

# Management information: back to basics

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*While formal information resources management is important, to be successful today information resource managers need to pay more attention to their informal sources of information than they have in the past.*

Progress in electronics has made the collection, storage, manipulation, analysis, and distribution of information faster, cheaper, and easier than ever, and every organization seems to be taking advantage of this progress. Given the rapid change, this may be a good time to take stock of where management is and how it is coping with the torrent of information coming its way. If managers are not to be overwhelmed by this information, they must be more attuned than ever to making sure that the information they have is the information they need.

Take as a start these two hypothetical examples:

The chief executive officer of a midwestern manufacturer was perplexed. "Our management information system is terrific. I know what it cost me for every nut and bolt assembled on any shift. Not one of my competitors, here or abroad, can have a better handle on costs. But I'm getting clobbered. My market share is declining monthly."

Eight hundred miles away in New England, two friends and business associates, neither quite 30 years old, at that moment were toasting a recently completed successful public stock offering. In storybook fashion, they started their electronics business in the basement. "I just knew this was going to be a success," gushed Founder One. "Everyone I ran into at the computer users group was complaining that no one could help them with this problem. Well, we did."

Such vignettes have become cliches today: the depression of the old manufacturing industries and the proliferation of successful high technology firms. But these specific stories were conceived to focus on a poorly understood piece of the industrial story. While the old, established businesses were installing and perfecting exquisite formal management information systems, the new wave of entrepreneurs successfully vacuumed up intelligence from the world outside

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their organizations and turned the insights gained thereby into new products and services. To be sure, these entrepreneurs will soon find that they have to add a formal management information system to stay competitive. But it does not necessarily follow that they will abandon the informal intelligence-gathering function that got them their first \$100 million. The older businesses would do well to pay attention to the ways of many of these upstarts.

Today, the stakes for having the right information in a timely fashion are higher than ever. Information available via "communications" (computers tied together through telecommunications) is not only a cost savings or reporting mechanism. It has been recast as the output of a "decision-support system" or the raw material for providing new opportunities for mature businesses. There appears to be a new level of consciousness of the role of information in organizations. Nonetheless, there is a missing link in the themes in the current body of advice. The literature tends to focus on formal systems at the expense of an examination of how individual decision makers actually get and use information in their daily rounds.

#### INFORMATION AS A RESOURCE: THE 5 PERCENT EDGE

People continually talk about how the world is moving into an information society or an information economy. It is perhaps more accurate, and consistent with past formulations, to refer instead to an information intensive society. That is, the Industrial Revolution largely substituted energy from minerals for that of people and animals—a shift from labor to capital-intensive production. For the past 30 years, the country has been in the midst of an evolution (in the grand sweep of history it may some day qualify as its own revolution) in which information is being substituted for both energy/labor and material/capital with greater intensity than ever. This can be seen in the information-processing power of computers that are able to be far more accurate and comprehensive than the clerks they replaced in billing functions. Similarly, the information processed by microprocessor-controlled automobile engines increases their efficiency, thereby reducing energy needs. Computer-aided design programs that run on desktop computers not only replace a room full of drafting tables and draftsmen, but change the traditional relationship between the draftsman and the engineer.

Information has always been a resource, but in earlier eras, for the most part, it was a poorly understood component compared to other, more tangible resources. Today, information can be put on an equal footing with other resources. That is, people now intuitively know that without energy, nothing would happen, or without material, there is nothing. Similarly, but perhaps less obviously, without information all is chaos. A few of today's decision makers are beginning to understand and internalize this notion. To work smartly and competitively, managers will have to institutionalize the concept of information as a resource.

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Traders in many commodities have known the advantage of having just a few minutes—or even seconds—of lead time in a market swing to buy in or bail out. Such an advantage in strategic as well as practical information is becoming a leading factor for a broader range of industries.

Keeping ahead of the competition does not necessarily require one to be very much better than the rest. In business, it may mean being five percent better over time. There is the story of the two hikers who spot a grizzly bear stalking them. One hiker quietly sits down and takes off his hiking boots, replacing them with his running shoes. "What good will that do?" asks his companion. "You can't outrun a bear." Lacing up his Nikes, the friend responds, "I don't have to outrun the bear. I just have to outdistance you." A broadened view of information as a resource gives a manager a similar edge.

The current era is not the first in which changing information technology has had a widespread impact on organizations and their managers. Chandler points out this idea when referring to the growth in the complexity of organizations in the 19th Century.<sup>1</sup>

Metalworking and textile factories were the two most complex industrial organizations in the United States in the first half of the 19th century. They were viewed as the prototypes for the increasing sophistication of factory management and organization. But by today's standards they were small, relatively simple organizations. The largest metalworking plant in the United States in 1815 was the Springfield Armory, with 250 employees.<sup>2</sup> The largest woolen manufacturer in the world in 1850, Bay State Mills in Lawrence, Massachusetts, had only 2,200 employees.<sup>3</sup> Accelerating industrialization and national markets, however, required larger, far more complex organizations. Thus, by 1891, the Pennsylvania Railroad, for example, grew into an organization with more than 110,000 employees.<sup>4</sup>

Many changes had to occur to allow managers to operate organizations of that size and still function reasonably effectively. Among the information-related developments were the invention and spread of the telegraph, the expansion of the postal service, and the development of the telephone. Other less heralded but equally important changes, such as typewriters, mimeographs, and the vertical filing system, permitted the needed growth of internal correspondence.<sup>5</sup> Thus, developments in information technology created the conditions that allowed organizational structures to respond to the production economies made possible by the Industrial Revolution.

## ROLE OF INTELLIGENCE

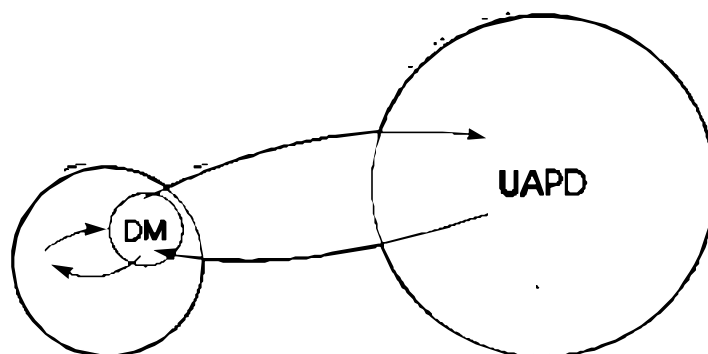
At its most theoretical level, intelligence refers to all the information regarding what is happening in the universe, including developments in politics, technology, sociology, economics, and so on. In effect, a rather mind-boggling Universe of All Possible Discourse (UAPD). Fortunately, for their effectiveness, if not their sanity, decision makers in an organization have a much smaller universe of decision making, which is bounded largely by the decision maker's institution (see Figure 1).

Both of these worlds are in flux, especially the UAPD, which is constantly expanding as more information comes on the scene. Decision makers have to keep an eye not only on their own small universes but on the UAPD as well, looking for information useful in managing the organization while bringing it into consonance with the threats and opportunities presented by the UAPD.

A few managers work in organizations that are large enough to affect the universe of discourse. IBM may be able to establish a de facto technical standard, for example. Most managers, however, are successful if they can keep out the way of threats or can leverage a minor opportunity. Part of what managers must do is find out what is going on in their own organizations and in the world outside and try to bring the former

Figure 1

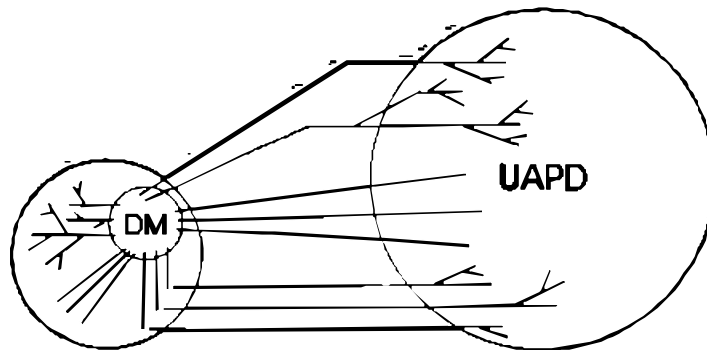
### INTELLIGENCE FOR DECISION MAKING



NOTE: UAPD = universe of all possible discourse; DM = decision maker

Figure 2

## COMPLEX WEBS OF SYSTEMS



into some sort of equilibrium with the latter to achieve the desired end.

What successful managers end up with is a complex web of systems for intelligence gathering, as illustrated in Figure 2. This network encompasses those in the organization charged with gathering and reporting information about events and activities within the organization. Some people may be charged with looking at the broader universe of discourse and feeding back to decision makers their views of that world. At the same time, decision makers are observing their organizations and the outside world to make their own evaluation of what is going on.

#### SOURCES OF DECISION-MAKING INFORMATION

Decision makers utilize this complex web of systems (Figure 2) as an information network, sometimes consciously, generally reflexively. Often, however, it is an underutilized system. Managers have contact with 10 to 20 superiors, including the chief executive officer, who in turn reports to a board of directors. The managers have peers inside and outside the organization, as well as within and outside the industry; these are people the managers have grown up with and been associated with, all of whom serve as sources of information. Managers talk with their immediate subordinates, typically 5 to 15 people, as well as 50 to 500 subordinates farther down the line.<sup>6</sup> Many of these contacts are continual sources of information.

General managers also have myriad contacts outside the organization and industry: bankers, brokers,

and analysts, all possible sources of financial information. In addition, there may be hundreds of suppliers and customers, competitors, the press, government regulators or other officials, and the general public.

Effective decision makers constantly exercise this network of contacts. In a five-minute conversation on the telephone with one of these sources, a manager can cover a dozen topics, or a manager can successfully soak up information while walking down the hall and taking the elevator, asking questions of people on the run.

Sources of information fall into three categories of intelligence sources: those *inside* the organization, those *outside* the organization, and the *decision maker's own knowledge*—those things he or she already knows

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or is convinced he or she knows. Much of the decision maker's knowledge probably came from inside or outside information sources at some earlier time, but it becomes part of the storehouse of knowledge, though not always accurate, that managers accumulate over the years.

These sources may be made through either formal or informal processes. Figure 3 summarizes these types of sources. The formal processes generally form

Figure 3

## SOURCES OF DECISION-MAKING INFORMATION

	Inside Sources	Outside Sources	Decision Maker's Knowledge
Formal Processes	Management Information Systems Scanning Special Studies	Media Trade Associations Consultants	Education Training
Informal Processes	Water-Cooler: "What Do You Think, Joe?"	Golf Course Cocktail Parties	Experience

part of the consciously designed organizational nervous system. The formal inside sources, in particular, have been the subject of most study and theory. The informal side of organizations has been researched, but typically from the viewpoint of understanding patterns of authority, responsibility, motivation, or power. Information sources have been at best an incidental sidelight.

The informal side of intelligence gathering, although not as easily described as formal management information systems (MIS), seems to play a far more crucial role than has been appreciated up to now. Many of the people who traditionally worry about designing MIS seem to believe that the chief executive officer should not really get information other than what is filtered through the formal system, or at least should not base any decisions on such spurious information. If this assertion accurately characterizes actual attitudes on the part of users or suppliers of intelligence, then it betrays a gross misunderstanding of the validity or legitimacy of other intelligence sources. The outcome for decision makers could be, or has been, disastrous.

Perhaps the clearest example of the consequences of focusing on the top left hand box of the matrix (Figure 3) at the expense of the informal processes can be seen in the U.S. domestic automobile industry. By the 1960s, Detroit had developed a legendary expertise in cost accounting. With the help of MIS, the auto makers knew what it cost to put a nut on the wheel of any model made in any plant on any shift on any day. Such attention to detail was perhaps an obsession. Meanwhile, imports exceeded 10 percent of the U.S.

market as early as 1968 and hit 15 percent in 1970.<sup>7</sup> Auto industry executives could not hide behind excuses of being suddenly blindsided by the quadrupling of gasoline prices after the Arab oil embargoes in 1973 and 1979.

During this time U.S. auto executives probably would have gotten a better payback if they had spent more time going to cocktail parties in San Diego or Atlanta and talking to people who loved their Toyotas or were willing to part with \$20,000 for a BMW. Less time spent on cost accounting and more time spent chatting with peers and customers outside the industry would have been a great improvement for managers at Ford, General Motors, and Chrysler. To be sure, too many businesses have folded because the chairman spent too much time with clients at the golf course believing that he or she was getting important information, while not paying attention to the company's cash flow situation. Nevertheless, managers err too often toward the other extreme, not recognizing the legitimacy of all sources of information.

#### INSIDE VERSUS OUTSIDE: COMPARING MANAGERS TO ENTREPRENEURS

Managers in large, bureaucratic organizations have access to all kinds of inside information, both formal and informal. Entrepreneurs, by definition, start without an organization. Thus they depend almost exclusively on outside information as well as a decision maker's knowledge. As the entrepreneur's successful venture grows, it too has a proclivity to become

a captive of its newly generated inside information, with the advantages and disadvantages that brings.

This is a phenomenon seen in the magazine publishing business, among others. Before a large publisher such as Time Inc., launches a new magazine, for example, an idea works its way through a magazine development group. It goes through an analysis of likely revenue streams based on advertising and circulation projections, and appears in mocked-up versions. All along, Time's managers are drawing on their inside information sources as well as their decision maker's knowledge. Thus, they may spend millions of dollars before an issue is published.

The magazine publishing entrepreneur, on the other hand, must be guided more from the outside: from consultants who are working with greater abstractions in their formulas than the Time Inc., insiders. The entrepreneur faces more direct pressure from bankers or investors than an internally financed venture (only remotely mindful of stockholders). In general, with fewer financial resources, the entrepreneur must act heavily on hunches, insights, or personal knowledge. This is why video magazines tend to be founded by video buffs and computer magazines by hackers. In the end, the literature on magazine start-ups shows that relatively low budget entrepreneurial ventures can succeed (e.g., *Byte*) while well-funded corporate start-ups often fail (e.g., *Gruner & Jahr's Geo*).

#### ADDED COMPLICATIONS: "UNK-UNKS" AND THE "FOG OF WAR"

Inside and outside sources and a decision maker's knowledge are necessary but simplified approaches to the intelligence problem. They represent set points in the UAPD. Added to these observable categories is another set of unilluminated points: the unknown-unknowns (unk-unks), or the things one does not know that one does not know. These are the factors

that decision makers did not even realize existed, let alone perceived as having a bearing on their decision (Figure 4).

Unknown-unknowns sometimes have more bearing on a problem than the factors that decision makers already know about or know they need to know about. This phenomenon was discovered a few years ago by the newspaper industry managers when they learned, almost too late, that the movement in Congress and the Federal Communications Commission to permit AT&T to enter competitive, nontelephone businesses exposed publishers to potential competition for their profitable classified advertising from an electronic yellow pages. Similarly, commercial banks took it on the chin when money market mutual funds came along, and bankers are still reeling from various unforeseen international events (such as the precipitous drop in oil prices) that affect their own portfolios in ways they never anticipated.

The fog of war is a concept that, despite its military origins, applies neatly to all sorts of decision making. Military strategist von Clausewitz said, "A great part of the information in war is contradictory, a still greater part is false, and by far the greatest part is somewhat doubtful."<sup>6</sup> Thus, in any given decision there are relative degrees of what decision makers actually know (whether it is from inside or outside sources) or what decision makers know or think they know.

Managers know that they must make decisions based on incomplete or imperfect information. If the decision is important enough and if the time horizon is such that the manager can devote appropriate resources to it, the unk-unks and the fog of war can be reduced. The value of the concepts of unk-unks and the fog of war is that they suggest how much or how little knowledge can actually be encompassed in any given decision.

Managers who have longevity in a particular job or area of their organization would therefore have an

Figure 4

#### DECISION MAKING WITHIN A CONTEXT OF UNKNOWN-UNKNOWNNS



advantage over those who are rotated to positions in different functions on a regular basis. The former have reduced the unk-unk territory over the years while expanding the decision maker's knowledge. The latter are constantly moving up the learning curve in a new functional job. It may be argued that these less experienced managers are less able to cope with the fog of the competitive wars and therefore liable to make more mistakes.

Although there are strong arguments for creating generalists by moving fast-track managers from finance to operations to marketing and so on, there may be a substantial cost in efficiency. Among the most prominent organizations that have taken the rotation concept the furthest were AT&T and the U.S. military. From the viewpoint of managers, AT&T was an attractive place to work because of this policy, which included stints with its old operating companies and then a return to the parent organization. Today, having been thrust into the competitive environment, AT&T has found itself able to cut tens of thousands from its managerial ranks. It is not coincidental that free-wheeling job rotation has been drastically reduced.

The military, like the old AT&T, has a similar organization approach. Its officers at all levels spend two or three years in each assignment. In the game of "getting their ticket punched" in the proper areas, officers move among diverse commands. Even as they play the game, many complain that they are moved out just about the time they learn their jobs. Anyone familiar with the Pentagon knows the frustration of

dealing with a new officer just when the former officer had been educated. Meanwhile, the people above and below are being moved around as well, so there are few sources of reliable informal information.

**CHANGING MIXES AND INFORMATION MISMATCHES**

For any decision, there is a unique bundle of inside information, outside information, decision maker's knowledge, and unk-unks. The specific mix will vary with one's place in the hierarchy, as well as the nature of the decision itself. Unfortunately, many formal information systems do not recognize this. It is not easy, or perhaps even possible, to design a system to cover all events for all possible situations. The typical decision in the typical organization, illustrated by the bottom bar in Figure 5, is made without a great deal of reliance on anything but the decision maker's knowledge.

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Managers do not give most of the relatively routine decisions much thought. It takes an exceptional problem for the decision maker to recognize that a lack of

Figure 5

**MIX CHANGES FOR EACH DECISION IN EACH ORGANIZATION**

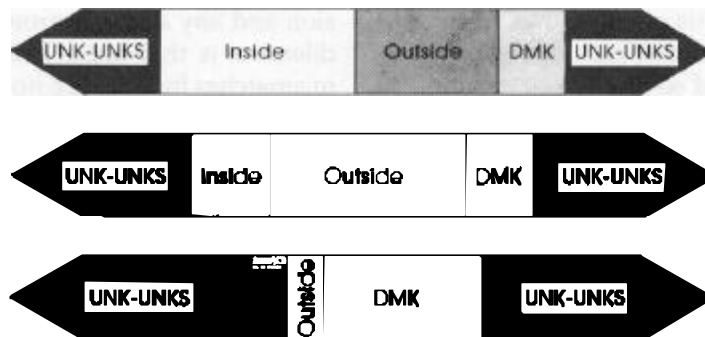
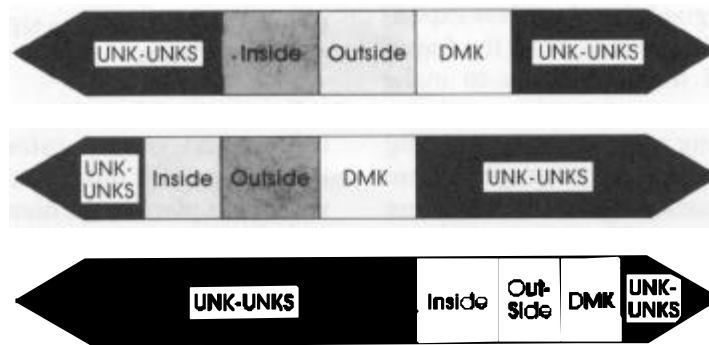


Figure 6

## MISMATCHES AMONG DECISION MAKER'S KNOWLEDGE AND UNKNOWN-UNKNOWN



sufficient knowledge and the importance of the decision require resources to gather specific information.

The most difficult type of decision from an intelligence perspective, however, is one in which more than one person is involved. In such cases, it is not unusual to have mismatches among each person's mix of inside and outside sources, decision maker's knowledge, and unk-unks, as illustrated in Figure 6.

For example, in a new product introduction, the three decision makers may be the marketing, production, and financial managers. The first may want to maximize the number of styles, sizes, or whatever. Marketers are conscious of customers and would tend to be high on outside information. The production manager, on the other hand, wants to keep the number of machine setups as low as possible and has to contend with work flows and scheduling. This manager relies mostly on inside information. The financial manager wants to know the timing of expenditures for equipment, inventory buildup, promotion outlays, and cash flow. This manager has to coordinate all of this activity with other cash demands, lines of credit from bankers, and so on.

These three decision makers also have different ranges of unknown-unknowns. For instance, the production manager's own knowledge about the difficulty of using a particular dye to produce a particular shade that the market manager decides is essential may be something the market manager knows nothing about and has never even thought of as a problem. It may be that neither of these managers is aware that the demands of the company's seasonal line of credit

make it unlikely that the funds will be available for a spring startup. Hence, there are three (or more) decision makers optimizing on totally different factors in the decision, and each dealing with totally different sources of information.

The above scenario describes a common situation in organizations, one that is usually handled by committees or task forces that draw on representatives of the departments involved. Nevertheless, two points need to be made. First, the greater the mismatches in the information base of those involved in the decision, the more cumbersome is the communication among them and hence the longer it will take to get to the point where all parties understand one another. In other words, one manager's own knowledge that does not seem to need any elaboration is another manager's unknown-unknown. Therefore, neither manager will raise the issue, even though it may constitute an essential assumption somewhere down the line. One can readily foresee serious consequences for the decision and any action it promotes. The flip side of this dilemma is that organizations that try to minimize mismatches by having a homogeneous group of managers involved in a decision (who all "speak the same language") may risk missing some important questions that would be raised by someone with a different set of information and unknown-unknowns.

For example, a publishing company that offers an electronic on-line information service decides to add a new database. The initial meetings involve the editorial and the business development managers. These managers share similar information sources and lan-

guage. At the last minute, they include the director of computer hardware in their decision. After some effort to get the director up to speed on what they were about to do, the director presents them with some technical questions that make them rethink their decision. The editorial and business development managers had assumed that the new database would fit into the existing structure. The technical manager knew it would not be so simple.

The second point of the information mismatch is that information systems need to be changed to fit the need of the incumbent managers. This problem is similar to climbing into a rental car that was last driven by someone 6 inches taller or shorter than the present driver. Keeping the seat in the old position would be not only uncomfortable but perhaps dangerous as well.

This is most obvious at the level of the chief executive officer (CEO). A particular information system may have been designed for good reason for a chief executive who came from a financial background. The formal reports generated by the management information system, the outside newsletters and subscription services, etc., that got fed to the CEO were weighted with financial data, analysis, and interpretation. When a succeeding CEO from a different background inherits this information system, no one remembers why it was structured the way it was, and it continues to spew forth information that may be inappropriate or ill suited to the new decision maker. It may be only after months or, even worse, after a crisis that the new man recognizes the need for new sources of information.

Indeed, it is often in crisis situations where the problem of information mismatches is most critical. In the most extreme crises, those involving national security and the President of the United States, the people whom a president will most likely want in the situation room are not an assortment of experts with whom he or she has never met and who all speak different languages. The president is apt to surround himself with the cronies who share his information sources and with whom he can speak without having to explain or risk being misunderstood. The danger lies in missing some unknown-unknowns, but that may be the lesser of the risks in a fast-breaking crisis.

Few other organizations would face crises of the magnitude of national security. But the principle of the trade-offs between shared information sources with efficiency in decision making on the one hand

and overlapping information sources with reduction of unknown-unknowns on the other hand is a real, if largely unrecognized, reality for all decision makers.

### OPTIMIZING INFORMATION FOR DECISION MAKERS

There is an old tenet (worth a fresh look now) that as soon as an organization starts to design a formal institutional information system it begins eliminating information sources. There are good reasons for doing so. The formal system does not need to reinvent many of the things that the system handles every day. These are the routine items for which computers and the formal institutional information systems were set up in the first place. The goal is to leave time available to decision makers to select ad hoc from the information that is most needed for the less routine decisions. The combination of the formal/routine with the informal/ad hoc process aims to minimize nasty surprises after decisions have been made and to recognize that some action should be taken in the first place.

But decision makers in large, structured organizations need to know when to supplement or even bypass their formal MIS with intelligence gathered through informal channels. There remains the question of whether one can institutionalize an informal information process without thereby encasing it in the formal management information system, and, indeed, whether institutionalizing would be a step forward in any event.

How can managers navigate through the thicket just described? Unfortunately, in the area of information for decision making, management remains every bit as much an art as a science. There are no stone tablets with pointers that will improve the reader's success. There is no single system that fits all circumstances.

Having said this, there are six generalizations that can provide some help to managers who want to enhance the decision-making process in their organizations.

1. The highest-order generalization is, above all, be flexible. Individual managers must not be only permitted but also encouraged to modify the information flow that comes to them when they move into a new position. They must be allowed to adjust the driver's seat to their own measurements.

2. Individual managers should consciously make part of their current job, and any future position, an

early evaluation of what mix of information sources are available, what they now use, and what they might use. They should know something about the background, strengths, and weaknesses of the person they replaced as a starting point for having some understanding of what information sources they might have been partial to or tended to ignore. Managers should then rearrange their own mix of sources based on their own decision-maker's knowledge. This might involve ordering up different reports from the MIS, stopping others, changing the flow of newsletters, or even seeking a new opponent for racquetball to fill in a gap in the informal outside information.

3. Any decision maker should seek to identify as many unkn-unks as feasible given the gravity of a decision. In most daily decisions this process is irrelevant. For those decisions involving commitment of substantial resources, however, managers might want to take some extra steps to seek out information not only from consultants, but from friends, associates in other parts of the firm, and so on.

4. When there is time, a decision maker should spend a few extra minutes thinking about the mix of managers involved in a major decision. Do they come from diverse backgrounds in the organization? Has a quick consensus been made at the expense of involving in the process others who might ask the critical question that no one else thought to ask?

5. The decision maker should reevaluate any organizational policies of playing musical chairs with executives. Producing generalists is wonderful if it can be afforded. There is great economy and efficiency, however, in having a cadre of managers who know their jobs well and who know intuitively where to get the information they need for a decision.

6. Nothing in the foregoing should be viewed as being critical of the formal MIS itself. Rather, managers need to recognize that such systems fill one square in the matrix. They are useful so long as managers understand that traditional MIS do not cover the entire area of decision-relevant information.

Coincidentally, in the course of this work, evidence kept mounting that successful managers use the telephone with great effectiveness in scooping up timely information, where and when it is needed, with relatively little wasted motion. In talking on the telephone with someone he or she knows, even a brief pause or an exclamation on the other end may convey pages worth of information. A manager can pick up the

telephone and reach practically any place on earth without concern for whether it is part of the organization's predetermined information system.

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Work on information as a resource is still in a developmental stage. At this point its primary value is in raising the notion of the range of sources of legitimate information and making managers more aware of the role of the substance and process of information in their organizations beyond the formal institutional sources. The overwhelming tendency of most managers and academics in the past 30 years has been to concentrate on the inside, formal sources of information.

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