**Introduction**

Computer chargeback, or cost recovery systems, can provide top level management with an attractive control mechanism for ensuring efficient and effective utilization of information resources. The decision to implement such a system, however, requires considerable thought regarding the objectives of the proposed chargeback scheme. If these objectives are not clearly defined before the chargeback system is designed and implemented, the results may be unimpressive or even dysfunctional.

This article focuses on one potential objective of chargeback systems, increasing user involvement in the development and use of computer applications. The characteristics of a chargeback system which is designed to encourage increased user involvement will be described and compared with commonly used chargeback schemes which are better suited for other purposes. The results of a field study investigating characteristics of chargeback systems in use and their apparent effects on user involvement will be presented.

**Objectives of Chargeback Systems**

Accounting for computer utilization has been the subject of an extensive amount of literature. Most authors begin by presenting their perceptions of the objectives of charging back information services costs to user divisions. Among these objectives are:

1. to provide the basic accounting function of cost recovery [6, 11, 13],
2. to maximize data processing benefits [2, 15],
3. to ensure equitable computer resource allocation among users [3, 9],
4. to satisfy contractual or legal requirements [7],
5. to regulate the demand for scarce computer resources [5, 11],
6. to assist management in planning [16], and
7. to motivate and provide evaluation criteria for data processing management [4, 16].

Although incomplete, this list of objectives presents a cross section of the different goals the same cost recovery system may be expected to serve.

**User involvement as an objective**

User involvement is another recognized objective of cost recovery systems [12, 13]. Users who are held accountable for information systems costs are expected to be more attuned to how the money is spent than users who are only charged indirectly (i.e., via an allocation strategy) or not at all. Users operating in a chargeback environment are expected to plan information systems ventures more carefully, take more responsibility for systems under development, and carefully monitor the expenses associated with operational systems. Furthermore, it is expected that users will modify their own requirements for information systems on the basis of the bills they receive from the information services department. Expensive and seldom used reports may be eliminated, input verification reduced, or online update transactions discontinued by users unable or unwilling to pay for information services they feel they can do without.

It is important to realize that the goal of the charging system is, or should be, carefully considered in selecting an appropriate chargeback strategy. For instance, if the primary goal is increasing user involvement, user charges should reflect actual costs for services. If a system is designed to allocate out all costs on some arbitrary basis (e.g., a division's contribution to sales), increased user involvement may result in suboptimization. A user conducted cost benefit analysis, for example, may misrepresent costs of computer based projects as compared to alternative investments.

The organizational environment will also influence the chances of a particular charging strategy achieving an anticipated objective. The existence and characteristics of other charging systems (e.g., telephone, travel, duplication services) will influence receptivity to use of chargeback for information systems as a management control tool. Similarly, if interdepartmental transfers of funds are treated as "less real" than interorganizational transfers, an objective such as increased user involvement is unlikely to occur.

**Previous Research on Chargeback Systems**

Although there is an extensive amount of literature on the subject of chargeback systems, it is almost exclusively normative. Little research has been done to determine whether the objectives of the various charging schemes described above are in fact met.

Nolan [12] examined the use of different charging schemes and its effect on user/manager attitudes. He assessed the "maturity" of chargeback systems based on four criteria: understandability of costs to the user/manager, controllability of costs by the user/manager, accountability of the user/manager for costs, and cost benefit incidence (does the manager responsible for costs also get the bill?). Generally, Nolan found that the more mature the information systems organization, the more mature (on the four criteria) the chargeback system. Nolan also found that, "in general, chargeout seems to create keen awareness of the cost of data processing. It also seems to accentuate user/manager responsibility for costs enough to spur communication between user/managers and the data processing department." He found, for instance, that understandability of costs reduced managers' frustrations with charges for data processing and promoted positive attitudes toward information systems. However, "the most surprising result of the study was that only four percent of the user/managers interviewed understood their charges well enough to take effective control actions."

Chargeback systems, if designed appropriately, can foster user involvement in decisions regarding information systems. As a consequence, more cost effective systems should be developed and more effective use should be made of information services within the organization. Unfortunately, chargeback systems are rarely designed to effectively meet the goal of increased user involvement.
A Research Model

In the research reported here, the authors' objective was to identify those characteristics of chargeback systems that accomplish the goal of increasing user involvement in decisions affecting the development, management, and use of their information systems. The authors expect these same characteristics to influence users' attitudes about information services and information systems.

The authors predict that a successful chargeback system, one that will result in greater user involvement and more positive user attitudes, is defined not only by the technical quality of the system but by the quality of the user interface. The user interface of the chargeback system is the mechanism by which the users actually associate information services with their costs. A system that equitably and completely represents actual use of services does not necessarily lead users to be more cost conscious or more committed to new projects unless they can associate the quality of service with its cost. Some important characteristics of a system with a high quality user interface are those suggested by Nolan [12] to indicate system maturity: that it be understandable to users, that it be controllable by users (i.e., they have the authority to reduce costs by reducing services), that users be accountable for cost and utilization of information services (i.e., they are included in performance evaluations of user/managers), and that the user who is responsible for information services costs also receives the bill.

In addition, the authors predict that a chargeback system designed to increase user involvement is more likely to successfully meet that objective if implemented in a supportive environment; that is, there is direct top management involvement in implementation of the system, there is a perceived need for the system on the part of users, and users are relatively sophisticated about data processing and its value to them. A chargeback system introduced in such an environment should also result in positive user attitudes about the “success” of the information system function in general and in greater satisfaction with the systems they use. The expected relationships among the information systems environment, chargeback system, and user involvement and attitudes are depicted with solid lines in Figure 1. The relationships actually tested in this research are shown with dotted lines.

Description of Study

In an attempt to learn how chargeback systems are currently being used, the authors conducted an investigation of manufacturing firms. The goal was to identify the types of charging systems in use (i.e., the characteristics of the chargeback system), the quality of the user interface of these systems, and the relationship between the charging strategy and user involvement and attitudes toward information systems. The authors did not, in their investigation, examine the characteristics of the system environment in which the chargeback system was implemented.*

Research variables

Four classes of research variables were assessed in the investigation. They are:

1. the type of charging mechanism,
2. the quality of the user interface of the charging mechanism,
3. user involvement in information system development, and
4. user attitudes toward information systems and the information services staff.

Each of these classes of variables is discussed briefly below.

Type of Charging Mechanism

There are several alternative mechanisms for charging out system costs. The appropriate method depends primarily on the goals of the system and their relationship to organizational goals. The classification of methods defined by Popadic [13] was used in the present study. In each organization studied, the methods of charging for system operations and, separately,
Characteristics of the User Interface

Characteristics of the Systems Environment

Characteristics of the Chargeback System

Success of Chargeback Strategy

User Involvement in Development of Information Systems

User Attitudes About Information Systems
- Employees
- Information Systems Function

Note: Solid lines represent the theoretical mappings. Dotted lines represent specific hypotheses tested.
for system development were identified and classified as one of these methods. They are the following:

1. **Overhead.** No charging mechanism is employed. All costs are absorbed by the information services department.

2. **Allocation of expense.** Time reporting or CPU utilization records are used to arrive at a rough percentage of use for each department. Usually 100% of all costs are allocated.

3. **Standard resource rates.** Users are charged by type of service used, according to a fixed rate schedule established in advance.

4. **Standard rate per unit processed.** Users are charged a prespecified rate for particular units of input or output; i.e., transactions processed, online inquiries, reports requested. This method is generally not appropriate for system development.

5. **Fixed price.** Users pay a fixed fee for usage of a block of time on a dedicated system or for new system development where the final product is relatively well-defined.

**Quality of the User Interface**

The characteristics identified by Nolan [12] as representing a "mature" chargeback system were employed to assess the user interface of the chargeback system. These are the following:

1. **Understandability** — the extent to which the users can associate chargeout costs with the activities necessary to carry out their tasks.

2. **Controllability** — the extent to which charges are under the control of the user/manager.

3. **Accountability** — the extent to which costs and utilization of information services are included in the performance evaluation of the user/manager.

4. **Cost Benefit Incidence** — whether or not the user/manager receiving the benefits of utilization of information services also receives the bill for those services.

**User Involvement in Information System Development**

User involvement can be examined on several different dimensions. Two aspects of user involvement were considered in this investigation. First, types of user involvement, such as steering committees, representation on project teams, sign-offs on stages of development, etc., were assessed. Second, user involvement in stages of system development was examined. A summary measure of user involvement was employed as well as individual measures of the mechanisms used and the stages in which they occurred. Several sample items from the user involvement measures are reproduced in the Appendix.

**User Attitudes Toward Information Services**

"Information satisfaction" can be employed as a surrogate measure for system quality. If the user/manager perceives the system as providing valuable information not readily available elsewhere, the system designer can be relatively confident of the "satisfactoriness" of the information system for that user/manager. In this study, an instrument developed by Guthrie [8] was used to assess information satisfaction. His fifteen item questionnaire, based on a measure developed by Porter [14] of job satisfaction, examines the difference between a user's "felt need" for certain types of information to support on-the-job performance and the amount of such information currently being provided by the information system. The higher the user/manager's perceived need for information, (i.e., the greater the "felt need"), the greater the dissatisfaction with the system. Sample items are reproduced in the Appendix.

The managers' perceptions of quality of the information systems group were also measured. Two items were used to assess the users' perceptions of how adequately the information systems group meets the needs of their areas of responsibility and of the company as a whole. Two more items assessed the users' perceptions of the efficiency and effectiveness of the information systems department. These items were averaged to pro-
Hypotheses

The specific hypotheses examined are shown by a dotted line in Figure 1. The first set of hypotheses examines the effect of the existence of a chargeback system on user involvement and user attitudes. The second set examines the impact of different types of chargeback strategies on user involvement and attitudes. The final set examines the relationship between the quality of the user interface and user involvement and attitudes. These are discussed below.

Impact of chargeback use

The authors differentiate between organizations that have some method of allocating charges for information services to users in proportion to actual use (Type 2 or greater) and those that treat information services costs as overhead (Type 1). The authors predict that users who are charged for information services will be more involved and have more positive attitudes about information services and their current information systems than will users who are not charged.

H1A: Organizations using chargeback systems to recover information systems costs will have users who are more involved in the development and use of information systems than organizations not using chargeback systems.

H1B: Organizations using chargeback systems to recover information systems costs will have users with more positive attitudes about information systems and services than organizations not using chargeback systems.

Impact of chargeback type

The authors differentiate between two general classes of chargeback systems. Expense allocation systems (Type 2) are an accounting mechanism for information services to distribute 100 per cent of expenses based on average use. Resource rate systems (Types 3, 4, and 5) use economic prices for resources, where the price structure is designed to ensure the most effective use of resources. The authors predict that the type of chargeback system will influence user involvement and attitudes as well as the quality of the user interface.

H2A: Organizations using resource rate systems will have users who are more involved in the development and use of information systems than organizations using expense allocation systems.

H2B: Organizations using resource rate systems will have higher quality user interfaces than organizations using expense allocation systems.

H2C: Organizations using resource rate systems will have users with more positive attitudes about information services than organizations using expense allocation systems.

Impact of user interface quality

The authors predict that without a high quality user interface, the system will not meet its objectives regardless of the technical quality of the chargeback system. Quality of the user interface affects user involvement and attitudes.

H3A: In organizations using chargeback systems, those that have a high quality user interface will have more user involvement in the development and use of information systems than those with a low quality user interface.

H3B: In organizations using chargeback systems, those that have a high quality user interface will have users with more positive attitudes about information services than those with a low quality user interface.

Methodology

The investigation was conducted in two phases. In the first phase, a questionnaire was mailed to
the information services managers of 150 manufacturing firms in eastern New York State, eastern Pennsylvania, and New Jersey. The questionnaire focused on identifying the type of cost recovery mechanism used in each organization. Some general questions about the size and age of the information services department were also asked. The questionnaire was designed to be objective; no questions about "success" or "effectiveness" of information systems or charging mechanisms were asked.

Based on the responses to the survey, a sample of thirty organizations was chosen to participate in Phase II. Companies were selected on the basis of size (at least 500 employees) and the type of chargeback system employed, including some who did not employ chargeback systems. Of the thirty organizations selected, twenty-three agreed to participate in Phase II of the study.

In Phase II, the authors visited organization sites and gathered more detailed information about the cost recovery mechanism used. They also investigated the quality of the user interface of the cost recovery system as well as user involvement and attitudes. In each organization, up to five participants were contacted: the information systems manager and three to five user/managers, identified by the information systems manager, responsible for those functions that most heavily utilized information systems.

Using a structured interview instrument, the authors interviewed information systems managers about the type of cost recovery function used and their perceptions of how effective it was in accomplishing its goals. The information systems manager provided information about the technical quality of the system as well as the quality of the user interface.

Using another structured interview instrument, the authors interviewed one of the four user managers regarding his or her attitudes about information systems and involvement in their development and use. Questionnaires were distributed to this person and the other three user managers assessing their "felt need" for information systems and their feelings of involvement in decisions affecting information system development and use.

Responses to the structured interviews were coded for analysis. Questionnaire responses were summarized for each organization; user questionnaires were not used unless at least three responses were received.

**Results**

Of the twenty-three organizations studied, only two used standard rates per unit processed (Type 4) as a basis for charging system operations; none used either Type 4 or Type 5 (fixed price) for system development. Therefore, Types 3, 4, and 5 were combined to represent resource rates (Type 3) for purposes of analysis. Table 1 shows the number of companies exhibiting each type for operations and development.

Inter-item reliability was calculated for the scales for user involvement in system development (twelve items), user information satisfaction (fif-

<table>
<thead>
<tr>
<th>Type of Charging Scheme</th>
<th>Number of Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Operations</td>
</tr>
<tr>
<td>1. Overhead</td>
<td>8</td>
</tr>
<tr>
<td>2. Expense Allocation</td>
<td>11</td>
</tr>
<tr>
<td>3. Resource Rate</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 1. Number of Companies Employing Each Type of Charging Scheme
teen items), and user perceptions of quality of the information systems group (four items). Reliability for all three scales was .85 or greater.

Differences between means for Types 1, 2, and 3 for operations and development were tested. Where differences were shown to be significant, contrasts between the three types are reported.

Hypothesis 1

The authors tested the null hypothesis that there are no differences in user involvement and user attitudes toward information services for different types of charging systems. Table 2 shows the F-values and significance levels for user involvement, user information satisfaction, and quality of the information systems group by cost recovery type for development and operations.

Inspection of Table 2 shows no relationship between the type of cost recovery mechanism and user involvement in system development (H1A). On the other hand, the type of charging for operations is significantly related to information satisfaction, although the type of charging for development is not. Table 3 shows the contrasts between Types 1, 2, and 3 in information satisfaction. There is a significant difference only between Type 1 and Type 3: Type 3 users were less dissatisfied than Type 1 users with their information systems.

Although the overall measure of quality of the information systems group was not significantly related to the type of charging scheme, one component variable, system efficiency, was significantly related to charging for development. Table 4 shows the F-value, contrasts and means for user ratings of efficiency of the information systems group, by development type. The difference between Type 2 and Type 3 users is significant: Type 3 users perceive information services to be less efficient than do Type 2 users.

Hypothesis 2

The quality of the user interface was significantly related to the type of charging scheme used for system development, as shown in Table 5. Thus Type 3 or greater charging mechanisms appear to have a higher quality user interface than Type 2 mechanisms in the organizations studied, and Hypothesis 2C is supported for system development. The difference was not significant, however, for charging for operations. Since the type of resource rates established for development are inherently more understandable than for operations, (e.g., hours of programmer time versus mintues of CPU time), it is not too surprising that this result was found for one and not for the other.

Hypothesis 3

For organizations using Type 2 or greater, the quality of the user interface was not significantly related to either user involvement or user

<table>
<thead>
<tr>
<th>Table 2. Test of Differences in User Behaviors and Attitudes Toward Information Services for Different Charging Schemes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development Type</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>F-value (P &gt; F)</td>
</tr>
<tr>
<td>User Involvement</td>
</tr>
<tr>
<td>User Information Satisfaction</td>
</tr>
<tr>
<td>Quality of IS Group</td>
</tr>
</tbody>
</table>
### Table 3. Contrasts between User Information Satisfaction for Different Charging Schemes for System Operations

<table>
<thead>
<tr>
<th>Type of Charging Scheme</th>
<th>F-value</th>
<th>P &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1 vs. Type 2</td>
<td>1.60</td>
<td>.21</td>
</tr>
<tr>
<td>Type 2 vs. Type 3</td>
<td>1.35</td>
<td>.25</td>
</tr>
<tr>
<td>Type 1 vs. Type 3</td>
<td>4.26</td>
<td>.04</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Charging Scheme</th>
<th>Mean Information Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Overhead</td>
<td>33.96</td>
</tr>
<tr>
<td>2. Expense Allocation</td>
<td>29.18</td>
</tr>
<tr>
<td>3. Resource rate</td>
<td>23.64</td>
</tr>
</tbody>
</table>

### Table 4. Contrasts Between User Ratings of System Efficiency for Different Charging Schemes for System Development

<table>
<thead>
<tr>
<th>Type of Charging Scheme</th>
<th>F-value</th>
<th>P &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>3.12</td>
<td>.05</td>
</tr>
<tr>
<td>Type 1 vs. Type 2</td>
<td>1.24</td>
<td>.27</td>
</tr>
<tr>
<td>Type 2 vs. Type 3</td>
<td>6.23</td>
<td>.01</td>
</tr>
<tr>
<td>Type 1 vs. Type 3</td>
<td>2.09</td>
<td>.15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Charging Scheme</th>
<th>Mean Rating of System Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Overhead</td>
<td>3.41</td>
</tr>
<tr>
<td>2. Expense Allocation</td>
<td>3.69</td>
</tr>
<tr>
<td>3. Resource Rate</td>
<td>3.00</td>
</tr>
</tbody>
</table>
attitudes toward information services. The lack of support for Hypothesis 3 was surprising, particularly given the support found for Hypothesis 2C, which showed significant differences in user interfaces across charging strategies. Nevertheless, the number of organizations employing Type 2 or greater charging schemes was only fifteen, thus substantially reducing the power of the statistical test of significance. A very strong relationship between variables was required for a statistically significant result to be obtained.

Conclusions

The result must be treated as preliminary and interpreted with caution. A limited objective of this study was to identify the type of charging systems currently in use. The one overwhelming result was that very few true charging mechanisms beyond expense allocation schemes are being employed (seventeen percent of the sample), at least in manufacturing firms. In this important respect the results are in agreement with Nolan’s previous study. The authors’ interviews indicate, moreover, that only two of the twenty-three organizations considered user involvement in information system development to be a specific goal of their charging system.

Despite the lack of resource rate-based systems in the sample, some results regarding user attitudes and user involvement are worth noting. First, there is some evidence that the type of charging scheme is related to user information satisfaction. In addition, there is some evidence that the type of charging scheme is negatively related to user perceptions of system efficiency. It seems reasonable that users who are aware of the costs of information services will question the efficiency of those services more than those who are not. An important negative effect to consider is that users may become more frustrated with the information services they receive if they see the costs.

It must also be noted that the type of charging scheme did not appear to affect the degree to which users become involved in development and use of information services; the relationship between charging scheme type and user attitudes is also weak. Moreover the quality of the user interface, although related to the type of charging scheme, was not related to either user involvement or user attitudes toward information services. Again these negative results may be explained by the lack of power exhibited by the statistical tests due to the small sample size. Alternatively, many other variables may be influencing user involvement and attitudes so that a relatively small amount of variance is accounted for by the chargeback variable.

The typical user/managers who are charged for information service receive a bill, and even though they may understand the charges, they do not know how to affect those charges through usage. Information systems are usually seen as an expensive but necessary evil. Charging schemes that are implemented for other purposes than to affect user requests for information services probably do not result in changes in user behavior or attitudes regardless of the quality of the user interface or the basis for establishing charges.

Practical implications

Practitioners considering implementing or changing chargeback systems on the strength of this research should act with caution. As noted previously, the small sample size precludes drawing substantive conclusions from nonsupported hypotheses. The partially supported hypotheses suggest two implications related to the move to a
chargeback system based on resource rates (i.e., Types 3-5). First, these systems generally will provide clearer user understanding of charges, although not necessarily any improvement in either involvement or attitudes. Second, given this clearer understanding users may, in fact, become more critical of the information systems group’s internal efficiencies.

Suggestions for future research
The authors suggest several avenues for further study of the relationship between chargeback, user involvement, and user attitudes. First, an intensive study of differences between organizations employing at least Type 3 charging schemes should be carried out. It should focus on differences in goals of the charging scheme, the basis for establishing charges, organizational characteristics, organization of the information services function, and user attitudes and behavior. Second, the significance of user involvement and its relationship to user attitudes should be closely examined. The positive relationship between user involvement and various user attitudes that is generally expected is weakly supported at best [10]. The underlying assumption of this article and much of the MIS literature — that user involvement is essential for successful implementation and use of information systems — should itself be examined further.

The authors recognize that the implementation of a charging scheme which represents equitable use of information services is very difficult. Designing the charging scheme to be understandable and controllable by system users is even more difficult and may introduce additional complexities into the objective of using this resource efficiently. Hopefully, future research will bring additional insights into this complex problem.

References
Appendix

Included here are sample items drawn from the survey scales employed in this study. Sample items are shown for information satisfaction and user involvement. The scale measuring attitudes concerning information services is shown in its complete form.

Information satisfaction

This scale, developed by Guthrie [8], includes fifteen items. Two examples are shown below:

1. Computer based information to help me do the planning and budgeting necessary in my management position:

   (a) How much is there now?
   (min) 1 2 3 4 5 6 7 (max)
   (b) How much should there be?
   (min) 1 2 3 4 5 6 7 (max)

2. Computer based information to keep me up-to-date on activities and performances related to my managerial position:

   (a) How much is there now?
   (min) 1 2 3 4 5 6 7 (max)
   (b) How much should there be?
   (min) 1 2 3 4 5 6 7 (max)

User involvement

User involvement was measured with a scale of sixteen items comprised of three types of questions.

The first seven items listed development activities that usually are required for a new system and that might be undertaken by either users or data processing personnel. The users were asked to rate the relative contribution of the two groups. The scale and two examples are shown below:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Processing takes most of the responsibility for this task.</td>
<td>Data Processing performs more than half of this task.</td>
<td>This task is about evenly split between us and DP.</td>
<td>We perform more than half of this task.</td>
<td>We take most of the responsibility for this task.</td>
</tr>
</tbody>
</table>

Justifying the proposed application (i.e., cost/benefit analysis)

Determining what computer generated reports and/or visual display screen formats will look like.

The next five items assessed organizational adaptations that the user manager might make to increase involvement with data processing. A five-point Likert scale was employed with items including:

- Usually someone from my group is put IN CHARGE of the project development group (the data processing people serve under this individual).
- Project development groups contain one or more members from my department.
The next four items tapped specific involvement behaviors that the user manager might exhibit. A five-point Likert scale was employed with items including:

- I have initiated attempts to REDUCE some of our demands for data processing services (for example, looking for reports no longer needed or reducing use of online terminals).
- I have initiated NEW data processing services (for example, development of a new computer based information system or of a new management report).

**User attitudes**

The following four-item scale measured user attitudes concerning the information services function:

1. How adequately do you feel the data processing group within your company meets the information processing needs of your area of responsibility?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poorly</td>
<td>Marginally</td>
<td>Adequately</td>
<td>Very Well</td>
<td>Excellently</td>
</tr>
</tbody>
</table>

2. How adequately do you feel the above data processing group meets the needs of the broader class of users they serve?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poorly</td>
<td>Marginally</td>
<td>Adequately</td>
<td>Very Well</td>
<td>Excellently</td>
</tr>
</tbody>
</table>

Data processing departments are often judged on two criteria: *efficiency* and *effectiveness*. *Efficiency*, of course, deals with how well they do what they do. Are reports on time? Are projects developed within preset budgets? *Effectiveness* takes a broader focus. Are they doing the right things? Are critical “life-blood” applications being developed? Are new computer technologies being successfully integrated into the organization?

3. How *efficient* do you feel the data processing group is?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very</td>
<td>Somewhat</td>
<td>?</td>
<td>Fairly</td>
<td>Very</td>
</tr>
<tr>
<td>Inefficient</td>
<td>Inefficient</td>
<td>Efficient</td>
<td>Efficient</td>
<td></td>
</tr>
</tbody>
</table>

4. How *effective* do you feel the data processing group is?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very</td>
<td>Somewhat</td>
<td>?</td>
<td>Fairly</td>
<td>Very</td>
</tr>
<tr>
<td>Ineffective</td>
<td>Ineffective</td>
<td>Effective</td>
<td>Effective</td>
<td></td>
</tr>
</tbody>
</table>
About the Authors

Margrethe Olson is an Assistant Professor in the Computer Applications and Information Systems Department of the Graduate School of Business at New York University. She holds a B.S. in Computer Science from the University of Michigan and an MBA and Ph.D. in Management Information Systems from the University of Minnesota. Professor Olson’s research interests focus on the organization of information services and the impact of computer systems on individuals and organizations. She is currently conducting research on remote work, particularly work at home, and problems of management and control associated with it.

Blake Ives is an Assistant Professor in the Program in Computer and Information Science at Dartmouth College. At the time the research was conducted he was an Assistant Professor of MIS at the School of Management, SUNY Binghamton. Dr. Ives’ research interests include management of the computing resource, user involvement in systems development, the design of user interfaces, and the dissemination of scientific knowledge.