 Cornell University.

emerges. Discussion and bargaining occur until a coalition is formed, as in the Carnegie model described earlier.

When a decision is formally accepted by the organization, *authorization* takes place. The decision may be passed up the hierarchy to the responsible hierarchical level. Authorization is often routine because the expertise and knowledge rest with the lower decision makers who identified the problem and developed the solution. A few decisions are rejected because of implications not anticipated by lower-level managers.

Dynamic Factors The lower part of the chart in Exhibit 11.4 shows lines running back toward the beginning of the decision process. These lines represent loops or cycles that take place in the decision process. Organizational decisions do not follow an orderly progression from recognition through authorization. Minor problems arise that force a loop back to an earlier stage. These are decision interrupts. If a custom-designed solution is perceived as unsatisfactory, the organization may have to go back to the very beginning and reconsider whether the problem is truly worth solving. Feedback loops can be caused by problems of timing, politics, disagreement among managers, inability to identify a feasible solution, turnover of managers, or the sudden appearance of a new alternative. For example, when a small Canadian airline made the decision to acquire jet aircraft, the board authorized the decision, but shortly after, a new chief executive was brought in and he canceled the contract, recycling the decision back to the identification phase. He accepted the diagnosis of the problem, but insisted upon a new search for alternatives. Then a foreign airline went out of business and two used aircraft became available at a bargain price. This presented an unexpected option, and the chief executive used his own judgment to authorize the purchase of the aircraft.⁴¹

Since most decisions take place over an extended period of time, circumstances change. Decision making is a dynamic process that may require a number of cycles before a problem is solved. An example of the incremental process and cycling that can take place is illustrated in Gillette's decision to create a new razor.

IN PRACTICE ♦ 11.5

Gillette Company

A bright idea developed at Gillette Company's British research facility finally became the Sensor razor thirteen years later, after more twists and turns than shaving a craggy face. The bright idea was to create a thinner razor blade that would make Gillette's cartridges easier to clean (recognition). The technical development cost for the idea ran \$200 million.

The technical demands of building a razor with thin blades and floating parts to follow a man's face had several blind alleys. Engineers first tried to find established techniques (search, screen), but none fit the bill. One idea called for the blades to sit on tiny rubber tubes, perhaps filled with fluid, but that was too costly and complicated to manufacture (new option interrupt). Eventually, a prototype was built (design), and five hundred men liked it. The next problem was manufacturing (diagnosis), which again required an entirely new process to laser weld each blade to a support (design).

Top management gave the go-ahead to develop manufacturing equipment (judgment, authorization). Then a conflict broke out among two groups of Gillette executives. One group wanted to orient the product toward inexpensive disposables, while the other group fought for a heavier, more permanent razor (internal interrupt). Then Gillette was

threatened with an outside takeover, reducing resources allocated to the project (external interrupt). A new executive vice president made the choice to deemphasize disposables (judgment). A nine-member task force was then authorized to live with the razor for fifteen months to get it to market (authorization). Another \$100 million was authorized for advertising and marketing promotions.

The razor has been a smashing success, smoothly sliding off shelves, and Gillette expects to recover its huge investment in record time. Now Gillette is starting the process over again, experimenting with a curved blade and perhaps a new ceramic blade, moving ahead in increments until the new razors are ready, probably not before the turn of the century.⁴²

At Gillette, the identification phase occurred because executives were aware of the need for a new razor and became aware of the idea for floating, thin blades. The development phase was characterized by the trial-and-error custom design leading to the Sensor. During the selection phase, certain approaches were found unacceptable, causing Gillette to recycle back, redesign the razor, and reappraise whether it should be a permanent or disposable razor. Advancing once again to the selection phase, the Sensor passed the judgment of executives, and manufacturing and marketing budgets were quickly authorized. This decision took thirteen years, reaching completion in January 1990.

INTEGRATING THE INCREMENTAL PROCESS AND CARNEGIE MODELS

At the beginning of this chapter, decision making was defined as occurring in two stages: problem identification and problem solution. The Carnegie description of coalition building is especially relevant for the problem identification stage. When issues are ambiguous, or if managers disagree about problem severity, discussion, negotiation, and coalition building are needed. Once agreement is reached about the problem to be tackled, the organization can move toward a solution.

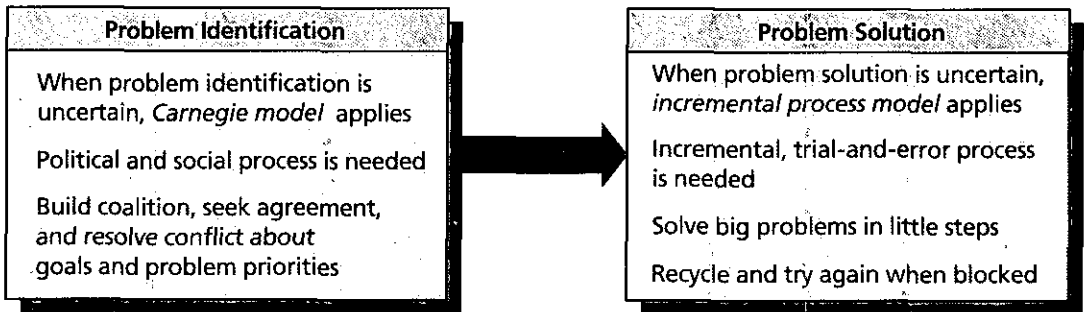
The incremental process model tends to emphasize the steps used to reach a solution. After managers agree upon a problem, the step-by-step process is a way of trying various solutions to see what will work. When problem solution is unclear, a trial-and-error solution may be designed.

The two models do not disagree with one another. They describe how organizations make decisions when either problem identification or solution is uncertain. The application of these two models to the stages in the decision process is illustrated in Exhibit 11.5. When both parts of the decision process are highly uncertain simultaneously, the organization is in an extremely difficult position. Decision processes in that situation may be a combination of Carnegie and incremental process models, and this combination may evolve into a situation described in the garbage can model.

GARBAGE CAN MODEL

The **garbage can model** is one of the most recent and interesting descriptions of organizational decision processes. It is not directly comparable to the earlier models, because the garbage can model deals with the pattern or flow of multiple decisions within organizations, while the incremental and Carnegie models focus upon how a

Exhibit 11.5 Organizational Decision Process When Either Problem Identification or Problem Solution Is Uncertain.



single decision is made. The garbage can model helps you think of the whole organization and the frequent decisions being made by managers throughout.

Organized Anarchy The garbage can model was developed to explain the pattern of decision making in organizations that experience extremely high uncertainty. Michael Cohen, James March, and Johan Olsen, the originators of the model, called the highly uncertain conditions an **organized anarchy**, which is an extremely organic organization.⁴³ Organized anarchies do not rely on the normal vertical hierarchy of authority and bureaucratic decision rules. They are caused by three characteristics:

1. *Problematic preferences.* Goals, problems, alternatives, and solutions are ill defined. Ambiguity characterizes each step of a decision process.
2. *Unclear, poorly understood technology.* Cause-and-effect relationships within the organization are difficult to identify. An explicit data base that applies to decisions is not available.
3. *Turnover.* Organizational positions experience turnover of participants. In addition, employees are busy and have only limited time to allocate to any one problem or decision. Participation in any given decision will be fluid and limited.

The organized anarchy describes organizations characterized by rapid change and a collegial, nonbureaucratic environment. No organization fits this extremely organic circumstance all the time. Many organizations will occasionally find themselves in positions of making decisions under unclear, problematic circumstances. The garbage can model is useful for understanding the pattern of these decisions.

Streams of Events The unique characteristic of the *garbage can model* is that the decision process is not seen as a sequence of steps that begins with a problem and ends with a solution. Indeed, problem identification and problem solution may not be connected to each other. An idea may be proposed as a solution when no problem is specified. A problem may exist and never generate a solution. Decisions are the outcome of independent streams of events within the organization. The four streams relevant to organizational decision making are as follows:

1. *Problems.* Problems are points of dissatisfaction with current activities and performance. They represent a gap between desired performance and current activ-

ities. Problems are perceived to require attention. However, they are distinct from solutions and choices. A problem may lead to a proposed solution or it may not. Problems may not be solved when solutions are adopted.

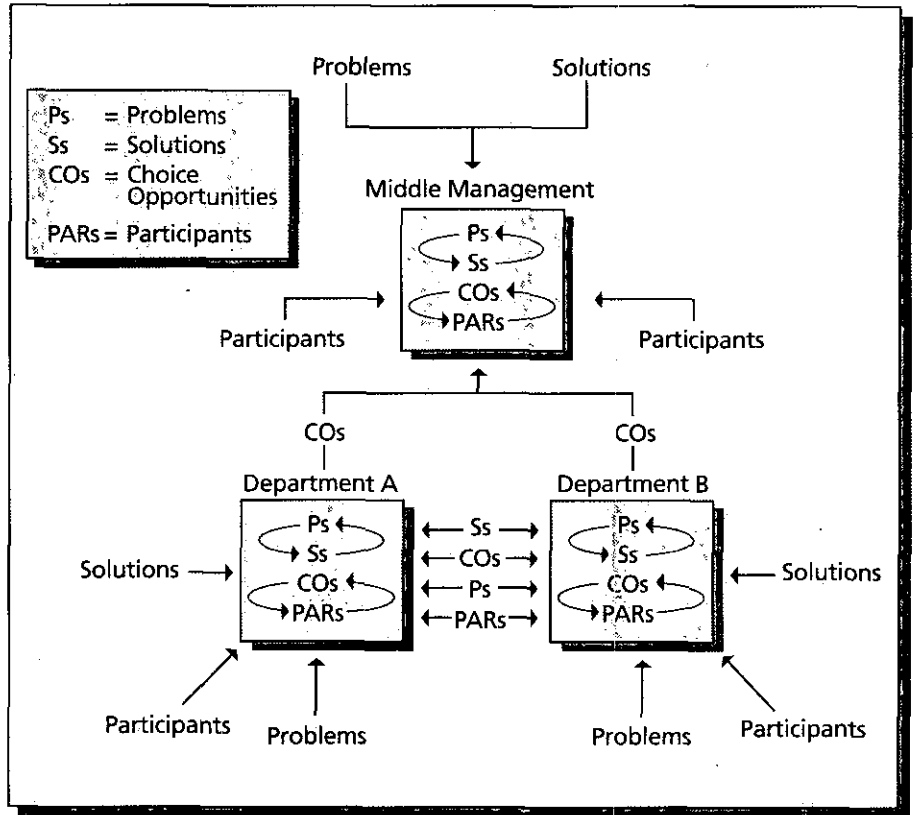
2. *Potential solutions.* A solution is an idea somebody proposes for adoption. Such ideas form a flow of alternative solutions through the organization. Ideas may be brought into the organization by new personnel or may be invented by existing personnel. Participants may simply be attracted to certain ideas and push them as logical choices regardless of problems. Attraction to an idea may cause an employee to look for a problem to which the idea can be attached and, hence, justified. The point is that solutions exist independent of problems.
3. *Participants.* Organization participants are employees who come and go throughout the organization. People are hired, reassigned, and fired. Participants vary widely in their ideas, perception of problems, experience, values, and training. The problems and solutions recognized by one manager will differ from those recognized by another manager.
4. *Choice opportunities.* Choice opportunities are occasions when an organization usually makes a decision. They occur when contracts are signed, people are hired, or a new product is authorized. They also occur when the right mix of participants, solutions, and problems exists. Thus, a manager who happened to learn of a good idea may suddenly become aware of a problem to which it applies and, hence, can provide the organization with a choice opportunity. Match-ups of problems and solutions often result in decisions.

With the concept of four streams, the overall pattern of organizational decision making takes on a random quality. Problems, solutions, participants, and choices all flow through the organization. In one sense, the organization is a large garbage can in which these streams are being stirred, as illustrated in Exhibit 11.6. When a problem, solution, and participant happen to connect at one point, a decision may be made and the problem may be solved; but if the solution does not fit the problem, the problem may not be solved. Thus, when viewing the organization as a whole and considering its high level of uncertainty, one sees problems arise that are not solved and solutions tried that do not work. Organization decisions are disorderly and not the result of a logical, step-by-step sequence. Events may be so ill defined and complex that decisions, problems, and solutions act as independent events. When they connect, some problems are solved, but many are not.⁴⁴

Consequences Four consequences of the garbage can decision process for organizational decision making are as follows:

1. *Solutions may be proposed even when problems do not exist.* An employee may be sold on an idea and may try to sell it to the rest of the organization. An example was the adoption of computers by many organizations during the 1970s. The computer was an exciting solution and was pushed by both computer manufacturers and systems analysts within organizations. The computer did not solve any problems in those initial applications. Indeed, some computers caused more problems than they solved.
2. *Choices are made without solving problems.* A choice such as creating a new department may be made with the intention of solving a problem; but, under conditions of high uncertainty, the choice may be incorrect. Moreover, many choices just seem to happen. People decide to quit, the organization's budget is

Exhibit 11.6
Illustration of
Independent
Streams of
Events in the
Garbage Can
Model of Deci-
sion Making.



cut, or a new policy bulletin is issued. These choices may be oriented toward problems but do not necessarily solve them.

3. *Problems may persist without being solved.* Organization participants get used to certain problems and give up trying to solve them; or participants may not know how to solve certain problems because the technology is unclear. A university in Canada was placed on probation by the American Association of University Professors because a professor had been denied tenure without due process. The probation was a nagging annoyance that the administrators wanted to remove. Fifteen years later, the nontenured professor died. The probation continues because the university did not acquiesce to the demands of the heirs of the association to reevaluate the case. The university would like to solve the problem, but administrators are not sure how, and they do not have the resources to allocate to it. The probation problem persists without a solution.
4. *A few problems are solved.* The decision process does work in the aggregate. In computer simulation models of the garbage can model, important problems were often resolved. Solutions do connect with appropriate problems and participants so that a good choice is made. Of course, not all problems are resolved when choices are made, but the organization does move in the direction of problem reduction.

The effects of independent streams and the rather chaotic decision processes of the garbage can model can be seen in the production of the classic film *Casablanca*.

IN PRACTICE ♦ 11.6**Casablanca**

The public flocked to see *Casablanca* when it opened in 1942. The film won Academy awards for best picture, best screenplay, and best director, and is recognized today by film historians and the public alike as a classic. But up until the filming of the final scene, no one involved in the production of the now-famous story even knew how it was going to end.

Everybody Comes to Rick's wasn't a very good play, but when it landed on Hal Wallis's desk at Warner Brothers, Wallis spotted some hot-from-the-headlines potential, purchased the rights, and changed the name to *Casablanca* to capitalize on the geographical mystique the story offered. A series of negotiations led to casting Humphrey Bogart as Rick, even though studio chief Jack Warner questioned his romantic appeal. The casting of Ingrid Bergman as Ilsa was largely by accident. A fluke had left an opening in her usually booked schedule. The screenplay still wasn't written.

Filming was chaotic. Writers made script changes and plot revisions daily. Actors were unsure of how to develop their characterizations, so they just did whatever seemed right at the time. For example, when Ingrid Bergman wanted to know which man should get most of her on-screen attention, she was told, "We don't know yet—just play it, well . . . in between." Scenes were often filmed blindly with no idea of how they were supposed to fit in the overall story. Amazingly, even when it came time to shoot the climactic final scene, no one involved in the production seemed to know who would "get the girl"; a legend still persists that two versions were written. During filming, Bogart disagreed with director Michael Curtiz's view that Rick should kiss Ilsa good-bye, and Hal Wallis was summoned to mediate. Since the cast received their scripts only hours before filming began, they couldn't remember their lines, causing continual delays.

Some industry analysts predicted disaster, but the haphazard process worked. Ingrid Bergman plays it "in between" just right. Bogart's characterization of Rick is perfect. The tale of love and glory and heartbreaking romance couldn't have been told better than it was in *Casablanca*. In addition, fortuitous circumstances outside the studio contributed to the film's commercial success. Just eighteen days before the premiere on Thanksgiving Day, 1942, the Allies invaded North Africa and fought the Battle of Casablanca. Then, when the film opened nationwide, President Franklin D. Roosevelt and Prime Minister Winston Churchill presided over the Casablanca Conference, a historical coincidence that was clearly a boon to the film, helping to push its initial gross to \$3.7 million.⁴⁵

The production of *Casablanca* was not a rational process that started with a clear problem and ended with a logical solution. Many events occurred by chance and were intertwined, which characterizes the garbage can model. Everyone from the director to the actors continuously added to the stream of new ideas to the story. Some solutions were connected to emerging problems: the original script arrived just when Hal Wallis was looking for topical stories; and Bergman was surprisingly available to be cast in the role of Ilsa. The actors (participants) daily made personal choices regarding characterization that proved to be perfect for the story line. Other events that contributed to *Casablanca's* success were not even connected to the film—for example, the invasion of North Africa only eighteen days before the premiere. Overall, the production of *Casablanca* had a random, chancy flavor that is

characteristic of the garbage can model. As evidenced by the film's huge success and continuing popularity after more than fifty years, the random, garbage can decision process did not hurt the film or the studio.

Contingency Decision-Making Framework

This chapter has covered several approaches to organizational decision making, including management science, the Carnegie model, the incremental decision process model, and the garbage can model. It has also discussed rational and intuitive decision processes used by individual managers. Each decision approach is a relatively accurate description of the actual decision process, yet all differ from each other. Management science, for example, reflects a different set of decision assumptions and procedures than does the garbage can model.

One reason for having different approaches is that they appear in different organizational situations. The use of an approach is contingent on the organization setting. Two characteristics of organizations that determine the use of decision approaches are (1) goal consensus and (2) technical knowledge about the means to achieve those goals.⁴⁶ Analyzing organizations along these two dimensions suggests which approach will be used to make decisions.

GOAL CONSENSUS

Goal consensus refers to the agreement among managers about which organizational goals and outcomes to pursue. This variable ranges from complete agreement to complete disagreement. When managers agree, the goals of the organization are clear and so are standards of performance. When managers disagree, organization direction and performance expectations are in dispute. *One example of goal uncertainty occurred among cabinet members and presidential advisors during the Cuban missile crisis. Participants fought intensely over what goals should be pursued.*⁴⁷ Another example of goal uncertainty occurred within the Penn Central Railroad after it went bankrupt. Some managers wanted to adopt the goal of becoming more efficient and profitable as a railroad. Other managers wanted to diversify into other businesses. Eventually, a strong coalition formed in favor of diversification, and that goal was adopted.

Goal consensus tends to be low when organizations are differentiated, as described in Chapter 3. Recall that uncertain environments cause organizational departments to differentiate from one another in goals and attitudes to specialize in specific environmental sectors. This differentiation leads to disagreement and conflict about organizational goals. When differentiation among departments or divisions is high, managers must make a special effort to build coalitions during decision making.

Goal consensus is especially important for the *problem identification* stage of decision making. When goals are clear and agreed upon, they provide clear standards and expectations for performance. When goals are not agreed upon, problem identification is uncertain and management attention must be focused on gaining agreement about goals and problem priorities.

TECHNICAL KNOWLEDGE

Technical knowledge refers to understanding and agreement about how to reach organizational goals. This variable can range from complete agreement and certainty to complete disagreement and uncertainty about cause-effect relationships leading to goal attainment. An example of low technical knowledge was reflected in market strategies at 7-Up. The goal was clear and agreed upon—*increase market share from 6 percent to 7 percent*, but the means for achieving this increase in market share were not known or agreed upon. A few managers wanted to use discount pricing in supermarkets. Other managers believed they should increase the number of soda fountain outlets in restaurants and fast-food chains. A few other managers insisted that the best approach was to increase advertising through radio and television. Managers did not know what would cause an increase in market share. Eventually, the advertising judgment prevailed at 7-Up, but it did not work very well. The failure of its decision reflected 7-Up's low technical knowledge about how to achieve its goal.

Technical knowledge is especially important to the problem-solution stage of decision making. When means are well understood, the appropriate alternatives can be identified and calculated with some degree of certainty. When means are poorly understood, potential solutions are ill defined and uncertain. Intuition, judgment, and trial and error become the basis for decisions.

CONTINGENCY FRAMEWORK

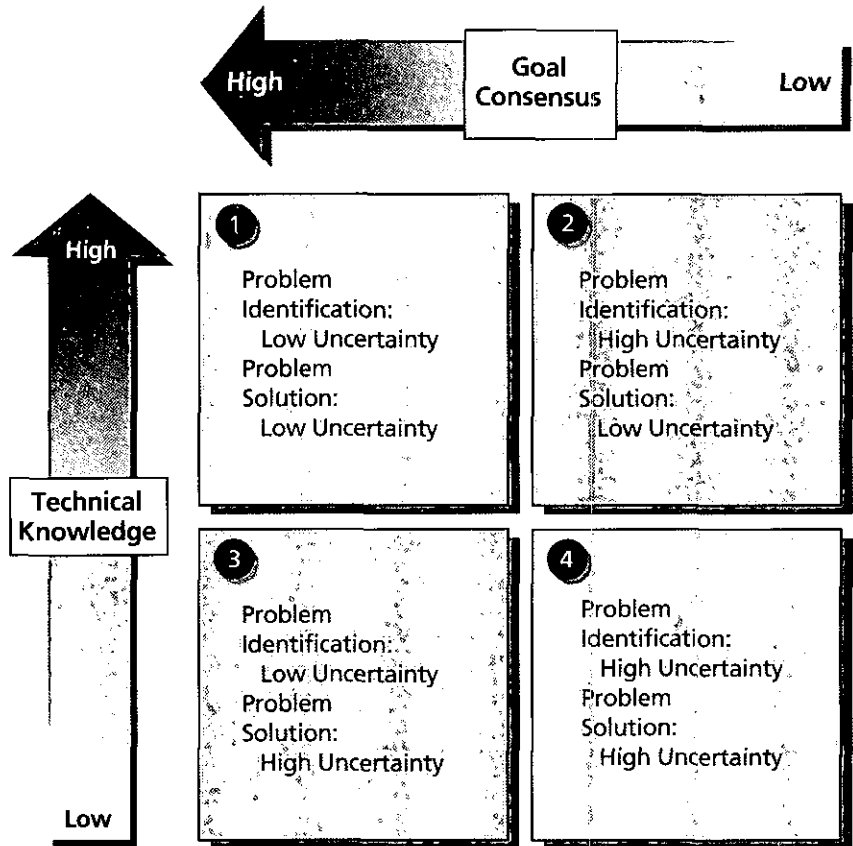
The **contingency decision-making framework** brings together the two organizational dimensions of goal consensus and technical knowledge. Exhibit 11.7 shows how these two variables influence the decision situation. Goals and technical knowledge determine the extent to which problem identification and solution stages are uncertain. Depending on the situation, an organization may have to focus on gaining goal consensus, increasing technical knowledge, or both. Low uncertainty means that rational, analytical procedures can be used. High uncertainty leads to greater use of judgment, bargaining, and other less systematic procedures.

Exhibit 11.8 describes the contingency decision framework. Each cell represents an organizational situation that is appropriate for the decision making approaches described in this chapter.

Cell 1 In cell 1 of Exhibit 11.8, rational decision procedures are used because goals are agreed upon and cause-effect relationships are well understood. Decisions can be made in a computational manner. Alternatives can be identified and the best solution adopted through analysis and calculations. The rational models described earlier in this chapter, both for individuals and for the organization, are appropriate when goals and technical means are well defined. When problems occur, a logical process can be used to decide upon the solutions.

Cell 2 In cell 2, bargaining and compromise are used to reach consensus about goals and priorities. Diverse opinions are present in this situation. Achieving one goal would mean the exclusion of another goal. The priorities given to respective goals are decided through discussion, debate, and coalition building.

Exhibit 11.7
Contingency
Decision
Situations.



Managers in this situation should use broad participation to achieve goal consensus in the decision process. Opinions should be surfaced and discussed until compromise is reached. The organization will not otherwise move forward as an integrated unit. In the case of Penn Central Railroad, the diversification strategy was eventually adopted, but only after much bargaining. During the Cuban missile crisis, debate finally led to the goal of establishing a blockade to prevent Soviet ships from reaching Cuba. At Gillette, much debate surrounded the struggle between executives favoring disposable versus permanent Sensor razors, eventually consolidating toward the permanent.

The Carnegie model applies when there is dissension about organizational goals. When groups within the organization disagree, or when the organization is in conflict with constituencies (government regulators, suppliers, unions), bargaining and negotiation are required. The bargaining strategy is especially relevant to the problem identification stage of the decision process. Once bargaining and negotiation are completed, the organization will have support for one direction.

Cell 3 In a cell 3 situation, goals and standards of performance are certain, but alternative technical solutions are vague and uncertain. Techniques to solve a problem are ill defined and poorly understood. When an individual manager faces this situation, intuition will be the decision guideline. The manager will rely on past experience and judgment to make a decision. Rational, analytical approaches are not

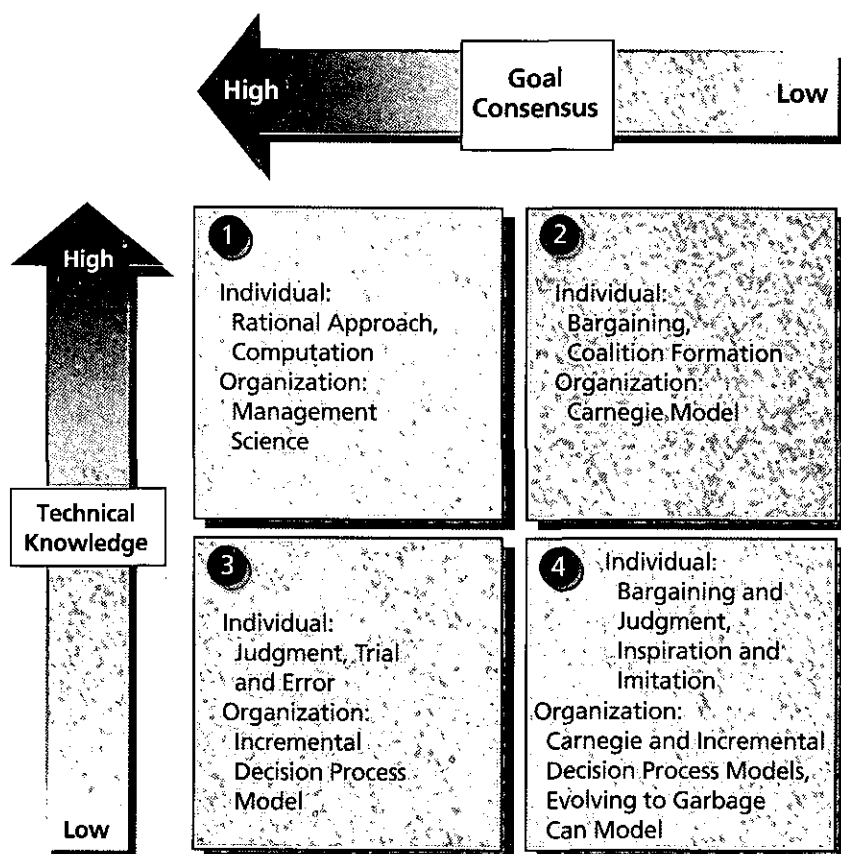


Exhibit 11.8
Contingency Framework for Using Decision Models.

effective because the alternatives cannot be identified and calculated. Hard facts and accurate information are not available.

The incremental decision process model reflects trial and error on the part of the organization. Once a problem is identified, a sequence of small steps enables the organization to learn a solution. As new problems arise, the organization may recycle back to an earlier point and start over. Eventually, over a period of months or years, the organization will acquire sufficient experience to solve the problem in a satisfactory way. Solving the engineering and manufacturing problems for the Sensor razor, described earlier, is an example of a cell 3 situation. Gillette engineers had to use trial and error to develop an efficient manufacturing process.

The situation in cell 3, of senior managers agreeing about goals but not knowing how to achieve them, occurs frequently in business organizations. If managers use incremental decisions in such situations, they will eventually acquire the technical knowledge to accomplish goals and solve problems.

Cell 4 The situation in cell 4, characterized by low consensus and low technical knowledge, occurs infrequently but is difficult for decision making. An individual manager making a decision under this high level of uncertainty can employ techniques from both cell 2 and cell 3. The manager can attempt to build a coalition to establish goals and priorities, and use judgment or trial and error to solve problems. Additional techniques, such as inspiration and imitation, also may be required.

Inspiration refers to an innovative, creative solution that is not reached by logical means. **Imitation** means adopting a decision tried elsewhere in the hope that it will work in this situation.

For example, in one university, accounting department faculty were unhappy with their current circumstances but could not decide upon the direction the department should go. Some faculty members wanted a greater research orientation, while others wanted greater orientation toward business firms and accounting applications. The disagreement about goals was compounded because neither group was sure about the best technique for achieving their goals. The ultimate solution was inspirational on the part of the dean. An accounting research center was established with funding from Big Eight accounting firms. The funding was used to finance research activities for faculty interested in basic research and to provide contact with business firms for other faculty. The solution provided a common goal and unified people within the department to work toward that goal.

When an entire organization is characterized by low goal consensus and low technical knowledge and many decisions are characterized by a high level of uncertainty, elements of the garbage can model will appear. Managers may first try techniques from both cells 2 and 3, but logical decision sequences starting with problem identification and ending with problem solution will not occur. Potential solutions will precede problems as often as problems precede solutions. In this situation, managers should encourage widespread discussion of problems and idea proposals to facilitate the opportunity to make choices. Eventually, through trial and error, the organization will solve some problems.

Special Decision Circumstances

In a highly competitive world beset by global competition and rapid change, decision making seldom fits the traditional rational, analytical model. To cope in today's world, managers must learn to make decisions fast, especially in high-velocity environments, to learn from decision mistakes, and to avoid escalating commitment to an unsatisfactory course of action.

HIGH-VELOCITY ENVIRONMENTS

In some industries today, the rate of competitive and technological change is so extreme that market data is either unavailable or obsolete, strategic windows open and shut quickly, perhaps within a few months, and the cost of a decision error is company failure. Recent research has examined how successful companies make decisions in these **high-velocity environments**, especially to understand whether organizations abandon rational approaches or have time for incremental implementation.⁴⁸

Comparing successful with unsuccessful decisions in high-velocity environments suggests the following guidelines.

- Successful decision makers track information in real time to develop a deep and intuitive grasp of the business. Two to three intense meetings per week with all key players are usual. Decision makers track operating statistics about cash, scrap, backlog, work in process, and shipments to constantly feel the pulse of what is

happening. Unsuccessful firms were more concerned with future planning and forward-looking information, with only a loose grip on immediate happenings.

- During a major decision, successful companies began immediately to build multiple alternatives. Implementation may run in parallel before finally settling on a final choice. Slow-decision companies developed only a single alternative, moving to another only after the first one failed.
- Fast, successful decision makers sought advice from everyone and depended heavily on one or two savvy, trusted colleagues as counselors. Slow companies were unable to build trust and agreement among the best people.
- Fast companies involved everyone in the decision and tried for consensus; but if consensus did not emerge, the top manager made the choice and moved ahead. Waiting for everyone to be on board created more delays than warranted. Slow companies delayed decisions to achieve a uniform consensus.
- Fast, successful choices were well integrated with other decisions and the overall strategic direction of the company. Less successful choices considered the decision in isolation from other decisions; the decision was made in the abstract.⁴⁹

When speed matters, a slow decision is as ineffective as the wrong decision. As we discussed in Chapter 8, speed is a crucial competitive weapon in a growing number of industries, and companies can learn to make decisions fast. Managers must be plugged into the pulse of the company, must seek consensus and advice, and then be ready to take the risk and move ahead.

DECISION MISTAKES AND LEARNING

Organizational decisions produce many errors, especially when made under high uncertainty. Managers simply cannot determine or predict which alternative will solve a problem. In these cases, the organization must make the decision—and take the risk—often in the spirit of trial and error. If an alternative fails, the organization can learn from it and try another alternative that better fits the situation. Each failure provides new information and learning. The point for managers is to move ahead with the decision process despite the potential for mistakes. “Chaotic action is preferable to orderly inaction.”⁵⁰

In many cases, managers have been encouraged to instill a climate of experimentation, even foolishness, to facilitate creative decision making. If one idea fails, another idea should be tried. For example, Tandy Corporation was disappointed in sales through its 386 computer centers, which were set up to sell computers directly to businesses. However, Tandy learned what it had done wrong—retail stores did not provide entry into the business market. Tandy is now experimenting in Dallas with a direct-sales force that is headquartered at Infomart, the company’s computer merchandise outlet. Past mistakes are allowing Tandy to gradually encroach on IBM and Apple as a major player in the business computer market. Failure often lays the groundwork for success, as when technicians at 3M developed Post-it Notes based on a failed product—a not-very-sticky glue. Companies like Pepsi-Cola believe that if all their new products succeed, they’re doing something wrong, not taking the necessary risks to develop new markets.⁵¹

Only by making mistakes can managers and organizations go through the process of **decision learning** and acquire sufficient experience and knowledge to perform more effectively in the future. Robert Townsend, who was president at Avis Corporation, gives the following advice:

Admit your mistakes openly, maybe even joyfully. Encourage your associates to do likewise by commiserating with them. Never castigate. Babies learn to walk by falling down. If you beat a baby every time he falls down, he'll never care much for walking.

My batting average on decisions at Avis was no better than a .333. Two out of every three decisions I made were wrong. But my mistakes were discussed openly and most of them corrected with a little help from my friends.⁵²

ESCALATING COMMITMENT

A much more dangerous mistake is to persist in a course of action when it is failing. Research suggests that organizations often continue to invest time and money in a solution despite strong evidence that it is not working. Two explanations are given for why managers **escalate commitment** to a failing decision. The first is that managers block or distort negative information when they are personally responsible for a negative decision. They simply don't know when to pull the plug. In some cases, they continue to throw good money after bad even when a strategy seems incorrect.⁵³ An example of this distortion is the reaction at Borden when the company began losing customers following its refusal to lower prices on dairy products. When the cost of raw milk dropped, Borden hoped to boost the profit margins of its dairy products, convinced that customers would pay a premium for the brand name. Borden's sales plummeted as low-priced competitors mopped up, but top executives stuck with their premium pricing policy for almost a year. By then, the company's dairy division was operating at a severe loss. Other companies have done the same, such as when Emery Air Freight Corporation acquired Consolidated Freightways, Inc. In the year since acquiring Consolidated, Emery lost \$100 million on it, but executives were reluctant to admit it was a bad choice, believing things were about to get better.⁵⁴ *Negative information often doesn't sink in.*

As another example, consider the increasing investment of the Canadian Imperial Bank of Commerce in the ill-fated Canary Wharf project, an \$8 billion development in London's remote Docklands area. CIBC had already lent over \$1 billion for Canary Wharf to the now-failed Olympia & York Developments Ltd. and its subsidiaries. Despite loads of negative information that led CEO Al Flood to pronounce Canary Wharf a project that "would not meet our lending criteria today," CIBC turned around and invested an additional \$36 million in the project. Flood said the move was designed to "protect our investment . . . and try to make the project work."⁵⁵ These additional millions now seem like a terrible choice.

A second explanation for escalating commitment to a failing decision is that consistency and persistence are valued in contemporary society. Consistent managers are considered better leaders than those who switch around from one course of action to another. Even though organizations learn through trial and error, organizational norms value consistency. These norms may result in a course of action being maintained, resources being squandered, and learning being inhibited. Emphasis on consistent leadership was partly responsible for the Long Island Lighting Company's refusal to change course in the construction of the Shoreham Nuclear Power Plant, which was eventually abandoned—after an investment of more than \$5 billion—without ever having begun operation. Shoreham's cost was estimated at \$75 million when the project was announced in 1966, but by the time a construc-

tion permit was granted, LILCO had already spent \$77 million. Opposition to nuclear power was growing. Critics continued to decry the huge sums of money being pumped into Shoreham. Customers complained that LILCO was cutting back on customer service and maintenance of current operations. But Shoreham officials seemed convinced that they would triumph in the end; their response to criticism was, "If people will just wait until the end, they are going to realize that this is a hell of an investment."

The end came in 1989, when a negotiated agreement with New York led LILCO to abandon the \$5.5 billion plant in return for rate increases and a \$2.5 billion tax write-off. By the time Governor Mario Cuomo signed an agreement with the company, LILCO had remained firmly committed to a losing course of action for more than twenty three years.⁵⁶

Failure to admit a mistake and adopt a new course of action is far worse than an attitude that encourages mistakes and learning. Based upon what has been said about decision making in this chapter, one can expect companies to be ultimately successful in their decision making by adopting a learning approach toward solutions. They will make mistakes along the way, but they will resolve uncertainty through the trial-and-error process.

Summary and Interpretation

The single most important idea in this chapter is that most organizational decisions are not made in a logical, rational manner. Most decisions do not begin with the careful analysis of a problem, followed by systematic analysis of alternatives, and finally implementation of a solution. On the contrary, decision processes are characterized by conflict, coalition building, trial and error, speed, and mistakes. Managers operate under many constraints that limit rationality; hence, intuition and hunch often are the criteria for choice.

Another important idea is that individuals make decisions, but organizational decisions are not made by a single individual. Organizational decision making is a social process. Only in rare circumstances do managers analyze problems and find solutions by themselves. Many problems are not clear, so widespread discussion and coalition building take place. Once goals and priorities are set, alternatives to achieve those goals can be tried. When a manager does make an individual decision, it is often a small part of a larger decision process. Organizations solve big problems through a series of small steps. A single manager may initiate one step but should be aware of the larger decision process in which it is embedded.

The greatest amount of conflict and coalition building occurs when goals are not agreed upon. Priorities must be established to indicate which goals are important and what problems should be solved first. If a manager attacks a problem other people do not agree with, the manager will lose support for the solution to be implemented. Thus, time and activity should be spent building a coalition in the problem identification stage of decision making. Then the organization can move toward solutions. Under conditions of low technical knowledge, the solution unfolds as a series of incremental trials that will gradually lead to an overall solution.

The most novel description of decision making is the garbage can model. This model describes how decision processes can almost seem random in highly organic organizations. Decisions, problems, ideas, and people flow through organizations

and mix together in various combinations. Through this process, the organization gradually learns. Some problems may never be solved, but many are, and the organization will move toward maintaining and improving its level of performance.

Finally, many organizations must make decisions with speed, which means staying in immediate touch with operations and the environment. Moreover, in an uncertain world, organizations will make mistakes, and mistakes made through trial and error should be encouraged. Encouraging trial-and-error increments facilitates organizational learning. On the other hand, an unwillingness to change from a failing course of action can have serious negative consequences for an organization. Norms for consistency and the desire to prove one's decision correct can lead to continued investment in a useless course of action.

KEY CONCEPTS

bounded rationality perspective	inspiration
Carnegie model	intuitive decision making
coalition	management science approach
contingency decision-making framework	nonprogrammed decisions
decision learning	organizational decision making
escalating commitment	organized anarchy
garbage can model	problem identification
goal consensus	problem solution
high velocity environment	problemistic search
imitation	programmed decisions
incremental decision process model	rational approach
	technical knowledge

DISCUSSION QUESTIONS

1. A professional economist once told his class, "An individual decision maker should process all relevant information and select the economically rational alternative." Do you agree? Why or why not?
2. Why is intuition used in decision making?
3. The Carnegie model emphasizes the need for a political coalition in the decision making process. When and why are coalitions necessary?
4. What are the three major phases in Mintzberg's incremental decision process model? Why might an organization recycle through one or more phases of the model?
5. An organization theorist once told her class, "Organizations never make big decisions. They make small decisions that eventually add up to a big decision." Explain the logic behind this statement.
6. Why would managers in high-velocity environments worry more about the present than the future? Discuss.
7. How does goal consensus influence problem identification in an organization?
8. Describe the four streams of events in the garbage can model of decision making. Why are they considered to be independent?
9. Are there decision-making situations in which managers should be expected to make the "correct" decision? Are there situations in which decision makers should be expected to make mistakes? Discuss.
10. Why are decision mistakes usually accepted in organizations but penalized in college courses and exams that are designed to train managers?



GUIDES TO ACTION

As an organization manager, keep these guides in mind:

1. Adopt decision processes to fit the organizational situation.
2. Use a rational decision approach—computation, management science—when a problem situation is well understood.
3. Use a coalition-building approach when organizational goals and problem priorities are in conflict. When managers disagree about priorities or the true nature of the problem, they should discuss and seek agreement about priorities. The Carnegie model emphasizes the need for building a coalition and maintaining agreement about goals and problems.
4. Take risks and move the company ahead by increments when a problem is defined but solutions are uncertain. Try solutions step-by-step to learn whether they work.
5. Apply both the Carnegie model and the incremental process model in a situation with low goal consensus and low technical knowledge. Decision making may also employ garbage can procedures. Move the organization toward better performance by proposing new ideas, spending time working in important areas, and persisting with potential solutions.
6. Track real-time information, build multiple alternatives simultaneously, and try to involve everyone—but move ahead anyway when making decisions in a high-velocity environment.
7. Do not persist in a course of action that is failing. Some actions will not work out if uncertainty is high, so encourage organizational learning by readily trying new alternatives. Seek information and evidence that indicates when a course of action is failing, and allocate resources to new choices rather than to unsuccessful ventures.

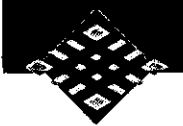
Consider these guidelines when analyzing the following case.

The New Library*

Jefferson University is a sizable and complex institution with an enrollment of more than ten thousand students in a number of undergraduate, graduate, and professional programs. The formal organization of the senior administration is shown in Exhibit 11.9.

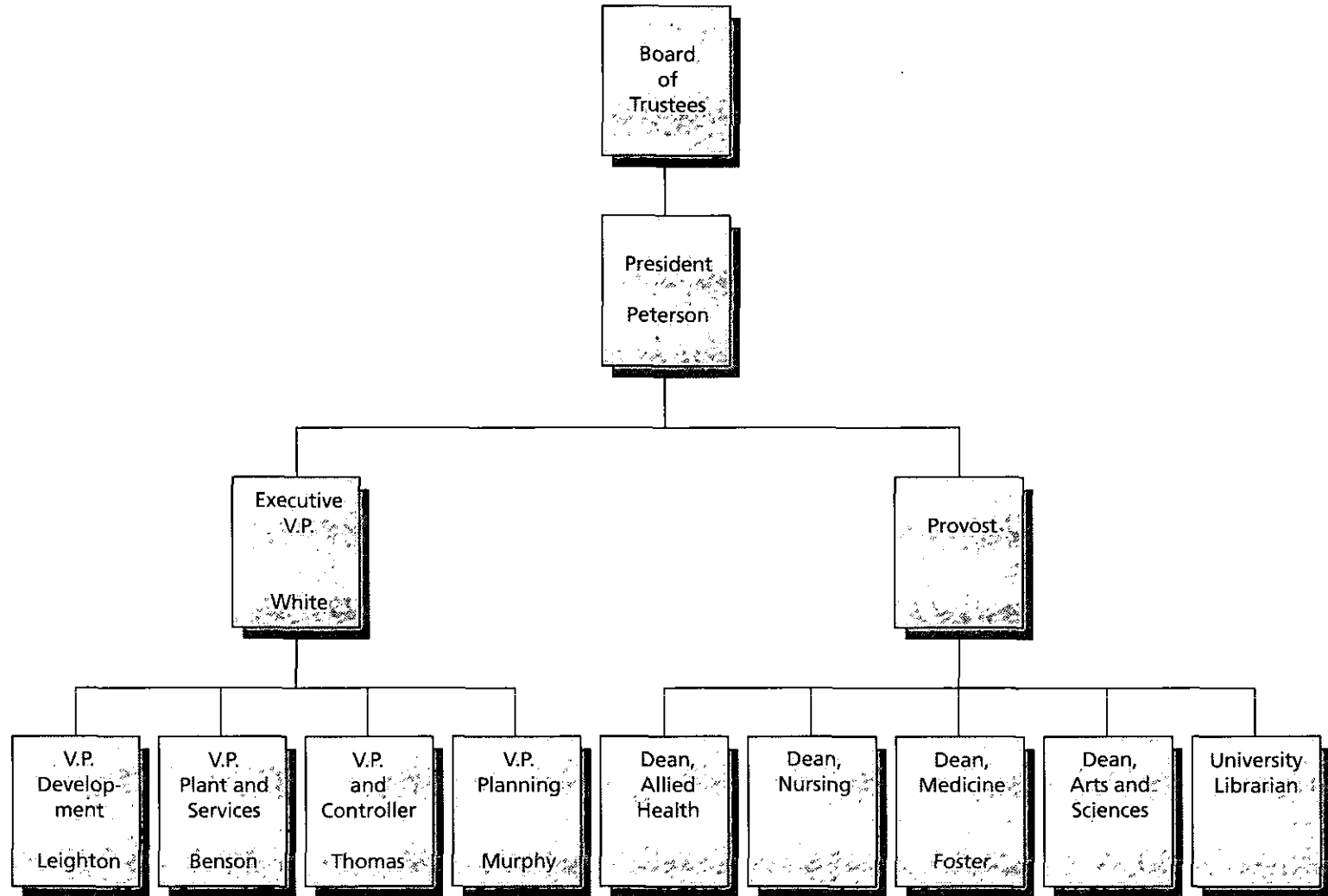
Ralph White, the executive vice president, had called the meeting. "I've asked each of you to look at the proposal for the new library for our health sciences campus from your own points of view," he said. "I have to make my recommendation to the president and the board tomorrow. What position should we take?" Having posed the question, he sat back and listened.

CASE FOR ANALYSIS



*Excerpted from John A. Dunn, Jr., "Organizational Decision Making," in Walter C. Swap and Associates, eds., *Group Decision Making* (Beverly Hills: Sage, 1984), pp. 280–310. Used with permission.

Exhibit 11.9 Administrative Organization Chart for Jefferson University.



Source: John A. Dunn, Jr., "Organizational Decision Making," in Walter C. Swap and Associates, eds., *Group Decision Making* (Beverly Hills: Sage, 1984), 282. Used with permission.

When the vice president for development came in, the rest of the group was sitting around the big table on the fourth floor of Jefferson Hall. "Evelyn," said Al Benson, the vice president for plant and services, "we've already set your target for you." Evelyn grinned; somehow, lately, all the big decisions seemed to rest on the ability of her shop to find new money. This time, however, she wasn't sure she could deliver.

The problem was the size of the project. Conversations about the need for a major library and learning resources center on the health sciences campus had been going on for years. A fund-raising campaign had been started four years before but, aside from about \$3 million in major gifts, had not produced anything like the funds needed to cover the project. Changes in the medical school's leadership and in faculty ideas about the sort of facility needed had muddied the water.

During those four years, a good deal of money had been spent on the project. An architectural programmer had been hired to work with faculty members and administrators in clarifying specifically of what the building should consist. Schematic designs had been prepared. Fund-raising staff had been hired and paid; lots of proposals had been written, brochures prepared, prospects identified and solicited, trips made. The net result was that the expenses of the campaign had eaten up a great deal of what had been raised; about a million was still due to be collected in the future.

Mike Thomas, vice president and comptroller, did not let Evelyn forget the cash-flow problem either. The bills had to be paid as they were incurred; much of the fund-raising progress was in pledges; payments were dribbling in over a number of years. That meant Mike had to use other money to pay the bills, to be refunded when and if the pledges were paid. The payment record was good; these were major donors who honored their commitments. Mike could be pretty sure of his repayments. There remained a related problem, however. Time was going by, and inflation was a major factor. He was paying bills in current dollars; the pledges, when they were paid, would be worth less, but the costs of the building would be going up—potentially leaving a gap in the financing.

There didn't seem to be much doubt about the need for the building. The present library conditions were less than marginal. The accreditation team for the American Medical Association gave the school its accreditation, to be sure, but only on the clear understanding that the new facility would be complete by time of its next visit. The accreditation teams for the nursing and allied health schools had also criticized the inadequacy of the facility and scope of the collection. Working with expert consultants, the university librarian had developed a detailed program for the needed facility.

The medical school also had an image problem. The allied health school had its own new building, constructed about ten years ago. The nursing school was building superb new facilities. The medical school, the "flagship" of the complex, had never in its eighty years of existence had a new building. It was housed in converted manufacturing buildings. These made good laboratories, because they were constructed to support sizable machinery; but the close columns and relatively low ceilings made for terrible classrooms. The recent advent of the nursing school had required shoehorning additional faculty members into already crowded quarters. In an era when all three schools were trying to increase research activity, there was a critical shortage of research lab space. Some of the functions that could

be moved from present quarters into the new building would free space that could be converted to lab use (at additional capital cost, of course).

So the needs were clear, but the financing wasn't. Early cost estimates ranged from \$9 million to \$15 million, depending on the size of the building and the mix of components proposed for it. A site was acquired in a good central location. Cost estimates kept rising as people got more and more enthusiastic about the possibilities and as construction costs rose with inflation. Evelyn Leighton took over the development division after the campaign had started, reviewed the discouraging progress to date, changed the fund-raising staff, and set to work. Not much happened. There was an acting dean of the medical school at the time who, despite his best efforts, could not be as effective as a permanent dean could be; and there was still some general skepticism about the university's ability to raise that kind of money. Some of the alumni remembered the strenuous efforts that had been made to raise funds for the new allied health tower and the disappointment when the campaign fell far short. The building plans had to be cut back; and for years, the allied health students have had to carry an extra eight hundred dollars per student per year on their tuition to pay the mortgages on the building.

This year, Dr. Peter Q. Foster was appointed dean of the medical school. He had been the director of a major medically oriented foundation. A nationally known researcher, he also brought strong administrative skills and high aspirations to the city campus. He quickly realized the need for the new facility but added an even more urgent dimension to its importance. He and many of his health science colleagues realized that the ways in which future health practitioners and others needed to have access to information was radically different from the past. They should not be looking through card indices or thumbing through past issues of periodicals; they should be inquiring directly from data bases by computer. Nothing of that sort existed at the university, though there were, of course, computer terminals in the library for accessing Medlines and other search services.

For the health schools, such developments had particular urgency. Each of the schools is linked for educational purposes with many associated institutions. The medical school has more than a dozen major teaching hospitals and an additional thirty hospitals with specialized programs. The health sciences schools could and should provide core information access services to all these institutions, tying them together into an even more effective teaching patient care network. The development of the new library would provide that possibility. Unfortunately, money doesn't come just because you need it.

Dr. Foster promptly undertook a serious study of the possibilities. An outside consulting group worked with a core group of medical school and central administrative people in a financial feasibility study. Cost estimates for various building sizes and configurations were prepared, starting at about \$20 million and going up to \$35 million. Estimates of the incremental costs of operating the building were worked out; the added costs would raise the tuitions of all three of the health sciences schools from eight hundred to thirteen hundred dollars per student per year. The consultant, acknowledging the importance of the project, recommended downsizing the building as much as possible, so as to bring it within the capacity of Jefferson University to afford.

Then came an almost incredible break. President Peterson and Evelyn Leighton had over the course of two years been working quietly in Mexico with an elderly, very wealthy medical school alumna. With long and patient work, she was

persuaded to grant the school a total of \$15 million through a private foundation. Suddenly everyone's mood brightened.

It was now clearly possible to build the building. The question of total size remained. The huge grant was not enough. Would \$23 million be adequate? \$25 million? \$30 million? How much more could the university raise? What would the operating costs be, and who was going to pay them?

"Damn it, Evelyn, I think we ought to be going," said Al, after reviewing the fact sheets White had distributed. "The old gal gave us enough to get started; but we have to go through a formal application process to her foundation, and the deadline for that is a month from now. It will take my people that long to get the application done, once we've made our decision to go ahead. Our present estimate is \$23 million. There's some room for slack in that, because we can always leave a couple of administrative office floors unfinished if we have to, and we can save the cost of the furnishings on those floors. Can't we raise the \$8 million?"

"What about the operating costs of the new building?" asked Ralph White.

"They are going to be high," said Jerry Murphy, the vice president for planning. "That building will add about \$1.5 million to the budgets of the schools every year. With six hundred medical students, six hundred allied health students, and two hundred nursing students, that means more than one thousand dollars per student per year. Maybe the medical students can stand it. The tuition is very high there, but there are still a lot of people who want to get into medical school; and the earning potential of the graduates is high. But interest in allied health is slowing down, and their earnings aren't as high; I don't want to see us sock another thousand dollars on top of the eight hundred they are already paying for their own building. And as for the nursing school, those tuitions are already incredibly high; I'd hate to see us load anything more there. It's going to be hard enough to get the nursing school onto a balanced budget under the best of circumstances."

Mike Thomas took out his calculator. "Since we can only count on about 5 percent or 6 percent as a long-run payout rate on endowment, it would take an endowment of \$30 million to generate that \$1.5 million annual income, if the students aren't going to pay for it. Can you raise \$38 million, Evelyn?"

"Come on, you guys," replied Leighton. "We got you the \$15 million. Give us a little time and I think we can probably raise at least enough to cover the balance of the cost of the building. Psychologically, having the grant money in hand helps us, because it gives a sense of reality to the whole project. This is the biggest project we're going to have on the health sciences campus for many years. We can do it. It may take some time, that's all."

"Let me add one complexity," said Murphy. "If all we were doing was to build a conventional library building, we'd know how to do it. The building itself will not be complicated; Al and his crew have a good handle on those costs. What about the new technology? We're going to try communications and computer linkages that haven't been tried anywhere else. That means that there's going to be added systems development expense and some rather unusual equipment costs, right? And we can pretty well bet that there are going to be some mistakes made; we're not perfect; we don't have all the answers going in. My own guess is that we could easily add \$1 million to \$1.5 million in unanticipated systems development costs to the project. When can we have any better handle on those costs?"

"Dr. Foster has several committees working on the program right now," said Al. "The problem is that they may take some months thinking through all the

pieces of this puzzle, and we have to make a decision very quickly. I can pretty well specify the cash payment schedule for the building right now, though. Figure about \$100,000 per month starting in April when the project gets board approval, and then after a year, figure \$1 million per month for the twenty-three months of construction."

Evelyn piped in, "Some of my staff has been working with the National Library of Medicine to see if we can get systems development support. They don't have any money right now, but it's possible that something may come through on that in the future. We may also be able to get some support from computer manufacturers who'd like to be involved in the development so they could use the technology elsewhere."

"Evelyn, let's come back to the fund-raising for a minute," said White. "How sure are you?"

My best guess is as follows: I can be 90 percent sure of raising \$4 million; for \$6 million, I guess about 70 percent sure; for \$8 million, about 50 percent sure. I think there is a chance we can go even higher—maybe \$10 million, but that's very risky. We should be able to get pledges in the next three years; most of those pledges will be payable over three years. And just to anticipate Mike's next question, you should deduct about 8 percent to 15 percent from the total for fund-raising costs."

"You guys are all forgetting the problem of how we get from here to there," added Mike. "Al, you're going to be spending money on the building design and then on the construction. We can draw down on the foundation grant pretty quickly, but what do we do for the rest of the money? Evelyn can't guarantee that she can raise it. And even if she does, you heard how long it's going to take. That means I may not get some of my cash for six or seven years. We're awfully tight for working capital now. We financed the classroom renovation project out of working capital and the hockey rink as well. And we haven't yet raised the funds to pay for those. There's just so far I can stretch. I can borrow some from the banks, of course, but that will cost us at least one point over prime. Who's going to be paying those interest charges? They should be charged to the project, but that just raises the total cost; the medical school operating budget is already tight and probably can't afford to absorb them."

"Look, we're not getting anywhere," said Murphy. "Al, you want to build the building, and you've got time constraints. We need a decision now. Mike, you've got real cash flow problems, and you're worried about whether or not we'll ever raise the construction money. I'm concerned about the operating costs and the unknowns in the systems development. Evelyn's a born optimist, but even she can't guarantee how much she and the president and Dr. Foster can raise, or when."

Al boomed in: "Come on. I say we go ask the board for approval of the \$23 million project. That's what Dr. Foster wants. We've got some flexibility within that total to cut back if we need to—maybe \$2 million. That gives Evelyn her fund-raising target. And it gets us the building we've all been talking about, the best thing that's happened to this place in years."

"Okay," said Ralph White. "You've brought out the important factors. I think we've chewed on this enough. I understand the various concerns around the table. Now here's what I think I'll recommend to the president and the board: can you all support a recommendation to. . . ."

QUESTIONS

1. What is the problem in this case? What would you recommend to the president and the board?
2. Which decision models from this chapter can be used to explain the decision processes in this case?
3. Can anything be done to improve the decision-making process about the new library?

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