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Abstract

Environmental scanning is the acquisition and use of information about events, trends, and relationships in an organization's external environment, the knowledge of which would assist management in planning the organization's future course of action. Depending on the organization's beliefs about environmental analyzability and the extent that it intrudes into the environment to understand it, four modes of scanning may be differentiated: undirected viewing, conditioned viewing, enacting, and searching. We analyze each mode of scanning by examining its characteristic information needs, information seeking, and information use behaviors. In addition, we analyze organizational knowing processes by considering the sensemaking, knowledge creating and decision making processes at work in each mode.

Keywords: knowledge, sensemaking

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Introduction

Environmental scanning is the acquisition and use of information about events, trends, and relationships in an organization's external environment, the knowledge of which would assist management in planning the organization's future course of action. (Aguilar 1967, Choo and Auster 1993) Organizations scan the environment in order to understand the external forces of change so that they may develop effective responses which secure or improve their position in the future. They scan in order to avoid surprises, identify threats and opportunities, gain competitive advantage, and improve long- and short-term planning (Sutton 1988). To the extent that an organization's ability to adapt to its outside environment is dependent on knowing and interpreting the external changes that are taking place, environmental scanning constitutes a primary mode of organizational learning. Environmental scanning includes both *looking at* information (viewing) and *looking for* information (searching). It could range from a casual conversation at the lunch table or a chance observation of an angry customer, to a formal market research program or a scenario planning exercise.

Research on Scanning

Scanning or browsing behavior is influenced by external factors such as environmental turbulence and resource dependency, organizational factors such as the nature of the business and the strategy pursued, information factors such as the availability and quality of information, and personal factors such as the scanner's knowledge or cognitive style. Thus, many research studies on scanning investigate the effect of situational dimensions, organizational strategies, information needs, and personal traits on scanning behavior (Fig. 1). *Situational dimensions* are often studied by measuring the perceived uncertainty of the external environment, a concept that is closely related to the perceived environmental analyzability of the scanning-interpretation-learning model that we discussed in the last section. *Organizational strategies* refer to the position or stance of the organization vis-a-vis the outside environment, and two examples of well-known strategy typologies are those developed by Miles and Snow (1978) and Porter (1980). *Managerial traits* that have been studied include the managers' functional specialty, hierarchical level, and cognitive style. Scanning as a form of information behavior comprises information needs, information seeking, and information use. In the context of environmental scanning, *information needs* are often studied with respect to the focus and scope of scanning, particularly the environmental sectors where scanning is most intense. *Information seeking* has been examined in terms of the sources that are used to scan the environment as well as the organizational methods and systems deployed to monitor the environment. Finally, *information use* is usually looked at in relation to decision making, strategic planning, or equivocality reduction.
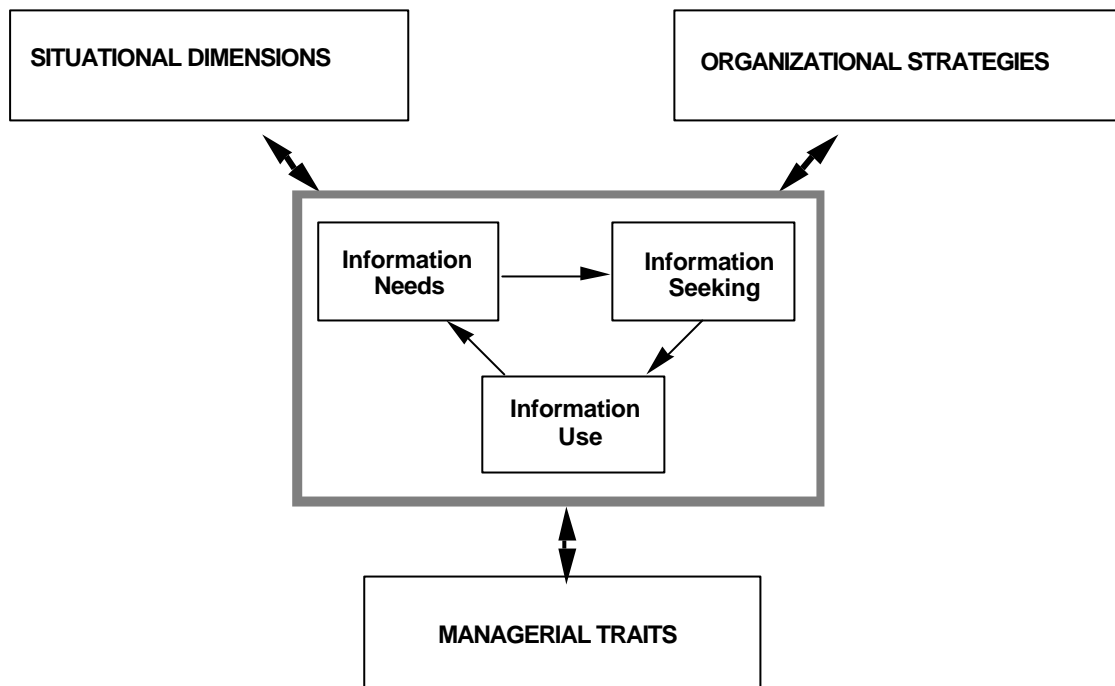
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Figure 1 A Conceptual Framework for Environmental Scanning

What may be gleaned from the research that has been completed so far on environmental scanning as a mode of strategic organizational learning? A summary may include the following observations (Choo 2002):

(1) *Situational dimensions: The effect of perceived environmental uncertainty.* Managers who perceive the environment to be more uncertain will tend to scan more. Environmental uncertainty is indicated by the complexity, dynamism, and importance of the sectors comprising the external environment.

(2) *Organizational strategy and scanning strategy.* An organization's overall strategy is related to the sophistication and scope of its scanning activities. Scanning must be able to provide the information and information processing needed to develop and pursue the elected strategy.

(3) *Managerial traits: Unanswered questions.* Little is known with confidence about the effect of the manager's job-related and cognitive traits on scanning. Upper-level managers seem to scan more than lower-level managers. Functional managers scan beyond the limits of their specializations.

(4) *Information needs: The focus of environmental scanning.* Most studies look at scanning in various environmental sectors: customers, competitors, suppliers, technology; social, political, economic conditions. Business organizations focus their scanning on market-related sectors of the environment.

(5)   *Information seeking: Source usage and preferences.* Although managers scan with a wide range of sources, they prefer personal sources to formal, impersonal sources, especially when seeking information about developments in the fluid market-related sectors.

(6)   *Information seeking: Scanning methods.* Organizations scan in a variety of modes, depending on the organization's size, dependence and perception of the environment, experience with scanning and planning, and the industry that the organization is in.

(7)   *Information use: Strategic planning and enhanced organizational learning.* Information from scanning is increasingly being used to drive the strategic planning process. Research suggests that effective scanning and planning is linked to improved organizational learning and performance.

Figure 2 outlines these principal findings, using the conceptual framework shown earlier.

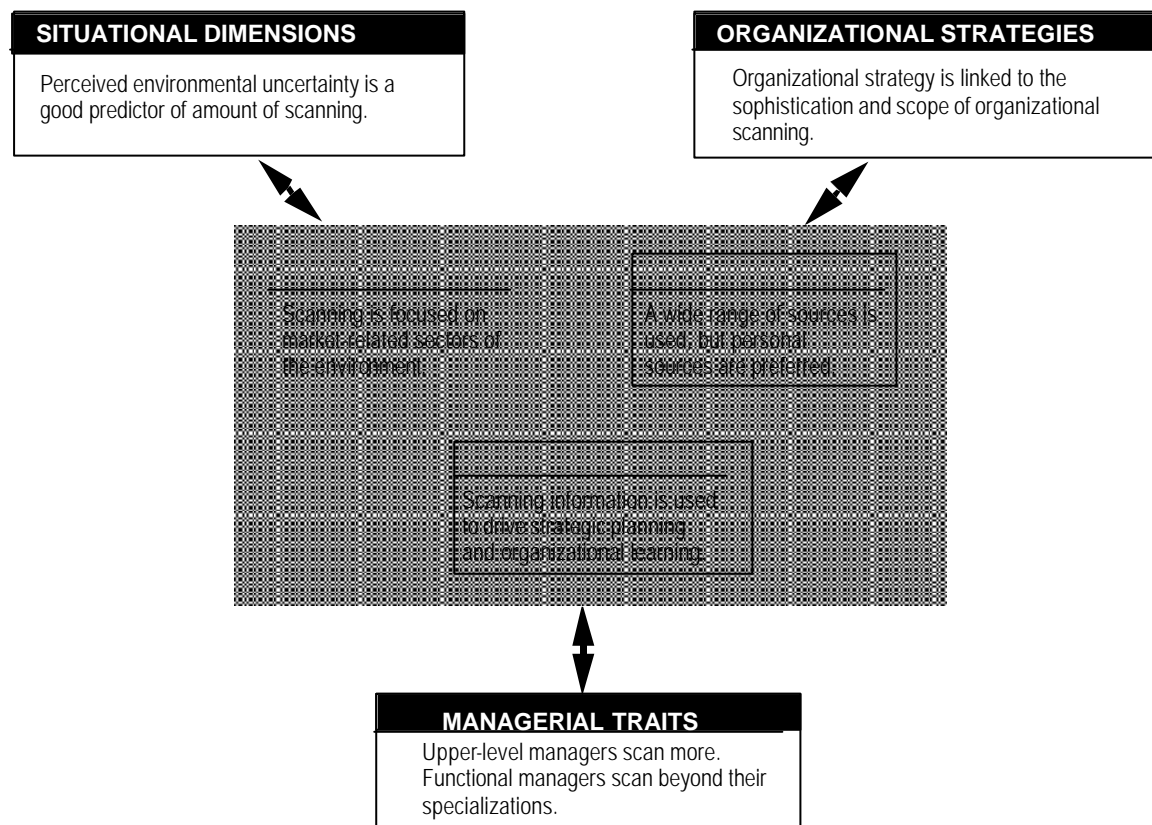Figure 2 Summary of Principal Findings from Research on Environmental Scanning

Scanning and Performance

Does environmental scanning improve organizational performance? Several studies suggest that this is the case. Miller and Friesen (1977) analyzed 81 detailed case studies of successful and failing businesses, and categorized them according to ten archetypes — six for succesful and four for

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unsuccessful firms. The study found that intelligence-rationality factor, which comprises environmental scanning, controls, communication, adaptiveness, analysis, integration, multiplexity, and industry experience, was by far the most important factor in separating the succesful companies from the unsuccessful, accounting for more than half of the observed variance. The environmental scanning and intelligence activity in all but one of successful archetypes were judged to be 'substantial' or 'concerted,' whereas the intelligence effort in the failing firms were described as 'poor' and 'weak.' Miller and Friesen observed that

> One fact is particularly worth noting. That is that the highest intelligence/rationality score amongst the failure archetypes is lower than the lowest intelligence/rationality score amongst the successful archetypes. The intelligence factor discriminates perfectly amongst failure and succesful archetypes. (Miller and Friesen 1977, p.269)

Newgren et al (1984) compared the economic performance of 28 US corporations which practised environmental scanning with 22 non-practising firms. Performance was measured over a five-year period (1975-1980) using the firm's share price/earning ratio, normalized by industry. Data analysis showed that scanning firms significantly outperformed non-scanning firms. The average annual performance of the scanning firms was also consistently better than the non-scanning firms throughout the period. The study concluded that environmental scanning and assessment has a positive influence on corporate performance. Scanning also benefits small businesses.

Dollinger (1984) analyzed the performance of 82 small firms and concluded that intensive boundary spanning activity was strongly related to organization's financial performance, where boundary spanning was measured by the number of contacts with outside constituencies such as customers, competitors, government officials, trade associations, and so on.

West (1988) examined the relationship of organizational strategy *and* environmental scanning to performance in the US foodservice industry. Data were collected from 65 companies over the period 1982 to 1986. Strategy was classified according to Porter's (1980) typology of product differentiation, low cost leadership, and niche focus. The study found that strategy and environmental scanning had a substantial influence on the firm's return on assets and return on sales. High-performing firms in both differentiation and low cost strategies engaged in significantly greater amounts of scanning than low-performing firms in those two strategic groups.

Daft et al's 1988 study of scanning by chief executives found that executives of high-performing firms (those with higher return on assets) increased the frequency, intensity, and breadth of their scanning as external uncertainty rose.

Subramanian and his associates' studied scanning and performance in US Fortune 500 companies and found support for a relationship between performance, measured by profitability and growth, and advanced scanning systems: firms using advanced systems to monitor external events showed higher growth and profitability than firms that did not have such systems (Subramanian et al 1993a).

Subramanian led another recent study of over 600 hospitals of the American Hospital Association which concluded that hospitals with the more sophisticated scanning functions performed significantly better than hospitals which used less advanced or basic methods to monitor the environment (Subramanian et al 1994). The sophisticated scanners scored high in their ability to obtain information *and* their ability to use the scanning information in the strategic planning process. These hospitals performed better in terms of occupancy rates and per bed expenditures.

The benefits of scanning were not solely economic or financial. In an in-depth case study of environmental scanning at the Georgia Center for Continuing Education, Murphy (1987) concluded that scanning is an important component of the organization's strategic planning process, improving the Center's ability to react to and implement change in response to external factors. Furthermore, scanning has also contributed to increased communication among the line and staff personnel of the organization, and greater employee involvement in the decision making process. Ptaszynski (1989) examined the effect of the introduction of environmental scanning in another educational organization. The study found scanning to have a positive effect on the organization in these areas: communication, shared vision, strategic planning and management, and future orientation. The most significant effect was that scanning provided a structured process which encouraged people to regularly participate in face-to-face discussions on planning issues. As a result, the organization was able to develop a number of strategic options that could be used proactively to cope with external change.

To recap, information derived from environmental scanning is increasingly being used to drive the strategic planning process by business and public-sector organizations in most developed countries. There is research evidence to show that environmental scanning is linked with improved organizational performance. However, the practice of scanning by itself is insufficient to assure performance – scanning must be *aligned* with strategy, and scanning information must be effectively *utilized* in the strategic planning process. An important effect of scanning is to increase and enhance communication and discussion about future-oriented issues by people in the organization. Coupled with the availability of information on external change, scanning can induce strategic, generative organizational learning.

Towards A Model of Organizational Scanning

Despite its importance, our theoretical understanding of organizational scanning remains limited. Although all forms of scanning necessarily involves the seeking and use of information about the environment, different organizations operating in different environments may be expected to scan quite differently. Aguilar (1967) identified four modes of managerial scanning based on his field research. Daft and Weick (1984) and Weick and Daft (1983) build on Aguilar's work and develop a general model of organizational scanning based on the two dimensions of environmental analyzability ("can we analyze what is happening in the environment?") and organizational intrusiveness ("do we intrude actively into the environment to collect information?"). The objective of this paper is to elaboratethe Aguilar/Daft and Weick model in two ways. First, since scanning is a quintessential form of organizational information seeking, we elaborate the model by detailing the information needs, information seeking, and information use patterns that characterize organizational scanning. Second, since the goal of scanning is the gaining of new knowledge that enables action, we elaborate the model by detailing the sensemaking, knowledge-creation, and decision-making processes that constitute organizational scanning.

In the first part of the paper (Section 1 and 2), we present the Daft and Weick model and its four modes of scanning, outlining each mode in terms of information needs, seeking, and use. In the second part (Section 3 and 4), we extend the analysis to see how scanning allows the organization to construct meaning, create knowledge, and make decisions. The overall goal is to enhance our understanding of environmental scanning not only as information seeking, but as organizational learning that leads to change and action.

Environmental Analyzability and Organizational Intrusiveness

Daft and Weick (1984) suggest that organizations differ in their modes of scanning, depending on management's beliefs about the analyzability of the external environment, and the extent to which the organization intrudes into the environment to understand it. An organization that believes the environment to be analyzable, in which events and processes are determinable and measurable, might seek to discover the 'correct' interpretation through systematic information gathering and analysis. Conversely, an organization that perceives the environment to be unanalyzable might create or enact what it believes to be a reasonable interpretation that can explain past behavior and suggest future actions.

Daft and Weick (1984) hypothesize that differences in perceptions of **environmental analyzability** are due to characteristics of the environment combined with management's previous interpretation experience. We may postulate further that analyzability would be closely related to the concept of

perceived environmental uncertainty. Perceived environmental uncertainty is the variable that measures the totality of the scanner's perception of the external environment's complexity and changeability. Duncan (1972) identified dimensions of the environment that would determine its perceived uncertainty: the simple-complex dimension (the number of environmental factors considered in decision making) and the static-dynamic dimension (the degree to which these factors change over time). Decision makers in environments that are dynamic and complex experience the greatest amount of perceived environmental uncertainty. Thus, perceived environmental uncertainty is determined by the perceived complexity (number of factors, opacity of causal relationships) and perceived dynamism (rate of change) of the external environment. The combined effect of a large number of external factors and actors, unclear cause-and-effect linkages, and the rapid rate of change is the perception that the environment is unanalyzable. Empirical research on scanning suggests that managers who experience higher levels of perceived environmental uncertainty tend to do a larger amount of environmental scanning (Choo 2002).

Besides environmental uncertainty, the level of knowledge and information available about the environment may also be an important factor. Some industries regularly collect and analyze data about products, markets, and competitors. In many cases automation and the use of information technology have made it possible to efficiently amass and analyze data and trends (for example, computerized reservation systems in the airline industry, and point of sales systems in the retail industry). Information that is available affordably, and that is sufficiently detailed and timely to support decision making, may lead to the perception that the environment is analyzable.

An organization that intrudes actively into the environment is one that allocates substantial resources for information search and for testing or manipulating the environment. A passive organization on the other hand takes whatever environmental information comes its way, and tries to interpret the environment with the given information.

Daft and Weick (1984) hypothesize that differences in organizational intrusiveness are due to the degree of conflict between the organization and its environment. They cite Wilensky's argument that when the environment is seen as hostile or threatening, or when the organization depends heavily on the environment, more resources are allocated to the scanning function (Wilensky 1967). A hostile environment increases scanning because of new problems and the need to identify new opportunities and niches. Conversely, organizations in benevolent environments have weaker incentives to be intrusive. This line of reasoning is congruous with resource-dependency theory and institutional theory.

In resource-dependency theory (Pfeffer and Salancik 1978), the environment is seen as a source of resources upon which the organization is dependent. Resource dependence is affected by munificence, or the abundance of resources; concentration, the extent to which power and authority in the environment is dispersed; and interconnectedness, the number and pattern of linkages among organizations in the environment. The degree of dependence would be great when resources are scarce, and when entities in the environment are highly concentrated or interconnected. An organization can manage increasing dependence by adapting to or avoiding external demands; changing the patterns of interdependence through growth, merger, and diversification; establishing collective structures to form a 'negotiated environment;' and using legal, political or social action to form a 'created environment.' (Pfeffer and Salancik 1978) Thus, "managers are manipulators and schemers vis-a-vis their environments." (Aldrich 1999, p. 65)

Institutional theory (Powell and DiMaggio 1991) generally regards organizations as being "forced to respond to, adapt to, or imitate the ebb and flow of normative and regulatory currents in their environments." (Aldrich 1999, p. 49) Organization-environment relations are described by verbs that carry the connotation that environments dominate or overpower organizations: change is imposed, authorized, induced, imprinted, and incorporated (Scott 1987).

In addition to the relationship with its environment, the organization's overall business strategy may also be related to the sophistication, scope, and intensity of its intrusiveness. An organization that follows a particular strategy, such as a product differentiation, cost leadership, or focus strategy (Porter 1980), or adopt a certain strategic stance, such as prospector, analyzer, or defender (Miles and Snow 1978), is likely to adopt a scanning mode that provides the required information and information gathering capabilities to pursue its desired strategy.

Besides organization-environment relationship and strategy, we may postulate that intrusiveness would also be affected by: organizational size and inertia; organizational slack or the availability of resources to allocate to active scanning; past experience with scanning and interpreting the environment; and the availability of action or communication channels allowing the organization to influence the environment.

Environmental Scanning as Information Seeking

Depending on the organization's beliefs about environmental analyzability and the extent that it intrudes into the environment to understand it, four modes of scanning may be differentiated: undirected viewing, conditioned viewing, enacting, and searching. In this Section, we analyze each mode by examining its characteristic information needs, information seeking, and information use

behaviors. In Section 4, we analyze organizational learning processes by considering the sensemaking, knowledge creating and decision making processes at work in each mode.

Modes of Scanning the Environment

	Passive	Active
Unanalyzable	**UNDIRECTED VIEWING** Casual, informal viewing	**ENACTING** Acting on the environment
Analyzable	**CONDITIONED VIEWING** Watching areas of concern	**SEARCHING** Determining true state of the environment

Assumptions about Environment (vertical axis)

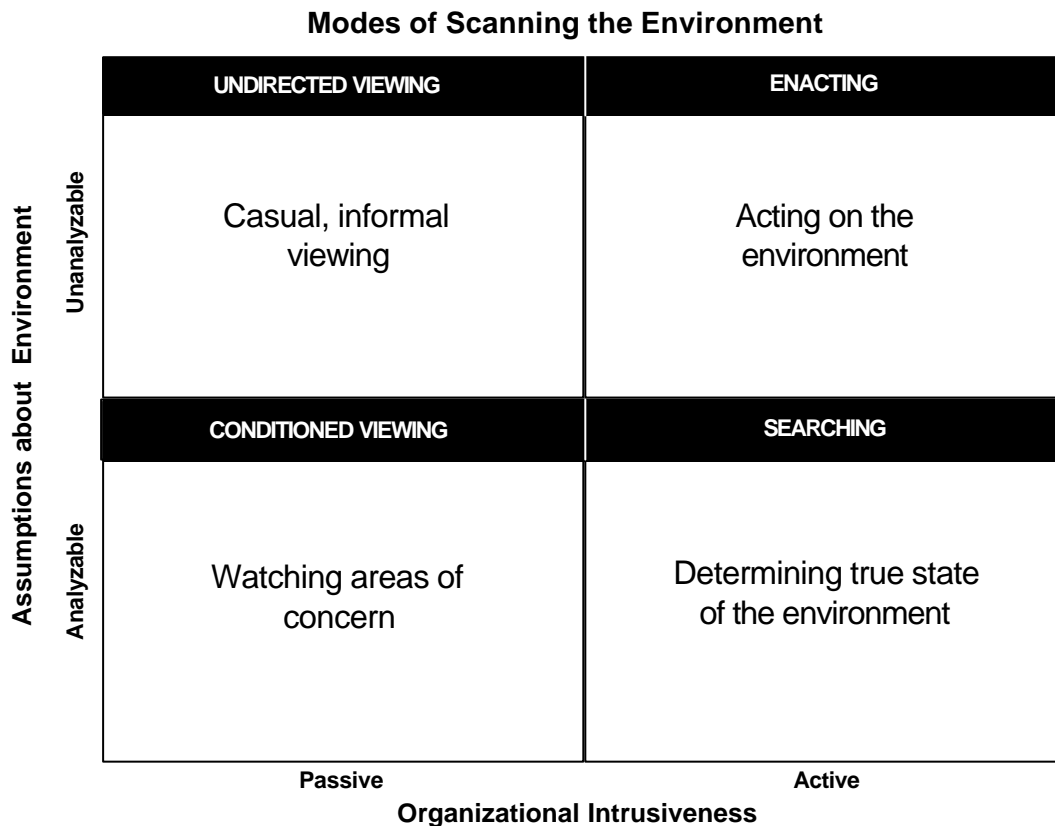**Organizational Intrusiveness** (horizontal axis)

Fig. 1 Modes of Environmental Scanning

Undirected viewing, a term first used by Aguilar (1967) takes place when the organization perceives the environment to be unanalyzable and so does not intrude into the environment to understand it. Information needs are ill-defined and fuzzy, and much of the information obtained is nonroutine or informal, usually gained through chance encounters. Since the environment is assumed to be unanalyzable, the organization is satisfied with limited, soft information and does not seek comprehensive, hard data. Information seeking is thus casual and opportunistic, relying more on irregular contacts and casual information from external, people sources. Information use is concerned primarily with reducing the high levels of environmental equivocality. Weick 1979 suggests that to resolve equivocality, organizations use assembly rules to shape data into a collective interpretation. The greater the equivocality, the fewer the number of rules activated because of uncertainty about what the information means. At the same time, arriving at a common interpretation requires many cycles of information sharing. The organization tends to adopt a reactor strategy, reacting to seemingly uncontrollable changes in the environment (Miles and Snow 1978). Decision making may require coalition building for management to agree on a single interpretation and course of action (Cyert and March 1992).

An example of undirected viewing might be a small firm that gathers information through pre-existing personal contacts with a limited number of buyers, suppliers, sales personnel, and associates in other companies. What information gets noticed and used depends on the frequency and intensity of cues that are entering the firm's awareness. Over time, a few of these signals build up in frequency and intensity, and so become "noticed." The advantage of undirected viewing is that the organization need not expend resources on formalized scanning, but this saving incurs the risk of the organization being surprised or caught off-guard.

Conditioned viewing, again from Aguilar (1967) occurs when the organization perceives the environment to be analyzable but is passive about gathering information and influencing the environment. Information needs focus on a small number of relatively well-defined issues or areas of concern. These are often based on widely-accepted industry assumptions and norms. Information seeking makes use of standard procedures, typically employing internal, non-people sources, with a significant amount of data coming from external reports, databases, and sources that are highly respected and widely used in the industry. Thus, viewing is conditioned in the sense that "it is limited to the routine documents, reports, publications, and information systems that have grown up through the years." (Daft and Weick 1984, p. 289) Because the environment is assumed to be knowable, there is less need for equivocality reduction, with a greater number of rules that can be applied to assemble or construct a plausible interpretation. The organization tends to adopt a defender strategy, concentrating on internal efficiency to protect what it already has (Miles and Snow 1978). Decisions are mostly programmed (March and Simon 1993), following standard procedures and premises derived from past experience.

An illustration of conditioned viewing gone awry is provided by a recent analysis of the computer disk drive industry (Christensen 1997). Several generations of disk drive manufacturers were highly focused on listening carefully to their largest customers, and failed to see how new technologies that were rejected by their best customers, had in fact appealing features to new customers which expanded into new market segments. Thus while one advantage of conditioned viewing is having established procedures and mental model to structure the scanning process, the disadvantage is that these rules and routines might miss detecting the emergence of new, possibly disruptive technologies or developments.

Enacting takes place when the organization perceives the environment to be unanalyzable but it then proceeds to intrude actively into the environment in order to influence events and outcomes. Information needs are those required for experimentation and testing the environment. This may involve identifying areas for fruitful intervention. Information seeking is from external sources and

channels that the organization has created through its intervention, and this may include feedback about the actions that the organization has taken. Enacting organizations "construct their own environments. They gather information by trying new behaviors and seeing what happens. They experiment, test, and stimulate, and they ignore precedent, rules, and traditional expectations." (Daft and Weick 1984, p. 288) Information use is focused on the actions that has been taken, and this information is used to reduce equivocality as well as to test existing rules and precedents. The organization tends to adopt a prospector strategy by introducing new products or services to take advantage of opportunities (Miles and Snow 1978). Decision making processes tend to be phased and incremental, involving iterative cycles of design and trial-and-error (Mintzberg et al 1976).

An example of enacting would be a firm that introduces and markets a new product based on what it thinks it can sell, rather than waiting for research to assess market demand. Another example would be an organization that actively influences and shapes the attitudes of its shareholders: it may try to "manipulate shareholder perceptions toward itself, environmental issues, or political candidates by sending information to shareholders through various media." (Daft and Weick 1984, p. 290) In today's network economy, organizations with an Internet presence have been using the World Wide Web as a channel for innovative ways of enacting their environment. For example, they have given away free products and services (browser software, open-source code, search engines) to test new products or increase market share; hosted online forums and communities to promote discussion and drum up support for issues; and created new Web sites to disseminate information as well as collect feedback on topics of interest.

Searching (labeled as Discovery in the original Daft and Weick paper) takes place when the organization perceives the environment to be analyzable and it actively intrudes into the environment to collect an accurate set of facts about the environment. Information needs are based on well-defined search goals that are broad, detailed, and open-ended. The organization is prepared to be surprised by unexpected findings that reveal new information needs. Information seeking is for hard, formal, often quantitative data, typically from surveys, market research activities that are rigorous, objective. The organization is likely to have its own scanning unit whose staff systematically analyzes data to produce market forecasts, trend analysis, and intelligence reports. There are important differences between Conditioned Viewing and Searching. Information seeking use in Conditioned Viewing is restricted to a few issues; routinized; and based on received knowledge. Information seeking use in Searching is broad, open, and based on a willingness to revise or update existing knowledge. The organization tends to adopt an analyzer strategy, maintaining its core of activities but with occasional innovations based on its reading of the environment (Miles and Snow 1978). Decision making is based on logical, rational procedures, often including systems analysis and quantitative techniques.

An example of formalized searching would be Motorola's strategic intelligence system, one of the first to be established in corporate America in the 1980s. To develop the system, Motorola hired Jan Herring, a professional intelligence officer who later helped to found the Society for Competitive Intelligence Professionals. Herring designed the scanning system as follows. The corporate intelligence office maintained the central database, coordinated collection and served as the clearing house for strategic intelligence reporting, led the corporate-wide analysis projects, and supported operational divisions' intelligence activities. The operating divisions, on the other hand, ran their own operational or tactical intelligence collection, performed division-level analysis, and supported corporate collection and analysis efforts. A high-level policy committee, comprising all group vice presidents and chiefs of headquarters functions, assigns intelligence priorities to the unit. The staff of the corporate office are highly trained, some with both intelligence and business experience, and they analyze the information collected to arrive at and recommend alternative courses of action. Strong emphasis is placed on foreign intelligence. Motorola is one of the few US companies that systematically monitors technology developments in Japan, making large investments in obtaining technical literature, learning the language, and developing long-term relationships with Japanese researchers and organizations. (Sutton 1988, Gilad 1994, Penenberg and Barry 2000)

The different modes of scanning are compared in Figure 2. Research suggests that the model proposed by Daft and Weick is consistent with the empirical knowledge about organizational scanning (Choo 2002). As indicated by the model, the amount of information seeking or scanning is related to the perceived analyzability of the environment. Moreover, when the environment is perceived to be difficult to analyze, there is a tendency to use people sources more heavily in order to help reduce the higher levels of equivocality. The concept of organizational intrusiveness underlines the relationship between the ability to maneuver actively in the environment and the gathering of useful information. This action-learning perspective is increasingly evident in the strategy literature that emphasizes improvisation, discovery-based planning, and emergent strategy making. In summary, the scanning model appears a viable framework for analyzing the primary environmental and organizational contingencies that influence environmental scanning as cycles of information seeking and information use.

UNDIRECTED VIEWING		ENACTING	
Information Needs	Ill-defined, general needs Wait for changes in environment to be noticed or revealed	Information Needs	Information for experimenting, testing Create own features in external environment
Information Seeking	Reactive Occasional, informal encounters External, people sources	Information Seeking	Proactive Collect feedback selectively External, people sources
Information Use	Much equivocality reduction Reactor strategy	Information Use	Some equivocality reduction Prospector strategy
CONDITIONED VIEWING		SEARCHING	
Information Needs	Routine, formal data Watch areas based on norms and conventions	Information Needs	Formal information Determine objective reality of external environment
Information Seeking	Passive detection Internal, non-people sources Record keeping, information systems	Information Seeking	Active detection Internal, non-people sources Studies, surveys, scanning unit
Information Use	Little equivocality reduction Defender strategy	Information Use	Little equivocality reduction Analyzer strategy

Left axis (top to bottom): Environmental Analyzability — Unanalyzable / Analyzable

Bottom axis: Passive — Active — **Organizational Intrusiveness**

Fig. 2 Environmental Scanning as Information Seeking

Organizational Knowing

So far we have looked at environmental scanning in terms of information needs, seeking and use. To help us better understand how organizations use information from and about the environment to take action and learn, we examine the sensemaking, knowledge creating and decision making processes at work in each mode.

Sensemaking

Sensemaking is induced by changes in the environment that create discontinuity in the flow of experience engaging the people and activities of an organization. These discontinuities are the raw data that have to be made sense of. People then enact or actively construct the environment that they attend to by bracketing experience, and by creating new features in the environment (Weick 1995). The sensemaking recipe is to interpret the environment through connected sequences of enactment, selection, and retention (Weick 1979). In *enactment* (similar to the organizational enacting discussed earlier), people actively construct the environments which they attend to by bracketing, rearranging, and labeling portions of the experience, thereby converting raw data from the environment into equivocal data to be interpreted. In *selection*, people choose from among several possible interpretations of current enactments according to their fit with past experience: "selection occurs

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when an enacted environment of plausible stories from the past sorts among variations in current accounts of enactment and retains those that best fit with prior understandings of plausibility." (Weick 2001, pg. 237) Selection produces an enacted environment that provides best-fit explanations of what is going on. In *retention*, the organization stores the products of successful sensemaking (enacted or meaningful interpretations) so that they may be retrieved in the future.

Organizational sensemaking can be driven by beliefs or by actions (Weick 1995). In *belief-driven processes*, people start from an initial set of beliefs that are sufficiently clear and plausible, and use them as nodes to connect more and more information into larger structures of meaning. People may use beliefs as expectations to guide the choice of plausible interpretations, or they may argue about beliefs and their relevance when these beliefs conflict with current information. In *action-driven processes*, people start from their actions and grow their structures of meaning around them, modifying the structures in order to give significance to those actions. People may create meaning to *justify* actions that they are already committed to, or they may create meaning to *explain* actions that have been taken to manipulate the environment.

Knowledge Creating

An organization possesses three kinds of knowledge: tacit knowledge, explicit knowledge; and cultural knowledge. *Tacit knowledge* is the personal knowledge used by members to perform their work and to make sense of their worlds. It is learned through extended periods of experiencing and doing a task, during which the individual develops a feel for and a capacity to make intuitive judgements about the successful execution of the activity. Since tacit knowledge is experiential and contextualized, it cannot be easily codified, written down or reduced to rules and recipes. Tacit knowledge is vital to organizations because it is an important source of new knowledge — discoveries and innovations that are the results of creative individuals applying their tacit insights and intuitions to confront novel or difficult problems.

Explicit knowledge is knowledge that is expressed formally using a system of symbols, and can therefore be easily communicated or diffused. Explicit knowledge may be object-based or rule-based. Knowledge is object-based when it is represented using strings of symbols (documents, software code), or is embodied in physical entities (equipment, substances). Explicit knowledge is rule-based when the knowledge is codified into rules, routines, or operating procedures. Explicit knowledge codified as intellectual assets is valuable to the organization because it adds to the organization's observable and tradeable stocks of knowledge. Explicit knowledge in an organization encodes past learning in rules; coordinates disparate organizational functions; and signifies competence and rationality.

Cultural knowledge consists of the beliefs an organization holds to be true based on experience, observation, reflection about itself and its environment. Over time, an organization develops shared beliefs about the nature of its main business, core capabilities, markets, competitors, and so on. These beliefs then form the criteria for judging and selecting alternatives and new ideas, and for evaluating projects and proposals. In this way an organization uses its cultural knowledge to answer questions such as "What kind of an organization are we?" "What knowledge would be valuable to the organization?" and "What knowledge would be worth pursuing?" Cultural knowledge includes the assumptions and beliefs that are used to describe and explain reality, as well as the criteria and expectations that are used to assign value and significance to new information.

Organizations continuously create new knowledge by converting between the personal, tacit knowledge of individuals who develop creative insight, and the shared, explicit knowledge by which the organization develops new products and innovations (Nonaka and Takeuchi 1995). Tacit knowledge is shared and externalized through dialogue that uses metaphors and analogies. New concepts are created, and the concepts are justified and evaluated according to its fit with organizational intention. Concepts are tested and elaborated by building prototypes. Finally, concepts which have been created, justified and modeled are moved to other levels of the organization to generate new cycles of knowledge creation.

Decision Making

Completely rational decision making requires information gathering and information processing beyond the capabilities of any organization. In practice, organizational decision making departs from the rational ideal in important ways depending on: (1) the clarity of organizational goals that impinge on preferences and choices (*goal ambiguity or conflict*), and (2) the uncertainty or amount of information about the methods and processes by which the goals are to be attained (*technical or procedural uncertainty*).

Figure 3 shows four modes of decision making along the two axes of goal ambiguity/conflict and technical/procedural uncertainty that characterize a decision situation. In the *boundedly rational mode*, when goal and procedural clarity are both high, choice is guided by performance programs (March and Simon 1993). Thus, decision makers 'simplify' their representation of the problem situation; 'satisfice' rather than maximize their searches; and follow 'action programs' or routinized procedures.

	Low Goal Ambiguity/Conflict	High Goal Ambiguity/Conflict
Low Procedural Uncertainty	**Boundedly Rational Mode**	**Political Mode**
High Procedural Uncertainty	**Process Mode**	**Anarchic Mode**

Fig. 3 Organizational Decision Making

In the *process mode* (Mintzberg, Raisinghani and Thêorét 1976), when strategic goals are clear but the methods to attain them are not, decision making becomes a process divided into three phases. The *Identification phase* recognizes the need for decision and develops an understanding of the decision issues. The *Development phase* activates search and design routines to develop one or more solutions to address a problem, crisis, or opportunity. The *Selection phase* evaluates the alternatives and chooses a solution for commitment to action. The entire process is highly dynamic, with many internal and external factors interrupting and changing the tempo and direction of the decision process.

In the *political mode* (Allison and Zelikow 1999), goals are contested by interest groups but procedural certainty is high within the groups: each group believes that its preferred alternative is best for the organization. Decisions and actions are then the results of the bargaining among players pursuing their own interests and manipulating their available instruments of influence.

In the *anarchic mode* (also known as the Garbage Can model of decision making) (Cohen, March and Olsen 1972), when goal and procedural uncertainty are both high, decision situations consist of independent streams of problems, solutions, participants, and choice opportunities arriving and leaving. A decision then happens when problems, solutions, participants, and choices coincide. When they do, solutions are attached to problems, and problems to choices by participants who are present and have the interest, time and energy to do so.

Organizational Knowing

Organizational knowing is the outcome of sensemaking, knowledge creation, and decision making working together to enable the organization to learn and adapt (Choo 1998). Through *sensemaking*,

organizational members enact and negotiate beliefs and interpretations to construct shared meanings and common goals. Shared meanings and purpose are the outcome of sensemaking, and they set the framework for explaining observed reality, and for determining saliency and appropriateness. Shared meanings and purpose help to articulate a shared organizational agenda, and define a collective organizational identity.

Within the framework of its constructed meaning, agenda, and identity, the organization exploits current specializations or develops new capabilities in order to move towards its vision and goals. Movement may be blocked by gaps in the knowledge needed to bridge meaning and action. When the organization experiences gaps in its existing knowledge or limitations in its current capabilities, it initiates *knowledge creating* and seeking, set within parameters derived from an interpretation of the organization's goals, agendas, and priorities. Organizational members individually and collectively fabricate new knowledge by converting, sharing and synthesizing their tacit and explicit knowledge, as well as by cross-linking knowledge from external individuals, groups and institutions.

Shared meanings and purposes, as well as new knowledge and capabilities converge on *decision making* as the activity leading to the selection and initiation of action. Shared meanings, agendas and identities select the premises, rules, and routines that structure decision making. New knowledge and capabilities make possible new explanations and alternatives, expanding the range of available organizational responses. By structuring choice behavior through roles and scripts, rules and routines, the organization simplifies decision making, codifies and transmits past learning, and proclaims competence and accountability.

While each organization adjusts its behavior to perceived changes in the environment, its responses are deflected and diffracted by concurrent actions of other actors that participate in the same arena. Thus each organization is reacting to the actions of other organizations that are also reacting to it. A continuous stream of new events and equivocal cues necessitates repeated cycles of sense-, knowledge-, and decision-making. In this way, the organization learns and adapts over time.
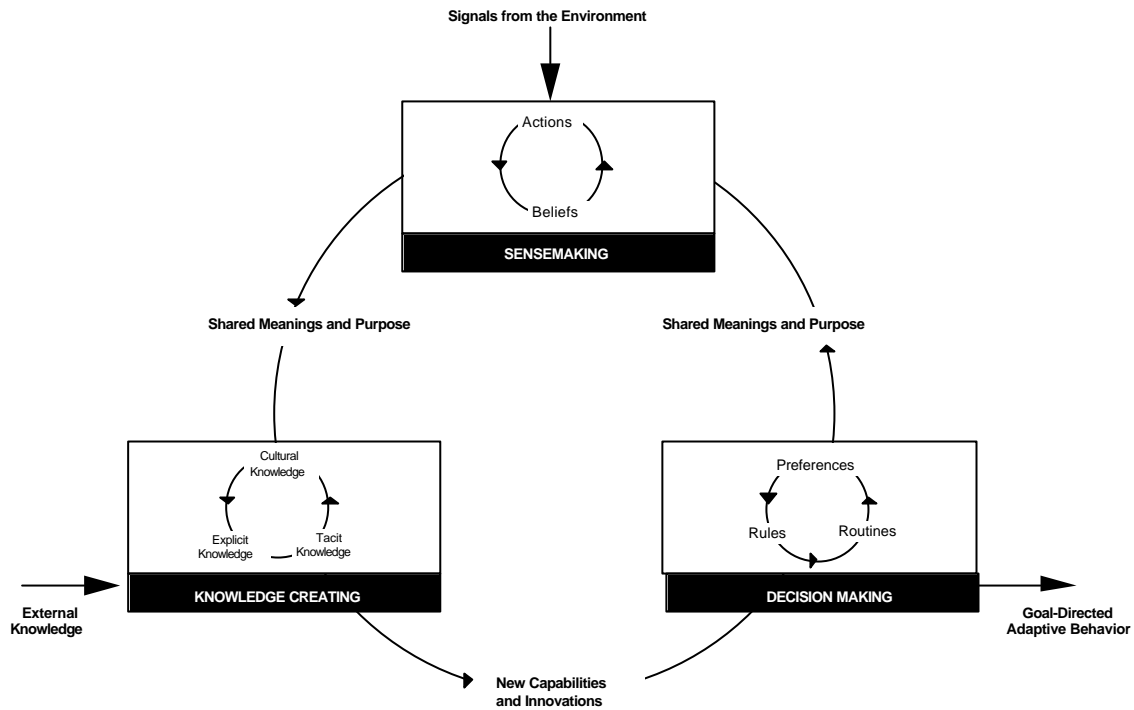
Fig. 4 Organizational Knowing

Environmental Scanning as Organizational Knowing

In this section, we extend our discussion towards the concept of organizational knowing by examining sensemaking, knowledge-creation, and decision making in each mode of scanning (Figure 5).

During **Undirected Viewing** (unanalyzable environment, passive organization), *sensemaking* is characterized by informal bracketing. Bracketing of external signals is informal in that what the organization notices depends on what subjective cues observers happen to be attending to at the time. Partly because multiple observers with different frames of reference may be involved, many cycles of sensemaking are required to reduce equivocality about what is going on in the environment. This may require many episodes of face-to-face communication, involving dialogue, negotiation and persuasion. Often, the issues or questions are not known beforehand, and the organization has to identify or clarify the gaps of understanding. In some situations, issues are defined by the external environment, as when government agencies, industry associations, consumer groups or other stakeholders bring forth areas of concern. *Knowledge* that is used in undirected viewing is based on tacit beliefs that the complexity, opacity and dynamism of the environment are such as to render it unanalyzable. These beliefs are shared by the organization's members and can remain unspoken and unexamined. There is little by way of a stable stock of knowledge that can be called upon to interpret and make sense of changes in the environment. *Decision making* has to deal with high levels of uncertainty and ambiguity, and Daft and Weick (1983) suggested that coalition building may be necessary for management to rally around

a particular interpretation and a single course of action. Alternatively, a strong, powerful leader may choose the course of action. Overall, the modus of learning in undirected viewing is one of stimulus-and-response: the organization maintains its status quo until a strong stimulus is recognized and necessitates a response.

During **Conditioned Viewing** (analyzable environment, passive organization), *sensemaking* is **belief-driven**, and there are fewer cycles of equivocality reduction. Over time, the organization (or the industry it is in) has developed a set of assumptions and beliefs about the environment and uses them to define a number of areas of particular interest to structure or "condition" the scanning activity. Fewer cycles of sensemaking are required to reduce equivocality because the organization is starting from an initial set of clear, accepted beliefs, and it is already sensitized to known issues that are deemed critical for the organization. *Cultural knowledge* plays an important role in conditioned viewing by supplying the assumptions and beliefs about the business and the environment that the organization is in: who are its customers, competitors, stakeholders; what environmental sectors to watch; as well as what information sources to uses. These assumptions and beliefs may be part of the **received knowledge** that firms in the same industry share. They draw a frame of reference within which knowledge about the environment is created. *Decision making* in conditioned viewing is likely to resemble that of the boundedly rational model. Representation of the decision situation is simplified, search is satisficing, and procedures are structured by rules and routines. These rules may be adopted from standard industry practice or developed from the firm's own experience. Overall, the modus of learning in conditioned viewing is for the organization to use its existing knowledge about what is important in the environment to focus its scanning and action taking.

	UNDIRECTED VIEWING		ENACTING	
Sense-making	Waiting for important change	Sense-making	Create features in environment
Knowledge Creation	Little prexisting knowledge	Knowledge Creation	Tacit knowledge: learn by doing
Decision Making	Coalition/Political mode	Decision Making	Anarchic/Process mode
	CONDITIONED VIEWING		SEARCHING	
Sense-making	Driven by norms and beliefs	Sense-making	Determine objective reality
Knowledge Creation	Cultural knowledge: expectations, frames	Knowledge Creation	Explicit knowledge: hard data, formal models
Decision Making	Programmed/Rational mode	Decision Making	Process mode

(Environmental Analyzability: Unanalyzable / Analyzable. Organizational Intrusiveness: Passive — Active)

Fig. 5 Environmental Scanning as Organizational Learning

During **Enacting** (unanalyzable environment, active organization), *sensemaking* is **action-driven**. The organization intrudes actively into the environment to construct new features and to then concentrate sensemaking on these features. For example, an organization may test-market a new product; organize a seminar or workshop; or produce a document for public comment. The information generated from these enactments then constitutes the new raw material for sensemaking. Thus equivocality is reduced by testing and probing the environment. *Tacit knowledge* is important in enacting since the kinds of enactments to be pursued depends on individual intuition and creativity (existing tacit knowledge), while the interpretation of enacted information depends on personal insight and instinct. New tacit knowledge may also be the outcome of enacting, as the organization acquires new ways of seeing the environment while it reflects on data returned by their enactments. Daft and Weick (1983) suggest that *decision making* in enacting follows the process model described by Mintzberg et al (1976): the organization decides on a course of action, designs a custom solution, tries it, and recycles the process if the solution does not work. In addition to the process model, we may also expect the decision process to resemble that of the anarchic mode presented earlier. Here, actions are not goal-driven but are taken in order to discover goals. Decisions happen when solutions (enactments) appear to work and they become attached to problems. Overall, the modus of learning in enacting is for the organization to learn by doing — by trying out new actions in order to reveal new goals and methods.

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During **Searching** (analyzable environment, active organization), *sensemaking* is based on formal, systematic scanning that is aimed at determining the objective facts of what is happening in the external environment. This systematic scanning can be **both action- and belief-driven**. Data gathering about the environment is relatively intense and may involve intrusive actions such as polls, surveys, focus groups, and so on. Following data collection, interpretation is likely to be belief-driven, where the organization would extrapolate from past experience and construct meanings from current beliefs. Developing and working with *explicit knowledge* is the essence of searching. Measurement, modeling, forecasting, trends analysis, and other formal, quantitative methods are utilized to discover the true condition of the external environment. The organization believes that there is a stock of knowledge about the environment that it can draw upon for analysis and planning. Because the organization is actively searching for information about an environment that it believes to be knowable, *decision making* is likely to follow the process mode described earlier. In this mode, the organization takes the time and resources to look for or develop alternatives, and choosing a course of action is based on a diagnosis of the situation giving rise to the decision need. Overall, the modus of learning in searching is for the organization to invest resources in collecting information about and analyzing the environment, and then to adjust its actions in the light of this new knowledge. The main difference between searching and conditioned viewing is that searching requires significant resources for entering the environment to create new features and/or to collect information. Another difference is that searching scans broadly and comprehensively in order to determine the true state of affairs, whereas conditioned viewing concentrates on selected areas or issues.

Implications for Practice and Research

The model presented in this paper is essentially a contingency framework that specifies two conditions influencing organizational scanning: environmental analyzability and organizational intrusiveness. In today's highly volatile environment, organizations face a dilemma. On the one hand, the environment appears unanalyzable because of its dense complexity and rapid rate of change. On the other hand, organizations recognize that they need to be proactive in scanning and shaping their environments. Some organizations believe that precisely because the environment is in flux, there is an opportunity (or a necessity in some cases) for them to intervene and influence developments to their advantage. The model implies that for organizations wanting to encourage their members to scan more proactively, both the level of (perceived) environmental analyzability and the level of organizational intrusiveness need to be raised. To increase environmental analyzability, the organization might keep in close touch with important actors in the environment; make information about customers, competitors, and the industry more widely available to employees; and encourage staff to be interested in and to discuss and collectively make sense of external developments. To increase organizational intrusiveness, the organization might create channels to communicate with and influence stakeholders;

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encourage managers and employees to probe or test their environments by allocating resources or providing organizational slack; and be tolerant about innovative enactment experiments that do not succeed.

The model suggests a set of hypotheses that may be tested empirically. Although the model is consistent with the results of past studies, its specific predictions need to be investigated. As a metric for assessing environmental analyzability, we may look to the variable of perceived environmental uncertainty. Several scanning studies have operationalized perceived environmental uncertainty by measuring subjects' responses to questions about perceived complexity, rate of change, and importance of environmental sectors (e.g. Daft, Sormunen and Parks 1988, Boyd and Fulk 1996, Choo 2002). For organizational intrusiveness, possible metrics might include the amount of scanning, particularly the frequency and extent of use of external sources; or the size of the budget for acquiring external information (market research, database subscriptions, travel) and building information resources (library, information center, records management). Other indicators might include the frequency and quality of communications and interactions with external stakeholders, and the use of enactments such as polls, surveys, and seminars. To identify modes of scanning predicted by the model, the characteristics of information seeking and use described in Section 2 could guide data collection and analysis. Studying the scanning modes in terms of sense-, knowledge-, and decision-making might call for a more narrative, ethnographic approach. This could involve, for example, analyzing textual accounts of significant episodes of scanning and learning.

In summary, the contingency model of environmental scanning presented here offers plausible explanations for the different levels and patterns of scanning that are observed in practice. We elaborated environmental scanning as information seeking and organizational knowing processes, discussed implications for managerial action, and stressed that much more could be learned by testing the model in field research.

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CONTENTS

Environmental Scanning as Information Seeking and Organizational Knowing

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Abstract: Environmental scanning is the acquisition and use of information about events, trends, and relationships in an organization's external environment, the knowledge of which would assist management in planning the organization's future course of action. Depending on the organization's beliefs about environmental analyzability and the extent that it intrudes into the environment to understand it, four modes of scanning may be differentiated: undirected viewing, conditioned viewing, enacting, and searching. We analyze each mode of scanning by examining its characteristic information needs, information seeking, and information use behaviors. In addition, we analyze organizational knowing processes by considering the sensemaking, knowledge creating and decision making processes at work in each mode.