Research and Development of Models and Instruments to Define, Measure, and Improve Shared Information Processing within Government Oversight Agencies

An Analysis of the Literature

August 1990-January 1992

*Prepared for the
United States Department of Energy
Office of Nuclear Materials under
Grant No. DE-FGO5-86DP70033*

Management Systems Laboratories
Virginia Polytechnic Institute and State University

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I.

GENERAL MODEL OF SHARING

GENERAL MODEL OF SHARING

I.A. WHY STUDY SHARING?

Because managers haven't learned and become skilled at sharing, they need a general model of sharing identifying the variables and their relationships.

We hear a lot about how information systems are going to increase information sharing. We also hear a lot about how information systems fail. Sharing information has become a buzz-word among corporate executives, but it hasn't become a reality.

More than ever before, technology is forcing managers to share information. Managers need to use their management tools (e.g., a master schedule or a spreadsheet) better by learning how to share. Before recent changes in technology, such as networks, fax machines, and large databases, managers knew they weren't sharing. Technology has exacerbated the problem because managers now believe technology helps them share. They believe new technology is improving their performance and productivity.

Unfortunately, technology isn't helping managers share better, but instead is helping them fail faster and on a more

global scale. My position is quite simple. Until we understand how to share cookies, library books, office space, office files, data, and information, we won't be able to improve our use of management tools for sharing. Our attempts at sharing aren't improving our productivity.

We never learned how to share data and information in file cabinets. We never realized the dilemma of sharing versus hoarding or protecting information. We never figured out the issues of priorities and ownership of information. Until we understand the dynamics of sharing, we aren't going to realize any additional benefit from our sophisticated information systems. What we need is a general model of sharing, simple enough to apply easily and broadly to sharing, yet detailed and specific enough to help identify key sharing variables and their relationships.

I.B. THE SHARING EXPERIENCE

To understand sharing we must define the sharing experience and characterize the experience in terms of the product, elements, tools, and process.

To diagnose, design, or conduct a sharing experience, we have to define the product, know the elements, be able to use the right tool at the right time, and have developed a process. This means we have to understand, operationalize, measure, and relate variables of the sharing experience and its product, elements, tools, and process. I'll use the model presented in Figure I.B to define the product, elements, tools and process of sharing.

Product. What is the product of sharing? The result of sharing is a transfer or exchange of something you already have. We can determine the result as an output or outcome of the experience. The result can be good, bad, or neutral. The product of sharing will be affected by what is shared, how it's shared, who shares, why they share, and when and where sharing takes place.

Elements. What are the elements of sharing? The elements of sharing tell us the what, how, who, why, when, and where of the sharing experience. In Figure I.B, I present the elements of the sharing experience: stakeholders, needs, motivators, linkage mechanisms, entities, and environment.

The *stakeholders* are who shares. There must be at least two stakeholders for sharing to occur.

Every stakeholder has a *need* to share. The need includes the reasons for or purpose behind a sharing experience. I

assume the major reason stakeholders share is to maximize their overall gain/loss ratio. For example, skippers of salmon seine fishing vessels made various calculations before deciding to share information. Gatewood suggests skippers decided to share information to "make wise decisions as to where to fish while reducing travel time and related costs" (1984:357). The skippers calculated the gains they'd experience from sharing information versus the losses they'd suffer if they didn't share information.

The sharing experience is initiated and perpetuated by *motivators*. Motivators serve as forcing functions and may be either internal or external to the boundaries of the sharing experience. A motivator could be a simple sharing opportunity for two or more stakeholders. However, motivators could also be mandated by someone outside the sharing environment. For example, the Freedom of Information Act, an external mandate, could lead two stakeholders to share information. Motivators for sharing could also come from within the sharing environment. For example, Gatewood describes information sharing among Southeast Alaskan salmon seiners as "a wise strategic maneuver" (1984:362). Economic prosperity and increasing prestige motivate their sharing.

Linkage mechanisms connect stakeholders. The linkage mechanism represents the sharing process and shows how things are shared. Linkage mechanisms include the tools we use to

share.

An *entity* is what is shared. For example, stakeholders can share decisions, information, data, or computers used to process data into information. Of course, stakeholders can share other entities like office space, a secretary, or a budget. Entities influence stakeholders' motivation to share. Stakeholders use the entities to assess the gain/loss ratio.

The *environment* represents where and when the sharing experience takes place. Therefore, the environment delimits the sharing experience.

Tools. What are the tools of sharing? Meetings, mail, computers, fax machines,

and telephones are some of the many examples of tools used to share information. In sharing, stakeholders transfer or exchange ownership or change something they already own. Transfer or exchange can be 1) one-to-one, 2) one-to-many, 3) many-to-one, or 4) many-to-many. Sharing tools help accomplish one or more of these types of transfer or exchange. As managers, we can contribute to sharing by developing good tools, providing support for using the tools, and specifying when a given tool will work in a given situation.

Process. What is the process of sharing? I've mentioned the linkage mechanism represents the sharing process. I discuss the sharing process in the next module.

Figure I.B. The model represents the elements of sharing and their relationships.

GENERAL MODEL OF SHARING

I.C. THE SHARING PROCESS

To understand the sharing process we simplify the model by limiting the sharing experience to two stakeholders.

The simplest combination of stakeholders in a sharing environment is depicted in Figure I.C. Figure I.C is a closer look at a portion of Figure I.B and highlights the linkage mechanism, or sharing process.

The sharing process is the map or method for putting the elements and tools together to achieve the desired results (product) in a sharing experience. The sharing process, like any process, should be considered in terms of activities, time, resources, and performance. Sharing occurs in four phases: recognition, formulation, execution, and evaluation. The sharing process is cyclic. People learn from the sharing experience based on the interaction while sharing and the outcome of the sharing experience. Learning allows the stakeholders to make decisions about future sharing.

Recognition. Stakeholders must first recognize the opportunity to share. Part of the recognition occurs when both stakeholders examine the gain/loss ratio. Among the seine fisherman, sharing only occurred when both skippers recognized the opportunity to share and the benefits

to each for sharing.

Formulation. After the opportunity to share is recognized, stakeholders formulate a plan. Seine fishermen, for example, plan where to fish based on the information shared.

Execution. Formulation leads to execution. This phase is the most mechanistic because it's heavily influenced by the tools stakeholders use to share.

Evaluation. After the plan is executed, stakeholders evaluate the sharing experience. Evaluation is based on the results of sharing. Evaluating the outcome influences future decisions. Does the stakeholder continue, amend, or avoid involvement in the sharing process? The evaluation phase results in the recognition of future sharing opportunities and the cycle begins again.

During the sharing process, the highest level of information sharing occurs during the formulation and execution phases. However, some type of sharing probably occurs during all phases of the process.

Figure I.C. The sharing process links two stakeholders.

II.

THEORETICAL PERSPECTIVE OF SHARING

II.A. WHAT DO WE MEAN BY SHARING?

Because we take sharing for granted and we rarely ask what it means to share, we must define what we mean by sharing before we can understand or measure sharing.

Sharing anything, whether it's a cookie or a large data set, is difficult. Clearly, people do share, they do help one another, and they do care for one another. Children learn to share, business associates are expected to share, and friends may evaluate one another based on how well they share. Because sharing is so much a part of our daily lives we rarely question what it means. If asked, most people probably couldn't define what they mean by sharing. By way of definition most would probably say "I can't exactly tell you what it is but I know it when I see it." Unfortunately, research about sharing hasn't moved much beyond this point. Researchers don't define sharing; they tell you what it is when they see it.

Therefore, prior to discussing what we know about sharing, how we learn to share, and the various factors affecting sharing, I'll define sharing. Sharing is a transfer or an exchange of something you already have (Kurstedt, 1989; LeFevre, 1977). This definition encompasses two kinds of specialized sharing: transfer and exchange. I limit the meaning of transfer to giving and refer to it as altruistic sharing. Altruistic sharing is maintained by the norm of giving (Leeds, 1963). Leeds (1963:230-231) describes three basic criteria for the norm of giving: 1) the person treats giving as an end in itself, anticipating no satisfaction or gain other than the pleasure of contributing to the welfare of others; 2) the person gives voluntarily, acting beyond the call of duty, and not fulfilling stipulated role

obligations; and 3) on balance the person is "doing good" as judged by the recipient and spectators to the action. Leeds argues any actions meeting these criteria are altruistic acts. I expand this statement and say any act having these characteristics represents altruistic sharing. Altruistic sharing is voluntary because it is unexpected.

Exchange refers to utilitarian sharing. Utilitarian sharing is guided by the norm of reciprocity. The norm of reciprocity requires people to help those who have helped them (Gouldner, 1960). Reciprocity has a central role in the definition of utilitarian sharing because, unlike altruistic sharing, behavior related to utilitarian sharing is expected. Utilitarian sharing isn't an all-or-nothing proposition because there are various degrees of reciprocity. Sahlins (1965) suggests a continuum of reciprocity defined by generalized reciprocity at one polar extreme, balanced reciprocity at the midpoint, and negative reciprocity at the other polar extreme. Sahlins' reciprocity types represent three distinct types of sharing behavior. Generalized reciprocity represents altruistic sharing, balanced reciprocity represents utilitarian sharing, and negative reciprocity represents hoarding or stealing. I've adapted Sahlins' reciprocity types to define altruistic and utilitarian sharing, and hoarding.

Altruistic sharing refers to transactions associated with charitable behavior. A shares with B and, if possible and necessary, B shares with A. The rules governing the interaction imply but don't

mandate B's sharing with A.¹ In this case the need to share is determined by the relationship between the stakeholders.

Utilitarian sharing refers to a direct economic exchange. A and B share based on a calculated gain/loss ratio. Sharing is reciprocal, guided by a set of well-defined and agreed-upon rules. Self-interest is involved and the outcome of sharing determines the social relationship between the stakeholders. If either stakeholder believes the exchange isn't equitable, the relationship between them may be impaired or destroyed.

Hoarding refers to what economists call the "free rider" problem. Both A and B attempt to get something for nothing. Essentially, the stakeholders approach sharing with the intent of maximizing their gain at the expense of the other. There can be no sharing because neither A nor B is willing to share. Obviously, the maintenance of any type of relationship isn't an issue in hoarding situations because sharing doesn't really occur.²

These definitions serve to delimit the kind of activities and motivations associated with sharing. In summary, altruistic sharing refers to behaviors motivated less by self-interest than by a desire to assist others. Utilitarian sharing refers to behaviors motivated by self-interest based

on a calculated gain/loss ratio. Hoarding refers to behavior motivated by the desire to gain something for nothing.

Many theorists assume altruistic behavior benefits society more than utilitarian behavior. However, individual self-interest is in fact good for society because "complete neglect of [individual] self-interest would be inconsistent with [a] commitment to group-interest" (Margolis, 1982:27). Simmel (1950), LeFevre (1977), Collard (1978), and Margolis (1982) suggest the dichotomy between altruism and utilitarianism is unproductive because there is always self-interest involved. Collard argues "altruism is neither a necessary nor sufficient condition for giving, for weak altruism may be Pareto-irrelevant and giving may be inspired by fear as much as love" (1978:8).

For my purposes, whether the behavior is called altruistic or utilitarian isn't important. Nor is it important to worry about whether sharing is altruistic or utilitarian. Recognizing some people share for altruistic reasons and others share for utilitarian reasons allows us to identify the motivation behind the behavior.

1. Altruistic sharing usually occurs in kinship groups where the "failure to reciprocate does not cause the giver to stop giving. [Sharing] moves one way, in favor of the have-not for a very long period" (Sahlins, 1965:147).
2. In both altruistic and utilitarian sharing there is a need for the social relationship to continue based on either the norm of giving or the norm of reciprocity. Neither norm is in force in hoarding. Therefore sharing can't take place. When need isn't recognized or is ignored these norms can't affect behavior.

III.

ELEMENTS OF SHARING

III.A. STAKEHOLDERS

Cognitive style, task performance, attitudes toward and experience with information systems, and decision styles affect how stakeholders share information.

Stakeholders are those who share. Stakeholders represent the central component of our model because without stakeholders there can be no sharing. In successive modules I'll show how cognitive style, task performance, attitudes toward and experience with information systems, and decision styles affect how stakeholders share information. Figure III.A depicts the relationships among these factors.

The most important dimension of the stakeholder is cognitive style because it affects other dimensions. Cognitive style is the way a stakeholder thinks (module III.A.1). Cognitive style determines how stakeholders make decisions (module

III.A.1.a), how stakeholders use information systems (module III.A.1.b), and how well stakeholders perform certain tasks (module III.A.2). Task performance is important because a stakeholder's perception of task performance influences ability, recognition of the opportunity, and willingness to share. Attitudes toward and experience with information systems determine how and whether stakeholders will use a system to share (module III.A.3). Decision styles define how stakeholders share information to make decisions. Some styles increase information sharing while others decrease sharing (module III.A.4).

Figure III.A. Cognitive style, task performance, attitudes toward and experience with information systems, and decision styles affect decision making, information system use, and information sharing.

III.A.1. COGNITIVE STYLE

Cognitive style is the most important dimension of the stakeholder because it affects how stakeholders search for information, how stakeholders use information to perform tasks, how stakeholders take risks, the amount of information stakeholders use, and how stakeholders use information systems.

A stakeholder's cognitive style is an important factor in sharing information. Cognitive style is simply the way an individual thinks. Simon defines cognitive style as "the characteristic, self-consistent mode of functioning individuals show in their perception and intellectual activity" (1960:72). Benbasat and Taylor (1978) use cognitive style to describe those relatively fixed patterns for experiencing the world. Zmud (1979) adds cognitive styles are adopted via learning experiences as a means of accommodating the conflicting demands of internal and environmental stimuli. I define cognitive style as the patterned ways of perceiving and thinking about the world, learned from past experiences, and used to process and share information.

Cognitive style has been shown to affect many dimensions of decision making including how people search for information, how people take risks, and the amount of information people use (module III.A.1.a). Cognitive style has also been shown to affect how people use information systems (module III.A.1.b) and how people use information to perform tasks (module III.A.2). Figure III.A.1 shows these relationships. Cognitive style research has yielded contradictory and inconsistent results. However, the one constant in all the literature is the "basic difference between the way people perceive and evaluate information" (White, 1984:95). Also, an individual's cognitive style can vary as the

result of learning and/or other situational factors (Pratt, 1980).

The majority of the literature supports the relationship between information sharing and cognitive style. Information sharing occurs between two people who may have differing views of the world, different ways of accessing and perceiving information, and different capacities for using information. Cognitive style is important for this research because it's a primary factor in how stakeholders gather and evaluate information. Understanding cognitive style allows us to identify the most appropriate linkage mechanisms for stakeholders to use in sharing information.

We must distinguish cognitive style from personality. Pratt (1980) says personality is what a person thinks. Cognitive style is how a person thinks and is affected by the situation and learning. Variations in the way people think can be categorized because certain basic differences in mental functioning are stable over time and are process specific (Myers, 1962; McCauley, 1974; and Carlyn, 1977). Many people have developed systems and frameworks for determining and defining cognitive style. The Myers-Briggs Type Indicator (MBTI) is a tool for assessing four dimensions of cognitive style: extravert/introvert, sensing/intuitive, thinking/feeling, and judgmental/perceptive. From the MBTI we can categorize how a person processes information. How a person processes information relates directly to how a

person shares information.

Figure III.A.1.

Cognitive style affects information sharing by influencing how stakeholders make decisions, use information systems, and perform tasks.

III.A.1.a. **DECISION MAKING**

Cognitive style affects many dimensions of decision making including reasoning, information gathering and evaluation, risk taking, the amount of information processed and the time required to process it, and biasing.

A stakeholder's cognitive style affects many dimensions of decision making (Figure III.A.1.a). Several frameworks describing relationships between dimensions of decision making and cognitive style have been developed. I'll discuss reasoning, information gathering and evaluation, risk taking, the amount of information processed and the time required to process it, and biasing. Some of the studies I discuss use the MBTI to measure cognitive style.

Huysmans (1970) used a single dimension of cognitive style related to ways of reasoning. Reasoning was divided into analytic and heuristic dimensions. Analytics reduce problems to a set of underlying relationships. These relationships are used to choose among a set of alternatives. Heuristics emphasize pragmatic solutions often using an analogous solution. Huysmans (1970) found cognitive style constrained implementation of research plans if the researcher's style didn't match the analytic approach of the manager. Differences in cognitive styles also affected sharing because the manager may not use the researcher as a source of information. Thus, cognitive style was found to affect both the implementation of a research plan and information sharing between the researcher and the manager. Differences in cognitive style between stakeholders can serve as a barrier to sharing.

McKenney and Keen (1974) proposed a framework emphasizing modes of

information gathering and evaluation.

The gathering dimension has perceptive and receptive modes of information acquisition. A perceptive person uses concepts, such as relationships and explanatory models, to search for and filter information. Detail rather than relationships are used by receptive people who are sensitive to stimuli. A receptive person attempts to derive relationships from information without imposing a preconceived coding device. The information evaluation dimension contrasts individuals who use intuitive and systematic strategies. An intuitive person tends to use trial and error, focuses on the overall problem, and is sensitive to nonverbal cues in evaluating information. A systematic person likes to structure problems by using methods increasing the chances of reaching a solution. Four characteristic decision styles are formed: systematic-perceptive, systematic-receptive, intuitive-perceptive, and intuitive-receptive. McKenney and Keen found the managers cognitive style must fit the information processing constraints of his tasks. Otherwise, task performance is reduced. Later I show how reduced task performance inhibits sharing.

Henderson and Nutt (1980) measured the relationship between cognitive style and choice behavior among decision makers. They attempted to define the effect cognitive style has on risk taking. Using the MBTI, Henderson and Nutt found cognitive style was a significant factor in explaining decision behavior. Cognitive

style was also found to affect the assessment of risk and the decision to adopt. Sensing-Thinking (ST) subjects were more risk averse. Sensing-Feeling (SF) subjects were less risk averse. These findings are important for information sharing. Different cognitive styles evaluate risk associated with decision making differently. Assessment of risk will affect stakeholders' willingness to share information to make decisions. For example, we can hypothesize ST's who are more risk averse will be less likely to share.

Driver and Mock (1975) consider the decision maker to represent an information processing system. They describe two approaches to studying information processing. The normative approach concerns measuring and understanding the quality of information processing. The descriptive approach concerns understanding and measuring how people make decisions and process information. Driver and Mock, using the descriptive approach, identified four cognitive styles associated with information processing and decision making: (1) decisive styles use minimal amounts of data to generate one firm opinion, (2) flexible styles use minimal data but see the data as taking on different meanings at different times, (3) hierarchic styles use large amounts of data to arrive at the one best conclusion, and (4) integrative styles use large amounts of data to generate many different decisions at the same time. Results of the study indicated different cognitive styles use different amounts of information to make

decisions. The amount of time needed to make decisions also varied by cognitive style. This study shows cognitive style affects information processing. I conclude differences in information processing affect sharing. Stakeholders with different cognitive styles using different amounts of information to make decisions might have problems sharing information. Also, the time different cognitive styles need to process information will affect sharing.

Wright (1980) describes one aspect of information processing related to cognitive style: biasing of information. In a review of the literature, Wright discusses some of the more common biases people have about information. Bias, for Wright, refers to using cognitive heuristics to simplify information processing. Cognitive heuristics allow people to make judgments without fully processing all the necessary information. Wright identifies how stress, experience, and attitudes affect information processing. Cognitive heuristics, in combination with these three constraints, make information sharing more problematic. Differences in cognitive styles and heuristics mean attempts to share may fail because people don't take in information at the same rate, don't process the same information in the same way, and may ignore some information.

Cognitive style affects how stakeholders process and share information to make decisions. Therefore, differences in cognitive style between stakeholders must be considered for successful sharing to occur.

Figure III.A.1.a. Cognitive style affects dimensions of decision making, which affect information sharing.

III.A.1.b. INFORMATION SYSTEMS

An information system must match stakeholders' cognitive styles because otherwise stakeholders won't use the system to share.

Cognitive style affects information system use and sharing. If system design doesn't match a stakeholder's cognitive style, the stakeholder won't use the system to share information (Figure III.A.1.b). I assume the use of an information system facilitates sharing. Other characteristics affecting information system design and use are discussed under Linkage Mechanisms.

Huber (1983) questions the importance of considering cognitive style when designing information systems. His rationale stems from his concern over the methodological rigor of most research about the relationship between information systems and cognitive style. Huber argues cognitive style research suffers from three weaknesses: 1) theories of cognitive style aren't developed enough, 2) instruments used to measure cognitive style have been inadequately tested for validity and reliability, and 3) faulty research designs have been used. Huber also argues further research won't lead to operational guidelines because of the number of cognitive differences among individuals. Trying to account for all of them would be overwhelming. And, even if such a model could be built, it wouldn't be useful to any one decision maker. Huber doesn't say cognitive style research is worthless; rather, he contends "task considerations and the user's expressed preferences for specific [information system] features should be the factors [considered] in [system] design" (1983:576).

Zmud (1979) suggests most individuals

don't know the kind or quantity of information they need to make decisions. One reason for information system development and use is to overcome this problem. However, system designers often fail to take users' cognitive styles into account when designing information systems. In fact, Mason and Mitroff (1973) and Zmud (1979) suggest implementation problems are related to differences in cognitive styles. Systems are designed based on the cognitive style of the designers, and users with different cognitive styles have difficulty using the system. Both Benbasat and Taylor (1978) and White (1984) suggest system designers should be aware of the cognitive styles of the users. Taking individual cognitive styles into account is difficult. However, Benbasat and Taylor (1978) recommend designing a system flexible enough so either analytic or heuristic cognitive types can use the system.

Zmud (1979), in a review of the empirical literature, discusses how different cognitive types use and perceive information systems. He reports systematics used the information system more but were less satisfied with the system. Individuals with greater risk taking propensities used the system less. Interestingly, systematics along with field-independents were found to perform better when using an information system than were heuristics and field-dependent individuals. Extraverted, perceptive individuals were found to possess more favorable attitudes toward information systems.

Cognitive style determines user preferences for information systems. Information system design must match

stakeholders' cognitive style for stakeholders to use the system to share.

Figure III.A.1.b. Information system design must match a stakeholder's cognitive style for the stakeholder to use the system to share.

III.A.2. TASK PERFORMANCE

Cognitive style and information system use affect task performance, and perceived level of task performance, task complexity, and task uncertainty affect sharing.

Task performance is one of the more complex aspects of information sharing because, unlike cognitive style, task performance varies by the situation and the stakeholder's perception of the task. Five aspects of task performance affect stakeholders' ability and recognition of the opportunity to share: perceived level of task performance, task complexity, task uncertainty, cognitive style, and information system use (Figure III.A.2).

The perceived level of task performance has been shown to affect information sharing. When discussing task performance we must distinguish between personal performance and organizational performance. By perceived level of personal performance I mean how well the stakeholder perceives he has been doing his task(s). By perceived level of organizational performance I mean how well the stakeholder perceives the organization is meeting its goals and objectives.

Schermerhorn (1977) examined the relationship between information sharing and perceived level of organizational performance. He formulates two dependent hypotheses based on the concepts of slack and distress. The slack hypothesis states when an organization is successful or content with itself, there is relative freedom from internal operating concerns and there is opportunity to share information for organizational innovation or just to promote a cooperative work environment. The distress hypothesis states when organizational performance is

low, stakeholders will share information to solve problems and relieve the conditions causing the low performance. Results of the study support the slack hypothesis: information sharing increases as perceived organizational performance increases. Since the results don't support the distress hypothesis, this suggests stakeholders fail to share information when sharing could prove especially beneficial--for example, in times of organizational distress.

Bryan and London (1970) review studies relating sharing behavior and perceived personal performance, particularly in children. They describe the norm of deservedness where "children may donate less after having justifiable claims on the reward than after having been given such reward following a poor performance" (1970:207). Extending the norm of deservedness to information sharing suggests stakeholders will be less willing to share information they worked hard for than if they acquired the information in spite of what they perceive as their own poor performance.

The complexity of the task affects information sharing. With simpler tasks, sharing is easier because stakeholders can more easily identify what's happening and who they need to share with. With complex tasks, it becomes more difficult to identify what's going in the situation, separate out the components of the task, and identify whom to share with or request information from.

Along with task complexity, the

uncertainty of the task affects information sharing. Task uncertainty increases information sharing because it increases stakeholders' need to share information. O'Reilly (1982) says perceived uncertainty of the task may lead decision makers to use different information sources. In other words, task uncertainty causes the stakeholder to alter who he shares information with or who he requests information from. Others have also found task uncertainty to affect preferences for information sources (Randolph and Finch, 1977; Randolph, 1978; Tushman, 1978; and Gifford et al., 1979).

White (1984) found task performance to be affected by cognitive style. White studied the relationship between the task performance of two project teams. Team one was composed of only sensing/thinking (ST) and intuiting/thinking (NT) members. Team two had members of all four MBTI types. Team one failed to develop a usable information system. Team two was able to design and implement a new information system. White concludes the heterogeneity of team two led to better task performance. Lusk and Kersnick (1979) studied the relationship between task performance, report format, and cognitive style. They developed three basic principles. First, tasks should match cognitive styles. Second, regardless of cognitive styles, use of different reports won't improve system performance. Third, report formats affect task performance: the less complex the format, the better the performance. The studies by White (1984) and Lusk and Kersnick (1979) show some factors affecting task performance. Cognitive style and format complexity affect how

information is used to perform the task. In White's research, the effects of cognitive style meant one group wasn't able to accomplish its task. This failure represents an inability to share information.

Foster and Flynn (1984) studied how the introduction of an information system affected an organization's task performance and task structure. They identified five changes: 1) an increase in the amount of time critical workers had for creative and managerial tasks, 2) less critical workers performed the more routine tasks, 3) perceptions shifted from the notion of tasks as a series of sequential but isolated jobs to one of shared responsibility for overall task completion, 4) the development of a feeling of joint ownership of the work shared by all workers regardless of position in the task structure, and 5) the development of lateral networks of workers with complementary skills and common problems. Foster and Flynn concluded the information system increased organizational effectiveness. Individual task performance improved because information sharing increased. As they note "a much larger amount of their system communications were task-focused than was true when interactive communication could take place only via telephone or face-to-face contact" (1984:231).

Task complexity, task uncertainty, cognitive style, and information system use affect task performance, and perceived level of task performance affects sharing. When stakeholders perceive increased task performance, sharing increases. When stakeholders perceive decreased task performance, sharing decreases.

Figure III.A.2.

Cognitive style and information system use affect task performance, and task performance, task complexity, and task uncertainty affect information sharing.

III.A.3. ATTITUDES TOWARD AND EXPERIENCE WITH INFORMATION SYSTEMS

Since information system use determines whether sharing occurs, it's important to understand how stakeholders' attitudes and experiences affect system use.

Cognitive style has been shown to affect information system use for sharing. However, attitudes toward and experience with information systems also affect information system use. Again, I assume information system use facilitates sharing.

Cheney and Dickson (1982) define user attitudes in terms of information satisfaction. Information satisfaction is related to how well the information provided by the system meets the needs of the user. Cheney and Dickson identified four dimensions to attitudes: 1) perceptions of format quality, 2) reliability of information, 3) ease of use, and 4) value of the information in accomplishing tasks. Utilization was measured by assessing whether or not the user included system-generated information in the decision making process. Cheney and Dickson found information satisfaction and utilization of the system were most affected by how the user interacts with the system and how computer resources are allocated within the organization. Technical sophistication wasn't related to the development of favorable attitudes toward the system or use of the system. In this case, how the system accommodated the user affected both attitudes toward and use of the system.

Lucas (1974) attempted to define the factors associated with favorable attitudes toward information systems. Lucas found high quality service and perceived management support to be positively related to favorable attitudes toward

information systems. Lucas concluded "these attitudes encourage the user to become more involved in the design of systems [leading to an increase in] the potential he perceives for the use of the computer" (1974:64-65). Zmud (1979), in a review of the empirical literature, reports user attitudes to be related to the potential of information systems, the extent of top management support for an information system, and the quality of the system staff. He also found other user characteristics associated with attitudes toward information systems: males, older individuals, and less educated individuals had less positive attitudes.

Maish (1979) attempted to identify the factors affecting favorable user behavior. Maish found positive relationships between favorable user behavior and: 1) positive user feelings about the quality of the user staff, 2) management support for the system, 3) unrestricted access to the system, 4) ease of correcting data input, 5) flexible output formats, and 6) effective and sympathetic handling of user problems. More favorable user behavior should increase system use, and therefore increase sharing. As did Cheney and Dickson (1982), Maish found no relationship between favorable user behavior and the system alone.

Nolan (1977) suggests users must have a "felt need" to develop positive attitudes about information systems. Nolan notes "if the required information is readily available, positive attitudes about

the...system are reinforced" (1977:177). For positive attitudes to develop, users must be confident of the need for the system and be sure the system will aid them in performing their tasks. If experience has been negative, users will develop negative attitudes toward the system. If experience has been positive, users will trust and increasingly use the system. Information sharing will increase only if the users trust the system, see a need for the system, and have positive experience with the system. All three

factors affect stakeholders' willingness to use the system to share information.

Attitudes toward, experience with, and use of an information system represent another dimension of the stakeholder. In conjunction with cognitive style, these factors have a significant affect on information sharing. The attitudes and experiences of stakeholders predict system use, and system use determines whether sharing occurs (Figure III.A.3).

Figure III.A.3. Stakeholders attitudes toward and experience with information systems predict whether they will use a system to share.

III.A.4. DECISION STYLES IN GROUP DECISION MAKING

Decision styles determine how and what information is shared by stakeholders in group decision making.

Decision making requires stakeholders to process and share information. Decision style is the way stakeholders use information to make decisions. Decision styles determine what information stakeholders share and how they share it in group decision making (Figure III.A.4).

Stasser and Titus (1985, 1987) studied the relationship between decision making and the introduction of new information. Previous research has shown predecision bias affects the outcome of the decision. Stasser and Titus reasoned new information introduced at the time of the decision would overcome predecision bias. Sharing new information with the group didn't overcome predecision bias to affect the outcome of the decision. In fact, after the introduction of the new information, group discussion represented a reiteration of already shared information. Stasser and Titus conclude "our analysis also suggests this failure to consider unique [unshared] information is more likely when the unique information counters the prevailing sentiment in the group and could change the final outcome" (1985:1477). This finding shows predecision bias significantly affects the use of shared information.

Stasser and Titus also suggest a group member's experience in attempting to share information may influence the decision to share. That is, group members who have shared in the past and failed may be less likely to share in the future. Group members with positive sharing experience may be more willing to share.

Several authors studied the dynamics of group decision making, especially the effect intragroup conflict has on decisions. Conflict, the argument goes, interferes with decision making and should be kept to a minimum. Wall, Galanes, and Love (1987) found a curvilinear relationship between conflict and decision quality. Decision quality was mediated by the number of conflict episodes and how the conflict was managed. Decision quality increased as the number of conflict episodes increased from zero to two, but quality substantially dropped off as the number of episodes approached four. Decision quality was significantly higher for integratively-managed conflict episodes than for distributively-managed or no-conflict episodes. Pood (1980) also found the way conflict was managed affected decision outcomes. If conflict was approached in a regulated fashion, decision accuracy increased. Subjecting ideas to close scrutiny and testing resulted in more information being elicited and evaluated. Challenging members' ideas resulted in the consideration of all points of view.

Sharing information has been shown to increase in groups where conflict occurs during the decision making process. Conflict means group members are required to defend their positions in the face of opposition from other group members. A positive outcome from this style of decision making is an increase in the information seeking behavior of group members. Information seeking refers to behavior directed toward gaining more information about the subject under

discussion (Pood, 1980; Lowry and Johnson, 1981; Smith et al., 1981; Hirokawa and Pace, 1983; Tjosvold and Field, 1984; Smith et al., 1985, and Hirokawa, 1987) An increase in information seeking increases information sharing because group members are forced to defend their positions as well as

consider other points of view. However, predecision bias and negative experience may inhibit information sharing. These effects must be considered to improve sharing among stakeholders in group decision making.

Figure III.A.4. Decision styles in group decision making determine how and what information stakeholders share.

III.B. ENVIRONMENT

Elements of the environment including uncertainty, organizational structure, and managerial climate set boundaries for sharing and tell us when and where sharing occurs.

In our model, the environment sets boundaries for sharing and tells us when and where sharing occurs. I've identified three environmental variables influencing information sharing: environmental uncertainty (module III.B.1), organizational structure (module III.B.2), and managerial climate (module III.B.3). Each variable affects information processing, decision making, and implementation of information systems in organizations. The variables are interrelated in this way (Figure III.B): environmental uncertainty results in the development of, or changes in, a specific type of organizational structure, and the resultant structure leads to the evolution of a given managerial climate.

Uncertainty initiates the sharing process, but responding to uncertainty in certain ways can affect how information is collected and used. Information processing varies by level of uncertainty.

Organizational structure should routinize and coordinate the process. However, structural characteristics can act as barriers to sharing or change the content of the information shared. Daft and Lengel's (1984) model of information richness allows us to overcome the problems caused by the structure and adjust the linkage mechanisms we use to share. Thus, we can adapt the linkage mechanisms to fit the needs of stakeholders and improve the process. In fact, Daft and Lengel's model predicts the type of information stakeholders need and how best to portray the information. Computer-based systems can overcome some of the barriers and increase both the quality and quantity of information sharing. Managerial climate also affects the process because without support from managers, sharing in organizations can't and won't occur.

Figure III.B.

Environmental uncertainty determines organizational structure, which influences managerial climate, all affecting information sharing.

III.B.1.

UNCERTAINTY

Environmental uncertainty precipitates sharing but also affects the amount, content, and use of shared information.

Environmental uncertainty is the greatest challenge organizations face. Uncertainty causes the organization to search for information, identify the source of uncertainty, and plan an appropriate response. Duncan (1972) defines the environment as "the totality of physical and social factors taken into account in the decision making behaviors of individuals in the system." Galbraith (1973) defines uncertainty as the difference between the information available and the information needed. Therefore, environmental uncertainty is the difference between the amount of available information about physical and social factors and the amount needed to make a decision.

Goldhaber suggests organizations cope with uncertainty "by creating and exchanging messages both internally among relevant units and externally to important publics" (1986:27). But, as March and Simon (1958) point out, responses to uncertainty can vary. If the source of uncertainty is unknown, the organization won't know the consequences of its response. Lacking this knowledge, the organization attempts to clarify the consequences of actions already taken. If clarification fails, the

organization searches for new alternatives.

Environmental uncertainty affects information sharing in several ways. First, uncertainty precipitates the search for information. Therefore, uncertainty can increase information sharing. However, uncertainty can decrease the amount of information shared (module III.B.1.b). Second, uncertainty causes decision makers to alter the way they use the information shared. For example, uncertainty may cause decision makers to ignore some information, leading to faulty decision making (module III.B.1.a). Finally, uncertainty can alter the type of information decision makers use and share. For example, Tushman (1978) reports uncertainty leads to increased use of technical communication in research and development units. Randolph (1978) found uncertainty leads to an increase in the use of verbal communication. Clearly, uncertainty is a key variable because it precipitates sharing, but uncertainty also affects the amount, content, and use of shared information (Figure III.B.1). Therefore, to increase information sharing, we must identify the source of uncertainty and determine the strategies stakeholders use to evaluate information.

Figure III.B.1. Uncertainty affects the amount, content, and use of shared information.

III.B.1.a. DECISION STRATEGIES

Uncertainty can lead to faulty information processing by decision makers because shared information is incomplete or ignored.

Janis and Mann (1977) discuss three strategies managers use to make decisions: optimization, satisficing, and incrementalism. All are relevant to information sharing because they highlight the effect uncertainty has on information processing by decision makers (Figure III.B.1.a). The first strategy, optimization, is selecting the course of action with the highest payoff. This narrows the search for alternatives but often causes the decision maker to miscalculate the benefits of a particular decision.

A second strategy, identified by Simon (1976), is satisficing. In this case, uncertainty imposes time constraints leading the manager to choose a course of action based on a "good enough" solution. Selection of a satisficing strategy means information is "evaluated sequentially with no attempt to work a comparative balance sheet of pros and cons" (Janis and Mann, 1977:27). A variation of this strategy is selecting a short-term solution for a long-term problem. Often the decision maker chooses a second best solution because it "will cause little immediate disturbance or disapproval...[since]...it will be seen as acceptable by superiors and peers who will review the decision and by subordinates who will implement it" (1977:26). Quasi-satisficing occurs when the manager decides to "do what we did last time if it worked and the opposite if it

didn't" (1977:28).

The final strategy is what Miller and Starr (1967) call "incrementalism" and Lindblom (1965) calls "muddling through." Incrementalism and muddling through represent the selection of a series of small changes viewed to be good enough. Slovic (1971) has concluded managers use incrementalism because "decision makers avoid uncertainty and the necessity of weighting and combining information or trading-off conflicting values" (In Janis and Mann, 1977:33). Regardless of the strategy selected, Janis and Mann suggest "the likelihood of miscalculation and postdecisional regret increases as a function of the degree to which [the manager] fails to engage in vigilant information processing during the period preceding commitment" (1977:40).

Uncertainty can lead to faulty evaluation of information because the decision maker overlooks the negative consequences of the decision or limits the amount of information consulted. Weick (1969) suggests organizations react to uncertainty in their environment by processing information, but "organizations will process only those information inputs relevant to them" (In Goldhaber, 1986:28). Information sharing is affected because the information shared is either incomplete or ignored.

Figure III.B.1.a. Uncertainty and decision strategies combine to affect information processing and sharing.

III.B.1.b. UNCERTAINTY REDUCTION

Environmental uncertainty facilitates information sharing because stakeholders need information to reduce uncertainty.

Stakeholders need information to reduce uncertainty. Therefore, uncertainty precipitates the sharing process. However, if stakeholders perceive uncertainty as too high, sharing virtually stops. Schroeder and Benbasat (1975) studied the relationship between environmental uncertainty and information use by managers. As shown in Figure III.B.1.b, they found a curvilinear relationship between level of environmental uncertainty and information processing. When environmental uncertainty is low, information processing will be low. As uncertainty increases, information processing increases until saturation is reached. At high levels of uncertainty, decision makers "tend to give-up due to saturation, and they tend to process less information" (1975:557).

Witteman (1988) studied uncertainty reduction by two means: direct and passive. "In a problem context, one directly searches [for information] by involving the other in an open-ended exchange about the nature of the problem and what can be done to resolve it" (1988:338). Recognizing when to share, "[t]he individual passively searches for information by waiting until conditions 'are right' for beginning a discussion about the problem, arranging circumstances so that information about the problem can be gathered at the proper time, and, in general, observing the other. Passive search is most likely when one anticipates that premature discussion of the problem with the other will result in additional

problems and increased uncertainty" (1988:338).

Reduction of uncertainty by different means of sharing information (direct or passive) can be related to communication or how and when information is shared. Witteman (1988) identifies four types of communication: integrative, distributive, indirect, and avoidance. Integrative communication is direct sharing characterized by high initiation and high search. Distributive communication is direct sharing characterized by high initiation and low search. Indirect communication is passive sharing characterized by low initiation and high search. Avoidance is the absence of sharing characterized by low initiation and low search. Witteman observes, "It seems that people tend to avoid gathering information rather than seeking information when they perceive high levels of problem-related uncertainty" (1988:353). This supports Schroeder and Benbasat's findings: past the point of saturation, as uncertainty increases, information processing, and thus information sharing, decreases.

Millon and Thakor (1985) developed a model to describe why financial information gathering agencies (IGA's) form. They base their model on the assumptions that "insiders" possess more accurate information about their firm's true economic value than do "outsiders," and those producing information to rectify this difference can gain from sharing their information. IGA's form to share

information and reduce uncertainties about firm values. Millon and Thakor found IGA's form "if group formation permits information sharing by members, and the benefits of such sharing outweigh the cost of heightened moral hazard" (1985:1404). However, as an IGA grows, the value of shared information will increase only up to the point where the increased costs of screening the information surpass the value of the information itself. At this point any further growth in size of the IGA is unproductive; the costs of sharing outweigh the benefits when the number of people sharing reaches a certain point.

Gatewood (1984) shows how environmental uncertainty can increase information sharing. Gatewood examined the relationship between information sharing and competition. Commercial fishing is an extremely competitive industry. Skippers have to consider three basic areas of uncertainty: 1) the skipper's knowledge of the area being fished (e.g., underwater hazards and migration patterns of salmon); 2) public information (e.g., weather forecasts and tidal conditions); and 3) detailed information about the boat and capabilities of the crew. To increase their catches, seine fisherman share information thus reducing the level of uncertainty. Gatewood's findings indicate uncertainty facilitates information sharing.

Uncertainty also affects the direction information is shared within the

organization. Extraorganizational uncertainty affects vertical information sharing. Top-down information sharing increases to decrease equivocality among people in the organization. Top management reinterprets the uncertainty. Intraorganizational uncertainty affects horizontal information sharing. Galbraith (1973) and Daft and Lengel (1984) say when there is uncertainty within the organization, horizontal information sharing increases to reduce uncertainty. The assumption is different groups/individuals in the organization have different frames of reference, values, and goals. The greater these differences, the greater the need for sharing. Reducing uncertainty between groups requires rich information. For example, two stakeholders can't afford to continue to communicate poorly. Therefore, it would be better to change the way they communicate from writing memos to face-to-face meetings. Changing the way the stakeholders share information will allow them to reduce their differences and thus allow them, over time, to use less rich forms of information.

Environmental uncertainty facilitates information sharing because stakeholders need information to reduce uncertainty. However, as uncertainty increases, information sharing increases only up to the point stakeholders are saturated with information. Different levels of uncertainty require different means of sharing.

Figure III.B.1.b. The relationship between sharing and uncertainty is curvilinear.

III.B.2.

ORGANIZATIONAL STRUCTURE

Organizational structure determines the way an organization shares and processes information to deal with its environment.

Organizational structure performs two major functions. First, structure facilitates the collection of information from the external environment. Second, structure functions to coordinate internal information processing within and between organizational subunits (Tushman and Nadler, 1978). Organizational structure, say March and Simon, consists of "those aspects of the pattern of behavior in the organization that are relatively stable and that change only slowly" (1958:170). Mintzberg (1983) says structure is the way organizations deal with the division of labor and the coordination of those tasks. More formally, Mintzberg defines structure as "the sum total of the ways in which its labor is divided into distinct tasks and then its coordination is achieved through these tasks" (1983:2). Goldhaber defines structure as "the network of relationships and roles throughout the organization. Structure enables the organization to meet its objectives effectively and in an orderly manner" (1986:42). Structure is the way an organization deals with its environment. Structure provides "the stability, predictability, and regularity necessary for an organization to function...[so]...information flow[s] freely without overloading relevant decision makers" (Goldhaber, 1986:56).

An organization's structure must be designed to meet the challenges of both external and internal environmental changes. Information structures are a particular type of organizational structure. Therefore, the information structure must be designed to process the information necessary to meet these challenges. However, organizational structures can affect information flow as well as being affected by the introduction of an information system. On the one hand, the structure may function to interfere with information sharing. On the other hand, the structure may be altered by the introduction of an information system.

Figure III.B.2 shows how four aspects of organizational structure receive inputs from the environment to affect information processing and sharing. Stakeholders can use their positions in the organization to control information and affect sharing (module III.B.2.a). Information structures can be designed to increase sharing (module III.B.2.b). However, hierarchical structure influences the content of information shared and can serve as a barrier to information sharing (module III.B.2.c). Introducing computer-based systems reduces structurally-induced barriers to information sharing (module III.B.2.d).

Figure III.B.2. Four aspects of organizational structure influence the way an organization shares and processes information to deal with its environment.

III.B.2.a. POSITION AND POWER

Stakeholders can use organizational position to affect information sharing because control of information translates into organizational power.

A stakeholder's organizational position is the office the stakeholder occupies in the organizational hierarchy. Pfeffer (1981) contends structural position is a determinant of power. Pfeffer and Salancik (1978) have shown power is related to the ability to control scarce information. Markus and Pfeffer note "the old maxim that information is power implies that those with access to and control over information have power in the organization" (1983:206). Information control "derives largely from one's position in both the formal and informal communication networks" (Pfeffer, 1981:130). Organizational position is important because control of the flow of information affects information sharing.

The relationship between organizational position and information sharing is complex. Position in the organization can influence the flow of information between hierarchical levels. Position can also lead to control of information and serve as a source of power. Perhaps the earliest description of the relationship between structural position and information is March and Simon's concept of uncertainty absorption. Uncertainty absorption occurs "when inferences are drawn from a body of evidence and the inferences, instead of the evidence itself, are then communicated" (1958:165). The position at which uncertainty absorption occurs affects the influence structure of the organization and can lead to the acquisition and exercising of power.

Poole (1978) suggests power is directly

related to the control of information and the exclusivity of the recipients of the information. O'Reilly (1983) argues powerful work units may selectively use information to further their own interests. Lowe and Shaw (1968) describe how managers are willing to bias information to suit their own interests. Pettigrew described how one person acting as a gatekeeper was "able to exert biases in favour of his own demand and at the same time feed the board [of directors] negative information about the demands of his opponents" (1972:190).

Markus and Pfeffer (1983) describe how position can decrease information sharing. Position means power based on the information controlled. If control of information is threatened, the stakeholder may use his/her position to maintain control of information. Power leads to a decrease in information sharing because of a desire on the stakeholder's part to maintain power. This is especially true in cases where the type of information system has changed from a paper system with no centralized database to the use of a computer with a centralized database. Markus and Pfeffer give many examples, but my favorite is "Old Oscar." Oscar kept all the production figures in his head and called all the shots. After a new information system was implemented, Oscar was concerned divisional salesmen would have direct access to the real plant production figures thus asking for more than they would need. However, he soon realized the salesmen would only have access to the figures he entered into the

system. Using his position, Oscar maintained control of the information by underreporting production. Oscar used his position to circumvent the information system and maintain power. Oscar's actions negated the purpose of the system. Although he did share information, the information being shared was inaccurate because Oscar was hoarding part of the information.

The previous examples are related to our model in two ways: 1) they show how stakeholders can use position in an organization to affect sharing, and 2) they show how the motivation to share information is based on an assessment of gain/loss ratio.

Position affects how superiors share decision making authority with subordinates. Sharing authority is related to perceptions of job related capabilities (Heller 1971, 1976; and Grove, 1983). Leana (1987) found superiors more willing to share decision making when the decision isn't important and the subordinate is perceived as having good job skills. When the decision was

perceived as important, superiors wouldn't share decision making, regardless of the subordinate's job skills.

Eisenberg, Kitz, and Webber (1983) suggest sharing authority for decision making among surgical residents is affected by, among other factors, the hierarchical nature of their programs. I argue this unwillingness to share authority is in part a positional phenomena. First-year surgical residents expressed a willingness to share authority with subordinates. Third-year surgical residents were hesitant to share authority with subordinates. Third-year residents are located higher in the hierarchy and their position inhibits sharing decisions.

Position in the organization affects information sharing because control of information is translated into organizational power (Figure III.B.2.a). Therefore, the amount and content of information shared as well as the willingness to share is affected. Position determines motivation to share or hoard information.

Figure III.B.2.a. A stakeholder's position in the organization allows control of information, which affects information sharing.

III.B.2.b. INFORMATION STRUCTURE

Vertical and horizontal dimensions of information processing determine the level of information richness stakeholders require to share successfully.

Information structures are how organizations process and share information. Daft and Lengel (1984) discuss two dimensions of organizational information processing: vertical and horizontal (Figure III.B.2.b). They describe the relationship between information structure and information richness. Richness refers to the amount of substantial new understanding provided by shared information.

Weick (1979) described the vertical dimension in terms of information equivocality. Vertical information processing arises to reduce environmental uncertainty. According to Daft and Lengel, organizations can't tolerate ambiguity and therefore "cope with equivocal cues in a way that reduces equivocality to an acceptable level so the organizations can take action and get things done" (1984:206). This is top down information processing, with managers reducing equivocality so "participants establish a shared view of events" (1984:207).

There is a structural dimension to vertical information processing corresponding to the degree of information richness. As Daft and Lengel suggest, "organizations reduce equivocality through the use of sequentially less rich [information] down through the hierarchy" (1984:213). Organizations must design their information structures so they stay open to environmental change. In this way, top management reinterprets the uncertainty so "employees within the organization

are...given a sense of specific roles, tasks, and purpose and are able to perform efficiently without having to interpret and define messy external issues" (1984:212). Varying the degree of information richness throughout the information structure allows the organization to deal effectively with external uncertainty. Daft and Lengel describe the empirical research concerning the diminishing richness of information. From their review, Daft and Lengel conclude "Organizations undergo a process of richness reduction from the top to lower levels of the organization....Rich information media are used for interpretation and decision making at the top, and sequentially less rich media are implemented at lower levels" (1984:220).

Galbraith (1973) described the horizontal dimension of the information processing structure. As the level of uncertainty increases, the amount of information processing increases to reduce uncertainty. Daft and Lengel contend Galbraith's contribution stems from his emphasis on increasing the internal flow of information in the face of uncertainty. Since Galbraith identified diversity, task variability, and interdependence as sources of uncertainty, "a structure [could] be implemented [to] encourage appropriate information exchanges" (Daft and Lengel, 1984:206). Galbraith's model provides a framework explaining both the amount of information needed and where it's needed throughout the organization. Galbraith's model also identifies how tasks should be coordinated within the

organization.

Daft and Lengel argue horizontal information processing reduces uncertainty within the organization. Internal uncertainty arises from interdepartmental differences in frames of reference, values, and goals. Tushman and Scanlan (1981) say specialization creates barriers to sharing information. Specialization leads to "idiosyncratic language/coding schemes, and the development of local conceptual frameworks" (1981:290). The development of work-group specific languages, frameworks, norms, and values all serve to facilitate productivity within the work group. However, they also become barriers to information processing and sharing across work groups.

The purpose of horizontal information processing is to reduce uncertainty and provide sufficient information for task performance. Interdependence specifies the amount of information needed, but the greater the interdependence, the more coordination required. Daft and Lengel suggest the difference in frames of reference between departments means there is more uncertainty. Reducing uncertainty requires rich information to reduce the difference between frames of reference. Once differences between departments are reduced, less rich information can be used. Daft and Lengel suggest "Different departmental frames of reference increase [uncertainty], hence the organization should design devices to process rich information and reduce equivocality...to facilitate coordination.

High interdependence between departments requires a large amount of information, so devices should be designed for sufficient volume of information to facilitate coordination" (1984:217). Ackoff (1967) cautions when departments have inappropriate performance measures putting the departments in conflict with each other, communication between the departments may hurt organizational performance. "Organizational structure and performance measurement must be taken into account before opening the flood gates and permitting the free flow of information between parts of the organization" (1967:152).

Daft and Lengel's framework can be used to reduce uncertainty because it defines how information needs vary by level of task complexity and uncertainty. High task complexity and high uncertainty require face-to-face, personal contact (rich information); simple and certain tasks required written rules and regulations (low richness). Daft and Lengel's model also defines the relationship between frames of reference and information needs. The greater the difference in departmental frames of reference, the greater the need for rich information. In general, Daft and Lengel conclude "requirements for horizontal information processing influence both richness and amount of information" (1984:223). Using the vertical and horizontal dimensions of information processing, we can identify the level of richness stakeholders require and the appropriate linkage mechanism(s).

Figure III.B.2.b. Organizations share information a) vertically to reduce environmental uncertainty, and b) horizontally to reduce uncertainty within the organization: Adapted from Daft and Lengel (1984).

III.B.2.c. HIERARCHICAL STRUCTURE

Hierarchical position determines the content of information shared vertically.

Organizational structures, including information structures and hierarchical structures, arise in response to environmental uncertainty and are designed to coordinate activities. As I've discussed, information structures can be designed to increase information sharing. However, hierarchical structures can serve as a barrier to effective communication and information sharing.

Roberts and O'Reilly (1974) studied the relationship between hierarchical position and information sharing. They measured how a subordinate's perception of his/her superior affects information sharing. Trust, superior's influence, and subordinate's mobility aspirations were used as measures of subordinate perception. Roberts and O'Reilly found a lack of trust impedes information flow and reduces performance. Low trust was associated with a tendency to block or withhold information. Superior's influence and subordinate's mobility aspirations weren't found to affect upward communication of information.

O'Reilly and Roberts (1974) studied the relationship between trust and influence on communication while holding mobility aspirations constant. O'Reilly and Roberts added directionality of information flow as an independent variable. Directionality affects the kind of information shared. Information favorable and important to the sender was sent upward. Information important and unfavorable to the sender was likely to be blocked. Although not statistically significant, O'Reilly and Roberts did find

"more unfavorable, more important information and therefore more total information is passed laterally than either upward or downward" (1974:259). Rosen and Tesser (1970) also found subordinates hesitant to communicate negative information.

O'Reilly (1978) studied whether trust, influence, and mobility aspirations had any affect on the likelihood the sender would sharpen or level information. Sharpening occurs when certain details in the content of information are emphasized or expanded. Leveling occurs when selective portions of the information are omitted. Senders tended to level unfavorable-important information, while sharpening favorable information sent to superiors. Leveling of information sent upwards can prevent information overload, but "bias can have deleterious effects when important or relevant information [reflecting] unfavorably on the sender is leveled, while irrelevant but favorable information is passed" (O'Reilly, 1978:189). O'Reilly found trust in the superior by a subordinate resulted in the leveling of unfavorable information and sharpening of favorable information. Perceived influence had no effect on the sharpening or leveling of information. Highly mobile individuals tended to engage in less intentional distortion of information than individuals with low mobility.

These findings raise interesting questions concerning the information top managers receive. Since important but unfavorable information is often denied top management, the quality of the decisions

they make is suspect. Trust in the superior has a greater effect on upward communication than on lateral or downward communication. Sender perception of the superior as trustworthy is the critical factor affecting sharing unfavorable information. Unfavorable-

important information, regardless of trust, is never passed downward. Hierarchical position is an important factor in determining what information stakeholders share with superiors and subordinates (Figure III.B.2.c).

Figure III.B.2.c. Hierarchical position determines what information is shared vertically.

III.B.2.d. COMPUTER-BASED SYSTEMS

Computer-based systems can overcome structural barriers to information sharing and lead to more uninhibited communication among stakeholders.

The research findings by Roberts and O'Reilly (1974), O'Reilly and Roberts (1974), and O'Reilly (1978) show the effect of organizational structure on information sharing. Structural position can isolate those at the top of the hierarchy from the information needed to make decisions (module III.B.2.c). Daft and Lengel (1984) and Tushman and Scanlan (1981) show how different departmental frames of reference inhibit sharing among work groups (module III.B.2.b). Research findings indicate these barriers to communication can be overcome by introducing computer-based systems.

Kiesler (1986) discusses the social effects of computer networks. She describes three effects new technology has on an organization. First are the intended technical effects. These are the planned improvements in productivity, quality, effectiveness, efficiency, etc. that justify the cost. Second are the transient effects. These are "important organizational adjustments made when a technology is introduced but that eventually disappear" (1986:46). Third are the unintended social effects. These are the permanent social effects that change the organization.

These three effects can be related to information sharing using computer-mediated communication as an example. Regarding the intended technical effects, organizations can introduce computers to improve sharing in terms of transmitting more information to more people in less time. Transient effects are those such as

resistance to change or reluctance to use the new technology, which may inhibit or interrupt sharing. The unintended social effects would include changes in the way information is shared, not in the physical sense, but in content. The computer reduces social context information allowing stakeholders to focus on the information, not each other. According to Kiesler, communicators feel a greater sense of anonymity and detect less individuality in others. They are less influenced by norms, less bound by convention, and less influenced by status. They become freer people (1986:48). Computer-mediated communications permit freer, more honest expression in sharing information. The breakdown of hierarchical (vertical) and departmental (horizontal) barriers to information sharing and the redefinition of organizational norms about information sharing lead to fundamental organizational change.

Sproull and Kiesler (1986) studied the effect electronic mail has on communication. Electronic mail was shown to break down social context cues, give managers access to information they wouldn't otherwise have access to, increase the amount of work-related information sharing, and serve to break down communication barriers. Seigal et al. (1986) found computerized information systems lead to more uninhibited communication than traditional face-to-face communication. Thus, information systems can overcome some of the structurally-induced

communication barriers and increase sharing. Whether other forms of information systems can serve the same purpose requires further research.

Foster and Flynn (1984) demonstrated how, through introducing an information system, position could be redefined to reroute power from structural position to level of competency. In traditional organizations, position usually influences communication channels, power, and lines of authority. Foster and Flynn report a loosening of the traditional hierarchy from a hierarchy based on position power to one based on competency. Position no longer means power because "power and resources now flow increasingly to the obvious centers of competence instead of to traditional hierarchical loci" (1984:232). Information sharing increased because the traditional structure wasn't threatened. Rather, there was a change in the traditional organizational protocol

increasing the ease of sharing information throughout the organization.

Organizational structure affects how information is used either by affecting what information is shared or by allowing certain individuals or groups to control how information is used. In either case, information sharing is restricted. Daft and Lengel (1984) suggest the effects of organizational structure can be overcome by analyzing the information needs of those sharing information and designing appropriate linkage mechanisms. Kiesler (1986), Sproull and Kiesler (1986), and Foster and Flynn (1984) have demonstrated how computer-based systems can break down the barriers to communication. These findings highlight the importance of recognizing barriers to sharing. They also show how recognition and use of the appropriate linkage mechanism can increase sharing (Figure III.B.2.d).

Figure III.B.2.d. Introducing computer-based systems can remove barriers to and increase information sharing.

III.B.3.

MANAGERIAL CLIMATE

Managerial climate influences information sharing by supporting information systems, setting up appropriate organizational structures, and providing opportunity and encouragement for sharing.

Using information as a source of power restricts sharing. Overcoming this problem requires an effective information system (module III.B.2.d), appropriate organizational structures (modules III.B.2.b and III.B.2.c), and managerial support for sharing. Without managerial support, sharing in organizations can't or won't occur.

Lucas says management support and commitment to any operation should result in "more favorable attitudes and greater cooperation" (1974:62). Lucas found a positive relationship between managerial support and favorable attitudes toward computerized information systems. Roby and Zeller (1978) describe how management support and involvement can affect adoption of an information system. In their research, managerial support made the difference between acceptance and rejection of the system. Sanders and Courtney (1985) found managerial support to be related to successful implementation of an information system. Finally, Ein-Dor and Segev (1978) suggest the level of managers who support an information system affect successful implementation. They argue support must come from top management for positive attitudes to develop toward the system. Positive attitudes must develop for stakeholders to use a system to share.

Tjosvold (1988) studied collaboration between departments to serve customers. Two requirements for productive

interaction are 1) stakeholders see their goals as cooperatively linked and expect to be successful together, and 2) stakeholders have the opportunity to work successfully together toward their cooperative goals. Stakeholders from different departments perceiving their goals as cooperatively linked shared information more than those perceiving their goals as competitively linked. Perceived goal interdependence is a function of organizational structure, but it's also a function of managerial climate. To increase sharing, management must set cooperatively-linked goals and provide the opportunity for stakeholders to work together to achieve the goals. Cooperation improves productivity, enhances competence, increases confidence in work relationships, and increases sharing. Ineffective interaction results in wasted time and money, dissatisfied customers, and lost business.

O'Reilly (1982) found the accessibility, not the perceived quality, of an information source affected frequency of use for decision making. Accessibility is perceived as more important because 1) decision makers are subject to social and economic costs such as time constraints and distractions, 2) organizational structure may restrict access to quality information sources, 3) organizational incentive systems may reward searching for certain types of information and punish searching for other types, and 4) information in organizations may be incomplete, vague, and subject to different

interpretations. To improve sharing, management must remove the barriers to seeking out quality information sources by modifying the task, hierarchical, reward, and information structures within the organization.

"Management also must create the climate in which it is legitimate to ask for assistance, in which providing this expertise is recognized, valued, and rewarded. Norms must evolve so that those with the relevant task expertise, whether they be supervisors or peers, are encouraged to provide work-related

assistance to their colleagues" (Tushman and Scanlan, 1981:303). Allen adds "organizational climate must be structured in such a way that problem-related information and the communication of problems are highly valued" (1979:205).

Managerial climate is important for information sharing because the attitude of the manager affects organizational structures, norms, and attitudes toward information systems (Figure III.B.3). Organizational structures, norms, and attitudes toward information systems affect how or if information is shared.

Figure III.B.3. Managerial climate influences organizational structures, norms, and attitudes toward information systems, which affect sharing.

III.C. LINKAGE MECHANISMS

Characteristics of linkage mechanisms, including their design, implementation, and information portrayal, affect the sharing process because linkage mechanisms are the means stakeholders use to share.

Linkage mechanisms connect stakeholders, represent the sharing process, and show how things are shared. Linkage mechanisms include the tools we use to share. The tools we use to share can range from notebooks to computers. I'll emphasize how a particular linkage mechanism, an information system, affects information sharing. I emphasize the relationship between information systems and information sharing for three reasons: 1) information systems have been marketed as the best way to increase information sharing, 2) information systems are the most visible tools used to share information, and 3) information systems variables can be generalized to other types of linkage mechanisms.

Three variables related to information system use for sharing are information portrayal (module III.C.1), information system design (module III.C.2), and information system implementation (module III.C.3). Dimensions of all three affect how well or how poorly information systems promote information sharing.

Information portrayal, information system design, and information system implementation act together to affect sharing (Figure III.C). Information

portrayal is the way information is presented to the stakeholder. Portrayal format must be taken into account because research has shown interpretation to vary by stakeholders' individual characteristics (e.g., cognitive style and personality type). In addition, portrayal varies by the nature of the task stakeholders are trying to accomplish. Information portrayal is also affected by the experience stakeholders have with information systems. Understanding how information portrayal affects sharing means we must take into account the effect portrayal will have on stakeholder perceptions of the information.

Information system design and implementation are also affected by individual characteristics of the user. Design features include how information is portrayed and determine whether implementation will be successful. Successful information systems must involve the users during the design stages, must match the needs of the users, not the design staff, and can't be overly complex. The key is to design the system so stakeholders get the output they desire, have confidence in the output, and can use the system without much difficulty.

Figure III.C. Linkage mechanism design, implementation, and information portrayal affect information sharing because linkage mechanisms are the means used to share.

III.C.1. INFORMATION PORTRAYAL

How stakeholders perceive information portrayal determines whether they use and share the information.

Stakeholders' perceptions of information portrayal determine what information they use and share, and how well they use and share the information (Figure III.C.1). Variables affecting information use, information sharing, and task performance include portrayal format (tabular or graphic), information content (abstract or concrete), and medium (mimeograph or computer-generated).

Malone et al. (1987) identified three techniques people use to filter information: cognitive filtering, social filtering, and economic filtering. Information filtering refers to the process of selecting specific information from a larger set of information. Stakeholders use these techniques to evaluate the portrayal of shared information. Malone et al. define the techniques as "general processes and specific kinds of knowledge and decision rules people use for extracting valuable information from a large pool of available sources" (1987:391). Cognitive filtering is using specific keywords or phrases in the text. Keywords serve as triggers alerting the receiver to the importance of the shared information. Social filtering is an assessment of the relationship between stakeholders. Evaluation of the relationship influences the content and timing of sharing. Economic filtering is a cost/benefit analysis of whether or not to share information. Identifying filtering techniques helps define how portrayal influences sharing and how stakeholders recognize the opportunity to share. Information portrayal triggers information

filtering, and filtering influences what is shared, with whom, and in what form.

Arend, Muthig, and Wandmacher (1987) studied the relationship between icon displays, word commands, and search time using computer menus. They examined whether icons reduced articulatory distance. Articulatory distance refers to the gap between the suggested meaning of an expression and the form the expression takes. Icons were recognized faster and with fewer errors than word commands. Thus, Arend et al. concluded "icons possess a smaller articulatory distance to their respective meanings than a set of word commands" (1987:424). This study shows how one particular format affects sharing. Portrayal formats decreasing articulatory distance make sharing between stakeholders easier by reducing miscommunication.

Borgida and Nisbett (1977) studied the relationship between information content and use. They were specifically interested in whether abstract information (statistical summaries of course evaluations) would be used more than concrete information (brief oral description of courses) in course selection among college students. Borgida and Nisbett found students prefer concrete information over abstract information. The authors suggest concrete information was more appealing because of the eyewitness principle. "Firsthand sense-impression data is assigned greater validity and relevance simply because one gathered it oneself" (1977:269). This research shows

stakeholders have preferences for content and portrayal format. These preferences determine whether stakeholders use the information shared. In this study, the subjects preferred the more rich information.

Watson and Driver (1983) studied the relationship between portrayal format and recall. Would recall be greater when information was presented in graphic or tabular form? Watson and Driver predicted graphic presentation would result in greater recall. There was no difference in recall between graphic and tabular displays. Watson and Driver suggested the graphic format used in the study may have been too complex, thus affecting recall. Complex graphic displays could affect recall leading to lack of use. This finding indicates how portrayal format can serve as a barrier to information sharing.

Benbasat and Dexter (1986) and Benbasat and Schroeder (1977) studied the relationship between color graphic displays and tabular reports under varying time constraints. They portrayed information using color graphics, tabular reports, and a combination graphic/tabular display. In general, tabular reports are better than graphic displays because, given enough time, those using tabular reports performed better than those using graphic formats. However, subjects using graphics and subjects using the combined format made decisions in less time than those using tabular reports. Subjects indicated a preference for the combined format because the graphic display allowed the subjects to narrow the range of answers quickly and use the tabular to determine the exact answer. Benbasat and Dexter

note "a given presentation is better than others only if it allows an additional perspective of the solution to the task" (1986:78). This research specifies another dimension of information portrayal: nature of the task. The portrayal format must match the task; otherwise, task performance is decreased. Decreased task performance inhibits sharing.

Luthans and Koester (1976) and Koester and Luthans (1979) studied the relationship between level of computer experience and the use of computer-generated information. They hypothesized subjects with computer experience would be more suspicious and less confident in computer-generated information than would inexperienced subjects. The subjects were divided into four groups: two with computer experience and two without computer experience. One experienced group and one inexperienced group were asked to evaluate computer-generated information. The other two groups were asked to evaluate mimeographed information. In both studies, results indicated decisions made by subjects with computer experience were less influenced by the computer-generated information. Decisions made by inexperienced subjects were more influenced by the computer-generated information. Koester and Luthans suggest "users should recognize that their past experience may affect their present judgment in using computerized information systems" (1979:421). These findings show how attitudes toward the linkage mechanism can affect its use. Portrayal interacts with experience, manifested as attitudes toward the computer, to affect confidence in the output.

Figure III.C.1. Stakeholders' perceptions of information portrayal influence how they use and share the information.

III.C.2. INFORMATION SYSTEM DESIGN

Information system design is directly related to information sharing because system design influences system effectiveness.

Information system design can either enhance or detract from the effectiveness of the systems we use to share. Juergens (1977) describes three dimensions of system effectiveness: capability, stability, and adaptability. Capability is the system's capacity to satisfy information needs and decision making functions. Other aspects of capability are accuracy and timeliness of system output. Stability and adaptability refer to remaining flexible when change is required. A system is effective if it produces information reducing the uncertainty surrounding decision making. If the system produces this kind of information, the information has value for the user (Zmud, 1979). An effective system producing valuable information increases information sharing.

Dickson, Senn, and Chervany (1977) describe four design characteristics they believe affect system use and decision making. First, hard-to-use systems with complex models don't improve user decision making. Second, systems with complex or unfamiliar attributes can produce low user confidence and satisfaction "even if operating results are better" (1977:921). Third, interactive systems increase use and acceptance of information systems. Finally, system design should be sensitive to individual differences among decision makers. These findings, while related to decision making, are relevant to information sharing. Information sharing is affected by the system used to share. Systems with design flaws become barriers to sharing

because users will either not use the system or won't understand the information being shared.

Carlson, Grace, and Sutton (1977) assumed system use would decrease if system output didn't match user expectations. This assumption was supported. System use decreased when analysis and display functions couldn't meet manipulation requirements. System use also decreased if the system imposed unfamiliar problem-solving processes on the user. According to Carlson et al. these problems could be overcome by actively involving users in the design of the system. Furthermore, if the system is useful and isn't too difficult to learn, then sharing will increase. These findings support Dickson et al. (1977). Ease in producing shared information is as important as being able to use the information once it is shared. Design features must take both input and output into account for the system to be effective. Systems producing useless or confusing information won't increase sharing.

Franz and Robey (1986) studied the relationship between perceived system usefulness and user involvement in system design. They found user involvement increased perceived usefulness. User involvement led to an increase in understanding of 1) how the system performs, 2) how system output matches the needs of the organization, and 3) how the system affects problem solving capabilities. All these factors increase commitment to and favorable attitudes

toward the system. User commitment to and favorable attitudes toward the system will increase system use, and thus increase sharing.

Juergens (1977) suggests systems should not be designed to meet the technical needs of the programmer but to satisfy the needs of the user. Specifically, Scott Morton (1971) suggests system designers should take into account the kinds of problems users are trying to solve. He argues batch systems are better suited for structured problems and interactive display systems are better for unstructured problems. Ackoff (1967) argues myths about the information needs of managers have lead system designers to make incorrect assumptions. According to Ackoff, erroneous assumptions can be overcome by flowcharting different decision types, determining information requirements, aggregating decisions with

overlapping information requirements, designing the appropriate information processing, and designing a control system for continuous improvement. Ackoff argues if managers and designers follow this process, the information system will provide the managers with the information they need. Systems producing information stakeholders need will increase sharing.

Information system design influences system effectiveness and information sharing. An appropriately designed system will be effective and increase sharing (Figure III.C.2). Ironically, many of the problems with system design could be avoided if users and information system staff shared information. In fact, much of the research reviewed here is about problems having their origins in a lack of sharing.

Figure III.C.2. Information system design influences system effectiveness, which affects information sharing.

III.C.3. INFORMATION SYSTEM IMPLEMENTATION

Stakeholders must find a system useful for implementation to be successful and for sharing to occur.

Successful implementation and operation of an information system determines the system's contribution to shared information processing. Without successful implementation or operation, stakeholders can't use the system, and sharing won't occur.

Powers and Dickson (1973) identified four criteria for information system success: time, cost, user satisfaction, and computer operations. The criteria were found to be statistically independent; each variable measured a different dimension of system success. Powers and Dickson concluded the most important criterion of success was user satisfaction because "If the manager does not use the products of the project because he does not understand what he is getting, because the products are too difficult to use, or because he is not getting information he really needs, being within time and cost budgets is a very superficial achievement" (1973:153). For satisfaction to be high, the system must be user-friendly and produce useful information for decision making. This requires involvement of the users in system implementation and initiation of projects by users rather than information systems staff. These conclusions are similar to the research findings related to system design. A successful information system enhances sharing because the user is familiar with the output and how the system operates. If the user can't use the system, sharing can't occur, and the system will fail.

Tait and Vessey (1988) studied the relationship between two dependent variables: system success and user involvement; and three independent variables: user system, technical system, and development process. User system was dichotomized into system impact and user attitude. Technical system referred to system complexity. Development process was defined as resource constraints. User involvement was not significantly associated with system success. However, user involvement was positively related to system complexity; as system complexity increased, the extent of user involvement increased. Resource constraints were negatively related to system success; as resource constraints increased, the likelihood of system success decreased. There were no other statistically significant relationships between the independent and dependent variables. The relationship between system complexity and user involvement does indicate how involving the user in the development of the system can increase commitment to and use of the system and, by extension, increase information sharing.

Stakeholders must find a system useful for successful implementation and operation. The success of implementation and operation also determines system usefulness. A system must be successfully implemented and operated, and useful, to increase information sharing (Figure III.C.3).

Figure III.C.3.

The success of implementing and operating an information system and its usefulness determine the system's contribution to information sharing.

III.D. NEEDS AND MOTIVATORS

Stakeholders are motivated to share by need. However, motivation is also influenced by social norms, social distance, demographic characteristics of the participants, role models, type of reinforcement, and the situation.

I believe all stakeholders want to share. But what motivates a stakeholder to share? In module II.A, I defined two specialized types of sharing: transfer and exchange. I limited the meaning of transfer to giving and called it altruistic sharing. I said exchange represented utilitarian sharing and limited it to situations where people share with those who have shared with them. In this module I'll discuss need and motivation. I'll explain what motivates people to share and what factors affect motivation. These studies describe sharing in general but can be related directly to information sharing.

It's difficult to separate need from motivation. Therefore, I simply say the motivation to share is initiated by a need. The degree of motivation is directly linked to the level of need. Following Maslow's (1948) hierarchical theory of motivation, there are some basic needs associated with sharing. According to Maslow, we all have certain basic needs (e.g., food, water, safety, and propagation of the species). These lower order needs must be fulfilled before higher order needs (e.g., self-realization and self-satisfaction) can be realized.

Survival is the basic lower order need motivating sharing (Service, 1962; Sahlins, 1965; Fried, 1967; and LeFevre, 1977). Service (1962) and LeFevre (1977) suggest sharing occurred before the formation of norms or values in primitive cultures. Group survival depended on

sharing. Sharing was prescribed and hoarding was proscribed.

The emergence of higher-order needs (self-satisfaction and self-realization) becomes the motivation for sharing when society has a surplus of goods (Service, 1962; Sahlins, 1965; Fried, 1967; and LeFevre, 1977). According to LeFevre, giving can only occur when there is "sufficient surplus so that [the stakeholder] does not reduce himself to penury by such open-handed procedures" (1977: 84). Fulfilling the need for self-satisfaction or self-realizations results in altruistic sharing.

Utilitarian sharing is initiated by a higher order need: economic exchange. Buchanan (1971) and Lindenberg (1982) suggest the motivation for sharing is economic. Aronfreed (1968) and LeFevre (1977) say sharing is motivated by the ownership of property. Sharing associated with these needs is guided by the norm of reciprocity.

Need motivates stakeholders to share, but so do other factors (Figure III.D). These factors include social norms (module III.D.1), social distance (module III.D.2), demographics (module III.D.3), role models and reinforcement (module III.D.4), and situational characteristics (module III.D.5). Some factors are internal characteristics of the stakeholder and some are external characteristics of the environment.

Figure III.D. Need and other factors motivate stakeholders to share.

III.D.1. SOCIAL NORMS

The salience of social norms, and their influence on sharing, depends on the stakeholders' experience and the situation.

Rushton (1981) suggests there are two norms associated with sharing: the norm of social responsibility, or giving, and the norm of reciprocity. I defined these norms in module II.A. Now I'll describe relationships between the norms and how they influence sharing behavior, as shown in Figure III.D.1.

Leeds (1963) discusses the relationship between the norm of giving and the norm of reciprocity. She suggests the norm of social responsibility can serve as a starting mechanism for what becomes a stable sharing relationship through adherence to the norm of reciprocity. That is, a stakeholder who shares first without expecting anything in return lays the foundation for a relationship where sharing occurs in both directions over time. The norm of social responsibility can promote sharing through a chain reaction process. The sharee, receiving help when in need without feeling pressure to immediately repay the sharer, might in turn share with others in a similar fashion. This type of sharing behavior "draws attention to the interstices which are in need of institutionalized patterns of action in order to insure [information] will be available when required" (Leeds, 1963:236). Once this type of information sharing becomes routinized, the focus shifts from the norm of social responsibility as it operates on the individual level to the norm of social responsibility as it operates on the organizational level.

Berkowitz and Daniels say "the salience of

the social responsibility norm on a given occasion varies with the individual's experience in the immediately preceding situation. Since this norm involves helping others, a person should be most aware of the culturally shared prescription to aid those who are dependent upon him right after someone else had voluntarily given *him* help. The assistance he received from one person should remind him strongly that he ought to help another who is dependent upon him" (1964:275). This suggests stakeholders reciprocating with the same or a different person, after a sharing experience, do so based on both the norm of reciprocity and the norm of social responsibility. The reciprocity norm may be more effective in sharing with the same person while the social responsibility norm may be more effective in sharing with a different person, but both norms have some effect in both situations.

Darley and Latane argue "norms are, in general, rather unimportant determinants of behavior in specific helping situations, and they should rarely be invoked unless all other alternative explanations fail" (1970:85). Three reasons supporting their position are 1) norms are contradictory and vague, 2) people don't report thinking about norms when deciding what to do, and 3) people's behavior doesn't always correspond to predictions derived from normative considerations (1970:87).

Schwartz (1968) supports normative explanations of sharing. When activated, personal norms influence sharing behavior. "The relationship of moral

norms to behavior depends upon how a person defines the moral choice situation. If a person construes a decision he faces to be a *moral* choice, relevant moral norms he holds are likely to be activated and to affect his behavior. When he fails to perceive that a moral decision is at stake, however, particular moral norms are unlikely to be activated. A norm which is not activated is unlikely to have any significant impact on behavior *regardless of its content or of how strongly the person holds it*" (1968:355). The activation of personal norms relevant to sharing varies with the salience of consequences in the situation and the salience of personal responsibility. "In the initial perception of a situation, moral norms may not be activated if a person fails to recognize or misinterprets the consequences of a potential action for the welfare of others, or if he views the causal origin of an event, and with it the locus of responsibility, to be external to himself.... These two modes of defense produce a redefinition the situation such that he no longer perceives himself as facing a moral choice and hence does not feel obliged to adhere to moral norms" (Schwartz, 1968:356).

"When called upon to act or to state what they feel they ought to do, people can crystallize norms based on their general values. Norms are more likely to influence behavior the greater the opportunity to crystallize them prior to the decision to act and the greater the similarity between the contexts of norm formation and of actual behavior" (Schwartz, 1973:362). Berkowitz (1972) found subjects asked about helping others and verbally rewarded regardless of their responses exhibited behavior consistent

with their verbalizations in situations immediately following the interviews. That is, approved selfish statements lessened helpfulness while rewarded helpful remarks lead to greater helpfulness.

Peterson developed an elaborated rule governing sharing: "I should help or give to *deserving* individuals who are in *X* level of *need* and are *dependent* on *me* for help when I can *ascertain* and *perform* the necessary behavior and when the *cost* or *risk* to me does not exceed *Y* amount of my currently available resources" (1982a:202). This rule is based on social norms and incorporates developmental level, interpersonal differences, and situational factors. Peterson recognizes in many cases a generalized rule offers less predictive ability than knowledge of specific situational factors. Four implications of the model are: 1) sharing is multi-determined, 2) the impact of each qualifier on whether sharing takes place is determined by the individually perceived magnitude and salience of the qualifier, 3) some qualifiers interact with one another, and 4) as age, social experience, and cognitive maturity increase, an individual's rule is constructed by the progressive addition of qualifiers.

The importance of normative explanations of sharing for our model is twofold. First, stakeholders use these norms to evaluate their behavior. Therefore, their decisions to share are affected by these norms. Second, all organizations have or develop cultures. Usually, societal norms are part of organizational culture or are altered somewhat by the culture. I believe both norms come into play, especially since sharing is, to a large degree, situational.

Figure III.D.1. A stakeholder's experience and the situation combine to affect the salience of social norms, which determines the influence of the norms on sharing.

III.D.2. SOCIAL DISTANCE

Social distance defines the social roles of stakeholders, affects the motivation to share, and determines what norms are in force when sharing occurs.

Social distance is the relationship between two stakeholders. Social distance defines the social roles of the stakeholders and affects their motivation to share. Identifying the social distance between stakeholders allows us to predict whether sharing will be altruistic or utilitarian. Knowing what kind of sharing is taking place allows us to predict whether the norm of social responsibility or the norm of reciprocity is in force.

Berkowitz (1972) describes the relationship between social distance and the norms governing sharing. "Societies possessing a strong reciprocity orientation often call for responsibility behavior only towards members of one's own family group or people who are fairly close. Interactions with persons outside the family or the intimate group are in terms of reciprocity. Thus, the more distant the other people are, socially speaking, the more likely it is that the reciprocator will help them only to the extent that he has benefited from the situation himself. This phenomenon might arise from the reciprocator's uncertainty about the 'distant' people. Not knowing what to expect from them, the reciprocator might be very surprised when he is given benefits by persons who are socially quite distant from him. He is greatly pleased and feels obligated to provide benefits to them in return. On the other hand, if these 'distant' others fail to benefit him when they could have done so, the reciprocator might interpret this failure as hostility

directed toward him. He feels slighted, if not insulted, and reciprocates by not helping them when the opportunity arises" (1972:102-103). Within a given group, the norm of social responsibility is in force; across groups or between groups, reciprocity is the norm.

Sahlins (1965) describes the relationship between social distance and a continuum of reciprocities. Generalized reciprocity refers to purely altruistic sharing. This corresponds to sharing based on the norm of social responsibility. Balanced reciprocity refers to direct exchange. This corresponds to sharing based on the norm of reciprocity. Negative reciprocity is attempting to get something for nothing. Sahlins relates the continuum to kinship distance. "Reciprocity is inclined toward the generalized pole by close kinship, toward the negative extreme in proportion to kinship distance" (1965:149). As shown in Figure III.D.2, Sahlins continuum can be applied to stakeholders sharing in an organization. The greatest amount of sharing takes place within the work group while the least amount of sharing occurs between stakeholders inside and outside the organization.

Social distance determines the relationship, the type of sharing, and what norms govern sharing, between stakeholders. Social distance provides us with an opportunity to apply what we know about kinship groups to organizational work groups.

Figure III.D.2. Sharing is affected by distance and social relations: Adapted from Sahlins (1965).

III.D.3. DEMOGRAPHICS

Stakeholders' demographic characteristics, such as age, social class, gender, and cultural factors, influence stakeholders' sharing behavior and what norm they base decisions to share on.

Many studies examined the effects of stakeholders' demographic characteristics on their sharing behavior. Demographic characteristics studied include age, social class, gender, and cultural factors.

Handlon and Gross (1959) found sharing increases with age. The literature shows a relationship between age and sharing for several reasons. Mussen and Eisenberg-Berg (1977) found role-taking abilities and moral reasoning increase with age. Green and Schneider (1974) found changes in the ability to make cognitive judgments occur with age. Peterson (1983) found competence to offer aid and feeling responsible for providing assistance increase with age.

Furby (1978) studied the effects of age on what people base decisions to share on and people's moral judgments about sharing. Results indicate children share based on the norm of social responsibility more than adolescents and adults. Adolescents and adults are more concerned with the honesty, responsibility, and trustworthiness of the sharee and how the sharee will use the shared possession. This suggests stakeholders are likely to share information more readily with those they trust and if they know how the information will be used. Furby found similar results on the morality of sharing. Younger subjects based their feelings about whether people should share on the norm of social responsibility while adults expressed concern for the sharee's welfare and the promotion of positive

interpersonal interactions. These findings indicate stakeholders may share to help out someone who needs information, and sharing promotes a more friendly work environment.

Berkowitz and Friedman (1967) studied the effects of social class on helping behavior. They found subjects from middle-class families with entrepreneurial backgrounds displayed a reciprocity orientation toward giving and receiving help. Subjects from middle-class families with bureaucratic backgrounds and from lower-class families felt socially obligated to give help regardless of how much help they had received.

Dreman and Greenbaum (1973) studied sharing in reciprocity and nonreciprocity situations by children grouped by social class and sex. Their findings support Berkowitz and Friedman (1967): middle-class individuals, particularly males of commercially oriented occupational backgrounds, base sharing on the norm of reciprocity. Middle-class females and lower-class individuals are more influenced by the norm of social responsibility. "The middle class, particularly the entrepreneurial segment, may find the reciprocity norm more amenable to the profit-and-loss orientation characteristic of their day-to-day transactions. Lower-class people perhaps rely more on the norm of social responsibility because it is compatible with considerations of mutual aid and family-centered exchange patterns typical of this

group" (Dreman and Greenbaum, 1973:61). Bryan and London (1970) and Muir and Weinstein (1962) also found social class affects sharing.

Others have studied the effects of gender on sharing. Shigetomi et al. (1981) found females tend to share more than males, but Handlon and Gross (1959) found no relation between gender and sharing. Mussen and Eisenberg-Berg (1977) attribute differences in sharing between males and females to gender-role socialization. They argue females in our society are socialized to help and share more than males are.

Several cultural factors have been shown to affect sharing. Children reared in traditional rural subcultures and small agricultural communal settlements cooperate more readily than urban children. Mussen and Eisenberg-Berg (1977) and LeFevre (1977) suggest traditional communal groups are more dependent on cooperation and sharing for survival than are other more industrialized societies. Children share more in cultures where parents and peers stress sharing. Those in extended family settings share more, and children who have been assigned responsibility early share more.

Four demographic characteristics of

stakeholders have been shown to affect sharing behavior (Figure III.D.3). In general, sharing increases with age. Social class and occupational background determine what norm stakeholders base decisions to share on. Some studies found females share more than males, but others found no relation between gender and sharing. Finally, geographic and familial settings also influence sharing.

The most significant findings for information sharing are probably those related to social class. These findings relate to stakeholders sharing information in different types of organizations. Stakeholders in an entrepreneurial organization are more concerned with social exchange in sharing information. Stakeholders in a bureaucratic organization are more likely to share in accord with the standards of the organization, regardless of personal considerations. Government oversight agencies are bureaucratic organizations. Within bureaucratic organizations, information is power. Since information is power, stakeholders will be less inclined to share in order to retain power. However, findings from Berkowitz and Friedman (1967) suggest if sharing is the standard, even in a bureaucratic organization where information is power, sharing will occur.

Figure III.D.3.

Age, social class, gender, and cultural factors influence how and whether stakeholders share.

III.D.4. ROLE MODELS AND REINFORCEMENT

Role models provide stakeholders with the opportunity to learn how to share, and reinforcement ensures stakeholders learn how to share.

Peterson (1982b) claims in a sharing experience, individuals may seek a role model to help them define the situation and the appropriate response. That is, the presence of a role model may impose demands to behave in a certain manner. These demands are part of the environmental cues for sharing. Harris (1971) examined the relationships between role models and sharing. In the study, models either shared with the subjects, shared with charities, or did not share. Results strongly support the effect of observing a model upon subsequent sharing.

Bryan (1970) studied the effects of sharing behavior and exhortation by role models on children's sharing behavior. Peer and adult models were observed talking about sharing or not sharing, then practicing sharing or not sharing. Some models' behavior didn't match their words. The results suggest children are much more influenced by what role models practice than what they preach, and inconsistency in words and deeds fails to affect children's behavior. Poulos and Liebert (1972) found verbalization and modeling no more effective combined than alone in eliciting sharing behavior.

Bryan also found "children who are frightened even of doing the right thing may simply become less inhibited upon seeing another peer 'get away with it.' This suggests that model's practices do not arouse already learned prosocial or anti-social disposition, but rather free the child to act upon those already present"

(1970:70). This finding can be extended to stakeholders sharing information in an organization. Stakeholders will likely share or not share based on the organization's culture and the behavior of their peers, role models, and superiors, regardless of the stakeholders' internalized beliefs about sharing. We can look at this in two ways. Stakeholders who want to share (or not share) may not (or may) to avoid contradicting organizational norms. On the other hand, stakeholders who want to share (or not share) but are afraid to (or not to) may be less inhibited upon observing another stakeholder successfully do so (or not do so).

Ascione and Sanok (1982) studied the effects of peer and adult model observation on children's sharing behavior. Interestingly, they found "children may have imitated negative behaviors or may have been inhibited in the performance of prosocial behaviors when they observed peers but not adults who were not prosocial and who suffered no adverse consequences for this behavior....Modeling of negative social behaviors followed by no reinforcement (or punishment) inhibited sharing" (1982:255). Stakeholders observing peers not sharing may be influenced not to share even if they would have shared otherwise. I believe much of the reluctance among stakeholders to share is the result of watching successful peers and superiors not share.

Lipscomb et al. (1982) examined the relationship between age and the

influence of a role model on sharing. In the study, the model was charitable, neutral, or selfish. Very young children imitated the sharing behavior of the model. Older children shared consistently but were little influenced by the model's sharing behavior. This difference was attributed to the internalization of the norm of social responsibility with age. The authors suggest "It is possible that modeling effects obtained with older children in some previous studies have occurred because any internalized standards of prosocial behavior were overwhelmed by demand characteristics inherent in the procedures employed" (1982:281). That is, in previous studies, older children may have imitated a model's behavior because of the experimental procedures rather than behaving based on their own beliefs about sharing.

White (1972) studied the effects of model observation on sharing. Results of the study indicate "modeling [alone] may be a relatively inefficient way of informing the subject how he is expected to behave under similar conditions" (1972:146), but observation combined with anticipated social approval or fear of disapproval elicits sharing behavior. Further, observation and socially driven compliant behavior increases sharing when the subject isn't in the model's presence, and is apparently strong enough to overcome the effects of competition, which have been shown to reduce sharing. This study shows the complexity of the effects of modeling and situational factors on sharing. Stakeholders share more readily after watching a role model share if they

anticipate social approval, or want to avoid expected disapproval, in spite of competition.

Reinforcement has also been shown to affect sharing behavior. Fischer (1963) studied children's sharing behavior as a function of the type of reinforcement (verbal or material). The results show material reinforcement to be much more effective in promoting sharing behavior than verbal reinforcement. Hartmann, et al. (1976) studied the effects of negative reinforcement on sharing. They found negative consequences for not sharing, combined with an explanation of the consequences to the sharer, increased sharing over time more than no explanation of the consequences. Grusec (1971) found social power facilitates the imitation and internalization of aversive behaviors involving the sharing of rewards an individual might have otherwise kept. Power, in this study, refers to a model's position, prestige, and control of resources. In this study, the model maintained the ability to dispense or withhold rewards important to the imitator. While both nurturance and power were found to facilitate imitation and internalization of neutral behaviors, only power increased imitation and internalization of aversive behaviors such as sharing.

Role models and reinforcement work together to promote sharing behavior (Figure III.D.4). While studies indicate sharing is increased by either role models or reinforcement, the greatest increase in sharing occurs when role models positively reinforce the behavior.

Figure III.D.4: Role models and reinforcement combine to influence a stakeholder's sharing behavior.

III.D.5. SITUATIONAL FACTORS

Understanding stakeholders' motivation to share is complicated by the situation surrounding the sharing experience. Whether sharing takes place may be determined by a single situational factor.

Sharing is, to a large degree, situational (Mussen and Eisenberg-Berg, 1977). Situational factors affect stakeholders' motivation to share. Some situational factors studied include the stakeholder's mood, guilt, and success or failure prior to sharing, and the other's attractiveness, previous helpfulness, and deservedness. Relationships among these factors are shown in Figure III.D.5.

Berkowitz (1972) reviewed several factors affecting sharing: mood, guilt, the other's attractiveness, and the other's previous helpfulness. Regarding mood, Berkowitz and Connor (1966) found people experiencing success were less resentful of felt obligations and worked harder for a dependent other. Regarding guilt, Darlington and Macker (1966) found guilt feelings prompted helpfulness, even though "the victim of the injustice is not necessarily the preferred beneficiary for the expiatory assistance" (Berkowitz, 1972:83). Concerning the other's attractiveness, Daniels and Berkowitz (1963) found people finding a dependent other highly attractive were less resentful of felt pressure to help; people were less inclined to help if they didn't like the person needing their assistance. Concerning the other's previous helpfulness, Goranson and Berkowitz (1966) found people worked hardest for those they believed voluntarily helped them earlier.

Isen, Horn, and Rosenhan (1973) studied the effects of success and failure on

children's generosity. Their findings support Berkowitz and Connor (1966) where prior success promotes helping and generosity. However, Isen et al. also found after failure, image repair and maintenance promoted generosity. Isen et al. recognize the importance of accounting for the effects of situational factors on sharing behavior. "Once again, we have evidence that a given behavior may be generated in more than one way and may represent any of various motives, and that, therefore, careful consideration of the specific circumstances surrounding a behavior is crucial to its ultimate understanding" (1973:247).

Concerning deservedness, Schopler and Matthews (1965) found those seen as a victim of circumstance will be helped more than those seen as being dependent of their own volition. A stakeholder's perception of the other's predicament affects the stakeholder's motivation to share.

Presbie and Kanareff (1970) examined what effect the number of sharees has on children's sharing behavior. They found "significantly more sharing occurred with three sharees than with a single sharee, but only when the sharees were personalized and individualized" (1970:40). Extending these findings to individuals sharing information in an organization suggests stakeholders may be more willing to share information with more people if the stakeholders know who they're sharing with.

Understanding stakeholders' motivation is complicated by the number of situational factors affecting sharing. However, as Isen et al. (1973) note, the situation must be accounted for to fully understand what motivates stakeholders to share. A single

situational factor may serve to inhibit sharing even though other situational factors are right for sharing to occur. In combination, motivation and the situation interact to facilitate or hinder sharing.

Figure III.D.5.

A stakeholder's mood, guilt, and prior success or failure is determined by the situation, and these factors combine with the other's attractiveness, previous helpfulness, and deservedness to affect sharing.

III.E. ENTITIES

Entities are what stakeholders use to evaluate the sharing experience.

An entity is what is shared between stakeholders. Stakeholders can share things like office space, a secretary, or a budget. In shared information processing, stakeholders share data, information, decisions, and tools (e.g., computers) used to process information from data. Data, information, decision mechanisms, and information processors make up the entities of shared information processing.

As shown in Figure III.E, information is central to the idea of shared information processing. The relationship between information and information processors concerns hardware, software, and networking. The relationship between information and decision mechanisms concerns information conversion for decision making. The relationship between information and data concerns different users of information converted from data.

Entities influence stakeholders'

motivation to share since the entities are used to assess the gain/loss ratio. Favorable evaluation of the sharing experience, based on assessment of the gain/loss ratio, may facilitate further sharing. In shared information processing, stakeholders evaluate the characteristics of the information shared to assess the gain/loss ratio and evaluate the sharing experience. I'll discuss the characteristics of information as perceived by the stakeholder (module III.E.1). I limit my discussion to one entity, information, since 1) the other three entities of shared information processing relate to information, 2) characteristics of information processors and decision mechanisms can be inferred from the characteristics of information systems previously discussed, and 3) no one in the literature talked about characteristics of data but I believe characteristics of information can be extended since we make information from data.

Figure III.E. Information is central to the idea of shared information processing.

III.E.1. INFORMATION

Stakeholders assess the gain/loss ratio based on the usefulness of the information shared.

Stakeholders use information characteristics to assess the gain/loss ratio. The most important characteristic of information is usefulness. Shared information perceived as useful results in a favorable evaluation of the sharing experience by the stakeholder(s).

Many people have studied the characteristics of information (American Accounting Association, 1966; Snavely, 1967; Godfrey and Prince, 1971; Gallagher, 1974; Swanson, 1974; Lucas, 1978; Zmud, 1978; Larcker and Lessig, 1980; Murdick, 1980; Epstein and King, 1982; Hicks, 1984; Davis and Olson, 1985; Burch and Grudnitski, 1986; Taggart and Silbey, 1986; and Senn, 1987). From these studies the most recognized attributes of information are accuracy, timeliness, and relevance. For information to be useful, it must be accurate, timely, and relevant for the decision maker (Hill, 1989).

For Larcker and Lessig (1980) the usefulness of information has two dimensions: perceived usability and perceived importance. Larcker and Lessig defined the perceived importance dimension as "the quality that causes a particular information set to acquire relevance to the decision maker" (1980:123). Perceived usability was defined as "the information quality allow[ing] a decision maker to utilize the [information] set as an input for problem solution" (1980:123). The perceived usability dimension is exemplified by unambiguous, clear, and readable information. The perceived importance

dimension is exemplified by informative, meaningful, helpful, and significant information. If information has the qualities associated with perceived importance and usability, perceived usefulness will increase. Larcker and Lessig developed an instrument to measure the two dimensions of information usefulness. They were successful in documenting the validity and reliability of the instrument.

Blaylock and Rees (1984) studied the relationships among cognitive style, information preferences, and perceived importance and usability of information. Importance and usability were defined using Larcker and Lessig's (1980) classification. Cognitive style was classified using the MBTI. Blaylock and Rees found the information selected to make an unstructured, strategic-planning decision varied by cognitive style, but only when feedback was available to the decision makers. Intuitives were able to reach agreement about the information necessary to make a decision. Sensing types weren't able to come to agreement. Without feedback, cognitive style didn't affect information preferences. There was marginal support for the hypothesis that feeling cognitive styles prefer social information more than thinking cognitive styles. Blaylock and Rees also found perceived importance of information, but not perceived usability, varied by cognitive style. The authors conclude "the value of information cannot be effectively evaluated apart from the users of the information. There is no sense providing

information to a decision maker whose cognitive make-up is such that he or she will ignore it" (1984:88).

Dermer (1973) studied the relationship between intolerance to ambiguity (a cognitive characteristic) and perceived importance of information. Dermer found individuals intolerant of ambiguity tend to perceive more information to be important than those tolerant of ambiguity. There was partial support for the hypothesis that individuals intolerant of ambiguity tend to judge well-defined, familiar, and certain information as important. Dermer's findings support those of Blaylock and Rees, especially the relationship between the importance of information and cognitive style. Dermer concludes there is little point in providing certain types of information to administrators "whose cognitive style make-up is such that they will tend to ignore it" (1973:518). Both studies indicate the need to consider an individual's cognitive style when providing information.

Neumann and Segev (1979) studied how managers evaluated four information characteristics: 1) content--information included in the information system, 2) accuracy--accepted percent of error in the information, 3) recency--delay between the real occurrence and its presentation, and 4) frequency--length of time between two subsequent occasions information is made available to the user. Neumann and Segev found prolonged use of an information system created a holistic perception of the information presented to the users. Holistic perception was defined as a lack of ability to differentiate among the various information characteristics. They also discovered a dominant information characteristic, content, influencing the users' evaluations of information characteristics. Content of

information affected how users evaluated the accuracy, frequency, and recency of the information. This study identifies another aspect of perceptions of information usefulness. Cognitive style affects how users evaluate information, but the interaction between holistic perceptions and the presence of a dominant information characteristic must also be considered.

Two studies on children's sharing behavior can be extended to information sharing. Presbie and Kanareff (1970) examined what effects reciprocity has on children's sharing behavior. The authors' hypotheses that with reciprocation the level of sharing would increase over trials and the level of sharing would be greater the higher the value of the reciprocated object were not supported. Comments made by the children during the study indicate the authors miscalculated how the children would value the reciprocated objects. Also, the increased accumulation of reciprocated objects over trials may have devalued the objects. Extending these findings suggests sharing information may take place only up to the point where stakeholders are saturated with reciprocated information, whether the information is useful or not. Fischer (1963) found as the number of objects accumulated increased (for those given more objects to share from), the number of objects shared increased. That is, as stakeholders (who have more information to share from) accumulate even more information, they may be more willing to share.

Stakeholders evaluate the gain/loss ratio based on the perceived usefulness of the information shared. The perceived usefulness of information can be measured using Larcker and Lessig's (1980) instrument and depends on the stakeholder's cognitive style, holistic perceptions of the information, the

presence of a dominant information characteristic, and the amount of information shared. Favorable evaluation

of the information shared serves to perpetuate the sharing process (Figure III.E.1).

Figure III.E.1.

The stakeholder's assessment of the gain/loss ratio, based on the usefulness of shared information, determines whether sharing continues.

IV.

SUMMARY OF FINDINGS ABOUT SHARING

SUMMARY OF FINDINGS ABOUT SHARING

IV.A. HOW CAN MANAGERS WHO WANT TO IMPROVE SHARING USE THIS DOCUMENT?

This document identifies from the literature the key variables of sharing and their relationships.

The model of sharing presented in module I.B helps us understand what sharing is and how we can integrate the concept of sharing with information processing. In this document, I've identified the elements of sharing, key variables of each element, and the relationships between the variables.

Stakeholders are who shares. The most important dimension of the stakeholder is cognitive style because cognitive style determines how stakeholders make decisions, how stakeholders use information systems, and how well stakeholders perform tasks. A stakeholder's perception of task performance influences ability, recognition of the opportunity, and willingness to share. Stakeholders' attitudes toward and experience with information systems determine how and whether they'll use a system to share. Decision styles define how and what information stakeholders share to make decisions.

The environment delimits where and when sharing occurs. Environmental factors affecting information sharing include uncertainty, organizational structures, and managerial climate. Environmental uncertainty precipitates information sharing because stakeholders need information to reduce uncertainty. However, uncertainty affects the amount, content, and use of shared information. Organizational structures arise in response to environmental uncertainty.

Stakeholders use their positions in the organizational structure to control the flow of information. Information structures can be designed to increase sharing. However, hierarchical structure influences the content of information shared vertically and can serve as a barrier to sharing. Different departmental frames of reference inhibit horizontal sharing among work groups. Introducing computer-based systems can overcome barriers to and increase information sharing. Managers can increase information sharing by supporting information systems, setting up appropriate organizational structures, and providing opportunity and encouragement for sharing.

Linkage mechanisms are the means used to share. Linkage mechanism design can either enhance or detract from the effectiveness of the system used to share. The way shared information is portrayed is an important design consideration because how stakeholders perceive information portrayal determines whether they use and share the information. Consequently, system design determines whether system implementation will be successful. Without successful implementation, stakeholders can't use the system, and sharing won't occur.

Stakeholders are motivated to share by need. Characteristics of the stakeholder and the situation also influence stakeholders' motivation to share. Sharing is regulated by two norms: the norm of

reciprocity and the norm of social responsibility. The salience of either norm and the resulting influence on sharing behavior is determined by the stakeholder's experience and the situation. Social distance defines the relationship and determines what type of sharing occurs between two stakeholders. Role models and reinforcement ensure stakeholders have the opportunity to learn how to share. A single situational factor may serve to inhibit sharing even though other situational factors are right for sharing to occur.

Entities are what stakeholders share. Stakeholders use the entities shared to

assess the gain/loss ratio and evaluate the sharing experience. For information sharing, stakeholders evaluate the usefulness of the information shared.

To improve sharing, managers need to understand what sharing is and the dynamics of sharing. By recognizing the variables of sharing and how they interact, managers can begin to understand what variables they can influence to affect sharing. This document can help managers recognize the variables of sharing and their relationships.

V.

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