Discovering Information Behavior in Sense Making. I. Time and Timing

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This study used the methods of ethnography of communication to explore the information behavior in sense making of participants in the annual work planning of a unit of a public agency. To capture the dynamic time aspects of the work-planning task, the study continued over three annual iterations of this work-planning process. The term sense making is used to convey the participants' characterization of their information behavior. This article explores the sense making that took place from the point of view of time and timing. The analysis revealed broad patterns of repetitive action that structured the work-planning process and limited or focused future action. Data was repeatedly collected early in the annual process, requiring subsequent and repeated updating and verification. A computer database of project information focused data collection and processing on details that were never used and neglected others that required independent data collection, processing, and display. Such findings suggest the role that time plays in capturing meaning from data that has a time value. Understanding of the role of time suggests some possible approaches for improving information management and the design of information systems.

Introduction

The research reported here focuses on sense making and the associated information behavior of participants in a work-planning task. As the organization under study was a public agency subject to annual appropriations, the task was performed on an annual cycle that governed the pace and tempo of the effort. Data collection persisted over three of these annual cycles. By selection, the study did not focus on a particular information system. Rather, the emphasis was on the people involved, the situation of their involvement, the resources and rules they employed, the actions they instituted, and how information came into play as the participants moved through the

work planning process (WPP). In short, the interest was in discovering how the individuals separately and in consort made sense of their situation and in making sense how they defined, sought, and used information.

There are many choices in conducting and reporting such a study. Research is a creative process that builds on a foundation of interests, ideas, anomalies, questions, and intuitions; takes advantage of opportunities; and works around barriers and constraints. Research is also a struggle to balance the necessity for summary and reduction with the need to communicate enough about methods and interpretations to allow readers to judge, while, hopefully, encouraging them to develop their own insights. The research process itself is framed by the decisions that researchers make regarding their questions of concern and the methods that support investigation of those questions. The interaction of questions and methods is influenced by decisions of focus, situation, duration, and tempo.

One important research design and analysis issue involves the perspectives that guide research. In studying the role of information in sense making a single perspective seemed limiting. Different insights may be gained by looking broadly at communicative events and how they fit together over time versus focusing on the sense-making mechanisms and information behavior of people interacting during communicative events or studying individual participants. In the analysis of the data and the reporting of the findings here, there is an emphasis on building bridges between existing theory and empirical findings and the development of new conceptions and theoretical descriptions. New insights that come out of research are strengthened when their relationship to the work of others is considered. Thus, themes identified in past studies are held up for examination in this study. The difference in this study is that the focus is on the information behavior of people as they create meaning and make sense, rather than on the stuff that we label information.

Whenever a researcher studies the role of information

in people's lives, there is the possibility of mixing up the insider view of the participants and the outsider view of the observer. It seems that there is something to be learned from both of these views. The challenge is to keep the two views separate as much as possible during analysis and reporting and to point out when a shift from one to the other takes place in the exposition. This insider-outsider distinction is related to the differentiation between descriptive research, which is designed to understand the nature of some phenomena without any assessment, and normative research, which is evaluative and considers processes and outcomes in relation to some set of values. Both descriptive and normative research has a place in the information field and their peaceful coexistence is tested here.

The reporting of research where this variety of perspectives, views, and distinctions is a driving force is not a simple matter. A conceptual synthesis of the findings is another interest. Yet, there is also a need for the rich description that is a hallmark of the ethnographic method that was employed. To address perspectivity and provide rich description, this study is reported in three parts. Part I, here, provides an overview of the conceptual foundations, background, and methodology covering all three parts as well as a broad view of time and timing. Part II (Solomon, 1997a) considers the social by focusing on organizational properties of sense making and the communicative events that support the creation of common ground and the development of meaning from often widely dispersed facts and points of view. Part III (Solomon, 1997b) considers the personal characteristics of participants to point out patterns of individual sense making that influenced the work planning process. Part III also attempts the promised conceptual synthesis. A brief overview of the study is provided in Solomon (in press).

Information Behavior in Sense Making

One of the problems of the information field is what to call the objects of study. As I began this study, I employed the term *human information behavior* to describe the emphasis of this research—the role of information in people's work lives—in a way that moves beyond the traditional focus on source selection and use of selected information sources. This distinction is critical because it focuses attention on the process of capturing meaning from the physical objects that are often labeled information. Use of the term *human information behavior* is jargon, as people involved in life's journey tend not to describe their actions in that way. As I proceeded through the analysis and writing associated with this study, I did, however, find subjects using the words: ''make sense,'' and ''sense making.'' There were other terms that were commonly employed. For instance, work planning process (WPP) participants frequently made references to their situation as involving ''information games.'' While this is a good characterization of the feelings of some of the study participants, the ''games'' label did not capture the gap in communication and shared experience that pervaded those situations that were so labeled. It, therefore, seemed appropriate to use the term sense making as a label that captured how subjects described the WPP. Thus, the term sense making is drawn from the words of participants and not solely from, for instance, Dervin (1992) or Weick (1995).

A study of information behavior in sense making promotes the discovery of people's strategies, expectations, attitudes, and anxieties as they live and work in their life worlds. It also suggests attention to the full range of possible information behavior beginning with working out just what is stopping progress, creating an information gap, or raising an anomaly. An important aspect of sense making as a process is the struggle of people to understand a problem that drives them to seek meaning for in many situations and many circumstances they are content to take no such action. The information behavior associated with sense making seldom followed the idealized order of selecting sources, gathering information, assimilating or rejecting gathered information, processing gathered information, and fitting information into some task or decision situation. That is, the sense making of the WPP participants was nonlinear; cycling, recycling, false starts, anxiety, assessment and reassessment, and sometimes failure or stoppage characterized information behavior as time advanced.

This conception of sense making, in addition to indicating the passage of. time, allows people to interact and share information—an interaction of structure and action. All of this closely falls within what Giddens (1984) labels as structuration: the recursive interaction of social structure (rules and resources) and action. Thus, sense making and its study may focus on an individual, but there is also a social aspect where participants interact and influence each other over time.

Many researchers who are concerned with the way people develop meaning characteristically refer to *information seeking*. For instance, Kuhlthau (1993a), and Chatman (1996) both employ the ubiquitous *information seeking* term to frame their work. Yet, regardless of their reference to *information seeking,* they present conceptions of process, learning, and social relations that more clearly reflect the focus and interest of their research and the people that they studied than use of the term *information seeking* does by itse f.

Kuhlthau's (1991, 1993a, 1993b) focus led to a detailed specification of an *information search process,* which emphasizes feelings, thoughts, and actions as people seek the meaning or understanding of a situation that they need to resolve task, problem, or topic. The studies that initiated Kuhlthau's research stream began with a student's need to complete a writing assignment—from initiation and topic selection to collection of supporting information and, ultimately, presentation. As an analytical strategy, the emphasis was on the participants' process

of construction of meaning. One of the major contributions of this important work from the descriptive point of view is the articulation of how emotions, thoughts, and actions tend to change as people move through their process of seeking meaning. In part, this understanding flows from the recognition that a person who is engaged in making sense is confronted by uncertainty, particularly at the initiation of the process, which ". . . is characterized by vague thoughts, anxious feelings, and exploratory actions" (Kuhlthau, 1993b, p. 352). On a normative level, this stream of research has been useful in providing a framework for improving information search instruction (Kuhlthau, 1994).

Chatman explores *information worlds* in her studies of job trainees (1987), janitors (1991) and retired women (1992). Chatman's work is unique in opening the research lens to its greatest aperture and adjusting the focus to allow individual, interpersonal, group, and organizational/institutional views to blend together to provide an extraordinary conception of psychosocial information behavior. For instance, the stream of *information world* views provided by the studies of job trainees, janitors, and retired women led Chatman (1996) to identify a set of conceptions—deception, risk-taking, secrecy, and situational relevance—that influenced the information behavior of these people and led to an impoverished information world. Retired women may deceive one another when honesty would lead to a loss of their independence and a ticket to a nursing home. They, also, may avoid risk by not seeking situationally relevant information to lessen the possibility that others would become aware of their problems and take some undesired action. Job trainees and janitors might keep knowledge of a job opening to themselves to limit the possible competition.

To the work of Kuhlthau and Chatman, which leads to new visions of people's sense making and associated information behavior, it is important to recognize a research example that displays social action through organizational life as sense making. Weick (1993) presents a fascinating retrospective analysis of the Mann Gulch (Montana) disaster of 1949, which resulted in the deaths of 13 forest firefighters. In his analysis, he sought to understand why an organization unraveled during a time of extreme adversity. He identified two patterns of breakdowns that may have contributed to the disaster. The first he labeled "shared provinces of meaning" (p. 645), where communication and social construction of the unfolding events failed to occur. The second involved "structural frameworks of constraint" (p. 645), where there was a breakdown in "roles, rules, procedures, configured activities, and authority relations" (p. 645). He notes that these two patterns must work together: "Meanings affect frameworks, which affect meaning" (p. 645). This is an organizational or institutional vision to complement the individual, interactional, and process views of Kuhlthau and Chatman.

These highlights were intended to display some of re-

cent research that has focused on people's sense making and associated information behavior from both individual and broader social perspectives. The particular research efforts that were considered emphasize a broadening of view that shows how people move through time and space as they make sense of their world, interact with other people, and otherwise act to make life and work choices. In turn, the theory of structuration provides a broad umbrella for study and analysis of the relationship of informing actions and structures to other resources and actions.

By beginning to understand the patterns of people's information behaviors, we begin to map the variety, uncertainty, and complexity (Bates, 1986) that are inherent in the information field. We begin to understand how people make sense. We begin to comprehend how people's feelings, thoughts, and actions move forward and fall back (Kuhlthau, 1993). We accept the barriers and constraints that face people in their information worlds as well as the possibilities for building bridges over, tunnels under, and ways around (Chatman, 1996). We identify the interactivity of information in task performance and organizational action (Giddens, 1984; Weick, 1993). Thus, this mapping provides us with the basic materials that are necessary for designing and improving information systems and services. The mapping also provides hope for an eventual theoretical and conceptual foundation for the information field.

Background

At the time that this study began, the study unit, whose mission was to provide technical assistance on natural resource conservation matters primarily to nonprofit community groups (external focus), had recently been incorporated into a new parent organization, whose mission focused on the management and operation of park and recreation areas (internal focus). Previously, the study unit had been a part of a much smaller organization, which had been dissolved. This former parent organization had itself existed for only a few years. As a result of its smallness and newness, the study organization was not governed by a set of established rules and procedures. There was a great deal of flexibility in its operations. For instance, it offered its employees a wide range of flexible work scheduling options. Perhaps its most distinguishing feature was that it made extensive use of information technology, having been, for instance, an early adopter of e-mail.

The new parent organization, on the other hand, was much more rigid and bureaucratic, with rules for everything including an eight to five no-exceptions work schedule. Initially, the parent organization treated its new stepchild as an autonomous appendage, showing only negative interest by requesting a cut in appropriations to a minimal level. Its management was suspicious of ad-
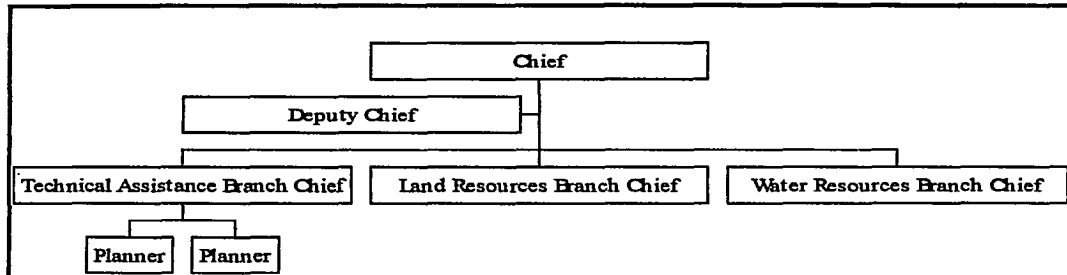
FIG. 1. Key players in the WPP.

vances in technology: it saw e-mail as a mechanism for undermining the authority structure of the organization.

While the study unit has many programmatic functions, the one that received attention in this study involved technical assistance to organizations who acquire, protect, or promote natural resources for recreation and conservation purposes. Technical assistance consisted of planning efforts that aimed to help these interests to work together to balance preservation and use. Thus, the technical assistance did not involve the direct distribution of funds. Rather, the products were less tangible and included plans, training, and information support to those who needed help in realizing their natural resource conservation goals (e.g., planning a bicycle trail, preserving open space, transforming a polluted stream into a recreation resource).

The work-planning task began with the release of the annual budget in January of each year and ended shortly after enactment of appropriations, a point in time that varied considerably, depending upon the whims of the political process of the legislature. That is, there was one iteration of the work-planning process per year, which was punctuated with a variety of communicative events and products: meetings, memoranda, notes, and telephone calls.

The direct research participants within the study unit included the Chief, Deputy Chief, three Branch Chiefs, and two subordinate staff. Figure 1 summarizes the organizational roles and relationships of these key players in the WPP. The Chief provided policy guidance for the process. The Chief's major interest was in ensuring the survival of the technical assistance program and his idea of survival has an interesting twist to it:

> My bottom line is survival. By that I mean more than continuing funding. But growing at least a bit. Growth lets us try new things. It brings new ideas into the mix. It lets people move up. Growth begets growth.

His fundamental strategies for achieving survival and growth involved encouraging all participants and interest groups to be heard during the process, attending to the likes and dislikes of the legislators and interest groups,

and selecting a set of projects that were both high in quality and impact.

The Deputy Chief was the administrative and financial manager of the organization and supported the WPP with financial and process information, computer and information systems support, and troubleshooting. The three Branch Chiefs had different operational foci. The Technical Assistance Branch Chief oversaw the WPP. The other two Branch Chiefs each represented different sets of interests—land and water, respectively—and were advocates for those projects related to their responsibilities. The staff members for the WPP belonged to the Technical Assistance Branch. They collected and maintained project information, drafted memoranda, prepared reports, and generally dealt with the operational and technical details of work planning.

At various points in the WPP, representatives of external interests also became participants. These included: (1) the administrators of the parent organization; (2) the regional office technical assistance staff, who actually performed the technical assistance work for projects selected during the WPP as well as gathered project information, submitted project proposals, and provided follow-up information over the course of the work planning; (3) the variety of public interest groups who provided support in creating legislative interest in the appropriation of funds and quality control during project selection; and (4) legislators and their staffs, whose interest was critical—no interest, no funds.

Methods

This was a research opportunity that arose suddenly and required a quick decision. I accepted the challenge because the opportunity allowed me to focus my research lens in many different ways to explore the role of information during work. My role was that of facilitator and record keeper. This role legitimized my attendance at meetings, requests for information, and questions without the responsibility of a regular participant.

Given the absence of the luxury of preparation time, I began the explorations that continued over 3 years by

relying on a set of methodological strategies that had worked well for me in the past (Solomon, 1993, 1994): the *ethnography of communication* (Saville-Troike, 1989; Schiffrin, 1994). This approach allowed the flexibility needed to explore the full richness of the communication forms that helped and hindered progress and provided a methodological framework that enabled quick development of the details of data collection.

Ethnography of communication emphasizes data collection using multiple methods in natural settings and seeks to develop an understanding of the communicative events that constitute the situation. Meetings, conversations, and written messages are all seen as key communicative events. This focus on communicative events provided an initial approach for organizing and orienting data collection, while providing a scaffolding for the evidence needed to understand the participants' patterns of sense making during data analysis. A major emphasis in both the research design and the choice of methods was the capture of as much of the dynamics of these communicative events as possible. Another concern was with charting the evolution of the WPP to capture the learning aspects of the social system and the contribution of information behavior in sense making to the learning process.

Data Collection

The particular methods that were employed in the study were chosen to complement one another by providing related views of the communicative events under study. These methods included observation, participant logs, interviews, and documentary traces. Observation was of a persistent and extended nature. Formally, the observations concentrated on the various meetings where three or more participants worked together to move the WPP along. Key to these observations of meetings was the tape recording of the complete session. Having a tape-recorded record allowed me as the observer to focus on actions including body language and details such as references to charts, which were not apparent on the audio tape as well as to record background notes, questions, impressions, and seeming impasses, gaps, or blockages in progress. Because I had the audio record of the meeting to fall back on, I was able to observe in an informal manner rather than through a formal observation guide. As a participant in these meetings, I was free to ask questions and contribute as I wished. Similarly, I could follow-up afterwards by asking for clarifications from the other participants. I confined such interaction to my role as facilitator and keeper of the WPP memory.

Observations also took place during many conversations between two participants in the WPP (with the addition of me as observer). When scheduled these conversations were audio recorded. Whether scheduled or not, notes were made during and after the conversation to record the nature, substance, and function of the event; any requirements for follow-up; and any information be-

haviors or breakdowns in progress that were evident. Informally, unplanned random overhearings of reports of work-planning behavior were also noted and followed up as appropriate by asking questions.

Participants were asked to maintain logs of their actions pertaining to the work-planning task. These logs provided a validating record of meetings, conversations, telephone calls, and written documentation that the participants either initiated or received. The logs were kept on a form that prompted for date, beginning and ending time, participants, and brief gist of the event or activity.

Documentary traces of the WPP were also gathered. These included drafts of memoranda, final memoranda, guidelines, tables, computer generated charts, flip chart sheets, faxes, etc. The documents added an extremely important dimension to the analysis: they grounded the work planning in a series of interim and final products that not only established a time line, but, when taken together with observations of meetings and other conversational events, provided evidence of the pieces of information, information behaviors, sense making approaches, and differences in viewpoint that facilitated and impeded progress.

Informal interviews tied the observations, participant logs, and documentary traces together by providing a mechanism for resolving inconsistencies, filling gaps in the record, and digging deeper into the rationales and concerns of participants. These were short events, seldom exceeding 15 min, where participants explained their points of view. I initiated them with openings such as: "I wasn't clear when you said," "How did you reach that conclusion," "Where did you get that piece of data." These openings were followed up as necessary with neutral sorts of questions (Dervin & Dewdney, 1986) that addressed situations (e.g., What circumstances led you to that conclusion?), gaps (e.g., what is missing?), and uses (e.g., How would that be of help to you?) (Dervin, 1992). If participants were troubled or confused by some report or other display of information, they were asked to think aloud as they tried to interpret or use the exhibit.

Analysis

As is typical in ethnography, data collection and analysis were interwoven: field notes and transcripts from observations were used to inform interviews and suggest initial interpretations. This sort of interaction between data collection and analysis during the course of the study is something that I think of as "petite" analysis. The data collected during each communicative event was viewed and reviewed, and, then, expanded by annotating the data with analytical notes, questions for participants, and questions for further consideration. Thus, each data collection session informed those that came after. I refer to analysis that took place after extended and repeated data collection was completed as "grand" analysis. This form of analysis involved the broad, inclusive examination of the data in-

cluding the progression of ''petite'' analyses that was necessary for my own sense making.

Both forms of analysis (petite and grand) were facilitated through the use of a text management software package named *askSam* (askSam Systems, 1994). Observer notes; transcripts of meetings, interviews, and think-aloud sessions; and participant logs were entered into *askSam*. Most documents already existed as word-processing documents. These were easily imported into *askSam*. Expansions of notes, transcripts, logs, think alouds, and documents were added to reflect my interpretations, comments, questions, and plans for future data collection.

A key aspect of the analysis process was the development of a classification scheme for coding of this data. This classification scheme was developed ''on the run'' over the course of the study as part of the ''petite'' analyses. An initial guide was provided by Dervin's (1992) sense-making framework of situations, gaps, and uses. The classification scheme for situations, gaps, and uses reflected those that were apparent in the behavior of the study participants in the data. Other aspects that were needed to construct the information worlds of the participants were identified as data collection proceeded and the analysis unfolded. These included participant (P-?, where ? is a variable), communicative event (e.g., CE-M, for meeting), task process stage (e.g., T-A, for allocation stage), products (e.g., P-PS, for policy statement), information behaviors (IB-[?]), information needed (IN-[?]), sought (IS-[?]), and used (IU-[?]) for work planning, and sense making properties (SM/P-[?]) or strategies SM/S-[?]). Ultimately, such codes provided a basic mechanism for tracing patterns and identifying themes in the data. For instance, if I wished to look at the pattern of gaps or breakdowns that confronted P-J (participant J), askSam allowed me to browse chronologically through the data to review the relevant notes and annotations. With the assignment of codes along with free-text search capabilities, I could quickly revise codes or add new ones to the text base.

The ''grand'' analysis culminated with the submission of the final draft of the research report for peer review and member checks. Peer reviews and member checks are two mechanisms for enhancing the research's match with reality (Merriam, 1988). The peer reviewers, who examined and critiqued the whole report, were researchers with an interest in sense making and information behavior. The peer reviewers offered suggestions that improved the clarity of the discussion and provided additional details of explanation. For instance, the suggestion was offered and taken that quotations from transcripts be made more readable by eliminating the transcription conventions that are typical of detailed conversational analysis, particularly the *ums* and *uhs*. Each of the primary participants in the study was given the opportunity to review the research report. Several of them chose to do so, and each confirmed the accuracy of the report and, in many cases, provided useful interpretive comments. Taken to-

gether, the data collection and analysis approaches that comprise the methodology of this study were designed to achieve a rigor that is bought about by making the data and its interpretation freely available (Guba, 1981). Thus, readers are encouraged to develop and offer their own interpretations as well as to replicate and extend the research to other information worlds (Constas, 1992).

The Broad View: Time and Timing

The purpose here is to provide a broad view of the total WPP through its three annual iterations. Questions that underlay the analysis include: What is the WPP? How and why does the process change from iteration to iteration (year to year)? How do these annual changes signal breakdowns? What clues does the analysis provide to understanding the broad sense making and associated information behaviors inherent in the WPP?

When we zoom out to view the WPP in its entirety, there is a trace of 3 years of effort that represents movement through time and space. Recognizing that the details are hidden in this level, the broad view shows clusters of activity that suggest the major subtasks of the WPP as well as the advance of time. These clusters (see Fig. 2), while evident in a time mapping of the WPP, were not apparent in the participants' comments. Rather, the participants' focus was on the product of the annual process: the ranked list of funded projects. Consequently, their planning for information gathering in support of the WPP focused on the allocation of funds to specific projects. The subtasks were neither seen nor valued separately. From an evaluative point of view, the subtasks suffered from discontinuities in time and space that might have been avoided with some consideration of the time relationship of possible phases of the process. From a descriptive point of view, the participants needed time to develop a common ground through their individual sense making and their discussions in meetings and conversations.

While there is a similar general pattern of differentiation of subtasks in each of the three iterations of the WPP that were studied, there were also substantial differences in the distribution of activities across time and space, the amount of time spent toward achieving particular ends, associated information behaviors, and the character of information that was collected. These differences reflect an interaction between learning and evolution of constraints and other situational factors. Overall, this broad view provides some important clues to the satisfactions and frustrations that the participants faced as they moved through the WPP as well as to the actions taken to overcome the excessive demands of the task. Highlights of the three annual iterations follow.

Year 1

During year 1 the WPP operated freely without constraints or guidance imposed by the parent organization.

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

FIG. 2. Broad view of the phases of the WPP

While the parent's mission was internally oriented towards the management of natural resources, the study unit was externally oriented towards providing technical assistance beyond the boundaries of its parent organization to public agencies and private organizations. While these two missions could well complement each other and provide opportunities for internal and external coordination, the daily pressures of road maintenance, trash collection, and the like, along with apparently inadequate funding for internal operations and maintenance led the parent organization's administrators to an internal perspective. The study unit was, thus, a "thorn" in its parent's side and its parent aimed to get rid of this thorn by requesting no funding in its budget request to the legislature for technical assistance activities. The parent's strategy was to seek the funds so released for its operations and maintenance priorities. In short, the study organization received no support from its parent.

Spurred on by the encouragement of various public interest groups with a natural resources conservation and use focus, some of the study participants worked to indirectly influence the appropriation process in the legislature. These marketing efforts were based on close cooperation with the interest groups that, through a coordinating coalition, served as an information and influence conduit between the study organization and key legislative committees and staffs. The two key questions that came out of these legislative contacts were:

What projects benefit my district?
Was there sufficient demand for these technical assistance services to justify added funds?

It became clear to the participants that "a list of potential projects was needed to market the technical assistance program" to the legislature.

Looking at the work planning task as an undifferentiated whole that emphasized the final product of a list of funded projects, the study unit's staff developed a project request form with some 20 information items (e.g., project name, region, political jurisdictions, initiator, sponsor, objectives). At this point one participant was heard to say: "OK, now that we have it, what do we do with it?" Only a few of the 20 information elements were required to inform the legislators about the distribution of proposed projects across legislative districts and the total level of demand in dollars (i.e., project title, location, a funds estimate, and a short description of the project).

In contrast to this undifferentiated whole view held by WPP participants, the mapping of the communicative events of the first year showed three clusters of activity. There was an initial flurry that involved initial collection, processing, and distribution of information on potential technical assistance projects. There was a second set of events that aimed to develop criteria for choosing among and ranking projects. There was finally a cluster that applied these criteria in ranking the projects. Thus, while the descriptive analysis shows that the WPP participants saw this data collection effort as critical to work planning, a normative analysis suggests that this large information gathering and processing effort diverted resources from other activities within the study unit and from actual project work by regional office staff. In fact, the information elements, which were given life during a short brainstorming session, were never reconsidered, even though much of the information that they carried went unused. Database management software enabled rapid development of an information storage and retrieval capability. This structure, however, hid the data collection, processing, and other costs inherent in operation and maintenance of the database. It also structured the actions of the WPP participants over the three iterations of the process that were tracked.

This surfeit of information led to the next phase of specifying project criteria:

How do we use this stuff now that we have it? I think that we need to decide what our criteria will be. Now that I think about it, we really should have set the criteria first. Now we'll probably have to go back and ask for more stuff.

This realization led to a series of meetings, conversations, and other communicative events (structures–resources) that ultimately led to the specification of criteria (structures–rules) that remained virtually unchanged over the three iterations of the WPP. The criteria resulting from this effort are listed in Table 1 and include baseline requirements that all projects needed to possess before consideration along with project ranking factors.

TABLE 1. Project selection criteria.

Definitions
    Technical Assistance Program—provides expertise while working cooperatively with public and private interests; emphasizes resource assessment and protection strategies over design and development; grants-in-aid are not available.
    Assessments—a systematic resource planning process designed to comprehensively identify important and threatened resources, and to lead to implementation strategies for conservation and use.
    Corridor Plans—focuses on a particular resource, identifies conservation issues and priorities, and develop public and private protection strategies, including implementation.
Minimal Requirements
    Cooperation and Cost-Sharing—each project must demonstrate cooperation among affected public agencies and private interests including the sharing of project cost.
    Public Involvement—each project must have a meaningful public involvement component as a foundation for success.
    Clear Goals, Objectives, and Deadlines—goals must be clear; objectives must be measurable; deadlines must be established and realistic.
    Results Orientation—a product or result must be specified.
Project Selection Criteria
    Resource Significance—the resource is of major significance.
    Tangible Impact—the project will be cost-effective and lead to a tangible conservation achievement.
    Public Support—the project will generate visibility and public support for conservation of the resource.
    Appropriateness—the results or products would not otherwise occur.
    Use—the resource has the potential to serve large numbers of people.
    Innovation—the project is pioneering.
    New Areas—the project focuses on a new opportunity rather than expansion.
    Staff Development—the project contributes to staff experience and falls within staff capability.
    Door Opener—project is in an location where few, if any, projects have been done before.

This criteria phase had two primary elements: brainstorming, where possible project criteria were suggested, and discussion, where agreement was eventually reached on the criteria to be employed in project selection and ranking. There was no thought given to standards and measures at this time. So, while one criterion involved potential for extensive use, no one considered, at this point in time, what extensive use might be. The study unit's staff did have to request additional information for some of the criteria (e.g., projected number of users of the resource) resulting in a renewed flurry of information gathering, entry, and report preparation. While data elements were frequently added to the work planning database, none were ever removed over the 3 years of this study.

By the time the actual project ranking process began, it had been some seven months since the project information had been collected. While all participants agreed to the collection of detailed project information at the beginning of the process, it is clear *in retrospect* that this approach neglected the time value of information in the process: the quality of the information substantially deteriorated over time. The information that had been collected early in the annual process became stale and suspect. Thus, much of the work during the third phase of the WPP for Year 1 involved checking and rechecking the status of projects as well as adding potential new projects. Also raising flags and requiring follow-up was the fact that many of the 20 information elements that were collected involved information that was subjective. One of the participants in the study described the information as "slimy," saying:

    Sure, everyone of them [regional office staff] is gonna say their project is the greatest thing since sliced bread. But how do I know that is so? Well, I talk to them and I talk to the local folks, the cooperators, the grassroots people.

I highlight *in retrospect* because this was not something that the participants ever became aware of through their natural devices. These information behaviors were a natural result of their sense-making process.

In sum, the Year 1 analysis shows a pattern of framing of products, preparation, information gathering, processing, and use. Framing did not include, for instance, a thoughtful analysis of requirements. Rather, the product and process were quickly determined. It was not until information gathered and processed came into use that deficiencies were noticed. These deficiencies, in turn, set off another cycle. During Year 1 this recycling was repeated three times before time ran out.

This sort of paralysis by data collection, information processing, or discussion is not unusual. It may well be a requirement for social sense making. From a normative point of view, these insights might be employed to try to avoid excessive time requirement in future sense making.

Year 2

By Year 2 the administrators of the parent organization had realized that the study unit was not likely to disappear as the technical assistance program received a large increase in appropriations at a time when many other of the parent organization's programs were further cut back. Also, the cooperation between the study unit as a part of the parent organization and other public and private interests helped heal some of the wounds left by the par-

ent's "land stealing" policies. The parent organization still did not ask for funds for the study unit's technical assistance activities in its budget request, but it began to "bestow favor" on the study organization's efforts by bringing the process under its administrative control. This was reflected in two formal "innovations." The first involved the creation of a new position, Assistant Administrator for External Programs. The Assistant Administrator monitored the study organization's activities and approved any policies by "signing off" on them before they were sent to the regional offices.

The second "innovation" involved a ranking process by the seven regional office administrators. The rationale offered by the parent's administrators was that the regional administrators were in a better position to decide which projects were best for their regions, the systematic process that the study unit had developed notwithstanding. While the study unit still provided a ranking of projects as input to the regional administrators' evaluations and, in fact, excluded some projects that did not meet the minimum requirements for project inclusion, the regional administrators, through a round robin process, were free to come up with different priorities, which they did. All involved in this meeting had project lists developed by the study unit's staff with a few of the elements contained in the project database. In addition, the regional administrators each had more elaborate information about projects located within their regions to show the contribution that a project was expected to make.

There was also a less formal "innovation." One regional office wanted to pursue several projects that did not meet the minimum criteria. Yet somehow these projects appeared as earmarked projects in the appropriations bill, which reduced the funds available for higher priority ranked projects.

Given these innovations and the Year 1 experience, the WPP during Year 2 had some differences. The first difference involved the transformation of the *marketing* process (phase 1) from a demand emphasis to one of "conservation successes." Having shown that there was a substantial demand for technical assistance, the "wish list" was not updated. Instead, the study unit's staff decided to develop an annual report, which highlighted successes, and also contained summaries of the projects that were underway, organized by geographic area. The primary aim of this report was to show legislators and their staff as well as interest group members that the funds were being well spent, where those funds were going, and their benefits. This annual report was tied to a related effort to periodically examine project performance through the development of a project status form. This status form provided the input for both the annual report and project assessment. The annual report included: project name, location, descriptions of status, conservation impacts to date, and expected future impacts as well as all of the information elements from Year 1. Additional information gathered for project assessment purposes in-

cluded work months consumed to date, expected completion date, staff assigned to the project, cooperative agreements, and products completed and in progress.

This seemingly rationalistic approach to information gathering, which was designed to support other rationalistic endeavors (project assessment), once again led to the collection of information that was out of date when it was time to use it, particularly for project evaluation efforts during phase 2 of Year 2, and, again, much information that was never used. Even in the case of the information specifically collected for the annual report, very few of the project descriptions that were received from the regional offices contained sufficiently descriptive information. Thus, the data collection via the project status form was supplemented by numerous phone calls to regional office staff. Perhaps the most useful potential data element, the phone number of project staff, was not included. Thus, in Year 2 the marketing and project evaluation functions were differentiated from project selection and ranking.

The project evaluation efforts (phase 2) of Year 2 did not lead to definitive evaluation results or even the specification of evaluation policies. Rather, the time ended up being devoted to meetings, conversations, and exchanges of notes or memoranda where participants offered suggestions and provided insights. In retrospect, these efforts to evaluate based on project status reports were unsatisfactory because of the ambiguity of the information they provided.

The selection and ranking phase of Year 2 began by providing copies of the information contained in the database for each project and a request that blank forms be completed for new projects to the regional offices. Only a handful of projects was expected to be completed by the end of the fiscal year. Thus, most of the project sheets were returned with corrections and updates as requests for continuing project funding. In addition, an excess of new project submissions was received. This combination of continuing and new projects made the selection and ranking process much more difficult, as there were five times as many projects being considered for funding as probable resources would allow.

The aftereffect of the regional administrators' project selection decisions was further frustration and discouragement. Final rankings had to wait until the legislature had appropriated funds. While there was a funding increase, there were less funds available for ranked projects due to earmarking of funds for the pet projects of some legislators.

Experience and changing environmental conditions refocused the WPP on marketing (phase 1), project evaluation (phase 2), and project selection (phase 3). Yet, the same pattern of quickly framing products, followed by laborious information gathering and processing, and, then, attempted use, which identified inconsistencies, inaccuracies, and missing information, reoccurred. The repeated jump to an answer without analysis of the question led to costly attempts to make sense when the answer and

the question did not satisfactorily match. As one consequence, Feldman and March's (1981) insight "that organizations systematically gather more information than they use, yet continue to ask for more" (p. 171) was certainly in evidence throughout the WPP.

Year 3

During Year 3 the refrain of "no formal request for funding" for technical assistance activities was played once again by the parent organization. However, support within the legislature seemed to have solidified so that funding at the Year 2 level was virtually assured. Due to pressures to reduce spending and the associated adoption of a spending cap by the legislature, there was little hope of any funding increase even with many good projects waiting for funding.

Because the annual report had worked well to get and maintain the interest of legislators and cooperators, it was continued. The initial part of the WPP relating to marketing (phase 1) continued with little difference. Collection of project status information for both annual report and evaluation purposes continued. This information again went unused for evaluation purposes. Many phone calls were made to fill in the gaps for the descriptive information required for the annual report. Thus, after three iterations of the WPP, information gathering and processing continued to have a ritualistic character: information collection was proforma, with the emphasis on completion of the database, rather than accuracy or relevance.

It easy to say that those involved in information gathering and processing were driven to complete the process rather than to consider whether the right pieces of information were available to answer critical questions. Such reevaluation of process was just not an interest of the participants and, thus, did not receive attention during sense making. Yet, from a normative point of view, all of this leads to a contradiction. The staff in the regional offices take time away from their technical assistance project activities to fill out project status forms and the study unit's staff takes time away from their program evaluation aims to maintain the project database. Projects fall behind schedule and the goal of evaluation to make things better is thwarted. The well-intentioned drive for accountability and improvement seems to have made things worse.

While there was no evidence of any effort to think this problem through or that the participants noticed this contradiction, the extreme of frustration felt by some of the participants often came to the surface. The process was characterized as cumbersome, unwieldy, and oppressive. One participant spoke for many:

I thought it was gonna be such a simple thing when we first started this [the WPP] a couple of years ago. It wasn't long though that it became a nightmare with mucho time spent passing paper around. Oh, and those inter-minable meetings. It's like swimming through Jello . . . Ugh! We have to find a better way. We're spending lots of time spinning our wheels. We need to help the regions, not add more roadblocks.

Thus, without knowing exactly what had led to this feeling of "swimming through Jello," there was a general consensus for simplifying the WPP. There was no consensus as to what form this simplification would take, however.

Ultimately, the backlog of projects, the slow down in project completion, and the likelihood of stable or declining funding halted unthinking repetition and led to an interest in process simplification (phase 3 of Year 3). Questions were being asked before the answers were decided upon: "What can we as a support office do to help the project staff in the regions improve their productivity?"

This productivity enhancement target led to a number of new "rules of the game." These rules were designed to enhance productivity as well as to transform what had begun to be seen by some as an adversarial relationship between the study unit and the regional office staffs due primarily to the repetitive calls for project information and related delays in project work. Three of these "rules," which all are based on the development of interorganizational linkages and shared experiences, merit attention here. First, there was the strategy of appointing staff members to serve as advocates for the regional offices. Thus, the advocate for a particular regional office would become the primary channel for information transfer between the study unit and region. The advocate would be conversant with the region's plans and projects, well versed in the region's strengths and weaknesses, a champion for the region, and a sounding board in aiding the region to strengthen its capabilities.

The second strategy involved periodic program building sessions with regional office staff. This took two forms. One involved expansion of the annual program meeting by adding staff development sessions to solve common problems and training opportunities in such technologies as geographic information systems. Another initiated a regional office support team strategy, where a small but select team of experts would be sent as required to help the region with its specific problems.

The third strategy involved a substantial simplification of the project ranking and selection phase of the WPP as well as decentralization of the process to the regional offices. To accomplish this decentralization, the regional offices were provided with a "base funding estimate," which gave them a funding target for their planning purposes, and program planning guidelines, which encouraged the development of a mix of projects that met the technical assistance program's project selection criteria. In turn, the regions developed and shared their annual work plans. The regional office work plans were to be used to identify weaknesses in the project mix or areas

where there were staffing gaps and training needs. This approach really did reduce the completion of forms, the passing of paper, and the gathering and processing of unnecessary information. It focused attention and effort on likely resources and did not force the regional office staff to spend time planning for new projects that could not be funded. It vastly cut the numbers of meetings and other communicative events.

This restructuring action was not achieved easily. Those participants who were most vocal in expressing their frustrations with the ''old'' process were also the ones who were most vocal in resisting the restructuring. There is evidence in their comments that the structures of work schedules, data collection forms, and database provided comfort and consistency in their work lives. Rather, the acts of other participants to question the work planning process in response to cues from the environment were seen as disrupting the continuity of the process and keeping the process from working in the agreed upon manner. The reenactment of the work planning process was seen as an abandonment of ''the rational, systematic review of projects'' that was fundamental to ''the wise expenditure of the taxpayer's dollar.'' While this was a situation that unfolded over time, it was created by people trying to work together to achieve an important end. These social and personal impacts are further considered in Solomon 1997a and 1997b.

Conclusions

This broad view descriptive analysis of 3 years of work planning indicates that sense making and its associated information behavior is neither simple nor easy to accomplish. It takes time for people to build common ground and develop meaning from uncertain and ambiguous evidence. The uncertainty surrounding a situation may encourage the collection of unnecessary data. Data collected early tends to become increasingly more ambiguous as time moves on. The euphoria of creating something new may become lost in the drudgery and repetitiveness of information maintenance and update. Some people luxuriate in the act of creation and wallow in the drudgery of repetitive actions. Others find comfort in the routine of work and are thrown by interruption and change. Information systems, along with other social structures, limit and focus future action. Given all of these broad insights, it is a challenge for information managers and system designers to recognize these sorts of patterns of information behavior and to manage or design for them.

Normative analysis suggests that productivity might be enhanced and information systems might better fit their associated tasks if attention is given early in information intensive tasks to issues of process and what *information* is in relation to the task at hand. Information has a time value and timing of information gathering has important productivity implications. An early start may actually limit productivity. That is, information systems that sup-

port process may help in managing and planning for time. Any such process to guide the sense making of people as they work to capture meaning from the uncertain and ambiguous needs to recognize the tension between task completion and adaptation in response to changes in situation. Information systems need to encourage flexibility both in viewing the *stuff* that they contain and in permitting the addition of new objects or characteristics.

That sense making takes time is a common oversight. The passage of time is so obvious that that we tend to ignore it. Time as a factor is, thus, often simply glossed over in research, theory development, and practice. Treatment of time in each of these pursuits is, for instance, an input to understanding why systems sometimes are used and sometimes are not. Yet, time as expressed in the information dynamics of social systems is difficult to capture and comprehend. However difficult, the information field will be better able to respond to the variety, uncertainty, and complexity of the tasks and situations information systems exist to serve as time is incorporated into research and system designs.

The issue of time has been mentioned before in connection with sense making (Dervin, 1992). I have written about the dynamics of information system use (Solomon, 1992) in an attempt to understand how information systems might help people with varied levels of skill and the related issue of how information systems limit the skill development of their users. This study considers what time and timing mean in a lengthy, complex, information intensive task. The facts and figures from which the participants found meaning and the memoranda and other information bearing products that resulted from sense making all have juxtaposition on the work planning process time line. One essential element of value of information is time; in the WPP the passage of time required renewed data collection. Seeing how information products, information behavior, and information carrying communicative events fit together provides a rich picture of the role of time in an information rich task.

Time has received attention in other fields. For example, Giddens (1984) points out situations of reversibility and irreversibility, history and memory, and structure and control that tie a person's daily life and life span to that of social institutions. Luhmann (1995) raises issues of meaning and measurement. Elchardus (1991, 1994) explores the relation of flexibility to time noting that ''As far as our life in society is concerned, time is, in a very real sense, a gift of the others, a socially constructed predictability that allows us to live'' (1994, p. 474). Thus, one likely benefit for the information field of attention to time and timing is to help us understand how information systems either free or consume time. Such an understanding seems basic to future efforts to advance theory and practice.

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