INFORMATION OVERLOAD: A TEMPORAL APPROACH*

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and

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Abstract

The purpose of this paper is to provide a more precise definition of information overload than previously found in the literature. Such a definition is essential to designing usable information systems. Drawing upon work in organization theory, information overload is defined as occurring when the information processing demands on an individual's time to perform interactions and internal calculations exceed the supply or capacity of time available for such processing. Cited empirical evidence demonstrates the reasonableness of the proposed definition.

Organizations and their members are affected by the ever increasing quantities and varieties of information (data) they are required to process. Organizations and their members, however, have limited information processing capacities. The combination of more information and limited information processing capacities has led to the phenomenon called information overload. Information overload has interested accountants for several reasons. First, information overload is believed to reduce decision making effectiveness (e.g. Ashton, 1974; Fertakis, 1969; Miller, 1972; Revsine, 1970; Schroder et al., 1967; Snowball, 1979, 1980). Given that accountants are major providers of information to decision makers, information overload has become an important accounting concern. Second, since management accountants are themselves decision makers and hence users of information, they too are subjected to the possible occurrence of information overload and associated negative consequences. Third, information overload has been associated implicitly with the promulgation and application of financial standards (American Institute of Certified Public Accountants, 1983). The concern in this latter regard is that the issuance of too many standards, and standards that are too detailed, have overwhelmed the compliance ability of many companies, particularly smaller ones. As a result of these factors, it is not surprising that accounting researchers have devoted much explicit and implicit attention to the study of information overload (c.f. American Accounting Association, 1977; Ashton, 1974; Casey, 1980; Iselin, 1988; Miller & Gordon, 1975; Revsine, 1970; Richardson & Wright, 1986; Shields, 1983; Snowball, 1979, 1980).

Despite the number of studies that have examined information overload, there has been

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1 We recognise that the terms information and data are distinguishable in a technical sense. Information is a subset of data and is directly related to the knowledge gained by an individual receiving a message (Feltham, 1972). However, for purposes of this paper, we will use these terms interchangeably since an operational distinction between the two is often impossible to make.
little precision in its definition. Yet, as noted by several researchers, defining the concept more precisely is essential to designing usable information systems and understanding and lessening the effects of information overload (Ashton, 1974; Casey, 1980; Libby & Lewis, 1982; O'Reilly, 1980; Snowball, 1979). Hence, the primary purpose of this paper is to propose a definition of information overload that has greater conceptual clarity than previous definitions. Our work approaches the subject from an organizational perspective, supplementing previous research which has approached information overload primarily from a psychological perspective.

In the following section, a brief view of accounting and related studies on information overload is presented. The conceptual foundation for our proposed definition of information overload, and the definition itself, are advanced in the third section. Conceptual differences between our definition and others are also discussed in the third section as well as the way these differences extend the literature. In the fourth section, evidence in support of our definition is presented. In the final section some concluding comments are offered.

LITERATURE REVIEW

A large part of the accounting research on information overload is based upon the work of Schroder et al. (1967). In their work, Schroder et al. sought to examine the relationship between an individual's level of information processing and environmental complexity. Level of information processing referred to an individual's internal thought processes, encompassing screening, comprehending, combining, evaluating, interpreting, and using information to make decisions. Environmental complexity was defined as the sum effect of the degree of uncertainty and the positive and negative reactions of the individual toward the processed information. They found that an individual's ability to process information increased with increases in environmental complexity, but only up to a point. Then, as environmental complexity (the independent variable) continued to increase, and individual's ability to process information (the dependent variable) decreased.

The finding of diminishing levels of information processing in nonaccounting contexts caused accountants to consider the possibility of its occurrence in accounting contexts. Drawing upon Schroder et al.'s (1967) work, accounting researchers loosely defined environmental complexity to mean information load. This definition allowed them to draw inferences about environmental complexity and human behavior by examining the effects of information load on human information processing and decision making performance. Relevant accounting studies pertaining to these relationships are summarized in Table 1.

The earliest studies, summarized in Section A of Table 1, were conceptual in nature. The basic issue examined in several of these studies was whether or not increases in accounting information load for both external and internal reporting purposes could lead to information overload and a resultant reduction in users' decision effectiveness (Ashton, 1974; Fertakis, 1969; Revsine, 1970). In other studies researchers debated about whether or not information overload could be minimized if the curve defining the relationship between information load and an individual's conceptual level could be raised (Miller, 1972; Miller & Gordon, 1975; Wilson, 1973). Finally, Snowball (1979) described the forces that contribute to the tendency to increase accounting information loads and assessed the possible impact of information overload in accounting contexts. In these studies the beginning point of information overload was the point where an individual's ability to process information reached its maximum.

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2Level of information processing has been labelled cognitive complexity or conceptual level in several accounting studies on information load. Although we use the researchers' terms in describing their studies, level of information processing, cognitive complexity and conceptual level refer to the same phenomenon and, hence, are used interchangeably in this study.
TABLE 1. Accounting studies on the effects of accounting information load

<table>
<thead>
<tr>
<th>Study</th>
<th>Focus</th>
<th>Finding</th>
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<tbody>
<tr>
<td>A. Conceptual</td>
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<tr>
<td>Fertakis (1969)</td>
<td>Analysis of whether or not the provision of more accounting information will improve financial reporting for external purposes</td>
<td>If the information needs and processing capacities of external users are not considered in determining the quantity of accounting information to provide, the provision of more information could result in information overload.</td>
</tr>
<tr>
<td>Revsine (1970)</td>
<td>Implications of increased information load and diversity on the decision making effectiveness of users of external financial statements.</td>
<td>Depending upon the amount and diversity of information currently available to users, empirical research is needed to determine whether or not information load increases could lead to information overload and a resultant reduction in users' decision making effectiveness.</td>
</tr>
<tr>
<td>Miller (1972)</td>
<td>Elaboration of Revsine's argument about the implication of increased information load on decision making effectiveness.</td>
<td>The curve defining the relationship between an individual's conceptual level and information load can be raised. This means that the higher an individual's conceptual level, the more information the individual can process before information overload occurs.</td>
</tr>
<tr>
<td>Wilson (1973)</td>
<td>Discussed Miller's finding above.</td>
<td>Miller's finding not supported. Available empirical evidence indicates that despite differences in conceptual level, individuals experience information overload at the same level of information load.</td>
</tr>
<tr>
<td>Ashton (1974)</td>
<td>Possible dysfunctional behavioral implications of information overload in managerial accounting reports are suggested.</td>
<td>More information may not, improve decision quality, but rather could result in reduced decision effectiveness. More timely, relevant and useful information should be provided in lieu of just more information.</td>
</tr>
<tr>
<td>Miller &amp; Gordon (1975)</td>
<td>Analysed the suggested relationship between differing conceptual levels and the processing of different information loads.</td>
<td>A properly designed accounting information system can raise an individual's conceptual level and, hence, the information load that can be processed.</td>
</tr>
<tr>
<td>Snowball (1979)</td>
<td>Described the forces that contribute to the tendency to increase accounting information loads and assessed the possible impact of information overload in accounting contexts.</td>
<td>Unclear as to the relationships between information load, conceptual level and decision making effectiveness.</td>
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B. Empirical

1. Direct examination of information load and decision making performance.

<table>
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<tr>
<th>Study</th>
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<tr>
<td>Casey (1980)</td>
<td>Examined the effects of variations in information load on the predictive accuracy and task time of bank loan officers in predicting bankruptcy.</td>
<td>Officers with the heaviest information loads took longer and predicted no better than officers with lower information loads. The use of more time without an increase in predictive accuracy was interpreted as indicating the occurrence of information overload.</td>
</tr>
<tr>
<td>Snowball (1980)</td>
<td>Assessed the effects of information load on the confidence in and dispersion of predictions made from accounting reports.</td>
<td>Higher information loads tended to be associated with more confident and less varied predictions.</td>
</tr>
<tr>
<td>Shields (1980)</td>
<td>Studied the amount of information in a performance report and its effect on a manager's report analysis process.</td>
<td>Unclear as to the relationship between information load and the way managers and analyse performance reports.</td>
</tr>
</tbody>
</table>
Empirical accounting research has assessed the relationship between information load and decision making performance. In this research the relationship between information load (the independent variable) or other proxy variables for information load (e.g. aggregated versus disaggregated data) and the external variable (the dependent variable) of decision making performance (e.g. cost performance, decision quality, decision time, decision confidence and search patterns in a variety of tasks) were examined. In these studies, information overload was said to occur when increases in information load did not improve user performance. These studies are divided into two groups. In the first group, summarized in Section B.1 of Table 1, the relationship between information load and decision making performance was examined directly (Casey, 1980; Iselin, 1988; Shields, 1980, 1983; Snowball, 1980). In the second group, summarized in Section B.2 of Table 1, information load was examined indirectly through the use of possible proxy variables for information load such as aggregated versus disaggregated

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<tr>
<td>Shields (1983)</td>
<td>Determined the relationship between the supply of information in performance reports analysed by corporate managers with, first, the demand for information and then, judgment accuracy</td>
<td>A direct association existed between the supply of and demand for information. Judgment accuracy was an inverted U-shaped function of the supply of information.</td>
</tr>
<tr>
<td>Iselin (1988)</td>
<td>Examined the effects of information load and diversity on decision accuracy and decision time.</td>
<td>Increases in information load were associated with less timely decisions. However, greater experience and learning resulted in increased decision accuracy and decreased decision time.</td>
</tr>
<tr>
<td>Barefield (1972)</td>
<td>Analysed the relationship between degree of aggregation and number of data sources on decision making performance.</td>
<td>Subjects receiving disaggregated data performed more consistently and better than those receiving aggregated data. No significant effect was found between the number of data sources and decision making performance.</td>
</tr>
<tr>
<td>Abdel-khalik (1973)</td>
<td>Investigated the effects of accounting data aggregation on the quality of lending decisions made by bank loan officers.</td>
<td>Bank loan officers using detailed data made better decisions with respect to the analysis of marginal firms and took no longer to do so than loan officers using aggregated data.</td>
</tr>
<tr>
<td>Chervany &amp; Dickson (1974)</td>
<td>Assessed the effects of aggregated versus disaggregated data on decision time and decision confidence.</td>
<td>Aggregated data were associated with higher quality decisions, longer decision times, and lower decision confidence.</td>
</tr>
<tr>
<td>Senn &amp; Dickson (1977)</td>
<td>Determined the relationship between detailed and summary data on decision effectiveness.</td>
<td>No relationship was found between the use of detailed or summary data and cost performance or decision confidence. However, users of detailed data took longer to make decisions than users of summary data.</td>
</tr>
<tr>
<td>Benbasat &amp; Dexter (1979)</td>
<td>Examined the effect that degree of aggregation in accounting data and psychological type of decision maker had on decision effectiveness.</td>
<td>Degree of aggregation was inversely associated with decision making time, but no association was found with profit performance. However, the combination of degree of aggregation and psychological type resulted in a positive association with profit performance but no association with decision making time.</td>
</tr>
</tbody>
</table>
data (Abdel-khalik, 1973; Barefield, 1972; Benbasat & Dexter, 1979; Chervany & Dickson, 1974; Senn & Dickson, 1977).

In the above research, information overload was examined primarily from a cognitive or psychological perspective and at the individual level of analysis. The thrust of the research was to try to learn about the psychological characteristics of accounting system users in order to fit them with accounting systems useful for decision making purposes. However, as noted earlier, the concept of information overload has not been defined precisely (Ashton, 1974; Casey, 1980; Libby & Lewis, 1982; Snowball, 1979). We believe that to obtain a more precise definition requires complementing previous psychological analyses of information overload with one from an organizational perspective.

INFORMATION OVERLOAD

Definition

The information processing approach to organization design provides the framework for the conceptual and operational analysis presented in this paper (Galbraith, 1973, 1977). This approach to organizational design has gained adherents and is utilized here because it conceptualizes uncertainty in information processing terms. According to Thompson (1967, p.13) "the central problem for complex organizations is one of coping with uncertainty". Uncertainty is reduced through information. Thus, by viewing uncertainty in terms of the difference between the amount of information an organization needs to possess for task performance and the amount it does possess (Galbraith, 1973; Tushman & Nadler, 1978), the uncertainty coping problem is considered in information processing terms. Specifically, the central problem for organizations becomes one of determining how to organize to process the information that confronts its members (Simon, 1976).

The information processing approach conceptualizes work, including organizing to perform work, in terms of information load (IL) and information processing capacity (IPC). All work, whether it is analyzing financial statements, driving a truck, or masterminding a leveraged buyout, requires information processing. In this literature, the amount of data to be processed per unit of time is generally conceived as the information load accompanying that work. Information load is determined by such factors as the predictability, complexity, and interdependence of one’s work with that of others and the level of required performance (Galbraith, 1973; Poole, 1978; Tushman & Nadler, 1978). Information processing capacity comprises an organization’s ability to perform information processing activities such as the collection, processing and use of information. The IPC of an organization is determined largely by that organization’s

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3Other studies in the accounting literature have concentrated on examining whether personality characteristics (the independent variable), such as tolerance for ambiguity and decision style, or other variables (e.g. presentation media) were associated with a preference for different types or quantities of information (the dependent variable). Thus, the focus of those studies was not on determining how much information an individual could process before information overload occurred. Rather, the focus was on linking personality traits and other variables to a desire for more or less information. Hence, the studies falling into this grouping are not relevant to this paper. Examples of this type of research are Benbasat & Taylor (1978), Dermer (1973), Driver & Mock (1975), McGhee et al. (1978), Mock & Vasarhelyi (1984) and Vasarhelyi (1977).

4We are aware that there is a vertical, spatial dimension to uncertainty in that top management, middle management, and operational personnel face different types of uncertainty. This vertical aspect of uncertainty has been captured by Mackenzie (1986b) in his nine-level "hierarchy of independence uncertainty" (p. 631) and by Daft & Lengel (1984, 1986) in their attribution of "equivocality" to the type of uncertainty faced by top-management (e.g. choices about lines of business to be in and products to handle). Although this vertical dimension of uncertainty should affect the type of information desired at different levels, uncertainty at each level would still be defined as the difference between the amount of information that people need versus what they possess. Thus, the spatial dimension ultimately is recorded in our model through the demands on an individual’s time.
structure, which is the network of relationships or pattern of interactions that occur between organizational members (Mackenzie, 1976). Thus, the primary design problem becomes one of how the organization should arrange its members to manage the frequency and duration of the interactions they have with each other and those outside the organization (Mackenzie, 1986a). Indeed, the ability of organizations to match work related information loads with their IPC has been put forth as a measure of organizational effectiveness (Daft & Lengel, 1984, 1986; Galbraith, 1973; Gordon et al., 1984; Tushman & Nadler, 1978).

The utility of the information processing approach in analysing organizational phenomena is illustrated by Mackenzie (1974) in his information processing analysis of span of control. In his model, which is the precursor of our definition of information overload, Mackenzie defined span of control as the number of subordinates with whom a person interacts. This number is determined only after accounting for all the interactions managers have with peers, subordinates, supervisors and individuals external to the organization. Thus, span of control was not defined in terms of control type activities, but rather was determined from a person's information processing capability (i.e. capacity) for interactions. Mackenzie made his model operational by using time as a common measuring unit. IPC was represented by a time norm, which was the amount of time an individual had to accomplish a task. This time norm is determined by the group or organization in which the individual works. The norm is set in light of the task complexity and the individual's experience with the task. The individual uses the time norm to interact with supervisors, colleagues, subordinates and others who are involved in finding solutions to the problems. She also uses this time for planning, problem finding, problem solving, solution implementation, review, etc., which Mackenzie calls internal calculation activities. Any residual time left over to handle emergencies or contingencies is considered excess capacity (slack) by Mackenzie. Thus, whether an individual is operating below, or at her/his maximum span of control is determined by whether the time norm set for the task (IPC) exceeds, or is equal to, the actual time required to process the information load resulting from the sum of interactions, internal calculations and emergencies. By defining span of control in this way, Mackenzie was able to conceptualize it as varying with any situation and individual and yet still be measurable.

As noted above, our notion of information overload is derived from Mackenzie's (1974) span of control concept. Conceptually, information load can be measured by the information processing demands on an individual's actual time to interact with others and perform internal calculations. Our concept of information load expands upon more traditional concepts by broadening information load to include the interactions that people have with each other as well as the processing of nonaccounting information. (A more extensive discussion of the contrasts between ours and previous concepts of information load will be presented in the conceptual departure section.) Interactions with supervisors, colleagues, subordinates, clients, legislative aides, consultants, etc., all require information processing time. Internal calculation activities, such as thinking, reading, planning, problem finding, problem solving, implementation and review also require information processing time. IL (i.e. information processing demands on time) varies across individuals.

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5 Williamson (1970, pp. 37–38) also considered experience in developing his span of control model. In his model, firm experience was operationalized in terms of a firm's age.

4 Internal calculations are equivalent to an individual's level of information processing, conceptual level, or cognitive complexity which were the terms used in previous research on information overload (e.g. Cасey, 1980; Miller & Gordon, 1975; Revsine, 1970; Schroder et al., 1967).
because of individual, task or technological, environmental and informational differences. These differences affect the way individuals would use their time for interactions and internal calculations if they were free from organizational constraints. However, other constraints, such as distribution of power, leadership style, intentional generation of overwhelming information loads, and culture also affect how individuals use their time and thus information load.

The amount of time or capacity an individual has to process information (i.e. IPC) for interactions and internal calculations related to his or her work is in part determined by the organization. The organization determines the number of days an individual has to complete a task (e.g. submit a budget, make the product, do the audit), in essence, setting time deadlines. The organization also indirectly affects the number of hours per day an individual can work on a task by determining the number of tasks an individual is expected to do in any given period. The organization will, or should, set the time allotted for processing information based upon the complexities of the task, an individual's perceived abilities, and his/her prior work experience with the task. However, the individual legitimates the time norm by determining the maximum number of hours per day as well as the number of days (e.g. weekends) that he or she is normally willing to work. The maximum number of hours depends upon such factors as the job itself, higher level manager's expectations about job performance, expectations about job performance by peers and subordinates, the monetary value of work time and external demands. These factors are assumed to be reflected in an individual's ambition or desire to have career success. As Farace et al. (1977, p.107) suggested, "the greater the individual's perception that increased communication processing is instrumental in retaining his or her position, or advancing in the organization, the greater the processing that will occur." Thus, ambition or desire for career success influences the maximum amount of time an individual is willing to work.

The assumption that an individual's maximum IPC for a particular task is legitimated by the individual working on the task is based upon the supposition that authority is legitimated by an individual's willingness to accept it (Barnard, 1968; Simon, 1976). This is an important assumption because it means that information overload is determined in part by the individual's opinion about the reasonableness of the time norm allotted for processing information. Variations in opinion across individuals make differences in individual processing capacities operational. These differences have been suggested by both Farace et al. (1977) and O'Reilly (1980) as causing information overload to vary across individuals. For example, suppose two individuals each work eight hours a day and have equal demands on their time. The demands increase. The only allowable alternative to meet the increased demands is to work overtime, which is equivalent to increasing IPC. The first person willingly works the overtime to get the task done. The second person does not. The first person has increased his/her supply of time to meet the new demands on time. For the second person, the new demands on time exceed his/her supply of time. By our conceptualization, the first person is not overloaded, while the second person is.

To summarize, time is used to measure an individual's information load so that the information processing demands placed upon an individual's time is equivalent to his or her information load. The number and nature of the demands are measured by the actual time for interactions and internal calculations an individual requires to complete his/her assigned tasks. The time norm represents the supply or capacity of time that individuals have available to accomplish their work related tasks. Thus, infor-

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7Conceptually, task and technology could represent different phenomena. For example, task could represent the ends to be accomplished and technology the means used for task accomplishment. However, in recent research no distinction appears to be made between task and technology. Thus, we use the terms interchangeably following the practice of Ginzberg (1980), Macintosh (1981), and Tushman & Nadler (1978).
mation overload occurs for an individual when the information processing demands on time (IL) to perform interactions and internal calculations exceed the supply or capacity of time available (IPC) for such processing. Given that we define the work an individual carries out within an organization in terms of her (his) information processing activities, it should not be surprising that our definition of information overload is similar to definitions proposed for communication overload (Farace et al., 1977), role overload (Froggatt & Cotton, 1987; Sales, 1970), work overload (Shaw & Weekly, 1985), and stress (Weick, 1983).

Conceptual departures

The relationship between time and information load has been recognized in the literature. For example, individuals may be able to develop improved ways of thinking over time, thus allowing them to process greater information loads (Miller, 1972; Miller & Gordon, 1975; Schroder et al., 1967). Time also has been used as a unit of measurement to define information load (i.e. quantity of information to be processed per unit of time) (American Accounting Association, 1977; Wright, 1974) or to manipulate the construct experimentally (Snowball, 1980). Finally, time has been used as a measure of decision making performance (Abdel-khalik, 1973; Casey, 1980; Iselin, 1988). Nevertheless, our use of time is different, which leads to several fundamental contrasts between the work contained herein and most previous research on the subject. The contrasts are discussed below.

First, we equate task related demands on information processing time with information load. This allows an extension of the conventional accounting view of information load to more varied and diverse information processing type activities and to nonaccounting information. In the accounting studies cited earlier in the literature review section, individuals were asked to process accounting type information that they were given initially or later in response to their re-

\[
\text{IL} = \sum_{i=1}^{m} F_{Si} R_{Si} + \sum_{j=1}^{n} F_{Cj} R_{Cj} + \frac{1}{k} \sum_{k=1}^{K} F_{Bk} R_{Bk} + \frac{1}{w} \sum_{w=1}^{W} F_{Dw} R_{Dw} + I,
\]

where

\( \text{IPC} \) = capacity of individual \( P \) to process information,

\( F_{Si} \) = frequency of interactions between individual \( P \) and \( i^{\text{th}} \) supervisor (\( i = 1, ..., m \)).

\( F_{Cj} \) = frequency of interactions between, individual \( P \) and \( j^{\text{th}} \) colleague (\( j = 1, ..., n \)).

\( F_{Bk} \) = frequency of interactions between individual \( P \) and \( k^{\text{th}} \) subordinate (\( k = 1, ..., l \)).

\( F_{Dw} \) = frequency of interactions between individual \( P \) and \( w^{\text{th}} \) outsider to the organization (\( w = 1, ..., r \)).

\( R_{Si} \) = average information processing time required for each interaction between individual \( P \) and \( i^{\text{th}} \) supervisor.

\( R_{Cj} \) = average information processing time required for each interaction between individual \( P \) and \( j^{\text{th}} \) colleague.

\( R_{Bk} \) = average information processing time required for each interaction between individual \( P \) and \( k^{\text{th}} \) subordinate.

\( R_{Dw} \) = average information processing time required for each interaction between individual \( P \) and the \( w^{\text{th}} \) organizational outsider.

\( I \) = internal calculation time required by individual \( P \) for information processing.
quests for more information. In these studies information load referred to the information processing associated with the accounting information received. However, in some situations information desired by individuals may not be systematically collected and processed by the accounting system and that which is collected may be perceived as untimely, ambiguous, incomplete and/or wrong (Gordon et al., 1979; Mintzberg, 1975b). Judgments individuals make about the adequacy and relevance of provided information and about the need for and sources of additional information require continual information processing. Thus, our view of information load refers not only to the analysis, evaluation and interpretation of readily available information, but also to the information processing associated with both the decision to search for more information and the information search process itself.

Second, information is explicitly considered in general terms. In our view, information is all inputs that people process to gain understanding (Driver & Streufert, 1969). Of course, one such input is accounting information, such as external written financial information. Individuals might use this type of information to make investment and lending type decisions and financial predictions such as were the subject of several of the earlier cited accounting studies (e.g. Abdelkhalik, 1973; Snowball, 1980; Shields, 1983; Iselin, 1988). However, all explicit and implicit communication, such as orders, requests, casual conversation, metaphors, pictures, touch and tone of voice that individuals receive from any source are also inputs of information. These communications may be transmitted in writing, such as by memos, reports or personal notes; verbally, such as face to face, in meetings and by telephone; and visually through inferences about office settings and body language (Farace et al., 1977; McCasky, 1979). This broader concept of information manifests itself in increased information load which is recorded in our model as an increase in the information processing demands on time.

Third, most previous researchers, especially accounting researchers, have sought to determine the relationships among different levels of information load and decision making (i.e. level of information processing). As a result, the marginal productivity of increased information load often has been examined rather than information overload (a related, but not identical concept). Although persons may process more information or take more time than is optimal to make correct decisions, this by itself does not imply the occurrence of information overload according to our definition. Indeed, having the capacity or time available to process these extra amounts of information are strong indications that information overload has not occurred.

The marginal productivity idea also can be carried further to disentangle the concept of information overload from information value as recommended by Iselin (1988). For example, suppose the cost of collecting additional information is negligible and an individual or group has more information processing time for interactions and internal calculations than is required (i.e. IPC > IL). Then it may take minimal benefits to justify the collection and processing of additional information (i.e. the opportunity cost of the extra supply of time may be close to zero). However, for an overloaded individual (i.e. IL > IPC), the major cost associated with obtaining more information may be the opportunity cost of the information ignored. In other words, at the point of overload, a choice must be made as to which information is not going to be gathered and/or processed. In such situations, a filtering rule becomes critical. In essence, information value may be conditional on the occurrence or nonoccurrence of information overload. Accordingly, decoupling the two concepts has operational merit.

A fourth difference between the work contained herein and the earlier research on information overload is that in this paper no attempt is made to identify the factors associated with the way individuals combine and use information to make decisions. The number of, and interactions between, factors cited earlier (i.e. individual, task and informational differences, environmental demands, organizational constraints) create difficulties in making them oper-
ational. Further, the possibility exists that the effects of these factors are not uniform across different levels (or tasks) within an organization or across individuals. When these operational difficulties and nonuniform effects are combined with the likelihood that these factors or their effects are always in a state of flux, it becomes apparent that the task of developing a causal understanding of information processing in organizations is formidable. Consequently, we take those factors that affect an individual's information processing strategies as given and seek to determine the relationship between an individual's level of information processing and the actual decision time required for task completion. In essence, we are concerned with the ends of information processing activities and the relationship between an individual's level of information processing (i.e. means) with those ends. Thus, individuals who are overloaded according to the line of research based on Schroder et al. (1967) and, hence, resort to simplifying information processing strategies may not be overloaded according to our definition. Because we assume information overload occurs when the actual information processing time for work completion exceeds the allotted time, individuals who use simplifying strategies to complete their work competently within the specified, accepted time deadlines would not be overloaded.

A fifth important way that our work departs from previous efforts is in the recognition that information overload has organizational structure determinants in addition to psychological ones. All organizational information processing minimally encompasses the following elements: (1) issues to be decided upon; (2) individuals with different values, personalities, expertise and powers of persuasion; (3) the nature of relationships between individuals as determined by such organizational factors as the distribution of authority and power, culture, the performance measurement and reward system utilized and the content, frequency, duration and intensity of verbal or written contacts; (4) the specification of appropriate information processing procedures; and (5) information. The integration of these elements has structural consequences in that they determine the interaction patterns that organizational members have with each other and those outside the organization. These patterns are measured in our model by the information processing interaction demands on time. By affecting the other information processing elements, the provision or nonprovision of information can modify the interaction patterns that occur within an organization. Thus, information providers (including accountants) appear to be in a pivotal position to affect the occurrence of information overload by contributing to or restricting the information processing demands on time for interactions. This position may account for Ashton's (1974, p. 40) opinion that “a major portion of the responsibility for alleviating information overload problems must rest with the accounting function of the organization.” Accordingly, accountants should strive to develop models or concepts of information overload that, in addition to psychological variables, consider organizational variables, as has been done in this paper, and which is recommended by several researchers (Libby & Lewis, 1982; O'Reilly, 1980; Winkler & Murphy, 1973).

The sixth, and final, way our work differs from other research in the area is that it highlights the importance of time in managing an organization and linking the information processing activities of many people working together to solve interdependent problems. At its most fundamental level, the acquisition and use of human resources can be viewed as involving the leasing of an individual's time for the performance of specific organizational work. To the extent that much work is interdependent and requires joint effort and because time is additive across individuals (i.e. the demands on, and the supply of, time for any sized group of individuals can be found by totalling across individuals in the group), time ties together an organization's parts. Thus, our definition permits information overload to be determined for any sized group.

At a group or organization level, information overload occurs when the actual information processing time for interactions and internal calculations required by all individuals involved in particular organizational tasks (i.e. IL) exceeds
the collective time norm of these individuals for the performance of such tasks (i.e. IPC). With this definition, not all individuals have to be overloaded for information overload to occur for an organizational unit. This situation may occur when some individuals have the capacity, but are not authorized to do the work. Conversely, information overload may not occur for the organizational unit as a whole, but still happen for individuals. For example, suppose a bottleneck in the work flow occurred because subordinates strategically overloaded the hierarchy in order to get their recommendations accepted or be delegated the right to make decisions, as was described by Stockman (1986). From the individual level of analysis, information overload would be a problem. However, if the unit had more time to perform the task than was required, the unit would have sufficient capacity for task performance. It would not be overloaded according to our definition. At the group level of analysis, inadequate task performance (i.e. a bottleneck) may result from an inadequate division of labor or a failure to delegate rather than from the existence of information overload. Hence, our definition allows the occurrence of information overload to be measured conceptually at the group or organizational level of analysis in addition to the individual level. Further, because the proposed definition links the passage of time to organizational information processing activities, the definition is appropriate for modeling dynamic processes (e.g. production).

The need to examine how groups of people working together process information has been noted by several researchers (Connolly, 1977; Hopwood, 1978; Macintosh, 1985; Mackenzie, 1976; O'Reilly, 1980; Spicer & Ballew, 1983; Ungson et al, 1981). Because we define information load and information processing capacity in terms of time, our definition of information overload provides a framework for analysing the information processing activities of groups by observing how their time in organizations is managed. That the effective management of time is the hallmark of successful organizations has been recognized recently by Stalk, Jr (1988, p. 41) who calls "time — the next source of competitive advantage".

SUPPORTING EVIDENCE

Organizations engage in many endeavors to improve their operational efficiency. Frequently, the specific impetus for many of these efforts is unknown. Nevertheless, many organizational practices are consistent with an interpretation that they are attempts to lessen the likelihood that information overload will occur, as is discussed in the next two subsections.

As indicated previously, our definition of information overload is based on the notion that the time norm or capacity for processing information is expended on the interactions individuals have with their colleagues, superiors, subordinates, and relevant external outsiders and on the internal calculations people perform. Because time links IL with IPC, we can analyse certain actions in organizations in terms of their effects on interactions and internal calculations. This allows us to identify two generic strategies, and various actions within each strategy, that organizations use to avoid information overload. The first strategy takes the total supply of time (i.e. available capacity) as fixed, and decreases the actual time individuals spend processing information related to interactions and/or internal calculations (i.e. decrease IL). The second expands the total supply of time or capacity, holding IL as fixed, thereby increasing the actual time available for interactions and/or internal calculations (i.e. increase IPC). As will become obvious, various combinations of these two strategies can be implemented simultaneously. These two generic strategies, which are illustrated in Fig. 1, provide conceptual guidance for our analysis of
Reduce the likelihood of information overload

A. Decrease information processing related to interaction and internal calculation time (i.e., decrease IL)

1. More efficient use of time
   - Structural change
   - Standard operating procedures
   - Training
   - Computerbased systems
   - Priority setting
   - Media selection

2. Fewer tasks to perform
   - Simpler information processing strategies
   - Reduce information processing performance

B. Increase the information processing time available for interactions and internal calculations (i.e., increase IPC)

1. More time available per employee
   - Allow more work hours
   - Hire temporary help
   - Hire additional full time employees
   - Overtime

2. Expand size of workforce
   - Home computer terminals
   - Incentives to increase the long term supply of time

Fig. 1. Strategies to reduce the likelihood of information overload.
the existing empirically based literature on ways to reduce information overload.

The strategies depicted in Fig. 1 serve both a descriptive and prescriptive purpose. Descriptively, they represent a classification scheme of actions consistent with efforts to reduce information overload that have been reported in empirical studies or those based on observational data. Prescriptively, to the extent these actions were successful, they represent techniques for reducing information overload.

*Decrease information processing related to interaction and internal calculation time (i.e. decrease IL)*

Two groups of actions are possible to decrease the information processing time required for interactions and internal calculations (i.e. decrease IL). The first group helps individuals use their time more efficiently. The second reduces the number of tasks individuals perform. Although each action can be viewed as an alternative to any other, various combinations of actions can be used concurrently to decrease IL.

A discussion of these groups of actions follows.

*More efficient use of time.* One way to enhance information processing efficiency is through structural change, such as the creation of self contained tasks (Galbraith, 1973). Structural change (e.g. moving from a functional to a divisional organizational form) impedes information overload by subdividing large interdependent problems and large integrated units into smaller independent subproblems and smaller, more independent subunits. The effects of this change are to allow decisions to be made where the information exists and to reduce coordination requirements associated with joint decision making. The result is that fewer and shorter interactions and internal calculations across hierarchical levels are required since IL for decision making is not transmitted up the hierarchy. Additionally, the frequency and length of interactions and internal calculations may be reduced for coordination requirements. Studies by Chandler (1962), Davis & Olson (1985), Mackenzie (1986a) and Peters & Waterman (1982) show that structural solutions decrease information processing related to interaction and internal calculation time because they reduce the frequency and duration of certain types of interaction patterns and internal calculations.

A second way organizations can help individuals use their time more efficiently is to establish standard operating procedures for recurring activities (Cyert & March, 1963; Tuggle, 1978). Standard operating procedures reduce both the number and importance of each interaction by specifying how problems are to be solved and setting down rules for allowable interactions. As a result, information processing time related to interactions is reduced. In addition, standard operating procedures permit similar problems or situations to be met with similar responses or reactions automatically. This reduces the information processing time needed for thought (i.e. internal calculations) because the need to rethink what actions should be taken for familiar problems is eliminated. In essence, standard operating procedures reduce information load by decreasing the per cent of information processing time individuals spend on routine tasks. These points are illustrated by Merchant (1984) and Robey (1981). Merchant reported that with more impersonal administrative controls (i.e. standard operating procedures) and standardized information flows in budgeting, managers had fewer interactions with their subordinates. Robey found that the use of standard operating procedures accompanying the introduction of a new computer system allowed upper level managers to monitor sales performance through automated reports rather than by personal supervision. Substituting impersonal control for direct supervision resulted in fewer superordinate-subordinate interactions. Greater standardization also increased the clarity of the budgeting process for lower level managers, decreasing their number of internal calculations. It should be noted, however, that the introduction of new

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10 Although the actions discussed may not be all inclusive, we believe they provide a representative list.
standard operating procedures could increase the amount of time individuals initially require for information processing (i.e. interactions and internal calculations) (Gordon et al., 1984). That is, standard operating procedures that are general in nature or necessitate the collection and use of new data or the performance of new activities may require additional learning time before their application could reduce interaction and internal calculation times.

Training programs constitute a third means to use information processing time more efficiently. Effective training programs can help individuals become familiar with new tasks, systems, problem solving procedures and interpersonal skills, thereby reducing the need and, hence, the information processing time required for interactions and internal calculations. Nowhere has the effectiveness of training been more evident than in the implementation of new technologically based information systems. Studies by Davis & Olson (1985), Gordon et al. (1984), Keen & Scott-Morton (1978), and Moore & Chang (1983) have illustrated the value of training in limiting the occurrence of overload situations that may arise from the introduction of new information systems. Ashkenas & Schaffer (1982), Ferner (1980), Mackenzie (1975), and Oncken & Wass (1974) also have shown that learning how to use time more efficiently decreases the demands on information processing time (i.e. decreases IL).

The use of computer-based information systems is a fourth way to decrease the information processing time associated with interactions and internal calculations. Computers reduce the time needed for internal calculations by permitting individuals to process information more quickly. More time is available for other purposes or for processing additional information. Studies by Klatzky (1970) and McFarlan et al. (1983), among others, illustrate this point. Klatzky (1970) noted that use of the computer for routine decision making (e.g. an EOQ model for inventory planning) increased the capability of lower and middle level managers to handle nonroutine decisions. McFarlan et al. (1983) observed that without computer related assistance, individuals in financial institutions would be buried in an avalanche of paper. However, computer usage is not without peril. The use of computers often brings about an environment where excessive amounts of information are gathered and processed. More internal calculations are required and, quite possibly, more interactions as well. Indeed, cries of information overload often accompany the early stages of implementing computer-based information systems.

Fifth, the establishment of priorities can result in a more efficient use of information processing time. Priority setting identifies tasks and activities according to whether they are critical, less critical but essential or can be eliminated. Thus, priority setting can help focus the expenditure of interaction and internal calculation time on essential activities, while minimizing the time spent on less important or nonessential activities. Simons' (1988) description of how top managers use one or two management control systems to identify and emphasize the importance of certain activities and Chevron Corp's response to declining profitability by "cutting down on useless time and things that were just nice to do but not really necessary" (Bennett, 1986, p. 27) illustrate this approach. In addition, Simons (1988) describes how businesses undergoing major change consciously labor under high information loads in order to establish priorities about what is important. In these businesses top managers want information from all their management control systems (e.g. business budgeting, human development) to learn what is going on and to decide what to do. However, their requests for information and their personal involvement in employees' decisions create, in a relatively short period of time, enormous informational demands on employees. The result is "information overload" and the attendant behavioral consequences of "stress... superficial analysis, a lack of perspective and potential paralysis" (p. 30). Hence, information overload forces top managers to establish priorities that signal both the work they consider important and the ways subordinates should use their time to accomplish that work.

The choice of communication media consti-
tutes the sixth, and final, method that individuals
can employ to use information processing time
more efficiently (Daft & Lengel, 1986; Daft et al.,
1987). Communication media vary in the infor-
mation contact they potentially can convey to
individuals. Some media (e.g. face to face) have
the capability to communicate considerable in-
formation in short periods of time. Others (e.g.
bulletins) often disseminate little information.
Thus, it becomes important for individuals to
select media that convey information necessary
for processing their work related IL. For
example, suppose a subunit faces high IL. Having
a face to face group meeting allows for the rapid
occurrence and instant interpretation of multi-
ple interactions and internal calculations as-
sociated with processing the IL. In contrast, di-
viding the group into subgroups and sequen-
tially meeting over time or using written docu-
ments (e.g. memos) substantially increases the
interaction and internal calculation times
needed to process the IL. This example may ex-
plain why many managers prefer verbal to written
media (Mintzberg, 1975a). Simply stated, they
process more information in less time.

**Fewer tasks to perform.** The second group of
actions, which decreases information processing
related to interaction and internal calculation
time, do so by reducing the number of tasks to be
performed. One way to accomplish this is by
using simpler information processing strategies.
Individuals who use simplifying strategies are
likely to require fewer and shorter reports;
gather less data; analyse, evaluate, and interpret
fewer dimensions, attributes and variables; and
use simpler rules to combine data into a deci-
sion. As a result, required internal calculations
are less arduous, although often less complete,
than those associated with more complex ap-
proaches to information processing. For
example, simplifying strategies may help to ex-
plain why the payback method is frequently used
in making capital budgeting decisions despite its
theoretical deficiencies.

A second way to lessen information processing
related demands on time for interactions and
internal calculations is to reduce desired per-
formance levels. Reduction in performance
levels results in less work being performed
because existing levels of resources are used less
intensively. The notion that information
processing time requirements for interactions
and internal calculations decrease when existing
resources are used less intensively is supported
by Gordon et al. (1984). They argue that a less
intense use of existing resources “such as under-
utilized capacity, long production and delivery
times, and large inventory levels reduce per-
formance standards by decreasing interdepen-
dencies between subunits, thereby lessening the
need for tight coordination...” (p. 115). In es-
sence, lower performance standards reduce the
pressure to complete work within a certain
period of time. This lessens the need for frequent
and lengthy interactions and more difficult inter-
 nal calculations, thereby decreasing the
demands on information processing time (i.e.
IL).

**Increased availability of time for interactions
and internal calculations (i.e. increase IPC)**

In the previous sections strategies to reduce
the occurrence of information overload focused
on decreasing the actual information processing
time individuals spend on interactions or inter-
 nal calculations. However, its occurrence also
can be limited through strategies that increase
the time available to organizations for interac-
tions and internal calculations (i.e. increase
IPC). Two groups of actions are possible. The
first seeks to increase the time each individual
has available for interactions and internal calcula-
tions. The second expands the size of the work-
force. Although each can be viewed as an alter-
native to the other, various combinations of
actions can be employed concurrently to in-
crease an organization's IPC. These strategies are
discussed below.

**More time available per employee.** The first
way to make more information processing time
available to each employee is to simply allow
more time for employees to do their work. Em-
pirical support for this approach to avoiding
overload is well documented in the literature. For example, the literature on organizational change (often called organizational development) has long argued the importance of providing ample time for the introduction of a new organizational structure or system (Ives & Olson, 1984; Markus, 1983). The literature on computer-based information systems, accounting systems and budgetary systems have all made similar points concerning the implementation of new systems (Argyris, 1977; Greiner, 1972; Keen & Scott-Morton, 1978; Nolan, 1979).

A second way to increase the information processing time available to each employee is to get current employees to work longer hours. A potentially effective short term solution is to ask them to work overtime. The use of overtime is quite common when one's work takes place under stringent time deadlines. Another means may be to provide key employees with home computer terminals (Daft et al., 1987). These units would allow them to extend their regular work day by working extra hours at home. A longer term approach, as suggested by Gordon et al. (1984, p. 115), is to offer incentives to employees "to encourage them to extend what they consider to be their normal work time". If we recall that the individual legitimates the time norm allotted for work, then the use of incentive plans can play an important role in increasing the information processing time that individuals have available for interactions and internal calculations. Indeed, many articles on incentive plans, that stem from the economic based agency theory paradigm, show that the use of incentive contracts can increase the effort expended by agents in the performance of their work (Lambert & Larcker, 1985; Waller & Chow, 1985).11

Expand size of workforce. The second group of actions increase the information processing time available to an organization for interactions and internal calculations by expanding the size of the workforce. If the information processing supply of time needs to be increased for a relatively short period, then temporary help can be hired. However, hiring temporary help also may increase the information processing demands on time. Figuring out what these new employees should do, instructing them to do it, evaluating their performance, and being ready to answer their questions will result in some nonproductive time for new employees and increased interaction and internal calculation times for some current employees. Nevertheless, because temporary personnel typically perform work that is relatively easy to learn, the increased availability of time should be more than the demands on that time for interactions and internal calculations. Employing temporary help to increase the time available for information processing is successfully used in the retailing industry in response to seasonal variations in sales, such as occur during the Christmas selling season. A longer term approach to expanding the information processing time supply is to hire additional full time employees. Long term increases in the time supply are required when IL increase because of long term growth trends in the demand for an organization's goods and services. As long as the increase in available time is not offset by as large an increase in the information processing time required for interactions and internal calculations, the addition of new full time employees is an appropriate way to increase the available time.

**IMPLICATIONS AND CONCLUSION**

This paper began by suggesting that information overload is an important problem that needed to be specified more precisely. Drawing upon the information processing approach to organization design, the concept of time was applied to an analysis of information overload. Time was conceptualized as a measure of information processing capacity (IPC) and as a mea-

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11A primary focus of this research is directed at deriving optimal incentive plans and thus is more in line with research on information value (Feltham, 1972). However, as noted in the conceptual departure section, we believe that our definition of information overload can help to understand and make operational the information value concept.
sure of the interaction and internal calculation demands on that capacity (IL). This made it possible to define information overload in terms of the relation between the demands on, and supply of, time and measure it conceptually for any entity (i.e. individual, group, organization), regardless of the causes or circumstances of its occurrence. Information overload occurs when the demands on an entity for information processing time exceed its supply of time (i.e. IL > IPC). Cited evidence from the literature demonstrates the reasonableness of the proposed definition.

Viewing organizations as information processing systems, where time links information processing demands on time (IL) to information processing capacities (IPC), has certain benefits. Specifically, it draws attention to two factors that may be critical to an organization's success. These are that: (1) IPC is in part a consequence of organization design, and (2) time is a critical, scarce resource. Herbert Simon (1976) has written that the central organizational problem is not a lack of information for decision making, but rather the need for processing capacity to attend to that information. He suggests attention, not information, is the real scarce resource and calls for information systems to be designed to "conserve the critical resource — the attention of managers..." (p. 296). However, if attention means "how we spend our time" as defined by Peters & Waterman (1982, p. 69), then the critical resource to be conserved is time. Appropriately designed systems would "distinguish between problems for decisions that come with deadlines attached (real-time decisions), and problems that have relatively flexible deadlines" (Simon, 1976, p. 294). The occurrence of information overload would signify problems in organizing (i.e. problems in the management of time).

Because our definition of information overload highlights the importance of time in the management of organizations, our definition has both practical and research utility. Practical utility can be found by looking at the critique by Kaplan & Johnson (1987) of what is wrong with the typical management accounting system. As they observe, "innovating Japanese companies are now managing time, not costs" (p. 29). Stalk Jr (1988) elaborates upon this observation by attributing the success of certain Japanese manufacturers to their ability to manage time.

Our model of information overload provides a theoretical grounding for why the management of time is important and has practical utility. The acquisition, organization, and use of time can affect both the demands on time and the supply of time available to meet those demands. Further, they also precede the generation of revenues and the incurrence of costs. Thus, our model provides a rationale for why planning and controlling the acquisition, organization, and use of an organization's time may be as important as planning and controlling the time-based consequences of revenues and costs. At the very least, our model draws attention to time as a critical, scarce resource, the importance of which still often appears to be underestimated.12

The proposed definition also may make it possible to shed new light on longstanding debated research issues. For example, as Macintosh (1985, p. 10) notes, participation has long been advocated "as the best means for getting managers and employees to make more effective use of accounting information systems". However, research on participative budgeting has shown that sometimes participation is beneficial and sometimes it is not. Differences in work group attitudes (Argyris, 1952; Becker & Green, 1987) has been utilized successfully in many fields to measure how people use time (e.g. urban planning, consumer behavior, gerontology, child care) (Andorka, 1987). Further, Smith & Gray (1987) have suggested that individuals could employ Lotus 1-2-3 to keep a continuous record of the use of this time. Still, we recognize that the actual measurement of information overload in real world organizational settings is difficult. However, difficulty in deriving a precise measurement does not mean that a concept lacks content or is scientifically meaningless (Hempel, 1966). Because information overload really occurs, is a troublesome problem, and our definition of information overload provides a way to analyse and measure its occurrence conceptually, we believe the concept has utility. Indeed, organizational practices and controversial issues can be more clearly understood within the context of our concept of information overload, as is discussed in the remainder of this paper.

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12 Time budget surveys has been utilized successfully in many fields to measure how people use time (e.g. urban planning, consumer behavior, gerontology, child care) (Andorka, 1987). Further, Smith & Gray (1987) have suggested that individuals could employ Lotus 1-2-3 to keep a continuous record of the use of this time. Still, we recognize that the actual measurement of information overload in real world organizational settings is difficult. However, difficulty in deriving a precise measurement does not mean that a concept lacks content or is scientifically meaningless (Hempel, 1966). Because information overload really occurs, is a troublesome problem, and our definition of information overload provides a way to analyse and measure its occurrence conceptually, we believe the concept has utility. Indeed, organizational practices and controversial issues can be more clearly understood within the context of our concept of information overload, as is discussed in the remainder of this paper.
1962), personality variables (Brownell, 1981; Collins, 1978), leadership practices (Collins et al., 1987; DeCoster & Fertakis, 1968), style of evaluation (Brownell & Hirst, 1986; Hopwood, 1976; Otley, 1978), and organizational variables (Hofstede, 1968; Swieringa & Moncur, 1974) are some of the explanations that have been advanced for the variations in findings about participation.

The desire of individuals to avoid information overload, as defined in this paper, provides another perspective from which to assess the conflicting findings regarding budgetary participation. Briefly, the argument is as follows. Individuals who are either overloaded, or close to being overloaded, work under considerable time pressures. One way they may strive to lessen these pressures is by reducing demands on their time for interactions and internal calculations (i.e. participation takes interaction and internal calculation time). If participation does not reduce the demands on time for interactions and/or internal calculations, than these individuals would be expected to attempt to prevent increases in, or to decrease their current levels of participation as has been reported by Covaleski & Dirsmith (1986) and Zammuto & Cameron (1985). Alternatively, if the time spent participating can be offset by larger decreases in the time spent on internal calculations or nonparticipatory induced interactions, then these individuals might be amenable to budgetary participation. This might help to explain the findings of Onsi (1973) and Schiff & Lewin (1970) that participation leads to the creation of organizational slack which is interpreted as a sign of inefficiency. However, our interpretation would be that some individuals use participative budgeting to lessen the demands on their information processing time for interactions and internal calculations in the hope of preventing or eliminating information overload. Seen in this light, organizational slack may be less an indicator of inefficiency and more an indicator of available information processing capacity that gives individuals flexibility to adapt to increased demands on their time. Conversely, individuals who are not close to being overloaded, and who are unlikely to become so in the foreseeable future, would have little reason to decrease their current levels of participation. Indeed, these individuals may be receptive to increased participation in budgeting. They have information processing time on their hands and participation is a way for them to soak up some of that time. This may help to explain why House (1971) and Macintosh (1983) found individuals at lower organizational levels more receptive to participation in budgeting than higher level managers.

In essence, our argument is that receptivity toward participation may be partly contingent on the demands that participation makes on time and on the availability of time that individuals have for interactions and internal calculations. Thus, it provides a rationale for the mixed results concerning participative budgeting and such outcome variables as job satisfaction and job performance.

In conclusion, the relationship between information overload and time often does not seem to be recognized. This paper is a step in rectifying that oversight. Our definition can be used to provide an a priori set of strategies that organizations can take to avoid and/or reduce the phenomenon labeled information overload. Additionally, the practical and research utility of the information overload framework suggests the possibility that time also may be important in the examination and analysis of other phenomena. If so, application of the framework may provide a means to assess organizational functioning in a new light or reconcile divergent research findings about information processing related topics reported in the literature.

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