

Information Behavior in Sense Making: A Three-Year Case Study of Work Planning

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ABSTRACT

This paper reports some of the key aspects of a three-year longitudinal study of work planning in a public agency involved in natural resource conservation. It focuses on the information behaviors of the participants as they struggle to make sense of the work planning task in a context of a rapidly changing environment. The methods employed during the study are those of an ethnography of communication including participant observation, interviews, and documentary analysis. The initial analysis emphasized the identification of factors that contributed to breakdown during the work planning process. The categorization of these factors suggested a story of sense making in work planning that involves at least three interrelated perspectives: time and timing, the social, and the person.

From the standpoint of time and timing, the time value of information was a key factor in slowing down progress. Some information gathered early in the work planning process proved superfluous, much of it needed to be updated as it quickly became outdated, and initially unanticipated information needed to be gathered late in the process. The result was a great deal of unproductive data collection and information processing.

From the social perspective, the ways in which the organization made sense of its situation were identified (e.g., environmental scanning, a record of success), and the recursive interaction of structure (e.g., meetings) and action (e.g., specification of project selection criteria) was mapped. The organization had a history of keeping in touch with its environment and of pride in the success of its work. These traditions continued to be in evidence throughout the three years of this study with conflicts resulting from incongruities in their related goals: long-term survival and near-term production.

From the perspective of the person, individual information styles, which involved cognitive, affective, and conative (action preference) components, became apparent. Conflicts in the information styles of participants coupled with a focus on one or the other of the organization's goals often led to breakdowns in the work planning process.

Overall, participants used information to raise differences for attention and possible action. There were both individual and social patterns of information behavior that made the work planning process a drain on the productivity of the organization. In particular, the time value of information was not considered and many information behaviors were taken too early and needed to be repeated to update or add to the work planning databases. Ultimately, information and information behaviors only "make sense" in a context of task and situation as these unfold over time.

INTRODUCTION

Studies of information behavior have typically focused on information seeking and source selection and have not tried to map the more comprehensive range of possible information behavior (e.g., understanding, gathering, browsing, displaying, brainstorming, examining, evaluating, deciding) nor attempted to understand such behavior in connection with a larger process of sense making within its context. Work, for instance, by Chatman (1996), Dervin (1992), and Kuhlthau (1993) notably depart from the typical and extend our understanding of information behavior to a variety of situations and contexts including, for example, blood donors, janitors, retired women, and high school students. Their work, too, adds to our perspectivity by developing and refining methods as well as exploring sensitive issues among disadvantaged persons and the affective aspects of people's information behavior in connection with tasks that unfold over time.

This paper reports a case study that explored the application of such a broader perspective. The case study focused on information behavior employed in sense making during three annual iterations of work planning within a unit of a public agency involved in natural resource conservation. While the participants in this work planning process saw their efforts as directed towards allocating limited organizational resources to those conservation projects that ranked highest for a set of project selection criteria, the process also proved to be fundamental to the very survival of the organization as it was a mechanism for adaptation in a turbulent environment (Emery & Trist 1965) as well as for monitoring conservation project completion and impact.

Underlying this study are several motivations or interests. The first involves a concern with understanding how and in what ways information fits into people's lives. The concern here moves beyond information seeking to include the whole range of information behavior that supports people as they move through life: how people define their small worlds and their movement through them. The idea of movement through life suggests the second motivation: that of change and the role of time. This motivation raises the question of how information behavior changes as time marches on and the role of timing in information systems. The third motivation, perspectivity, addresses the ques-

tion of how and where to set the research lens as well as how such setting might influence understanding. That is, do we want a black and white snap shot or a color video? A close-up or distance shot? Do we want to filter out certain factors or include everything framed in our view finder? Do we want our subjects to wear costumes and perform tasks that we design or is it all right for them to select their own costumes and to do their dance in their own way? Finally, related to all of these motivations is methodology. There is the joy of asking those wonderful WHY questions.

The remainder of this paper will introduce theoretical and conceptual foundations for the research, the background of the work planning task, the methods and analytical approach employed, and an overview of the findings.

MAKING SENSE: THEORETICAL AND CONCEPTUAL FOUNDATIONS

The recurring problem of *making sense* is fundamental to studies of information behavior. That is, we repeatedly find ourselves in situations where information is needed, gathered, sought, organized, retrieved, processed, evaluated, and used. Can information be information until it is processed in sense making? Dervin's (1992) situation, gap, use; time and space; and focus on the person's acting are influential underpinnings of this study. Yet, the words *making sense* and *sense making* are not employed here to refer solely to Dervin's Sense-Making theory or methodology. Rather, they try to capture the words frequently expressed by participants in this study when they described what they were doing when they employed information during the work planning task. The participants did not see information as something separate to be held up as special, but as an integral part of their "trying to make sense of what was happening" in their world of work. While it seems almost trivial in retrospect, information and information behaviors are part and parcel of the whole sense making process. Viewing information behavior as something separate from its context, consequently, is likely to be misleading.

An understanding of sense making is not complete without the complication of social influences. Chatman's (1996) work integrates her studies of job trainees, janitors, and retired women to convey the influence of social factors (e.g., an insider-outsider distinction) pointing to such concepts as secrecy, deception, risk-taking, and situational relevance, which is related to sense making as "...things that make sense are relevant" (Chatman 1996, 202). Thus, while the person makes choices in making sense, those choices are likely to be influenced by our reactions to what others have said or will say.

Making sense involves time and timing too. Time is a difficult dimension to capture with simplicity and clarity and Kuhlthau (1993) does this by bringing together a stream of research that helps us see sense making as a moving picture through her explication of the information search process. The understanding that comes from viewing individual information behaviors in temporal order

provides a much clearer picture of their role in sense making than their comparison in terms of percentages of total.

These views from the arena of information and communication studies work together to create a dynamic of people interacting with others as time moves on. Other inspirational inputs to this study came from research and theorizing on small groups (Frey 1994), teams (Isgar & Isgar 1993; Schwarz 1994), meetings (Schwartzman 1989), organizations (Weick 1995), social systems (Luhmann 1990, 1995), and society (Giddens 1984).

The wealth of research in the small group area provides a context for considering the social, but tends to focus on artificial tasks and situations. Recent criticisms of the body of small group research (Frey 1994), which call for researchers to leave the lab and join the real world, raised a variety of issues for consideration in this study. For instance, Scheerhorn, Geist, and Teboul (1994) point to the need to understand what stands for communication in small task groups and not to limit concern to a particular sort of communication (i.e., decision making). McGrath (1991) raises questions regarding the temporal dimension of small group behavior. While there is little formal research on work teams in natural settings, which are rather largely covered by normative writings (e.g., Isgar & Isgar 1993; Schwarz 1994), these writings suggest matters that deserve research attention. For instance, what leads to impasse in work groups, and how to help participants positively confront such impasses rather than walk away from them?

Particularly important as an unpinning for this study is a work on meetings by Schwartzman (1989) who sees "Meetings as Sense Makers" noting that "... they may define, represent, and also reproduce social entities and relationships" (p. 39). Thus, the happenings at meetings and other communicative events provide evidence of the interaction of the person, the social, and time in a process of structuration. Given this focus on communicative events, Hymes (1986) "SPEAKING" framework for analysis of such events (1986) provided a starting point and key for studying and analyzing such events.

Weick's process view of how organizations make sense or create order out of chaos highlights the invention that proceeds interpretation: "How can I know what I think until I see what I say?" (Weick 1995, 12). He, thus, offers a framework for studying and interpreting organizational sense making, which is based on seven properties, which he labels: "grounded in identity construction, retrospective, enactive of sensible environments, social, ongoing, focused on and by extracted cues, and driven by plausibility rather than accuracy" (Weick 1995, v).

Luhmann (1990, 1995) reminds us of the idea of social systems, including their autopoietic nature: "Autopoietic systems ... are not only self-organizing systems, they ... produce and eventually change their own structures; their self-reference applies to the production of other components as well... Social

systems use communication as their particular mode of autopoietic reproduction. Their elements are communications that are recursively produced and reproduced by a network of communications and that cannot exist outside of such a network" (Luhmann 1990, 3). A systems view guided the monitoring of the movement of work planning process actions through time and space as well as identifying patterns within the participants' information behaviors.

Giddens (1984) structuration theory provided a framework, along with Luhmann's autopoietic social systems, for explaining the recursive nature of resources (e.g., meetings and conversations) and rules (e.g., project selection and ranking criteria), which both support action and, in turn, are created or changed by action. Giddens terms this the "duality of social structure," a concept which seems to be related to Luhmann's (1994) discussion of "double contingency."

Taken together this range of research streams and theories constitutes those matters that were on my mind during the analysis phase of this study.

STUDY BACKGROUND

What is this thing that I have labelled the work planning task? The research context involved a public agency, subject to annual appropriations, with a mission to provide technical assistance on natural resource conservation projects. These projects, for instance, involved the planning of recreational trails, the conservation of rivers and other recreational waterways, and the preservation of open space.

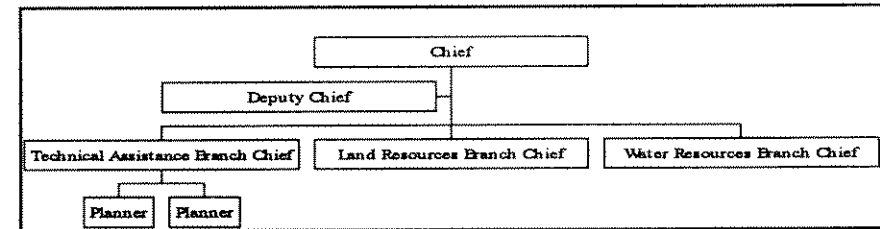
The participants view of the end of the work planning task was a ranked list of projects that would then be funded in priority order depending on the funds appropriated by the legislature. The task itself consisted of those structures and resulting actions that the participants moved through as they tried to select projects (e.g., developing a project data form, collecting project data, evaluating projects for funding).

The study organization was a subordinate unit of a larger organization, which was responsible for managing the daily operations of geographically dispersed park and recreation areas. The parent organization, consequently, was not interested in the work of the study organization and, in fact, sought its disestablishment. The study organization, in turn, developed policies, plans, and evaluated the work of staff in regional offices, who actually performed the project work. In short, the work planning task aimed at rationally deciding how to allocate appropriated funds to regional offices and projects.

Figure 1 provides an organization chart for the participants in the study to provide a sense of their superior/subordinate relationships. The study organization has other functions and staff who had little involvement with the work planning task and are not portrayed in Figure 1. While the study focused on these seven people, I also tracked their networks of involvement with other people,

when this involvement related to the work planning task, beyond the boundaries shown here, for instance, to public interest groups and the legislature. Solomon (1996a) provides additional details regarding the study organization and its relationships with its parent organization.

FIGURE 1
Key Participants in the Work Planning Process



METHODOLOGY

The study was naturalistic in that it attempted to discover patterns of behavior in the light of people performing their own work, in their own manner, and in their own time. This pattern discovery was accomplished by relating several analytical layers—task performance over time, the social, and the person—to try to discover the place of information as people made sense during their work planning activities. Methods were those of an ethnography of communication (Saville-Troike 1989), where observation of communicative events, interviews, transcripts of meetings and conversations, documentary traces, and participant logs were the primary sources of data.

As the ethnographer, I was a participant observer in that my role was to facilitate the work planning process by collecting information about the process so that it would be available to provide an organizational memory. This role legitimized my interest in observing, recording, and transcribing events related to work planning, in asking participants to keep logs of their activities, in asking participants about their understandings and actions, and in collecting documents and other artifacts of the work planning process, particularly information supporting understanding of structures (e.g., meetings, project selection crite-

ria) and actions (e.g., project ranking decisions) and their interactions. My interest was not in making broad generalizations, but to discover the role and impact of information in the sense making of the work planning task. I expect though that the patterns of behavior and themes identified by this study may serve as a point of departure for studies of similar phenomena as I suspect that, while context is critical in flavoring the mix, similar patterns of information in sense making flow across contexts.

For the purposes of analysis and reporting, I focused on several views of the data: time and timing, the social including organizational and group or communicative event perspectives, and the person. The common analytical method that I employed for each of these views involved the assignment of codes to segments of the data followed by investigation of patterns and themes evident from the similarities and differences across or between the assigned codes (Constas 1992). Typically, I initially employed analytical frameworks suggested by researchers and theoreticians previously mentioned among others as a point of departure. Categories suggested by the research or theories of others were frequently elaborated by additional categories or specified by the inclusion of subcategories to reflect the evidence contained in the data and situation of this research.

Additional methodological details are provided in Solomon (1996a).

TIME AND TIMING

In this view I used a broad classification of events to map information transfer and use along the time line of the work planning process. This mapping indicated three separate clusters of activity for each of the three annual iterations of the process included in the study, which are summarized in Figure 2.

FIGURE 2
Time View of the Phases of the Work Planning Process

Phase	Year 1	Year 2	Year 3
1	Marketing-Demand	Marketing-Successes	Marketing-Successes
2	Project Selection Criteria	Project Evaluation	Process Simplification
3	Project Ranking	Project Selection	Base Funding

Each year started off with a comprehensive information gathering effort that was intended to serve the entire annual work planning effort. In actuality, the overall process had several aspects. During the first cluster of activity of each annual iteration there is what I label as marketing. During the first year this marketing cluster focused on determining the demand for projects by developing a list of candidate projects and their funding requirements, impact, cooperators, etc. In years two and three the marketing cluster focused on reporting of "conservation successes" as well as the locations of ongoing projects to public interest groups and legislators.

The second cluster of activity varied in detail each year. Commonly though this second cluster tried to refine some critical (as seen by the participants) aspect of work planning. During the first year, project selection criteria were defined. A structure for providing feedback on project success was developed during the second year. The third year's effort resulted in drastic simplification of the work planning process.

The third cluster of activity emphasized the production of a list of funded projects. Here too there was evolution over time as during year 1 the study participants did the project ranking, during year 2 the participants provided input into a project selection process that involved the directors of the regional offices, and during year 3 a decentralized effort resulting from a process simplification effort to provide each region with a funding target and allow them to select projects on their own using the established project selection criteria.

There were many interesting findings in this broad analysis. The one that I will focus on here involves the fact that project information was repeatedly collected, recollected, or verified during each of these clusters of activity. For example, during the marketing demand phase of year 1, a computer database for project information was developed. The 20 original data elements (e.g., work to be performed, location, expected impact, work-months of effort required) of this database were suggested during a short brainstorming session. Data collection began soon after and before long a small mountain of data was collected and entered into the work planning database.

Yet, what was really needed at this point in the process, from the standpoint of showing the demand for technical assistance projects to the legislature, was the total dollar estimate of project costs—some five million dollars—and the geographical distribution of the projects by legislative district. After a bit of time to recover from the labor of data entry, obtaining missing information, editing the data set, and producing reports in a variety of formats and sort orders, the work planning process participants came down to earth and began to consider how they were going to use all of this "stuff" in the database to rank projects.

After much discussion, spread over many meetings and several weeks, the participants came to the consensus that they needed project selection criteria.

The criteria were developed through a series of meetings, conversations, and individual review of draft criteria. When the criteria so developed had been considered and reconsidered, worded and reworded, and deleted and added until all were satisfied with them including external cooperators, staff were asked to make the connection between data in the database and the criteria. There was a quick realization that some of the previously collected information was unnecessary, other necessary information had not been collected, and some information was there but not in the appropriate form. This realization set up a renewed round of information update. There was then a lull of several weeks. Finally, it was time for the challenge of ranking projects. At this point much of the information collected earlier was suspect because of its age and, consequent, ambiguity. Information update began again.

This pattern of trying to collect everything early, only to need to update later continued over the three years of the study. Too much information that was never used for project ranking or any other purpose continued to be collected apparently only because it had made its way into the database initially. Thus, the structure of the database and associated requirements for data collection, editing, processing, reporting, etc. consumed much time without a related influence on productivity.

While each of the clusters of activity had its own requirements, the structuring action of, for instance, the computer database seemed to hide the fact that different pieces of information were required at different times during the fiscal year and that there was a time value to information (Orlikowski 1992). This realization suggests that a consideration of time and timing of information collection and processing in tasks of various sorts may enhance productivity and perhaps have other benefits.

Solomon (1996a) provides additional details of the time and timing story.

THE SOCIAL

For the social view I considered both the role of the organization and the communicative events that bring people together to interact in groups through meetings, in interpersonal interaction through conversations, and as individuals through creation and review of written documentation of the work planning process. Thus, the concern here is with how the organization and its subordinate social structures enabled or inhibited the sense making that produces subsequent action and, thus, structural change.

Organizational

In developing an organizational view of the role of sense making in information behavior, I considered the play of Weick's (1995) framework of seven properties of organizational sense making. Each of these will be briefly highlighted in the following. Taken together these properties suggest options and opportunities for design as well as reasons for breakdown in sense making.

Identity relates to beliefs about why the organization exists and how it creates its uniqueness. The study organization has a history of focusing its technical assistance mission on the basis of environmental pressures or interests. For instance, when the study organization was merged into a larger organization that had no interest in technical assistance, it sought to create new relationships with public interest groups and members of the legislature. Too, the organization has a history of emphasizing its "conservation successes" in securing funding support. Both of these thrusts, which created a positive identity for the study organization in the eyes of its cooperators and the legislature, continued during the three years of this study and helped the organization to survive and grow in the face of pressures to control spending in the legislature.

Retrospect involves the patterns of past behavior that create an organizational identity. Survival strategies of cooperation and production are rooted in the past of this organization. The major shift in the application of these strategies was movement from an internal focus to satisfy the leaders of the organization to an externally oriented perspective to obtain support from the legislature and external interest groups, when the study organization was moved from a situation of supportive executive management to one where the executive of its new parent organization actively worked for the study organization's dissolution.

Enactment relates to an organization's attempts to create its own environment. The study organization enacted its environment by raising the awareness of legislators regarding the technical assistance projects, their locations, and "conservation successes" as well as modifying legislators' expectations regarding future activities, the criteria employed in project selection, and the increasing sophistication of projects selected from year to year.

Social refers to the norms, roles, formats, standards, communicative events, patterns of communication, reference groups and the like that influence the perceptions and interpretations that are sense making. Participants in the work planning process were tied together by their transactional and authority roles. One person gathered information, another summarized and reported it, others interpreted information, and all discussed implications. Communication was often at cross purposes, however, with one person unable or unwilling to understand another's point of view. In contrast, interorganizational linkages with counterparts in cooperating organizations were very productive as these people shared common education, professional experience, and even leisure time pursuits. That is, the process of agreement/disagreement was facilitated by common experiences, shared terminology, and similarity of goals and values, which were sometimes lacking within the study organization.

Ongoing highlights the fact that work in organizations is not static, but dynamic: organizational life emphasizes continuity rather than beginnings and

endings. Interruptions to the continuity of the work planning process promoted unease and emotional responses from some participants. Thus, the emphasis of different participants on, for instance, production or getting through the process versus environmental scanning and action to respond to the interests of those in control of the purse strings often led to breaks in continuity and, consequently, cross purposes.

Extracted cues provide information that things are going well or not. Evidence that the study organization's environment was rapidly changing was extracted from information gleaned through members' contacts with their counterparts in other organizations. The extracted cues often led to restructuring actions that allowed the study organization to change.

Plausibility suggests that organizational sense making emphasizes the apparent, likely, or possible over absolute accuracy. Plausibility bridges current understandings and past history to account for extracted cues. Thus, extracted cues were never verified. The fact that someone passed a negative comment was reason enough for concern.

Summary. Based on comments from public interest groups and legislators (extracted cues), the action to pursue a project approach to technical assistance was used to inform others (enactment) of a potential for interaction and impact (social) where previously successful and unsuccessful experience (retrospect) was employed to design procedures (ongoing), suggest program impacts (plausibility), and market the program (identity).

This sort of organizational sense making analysis provides a key to strengths and weaknesses that might be protected or revised. For instance, the pattern of extracting cues from the environment enabled the organization to successfully influence its own environment and deserves protection. On the other hand, social conflicts between the ongoing nature of work and the interrupting effect of extracted cues need to be confronted.

Communicative Events

Communicative events are social constructions that people use to make sense both individually and collectively. As such, these events bridge the individual and the social and add a social dimension to sense making. The recurring structures of communicative events encourage, restrict, shape, and inhibit organizational action. The analysis of communicative events here focused on the transmission and use of information, particularly conditions that facilitate or inhibit information transmission and use. In the analysis, written (texts) and oral (meetings—three or more participants or conversations—just two participants) events are distinguished.

Meetings promoted a healthy but exhausting and sometimes frustrating airing of ideas, complaints, and opinions that kept the work planning process open and divergent for too long. Diversity, especially in light of environmental

uncertainty, forced a rethinking of positions that took time. Yet, when these positions were reached they were well-crafted, addressing the concerns of the various interests both inside and outside of the study organization. Again, the primary blockage to progress was due to differences in emphasis of participants in the work planning process: completion of work plans versus reassessment and change of plans based on cues from the environment. The ambiguity of the environment suggested restructuring actions, but some participants thought of this movement from following established plans to developing proposals for change in response to environmental cues as the playing of games.

While the ambiguity present as an organization faces planning for the future when the world is in flux around it and the divergent interests of participants in meetings made those events something that the participants tried to postpone or avoid, the focused nature and clarity of purpose underlying conversations made them much more successful. The reciprocal, two-party, turn-taking nature of conversations also allowed participants to raise confusion and puzzlement. Thus, meetings and conversations served very different functions: global versus local; intermediate and long term versus short term.

Unlike oral communications which were synchronous, written messages were used when people could not be together at the same time and place. They also served as markers of the work planning process, reflecting interim and final products, recording the sense that participants had made during meetings, conversations, and their own individual reflections. Interim products, in particular, permitted general reaction of all participants to the writer's sense of consensus. Final products codified agreements or the final position in the case of disagreement.

Together these events comprise the major structures for information transfer during the work planning process. The two major insights that seemed evident as a result of the analysis involve 1) the confrontation of blocks to progress in an open way: Why aren't we getting anywhere? Why do people avoid attending meetings? and 2) particularly in an environment where uncertainty and ambiguity abound, consideration of the role of timing: Is now the best time to deal with this or should we wait until we are closer to the deadline when uncertainty and ambiguity will be reduced?

Additional details of the social can be found in Solomon (1996b).

THE PERSON

At the person level, one interest was in discovering how people conceptualize their information behaviors. There was no evidence that the participants in the work planning process think of their actions in such terms as information search or information seeking, for instance. Rather, they talked about doing their job, finding out what is happening, or checking it with staff in the regional offices. Thus, information and information behavior were part and parcel of the work

planning task. In the absence of any sense that the participants conceptualized their information behavior, I set about to categorize the characteristics and circumstances of such behavior. At the broadest level I labeled these categories as cognitive, affective, and conative. Taken together, I named the constellation of these broad categories for the individual participants as their information styles.

Cognitive. As I made my own sense of the transcripts of communicative events, interviews, documents, and participant logs, I found that some of these behaviors involved perception, memory, recognition, conceptualization, thinking, and judgment. For example, participants seemed to focus and control their perceptual apparatus in different ways: some emphasized internal operations of the organization; others focused on the external environment. Individuals often forgot the details of previous discussions or interpreted the commitments to action of those discussions in contradictory ways. Also, the individual participants' analyses and choices were subject to a range of information processing biases or heuristics. All of this seemed to be cognitive.

Affective. After coding these various signals of cognitive behavior, I revisited the data to see what other aspects might be present. Most obvious were outbursts of anger and expressions of frustration. There were also positive expressions of emotions: excitement, laughter, and joking. Thus, there was a whole range of affective behavior: from happy to sad, anxiety to exuberance, frustration to satisfaction. I labeled this affective and noticed that expressions of emotions, feelings, mood, etc. seemed to influence cognitive behaviors. For instance, both exuberance and frustration seemed to limit people's cognitive powers.

Conative. Again, I appraised the data and found behavior that seemed to me to represent preferences for action: Some individuals resisted change, others sought it. Some were quick to try out an idea, others insisted upon gathering data first. That is, some work planning process participants seemed to be motivated to insist upon some actions even while there was widespread resistance by others. Insisting, resisting, and the mediating action of ambivalence were frequently expressed in the data.

This is all very tentative, but based on the behaviors that I identified in the data, participants had different emphases in their information styles: information gathering, information processing or organization, information use to propose new actions, and information use to complete established plans. The information gatherers sought facts about projects or opinions of cooperators or legislators. They made proposals such as: "Why don't we call all the regional offices and get their reactions before we proceed." The information processors or organizers entered data, prepared tables, sorted information, prepared reports, and edited information. They made statements like: "let me take the stuff on the flip chart and prepare a table." The innovators wanted to respond rapidly

to new information to try out ideas and see what their impacts are. They offered proposals for change: "Let's test the water with a demo project. If it works, great; otherwise we haven't invested much." Those who wanted to follow through on established plans wanted to use information that was related to getting the job done and ignore other information. "Hey, we agreed to do this. Let's just finish one thing before we move on to something else."

In looking at the management, learning, and personality literature (e.g., Snow & Farr 1987), I found that a term, conation, was being used to describe these sorts of action instincts.

Discussion. It seems to me that the interaction of these three categories of behavior—cognitive, affective, and conative—suggests the sense making personalities or information styles of participants. I think too that a person's role in the work planning process as well as other factors such as personality attributes like shyness influence a participant's particular behavior. While a participant's information style was stable over the three years of the study, an individual's style might vary considerably for different situations, roles, and tasks. No single style was "best." The mix of styles produced both a healthy diversity of viewpoint in discussion as well as unproductive blockages to progress. If such styles are widespread and stable, understanding their nature and using that understanding to consider style conflicts might lessen associated productivity problems.

Solomon (1996c) provides additional details of the person in sense making.

CONCLUSION

In sum, from the broad view of time and timing, I found that information collection and processing were repeated at great cost in time and effort due to refinement of information requirements, uncertainty in the environment, and the ambiguity of information that had aged for many months. Time and timing of information collection and processing in relationship to use may be critical especially in a turbulent information environment. The early start, while uncertainty and ambiguity are at their worst may be a false productivity tool.

From the social point of view, the great consumption of resources by the work planning process took these resources away from important efforts to extract information cues from the environment and to complete conservation projects "successfully." Eventually, during year three the process was substantially shortened and a new approach that emphasized project support over project selection was instituted. Diversity of viewpoint can contribute to organizational health; it can also contribute to organizational malaise. For health to be achieved over malaise, we need to understand the agendas and meanings of others as well as the way that structures such as databases and meetings constrain or structure future actions.

Communicative events such as meetings, conversations, and their textual products benefit sense making by providing opportunities for shared experience that encourage the discussion that enables shared meaning and commitment to action. Yet, these events during the work planning process often led to confusion, frustration, and blocks to progress. The combination of the uncertainty of funding and ambiguity of meaning and intent among participants came together in the language games (Kenny 1973) of meetings. If such blocks to progress are recognized, they may be confronted. Otherwise, they may stand, as they did in the study organization, as blocks that are seen by participants as inexplicable attempts to sabotage progress, when they were intended as honest efforts to raise issues of survivability.

Cognitive, affective, and conative factors interact to seemingly form styles of individual sense making and associated information behavior. As people with various information styles interact during work, misunderstandings and conflicts in approach occurred. Recognition of such gap producing differences in style may allow their attenuation by fitting them into a coordinated team effort.

A conflict between long term survival and shorter-term production goals diverted organizational resources away from both of these goals toward unproductive discussion and information churning. Meetings were often exercises in frustration due to confusion about the motives underlying proposed changes in direction that were taken by some participants as blocks to progress. The ambiguity of the situation, as evidenced by disparity in the language games of participants, led to an avoidance of such meetings by some participants. Yet, those meetings that were forced by some crisis, where uncertainty and ambiguity regarding purpose was not an issue, seemed to galvanize the participants toward collective action and overcome previously existing barriers to communication. Differences in individual information styles, also, slowed down the work planning process and frustrated the participants. People who preferred organizing and follow-through actions were unable to accept the proposals of those who preferred additional data collection or offered proposals for changes in structures and actions.

Over the course of three years the time required for the process and the levels of frustration and dissatisfaction that resulted from frequent interruptions led to a major simplification in approach that inadvertently supported both survival and production—in the form of completed projects and their conservation impacts—goals. The social system did work, ultimately, to produce restructuring actions that minimized the work of work planning. From a productivity standpoint, the challenge is to recognize the signals of malaise and to confront them. Many of these signals reside in the interplay of information and information behavior in the sense making of the language games of meetings, conversations, and written artifacts.

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