

**An Empirical Study of the  
Effectiveness of Relationships Between  
End-users and Central Information Services**

**MANOEL G. OLIVEIRA**

FLORIDA INTERNATIONAL UNIVERSITY

**DANIEL ROBEY**

GEORGIA STATE UNIVERSITY

**JOYCE J. ELAM**

FLORIDA INTERNATIONAL UNIVERSITY

**ABSTRACT**

Over the last two decades, the role of central information services (IS) groups in many organizations has changed from designing and implementing systems to managing the infrastructure for information technology and providing technical support for end-users. Consequently, the effectiveness of central IS groups is more dependent on the quality of the working relationship with end users than upon the delivery of specific applications. Several factors can be identified as contributing to effective relationships between end-user work units and the central IT group. This paper reports the results of a study conducted within a large governmental agency in which end-user groups depended on a central Information Services department. Five factors describing relationships among organizational units were drawn from Van de Ven and Ferry's [23] framework for organizational assessment. As hypothesized, the perceived effectiveness of the relationship between users and IS was found to be related to the *formalization* of the relationship, *ease of communication*, and *consensus*. Contrary to our hypothesis, *frequency of communication* was not correlated with effectiveness. The implications of these results for managing IS groups in organizations are discussed.

**INTRODUCTION**

The last 20 years have witnessed a major expansion of information technology in organizations of all sizes. Information technology has become much easier to install, configure and operate, motivating end users to become more involved in the management of information resources. More "user friendly" computer hardware and software have aided end users in their quest for autonomy from centralized units established to oversee the management of information resources. Nonetheless, information systems still demand the attention and support

of specialized professionals. Complex information systems typically extend beyond the scope of attention of any single unit in an organization. Moreover, the technical complexity of the users' needs may exceed their ability to articulate adequate IT solutions, demanding specific technical expertise [12, 8]. In addition, the adoption of information technology resources prompts specific concerns regarding technical compatibility and user training. Diversification of hardware and software may result in the proliferation of incompatible resources and in greatly increased costs of training and technical support. For these reasons, many organizations maintain a central IS group comprised of in-

house technical personnel who are responsible for providing technical support to users and for maintaining the organization's technical standards.

Despite the apparent advantages of maintaining a central IS group, the role and value of the such groups is frequently a topic of discussion in both the practitioner and academic literatures [3]. Fundamental questions have been raised about the extent to which central IS groups usefully support the interests of different organizational units. Since the effectiveness of such groups is likely to vary in practice, it is important to identify the characteristics in both the user and the IS groups that contribute to an effective relationship between them. This research investigated how specific aspects of information flow and the sharing of ideas between the central IS and end-user groups influenced the effectiveness of their relationship.

### **THE EVOLUTION OF CENTRAL INFORMATION SERVICES**

Information systems activities in organizations have been in a continuous state of change during the last 20 years [8, 25]. In the decades of the 1960s and 1970s, information systems and their associated technologies were relatively inflexible but generally stable resources. During this period, information technology was typically managed by a central information services group made up of specialized technical personnel. This group functioned as an internal, monopolistic provider of information services to various user departments in an organization, and most users had limited influence over the choice of computing hardware and software. Applications were developed, operated and maintained by central IS. This is no longer the situation in most organizations. Profound changes in the accessibility and character of information technologies have led organizations to re-evaluate the manner in which information resources are managed.

Several reasons for this re-evaluation are worth noting. First, information technology has become an increasingly necessary part of most work environments. Information technology is essential to the basic work processes and competitive hopes of numerous organizations, in addition to providing traditional benefits of efficiency and accuracy in routine data processing. Second, information technology has become more accessible and economical to use. Proliferation of microcomputing has brought about not only more powerful computing hardware but also the availability of flexible, easy-to-use programs for all levels of technical expertise. People who would previously not have thought of interacting with computers now have the capability and confidence to develop and use sophisticated applications. The rapidly increasing ratio of capability to cost promises

to increase accessibility and lower required investment for years to come. Third, the performance of centralized information services groups has been hampered by a lack of resources and growing pressures to downsize organizational staff groups. With smaller staffs and greater demand for their services, central IS groups often limit themselves to the maintenance or improvement of existing services. Centralized groups have become less able to apply resources toward the development of new systems or services requested by users. As the backlog of new systems projects grows [4], users have devised means of circumventing centralized groups to get new systems built. The general availability of cheaper technologies has made it possible for users to provide for their own information services, in ways that are more flexible and satisfying to users' expectations than the services provided by their IS groups.

Such significant changes in information technology availability and use have suggested alternate roles for the IS function in organizations. In their review of the IS planning literature, Boynton and Zmud [5] noted that the IS function within many organizations has transformed itself to operate as a business within a business, serving as a primary provider and manager of IT products and services to the various subunits. Like any business, the IS groups now face a direct competition from third-party suppliers of IT services, who can frequently satisfy organizational needs in more effective ways. Nevertheless, few organizations have completely abandoned the idea of supporting user applications through a central IS group. Rather, many have sought alternative ways to make the IS-user relationship more effective [25]. For example, many organizations have dispersed information resources into users' business units but have retained control over them by the IS group. Under this arrangement, users may assume the authority to manage the development of systems by, for example, chairing steering committees, but IS typically retains responsibility for conducting development work. Other organizations have decentralized their information resources by assigning complete responsibility and authority over them to the business units [8]. Clearly adapting to the decentralization trend of IT management and decision making, central IS groups are steadily assuming a role of policy and regulations provider, in a structure which Boynton and Zmud [5] related to a federal government. In this configuration, the IS function does not dictate how subunits handle their information processing activities, but do develop appropriate guidelines and standards for adoption of the organization.

A recent trend is to shift the primary function of the central IS group from systems design and development to systems integration. This changes the central IS group's role to one of advisor or technical consultant, rather than

system developer [12, 8]. Additionally, the IS group continues to operate those IS services that are critical to the survival of the organization, those that benefit from economies of scale, or those that are not performed by any subunit. Instead of controlling all system-related design and implementation efforts, many central IS groups have assumed to focus on maintaining corporate-wide information systems, such as accounting and human resources, or information systems to support corporate staff, such as EIS. They provide technical expertise needed to support individual business unit projects and they maintain the technical infrastructure of commonly shared resources such as telecommunications, office systems, corporate databases, software, and hardware. Because of their technical expertise, the central IS group can play a critical role in identifying and planning strategic information services and in supporting reengineering efforts. For some centralized IS groups, this new role provides more satisfactory network management than was true in the days of mainframe systems design and implementation [1]. The management of technology investigation, pilot testing, and dissemination is also commonly left to the central IS group, while end-users are freed to implement many of their own particular solutions.

Within these new designs for the management of information services, the relationship between a central IS group and users remains crucial to the realization of economic and strategic benefits [7]. Information technology represents an increasing large portion of total capital investment for organizations, and its benefits have only begun to be realized. An understanding of the factors that contribute to the effectiveness of a central IS group's relationship with technology users is clearly needed.

#### A FRAMEWORK FOR ORGANIZATIONAL ANALYSIS

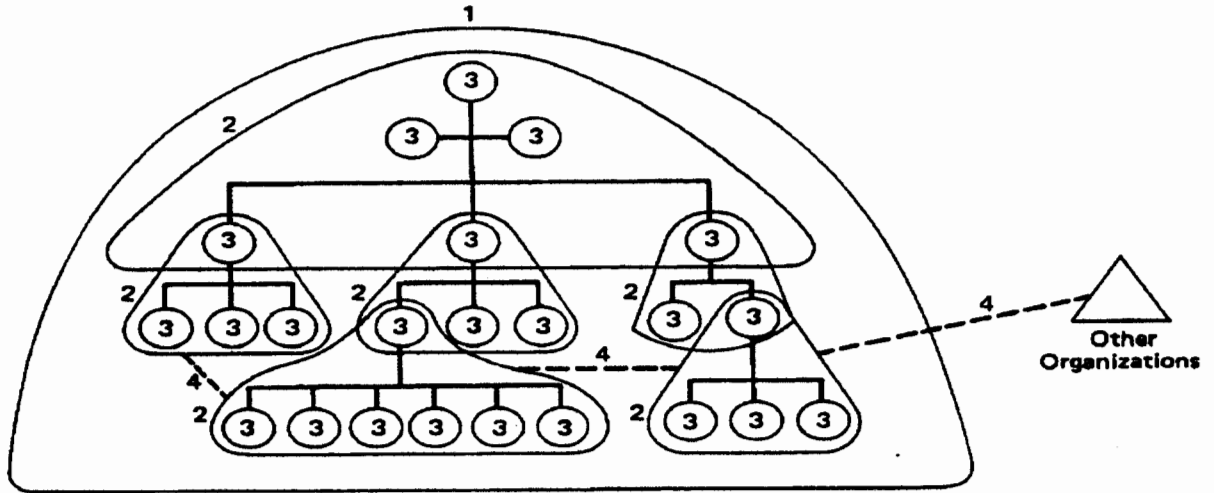
Although the relationships between users and a central IS group has been discussed extensively in the literature, empirical studies tend not to be based on accepted theoretical frameworks from the organization sciences [18]. Research on practical IS questions should be based on theory for at least three reasons: (1) theory offers general predictions that can be tested in specific situations; (2) the use of theory improves communications between researchers; and (3) a theoretical basis of research will

warrant credibility of the research community toward eventual findings [18]. Our objective is to conduct an investigation of the user-IS relationship within a strong theoretical framework. This study was thus planned and executed from the perspective of organizational theories applicable to the study of effective working relationships.

Katz & Kahn [13] and Mintzberg [15] refer to two major exchange functions that must exist in organizations if they are to achieve their goals and survive: resource and information flows. To perform these functions, organizational units rely on the relations that they establish and maintain with other units within the same organization or with units in different organizations. These relationships were addressed by a theoretical framework devised by Van de Ven and his colleagues to assess the structure and operation of organizations [22, 23]. Their framework guided organizational assessment at four different levels, where each level refers to different units of analysis: (1) the overall organization, (2) within work groups or units, (3) at the individual job level, and (4) the relationships between jobs and units within the organization and with other organizations. These are diagrammed in Figure 1. Level 1 addresses notions pertinent to the organization as a whole and is mainly concerned with internal constructs such as organizational culture, size, or geographical dispersion. Level 2 addresses constructs within work groups, such as cohesiveness of ideals among its components, or types of group activity. Level 3 deals with characteristics of individuals such as level of education, professional skills and how these may eventually impact organizational performance. Finally, level 4 assesses particular characteristics of the *relations* that exist within or between various units of interest. At this level, the focus of analysis become the relation itself and how its various characteristics affect organizational performance.

This study refers to various aspects of the relationship between central IS and IT users. Level 4 of the Van de Ven framework thus seems to be quite appropriate for the analysis of how the flow of resources and information are affected by and affect that relationship within organizations. There are readily identifiable resource and information flows between these groups.

RAD and evolutionary prototyping have found that these approaches solve many problems with throughput and user satisfaction.



**Key to Numbers:**  
 1 = Overall Organization Focus of Analysis  
 2 = Organizational Unit Focus of Analysis  
 3 = Individual Job or Position Focus of Analysis  
 4 = Relations within and between Units Focus of Analysis

Figure 1. Levels of Analysis in Van de Ven's Organizational Assessment Framework

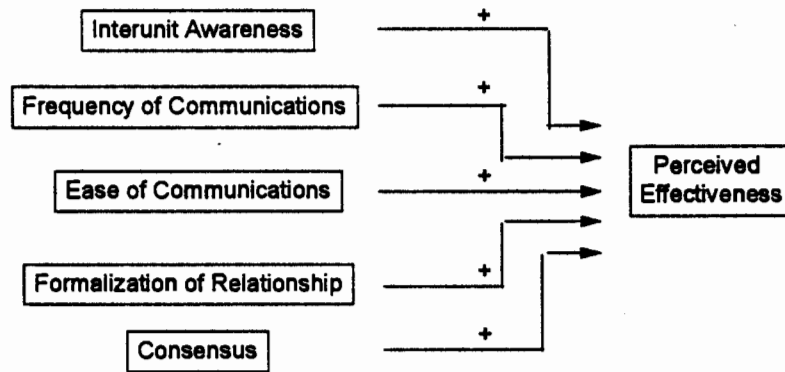


FIGURE 2 - Research Model Containing Dependent and Independent Variables

In assessing organizations at the level of interunit or group relations, Van de Ven and Ferry [23] considered 15 group-level constructs related to interunit effectiveness. Due to limitations imposed by the available sample size (more thoroughly discussed in the method section of this paper), this research addressed the relationship between interunit effectiveness and only five of these constructs: (1) *interunit awareness*, (2) *frequency of communications between the units*, (3) *ease of communications between the units*, (4) *formalization of the relationship*, and (5) *consensus between the units*. These five constructs were chosen because they reflect a common concern with the flow and sharing of information. Figure 2 presents these constructs within the research model used in the study.

*Dependent Variable: Effectiveness.* Organizational effectiveness can be conceptualized as either an objective or subjective measure. Obtaining objective measures is problematic. For this reason, most research studies view the construct of organizational effectiveness as essentially a subjective, value-laden human judgement [24]. While numerous criteria have been used to assess the levels of effectiveness in organizations [5], the effectiveness of central IS groups' relationship with users can be approached directly as a subjective assessment [2, 8]. In this study, *perceived effectiveness* is defined as *the extent to which the work units subjectively (1) believe that each party carries out its commitments and (2) feel their relationship is equitable, worthwhile, productive and satisfying.*

*Independent Variables.* Van de Ven & Ferry [23] defined *interunit awareness* as the degree to which each group is *informed* about the specific goals, services, and resources of the other group. *Frequency of communications* was conceptualized as the number of times during the past six months that messages about the nature of the relationships or units of exchange were transmitted between the units through written reports and letters, telephone calls, face-to-face discussions, and group or committee meetings. It is a broad construct that reflects the incidence of different forms of information flows between the units. *Ease of communication* was defined as a restricted measure of quality of communication that indicates the facility found in getting in touch with the other unit and getting ideas across. According to these definitions, *awareness* relates to one of the two dimensions of communication referred to by Guetzkow [11]: communication content, which accounts for the actual knowledge transferred between parties. The other dimension is communication flow, which relates to the concept of how knowledge is transferred. This is affected by the frequency and ease of communication existing between the parties. Together these variables provide indication of how well the groups know each other and how well they work toward improving that knowledge.

According to Van de Ven and Ferry [23], interunit awareness, frequency of communications, and ease of communications are expected to be positively related to the effectiveness of the relationship between organizational units. This expectation is supported in the literature pertaining to organizational communication. Daft and Lengel [9] assert that organizations process information to reduce *uncertainty* and *equivocality*. The first has to do with unclear specification of solutions to clearly defined problems. The second refers to the difficulty in identifying needs or problems. It is reasonable to suppose that end-users and a central IS group engage in communications to reduce both uncertainty and equivocality. In matters relative to the provision of basic support (e.g., hardware malfunction, installation of a new copy of a standard application package), only a minimum amount of information is necessary for the user group to report the need and request that action be taken. In other matters, an end-user group may face a novel work situation where it is felt that information technology may be used to advantage, but for which the users lack technical expertise to specify solutions. In this case, both uncertainty and equivocality are high, and large quantities of information may have to be exchanged in the search for adequate solutions. It is reasonable to expect high levels of mutual awareness and good communication practices between a central IS group and end-user work units to lead to enhanced relations and ultimately to more productive work outcomes.

*Formalization* is defined as the degree to which rules, policies, and procedures govern the role, behavior and activities of organizations. According to Mintzberg [16], organizations formalize behavior to reduce its variability, ultimately to predict and control it. Whether formalization is beneficial to effective working conditions between groups in an organization is debated. Van de Ven & Ferry [23] found formalization to be generally positively correlated with perceived effectiveness. Guetzkow [11], in reviewing the literature about communications in organizations, concluded that the correlation between formal communications and effectiveness is highly dependent on the type of task being addressed and various characteristics of the organization. He suggests that formal communications in organizations are more efficient in conveying information that is aimed at notifying or creating awareness of a situation, whereas informal communications are more efficient in dealing with the recognition or acceptance of ideas. The relationship between the central IS and end-user groups involves several types of activities. Some are undoubtedly novel situations that may benefit from an informal, richer mode of communication, as prescribed by Daft and Lengel [9] or from more flexible, rather than bureaucratic policies. In such cases, formalization should not be expected to necessarily

contribute to good relationships. Nevertheless, it is reasonable to assume that most situations that arise refer to commonly encountered problems dealing with technical support or the provision of hardware or software resources, where well known goods or services are requested and supplied. In such situations, involving routine procedures and communications, it is reasonable to believe that the relationship between the units should benefit from formalization.

Van de Ven and Ferry defined *consensus* as the degree of agreement among parties in a relationship on (1) the needs and problems of the parties and (2) the specific services and goals each side should achieve. They considered consensus as contributing to interunit effectiveness. The literature on inter-party consensus and conflict is extensive and contrasting views exist as to their value in an organization. Deutsch [10] called attention to how "productive conflict" could be used to prevent stagnation and promote creativity and innovation. Nonetheless, if not adequately managed, conflict can be a destructive force in an organization [19].

Formally, it was hypothesized that each of the five independent variables should increase the degree of perceived effectiveness in the relationship between the central IS group and end-users. Thus:

- **H1 - Higher levels of interunit awareness between IS and end-users are associated with higher levels of perceived effectiveness.**
- **H2 - Higher frequency of communications between IS and end-users is associated with increased levels of perceived effectiveness.**
- **H3 - The maintenance of easy communication channels between IS and end-users is associated with increased levels of perceived effectiveness.**
- **H4 - Higher levels of formalization of the IS-end-user relationship are associated with higher levels of perceived effectiveness.**
- **H5 - Higher levels of consensus between IS and end-users are associated with higher levels of perceived effectiveness.**

## METHOD

### Research Site

In 1994, the authors were asked to evaluate the information management practices of a large governmental agency. The agency operated a central IS group that gave technical

support to a substantial number of user groups with independent management and diversified needs. The evaluation was supported by a survey of user departments and interviews with both users and members of the central IS department.

### Measures

In the development of their theoretical framework, Van de Ven and Ferry [23] designed and recurrently improved several survey instruments to measure various aspects of organizational context, design, and performance at each of the levels defined in their framework. The part of their instrument that addresses interunit relations was used in this study. Each construct is measured with two or more questions that require responses on five- or six-point numerical scales. The scales have been designed to help segregate responses from subjects who do not understand the question or have no formed opinion to answer the item. Answer items like "Don't Know" allow for improved statistical analyses, lowering the levels of biases caused by inappropriate answers.

The instrument included scales for all of the constructs in our research model (see Figure 2) and additional questions to allow for positive identification of the respondent. Although the respondents were kept anonymous, it was important to collect data on what group they belonged to, how long they had been with the organization and with the particular work group. The final instrument comprised a total of five respondent identification questions plus 22 items to measure the theoretical constructs. Only minor wording modifications were needed to fit the context of this research. A sample of the questionnaire and a cross reference table of question numbers and constructs are presented in Appendix 1.

### Unit of Analysis

A fundamental decision in designing any research study in organizational settings is defining the unit of analysis. Failure to observe the correct relationship between the constructs of interest and the level at which data is collected and analyzed may result in misleading interpretations and ultimately erroneous conclusions [14, 21]. All the constructs defined in this study refer to the *relationship* between the central IS group and *each* of the end-user groups to which it renders service. For example, effectiveness is defined in terms of the whether the relationship between IS and a particular user group is regarded as satisfying and productive. The unit of analysis is thus the *dyad*, or pair of organizational subunits.

Even though the unit of analysis is the dyad, the *unit of observation* is the individual. Because the data could not be collected from objective sources at the dyad level, the survey instrument collected data *from individuals regarding the dyad*. This practice assumes that individual respondents can be reliable informants about properties of the dyadic relationship [14]. Where data from individual reports are used to estimate properties of dyads or groups, data must be aggregated. Accordingly, the data gathered from individuals were averaged within each responding group to represent the reported *group* response.

In such a situation, it would be desirable that survey data be collected and aggregated from both sides of a dyad to capture the perspectives of all involved parties. Nonetheless, considering that the agency's IS group handled a large number of user groups, it would have been too burdensome to require IS respondents to describe the various aspects of their relationship with every end-user group. Besides, it is uncertain that they would be able to describe accurately each individual relationship among so many. For these reasons, the researchers chose to collect data about the dyads solely from the end-user groups.

### Sample

An initial interview with agency managers revealed fewer than 15 functional units within the organization that could be considered independent end-user groups with distinct management structures. However, within these functional units multiple groups maintained separate liaisons with the IS group. The multiple groups were either geographically separated from each other or had different information needs, thus justifying their treatment as separate end-user groups. After discussions with agency management, 28 independent end-user groups were identified.

The supervisors of each of the 28 groups were contacted to help the researchers identify the employees within the groups best suited to respond to the questionnaire. These individuals would be expected to be very familiar with both the group's information needs and the service received from central IS. In most cases, the identified respondents were the "gatekeepers" of the group's relationship with IS. In most groups, these individuals held managerial or supervisory positions. In a few of the smaller groups, where information needs were not very sophisticated, respondents were direct workers or members of the clerical staff.

Packets of individually addressed questionnaires were mailed to the manager of each group for distribution. Each questionnaire gave the respondent instructions on how it should be completed and returned, and each was individually sealed to preserve confidentiality. Respondents were kept anonymous to motivate more accurate responses.

Questionnaires were mailed to a total of 165 respondents within the 28 identified groups, with an average of six respondents per group.

## RESULTS

A total of 137 questionnaires from 27 groups were returned, comprising an 83 percent response rate. Nine of the questionnaires were discarded because either the respondent was obviously uninterested in completing them (very few questions were actually answered) or, as it was later discovered, the respondent was actually an IS employee temporarily assigned to work in the end-user group. This resulted in 128 valid questionnaires.

*Reliability.* An initial assessment of reliability was performed to verify integrity of the measuring instrument, using Cronbach's alpha as indicator. All individual scores were assessed and the results are shown in Table 1.

Variable	Question	Cronbach's $\alpha$
Interunit Awareness	7,9	.2752
Frequency of Communication	15, 20	.5761
Ease of Communication	18, 19 (both reverse scales)	.7145
Formalization of Relationship	6a, b, 21a, b	.7571
Consensus	12a, b, c, 13 (rev.), 22 (rev.)	.6332
Perceived Effectiveness	14, 23, 24, 25, 26, 27	.8644

Table 1: Reliability of Variables at Individual Level

Unfortunately, interunit awareness and frequency of communication did not reach the score of 0.6, typically regarded as the minimum acceptable reliability score among items [17]. The questionnaire items and answers for these two scales were examined to determine the causes of low reliability. One of the items used to measure interunit awareness (question # 7) asked the respondent how many years *the unit* had been directly involved with the IS group. Apparently many respondents interpreted this as how many years *he or she* had been involved with IS because the answer to question # 7 matched the reported number of years the respondent had been with the unit or the organization. The researchers thus decided to drop the interunit awareness variable from the analysis. The reliability analysis also revealed that frequency of communication was partly assessed by the *percent of working time* the individual spent discussing matters with central IS (question # 20). The responses to this item varied mostly between 0 and 6 percent, seriously restricting the range of variation on this item. Nonetheless, as the reliability score was relatively high (.58), the researchers decided to keep the variable in the research model and to exercise greater caution in interpreting the results.

For each individual, the items comprising each variable were averaged to produce the respondent's score for that variable. Whenever an item presented an invalid response or the answer indicated that the respondent could not accurately reply ("don't know"), the score for that variable was calculated as the average of the remaining items for that variable. If less than half of the items were valid, no score was given to that variable for that respondent.

The groups' scores for each variable were calculated next, using the following procedure. For the aggregate group scores to be considered representative of the groups, individual scores within the groups were tested for homogeneity relative to mean score variance across groups [14]. An analysis of variance was carried out for the dependent variable at the individual level, using group membership as the differentiating factor. The ANOVA revealed significant differences in the group means ( $p < .054$ ), suggesting that aggregated individual scores were significantly different across groups.

The valid individual scores of all respondents that belonged to each end-user group were averaged and became the final variable scores for that group. At this level of aggregation, it was not required that more than half of the respondents had valid answers for a valid score to be assigned to that item. It was a judgement call of the researchers not to sacrifice a rating of a variable at the group level even though it was not based on a majority of respondents. The only invalid group-level scores were those that had no valid individual scores. Of a total of 162 variable group scores (27 groups x 6 variables), only five received no score.

*Statistical analysis.* The data were analyzed with SPSS v.6.0 statistical software. Table 2 presents the descriptive statistics of the aggregated group scores. The Pearson correlation matrix was examined, using pairwise elimination of items with missing data, in advance of the multiple regression analysis used to test hypotheses. The correlations are reported in Table 3. No pair of independent variables were significantly correlated, which suggested that the multiple regression analysis could proceed without concern for multicollinearity.

Variable	Mean	Std Dev	Minimum	Maximum	Valid N
FREQ_COM	2.78	.89	1.5	5.1	25
EASE_COM	3.83	.63	2.0	4.6	27
FORMAL	2.52	.42	1.9	3.3	27
CONSENS	3.29	.61	2.2	4.6	26
EFFECTIV	3.02	.52	1.9	3.9	27

Table 2: Group Score Descriptive Statistics

	FREQ_COM	EASE_COM	FORMAL	CONSENS
EASE_COM	.0914 ( 25) P=.664			
FORMAL	.3413 ( 25) P=.095	-.0715 ( 27) P=.723		
CONSENS	-.2755 ( 24) P=.193	.2931 ( 26) P=.146	-.0857 ( 26) P=.677	
EFFECTIV	.3082 ( 25) P=.134	.4914 ( 27) P=.009	.4657 ( 27) P=.014	.4288 ( 26) P=.029

Table 3: Correlation Coefficients between Variables at the Group Level

A multiple regression analysis was carried out on the data, considering frequency of communication, ease of communication, formalization of relationship, and consensus as independent variables and perceived effectiveness as the dependent variable. As the dataset had five missing items, the regression was performed in three different ways: (1) removing the cases with missing data (three cases), (2) removing the missing data pairwise with the corresponding value of the dependent variable, and (3) substituting the missing data with the average of existing data for that variable.

All three procedures yielded comparable results, with the mean substituting missing data procedure (3) presenting better adherence to model assumptions, as discussed below. The results for procedure # 3 are presented in Table 4.



Multiple R	.80096				
R Square	.64154	DF	Sum of Squares	Mean Square	
Adjusted R Square	.57637	Regression	4	4.44084	1.11021
Standard Error	.33584	Residual	22	2.48131	.11279
F = 9.84343		Signif F = .0001			
----- Variables in the Equation -----					
Variable	B	SE B	Beta	T	Sig T
EASE_COM	.327811	.111393	.397420	2.943	.0075
FORMAL	.556666	.164770	.456061	3.378	.0027
CONSENS	.343846	.119135	.399811	2.886	.0086
FREQ_COM	.139277	.085225	.229593	1.634	.1164
(Constant)	-1.156532	.670058		-1.726	.0984

Table 4. Multiple Regression Results

The assumptions of error normality, linearity, and homoscedasticity were verified with a histogram of the distribution of the standardized residuals, a scatterplot of the residuals, and a normal P-P plot of the expected versus observed cumulative probability of standardized residuals of the dependent variable. Both normality and linearity were regarded as satisfactory for the research. There seemed to be low levels of heteroscedacity, with no appreciable differences in residual standard deviations across predicted values of the dependent variable.

**DISCUSSION**

The research data rendered mixed support for the research model. Hypothesis H1 was not tested due to the exclusion of interunit awareness from the model because of low measurement reliability. The regression model using the remaining independent variables accounted for 64 percent of the variation in perceived effectiveness. Hypothesis H2 was also not supported by the empirical data. There was no statistical evidence that frequency of communication contributed to higher levels of perceived effectiveness either through significant levels of correlation with the dependent variable ( $p = .134$ ) or through a significant contribution to the regression model ( $p = .116$ ). Hypotheses H3, H4, and H5 received strong empirical support. Significant statistical evidence was found that higher levels of ease of communications, formalization of relationship, and consensus between the units were

positively related to higher levels of perceived effectiveness. These variables manifested both significant correlation coefficients with the dependent variable and significant contributions to the regression model. The level of formalization of the relationship seems to affect more acutely the level of perceived effectiveness. While ease of communications and consensus had regression coefficients of .328 and .343, respectively, formalization had a coefficient of .556.

Although significant correlations do not demonstrate causal relationships between variables [20], these results may be used to guide managerial thinking about how higher levels of effectiveness in the relationship between IS and end-users may be reached. For instance, to facilitate the ease of communication between central IS and end-users, IS personnel may be trained in being courteous, attentive, and responsive to end-user requests for support. A positive, supportive response to end-users should contribute to clear communication channels between those units. Additionally, IS may offer dedicated services, such as help desks, for improving the quality of the relationship with end-users. Such services should contribute to easier communications and ultimately to higher levels of perceived effectiveness.

Several measures can be taken to encourage consensus between the groups and IS. For instance, end-users should be involved in developing organizational policies pertaining to IS support. A potentially effective approach is to assign representatives from each end-user

group to participate in planning committees that meet regularly with IS to discuss user needs and solutions. These same representatives could additionally meet among themselves to exchange ideas and form cohesive lists of needs to be presented to central IS. Additionally, whenever end-users request support, they should be encouraged to participate in deciding how that support is to be given. IS personnel should be trained to be attentive to what users have to say and objectively consider their suggestions. To make this type of relationship effective, users need to have minimum levels of knowledge of IS resources and applications at both a technical and strategic level. Training of end-users, at least of some elements in each group, may be necessary to enable the building of realistic consensual relationships.

Levels of perceived effectiveness may be particularly sensitive to increased levels of formalization between the groups. A clear definition of roles for both IS and end-users, by way of formal guidelines or procedures, may contribute to greater perceived effectiveness. Also, the adoption of formal mechanisms for requesting support services and verifying their completion should contribute to higher levels of perceived effectiveness. Either printed or electronic forms may prove useful in formalizing work orders and monitoring their execution. The strong relationship between formalization and effectiveness highlights the importance of a well-defined understanding between IS and its various user groups of each party's responsibilities and of their working approaches. With the frequent shifts in technology and users' knowledge, it is critical that responsibilities and work approaches be reexamined and formally reaffirmed on a regular basis.

The finding that frequency of communication was not significantly related to perceived effectiveness is an interesting result, considering that other aspects of communication were found to be highly correlated to perceived effectiveness. This may indicate the increasing self-sufficiency of the user group with respect to information services or a decrease in the amount of communication required when appropriate standards are in place. In either case, good working relationships between IS and user groups would be correlated to the amount of communication. Alternatively, it may mean that our empirical methods were not precise enough to detect a positive relationship that actually exists in the sample.

The results of this study are subject to two important limitations. First, the number of groups from which data were collected (27) was relatively small for statistical purposes. This may be considered a threat to the validity of the conclusions. Nonetheless, the following arguments should justify the adoption of this sample size in this study. In the assessment of interunit effectiveness, various factors at the organizational level may affect the

measures of perceived effectiveness [23, 15]. It is thus desirable that the groups under study belong to the same organization, so that this variance is controlled for. Finding a single organization with more interacting work groups to sample would be no easy task. Twenty seven independent work groups within the same organization thus becomes an attractive pool of subjects for study, although adequate care must be exercised in evaluating the results. Second, the Van de Ven and Ferry [23] instrument that was used to collect the data presented some reliability problems when used in the IS-end-user context. The low reliability scores for interunit awareness and frequency of communication indicate the need for possible revisions in the scales themselves, the method of administration, or other refinements.

Future research with a larger sample and modified measures may address research questions related to the present investigation. Due to limitations in sample size, the independent variables investigated here were restricted to those related to aspects of flow and sharing of *information* existing between the IS and end-user units. Alternatively, other elements in the Van de Ven framework should be assessed for their impact on perceived effectiveness of the IS-end-user relationship. Factors related to the flow of *resources* seem particularly relevant in the IS context because users experience frequent pressures to obtain and maintain new computing resources, both hardware and software. Communication alone cannot fulfill such needs. In addition, aspects related to power distribution, reward systems, and management systems could be addressed as contributing to effective relationships.

It is also suggested that future research be extended to other organizational settings for eventual confirmation of the conclusions found here. Public agencies face a number of unique constraints on resources as they try to deliver services to the publics they serve. Typically, expenditures for information technology resources are not related to levels of service provided, and funding formulas are usually insensitive to the needs for expensive overhead equipment and other resources. Thus, public agencies may create severe pressures on the relationship between users and IS groups because neither group may be adequately funded to perform their work efficiently. In the agency studied in this research, such pressures may have affected both the level of effectiveness and the nature of the links between independent and dependent variables. While we anticipate that the research model would be supported in private business organizations, empirical confirmation of the model in that setting should be conducted.

Finally, the results of this study raise questions regarding the evolving *role* of the IS group in organizations. If IS plays the role of day-to-day advisor or technical consultant, as suggested by the literature, it would

be expected that frequency of communication would be related to effectiveness. The results of this research suggest that the role of IS may be evolving to more of a specialist or second-level technical support, thus reducing the need for day-to-day technical support. A study across organizations would be interesting to verify the roles that the central IS group actually plays in organizations at the present.

In conclusion, the study in the state agency indicated that the perceived effectiveness of the relationship between the central IS group and end-user groups was significantly related to ease of communication, consensus between the groups, and to the level of formalization between the groups. Of these, the level of perceived effectiveness was most sensitive to the level of formalization. No significant relation was detected between perceived effectiveness and the frequency with which the groups communicate. These results provide valuable suggestions to organizations in how to promote more effective relationships between the central IS group and end-users.

#### REFERENCES

- [1] Anderson, P., IS groups: Dinosaurs in an end-user world? *Datamation*, Vol. 40, Num. 6, March 1994, p. 88.
- [2] Bjørn-Andersen, N., A Post-Modernistic Essay on Technology Assessment. In N. Bjørn-Andersen and G. Davis (Eds.), *Information Systems Assessment: Issues and Challenges*, North Holland, 1988, pp. 5-13.
- [3] Brancheau, J. C. and Brown C. V., The management of end-user computing: Status and directions. *ACM Computing Surveys*, Vol. 25, Num. 4, Dec. 1993, pp. 437-482.
- [4] Boehm, B. W. and Papaccio P. N., Understanding and Controlling Software Costs. *IEEE Transactions on Software Engineering*, Vol. 14, Num.10, Oct. 1988, pp. 1462-1477.
- [5] Boyton, A. C. and Zmud, R. W., Information Technology Planning in the 1990's: Directions for Practice and Research. *MIS Quarterly*, Vol. 11, Num. 1, Mar. 1987, pp. 59-71.
- [6] Cameron, K. S., Effectiveness as Paradox: Consensus and Conflict in Conceptions of Organizational Effectiveness. *Management Science*, Vol. 32, Num. 5, May 1986, pp. 539-553.
- [7] Cash, Jr., J.I., McFarlan F.W., McKenney, J.L. and Applegate, L., *Corporate Information Systems Management: Text and Cases*, 3rd edition, Homewood, IL: Irwin., 1992.
- [8] Clark, Jr., T.D., Corporate Systems Management: An Overview and Research Perspective. *Communications of the ACM*, Vol. 35, Num. 2, Feb. 1992, pp. 61-75.
- [9] Daft, R. L. and Lengel, R. H., Organizational Information Requirements, Media Richness and Structural Design. *Management Science*, Vol. 32, Num. 5, May 1986, pp. 554-571.
- [10] Deutsch, M. Productive and Destructive Conflict. *Journal of Social Issues*. Vol. 25, 1969, pp. 7-42.
- [11] Guetzkow, H., Communications in Organizations. In J. G. March (Ed.). *Handbook of Organizations*. Chicago: Rand McNally & Co., 1965, pp. 534-573.
- [12] Guimaraes, T., Exploring the relationship between IC success and company performance. *Information and Management*, Vol. 26, Num. 3, March 1994, pp. 133-141.
- [13] Katz, D., and Kahn, R.L., *The Social Psychology of Organizations*, 2nd Ed., New York, NY: John Wiley & Sons, 1978.
- [14] Klein, K. J., Dansereau, F., and Hall, R. J., Levels Issues in Theory Development, Data Collection, and Analysis. *Academy of Management Review*, Vol. 19, Num. 2, 1994, pp. 195-229.
- [15] Mintzberg, H., *The Structuring of Organizations*. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1979.
- [16] Mintzberg, H., *Designing Effective Organizations*. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1983.
- [17] Nunally, J. C., *Psychometric Theory*. New York: McGraw Hill, 1978.
- [18] Robey, D., and Zmud R., Research On The Organization of End-User Computing: Theoretical Perspectives From Organizational Science. *Information Technology and People*. Vol. 6, Num. 1, 1992, pp. 11-27.

- [19] Robbins, S.P., *Managing Organizational Conflict*. Englewood Cliffs, NJ: Prentice-Hall, 1974.
- [20] Rosenthal, R. and Rosnow, R. L., *Essentials of Behavioral Research: Methods and Data Analysis*. New York: McGraw Publishing Company, 1991.
- [21] Rousseau, D. M., Issues of Level in Organizational Research: Multi-Level and Cross-Level Perspectives. *Research in Organizational Behavior*, Vol. 7, 1985, pp. 1-37.
- [22] Van de Ven, A. H., Emmett, D. C., Koenig, Jr., R., Framework for Inter-Organizational Analysis. *Organization and Administrative Science Journal*, Vol. 5, Num. 1, Spring 1974, pp. 113-129.
- [23] Van de Ven, A. H., and Ferry, D. L., *Measuring and Assessing Organizations*. New York: John Wiley & Sons, 1980.
- [24] Zammuto, R. F., A Comparison of Multiple Constituency Models of Organizational Effectiveness. *Academy of Management Review*, Vol. 9, Num. 4, 1984, pp. 606-616.
- [25] Zmud, R. W., Design Alternatives for Organizing IS Activities. *MIS Quarterly*, Vol. 8, Num. 2, June 1984, pp. 79-93.

#### AUTHORS' BIOGRAPHIES

*Manoel G. Oliveira is a doctoral candidate of Management Information Systems in the College of Business Administration at Florida International University. Mr. Oliveira has a B.S. degree (1978) in electrical engineering and has extensive experience in planning and implementing local and wide-area computer networks and information systems in financial and government institutions. For several years he has been involved in the management of IT-related changes in large organizations, particularly overseeing technical end-user support throughout the change process.*

*Among Mr. Oliveira's research interests are examining the process of information technology adoption by non-technical users and various productivity issues related to linking individuals and groups through networked tools for remote collaborative work in organizations.*

*Daniel Robey is Professor of Computer Information Systems at Georgia State University. He earned his doctorate in 1973 from Kent State University and has served on the faculties of The University of Pittsburgh, Marquette University, Gannon University, and Florida International University. He is the author of three books and numerous articles in such journals as Management Science, Organization Science, Information Systems Research, MIS Quarterly, Communications of the ACM, Human Relations, ACM Transactions on Information Systems, Academy of Management Review, Academy of Management Journal, and Decision Sciences. Professor Robey is currently an associate editor for Management Science and Accounting, Management and Information Technologies and serves on the editorial boards of Information Systems Research, Organization Science, Journal of Information Technology Management and the Wiley series on Information Systems. He is also program chair for the OCIS Division of the 1996 Academy of Management Conference. His current research deals with the consequences of information systems in organizations and the processes of system development and implementation. This research includes empirical examinations of information systems development work and of the effects of a wide range of technologies on organizational structure and patterns of work. It also includes the development of theoretical approaches to explaining the development and consequences of information technology in organizations.*

*Joyce J. Elam is the James L. Knight Professor of Management Information Systems in the Department of Decision Sciences and Information Systems at Florida International University. She was previously an associate professor at the University of Texas and an assistant professor at the University of Pennsylvania's Wharton School. Dr. Elam was a Marvin Bower Fellow at the Harvard Business School during the 1987-88 academic year. Dr. Elam earned both her Ph.D. in operations research (1977) and her BA in mathematics (1970) from the University of Texas.*

*Dr. Elam has published extensively in the areas of the competitive use of information technology, the management of the information services function, and the use of information technology to support both individual and group decision making. These articles have appeared in such journals as Information Systems Research, Decision Sciences, Operations Research, and Decision Support Systems. She is co-author of the book, Transforming the IS Organization, published by ICIT Press.*

*Dr. Elam is also active in the IS professional community. She has served as associate editor for MIS Quarterly and is currently on the editorial boards for Information Systems Research and Strategic Information Systems. Dr. Elam is a frequent speaker on management information systems topics at national and international meetings. Dr. Elam has extensive experience in executive development programs and in consulting. Recent clients include IBM, American Bankers Insurance Group, J.C. Penney, State of Florida, State of Texas, Indiana University, and the United Nations.*



Florida International University

**STUDY OF THE  
MANAGEMENT SYSTEMS - USER RELATIONSHIPS  
IN HRS - District 11**

**Dr. Daniel Robey  
Dr. Joyce Elam**

**Department of Decision Sciences &  
Information Systems**

**College of Business Administration**

**rev. date: 07/26/94**

Dear Friend:

Because of your contact with the Management Systems (M/S) group in District 11, you have been selected to participate in a research study analyzing those factors which contribute to effective M/S-User relationships. We need your insights, perceptions and observations of the day-to-day nature of your relationship with M/S. Attached is a questionnaire which addresses various areas that may be more or less important in establishing and/or maintaining effective relationships.

We ask that you take the time to fill out the attached questionnaire. The questionnaire is divided into two sections: Section 1 asks for some general information about your job and your background. Section 2 contains questions on several aspects of your relationship with M/S. Please select the answers that you feel most accurately describe your experience with M/S.

Please consider the M/S group as the functional unit located in District 11 only. When you answer the questions do not refer to information systems personnel at HRS Headquarters in Tallahassee. Please answer all questions even though some may appear to be similar.

When you have completed the questionnaire, please seal it in the enclosed envelope and return it to the person who gave it to you.

Your time and help are greatly appreciated! If you have any questions or concerns, please contact us.

Sincerely,

Daniel Robey  
Professor  
College of Business Administration  
Florida International University  
(305) 348-2830

Joyce J. Elam  
Professor

Questionnaire survey conducted by:  
Manoel Oliveira - DSIS/FIU

**PLEASE READ EACH QUESTION CAREFULLY AND ANSWER EACH ONE BASED ON YOUR PERCEPTIONS OF THE ACTUAL SITUATION, NOT HOW YOU THINK IT SHOULD BE. YOUR ANSWERS WILL BE KEPT STRICTLY CONFIDENTIAL.**

**SECTION I. GENERAL INFORMATION**

The questions contained in this section elicit some general information that will be useful in analyzing your responses and will help us draw appropriate conclusions.

1. What is your present job title or position? \_\_\_\_\_
2. When did you assume your current position? Month \_\_\_\_\_ Year \_\_\_\_\_
3. What is the job title or position of the person you report to? \_\_\_\_\_
4. When did you begin with HRS? Month \_\_\_\_\_ Year \_\_\_\_\_
5. What is the name of your department/group? \_\_\_\_\_



**SECTION II. RELATIONSHIP WITH M/S - THE MANAGEMENT SYSTEMS GROUP**

This section focuses on the relationships you maintained with the Management Systems group in District 11 (which we will refer to as "M/S") during the past six months. Please do not refer to the information systems group in Tallahassee in answering the questions. In the box to the right of the questions, circle the numbers that correspond to your answers.

6. To what extent have the terms of the relationship between your unit and M/S:

- a. Been explicitly verbalized or discussed?
- b. Been written down in detail?

7. For how many years has your unit been directly involved in some fashion with the M/S group?

8. Prior to the past six months, to what extent has your unit had effective working relationships with M/S?

9. How well informed are you about the specific goals and services of M/S?

10. How many years and months have you personally known your main contact person in M/S?

11. How well are you personally acquainted with that contact person in M/S?

12. How much do you and this contact person agree or disagree on:

- a. The goal priorities of your unit?
- b. The specific ways work is done or services are provided by your unit?
- c. The specific terms of the relationship between your unit and M/S?

Use the following scale for the next question:

To No Extent	Little Extent	Some Extent	Considerable Extent	Great Extent	
1	2	3	4	5	
1	2	3	4	5	
_____ Years					
No Prior Contact	To No Extent	Little Extent	Some Extent	Great Extent	
1	2	3	4	5	
Not at All	Little Informed	Somewhat Informed	Quite Informed	Very Well Informed	
1	2	3	4	5	
_____ Years			_____ Months		
No Personal Acquaintance	Not Very Well	Somewhat Well	Quite Well	Very Well	
1	2	3	4	5	
Don't Know	Dis-agree Much	Agree a Little	Agree Somewhat	Agree Quite a Bit	Agree Very Much
0	1	2	3	4	5
0	1	2	3	4	5
0	1	2	3	4	5

13. To what extent did individuals in M/S *hinder* your unit in performing its functions during the past six months?
14. Consider now the *equality* of the give-and-take relationship with M/S. *How fair* do you feel are the "payoffs" to your unit?
15. During the past six months, *how frequently* have people in your unit *communicated or been in contact* with people in M/S?
16. Specifically, *how frequently* did your unit *communicate* with M/S *through each* of the following ways during the past six months:
- a. Through *written letters, memos, or reports* of any kind?
  - b. Through *personal face-to-face discussions*?
  - c. Through *telephone calls*?
  - d. Through *group or committee meetings* between three or more people from your unit and M/S?
17. In general, what *percent* of all these communications with M/S were *initiated* by people in your unit during the past six months?
18. Overall, how much *difficulty* do you experience in *getting ideas clearly across* to individuals in M/S when you communicate with them?
19. When you wanted to communicate with individuals in M/S, how much *difficulty* have you had *getting in touch* with them?
20. During the past six months what *percent of your total working hours* did you spend discussing matters directly related to information systems or technology with M/S?
21. To coordinate activities with M/S during the past six months, *to what extent*:
- a. Have *standard operating procedures* been established (e.g., rules, policies, forms, etc.)?
  - b. Are *formal communication channels* followed?

Use the following scale for the next question:

Don't Know	To No Extent	Little Extent	Some Extent	Considerable Extent	Great Extent
0	1	2	3	4	5
We Get Much Than We Ought	We Get Less Somewhat Than We Ought	Balanced	We Get Somewhat More Than We Ought	We Get Much More Than We Ought	

Not Once	1-2 Times	About Monthly	About Every 2 Weeks	About Weekly	About Daily	Many Times Daily
0	1	2	3	4	5	6

0	1	2	3	4	5	6
0	1	2	3	4	5	6
0	1	2	3	4	5	6
0	1	2	3	4	5	6

\_\_\_\_\_ %

No Contact	None	Little	Some	Quite a Bit	Very Much
0	1	2	3	4	5
0	1	2	3	4	5

\_\_\_\_\_ %

To No Extent	Little Extent	Some Extent	Much Extent	Very Great Extent
1	2	3	4	5
1	2	3	4	5

- 22. During the past six months, *how often* were there *disagreements or disputes* between people in your unit and M/S?
- 23. To what extent has M/S carried out its responsibilities and commitments in regard to your unit during the past six months?
- 24. To what extent has your unit carried out your responsibilities and commitments in regard to M/S during the past six months?
- 25. To what extent do you feel the *relationship* between your unit and M/S is *productive*?
- 26. To what extent is the *time and effort spent* in developing and maintaining the relationship with M/S *worthwhile*?
- 27. Overall, to what extent were you *satisfied with the relationship* between your unit and M/S during the past six months?

**Use the following scale for the next question:**

Not Once	About Once A Month	About Every 2 Weeks	About Once A Week	Several Times A Week	Every Day
1	2	3	4	5	6

To No Extent	Little Extent	Some Extent	Considerable Extent	Great Extent
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5
1	2	3	4	5