



The Knowing Organization: How Organizations Use Information to Construct Meaning, Create Knowledge and Make Decisions

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An organization uses information strategically in three areas: to make sense of change in its environment; to create new knowledge for innovation; and to make decisions about courses of action. These apparently distinct processes are in fact complementary pieces of a larger canvas, and the information behaviors analyzed in each approach interweave into a richer explanation of information use in organizations. Through sensemaking, people in an organization give meaning to the events and actions of the organization. Through knowledge creation, the insights of individuals are converted into knowledge that can be used to design new products or improve performance. Finally, in decision making, understanding and knowledge are focused on the selection of and commitment to an appropriate course of action. By holistically managing its sensemaking, knowledge building and decision-making processes, the Knowing Organization will have the necessary understanding and knowledge to act wisely and decisively. Copyright © 1996 Elsevier Science Ltd

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Introduction

How do organizations use information? This question is much harder than it sounds. Information is an intrinsic component of nearly every activity in the organization, so much so that its function has become transparent. Yet the question is not a frivolous one. Without a firm grasp of how it creates, transforms and uses information, an organization would lack the coherent vision to manage and integrate its information processes, information resources and information technologies. In this paper, we portray the principal ways in which an organization uses information strategically, and suggest how these processes are closely interconnected and could be managed to design a 'knowing organization' that is perceptive, wise, and decisive.

Current thinking in management and organization theory recognizes three distinct areas in which the creation and use of information play a strategic role in determining an organization's capacity to grow and adapt. First, organizations search for and evaluate information in order to make important decisions. In theory, this choice is to be made rationally, based upon complete information about the organization's goals, feasible alternatives, probable outcomes of these alternatives, and the values of these outcomes to the organization. In practice, rational choice-making is muddled by the jostling of interests among

organizational stakeholders, bargaining and negotiation between powerful groups and individuals, the limitations and idiosyncracies of personal choice making, the lack of information, and so on. Despite these complications, an organization must keep up at least an impression of rational, reasoned behavior, both to sustain internal trust, and to preserve external legitimacy. Although organizational decision making is a complex, messy process, there is no doubt that it is a vital part of organizational life: all organizational actions are initiated by decisions, and all decisions are commitments to action. Herbert Simon and his associates have maintained that management *is* decision making, so that the best way to analyze organization behavior is to analyze the structure and processes of decision making.

The second area of strategic information use is when the organization makes sense of changes and developments in its external environment. Organizations thrive in a dynamic, uncertain world. A dependable supply of materials, resources, and energy must be secured. Market forces and dynamics modulate the organization's success or failure. Fiscal and legal structures establish its identity and sphere of influence. Societal norms and public opinion constrain the organization's roles and reach. The critical dependencies between an organization and its environment requires the organization to be constantly alert of changes and shifts in its external relationships. Indeed, the organization that has developed early insight on how the industry and markets are moving will have a competitive edge. Unfortunately, messages and signals about events and trends in the environment are invariably ambiguous and are subject to multiple interpretations. As a result, a crucial task of management is to discern the most significant changes, interpret their meaning, and develop appropriate responses. The immediate goal of sensemaking is for an organization's members to share a common understanding of what the organization is and what it is doing; the longer term goal is to ensure that the organization adapts and therefore continues to thrive in a dynamic environment.

The third area of strategic information use is when organizations create, organize and process information in order to generate new knowledge through organizational learning. New knowledge is then applied to design new products and services, enhance existing offerings, and improve organizational processes. Peter Drucker has called knowledge, rather than capital or labor, the only meaningful economic resource of the post-capitalist or knowledge society. For him, the right role of management is to ensure the application and performance of knowledge, that is, the application of knowledge to knowledge.¹ The creation and use of knowledge is a particular organizational challenge. Knowledge and expertise is dispersed throughout the organization, and is often closely held by individuals or work units. There have been numerous accounts of organizations having to reinvent the wheel unnecessarily and not being able to locate the expertise that exists somewhere in the organization. Another obstacle to learning is that organizations find it difficult to unlearn their past—to question inherited assumptions and beliefs, to reject existing practices as the only viable alternatives. Indeed, Senge has warned that many organizations are unable to fully function as knowledge-based organizations—they suffer from learning disabilities.² To overcome these disabilities, the learning organization must develop the capacity for both generative and adaptive learning.

¹DRUCKER, P F (1993) *Post-Capitalist Society* HarperCollins, New York

²SENGE, P M (1990) *The Fifth Discipline: The Art & Practice of the Learning Organization* Doubleday Currency, New York

Organizations as decision making systems

In the decision-making view, the essential features of organizational structure and function may be derived from the characteristics of human decision-making processes and rational human choice.³ In an ideal world, rational choice would require a complete search of available alternatives, reliable information about their consequences, and consistent preferences to evaluate these outcomes. In the real world, such demands on information gathering and processing are unrealistic. Instead of a comprehensive, objective rationality, Herbert Simon suggested that decision making in organizations is constrained by the principle of *bounded rationality*.⁴

The capacity of the human mind for formulating and solving complex problems is very small compared with the size of the problems whose solution is required for objectively rational behavior in the real world—or even for a reasonable approximation to such objective rationality. (p. 198)

What constitute the bounds that limit the capacity of the human mind for rational decision making? Simon identifies three categories of bounds: the individual is limited by his mental skills, habits, and reflexes; by the extent of knowledge and information possessed; and by values or conceptions of purpose which may diverge from organizational goals.⁵ It is because individual human beings are limited in their cognitive ability that organizations become necessary and useful instruments for the achievement of larger purposes. Conversely, the organization can alter the limits to rationality of its members by creating or changing the organizational environment in which the individual's decision making takes place. Simon proposes that the organization influences its members' behaviors by controlling the *decision premises* upon which decisions are made, rather than controlling the actual decisions themselves.⁶ A fundamental problem of organizing is then in defining the decision premises that form the organizational environment: "The task of administration is so to design this environment that the individual will approach as close as practicable to rationality (judged in terms of the organization's goals) in his decisions."⁷

As a consequence of bounded rationality, the organizational actor behaves in two distinctive ways when making decisions. First, he *satisfies*—he looks for a course of action that is satisfactory or good enough rather than seeking the optimal solution. A course of action is satisfactory if it is practical and exceeds some minimally acceptable criteria. For March and Simon, "most human decision making, whether individual or organizational, is concerned with the discovery and selection of satisfactory alternatives".⁸ The search for a satisfying alternative, motivated by the occurrence of a problem, is concentrated near the symptoms or an old solution, and reflects the training, experience and goals of the participants.

Second, the organization or organizational actor *simplifies* the decision process—he follows routines and applies learned rules of thumb in order to avoid uncertainty and reduce complexity. For example, the organization develops action repertoires using *performance programs* to deal with recurrent situations. By restricting the range of situations and the range of alternatives available, performance programs greatly reduce the cognitive and informational requirements of the decision-making process. For instance, the sounding of the alarm in a fire station

³MARCH, J G AND SIMON, H A (1993) *Organizations* 2nd edition, Blackwell, Oxford

⁴SIMON, H A (1957) *Models of Man: Social and Rational* John Wiley, New York

⁵SIMON, H A (1976) *Administrative Behavior: A Study of Decision-Making Processes in Administrative Organization* 3rd edition, Free Press, New York

⁶*Ibid*

⁷*Ibid*, pp 240–241

⁸*Op cit*, Ref 3, p 162

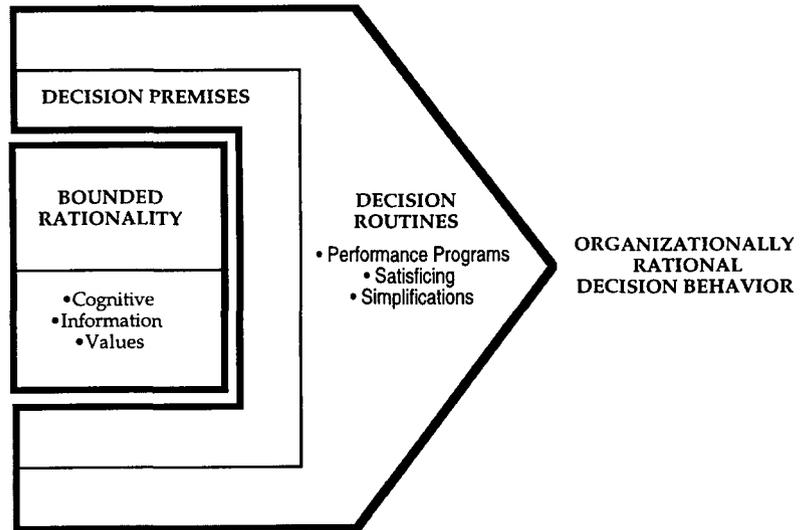


Figure 1 Organizations as decision making systems

initiates a predefined action program, as does the appearance of a relief applicant at a social worker's desk, or the appearance of an automobile chassis in front of the work station of a worker on the assembly line.⁹ Most behavior in organizations is governed by performance programs.

The key features of organizations as decision making systems are shown in *Figure 1*. Organizations seek rational behavior in terms of actions that contribute to its goals and objectives. Unfortunately, the behavior of individual members are constrained by their cognitive capacity, information, and values. A way to bridge the gap between organizational rationality and the individual's bounded rationality is to design decision premises and decision routines that guide or control individual decision behavior.

The decision-making model remains a rational model. The organization is intendedly rational even if its members are only bounded so. Goals and objectives are set first, and when participants encounter problems in the pursuit of these objectives, a search for information on alternatives and consequences takes place, followed by evaluation of the outcomes according to the objectives and preferences. There is a linear, input-output flavor to the model, with a focus on the flow of information in the organization's decision-making processes.

Organizations as sensemaking communities

Whereas the decision-making model assumes that organizational behavior is directed at the attainment of goals and is primarily concerned with uncertainty and choice in the performance of organizational tasks, the sensemaking view suggests that organizational actors have first to make sense of what is happening in their organizational environments in order to develop a shared interpretation that can serve as a context for organizational action. The sensemaking view assumes that people in organizations are continuously trying to understand what is happening around them. This assumption does not require them to be rational processors of information—they may impose their own meaning upon experience, and use the ascribed meaning as a basis for subsequent

⁹*Ibid*

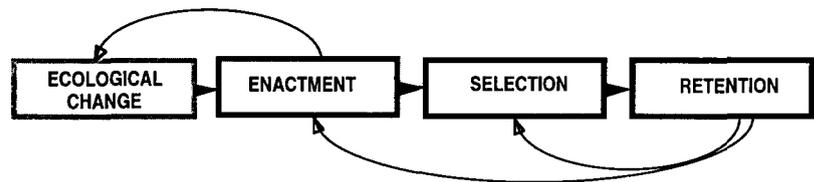


Figure 2 Sensemaking processes in an organization

understanding and action. In other words, people in organizations create their own subjective reality rather than try to discover some existing reality.

In contrast to the rational model in which organizations are tightly bound by decision premises and performance programs, Karl Weick¹⁰ proposes a model of organizations as ‘loosely coupled’ systems in which individual participants have great latitude in interpreting and implementing directions. He stresses the autonomy of individuals and the looseness of the relations linking individuals in an organization. The central information activity is resolving the *equivocality* of information about the organization’s environment. This sensemaking is done retrospectively since we cannot make sense of events and actions until they have occurred and we can then glance backward in time to construct their meaning. Current events are compared with past experience in order to construct meaning: “the goal of organizations, viewed as sensemaking systems, is to create and identify events that recur to stabilize their environments and make them more predictable. A sensible event is one that resembles something that has happened before.”¹¹

An organization engages in sensemaking through four sets of interlocking processes: ecological change, enactment, selection, and retention (*Figure 2*). Sensemaking begins when there is some change or difference in the organizational environment, resulting in disturbances or variations in the flows of experience affecting the organization’s participants. This *ecological change* requires the organization’s members to attempt to understand these differences and to determine the significance of these changes. In trying to understand the meaning of these changes, an organizational actor may take some action to isolate or bracket some portion of the changes for closer examination. Thus, managers respond to equivocal information about the external environment by *enacting* the environment to which they will adapt. In creating the enacted environment, they attend to certain elements of the environment—they selectively bracket actions and texts, label them with nouns, and look for relationships. When managers enact the environment, they “construct, rearrange, single out, and demolish many ‘objective’ features of their surroundings . . . they unrandomize variables, insert vestiges of orderliness, and literally create their own constraints.”¹² The result of this *enactment* is to generate equivocal raw data about environmental changes, raw data that will subsequently be turned into meaning and action.

The enactment process segregates possible environments that the organization could clarify and take seriously, but whether it actually does so depends on what happens in the selection processes. In the *selection* process, answers are generated to the question, “What is going on here?” Selection involves the overlaying of various plausible relationship structures on the enacted raw data in an attempt to reduce their

¹⁰WEICK, K E (1979) *The Social Psychology of Organizing* 2nd edition, Random House, New York

¹¹WEICK, K E (1995) *Sensemaking In Organizations* Sage, Thousand Oaks, CA, p 170

¹²*Op cit*, Ref 10, p 164

equivocality. These structures, often in the form of cause maps, are those that have proven sensible in explaining previous situations, and are now being superimposed on the current raw data to see if they could provide a reasonable interpretation of what has occurred. The selection process therefore reaches into the past to extract history and select a reasonable scheme of interpretation.

In the *retention* process, the products of successful sensemaking are retained for future use. The product of organizational sensemaking is an enacted environment—a sensible rendering of previous events stored in the form of causal assertions, and made binding on some current enactment and/or selection.¹³ Because the enacted environment is based on retrospective interpretations of actions or events already completed, it is like a historical document, stored usually as a map of relationships between events and actions, that can be retrieved and superimposed on subsequent activities. In the sensemaking view, the reason for existence of an organization is to produce stable interpretations of equivocal data about environmental change. Although the entire process operates to reduce equivocality, some equivocal features do and must remain if the organization is to have the flexibility to survive into a new and different future.

An important corollary of the sensemaking model is that organizations behave as interpretation systems:

Organizations must make interpretations. Managers literally must wade into the swarm of events that constitute and surround the organization and actively try to impose some order on them . . . Interpretation is the process of translating these events, of developing models for understanding, of bringing out meaning, and of assembling conceptual schemes.¹⁴

What is being interpreted is the organization's external environment, and how the organization goes about its interpretation depends on how analyzable it perceives the environment to be and how actively it intrudes into the environment to understand it. Equivocality is reduced by managers and other participants who extensively discuss ambiguous information cues and so arrive at a common interpretation of the external environment.

Organizations as knowledge creating enterprises

Nonaka and Takeuchi recently presented a comprehensive model of how organizations dynamically create knowledge.¹⁵ Knowledge creation is achieved through a recognition of the synergistic relationship between tacit and explicit knowledge in the organization, and through the design of social processes that create new knowledge by converting tacit knowledge into explicit knowledge. *Tacit knowledge* is personal knowledge that is hard to formalize or communicate to others. It consists of subjective know-how, insights, and intuitions that comes to a person from having been immersed in an activity for an extended period of time. *Explicit knowledge* is formal knowledge that is easy to transmit between individuals and groups. It is frequently articulated in the form of mathematical formulas, rules, specifications, and so on. The two categories of knowledge are complementary. Tacit knowledge, while it remains closely held as personal know-how, is of limited value to the

¹³*Op cit*, Ref 10, p 166

¹⁴WEICK, K E AND DAFT, R L (1983) 'The effectiveness of interpretation systems' in CAMERON, K S AND WHETTEN, D A (EDS) *Organizational Effectiveness: A Comparison of Multiple Models* Academic Press, New York, pp 71-93

¹⁵NONAKA, I AND TAKEUCHI, H (1995) *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation* Oxford University Press, New York

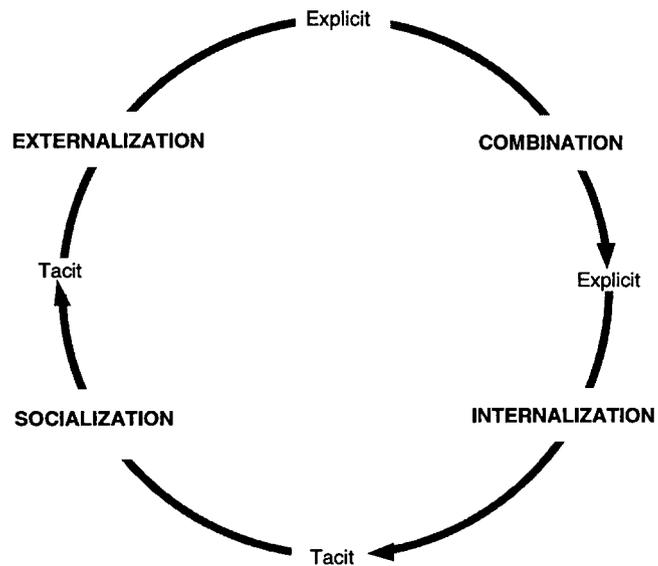


Figure 3 Organizations as knowledge creating enterprises

organization. Explicit knowledge does not appear spontaneously, but must be nurtured and cultivated from the seeds of tacit knowledge. Organizations need to become skilled at converting personal, tacit knowledge into explicit knowledge that can push innovation and new product development. Whereas Western organizations tend to concentrate on explicit knowledge, Japanese firms differentiate between tacit and explicit knowledge, and recognize that tacit knowledge is a source of competitive advantage.

There are four modes of knowledge conversion (*Figure 3*): socialization, externalization, combination, and internalization. *Socialization* is a process of acquiring tacit knowledge through sharing experiences. As apprentices learn the craft of their masters through observation, imitation, and practice, so do employees of a firm learn new skills through on-the-job training. When Matsushita was developing an automatic home bread-making machine in the late 1980s, its software engineers apprenticed themselves to the head baker of the Osaka International Hotel, who was reputed to produce the area's best bread, and discovered that the baker was not only stretching but also twisting the dough in a particular fashion, which turned out to be the secret for making tasty bread. This twisting-stretch movement was copied by the machine, and Matsushita's Home Bakery product sold a record-setting volume in its first year. (Examples of knowledge creation processes are from Nonaka and Takeuchi.¹⁶)

Externalization is a process of converting tacit knowledge into explicit concepts through the use of metaphors, analogies, or models. The externalization of tacit knowledge is the quintessential knowledge-creation activity and is most often seen during the concept creation phase of new product development. When Canon was designing the Mini-Copier, it had to produce a low-cost disposable cartridge that would eliminate the need for expensive maintenance. One day, after consuming cans of beer following a heated discussion, the design group leader asked how much it would cost to manufacture a beer can. By examining beer cans, the group discovered how to fabricate the low-cost

¹⁶*Ibid*

disposable aluminium drum cylinder that eventually established Canon's leadership position in the personal copier market.

Combination is a process of creating explicit knowledge by bringing together explicit knowledge from a number of sources. Thus, individuals exchange and combine their explicit knowledge through telephone conversations, meetings, memos, and so on. Existing information in computerized databases may be massaged to produce new explicit knowledge. At Kraft General Foods, point-of-sales data are analyzed to find out not only what does and does not sell, but also to develop new ways to increase sales. Stores and shoppers are classified into categories, so that the system can pinpoint who shops for which goods at what stores, and provide timely recommendations on merchandise mix and sales promotions.

Finally, *internalization* is a process of embodying explicit knowledge into tacit knowledge, internalizing the experiences gained through the other modes of knowledge creation in the form of shared mental models or work practices. Internalization is facilitated if individuals can re-experience indirectly the experience of others. At GE's Answer Centre in Louisville, Kentucky, all customer complaints go into a huge database. The new-product development team can then use this database to re-experience for themselves what the telephone operators had encountered.

As shown in *Figure 3*, the four modes of knowledge conversion feed off each other in a continuous spiral of organizational knowledge creation. Knowledge creation typically begins with individuals who develop some insight or intuition into how better to do their tasks. This tacit know-how may be shared with others through socialization. However, as long as the knowledge stays tacit, the organization is unable to exploit it further. Thus, the tacit know-how of the master baker's kneading technique has to be converted into explicit knowledge that is then used to design the kneading mechanism inside the bread-making machine. From the organization's perspective, externalization of tacit knowledge into explicit concepts is therefore vital. Drawing out tacit knowledge requires taking a mental leap, and often involves the creative use of a metaphor or analogy (recall the aluminium beer can in Canon's design of disposable copier cartridge). An organization would have several bodies of explicit knowledge generated by different groups or units at different points in time. These disparate bodies of expertise may be combined and reconfigured into new forms of explicit knowledge. Lastly, the new explicit knowledge created through the various modes would have to be re-experienced and re-internalized as new tacit knowledge.

Towards the knowing organization

Of the three models, the rational decision making framework is probably the most influential and widely applied. Yet there are some perplexing behavior patterns common in organizations that do not seem to fit this view. People gather information ostensibly for decisions but do not use it.¹⁷ They ask for reports but do not read them. Individuals fight for the right to take part in decision processes, but then do not exercise that right. Policies are vigorously debated but their implementation is met with indifference.¹⁸ Managers observed in situ seemed to spend little time in making decisions, but are instead most often

¹⁷FELDMAN, M S AND MARCH, J G (1981) 'Information in organizations as signal and symbol' *Administrative Science Quarterly* 26 (2) 171-186

¹⁸MARCH, J G AND OLSEN, J P (1976) *Ambiguity and Choice in Organizations* Universitetsforlaget, Bergen

engaged in meetings and conversations.¹⁹ Such findings seem to suggest that decision making, apart from being an occasion for making choices, is also “an arena for developing and enjoying an interpretation of life and one’s position in it. A business firm is a temple and a collection of sacred rituals as well as an instrument for producing goods and services. The rituals of choice tie routine events to beliefs about the nature of things. They give meaning.”²⁰ In other words, organizational life is not just about choice but also about interpretation, and the process of decision making must embrace the process of sensemaking even as it examines the behaviors of choice-making. In their introduction to the 1993 edition of their 1958 classic, *Organizations*, March and Simon wrote:

Some contemporary students of meaning in organizations would go further to assert that it is interpretation, rather than choice, that is central to life. Within such a view, organizations are organized around the requirement to sustain, communicate, and elaborate interpretations of history and life—not around decisions. Decisions are instruments to interpretation, rather than the other way round. Although we think an interpretive perspective yields important insights into organizations, we would not go that far, even in retrospect. But we suspect that a 1992 book on organizations, even while reaffirming that there is a real world out there to which organizations are adapting and which they are affecting, would need to pay somewhat more attention than a 1958 book did to the social context of meaning within which organizations operate.²¹

In the sensemaking model, the enacted environment is an output of the meaning-construction process, and serves as a reasonable, plausible guide for action. However, once the environment has been enacted and stored, people in the organization now face the critical question of what to do with what they know—these are what Weick has called ‘the consequential moments’.²² Furthermore, the shared interpretations are a compromise between stability and flexibility—some equivocal features do and must remain in the stored interpretations, so that the organization has the flexibility to adapt to a new and different future. People in organizations are therefore “people who oppose, argue, contradict, disbelieve, doubt, act hypocritically, improvise, counter, distrust, differ, challenge, vacillate, question, puncture, disprove, and expose. All of these actions embody ambivalence as the optimal compromise to deal with the incompatible demands of flexibility and stability.”²³ Where decision premises in the decision-making model control organizational choice-making, shared assumptions and experiences in the sensemaking model constrain the ways that people in an organization perceive their world. Both phenomena are aspects of premise control, and premise control becomes a useful concept that joins sensemaking with decision making.²⁴ The central concern of sensemaking is understanding how people in organizations construct meaning and reality, and then exploring how that enacted reality provides a context for organizational action, including decision making and knowledge building.

Commenting on the rational decision-making model, Nonaka and Takeuchi argued that this information processing view has a fundamental limitation.²⁵ For them, the decision-making model does not really explain innovation. The decision making view is essentially

¹⁹MINTZBERG, H (1973) *The Nature of Managerial Work* Harper and Row, New York; KOTTER, J P (1982) *The General Managers* Free Press, New York

²⁰CYERT, R M AND MARCH, J G (1992) *A Behavioral Theory of the Firm* 2nd edition, Blackwell, Oxford, p 236

²¹*Op cit*, Ref 3, p 18

²²*Op cit*, Ref 10

²³*Ibid*, p 229

²⁴*Op cit*, Ref 11, p 114

²⁵*Op cit*, Ref 15

conservative, where decision premises and performance programs are designed for control, and search biases inhibit radically innovative solutions. On the other hand, “when organizations innovate, they do not simply process information, from the outside in, in order to solve existing problems and adapt to a changing environment. They actually create new information and knowledge, from the inside out, in order to redefine both problems and solutions and, in the process, to re-create their environment.”²⁶ The key to innovation is in unlocking the personal, tacit knowledge of the organization’s members. This knowledge conversion process has to take place against the backdrop of a shared understanding of what the organization stands for and where it is headed, in other words, a *knowledge vision* that “defines the ‘field’ or ‘domain’ that gives corporate members a mental map of the world they live in and provides a general direction regarding what kind of knowledge they ought to seek and create.”²⁷

Although the three arenas of information use—sensemaking, knowledge building, and decision making—are often treated as distinct and separate organizational processes, closer scrutiny suggests that they are in fact highly interconnected processes, and that by analyzing how the three activities energize each other, a holistic view of organizational information use emerges. Our discussion reveals that the three models complement each other by supplying some of the missing pieces necessary for each model to function. At a general level, we can visualize the three models as representing three concentric layers of organizational information behaviors, with each inner layer building upon the information outputs of the outer layer (*Figure 4*). Information flows from the external environment (outside the circles) and is progressively assimilated and focused to enable organizational action. First, information about the organization’s environment is sensed and its meaning is socially constructed. During *sensemaking*, the principal information process is the interpretation of news and messages about the environment. Members must choose what information is significant and should be attended to; they form possible explanations from past experience; and they exchange and negotiate their views in order to arrive at a common interpretation. Sensemaking supplies a meaningful context for all organizational activity and in particular guides the knowledge creation processes. Knowledge resides in the minds of individuals, and this personal knowledge needs to be converted into knowledge that can be shared and transformed into innovations. During *knowledge creation*, the main information process is the conversion of knowledge. Members share their personal knowledge through apprenticeships and training, and articulate what they intuitively know through dialogue and discourse, as well as more formal channels. When there is sufficient understanding and knowledge, the organization is primed for action, and chooses its course rationally according to its goals. During *decision making*, the key information activity is the processing of information about the available alternatives in order to weigh their relative merits and demerits. Members typically follow a sequence of steps and adopt a set of criteria to collect information, design alternatives, and evaluate alternatives. The resulting organizational action changes the environment, and produces new streams of experience for the organization to adapt to, thus beginning another cycle. All three information modes—interpretation, conversion, and processing—are dynamic social processes, subject to interruptions and iterations.

²⁶*Op cit*, Ref 15, p 56

²⁷*Op cit*, Ref 15, p 227

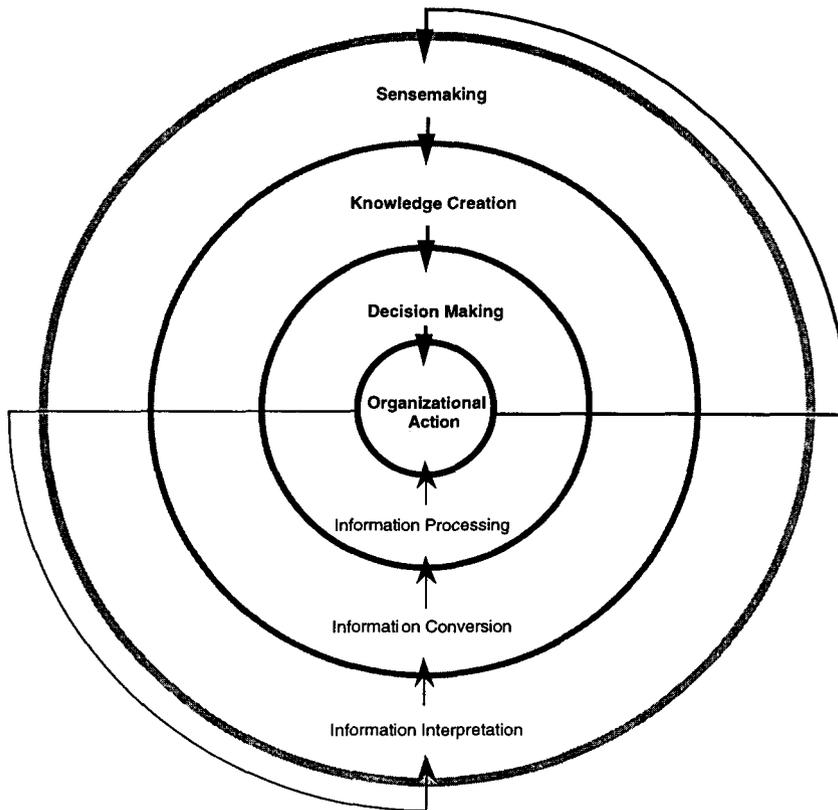


Figure 4 The Knowing Organization

The organization that effectively integrates sensemaking, knowledge creation, and decision making in the manner we have just described may be called a Knowing Organization. The Knowing Organization possesses information and knowledge so that it is well informed, mentally perceptive, and enlightened. Its actions are based upon a shared and valid understanding of the organization's environments and needs, and are leveraged by the available knowledge resources and skill competencies of its members. The Knowing Organization possesses information and knowledge that confers a special advantage, allowing it to manoeuvre with intelligence, creativity, and occasionally, cunning.

The knowing cycle in action

For an example of the knowing cycle in action, consider the strategic planning approach of the Royal Dutch/Shell Group of companies. Shell is a century old company that has shown adaptiveness in anticipating and reacting to changing environments. In the early 1970s, Shell was able to discern differences between Iran and Saudi Arabia (while everyone else perceived the Arab oil nations as a homogenous cartel) and thus anticipate the shortages that led to the 1973 oil crisis. In 1981, Shell was able to sell off its excess reserves (while other companies were stockpiling following the Iran-Iraq war) before the glut caused the price collapse. More recently, by recognizing the demographic and economic pressures on the Soviet Union (while Western politicians saw only an evil communist empire), Shell was able to anticipate glasnost. Arie de Geus, head of planning of Shell for more than three decades, observes

that “Outcomes like these don’t happen automatically. On the contrary, they depend on the ability of a company’s senior managers to absorb what is going on in the business environment and to act on that information with appropriate business moves.”²⁸

As a large multinational with interests all over the world, Shell faces a daunting task as it attempts to make sense of its highly complex and equivocal environment. In trying to construct plausible interpretations of the external environment, Shell’s planners differentiate between knowable ‘predetermined variables’ and unknowable ‘key uncertainties’, a process that is equivalent to enacting the environment. Predetermined variables are reasonably predictable (using for example, demographic data) and set the boundaries of future scenarios, while key uncertainties are hard to predict and point out the most serious consequences of the decisions taken. In selecting a reasonable interpretation, Shell’s managers and planners plot out two or three scenarios, and use them in extended conversations to converge on a shared representation of the environment and a consensus on what Shell is to be in that new environment.²⁹ Shell has developed scenario planning techniques that have been used to draw out the personal, tacit knowledge of managers and planners, and externalize the knowledge into formal scenarios which facilitate the creation of a shared interpretation of external developments.³⁰ Planners use an interviewing method with trigger questions and feedback which reveal the mental models, assumptions, and critical concerns of managers.³¹ These assumptions and concerns are then weaved into a few scenarios that managers can use to deepen their understanding and uncover possibilities for action. The insight and knowledge gained through scenario planning must be translated into specific courses of action. Shell Nederland, a sizeable member of the Shell group, uses a set of search and decision routines (called a strategic review) to develop a strategy for action.³² In evaluating a particular option or project, data on a small number of key variables (such as historic price and cost analyses, exchange rates) are searched and presented. The premise here is that most businesses’ income variations are determined by changes in only a few key variables. This analysis results in expected income ranges, which are then compared with required income levels derived from longer term strategic goals. The course of action with acceptable risk-payoff is then selected.

Shell has been able to effectively manage and integrate its sense-making, knowledge building, and decision-making processes in scenario planning and strategy development. Its ability to survive and adapt through the years is due in no small part to its skill in scanning the environment, developing interpretations or scenarios that provide a context for action, mobilizing the tacit knowledge of its managers and planners, and implementing hard-headed decision routines to aid strategy development.

Our description of the Knowing Organization provides a unified view of the principal ways in which an organization can make use of information strategically. By attending to and making sense of signals from its environment, the organization is able to adapt and thrive. By mobilizing the knowledge and expertise of its members, the organization is constantly learning and innovating. By designing action and decision routines based on what its members know and believe, the organization is able to choose and commit itself to courses of action.

²⁸DE GEUS, A P (1988) ‘Planning as learning’ *Harvard Business Review* 66 (2) 70–74

²⁹KLEINER, A (1994) ‘Creating scenarios’ in SENGE, P, KLEINER, A, ROBERTS, C, ROSS, R AND SMITH B (EDS) *The Fifth Discipline Fieldbook* Doubleday, New York, pp 275–278

³⁰WACK, P (1985) ‘Scenarios: uncharted waters ahead’ *Harvard Business Review* 63 (5) 72–89

³¹VAN DER HEIJDEN, K (1994) ‘Shell’s internal consultancy’ in SENGE, P, KLEINER, A, ROBERTS, C, ROSS, R AND SMITH, B (EDS) *The Fifth Discipline Fieldbook* Doubleday, New York, pp 279–286

³²LEEMHUIS, J P (1985) ‘Using scenarios to develop strategies’ *Long Range Planning* 18 (2) 30–37