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ABSTRACT

In the information systems literature the incidence of implementation failures has increasingly been attributed to excessive attention to technical and economic issues, and an absence of concern about the social, political, and psychological (individual) aspects of the system being developed. On an intuitive level this has been explained by assuming a techno-economic value orientation of the system developer. This paper presents empirical evidence in support of the assumption of the dominance of technical and economic values in system developers.

The basis of this evidence is a field study of developer values. These values were measured by adapting a value measurement methodology developed by England (1967). This methodology determines the behavioral relevance of values by classifying them from operative (most likely to govern behavior) to non-relevant (values having no impact on behavior).

The study results show that technical and economic values are the most operative of system developer values. In the social, political, psychological domain, systemic values, and the values relating to the organization and functioning of the development project were found to be operative. However, the study found that the developers considered user job satisfaction related values mostly non-relevant.

Introduction

A survey of information systems literature (Ackoff, 1967; Argyris, 1971, 1980; Swanson, 1974; Hedberg and Mumford, 1975; Lucas, 1975; Kling, 1977; Bostrom and Hienen, 1977a; Hawgood, Land, and Mumford, 1978; DeMaio and Bartezzagi, 1979; Welke, 1979, DeMaio, 1980; Bostrom, 1980; and Zmud, 1983) suggests that implementation failures are widespread and serious. The consequences of such failures are reflected in the nonacceptance of the system by users, the jeopardizing of technical and economic investments in the system, high maintenance costs, and the opportunity costs of unrealized benefits (Zmud, 1983). Furthermore, such failures also tend to build upon one another through their effect on the user attitudes towards the information systems developers. Lucas (1973, 1975) has shown that, in the long run, these attitudes influence the success or failure of future system development efforts.

The advocates of socio-technical and participative approaches to system development (Hawgood, Land and Mumford, 1978; Bostrom and Hienen, 1977b; DeMaio, 1980; Turner, 1981) explain the incidence of implementation failures by suggesting that the designers of computer-based information systems subscribe to overly rational technical and economic design ideals. At the same time they suggest an absence of attention paid to the social, political, and psychological issues in systems development. For example, Hawgood, Land, and Mumford (1978, p. 40) state that "many past failures of computer-based information systems can be directly attributed to—a lack of knowledge of human needs and motivation on the part of technically oriented systems analysts and designers." Bostrom and Hienen (1977a) include the sytem developer's limited goal orientation, optimizing the technical system and limited frameworks, nonsystemic view with limited focus on decision making and data processing as some of the causes of MIS problems and failures. Turner (1981) suggests that major design decisions are usually made by technical specialists who tend to be guided by machine efficiency considerations. DeMaio (1980) summarizes this reasoning as:

> "—the primary cause of problems and failures of computer based information systems is the inadequacy of the conceptual frame of reference of the information system analysts/designers. In

particular such a conceptual frame of reference can be analysed through the—"non-systemic" approach to design, as only variables relevant to technical-economic subsystem are considered, while those relevant to social subsystem are omitted;—the resulting focus (is) on a limited objective, namely the optimization of the technical-economic subsystem."

Other authors have attributed this orientation of system developers to a technological imperative (Davis, 1971), the new utopian attitude (Boguslaw, 1965), and an overly mechanistic orientation (Zmud, 1983). Kling (1977) states that "the prevailing norms of computer system design are machine-oriented."

The advocates of socio-technical and participative system development approaches go on to suggest that these approaches be used to compensate for the limited techno-economic perspective of the system developers. On the other hand, Hedberg (1980) suggests that the very same limited value orientation of the system developers has been a major obstacle in the adoption of these approaches in practical systems development.

Underlying the preceding discussion is the assumption that the developers of the information system primarily subscribe to technical and economic values and consider the social, political and psychological design ideals nonrelevant to the system design process.

Usually this assumption is stated as a truism, though sometimes it is justified in terms of the technical (computer-oriented) background, the rational training, and/or the efficiency oriented reward structure of the system developers (Hedberg, 1980).

The purpose of this paper is to empirically validate (or disprove) this assumption.

System Developer Values—A Review of the Literature

The issue of values has surfaced occasionally in the literature of management science, systems theory, and information systems. At the theoretical/analytical level, the role of values in systems has been recognized by Churchman (1961, 1968a, 1968b), Kling (1977, 1978), Mattessich (1974, 1978), Klein, *et al.*, (1981), Klein (1981), Sage (1977), Berg, Chen, and Zissis (1976). Though most of these works discuss the role of values in systems development, they do not isolate the values in question explicitly and, therefore, do not attempt to empirically measure the subscription to these values.

At the operational/empirical level there are two previous studies with the stated intent of measuring system developer values. Hedberg and Mumford (1975) measured designer values in terms of their Theory X vs. Theory Y (McGregor, 1960) view of the system users. This study, which reported the designer's pre-disposition towards a Theory X view of system users, has implications for developer preferences for technical efficiency and control oriented information system solutions. Hedberg and Mumford also found that the system designers perceive themselves as having a rather limited role in terms of the system design contributions to the organization. "They see their principal work activities as increasing efficiency through stream-lining procedures and providing better information. They do not appear to appreciate the potential of computer technology for improving the overall quality of working life" (Hedberg and Mumford, 1975, p. 50). Bostrom and Hienen (1977a) report similar results from a 1971 U.S. study (Taylor 1971).

Anderson (1978) measured the value orientations of computer science students using a variation of Rokeach's (1973) measurement of terminal values (desirable end-states). These terminal values consist of values such as family security, a world of beauty, world at peace, salvation, mature love, scientific knowledge, etc.; a list which does not have direct implications for the system design process.

In addition to these studies with the stated aim of measuring developer values, there have been some studies measuring developer preferences in terms of their objectives, criteria, priorities, etc. These preferences can be interpreted as the concept of the desirable, i.e., values (Kluckhohn, 1951). Smith (1977) measured developer rankings of ten system control objectives such as materiality, timeliness, security, useability, retrievability, etc., and compared them to rankings provided by system users. Hallam and Scriven (1976) surveyed MIS managers for their EDP objectives. Schussel (1974) measured 200 DP and user executives on the level of importance they attached to fourteen DP performance criteria, such as meeting deadlines, accuracy and completeness, quick response to user requests, budget performance, and control. Alloway and Nolte (1979) surveyed DP executives and systems developers in five firms in an attempt to measure the importance they attached to sixteen analyst skills. The priority attached to such skills as user orientation and behavioral sensitivity could be interpreted as the importance developers attach to these surrogate values.

With the exception of Hedberg and Mumford (1975), the preceding studies were not designed to empirically verify the relative level of importance attached to a variety of technical, economic, and socio-political-psychological

system development values (design ideals). Therefore, the list of values considered in these studies tend to be rather sparse, and do not include the numerous value dimensions which drive systems development. Most studies tend to be localized in the technical and economic items, but their categories are so broad that much of the finer discrimination is lost.

In summary, our review of literature suggests that except for some peliminary evidence found by Hedberg and Mumford (1975), the assertions of techno-economic dominance and the advocates of socio-technical and participative systems development approaches, have, at best, a very weak empirical justification for their assumptions. The remainder of this paper describes a study conducted to more adequately test this assumption.

Research Problems and Method

RESEARCH HYPOTHESIS AND METHODOLOGICAL PROBLEMS

A field survey was conducted to empirically substantiate (or disprove) the assumption that system developers primarily subscribe to technical and economic values, and find the social, political, and psychological values nonrelevant in the context of the development of computer-based information systems. Stated in the null form the research hypothesis was:

> H_0: There is no difference between the relative levels of importance attached to technical, economic, and socio-political-psychological values by the developers of computer-based information systems.

Testing this hypothesis posed several methodological problems. First was the problem of enumerating a value list which is both relevant to the system development process, and complete and comprehensive from the three perspectives of technical, economic, and socio-political psychological values. An analysis of the definition of value provided a likely starting point. Kluckhohn (1951) defines values as:

> "... a conception, explicit or implicit, distinctive of an individual or characteristic of a group, of the *desirable* which *influences* the selection from available *means* and *ends* of *action*."

This definition was used to develop a framework for system development values which classified them either as end values (values that influence the selection of the means or the "development approach" employed (Kumar, 1984).

A literature survey was used to identify various objectives and concerns which arise in the course of systems development. These concerns identified the aspects of the computer-based information system which were relevant in the context of systems development. These aspects were associated with attributes, thereby generating a list of end values. The development project analogs of the object system aspects and their associated attributes were identified to determine a possible set of means values. The preceding analysis resulted in a large value list which was reviewed for clarity, completeness, and orthogonality by a panel of system experts (system analysts, experienced system users, managers and directors of systems, consultants, and academics). A final list of 86 value concepts was used in developing an information systems development personal value questionnaire (ISD-PVQ) for measuring system developer values.

The second methodological problem concerned the relationship of professed values to system development behavior. Jick (1981) and England (1967) note that people do not always act on all the values they verbally indicate as important. Hedberg (1980) reports similar findings from his 1975 study of system developer values (Hedberg and Mumford, 1975). This problem was addressed in England's (1967) "Theoretical Model of the Relationship of Values to Behaviour." This model addresses the problem by determining the "behavioral intentionality" of values. The model was operationalized by England as a managerial Personal Value Questionnaire (PVQ). England's model and his PVQ were used as a basis for developing our instrument for measuring the value profiles of system developers. The model is briefly described below.

ENGLAND'S THEORETICAL MODEL OF THE RELATIONSHIP OF VALUES TO BEHAVIOR

England's model recognizes four behavioral categories of values. The total value space consists of all *potential values*. The potential values for a specific group or individual are made up of two classes of values; (1) *Non-relevant* values (values having little or no impact on behavior), and (2) *conceived values* (values which may influence behavior). Conceived values are further partitioned into (i) *operative values* (those that have a very high probability of translation from intended to actual behavior), (ii) *adopted values* (those values which are less a part of the personality structure of the individual, but may affect behavior through situational factors), and (iii) *intended values* (values which the individual states as being important to him, but have only a moderate probability of being translated into behavior because of situational reasons). The model is presented in Figure 1.

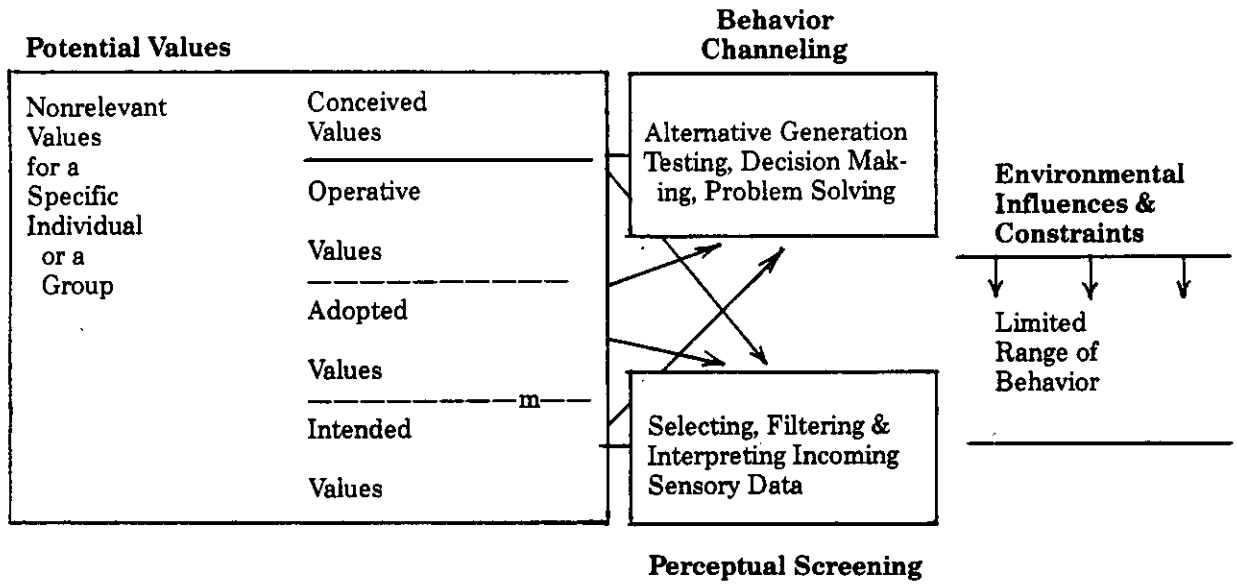

Figure 1

Theoretical Model of the Relationship of Values to Behavior. (Adapted from England, Agarwal, and Trerise, 1971).

ENGLAND'S PERSONAL VALUE QUESTIONNAIRE

The above model was used in devising a personal value questionnaire (PVQ) which has been used by England and several others to measure the value systems of various managerial groups (managers—England, 1967; England, Agarwal, *et al.*, 1970; England, Agarwal, and Dhingra, 1974; union leaders—England, Agarwal, and Trerise, 1971; small business owners—Lindecamp, 1981; educational administrators—Sjogren, England, and Meltzer, 1969; and U.S. naval officers—England, Agarwal, *et al.*, 1970).

The development of the PVQ is based on the rationale that the meaning an individual attaches to a carefully specified set of concepts provides a useful description of their personal value system which, in turn, is related to their behavior in systematic ways (Osgood *et al.*, 1957).

England's PVQ determines the behavioral strength of each value concept by measuring it along two dimensions (modes) of meaning:

1. **The Importance Mode**—Since the general value of an object of an idea is thought to be largely a function of its degree of importance, the primary mode of valuation utilized is an importance scale.
2. **The Reason Mode**—As the focus of the PVQ is to make operational the behavioral effect of values, it is necessary to make operational the theoretical distinction between the intentionality of values and their translation into behavior (operative from among conceived values). To the extent that it is possible to determine a consistent rationale as to why an individual thinks certain concepts are important or unimportant, one has a reasonable basis for distinguishing operative from conceived values. The secondary, or reason mode measures the primary rationale (success, right, and pleasant) attached to the value concept.

The overall responses to all the value concepts are used to determine the *dominant reason mode* (primary value orientation in England' terminology) for the individual respondent. The dominant reason mode is the reason (success, right, and pleasant) most frequently attached to important value concepts.

A combination of the importance and reason modes is thought to be a better behavioral predictor than the importance mode alone. For example, if a manager's dominant reason mode is success (i.e. when he says something is important, he is more frequently apt to see it as successful as opposed to right or pleasant), his behavior would be predicted best by viewing it as a joint

function of those concepts he though as important *and* successful (operative values). On the other hand, those value concepts which are neither important nor fit the respondent's dominant reason mode will be his nonrelevant values (i.e. values which are not expected to influence his behavior). In between are the behaviorally less relevant intended values (concepts which are regarded as important, but do not fit the person's dominant reason mode) and the situationally induced adopted values (values which fit the dominant reason mode of the individual, but are regarded to be of average or low importance).

INDIVIDUAL AND GROUP VALUE PROFILES

An individual's value profile can be constructed by analyzing the value questions in the PVQ according to the above procedure in order to determine the individual's operative, adopted, intended, and nonrelevant values.

Such a profile can be constructed for each respondent. It is also possible to derive an overall profile for the respondent group by aggregating the individual value profiles. This aggregation may be used for tabulating the proportion of the group for whom a particular value concept is operative, adopted, intended, and nonrelevant, and for determining the modal[1] value category for the group. The overall value profile will then show a similar categorization for each of the concepts in the PVQ.

While this data is complete, it is somewhat difficult to interpret because of its voluminous nature (number of value concepts x 4 value categories). England, Dhingra, and Agarwal (1974) have developed a summary index to portray value patterns and their behavioral relevence. This index is called the *Behavioral Relevance Score* of the value concept, and is the percentage of the total group for whom the concept is an operative value. This score can vary between 0 and 100 for any given concept. A high score for a concept indicates a high behavioral relevance of the concept for the respondent group and, as such, indicates a group value which is very likely to govern behavior.

THE INFORMATION SYSTEMS DEVELOPMENT—PERSONAL VALUE QUESTIONNAIRE

The Information Systems Development—Personal Value Questionnaire (ISD-PVQ) was developed by substituting the information systems development list of 86 value concepts into the PVQ framework developed by England. In addition to the standard PVQ questions, the questionnaire also included items relating to the demographic attributes of the respondents. In order to maintain respondent interest in the face of a rather lengthy questionnaire, principles of design from marketing research (Dillman, 1978) were used to format the questions. Some sample questions are presented in Appendix A.

The questionnaire was pre-tested on a representative group. In addition, a test-retest was performed with a sample of thirteen accounting and business students. The test-retest reliability co-efficients for the primary mode and the secondary mode were 0.89 and 0.84 respectively, which are comparable to the results reported by England, Olsen, and Agarwal (1971) for the PVQs given to educational administrators and naval officers.

Methodology Application and Results

CONDUCT OF THE SURVEY

The field survey was conducted in thirteen Canadian business and government organizations. The organizations sampled included federal, provincial, and city government departments, electric and nuclear power utilities, manufacturing, retail, insurance, and universities. The organizational levels of respondents included vice-president of systems, directors of MIS, MIS managers through to programmer-analysts.

To obtain the sample we contacted the highest ranking information systems executives in various organizations. Of approximately twenty organizations which initially agreed to participate, seven dropped out after the second contact.

In the remaining thirteen organizations, the contact information systems executive was requested to randomly select information system developers to participate in the survey. The information systems executive was also requested to arrange a one hour meeting for the researcher with the selected respondents.

The ISD-PVQ was administered to the respondent group at this meeting. The meeting was opened with an explanation of the purpose of the study (surveying system developer values), followed by instructions on completing the questionnaire. The respondents were encouraged to respond according to their personal preferences by suggesting that there were no right or wrong answers and that the individual responses were confidential. The researcher stayed in the room with the respondents to answer any clarifying questions.

[1] Where "mode" has the usual meaning of the class or the category with the largest frequency of occurrence.

RESULTS

The final sample contained 132 system developers from thirteen business and government organizations. Of the 132 respondents, 34 were found to have a mixed dominant reason mode (i.e. when they said that a value concept was important, they were equally likely to attach the rationale of success, or right, or pleasant to it). These respondents were excluded from further analysis because the intersection data required to classify value concepts can not be reliably calculated for persons having a mixed dominant reason mode.

For the remaining respondents, each person's value profile was determined by classifying each of the value concepts for that person into one of the operative, adopted, intended, and nonrelevant categories. The individual value profiles were then aggregated into group value profiles. Two methods of aggregation, were used to produce the group value profiles; the modal value category method, and the behavioral relevance score.

Modal Category Value Profile

Figure 2 presents the modal category value profile for the technical, economic and socio-political psychological values of the system developers in the sample. To generate this group profile, the individual profiles were tabulated to determine the modal category (i.e. the category with the highest frequency of occurance) for each of the 86 value concepts in the ISD-PVQ. Each of the values was classified over all four behavioral categories of values (i.e., operative, adopted, intended, and nonrelevant). However, the modal categories in all cases, were polarized into the two extreme categories of operative and nonrelevant. None of the value concepts were predominantly adopted or intended.

Most of the *technical values* were found to be operative. However, values relating to computer hardware and software, the use of latest technology, and latest system development methodologies were found to be nonrelevant.

In the domain of *economic values* all value concepts, except for the monitoring and control of clerical and operating work, were found to be operative.

In the domain of *socio-political-psychological* values two different value polarities emerged. At the operative end were values related to the conduct of the project (such as user participation in system design, formal assignment of responsibility for the project, frequency of user reviews, etc.), and systemic values (such as the primary client of the system, organizational goals and objectives, communication structures, etc.). At the nonrelevant end were most of the job satisfaction related values such as the status of the user's job in the organization, the alignment of user salaries to his/her job description, job security for the user, and the variety of tasks in the user job. Also at the nonrelevant end were values related to the analyst's job satisfaction. However, the concept of user job design and the resulting job satisfaction were found to be marginally operative (with 36 percent of the respondents classifying it as operative). In addition, the alignment of the mode of information display to the cognitive/decision style of the users was found to be nonrelevant.

Behavioral Relevance Score Value Profile.

The behavioral relevance score for each of the value concepts was determined by calculating the percentage of the group for whom the value concept is operative. Figure 3 presents the behavioral relevance scores for the technical, economic and the socio-political-psychological values for the sample. The figure has been subdivided by horizontal lines to indicate the quartile ranking of the value concepts.

With respect to both *technical* and *economic* values, most of the value concepts were found to be clustered in the high (top two quartiles) behavioral relevance score range. In both these classes of values, only a few value concepts (such as values relating to computer hardware and system software in the technical value class, and monitoring and control of clerical and operating work in the economic value class) were found to have low behavioral relevance scores. This indicates that most of the technical and economic values have a high likelihood of influencing the system design decisions.

At the high end of the *socio-political-psychological* values are those related to the conduct of the system development project (such as user participation and formal assignment of responsibility) and systemic values (such as the status of the user's job within the organization, job security for the user, variety of tasks, and learning, and growth in user jobs) are clustered in the bottom quartile. The values related to the analyst's own job satisfaction are also rated as having low behavioral relevance. These scores imply that the job satisfaction related values have a low likelihood of influencing system development behavior.

Conclusions and Implications

The objective of this paper was to substantiate or disprove the assumption that system developers pri-

	Technical Values	Economic Values	Socio-Political-Psychological Values
Operative Values	System Reliability		Effect of System on Primary Client of Organization
			User Understanding of Overall System Design
	Input/Output Processing		
	Timeliness of Information	Planning and Control of Development Project	User Manager Participation in Design Decisions
	Accuracy & Consistency of Data: Analyst Errors in Design		
	Documentation Useability by Project Team and by Users		System Responsiveness to People
	System Flexibility		
	System Controls		User Underst. of Dev. Plan; Formal Resp. Assgmnt. on Project
		Development Project on Schedule	
	Data Flows (Input Forms, Reports, Messages, Etc.)		Organization's Goals and Objectives
	Maintainability of the System Procedures	Development Project on Budget	
	Compatability with Interfacing Systems		
			Frequency of User Reviews
	System Throughput: Currency or Recency of Information	Elapsed Time for the Development Project	Support for Organization's Goals & Objectives
	Relevance of Information to Decision or Task	Level of Analysis Expertise/Skills Required	
	Consistency of Work between different Analysts		
	Adequacy and Comp. of Data: System Documentation	Operating Costs of the System	
			Assignment & Formalization of User Resp. in System
	Data Stores (Files and Databases)	System Development Costs	
	Prompt Response to Devel. Requests: Program Modifiability		
	Flexible Devel. Standards: Computer Support for Decisions		User Clerks Participation in the System
	Ease of Documentation Prep. and Maint.: User Decisions	User Manpower Required for Devel. Project	Communication between Organizational Units
	Computer Programs		
	Manual Procedures		
	Human Errors in Data Processing		Communciation Structure
	System Response Time	Flow and Consumption of Organization's Resources	
		Systems Dept. Manpower Required for Dev. Project.	
			Data Privacy; User Job Design/Satisfaction User's sense of Contribution.
		User Manpower Required for Operating the System	
	Security of Update/Retrieval: Computer Support for Devel.	Control of Organization's Resources	Organizational Structure
Nonrelevant Values	Hardware/Software Latest Developmental Methodologies		Routine & Repetitive User Tasks
			Alignment of Information Display to Cognitive Style
			Learning New Skills during System Development
			User Job's Health/Safety; Analyst's Autonomy on Project
			Job Induced Mental Stress on User
			Learn/Growth in User Jobs; Analyst Social-Contact on Job
	Sophisiticated of Hardware/Software		User-Social Contact on Job; Variety of Analysis Tasks
		Monitoring and Control of Clerical Work	
			User Task Variety; User Autonomy; Analyst Job Routiness
			Proportion of Challenging vs. Simple Jobs—Analysts
			Proportion of Challenge vs. Simple Tasks—Users
			User Job Security; Others in Society affected by System
		Centralization of Authority & Decision Making	
	Centralization of Hardware/Software		User Salary—Job Alignment; Status of User Job
			User Understanding of Technical System

Figure 2

Modal Category Value Profile

Behavioral Relevance Score	Technical Values	Economic Values	Socio-Political-Psychological Values	
	74. System Reliability	74.	74.	
	73.	73.	73.	
	72.	72.	72.	
	71.	71.	71.	
	70. Input/Output Processing	70.	70.	
	69. Timeliness of Information	69. Planning and Control of Development Project	69.	Top Quartile
	68. Accuracy & Consis. of Data; Analyst Errors in Design	68.	68. Effect of System on Primary Client of Organization	
	67.	67.	67. User Understanding of Overall System Design	
	66.	66.	66.	
	65. Documentation Useability—by Proj. Team;—by Users	65.	65. User Manager Participation in Design Decisions	
	64. System Flexibility	64.	64.	
	63. System Controls	63.	63.	
	62.	62. Development Project on Schedule	62.	
	61. Data Flows (Input forms, Reports, messages etc.)	61.	61.	
	60. Maintainability of the System Procedures	60. Development Project on Budget	60.	
	59. Compatability with Interfacing Systems	59.	59. System Responsiveness to People	
	58. System Throughput; Currency or Recency of Info.	58. Elapsed Time for the Development Project	58.	
	57. Relevance of Information to Decision or Task	57. Level of Analysis Expertise/Skills Required	57. User Underst. of Dev. Plan; Formal Resp. Assgn. on Proj.	
	56. Consistency of Work between Diff. Analysts	56.	56.	2nd Quartile
	55. Adequacy and Comp. of Data; System Documentation	55. Operating Costs of the System	55. Organization's Goals and Objectives	
	54.	54.	54.	
	53. Data Stores (Files and Databases)	53.	53.	
	52. Prompt Response to Devel. Requests; Program Mod.	52.	52. Frequency of User Reviews	
	51. Flexible Devel. Stds.; Computer Support for Decisions	51.	51. Support for Organization's Goals & Objectives	
	50. Ease of Documentation Prep. and Main.; User Decis.	50.	50.	
	49. Computer Programs	49.	49.	
	48. Manual Procedures	48. System Development Costs	48.	
	47. Human Errors in Data Processing	47.	47.	
	46. System Response Time	46.	46. Assignment & Formalization of User Resp. in System	
	45.	45.	45.	
	44.	44. User Manpower Required for Devel. Project	44.	
	43.	43.	43.	
	42.	42.	42. User Clerks Participation in the System	
	41.	41.	41. Communication between Organizational Units	3rd Quartile
	40. Security of Update/Retrieval; Comp. Supp. for Devel.	40.	40.	
	39.	39. Flow and Consumption of Organization's Resources	39.	
	38.	38. Systems Dept. Manpower Required for Dev. Project	38. Communication Structure	
	37.	37. User Manpower Required for Operating the System	37.	
	36.	36. Control of Organization's Resources	36. Data Privacy; User Job Design/Satisfaction; User's	
	35.	35.	35. —— Sense of Contribution.	
	34.	34.	34. Organizational Structure	
	33.	33.	33.	
	32.	32.	32. Routine & Repetitive User Tasks	
	31.	31.	31.	
	30. Hdwe./Softwe.; Latest Develop. Methodologies	30.	30. Alignment of Info. Displays to Cognitive Style	
	29.	29.	29.	
	28.	28.	28. Learning New Skills during System Development	
	27.	27.	27.	Bottom Quartile
	26.	26.	26. User Job's Health/Safety; Analyst's Autonomy on Pro.	
	25.	25.	25.	
	24.	24.	24.	
	23.	23.	23. Job Induced Mental Stress on User	
	22.	22.	22.	
	21. Sophistication of Hardware/Software.	21.	21.	
	20.	20. Monitoring and Control of Clerical Work	20.	
	19.	19.	19. Learn/Growth in User Jobs; Anal. Social-Cont. on Job	
	18.	18.	18. User-Social Contact on Job; Variety of Anaysis Tasks	

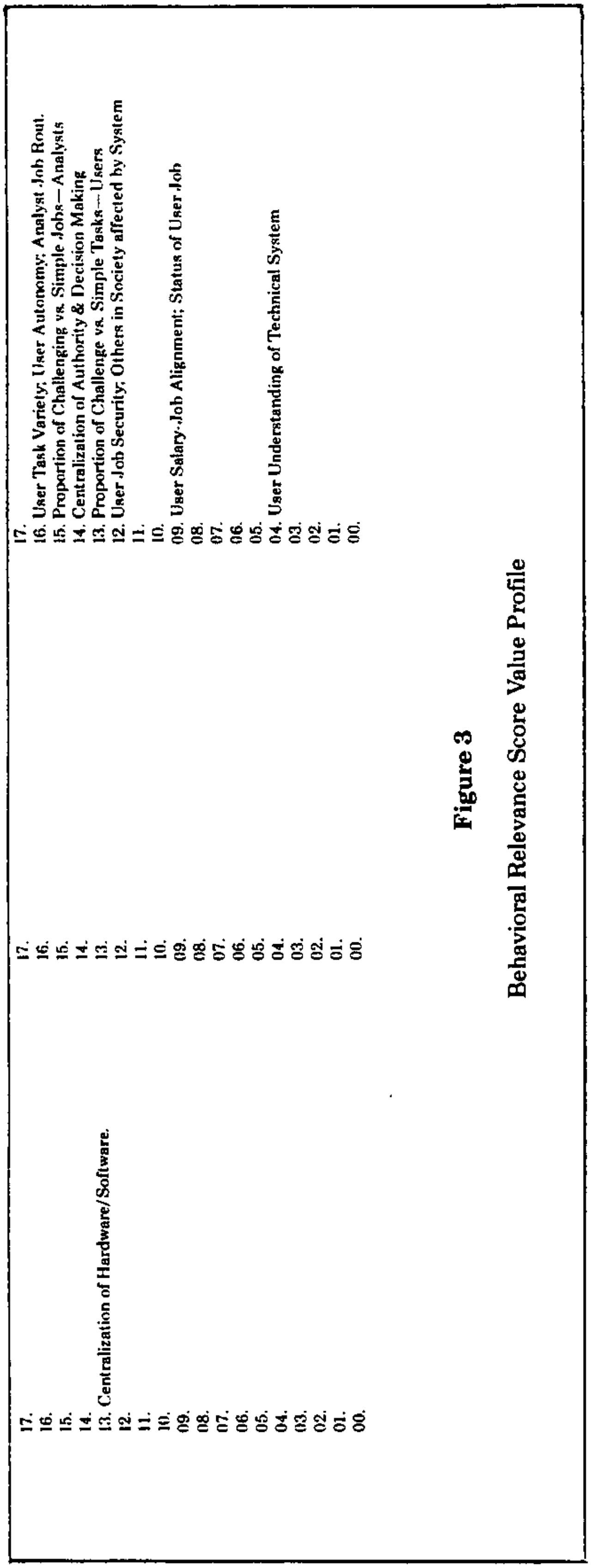

Figure 3

Behavioral Relevance Score Value Profile

marily subscribe to technical and economic values, and find the socio-political-psychological values nonrelevant in the context of information systems development.

The results from the field study give strong support to the assumption of the dominance of technical and economic values. Most technical and economic values are clustered in the high behavioral score ranges. With the exception of values related to computer technology, development methodologies, and the monitoring and control of clerical tasks, all these values are in the operative behavioral category. This implies that the technical and economic value concerns are highly likely to influence and govern system design choices and behavior.

The nonrelevant values in the technical and economic value classes suggest two interesting implications. First, that system developers seem to have outgrown their earlier fascination with the latest and most sophisticated technology (both hardware, software, and methodologies), and second, that there seems to be a move away from the monitoring and control of people-oriented Theory X view of systems.

In the socio-political-psychological domain, values are found relevant as long as they contribute directly to the system development project (such as frequency of user reviews, participation by users, formal and definite assignment of project responsibilities), or are related to systemic goals and concerns (such as the primary client of the system, organization's goals and objectives, communication structure).

On the other hand, job satisfaction and quality of working life values are considered non relevant to the design of information systems. These values are clustered in the lowest behavioral score ranges. This implies that they are likely to have very little or no impact on the design decisions made by the system developers.

Information systems development is a complex process with numerous competing objectives. Usually the resources (both time and money) available for the systems analysis phase are limited. This means that only the high priority objectives or value concerns will be accommodated in the design of the new system. Job satisfaction and quality of working life value concerns, with low behavioral relevance (in the bottom quartile), are therefore likely to be ignored by the system developers concerned with bringing the system development project on schedule (behavioral relevance score—62), and within budget (behavioral relevance score—60).

However, the advocates of socio-technical and participative development (Hawgood, Land, and Mumford, 1978; DeMaio, 1980; Bostrom and Hienen, 1977) have suggested that the lack of attention to the job satisfac-

tion concerns is one of the primary causes of the implementation failures of computer-based information systems. Sackman (1983) states that "computer professionals often subvert the development process with their narrow sectarion concerns—." Therefore measures are needed to compensate for this lack of attention.

Land, Mumford, and Hawgood (1980), DeMaio (1980), and Welke (1979) suggest that this lack of attention to job satisfaction issues can be compensated by the introduction and adoption of systems development methodologies with strong socio-technical and participative components. However, Hedberg (1980) suggests that this very lack of attention is a major obstacle in the adoption of such methodologies. Sackman (1983), and Hoyer (1980), have indicated that the system analyst's limited value concerns are major problems in adoption of participative development approaches.

This means that we may need to go to the root cause of the problem and attempt to modify the underlying value structures of the system developers. Courbon and Bourgeois (1980) suggest that we need "a new breed of designers, who will be nurturing agents" for the socio-technical process. We suggest two options for developing this new breed. First, we should train the aspiring sytems developers not only in the technical and economic aspects, but also in the human and job design aspects. Nygaard (1983), through the suggestion for informatics as an academic discipline, and Land, Mumford, and Hawgood (1980) through their proposal in "Training the Systems Analysts of the 1980s," support this approach.

Second, we can change the reward structure for the system developers in such a manner that the conscious consideration and maximization of job satisfaction and human concerns is rewarded. Hedberg (1980) states:

> "Designers design to please those who control the rewards. They live in a world where technical constraints, cost budgets, and deadlines are real and demanding, but where human needs, democratic organization structures, and user participation are little but window dressing. Should we moralize over that they first attend to problems of costs, timing, and tehcnical functioning—. No, they act according to the rules of the game they are in. It is these rules that must be changed.

It is our belief that a suitable combination of the above three strategies (i.e. socio-technical and participative methodologies, system analyst training, and a modified reward structure) will be instrumental in modifying the system developers' value structure, such that adequate attention is given to the human and job satisfaction issues.

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Appendix A

Information Systems Development—Personal Value Questionnaire

Sample Questionnaire Items

Section II: Having decided which aspects of the system to examine and/or develop, the next question deals with the direction in which development should take place (the "norms" of development). This section measures the level of importance you attach to each of these norms of criteria. For each of the items listed below, please indicate:

1. The level of importance you attach to it, and
2. The primary meaning (i.e. success, right or pleasant) you attach to the item.

	IMPORTANCE RATING					MEANING		
	V. LO	LO	MED	HI	V. HI	SUCC	RGHT	PLSN
	1	2	3	4	5	1	2	3
1. Timeliness of information supplied by the system	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
4. Security of update/retreival access to information	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
16. Operating costs of the system	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
40. Job security for the users	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
45. Development project on schedule	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]