MANAGEMENT INFORMATION: BACK TO BASICS

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Cambridge, Massachusetts

A publication of the Program on Information Resources Policy.

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July 1986, P-86-6

The Program on Information Resources Policy is jointly sponsored by Harvard University and the Center for Information Policy Research.

Printing 5 4 3 2

July 1986

PROGRAM ON INFORMATION RESOURCES POLICY

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EXECUTIVE SUMMARY

-- Managers make decisions based on information from a variety of sources. The formal management information system is an important one. But it is neither the only source nor always the most important. Information comes from other formal channels, such as outside consultants, trade publications, seminars, and training sessions. It also comes from a myriad of informal channels, such as ad hoc conversations with colleagues, talk at cocktail parties and other social settings, and the cumulative experience of a manager.

-- These sources can be organized into a matrix with formal and informal information as one dimension and inside sources, outside sources, and decision-maker's knowledge as the second dimension.

-- Too often organizations focus on the formal, inside sources of information at the expense of recognizing the importance of the informal, outside channels of information. All are needed for a competitive edge. An organization in a competitive environment needs only to be several percentage points better than its competitors to gain an advantage.

-- Managers who move into new jobs should recognize the need to adjust the sources of information they are receiving from that which had been flowing to the previous holder of the job. The individual's personal information system is determined in large measure by that person's own knowledge, which is probably different from his predecessor's.

-- Managers can be blind-sided in major decisions by "unknown-unknowns" -- the questions they didn't even know had to be asked. Having a heterogeneous mixture of people involved in a major decision can reduce the chances of unknown-unknowns. But the price is paid in the longer period it may take for the group to learn the "language" used by others involved in the decision.

-- Playing musical chairs with executives to produce generalist managers also has a high cost. There is great economy and efficiency in having a cadre of managers who know their jobs well and know intuitively where to go to get the information they need for a decision.

-- To work smartly and competitively, managers will have to institutionalize the concept of information as a resource. Information can and must be harnessed to the same advantage as energy or capital have been in the past. To the economic constructs of "capital intensive" and "labor intensive," managers today need to add the growing role of "information-intensive" products and services.

TABLE OF CONTENTS

LIST OF FIGURES

MANAGEMENT INFORMATION;

BACK TO BASICS

Progress in electronics has made the collecting, storing, manipulating, analyzing, 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 we are and how we are coping with management information. If managers are not to be overwhelmed by the torrent of information coming their way, they must be more attuned than ever to making sure that the information they have is the information they need, from whatever source makes sense.

Take as a start these two hypothetical examples.

The chief executive officer of a Mid-Western 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 could have been toasting a recently completed successful public stock offering. In story book fashion, they started their electronics business in the basement. "I just knew this was gonna 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 almost 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. For while the old, established businesses were busy installing and perfecting exquisite formal management information systems, the new wave of entrepreneurs has been successful by vacuuming up intelligence from the world outside their organization and turning 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 compunications (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. They tend 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.

This analysis describes why we believe that decision makers in organizations of all sizes and classifications should consider their priorities and their approaches to the information-gathering function. It explicitly identifies and describes the roles of "unk-unks" and the "fog of war" as factors that cloud the decision-making process even in the face of the tidal wave of information that seems to be flowing into the workplace. Finally, we suggest some general strategies for understanding and coping with the expanded role of information in modern organizations.

Information as a Resource -- the 5% Edge

Today's managers hear repeatedly that they have been moving into an information society or 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 was largely a case of substituting energy from minerals for that of people and animals -- a shift from labor to capital-intensive production. For the past 30 years or so, society 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. Anyone can see this in the information-processsing 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. And computer-aided-design programs that run on desk-top computers not only replace a room full

of drafting tables and draftsmen, but change the traditional relationship between draftsman and engineer.

Information has always been a resource, but in earlier eras, for the most part, it has been a poorly understood component compared to other, more tangible resources. Today, information is easier to conceptualize on an equal footing with other resources. That is, we 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.

For in today's highly competitive, often fast-moving global economy, having only a small edge in the timing or reliability of information may be the difference between an organization's surviving and thriving. Traders in many commodities have known the advantage of having just a few minutes -- or even seconds -- 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 5% better over time. There is the story of the two hikers who spot a grizzly bear stalking them. One hiker 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 is the similar edge for the manager.

The current era is not the first in which changing information technology has had a widespread impact on organizations and their managers. Alfred Chandler points out this idea in his book The Visible Hand in referring to the growth in the complexity of organizations in the 19th century.

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.[1] The largest woolen manufacturers in the world in 1850, Bay State Mills in Lawrence, Mass., had only 2200 employees.[2] But accelerating industrialization and national markets required larger, far more complex organizations. Thus, by 1891, the Pennsylvania Railroad, for example, grew into an organization with more than 110,000 employees.[3]

Many changes had to occur to allow managers to operate organizations of that size and to 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 occurred to permit the needed growth of internal correspondence, such as typewriters, mimeographs, and the vertical filing system.[4] Thus, developments in information technology created

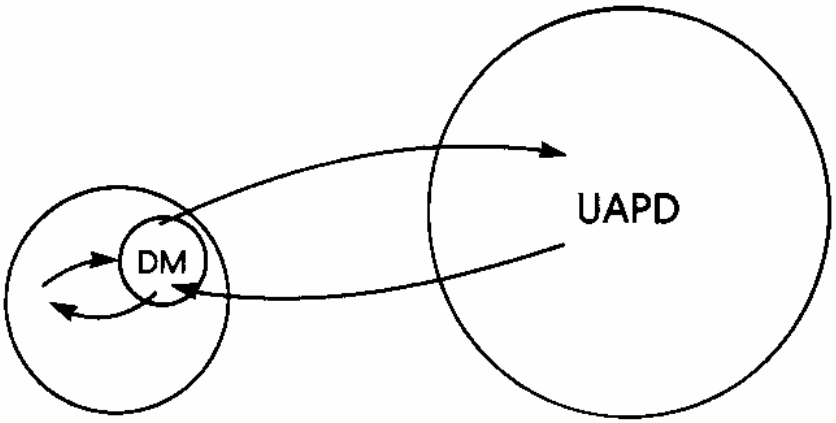
the conditions that allowed organizational structures to respond to the production economies made possible by the Industrial Revolution.

Role of Intelligence

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

Figure 1

Intelligence for Decision Making

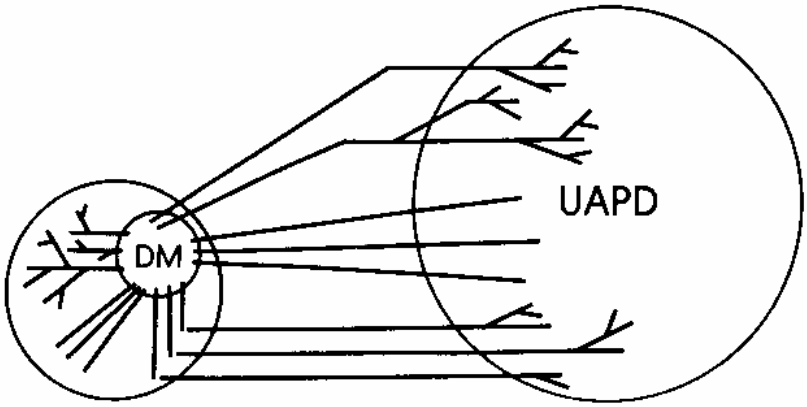


Both of these worlds are in flux, especially the UAPD, which is constantly expanding as more information comes on the scene all the time. Decision makers have to keep an eye not only on their own small universes but on the UAPD as well, looking for information useful in managing the organization while 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. An IBM may be able to establish a de facto technical standard, for example. But most managers, most of the time, are successful if they can keep out of the way of threats or even leverage a minor opportunity. Part of what managers must do is find out what is going on in their own organization and in the world outside and try to bring the former into some sort of equilibrium with the latter to achieve some desired end.

Figure 2

Complex Webs of Systems



What successful managers end up with is a complex web of systems for intelligence gathering, illustrated by Figure 2. This network encompasses those in the organization charged with gathering and reporting information on what is happening 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 both the organization and the outside world themselves to make their own evaluation of what is going on.

Sources of Decision-Making Information

Decision makers utilize this complex web of systems as an information network, sometimes consciously, generally reflexively. Often however, this web is an underutilized tool. Managers have contact with 10 to 20 superiors, including the chief executive officer, who in turn has a board of directors to contend with. They have dozens of peers inside and outside the organization as well as within and without the industry. These are people they have grown up with and have been associated with, all of whom serve as sources of information. Managers talk with their immediate subordinates, typically five to 15 of these, as well as 50 to 500 of their subordinates farther down the line.[5] Many of these contacts are continuing sources of information.

General managers also have a myriad of contacts outside the organization and industry: bankers, brokers, and analysts -- all possible sources of financial information. There may be hundreds of suppliers and customers, competitors, the press, government regulators or other officials, and the general public as well.

Effective decision makers constantly exercise this network of contacts. In a five-minute conversation on the telephone with just one of these sources, a manager can cover a dozen topics. In other cases, a manager can be very sucessful in soaking up intelligence in the process of walking down the hallway and taking the elevator, asking questions of people on the run.

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

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 already knows or is convinced he 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 -- not always accurate -- that managers accumulate over the years.

These sources may come via either formal or informal processes. Figure 3 summarizes the types of sources in each cell of the model. The formal processes are those that generally form 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, however, although not as easily described as the formal 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 management information systems 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 does accurately characterize 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 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 had passed 10% of the U.S. market as early as 1968 and hit 15% in 1970.[6] Auto industry executives cannot hide behind excuses of being suddenly blind-sided by the quadrupling of gasoline prices after the Arab oil embargoes in 1973 and 1979.

During this time U.S. auto executives would most likely have gotten a better pay back if they had spent more time going to cocktail parties in San Diego or Atlanta and heard why people 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 their industry would have been a great improvement for managers at Ford, GM, 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 was getting important information, while not paying attention to his cash flow situation. Nevertheless, managers err too often toward the other extreme, not recognizing the legitimacy of all sources of information.

Inside vs. Outside: Comparing Managers to Entrepreneurs

Managers in large, bureaucratic organizations have access to all sorts 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 on their own knowledge. As the entrepreneur's successful venture grows, he risks becoming a captive of the organization's newly generated inside information.

This is a phenomenon seen in the magazine publishing business, among others. Before a 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. It appears in mocked-up versions. All along, Time's managers are drawing on their inside information sources as well as on their decision-makers' knowledge. And 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. They face 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 (which is why video magazines tend to be founded by video buffs or 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).

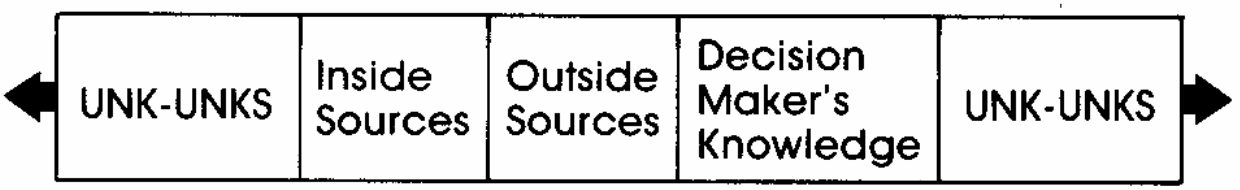
Added Complications: Unk-Unks and the Fog of War

Inside, outside, and decision-makers' knowledge as categories are a necessary but simplified approach to the intelligence problem. They represent set points in that Universe of All Possible Discourse. Figure 4 adds to these observable categories another set of

unilluminated points -- the unknown-unknowns, or the things you don't know you don't know. These are the factors that decision makers did not even realize existed, let alone perceive as having bearing on their decision.

Figure 4

But Every Decision Is Made within a Context of "Unknown-Unknowns"



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, non-telephone 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 as neatly to all sorts of decision making. Military strategist Karl 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."[7] Thus, in any given decision there are relative degrees of what decision makers actually know, whether it's from inside or outside sources or from 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 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 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-makers' 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, including stints with its old operating companies, then back to the parent. 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 monopoly 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 his predecessor had been educated. Meanwhile, the people above and below are being moved around as well, so there are few sources of reliable informal information.

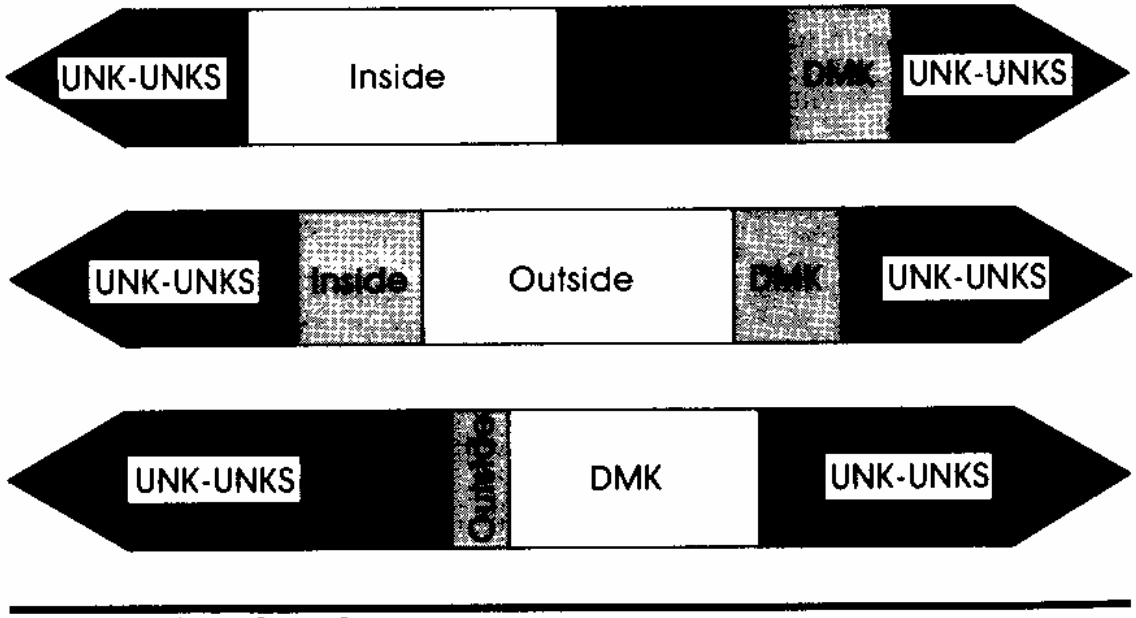
Changing Mixes and Information Mismatches

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 with 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.

Figure 5

The Mix Changes for Each Decision in Each Organization

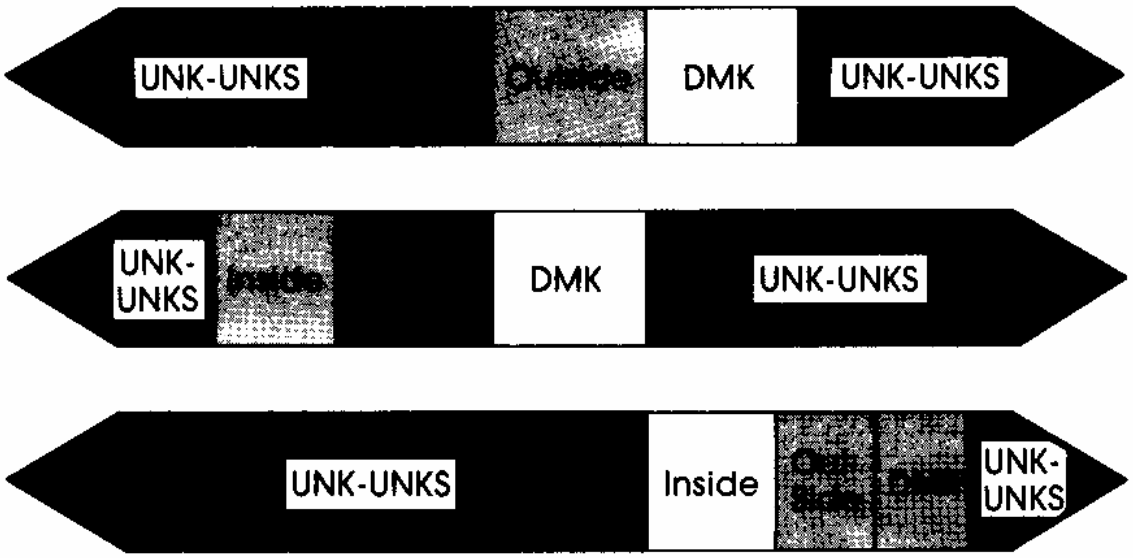


Managers don't give most of the relatively routine decisions much thought. It is the exceptional problem for which the decision maker recognizes that lack of sufficient intelligence and the importance of the decision require spending some resources to gather specific information.

However, the most difficult type of decision from an intelligence perspective 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, outside, decision-maker's knowledge, and unk-unks, as illustrated in Figure 6.

Figure 6

And Complex Decisions in Large Organizations May Entail Complete Information Mismatches



For example, in a new product introduction, the three decision makers may include 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 set-ups as low as possible and has to

contend with work flows and scheduling. There is a high degree of reliance on inside information. The financial manager wants to know the timing of expenditures for equipment, inventory build-up, promotion outlays, and cash flow. He 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. The production manager's own knowledge -- about, say, the difficulty of using a particular dye to produce a particular shade that the market manager decides is essential -- may be a complete unknown to the marketer, who never even thought of this step as a problem. Neither of these managers may have been aware that the demands of the company's seasonal line of credit make it unlikely that the funds will be available for a Spring start-up. 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.

This scenario describes a common type of situation in organizations, one that is usually handled by having committees or task forces drawing on representatives of the departments involved. Nevertheless, two points need 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. What is one manager's own knowledge and thus does not seem to need any elaboration is another manager's unknown-unknown. Neither will therefore 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 involving in a decision a homogeneous group of managers 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 was deciding on adding a new database. The initial meetings involved the editorial and the business development managers. These two shared similar information sources and language. At the last minute, they included the director of computer hardware in their decision. After they brought him up to speed on what they were about to do, he presented them with some technical questions that made 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. An analogy is climbing into a rental car that was last driven by someone 6 inches taller or shorter than you. 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. 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, 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 manager recognizes the need for new sources of information.

Indeed, the problem of information mismatches is often most critical in crisis situations. 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 around him in the Situation Room are not an assortment of experts whom he has never met before 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 himself 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 national security magnitude. 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 reality, if largely unrecognized, for all decision makers.

Optimizing Information for Decision Makers

An old tenet deserves a fresh look here: the assumption that as soon as an organization starts to design a formal institutional information system, it should begin by 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 that information which 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, or to recognize that some action should have been 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 via 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. We have no stone tablets with the six points that will improve the reader's success. There is no single system that fits all circumstances.

Having said this, we believe that several generalizations 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 be not only permitted but 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) Specifically, individual managers should consciously make part of their current job, and part of any future position, an early evaluation of what mix of information sources they have available, they now use, and they might use. Managers 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 their predecessor might have been partial to or tended to ignore. Managers should then rearrange their own mix of sources based on their own set of decision-maker's knowledge. This might involve ordering up different reports from the MIS, stopping others, changing the flow of newsletters, even seeking out a new opponent for raquetball to fill in a gap in the informal outside information.

3) Decision makers should seek to identify as many unk-unks as feasible given the gravity of a decision. In most daily decisions this process is irrelevant. But for those decisions involving commitment of substantial resources, 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, decision makers 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 the decision maker bought a quick consensus at the expense of involving others in the process who might ask the critical question that no one else thought to ask?

5) Re-evaluate any organizational policies of playing musical chairs with executives. Producing generalists is wonderful if the organization can afford it. But there is great economy and efficiency in having a cadre of managers who know their jobs well and know intuitively where to go to get the information they need for a decision.

6) Nothing in the foregoing should be viewed as being particularly critical of the formal management information system itself. Knocking traditional MIS approaches was not our objective -- and such criticism occurs so often it has become almost a cliche. Rather, managers need to recognize that such systems fill one square in the matrix. Formal systems are useful so long as managers understand they don't cover the entire area of decision-relevant information.

Coincidentally, in the course of this work we have also been impressed by the robustness of the common telephone as an important management tool for informed intelligence as well as for command and control. Evidence keeps 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 a telephone conversation with someone he or she knows, a manager may

glean more information than from pages of memos. A manager can pick up the telephone and reach practically any place on earth without concern for whether it's part of the organization's predetermined information system.

Work on information as a resource is still in a developmental stage. At this point its primary value is in raising this notion of the range of sources of legitimate information and in making managers more aware of the information process in their organizations, beyond the use of 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.

NOTES

1. Alfred D. Chandler, Jr. The Visible Hand: The Managerial Revolution in American Business (Cambridge, Mass: The Belknap Press of Harvard University Press, 1977), p. 72.

2. U.S. Bureau of the Census, The 8th Census of the United States Manufactures (Washington, D.C., 1865), p.xxxii.

3. Chandler, p. 204.

4. See JoAnne Yates, "From Press Book and Pigeonhole to Vertical Filing: Revolution in Storage and Access Systems for Correspondence," The Journal of Business Communication, 19:3, pp.5-26.

5. John P. Kotter describes these relationships in The General Managers (New York: The Free Press, 1982).

6. Statistical Abstracts of the United States: 1984, 104th Edition (Washington, D.C.: 1984), p. 575.

7. Karl von Clausewitz, War, Politics, and Power, ed. Edward N. Collins (Chicago: Henry Regnery Company, 1962), p. 128.