THE ORGANIZATIONAL VALIDITY OF MANAGEMENT INFORMATION SYSTEMS

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Abstract

Organizational validity refers to the "fit" between an information system and its organizational context of use. This paper applies the concept to MIS and extends it beyond earlier formulations. The conditions fostering invalid systems and two processes by which organizational validity is achieved, integration and negotiation, are discussed. Finally, the desirability of increasing validity as a strategy of improving system effectiveness is assessed.

The Organizational Validity of Management Information Systems

The field of Management Information Sytstems (MIS) has as its central concern the effective design, implementation and use of computer-based systems in organizations. Recent research in MIS seeks to identify criteria by which effectiveness in system design can be measured and to prescribe development processes which lead to system effectiveness. Initial criteria for system effectiveness stressed technical aspects of design because these technical features are relatively easy to analyze and relate directly to the special competencies of MIS professionals. However, accumlating research indicates that, while the technical attributes of a system may be necessary for system success, at least in some threshold quanitities, they are not sufficient for success.

More recently, MIS research has broadened its perception of well-designed systems to include human and organizational criteria as well as technical criteria (Bjorn-Anderson, 1980; Mowshowitz, 1980; Mumford and Sackman, 1975). The concept of "organizational validity" has joined "technical validity" as an attribute deemed essential for success of technical innovation (Schultz and Slevin, 1975). Although first used to describe the validity of Operations Research/Management Science models, organizational validity can be easily extended to include MIS or, for that matter, any technical change in complex organizations. Our purpose in this paper is to examine more closely the concept of organizational validity and to recommend certain extensions.

We specifically propose a conceptual framework which 1) clarifies the meaning of organizational validity, 2) identifies the conditions which foster invalid systems, and 3) describes the processes whereby organizational validity can be increased. Finally, we comment on the desirability of doing so.

CONCEPTUAL FRAMEWORK FOR UNDERSTANDING ORGANIZATIONAL VALIDITY

Schultz and Slevin (1975) are credited with coining the term organizational validity in an effort to conceptualize the successful implementation of applied mathematical models in operations research and the management sciences. In their conception, organizational validity is the result when the degree of change in individuals, small groups and organizational variables required to implement a model or a system has been accomplished. Inherent in this definition is the assumption that achieving implementation of the model is a desirable end state; the attribute of organizational validity, therefore, is normatively related to system success. Achieving validity should be the goal of implementation efforts, according to this formulation.

Ginzberg (1980) extended the concept to management information systems but defined it somewhat differently, as a fit or match between a system and its organizational context. This formulation suggests potential ways to measure the concept, but closer examination reveals that the concept is still used normatively. An example is Chervany's (1978) statement: "We have adequate management processes to insure technical validity. In contrast, we have (at best) 'stone age' management processes to insure organizational validity" (1978:).

The underlying prescription is: increase organizational validity to improve effective system implementation and use.

There are at least two reasons for the appeal of organizational validity as a central concept for understanding information system implementation. The term organizational validity implies, first, that a single criterion can be used to assess information systems and, second, that valid systems are more likely to be easily implemented and effectively used.

At the same time, a number of problems with organizational validity as a useful research and practical concept remain. First, the nature of "fit" needs to be spelled out more satisfactorily, lest we be seduced by a deceptively simple concept. Secondly, validity must be extended to include the political acceptance of an MIS. While it is widely regarded that implementation is a political process, little has been done to examine the negotiation process or the effects of systems on the power distribution in the organization. Third, validity is often assumed to be related to organizational effectiveness, but this is a relationship that should be examined.

Our conception of organizational validity departs from the prevailing wisdom in three ways. First, we view organizational validity not as a unitary concept but as a quality which can be assessed on at least four levels of analysis. Second, we view validity to be a property neither of systems nor of organizations, but of the match or fit between them. And, third, we consider organizational validity to be a descriptive and relative concept rather than a normative and absolute one, with no simple connection between it and the effective system use.

The prevailing view is that an organizationally valid system is

one in which key attributes match users' psychological characteristics. In our conception, the fit between the system and users' motivations or cognitive styles is only one of four ways in which a system can match its context of use. The others include the structural dimensions of the organization, the distribution of power in the organization, and the interface between the organization and its environment. Central to this view is the notion that evaluation at these levels may yield different assessments of organizational validity. There is no inherent reason to suppose that a system considered valid at one level of analysis will be valid at all others. This poses the interesting question of which levels are the most critical to the success of information systems implementation, a question which can hardly be answered without further research.

A second key aspect of our conceptualization is that organizational validity is a property neither of the system itself nor of the organization in which it is used, but rather of the degree of fit or match between them. This implies that organizational validity cannot be assessed in absolute terms, but only relatively, by comparing a specific information system with its concrete context of use. In other words, the same system may be valid (on any or all dimensions) in one context, yet invalid in another.

Finally, although we are convinced that organizational validity is a useful concept for describing information systems and explaining implementation problems, we recommend caution in applying the concept normatively. For example, the hypothesis that organizationally invalid systems, that is, systems mismatched to their organizational context of use on any or all of four dimensions, are more difficult to implement

than valid ones is intuitively pleasing, since the introduction of an invalid system requires change from existing organizational thinking and behavior patterns. It is by no means certain, however, that validity will lead to effective use or invalidity to ineffective use. The success of the outcome will clearly depend, at least in part, on how effective and successful were the thinking and behavior patterns which the information system matched or did not. Thus, an organizationally valid information system might be easily installed but fail to produce any significant benefits because it merely automated inefficient organizational rules of thumb. Or, a highly invalid system might generate enormous resistance as it is installed, yet lead to a major long-run improvement in organizational effectiveness. Therefore, while we may point out ways in which the organizational validity of an information system can be increased, because we are using the concept descriptively, we intend no simple prescriptions about the wisdom of doing so.

What follows is a brief description of the characteristics of organizational validity at each of four levels of analysis.

TYPES OF ORGANIZATIONAL VALIDITY

User-System Fit

More research has focused on this aspect of organizational validity than any other, perhaps because individuals are so concrete, unlike organizations and their environments. At any rate, user-system fit or match has been conceptualized in at least two different ways, in

terms of system interaction with people's internal needs or motivations and in terms of system interaction with people's cognitive processes. In both cases, validity is achieved if the system fits the user's psychological characteristics. This fit can be achieved by designing the MIS to fit existing users, training users to fit the existing system, or selecting new personnel to fit the existing MIS.

Early forecasts of the impact of computing in organizations (Leavitt and Whisler, 1958; Anshen, 1960) implicitly rested on a model of user motivation which stressed the importance of task content to motivation. Briefly, motivation depends on the opportunity to satisfy esteem or achievement needs, take on more responsibility, and receive intrinsic rewards from the work itself. If an MIS expands the scope of user tasks in a way that provides these opportunities, it is hypothesized that motivation would increase, leading to user acceptance of the system. If task scope decreases and removes opportunities for higher need satisfaction, then motivation of the user would decrease. Thus, user behavior is believed to be directly tied to changes in task content caused by MIS introduction.

More recent models of user motivation are more complex. For example, Lucas' (1975) descriptive model of user behavior identifies a large number of attitudinal, personal, and situational factors affecting system use. Use depends upon positive attitudes toward system features and the decision-making style of the user. While not based on a psychological model of motivation per se, Lucas' model does not extend the motivational perspective by stressing the instrumental value of an MIS. This point is further developed by those taking an expectancy theory approach to user motivation.

Expectancy theory stresses user cognition of several important relationships which ultimately affect the motivation to use an information system (Robey, 1979). First, the perception that effort (motivation) will improve job performance is crucial. Obviously, a low quality system or an untrained user will make efforts less productive and therefore diminish future motivation. The second important relationship is the link between performance and both intrinsic and extrinsic rewards. Unlike earlier theories, which stress the pre-eminence of intrinsic motivation through expanded tasks, expectancy theory acknowledges the continuing importance of extrinsic rewards like pay, working conditions, and benefits. To the extent that these are contingent upon performance, motivation may be enhanced. Intrinsic rewards are always (by definition) contingent upon performance since they emerge directly from the task itself. Finally, motivation also depends on the value the individual places upon the rewards received.

Zmud (1980) has taken motivation concepts and extended them backward into the MIS development process. He notes that user perceptions of system quality and attitudes toward the system are largely formulated during the system's development period. Thus, the perceived link between effort and performance, so crucial to motivation, may be largely formulated before system design is complete.

Whereas the preceding studies have focused on the interaction of systems with people's motivation processes, other studies have looked at organizational validity in terms of cognitive information processing, since the stated goal of MIS is to improve managerial decision-making. According to this way of viewing organizational validity, user preferences for information content and format are rooted in personal cognitive styles.

Cognitive style refers to the way people process information. There are numerous ways to conceptualize and measure cognitive styles (Robey and Taggart, 1981, Taylor and Benbasat, 1980). For example, several studies have examined differences in the decision behavior of analytic and heuristic subjects (Huysmans, 1970; Dickson, Senn, and Chervany, 1977; Vasarhelyi, 1977). Others treat cognitive style in terms of field dependence/independence (Benbasat and Dexter, 1979; Doktor and Hamilton, 1973; Lusk, 1979). For example, Benbaset and Dexter (1979) showed a significant interaction between cognitive style and the type of information support received from an MIS in predicting profit performance in a simulation game. Profit was highest when structured, aggregate reports were available to analytic subjects and where non-analytic subjects used a flexible data base inquiry system.

Recently, attention has been paid to the different functions of the brain's cerebral hemispheres (Mintzberg, 1976; Taggart and Robey, 1981). Some users depend more on the logical sequential processing of the left hemisphere, while others might use the intuitive processes of the right hemisphere more dominantly. Doktor (1978) has shown such differences by measuring brain waves of fourteen subjects during performance of various types of problem-solving tasks.

However cognitive style is conceived, it is likely that compatibility between the style of the user and the nature of information support would affect use and performance with an MIS. Some decision-makers are analytic, requiring complete and detailed documentation. Other are more intuitive and heuristic, preferring to use partial information to get the "big picture" without details. Intuitive decision makers may dislike an MIS that provides reams of

information in tabular format. Analytic decision makers, conversely, may not use an MIS which provides summary data, because they view it as incomplete.

The hypothesis that compatibility between users' cognitive styles and system design leads to effective use of and performance with the system is intuitively satisfying and simple. Achieving such a fit, however, may not be as straightforward or as effective as it first appears. For one thing, many systems have users belonging to different organizational and occupational groups, like accountants, clerks, low and higher level managers and engineers, all of whom may have different cognitive styles. For another, DeWaele (1978) has noted that "fit" can be defined in terms of users' desires as well as in terms of their needs; compatibility could easily be lacking in one or the other of these dimensions. Finally, empirical evidence does not allow us to accept the simple solution offered by the cognitive style compatibility hypothesis. Research testing this hypothesis indicates partial support, but suggests that other factors, such as the nature of the task, also affect use and performance (Robey and Taggart, 1980).

Organization Structure-System Fit

Organizational validity as we have seen, can be defined as the degree of fit between users' psychological characteristics and system design attributes. It can also be defined as the match between the structural characteristics of an organization and different system design attributes. Organizations experience environmental uncertainty

and the need to coordinate the task-related activities of many individuals. To achieve these ends, managers design aspects of organizational structure such as communication channels, control mechanisms, decision rules and chains of command. Among the structural interventions available to managers are computer-based information systems (Galbraith, 1978).

Just as managers can design their organization charts to reflect or compensate for key environmental and task-related uncertainties, information systems can be designed to support a variety of differing objectives. Financial control systems can be structured for centralized, decentralized or matrix decision environments, for example. Production control systems can embody and routinize existing organizational procedures and rules of thumb, or they can replace these with sophisticated analytic models. Organizational communication channels can be simulated or altered in the distribution of reports from an order entry and tracking system. The potential for information systems to match or to differ from existing organizational structures suggests a non-psychological component of organizational validity. Validity in this sense can be achieved by designing the information system to match the organizational structure or by altering the organizational structure to conform to system characteristics.

Two key aspects of formal organizational structure are the degree to which subunits are "organic" or "mechanistic" and the degree to which decision-making is centralized or decentralized. Lawrence and Lorsch (1967) found a relationship between the formal structure of an organizational subunit and the amount of uncertainty in the task performed by the subunit. Thus, the task of research and development

units cannot be tightly programmed, and effective R & D units tend to have organic forms. Effective production units, however, are more mechanistic in structure, and in general, large scale production units are buffered from many variances by production smoothing, inventories and other tactics. Extending these findings, one would expect organizationally valid management information systems to match the subunits in which they are used along the organistic-mechanistic dimension. In partial support of this notion, McIntosh and Daft (1978) have demonstrated empirically that information system requirements differ with the technology of a department or the stability of its basic work process.

Similarly, organizationally valid management information systems should match their organizational contexts on the centralization-decentralization dimension. Decentralized interactive inquiry systems may be most appropriate for non-routine departments like R & D and strategic planning or for organizations in which decision-making is distributed to local units. Centralized management information systems with optimization models may be more appropriate for subunits with routine technology, like production scheduling, or for organizations with traditions of tightly controlled decision-making. Numerous case studies on the organizational impact of computing show that systems can support either routine or non-routine decision making and that successful systems tend to fit organizational patterns designed for those tasks (Robey, 1977; 1981).

The preceding discussion runs the risk of ignoring the ability of information systems to alter organizational structures, for example, by routinizing formerly unprogrammed decision making or by apparent

decentralization of decision-making to users of a centrally designed computer-assisted model. Development of programmed heuristic decision rules enable the centralization of decisions previously made at lower levels in a more organic fashion. Porfolio analysis models, aggregate production scheduling systems and personnel selection models are cases in point. Again, by defining organizational validity as a fit or match between system and structure, we would label these structure-transforming systems as invalid relative to prior structures, although they may well enhance the long-run effectiveness of the organization.

Power Distribution - System Fit

While an information system might validly fit the organizational task and users' needs and cognitive styles, it might be resisted because it causes a redistribution of power unacceptable to those losing power. Thus, organizational validity can also be defined in terms of the distribution of power with an organization; a system can be said to be invalid to the extent that it embodies a power distribution at odds with that existing in the organizational context of use. This is not unrelated to the oganizational stucture-system definition of validity, because the formal structure of an organization can give various actors or subunits control over and access to key organizational resources which can serve as bases of power (Pfeffer, 1981). It differs from the formal structural perspective, however, because there is no assumption that subunits or actors are behaving in ways that contribute beneficially to the welfare of the organization as

a whole; in fact, if anything, the assumption is that subunits will behave to achieve their own local self-interests, which are often defined by quirks and "irrationalities" in organizational decision making and reward structures.

A number of researchers have identified a tendency for shifts in the balance of power or influence among organizational actors to be associated with the introduction of computer-based information systems (Kling, 1978; Pariff and Galbraith, 1978; Kraemer and Dutton, 1979; Bjorn-Anderson and Pedersen, 1979). This suggests that organizational validity might be identified and measured as the degree to which management information systems match or modify existing informal patterns of power distribution in an organization. Markus (1980a) illustrates this perspective by demonstrating changes in control over and access to information before and after the introduction of a financial information system and a production planning and profit analysis system. Markus concludes that system-related changes in power distribution, potential measures of organizational validity, are very strongly related to observed behaviors of user resistance to the systems in question.

Environment - System Fit

A fourth type of organizational validity refers to the fit between system design characteristics and the environment of the organization in which it is used. Perhaps a better way of saying this is that a valid system matches the organization-environment interface in its context of use.

At this level of analysis, our conception of organizational

validity is most speculative: we know of no research comparing system design features to environmental or environmental interface characteristics. Our speculation is, however, based on some theoretical propositions and personal observations. At this level of analysis, validity may refer to the type of data contained in the system or to the organizational routines embedded in the system.

Implicit in the writings of Galbraith (1973) and Gorry and Scott-Morton (1971) is the notion that data about the state of organizational environments are essential for certain organizational processes, like strategic planning and decision making, and that this type of data may not be found in systems which collect, summarize and analyze internal performance and completed transactions. The need for this planning and decision making increases with the rate of change in the environment, which also increases the difficulty of the process. Therefore, complex planning and environmental scanning systems may be organizationally valid in turbulent environments, but not in placid ones.

Lawrence and Lorsch (1967) demonstrated that effective organizations have mechanistic or organic structures which match their stable or dynamic environments. Organizational validity may then refer to a match between the organizational communication, control or decision making routines embedded in an information system and the environment, independent of the design of other organizational structures.

Organizational validity at the environment-system level of analysis may also refer to a more substantive correspondence between the design of information systems and the structure of the environment. Two

examples may illustrate this concept. In the last several years, there has been a sharp increase in the competition among banks for corporate customers. Several banks have responded to this challenge by creating electronic cash management services which generate revenues in fees even when customers transfer interest-generating deposits to other banks. These systems are clearly organizationally valid in the face of new environmental circumstances. Ten years ago, however, when customers rarely moved their deposits, such a system might have seemed invalid.

With the rapid increase in corporate-initiated employee mobility, home real-estate brokerage has become a national rather than a local service. Supporting the new brokerage networks are computer systems which list properties nation-wide. These systems are valid in the emerging ecology of affiliated, rather than independent, brokers.

Clearly, organizational validity at the environment-system level may not be an appropriate concept for all information systems, payroll for example. Nevertheless, given the increasing use of computers as the delivery vehicle for services, this level of analysis may assume growing importance in the future.

CONDITIONS FOSTERING POTENTIALLY INVALID SYSTEMS

In this section of the paper, we discuss the conditions fostering the organizational invalidity of information systems. In the preceding discussion, we implied that organizational validity of a system could be ascertained by examining the degree of fit or match with users' cognitive styles and motivations, organizational structure, organizational power distribution, and also, possibly, the

organization-environment interface. Although fit or match, and hence, validity, is a relative concept, the dimensions of fit themselves are concrete and measurable; they are the properties which characterize an information system's design. Therefore, the search for conditions fostering the organizational invalidity of information systems leads to the context and process of system design.

Unfortunately, the context and process of information system design are probably as complex as those of system use. First, there is a fundamental division of labor between information system designers and information system users; only rarely do the same people design a system and use it exclusively. Systems are more frequently designed by one group of people for use by another. Second, designers of information systems do not comprise a monolithic group, any more than do users. Just as there are managerial users, clerical users, salesmen users, accounting users, so, too, there are professional systems analysts, accountants who design systems on the side, programmers who dabble in analysis, engineering systems designers and so forth. Third, the contexts of information system design are varied. Information systems may be designed by computer hardware vendors, independent software vendors or internal data processing staff in either a central group or in user areas, and systems may be used without substantive modification or they may be considerably tailored to the requirements of "the user" by the original designers or by someone else. Information systems may be purchased, rented or leased, by themselves, with computer hardware, or in the form of a service, each combination entailing different degrees of dependence on specialists and generalists internal and external to the organizational context of use.

Given these complexities, it is by no means a trivial task to identify how organizational invalidity is built into information system designs. We believe, however, that the conditions fostering organizational invalidity can be grouped into three categories: individual attributes, organization structural conditions and societal factors.

Individual Attributes

Achieving organizational validity of an information system would be less difficult if managerial users and system design professionals were more alike. But considerable research supports the observation that they differ with respect to cognitive styles (Doktor, 1978, Huysmans, 1970). Many managers, for example, are intuitive thinkers, while management scientists and system designers are analytics (Mintzberg, 1976; McKenney and Keen, 1974). Research has not yet decided the question of whether these differences of cognitive style are in-born, implying that people of given styles self-select into certain professions, or learned, implying that people are molded by educational and work experiences. Probably both occur. Kolb (1980), for example, demonstrated that students scored substantially more like a typical member of their chosen field after four years of specialized undergraduate education. Further, Plovnick (1971) demonstrated that students whose cognitive styles differ substantially from the norm are much more likely to abandon their chosen field than those who are more typical. In either case, the organizational invalidity of information systems can result from the division of system using/building labor into groups with different cognitive styles who must communicate effctively with each other in the process of developing systems.

Organization Structural Conditions

Organizational invalidity of information systems can also result from the way in which the system development process is structured in organizations. In a case cited by Markus (1980b), for example, the system development process at Telecomm Corporation involved numerous "handoffs" of specifications and incomplete work between analysts and programmers, accompanied by elaborate checkings of compliance with standards and formats. In the process, attention to the content coded into the systems flagged; systems took what was perceived as excessive time to build; and delivered systems were frequently found to meet neither the original needs of users nor the needs they perceived when the systems were finally complete. The fundamental communication distortions between users and designers were complicated by the differentiation of system building tasks.

The preceding discussion implies that difficulties arise when all parties share the same goals or preferences. But many researchers have observed that location in the organizational hierarchy encourages the development of particularized interests which are reinforced by organizational reward structures and control systems (Ritti and Goldner, 1969). Individual subunits might work to achieve their own objectives, decreasing overall organizational effectiveness. In particular, the special mission of data processing groups within organizations gives them access to data about many departments and an overview of organizational functioning. This is a base from which they could increase their power over other organizational subunits, especially user departments. Bjorn-Anderson and Pedersen (1977) and Kling (1978) found shifts of power toward data custodians. In a case described by Markus

(1979), the desires of one data processing group to work on a state-of-the-art system successfully influenced ultimate system architecture. And Pettigrew's (1972) study of computer acquisition decisions shows that political processes within data processing groups affect the outcome of equipment choice, a fundamental influence on the systems that users eventually use.

A second condition fostering the organizational invalidity of systems is, then, the organizational structural relationships both between data processing and users and within data processing itself. These structural relationships affect organizational validity because they specify the process by which systems are designed, creating power bases and particularistic objectives which can lead to distortion in communication and failures in coordination.

Societal Factors

Some of the conditions fostering organizational invalidity of systems may relate more to the general division of labor in society than to individual attributes or organizational structural conditions. Kling and Gerson (1977,1978) have categorized people with relationships to the world of computing into fourteen categories ranging from innovators who design computer hardware to consumers of computer-based products and services. They argue that each group, by virtues of its position in the production-consumption chain, has certain structural interests vis a vis other parties. These structural interests define, in large measure, whether one stands to gain or lose from certain arrangements pertaining to the supply, distribution and use of computing. From this perspective, the interests of computer software workers, such as systems

analysts and programmers, are fundamentally at odds with those of business managers and organizational administrators even when they are all employees in the same organization.

As members of groups with different structural interests, system users and designers will have different orientations and loyalties. For example, information system designers have characteristics similar to engineers who frequently show more loyalty to their profession than to the specific organization in which they work. This cosmopolitan orientation (Gouldner, 1964) differentiates design personnel from the majority of users with local orientations. Frequently, therefore, software professionals may desire an allocation of resources, such as the purchase of a new computer, which managers do not believe to be in the best interests of the organization. Similarly, managers may view with concern the fact that increased demand for information systems has created increased demand for software professionals, and the prices for their services have gone up as a result. They may also view with concern the ways in which the professionals perform their work, for these work practices may not always serve the needs of consumers. Specifically, business managers believe that data processing professionals desire the technical state-of-the-art and favor new system development when existing "code" could be adapted from another source. Conflict between managers and data processing professionals over organizational decision making outcomes can result from this cosmopolitan-local distinction, and organizational invalidity of systems may be a natural consequence.

Another societal explanation for the organizational invalidity of information systems can be found in the work of scholars like Kraft

(1977) and Greenbaum (1979), who argue that managers have attempted systematically to control, routinize and deskill the work of system designers. According to this perspective, managers divide system design activities into small tasks, reorganize these into repetitive jobs and impose oppressive patterns of work organization on programmers and analysts in order to eliminate dependence on them and to purchase their labor more cheaply. A consequence of this job routinization is alienation of software workers which manifests itself in higher turnover rates. Managers, in turn, tend even more strongly toward job fractionalization so that the effect of high turnover can be minimized through lower replacement costs. Ultimately, the denegerative process results in the lack of well-rounded MIS professionals who are in a position to see a whole system design problem in proper perspective. Through professional specialization, the barriers between occupations are fortified, making communication across them even more difficult, and fostering organizational invalidity.

This consequence is consistent with an interpretation that attributes the desire to gain power to systems professionals, also, not just to managers. The job-hopping and turnover of data processing professionals may be more than a mere response to managerial control and deskilling attempts; these behaviors may be intended to maintain power over the consumers of their services and to keep salary levels artificially high by creating a perceived scarcity. Pettigrew (1973) presents a case in which members of an internal data processing group were able to use their position inside the organization to improve their status and pay relative to data processing professionals in the surrounding geographic areas.

The fundamental division of labor between system users and designers is, then, a societal factor fostering the organizational invalidity of information systems. Users desire cheap software products of predictably high quality, whereas builders desire enhanced occupational status, prestige and pay through the performance of specialized, craft-like services which cannot be routinized, automated or obtained elsewhere. Because of their different structural interests, system-builders may unintentionally misinterpret the needs or desires of system-users in the building process, and may structure their work in ways which affect the validity of the systems they build.

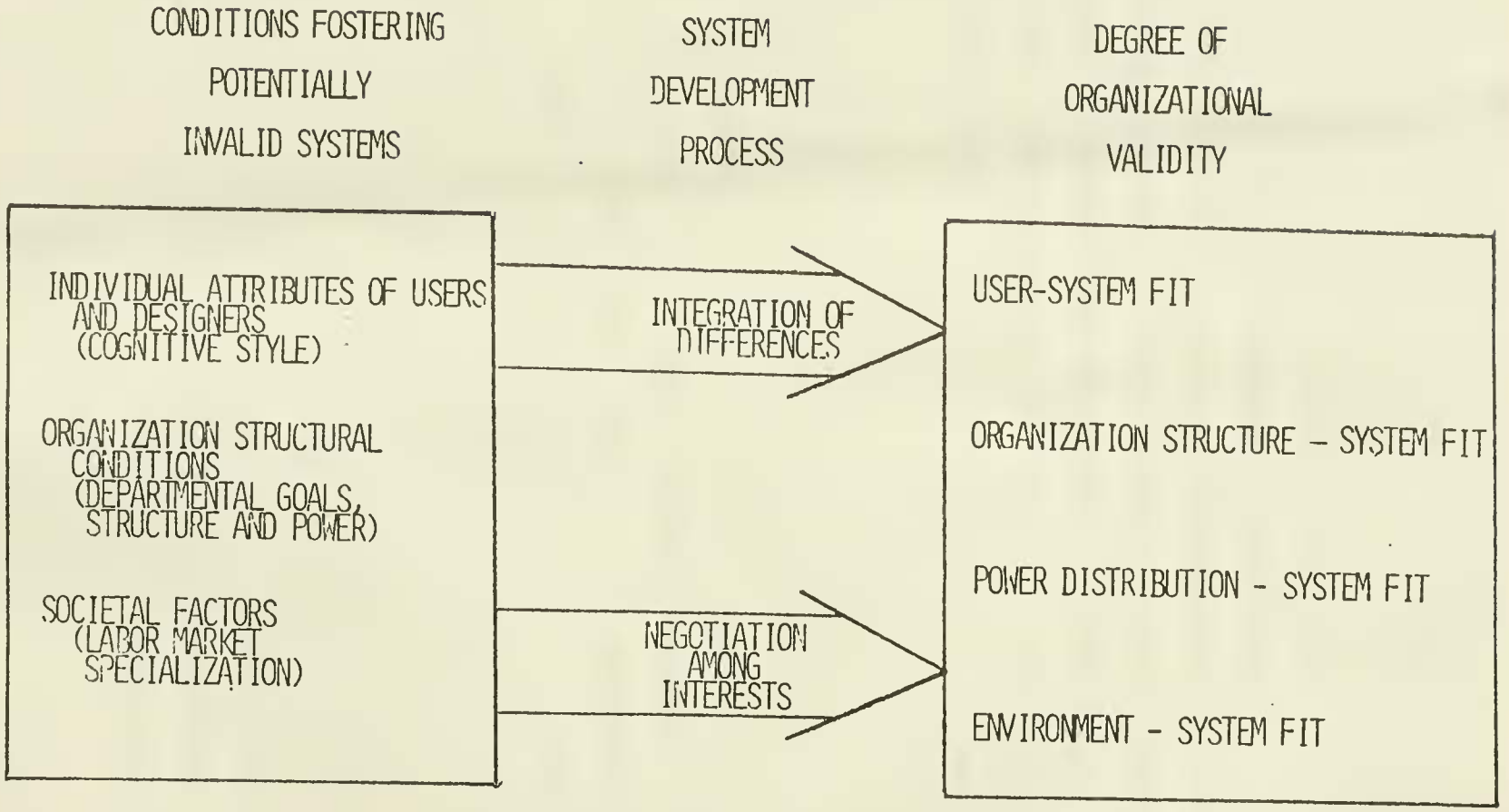
Nevertheless, attempts to reduce the differentiation may produce undesired losses of specialization and reduce technical validity. In general, the computing world remains splintered because the need for specialization is so great. In this light, it is interesting to examine some recent trends in software production. It is clearly too early to determine the extent of their impact, but the intent behind the trends is to eliminate the division of labor between system-builders and system-users. Two new technologies exist in various stages of development and use: application development tools and end-user programming. The first clearly de-skills the jobs of programmers by replacing the writing of modules of code with simple responses to programmed choices. At the same time, these technologies may allow a single individual to work with whole systems or very large pieces of them, rather than with unidentifiably small segments. Thus, the impact of this technology is likely to be contradictory, simultaneously making work simpler, hence less challenging, but of larger scope and importance, hence more autonomous.

A second technological development in the production of software is end-user programming. This may alleviate projected shortages of software professionals by making it much easier for users to write their own programs in non-procedural, very-high-level inquiry languages. Together, application development tools and end-user programming have the potential to change fundamentally the way systems are created by altering the division of labor around system design and use. To the extent that this occurs, one can expect major implications for the organizational validity of systems developed. At the very least, the new user-builders may have to take more responsiblitiy for the consequences they create for themselves.

We have examined three conditions fostering organizational invalidity of information systems: individual attributes, organization structural conditions and societal factors. It should be emphasized that, in any given situation, the conditions prevailing at the three different levels of analysis may either reinforce each other or work in contradictory directions. Thus, the cognitive orientation of designers, their intraorganizational affiliations with users and their occupational role in the larger society may all work in the same direction to produce high organizational validity in a specific information system used in a specific context. On the other hand, however, conditions at one level may work in opposing directions with unpredictable results. Clearly, more research is needed to determine the most critical conditions and those most amenable to change.

FIGURE 1

A FRAMEWORK FOR UNDERSTANDING THE ORGANIZATIONAL VALIDITY OF MANAGEMENT INFORMATION SYSTEMS



THE SYSTEM DEVELOPMENT PROCESS AND ORGANIZATIONAL VALIDITY

We have defined organizational validity as the degree of fit or match between a system and its organizational context of use at four levels of analysis: user-system, organization structure-system, power distribution-system, environment-system. We have also discussed three sets of conditions fostering invalidity: individual attributes of users and designers, organization structural conditons and societal factors. A number of questions remain to be answered, among them: What are the processes by which organizational validity is achieved and when is organizational validity a useful objective to be pursued actively in the system development process?

In our view, two distinct processes comprise the system development process by which conditions fostering potentially invalid systems are transformed into the degree of organizational validity or invalidity actually observed. These are the processes of integration of differences and negotiation among interests, diagrammed in Figure 1. We suggest that integration of differences and negotiation among interests occur simultaneously and that the degree of organizational validity depends on the quality of both these processes. We now explore parts of the model in more detail.

Integration of Different Interests

The prevailing norm for improving organizational validity has been to involve end users in the system development process. Conceived by Schultz and Slevin as "behavioral model building" (1975: p. 35), the idea of more intense interaction between users and specialists has taken

firm root in the MIS literature. Drawing from behavioral concepts of conflict resolution through confrontation and integration (Deutsch, 1969; Lawrence and Lorsch, 1967), user involvement is recommended as a way of producing congruence between user needs and system characteristics. Inherent in the integration process is establishment of trust, authentic exchange of beliefs and opinions, and creation of a climate wherein users and developers feel powerful in influencing system design (Robey and Farrow, in press; Zmud, 1979). An important feature of this type of user involvement is agreement between user and specialist perceptions of system outcomes and the implementation process itself. Ginzberg (1979) found such shared perceptions to be crucial in predicting project success.

Several methods have evolved for obtaining user involvement, ranging from direct surveys of user information requirements to intense group experiences. On study showed that a more interactive process produced MIS designs of higher quality (Roland, 1978). Other studies have examined the conditions under which user involvement is appropriate in its various forms (DeBrabander and Edstrom, 1977; Edstrom, 1977; Franz, 1980). These findings suggest that the stage of development, organization structure, and the magnitude of user-developer differences all moderate the extent to which an integrative strategy will be successful. It is clear that many more research findings are needed before a solid empirical basis for the integrative strategy is attained (Ives and Olson, 1980).

Negotiation Among Different Interests

Issues of politics, power, and negotiation have been generally neglected in the management literature, which has chosen to focus on integration of differences. However, exclusive examination of the integration strategy can blind us to negotiation strategies that occur simultaneously in MIS developpment. Negotiation strategies are necessitated by the same initial conditions of differentiated interests between users and specialists. However, negotiation more explicitly recognizes the durability of these differences and achieves solutions not by integrating them together but by bargaining. It is not assumed that everyone will gain as a result of MIS design, so attention is paid to placating the losers by satisfying some of their demands. Negotiation is an ongoing process where today's losers remain and continue to bargain using past concessions as fuel for future bargains. In negotiation, it is assumed that actors will behave in ways consistent with their own interests and not necessarily those of the organization as a whole. These subinterests are not "irrational," nor are they necessarily dysfunctional, except as they appear from the perspective of another interest group.

Since politics are not granted legitimate status in most organizations, negotiating is conducted informally -- often during activities that are formally designed to accomplish "rational" system aims. Decomposition of systems analysis into stages creates opportunities for various parties both to provide "rational inputs" and to exercise their power over final system design. Users can ignore data processing requests, try to take them over, and intentionally misstate their own needs to ensure system failure (Markus, 1979). Specialists

can influence system architecture and equipment acquisition by insisting that certain features are necessary (Markus, 1980b; Pettigrew, 1973). User groups may not be in a position to question technical judgements, but they can counter through other tactics like resistance.

Like integrative strategies, the negotiation process can be improved by deciding on groundrules and a suitable forum for negotiations. Keen and Gerson (1977) suggest that when politics are dealt with more explicitly, they can be more productive. From our standpoint, a more legitimate negotiation process is likely to improve acceptance of power distributions and reduce the chance that power redistributions caused by the introduction of new systems will lead to insuperable negative consequences.

Organizational Validity and Effective Implementation and Use

From the preceding discussion and Figure 1, it appears that the degree of organizational validity of an information system can be increased through suitable intervention strategies. In this section, we comment on the advisability of doing so.

It seems to us that two considerations bear on the question: should system designers actively strive to improve the organizational validity of their systems? In other words, when is organizational validity desirable and when ought it to be prescribed? The two considerations are ease of implementation and long-run organizational effectiveness, and we believe that these are independent. Increasing organizational validity may produce a desirable change in the first dimension and an undesirable change in the second. For this reason, we

argue that the organizational validity concept is useful primarily descriptively but that is should be used normatively only with careful reference to ease of use and long-range effectiveness.

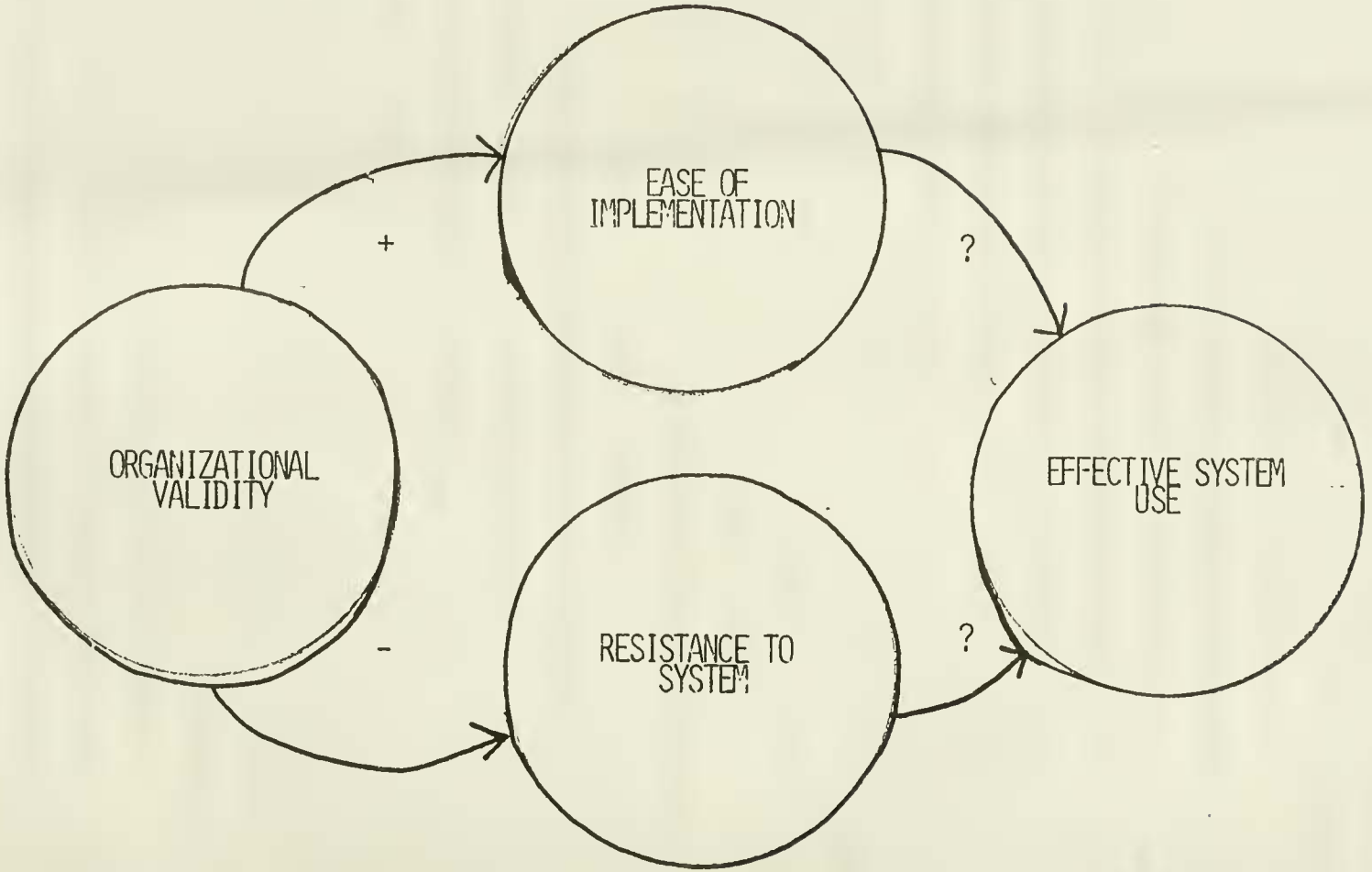
The writings on organizational validity and on resistance to information systems suggest that invalidity or mismatch between system and organization is a major contributor to resistance (Markus, 1980a). If the goal of system design is to minimize resistance, then a high degree of organizational validity can be prescribed (See Figure 2). This assures that a system will be easy to implement, for reasons which are easy to understand: the system would require minimal change in users' thinking patterns, organizational structure, organizational power distribution and patterned ways of dealing with the environment.

On the other hand, if current organizational behavior and thought patterns are ineffective, the fact that it is possible to convert easily to a new type of ineffective performance is hardly likely to produce effective use of a managment information system. Organizational validity will be positively related to effective system use only to the extent that the organizational procedures matched by the system are themselves effective.// In all other cases, which may be most cases, the greater the organizational invalidity of a system, the higher its chances of producing an effective long-range result for the organization.

Clearly, there is some relationship between resistance and long-range effectiveness. If a system is too invalid, too mismatched to organizational processes, resistance to it may be so great that it is abandoned, allowing little opportunity for long-term beneficial consequences. But not all resisted systems are abandoned, for few

FIGURE 2

ORGANIZATIONAL VALIDITY, EASE OF IMPLEMENTATION AND EFFECTIVE SYSTEM USE



organizations are cavalier about the high costs of system development. Further, since resistance may be a normal and natural concomitant of change, it is by no means clear that any system designer should have the objective of eliminating it: it is sufficient merely to prevent the resistance from degenerating into immobility and alienation.

In this respect, our notion of the relationship of organizational validity to system effectiveness fits the thinking of other writers. It has been noted that Operations Research models can have beneficial organizational consequences independent of their actual use or degree of user satisfaction, since managers may learn more about organizational functioning from them (Huysmans, 1975). On the other hand, if models or systems operate regularly but do not influence management behavior, they become irrelevant adjuncts to organizational performance and serve only to consume scarce resources (Anderson and Hoffman, 1978). It is also possible that systems which lack validity because of political resistance actually stimulate effectiveness by raising the issue of power and control and by motivating those who will gain politically to support the system and its implied changes (Pfeffer, 1981).

In conclusion, we suggest that the utility of organizational validity does not come from normative application of the concept. No simple prescriptions can be made about the relationship between the organizational validity of systems and effective system use. On the other hand, we believe the value of the concept lies in its use as a descriptor of organization - system interaction. By pinpointing the various dimensions on which organization-system mismatch can and does occur, the concept enhances our ability to theorize about organizational impacts and to make intelligent system design choices.

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