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Implementing an organization-wide intelligent telephone system: Individual use of an innovation after an authority-based adoption decision

Levitt, Steven Robert, Ph.D.

The Ohio State University, 1988

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IMPLEMENTING AN ORGANIZATION-WIDE INTELLIGENT TELEPHONE SYSTEM: INDIVIDUAL USE OF AN INNOVATION AFTER AN AUTHORITY-BASED ADOPTION DECISION

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of the Ohio State University

By

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* * * *

The Ohio State University
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TO CHRISTINE AND MY PARENTS
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# TABLE OF CONTENTS

DEDICATION........................................................................... ii

ACKNOWLEDGMENTS.......................................................... iii

VITA....................................................................................... iv

LIST OF TABLES....................................................................... x

LIST OF FIGURES...................................................................... xii

CHAPTER

<table>
<thead>
<tr>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. INTRODUCTION .................................................................. 1</td>
</tr>
<tr>
<td>Nature of the study......................................................... 2</td>
</tr>
<tr>
<td>II. AUTHORITY-BASED ADOPTION DECISIONS ......................... 4</td>
</tr>
<tr>
<td>Nature of the problem....................................................... 4</td>
</tr>
<tr>
<td>Traditional Diffusion And Adoption......................................... 5</td>
</tr>
<tr>
<td>Attributes of an innovation................................................ 7</td>
</tr>
<tr>
<td>Individual innovativeness.................................................. 9</td>
</tr>
<tr>
<td>Communication networks.................................................... 14</td>
</tr>
<tr>
<td>The &quot;Adoption Perspective&quot; Of Innovation Adoption.................. 18</td>
</tr>
<tr>
<td>Authority-based innovation decisions................................... 20</td>
</tr>
<tr>
<td>High and low involvement.................................................. 33</td>
</tr>
<tr>
<td>Job category.......................................................................... 38</td>
</tr>
<tr>
<td>Research Questions And Hypotheses...................................... 40</td>
</tr>
<tr>
<td>III. METHOD .......................................................................... 44</td>
</tr>
<tr>
<td>Innovation And Change........................................................ 45</td>
</tr>
<tr>
<td>Action Research..................................................................... 46</td>
</tr>
<tr>
<td>Sociotechnical Analysis....................................................... 54</td>
</tr>
<tr>
<td>Process Of The Investigation............................................... 59</td>
</tr>
<tr>
<td>Context of the research...................................................... 59</td>
</tr>
<tr>
<td>Historical background........................................................ 60</td>
</tr>
<tr>
<td>Factors leading to the adoption of the telephone system............. 60</td>
</tr>
<tr>
<td>The adoption decision......................................................... 66</td>
</tr>
<tr>
<td>Implementation: technical factors........................................... 67</td>
</tr>
</tbody>
</table>

vi
APPENDICES

A. UNITS Telephone System Description ...........................................259
B. UNITS Management Plan ..........................................................263
C. UNITS Feature Package Options ......................................................267
D. Original Operations Manuals..........................................................280
E. Revised Operations Manuals ..........................................................307
F. Interview And Focus Group Guides ...................................................335
G. Pilot Survey Forms ........................................................................343
H. Final Survey Forms ........................................................................361
I. UNITS Transition Dialing Procedures Memo .........................................377

LIST OF REFERENCES ...........................................................................380
<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Percentage of users not having or not sure they have optional features</td>
<td>105</td>
</tr>
<tr>
<td>2. Frequency of features most often listed as wanting to add</td>
<td>106</td>
</tr>
<tr>
<td>3. Response percentages to factors affecting attitudes scale cost items</td>
<td>108</td>
</tr>
<tr>
<td>4. Principle components analysis with oblique rotation (pattern matrix)</td>
<td>110</td>
</tr>
<tr>
<td>5. Mean responses to factors affecting attitudes scale</td>
<td>111</td>
</tr>
<tr>
<td>6. Response percentages to factors affecting attitudes scale item 24</td>
<td>120</td>
</tr>
<tr>
<td>7. Frequency of coordinator access by job and department type</td>
<td>124</td>
</tr>
<tr>
<td>8. Frequency of &quot;not sure I have&quot; responses to features</td>
<td>140</td>
</tr>
<tr>
<td>9. Percentage of &quot;don't know how to use&quot; as a reason for not using features</td>
<td>142</td>
</tr>
<tr>
<td>10. Frequency of training attendance by job</td>
<td>149</td>
</tr>
<tr>
<td>11. Frequency of access to instruction/help sources overall and by job</td>
<td>157</td>
</tr>
<tr>
<td>12. Mean involvement scores by job</td>
<td>175</td>
</tr>
<tr>
<td>13. Percentage of most beneficial features by job category</td>
<td>177</td>
</tr>
<tr>
<td>14. Frequency of features most often listed wanting to add by job category</td>
<td>178</td>
</tr>
<tr>
<td>15. Mean task time on the telephone by job</td>
<td>180</td>
</tr>
</tbody>
</table>
16. Mean telephone time seeking/giving information and solving problems
181
17. Percent of users not having or not sure they have optional features
183
18. Frequency of feature use (per week) by users who know they have features
184
19. Mean extent of feature use scores by job
188
20. Mean response to item 1: the technology was not needed
189
21. Attitude responses by job category
192
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>FIGURES</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Traditional and network diffusion</td>
<td>16</td>
</tr>
<tr>
<td>2. Rogers' model of stages in the innovation-decision process</td>
<td>22</td>
</tr>
<tr>
<td>3. Utility of an electronic communication network as a function of universal access and use by functionally related individuals</td>
<td>27</td>
</tr>
<tr>
<td>4. A proposed model of factors affecting individual levels of technology use and perceived effectiveness</td>
<td>42</td>
</tr>
<tr>
<td>5. Joiner's action research model</td>
<td>51</td>
</tr>
<tr>
<td>6. Non-linear trend in overall feature access. Feature use has been collapsed across all features. Number of responses = 2066. Note. Low = 1-5 times/week; medium = 6-10 times/week; high = &gt;10 times/week</td>
<td>186</td>
</tr>
<tr>
<td>7. Non-linear trend in overall feature access by job category. Feature use has been collapsed across all features. Number of responses = 2066. Note. Low = 1-5 times/week; medium = 6-10 times/week; high = &gt;10 times/week</td>
<td>187</td>
</tr>
<tr>
<td>8. Relationships between factors affecting individual levels of feature use and affective responses to a new technology</td>
<td>243</td>
</tr>
</tbody>
</table>
CHAPTER I
INTRODUCTION

In an age of rapidly expanding telecommunications applications, organizations are adopting technological innovations to remain competitive in their respective markets. Institutions of higher education increasingly are using telecommunications to support their activities as they face increased competition from other universities and private organizations for students and research contracts. For state educational institutions, the need to use economic resources efficiently and effectively is growing as government support for public education decreases.

One way to extend a shrinking revenue base is to adopt technologies which decrease costs. Telecommunications has become a growing budgetary problem as its share of total costs continues to increase and because of increased telephony usage and costs, The Ohio State University decided to adopt, purchase and implement an intelligent telephone network during 1984-1988. In the process, it has become independent (for internal communications) of the Ohio Bell system, the previous provider of telecommunications services on campus.

An intelligent telephone system includes the telephone terminals and a computerized digital switch, which together allow for many advanced functions to be performed by the end user. These functions include: call forwarding, call pick up (allowing a user to answer a co-worker's phone if the co-worker is away without leaving their own desk), call transfer, 3-way conference calls, message waiting (alerts the user that a message has been taken for them by a co-worker), ring again (if a busy number is reached, the user is notified when the busy number is free, and the call is automatically placed), call park (allows the user to place a call on hold while retrieving a call on another
telephone), **speed dialing** (one preprogrammed numbers can be dialed by depressing one or two buttons), and **make set busy** (sometimes referred to as do not disturb, which makes the set appear busy to all incoming calls). The physical connections between telephones and the advanced functions are completely controlled by the computerized switch. A complete list and description of features available on the system appears in Appendix A. While the investment in this network is very large, the University projected considerable telecommunications cost savings from this innovation. However, for the end users, the new system represented new and entirely different methods of telephone operation, and potentially new behavioral requirements.

An innovation, then, can be considered as a new idea, object or practice (Rogers, 1983). Since an intelligent telephony system can be considered both an object (the intelligent telephone terminals and switching system) and a new practice for its users (methods of communicating), the study of its implementation at The Ohio State University provided an excellent opportunity to investigate the implementation of an innovation within a very large and diverse organizational setting.

**Nature of the Study**

Much literature has been devoted to the process of adopting technologies, though much less attention has been paid to factors which influence the implementation of new technologies, particularly within organizational contexts. Yet implementation factors, because they influence individual and group knowledge, attitudes, and most importantly use of technology, are ultimately the main determinants of the effectiveness of technological systems. Rogers (1983) defined implementation as "all of the events, actions, and decisions involved in putting an innovation into use" (p. 364).

As researchers and practitioners begin to examine implementation factors influencing technology use, they find a large literature base focused on the diffusion and adoption of innovations, centered around
individuals' decisions to adopt technologies. However, research focused on the implementation process can contribute to understanding the use of technology where the decision to adopt the technology has been made by the organization, at top management levels; and only later implemented at the individual level. Hence, research on the implementation process within organizations would strengthen understanding of technology use within an organizational setting where the adoption decision has already occurred.

In 1984 the University selected a bid by Ohio Bell who supplied a Northern Telecom SL-100 Digital Switch and Northern Telecom telephone sets. The adoption of the system was followed by an implementation process that began in late 1985. The switch was installed in October 1985. A user training program was designed by November, 1985, and the first phase of telephone installation (approximately 1100 stations) was begun in December 1985 and completed in February 1986. The remainder of 1986, 1987, and part of 1988 were devoted to installation of equipment which would eliminate the old Ohio Bell switch, and installation of approximately 10,000 telephone stations throughout the University.

With a combination of individual and focus group interviews supplemented with survey data, this study examined the implementation of Ohio State University's telephone system. At the time the study began, implementation had occurred in several administrative/service and academic units at the University. The experiences and usage patterns of current users within these units were assessed. The expectations and attitudes of future users towards the new telephone system, and the origins of these attitudes and expectations from mediated and interpersonal contacts, as well as experience with the system itself (by dialing into areas on campus using the new system) were also explored. Finally, the study creates a model of effective implementation of innovations within an organizational setting; recommending procedures to enhance new user effectiveness.
CHAPTER II
AUTHORITY-BASED ADOPTION DECISIONS

Nature of the Problem

When an organization is faced with implementing an innovation (in The Ohio State University's case a $24 million dollar telephone system into a 10,000 phone, complex social system), research on individual use of new technology under authority-based adoption decisions is needed. Authority-based adoption decisions are made by decree from top management levels, and subsequently introduced to end users who therefore "adopt" by default. Because authority-based adoption decisions are common within organizations, further research is needed to examine implementation factors which affect individual levels of use. Past research has 1) favored the process by which adoption occurred, largely ignoring implementation factors which are crucial to successful organizational innovations; 2) focused on individual (optional) decisions to adopt which are not characteristic of organizational authority decisions; and 3) been limited to "binary diffusion" models, which treat adoption as an adopt/non-adopt phenomena, and therefore do not account for extent of use, communication network interdependencies, or user effectiveness as criteria for innovation success. Past research needs to be extended to address the problems of implementing innovations into a large and diverse organizational setting where the adoption decision has been made for the individuals by management. In such cases, no "option" has been given to the individual to adopt or reject the innovation. The effectiveness of the innovation, then, rests on the extent to which it is designed appropriately and used efficiently by the individuals within the organization -- factors affected by implementation procedures. Hence, the following research questions will
be examined in this study:

1) How is a telephone used in an organizational setting and how can it be implemented to more effectively fulfill its functions?
2) What are the factors which influence the extent of individual use of the telephone system once adopted by an organization?
3) How can an understanding of these influential usage factors promote successful implementation?

Traditional Diffusion and Adoption of Innovations

In his 1983 book, Everett Rogers defines an 'innovation' as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (p. 11); and 'diffusion' as "the process by which an innovation is communicated through certain channels over time among the members of a social system" (p. 5). Rogers' model analyzes the diffusion process from a communication perspective. Similarly, Brown (1981) perceives diffusion as a process "by which innovations spread from one locale or one social group to another" (p. 1). Hence, diffusion can be considered a particular type of communication whereby information is exchanged concerning new ideas (innovations).

The diffusion of innovations is a very complex phenomenon which is affected by such factors as:

1) the attributes of the innovation itself;
2) the nature of the potential adopter(s);
3) the communication channels involved;
4) the nature of the change agent and his/her relationship to potential adopters;
5) the culture of the particular social system(s) and the communication networks within and among such systems; and
6) the type of innovation-decision.

This last factor is of key importance to the present study. The research on diffusion of innovations has traditionally focused on individual (optional) decisions to adopt which are not characteristic of
organizational authority decisions, and do not account for implementation as the key to successful organizational innovation adoption. Thus, the following sections will demonstrate that research beyond a focus on individual decisions to adopt is needed to provide a complete explanation of organizational adoption and implementation of technology. This is not to say, however, that knowledge of the first five diffusion factors do not help provide an understanding of innovation implementation within organizations.

Although traditional innovation diffusion studies do not provide much insight into implementation factors within the context of organizational authority-based innovation adoption for the reasons previously stated, it will be helpful to briefly examine this diffusion research and speculate on how diffusion factors might affect the implementation process. In short, innovation diffusion studies can help provide an understanding of the human factors which the literature identifies as crucial to successful implementation of technology in organizations.

Current knowledge of diffusion and adoption of innovations has culminated from over 40 years of research in various disciplines. Diffusion research has its roots in Anthropology and Rural Sociology/Agriculture (Rogers, 1983). Since 1962, when Rogers' first book on the diffusion of innovations was published, a trend has developed for diffusion studies occurring in various disciplines to merge: including studies in Education, Public Health and Medical Sociology, Communications, Marketing, Geography, and to a lesser degree many other fields. "Each of these disciplines pursued diffusion research in its own specialized way, and for some time without much interchange with the other diffusion research traditions, at least until the early 1960s when the boundaries between the traditions began to break down" (Rogers, 1983, p. 46). From this 40 year tradition, then the factors which affect diffusion and adoption of innovations have emerged as generalizations, and will be described.
Attributes of an Innovation

Rogers (1983, pp. 213-232) identifies five attributes of an innovation which affect its rate of adoption. These attributes have emerged essentially from factor analysis and other statistical methods analyzing agricultural and educational research. In these studies, the attributes of the innovation were "considered independent variables in explaining variance in the dependent variable of rate of adoption of innovations" (p. 212). Yet Rogers believes that research on the attributes of an innovation can be of great usefulness in predicting future rates of adoption. The five attributes identified by Rogers are:

1) **Relative Advantage**: refers to the advantages that the innovation is perceived by individuals to have over existing (in use) methods. Relative advantage is positively related to adoption, and probably to extent of use of an innovation within an organizational setting. In the case of the intelligent telephone system, relative advantage would concern how the users perceived the system's ability to provide available, easier, more effective means of communicating with others internal and/or external to the organization with whom they wish to interact. While relative advantages may be perceived through use and experience with the technology, involving end users early in the implementation process may enable these users to perceive relative advantages prior to use; thus developing more user commitment to the change. The implementation issue then becomes: at what point in the process, to what extent, and by which mechanisms should expected relative advantages be communicated to potential users in order to develop accurate expectations? If the extent to which individuals perceive advantages of the innovation will increase use, methods of informing individuals of these advantages, and convincing them that the advantages are real becomes a critical implementation factor.

2) **Complexity**: refers to how difficult the innovation is to understand and use. Complexity is negatively related to adoption. The perceived complexity of the functions of a proposed telephone system would be dependent upon how difficult using the phone was compared with the
existing or previous system, and further how difficult accessing the advanced features were and how easily it was incorporated into the work environment (for example, the extent to which new processes had to be learned while trying to accomplish daily job functions). Thus, if the operation of the new telephone were perceived as very complicated, difficult, and perhaps time consuming to learn, then one would expect lower levels of use by individuals of features that were intended to increase efficiency when the system was adopted by the organization.

3) **Observability**: refers to how well the benefits of the adoption can be seen by the users of the innovation. Observability is positively related to adoption. Increased levels of use by users of the innovation are expected if they can *readily observe* the relative advantages that the innovation holds for them. Individuals faced with a new telephone system are likely to increase their levels of use of particular features if they can convince *themselves* of the advantages of increased use through direct observation. For example, observing an increase in communication effectiveness upon use of conference call or other functions might convince an individual that use of features holds relative advantages over other means of communication. This observability might entail observing other users using features successfully, or perhaps listening to testimonials from other users with similar needs about the relative advantages they perceive.

4) **Trialability**: refers to whether or not prospective users have a chance to experiment with the innovation on a trial basis under low-risk conditions. Trialability is positively related to adoption. The ability to experiment or try an innovation prior to consequential use lowers the individual's uncertainty about the innovation. Trialability is also a mechanism which enhances **observability** of the relative advantages of the innovation. One strategy would be to allow users to *simulate* their new means of communicating via telephone prior to actual functional use where failure could have real negative consequences.

5) **Compatibility**: refers to how consistent the innovation is with the existing values, objectives, and skills, and most importantly the needs of the organization's members. Compatibility is positively related to
adoption. An innovation will be perceived as compatible to the extent that changes in communication networks and the social system incurred by newly available means of communicating via telephone are perceived as congruent with the established communication procedures and norms, skills, and needs of the users. For example, a new telephone system may place new behavioral demands on individuals (different answering procedures, transferring obligations, etc.) These individuals may feel that these new demands are not part of their job responsibility. An innovation will not be perceived as compatible if it's introduction is perceived as disruptive of normal procedures, operation of the innovation is beyond the skills of the potential users, or is not perceived to meet the needs of the users or organization.

**Individual Innovativeness**

Individuals also exhibit certain characteristics and motivations regarding innovations and change which potentially affect adoption and rates of innovation use, which Rogers (1983) calls innovativeness. In situations where individuals have the option to adopt or reject innovations, not all of them who chose to adopt will do so at the same time. Prior research has shown that adopter distributions closely approach a normal distribution curve. Means and standard deviations have been used to divide the distribution into standardized percentages of adopters into each of five categories. However, in an organizational setting, when the adoption decision has been made by top management levels, individuals are seldom given the opportunity to choose when, or even if they will "adopt" the innovation. There may be some utility in understanding innovativeness characteristics if they somehow relate to extent of use of an innovation once adopted by the organization. Rogers (pp. 247-252) outlines the five adopter categories based on what he describes as degrees of innovativeness.

1) **Innovators:** first 2.5% of the individuals to adopt an innovation. Rogers describes innovators as "venturesome"—individuals who are eager to try new ideas, and are able to cope with high degrees of uncertainty.
These innovators may turn out to be internal change agents, (although they may be perceived as deviant and therefore non-credible). They often have more exposure to media and interpersonal (word of mouth) sources of information; which are important in the knowledge or awareness stage of the diffusion process whereby innovations can be imported from outside the organization. When the adoption decision has been made by management, many organizational members may not have knowledge of the adoption decision at the time it is made, and the knowledge or awareness stage then plays a crucial role in the implementation of the innovation. In this way, innovators often play a "cosmopolite" or gatekeeping role in the flow of information about the innovation.

2) Early Adopters: the next 13.5% to adopt the innovation. These individuals are described as "respectable." Members of this adopter category have the greatest degree of opinion leadership. Potential adopters seek advice and information about the innovation from early adopters. Thus, early adopters are considered key individuals in the diffusion process, as the (positive or negative) experiences which they have and communicate to others can have great influence on others' decision to adopt. Within an organizational authority-adoption context, members of the firm may seek out advice or information about the innovation which can influence their rates of use, rather than their adoption decision.

3) Early Majority: the next 34% to adopt; described as "deliberate." They adopt the innovation just before the average member of a social system, and "interact frequently with their peers, but seldom hold leadership positions... they follow with deliberate willingness in adopting innovations, but seldom lead" (p. 249).

4) Late Majority: the next 34% to adopt; described as "skeptical." These individuals are often forced to adopt due to increased network pressure. This pressure often comes from peers who see the Late Majority as disruptive to the social system's activities or organizational functions due to lack of adoption or lack of use of the innovation. Almost all of the uncertainty must be removed from the innovation before the Late Majority feels it is safe to adopt.
5) Laggards: the last 16% to adopt. These individuals are known as "traditional;" whose point of reference is the past. These are individuals who are suspicious of innovations and change agents, but possess almost no opinion leadership. In situations where there is an option to adopt, the innovation may already be superseded by another more recent idea or practice. Within organizations, these individuals represent a major source of resistance to innovation use. Since it has been demonstrated that reluctant users can disproportionately disrupt the value of a communication network by reducing the number of potential communication links (demonstrated more fully in a subsequent section), these individuals represent a key group in the implementation process.

Indeed, the same importance in the implementation process can be attributed to the Early and Late majority, since they represent the largest segment of users, and thus their non-use presents the greatest potential disruption to the communication network. Strategies must be formulated whereby relative advantages specific to the needs of these individuals can become readily observable—perhaps through increased trialability and change agent contact. This latter strategy will be explored more in a succeeding section of this chapter.

It must here be pointed out that while Rogers has outlined certain "personality characteristics" associated with these "ideal types" of individuals based on degrees of innovativeness, the method used to classify them has been to measure adoption rates over time, and categorize adopters along a normal statistical distribution (as indicated by distribution along certain percentiles). However, this method of describing innovativeness has received criticism from other researchers. Midgley and Dowling (1978) feel that research in this area makes two implicit assumptions: 1) that innovativeness is a personality trait which individuals possess; and 2) that what is being measured and reported in these studies is, in fact, this trait. They state:

Rogers and Shoemaker (1971 p. 27) define innovativeness as 'the degree to which an individual is relatively earlier in adopting an innovation than other members of his system,' with an accompanying footnote to the effect that 'By relatively earlier is meant earlier in terms of actual time
of adoption, rather than whether the individual perceives he adopted the innovation relatively earlier than others in his system.' This is essentially an operational definition since it is couched directly in terms of the measurement of innovativeness viz., the time taken for an individual to adopt...The prime focus of our attack is on methodologies which equate time of adoption with innovativeness, and in doing so ignore the dynamic social processes which characterize the diffusion of innovations...

Innovativeness itself is a hypothetical construct postulated to explain and/or predict such observable phenomena, but existing only in the mind of the investigator at a higher level of abstraction...The essence of the argument in this paper is that the trait-behavior model is an inadequate representation of this system, and that in the context of any specific innovation, complex situational and communication effects intervene between individual's innovativeness and their observed time of adoption (Midgley and Dowling, 1978, p. 230).

Midgley and Dowling's conception of innovativeness does acknowledge certain psychological traits such as empathy, dogmatism, achievement motivation, self-monitoring, and intelligence, as well as sociological variables such as social participation, social integration, cosmopolitism, and social character. While a complete discussion of these variables is beyond the scope of this analysis, the importance of the variables is noted within Midgley and Dowling's conclusion that innovativeness carries a high degree of dependence upon:

the degree to which an individual is receptive to new ideas and makes innovation decisions independently of the communicated experience of others...[yet] future definitions should include the idea of an individual's degree of dependence upon communication experience. For this is the key to distinguishing between those individuals who display low variance in their relative times of adoption across several innovations (high innovativeness by our definition), and those who display high variance (low innovativeness) (p 236).

This communicated experience refers to the network of interpersonal messages relating to the innovation and the effects of these messages on the individual. Midgley and Dowling consider the
communicated experience to be one of three "intervening variables" which mediates between the individual's psychological traits and actual time of adoption. The second intervening variable is labeled "interest in the product category", and the third intervening variable "situational effects" (p. 236-237). This last variable includes such factors as situations in which the individual discusses the innovation, the extent of available financial resources, "or perhaps most important of all, whether he has a latent need for the particular innovation's perceived benefits" (p. 237). In fact, there is empirical support for the contention that these perceived benefits (or relative advantages in Rogers' terms) may be the most important factor in determining an individual's innovativeness with respect to a particular innovation.

For example, Oostlund (1974) found that perceptions of the attributes of the innovation by potential adopters can be more effective predictors of innovativeness than innate personality traits. In another study, Bolton (1983) measured perceptual differences between adopters and non-adopters of a Videotex system (Channel 2000) and found that "the perceptual attributes of relative advantage, compatibility, trialability and perceived risk are important indicators of potential Channel 2000 adoption both before, during, and after actual product experiences" (p. 149), and concluded that:

the discriminant function [between adopters and non-adopters] itself was almost entirely based upon the attributes of compatibility and relative advantage at all three points in time. These findings support the contention that these two perceptual attributes are very important influencing factors in the adoption decision process (p. 151).

Similarly, Pappa and Pappa (1987) found that relative advantage, complexity, and trialability accounted for a significant amount of the variance in employee productivity with a new computer system. Employee productivity was defined as the number of insurance claims reports processed -- indicating efficiency at using the computer to retrieve and input information to various files for processing. Relative advantage accounted for 16 percent of the variance, while complexity and
trialability accounted for an additional 4 percent each. Compatibility and observability did not account for a significant amount of the variance in employee productivity. Pappa and Pappa feel that observability did not contribute significantly to the variance because the measure was taken before the employees might have had a chance to consider how their performance had changed due to the new system. While the new computer system required significant changes in claims processing procedures, use of computers was viewed as compatible with the tasks associated with the job of a claims adjuster.

Thus, it appears that Midgley and Dowling's "situational factors," particularly latent need for the perceived benefits and their relative advantages, are at least as useful, if not more useful in predicting innovativeness and extent of individual use of an innovation than are personality traits.

Communication Networks

Thus far, the attributes of the innovation, and the nature of the potential adopters have been identified as factors which affect the diffusion process, and which may also affect the implementation process. The communication channels and networks are also important in diffusion and implementation. Media channels are most important during the knowledge stage, but interpersonal channels are most important for persuasion. Those individuals who have communication links with more innovative cosmopolites (who are usually change agents or opinion leaders) may enter the persuasion stage earlier, or become aware early -- likely as the result of active information seeking. The change agent's success is positively related to the extent of contact with the client/user groups (Rogers, 1983). Yet, a fundamental notion to communication networks and potential adopters is the idea of homophily. Rogers suggests that those who are more similar in nature to each other have more effective communication; that is, understand each other better and are more receptive to information. Within organizations, this similarity takes the form of common knowledge and understanding about
the flow of work within a department or sub-unit, and shared goals and objectives for the unit and the organization as a whole. Thus, the degree of homophily between those crossing horizontal levels of the organization will increase awareness and persuasion due to increased understanding and receptiveness to information.

However, while change agents may have what Rogers calls "competence credibility;" or perceived expertise, he or she is usually lacking in "safety credibility" (p. 328). This safety credibility refers to the "trust" that one develops with more homophilous members of the social system. Here is an important argument for what Rogers and Kincaid (1981) call "network" diffusion rather than traditional diffusion: because the traditional favors top-down diffusion among non-homophilous groups, while network diffusion favors diffusion within existing work-groups which are more homophilous (see Figure 1). This type of diffusion allows change agents to have "optimal heterophily:" that is, they are similar in as many ways as possible with potential users except for their expertise with the innovation. According to Rogers, these are the ideal characteristics for effective change agent-client relationships.

In a large organization such as The Ohio State University, there are many departments and sub-units of the University which have different functions, task objectives, and employ a wide variety of individuals with different skills and experiences. Even within each of the three main classifications of Administrative, Service, and Academic departments, there may be vast differences among these departments with respect to size, tasks and objectives, and knowledge and experience of employees. Therefore, it would seem that informal networks within each department would facilitate this type of diffusion in a hierarchy more than would traditional diffusion along formal networks.

Finally, management philosophies and objectives can affect diffusion. Management itself may exhibit different characteristics concerning innovativeness: managers within departments of an organization may be resistant to change, or supportive/innovative themselves. The innovativeness and/or attitude of the management toward
the innovation could affect the levels of use of individuals. In addition to the amount of encouragement (or perhaps coercion) given to individuals to use the innovation, managers can perhaps play important functions as role models. Further, managers may be gatekeepers in the flow of information about the innovation, affecting levels of awareness and knowledge. Most importantly, management plays a crucial role in defining the criteria by which the success of the innovation is to be evaluated. Engineering and technical management (communications systems managers for example), who are often involved in adoption decisions of technology, tend to focus on technical criteria for success: how well the system works technically. These managers likely have different criteria for evaluation than departmental managers and
users who focus more on the needs of the users and appropriateness of technology use. Much more will be said about these criteria for success in the following section.

The size of the firm also places certain constraints on innovativeness. Larger firms, such as The Ohio State University may have necessary capital resources and "slack" or available resources to devote to innovations, whereas smaller firms might not. However, the diffusion and adoption process may be more difficult in the large firm due to the chances of more competing goals and philosophies. In a university setting, various academic, administrative, and service department may have different sets of goals and objectives than the university's goals as espoused by the President's office, for example. The university upper management may set goals and criteria for success of an innovation of decreasing overall telecommunications costs by ownership and management of the telephone system, and promote use of labor saving telephone features to increase productivity. Appropriate use of these features, as defined by university management and technicians, may necessitate economic, structural and procedural/behavioral changes within individual departments. However, individual departments may not be willing or able to pay additional monies for installation of advanced features, or may not be willing to implement such structural/procedural changes to accommodate the technology. In other words, the university goals may be to change methods of operation and cost distributions by introducing an innovation, while departmental goals may be to minimize costs and changes associated with the innovation, which they see as disruptive. When the decision to adopt an innovation is made by top management, as with an authority-based adoption decision, then these competing goals and philosophies become important implementation issues which can influence criteria for innovation effectiveness and individual levels of innovation use.

This section considered how prior research on traditional diffusion and adoption of innovations may be helpful in understanding the process of implementation of an innovation within an organizational context. However, traditional diffusion and adoption research has
focused mainly on individual, optional decisions to adopt. Individuals within organizations are rarely given the option to adopt or reject the innovation once the decision to adopt has been made by upper management. The following sections explain why further research, which goes beyond the diffusion and adoption processes, is needed to fully understand implementation of an innovation within an organizational authority-based adoption situation.

The "Adoption Perspective" of Innovation Diffusion

Brown (1981) suggests that the isolation of the diffusion process, and a focus on the process by which adoption occurs, has been the dominant and most completely developed perspective for the last 50 or so years. Brown labels this the "adoption perspective," which looks at the "demand aspect of diffusion":

The basic tenant of this conceptualization of the spread of innovation across the landscape is that the adoption of an innovation is primarily the outcome of a learning or communications process...Accordingly, a fundamental step in examining the process of diffusion is identification of factors related to the effective flow of information and of the characteristics of information flows, information reception and resistances to adoption (Brown, 1981, p. 5-6).

Research has favored the process by which adoption has occurred, largely ignoring implementation factors which are crucial to successful organizational innovations. Rogers (1979) finds that:

past studies of innovation in organizations mainly consisted of correlational analyses of cross-sectional data gathered in one-shot surveys from a sample of organizations. Usually the dependent variable was organizational innovativeness, defined as the degree to which an organization is responsive to adopting new ideas...From such investigations, we have been able to learn something about the characteristics of innovative and non-innovative organizations. Unfortunately, such studies have told us little about the process through which a new idea is put into use in an organization (p. 77).
Indeed, Rogers concludes that "The 'bottom line' is implementation (including institutionalization), not just the adoption-decision. While the concept of institutionalization will be explored more fully later, Rogers considers institutionalization as the end of the implementation period: when the innovation has become a routine part of the organization's processes, and thus loses its distinctive quality. Previously, most diffusion scholars focused on adoption, not implementation, as their dependent variable" (1979, p. 79).

In an organization, the adoption process centers largely around the decision process to introduce the innovation. These decisions are arrived at through a diffusion process which exhibits the following stages (Rogers, 1983):

1) knowledge, or awareness of the innovation;
2) persuasion: formation of attitudes/beliefs about the innovation as a result of contact with change agents, opinion leaders, management, media, etc.;
3) adoption (or rejection) of the innovation, based on the previously described factors affecting diffusion process;
4) implementation of the innovation;
5) confirmation: evaluation of the relative advantages and compatibility of the innovation, which confirms or disconfirms prior expectations formed at the persuasion stage--leading to continued or discontinued use.

According to Rogers, the adoption decision is one in which there may be several forms, and occurs over time. Optional decisions are made by individuals free from coercion by management, and independent of who else adopts. Collective decisions are made by consensus among most or all members, while Authority decisions are those made by decree from top levels of the organization. Finally, Contingent decisions are those which are dependent upon the adoption of another innovation(s) prior to this decision (use of spreadsheets for business calculations and projections is contingent upon computer adoption for example).
Authority-based Innovation Decisions

The first form, or optional decisions are most likely of all forms to be associated with the diffusion steps of knowledge, persuasion, adoption or rejection, implementation, and confirmation. While these steps may be typical of individual optional decisions, Rogers and Brown agree that there is much less validity to the occurrence and/or progression of these steps within organizational adoption settings, and particularly where Authority decisions are made. Rogers (1983, pp. 362-366) presented a model of the innovation process in organizations. This model presents an initiation phase, leading to the decision to adopt, and an implementation phase; with initiation and implementation phases consisting of several stages.

Initiation is defined as "all of the information gathering, conceptualizing, and planning for the adoption of an innovation, leading up to the decision to adopt" (p. 364). The first stage of the initiation phase is labeled "agenda setting:" where an important organizational problem is identified, and an innovation is sought as one means of coping with or solving the problem. The "matching" stage, then, conceptually examines the feasibility of an identified innovation in order to anticipate how well the innovation is likely to solve the organization's problem -- leading to adoption if it appears to be a good "match."

The implementation phase, defined as "all of the events, actions, and decisions involved in putting an innovation into use" (p. 364), follows the adoption decision and consists of three stages. If the innovation does not exactly fit the organization's situation, "redefining/restructuring" occurs; where the innovation is modified to better accommodate the organization's needs and structure. As Rogers points out, sometimes the structure of the organization may have to itself be modified in order to accommodate the innovation. Under such circumstances, the implementation may prove to be a more difficult process. The "clarifying" stage occurs as the innovation gradually begins to serve more and more functions within the organization, "and as
this happens the meaning of the new idea becomes clearer to the organization's members" (p. 365). Rogers suggests that while misunderstandings or unwanted side effects (resistance to change) may occur, corrective action can be taken to rectify these. Attempting to create a clear understanding of the innovation, its perceived capabilities, benefits, and limitations among the members of the organization prior to implementation should be a major objective of the implementation phase. As Lippitt, Miller, and Halamaj (1980) find, more accurate and realistic prior expectations increase an individual's satisfaction with a system. Finally, "routinizing" occurs as the innovation loses its separate identity and becomes incorporated into the regular activities of the organization. This phenomenon is also known as "institutionalization" of the innovation (Rogers, 1979). Figure 2 presents Rogers' model of stages in the innovation-decision process (1983, p. 165).

What is needed beyond this model of organizational innovation is a further examination which accounts for the type of adoption decision, and explicates the processes through which the implementation stages are accomplished. There are likely to be fundamental differences in the processes which may be present under Authority decisions, as compared to other adoption decision types.

Indeed, many environmental factors seem to be fostering or forcing Authority decisions as the norm among business firms today (Brown, 1981; Rogers, 1983; Klemmer & Dooling, 1983). First, the rapid expansion of technological development in telecommunications is being driven largely by products being marketed as solutions to existing problems, and to a lesser (but substantial) extent as opportunities to achieve a competitive edge over other firms. In many senses, these are congruous if not identical needs. For example, many innovations are adopted as preventative measures against threatening environmental factors
A model of stages in the Innovation-decision process.

The innovation-decision process is the process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision.

Note that for the sake of simplicity we have not shown the consequences of the innovation in this diagram.

Figure 2. Rogers' Model of Stages in the Innovation-Decision Process.
Alternately, many firms adopt innovations to secure "windfall profits," or a competitive edge. Rogers defines windfall profits as the special advantage gained by the first adopter(s) between the time of their adoption and adoption by other firms. Further, after use and experimentation with an innovation, new and advanced applications may be found which were not perceived at the time of adoption; leading to additional advantages. This process is known as "re-invention." Yet, Rogers points out that when all members of a social system adopt a new idea, total production or efficiency increases, and the price of the product or service often goes down. In addition, many innovations are not successful, and may result in "windfall losses." Thus, innovators must take risks in order to secure windfall profits, and there may be costs associated with innovativeness. However, as Brown and Rogers argue, given the high levels of competition among organizations, firms are forced to adopt technological innovations or fall behind its competitors who do.

Hence, organizational adoption decisions are typically Authority decisions, rationalized by cost-benefit analyses, based on the assumption of universal user adoption. Yet experience has shown that it is uncertain whether adoption by an individual (or more accurately use by an individual) will follow from the adoption and implementation by the organization (Rogers, 1983). For example, an organization might adopt an electronic mail system to increase the number and efficiency of communication.

1. Optical prints, or "fingerprints of the eyes" have been adopted for security measures against unauthorized access to restricted areas of buildings, etc. Similarly, voice prints could be used to deter unauthorized access to a voice mail network.

2. For example, HBO was the first cable programmer to begin distribution by satellite. In effect, this gave them inexpensive access to every cable headend, and HBO subsequently went on to become the most lucrative cable programmer.
communication links within and outside the firm. However the adoption by
the organization itself is no guarantee that the individuals within the
organization will actually use the system at all, much less routinely.
An organization may adopt certain advanced features for a new telephone
system, which are intended to facilitate communication or make office
operations more efficient. Yet there is no guarantee that these features
will ever be used by individuals. Klemmer & Dooling (1983) suggest one
factor which tends to increase the probability that individuals may not
actually use adopted innovations effectively. Marketing studies, they
assert, (specifically in regards to business telephone systems) "tend to
focus on the person who makes purchasing decisions on communications
equipment...Often such studies focus on [system design] feature
capabilities (e.g., '3-way conference calling') and not on the detailed
needs of the specific users (e.g., secretaries need to know whether to
pass a call to a busy principle)" (p. 279). Moreover, Klemmer and
Dooling state that "It has been our experience that operating procedures
are even more important than physical design" (p. 280). The fact that
priorities on hardware implementation rather than use by individuals,
and lack of consideration of specific user needs can result in decreased
system use is underscored by Rogers' claim that there have been few
diffusion investigations into "how-to knowledge:" that is, communication
processes which involve diffusion and effective use of the innovation
within organizations subsequent to organizational adoption. These are
clearly implementation processes. In addition, Rogers (1983) finds that:

A certain degree of uncertainty about the expected
consequences of the innovation still exist for the individual
at the implementation stage, even though the decision to
adopt has been made previously...Problems of implementation
are likely to be more serious when the adopter is an
organization rather than an individual. In an organizational
setting, a number of individuals are usually involved in the
innovation-decision process, and the implementers are often a
different set of people from the decision makers. Also, the
organizational structure that gives stability and continuity
to an organization, may be a resistant force to
implementation of an innovation (Rogers, 1983, p. 174).
Thus, while Authority decisions accelerate adoption/diffusion, they are also the most susceptible to individual circumvention and sabotage. In other words, when the experiences and expertise of those individuals who are likely to be affected (either positively or perhaps negatively) by the changes inevitable with innovation implementation are not fully considered during the decision process, there is no generation of a shared perception of the need for change among those to be impacted -- resulting in less user commitment to the success of the innovation. Indeed, several authors point out that failure to involve end users in specifying a system's design can lead users to be dissatisfied with their jobs subsequent to system implementation (Lucas, 1978; Mumford & Banks, 1967; Mumford, 1972). This issue of certain implementation of the innovation by the organization, but uncertain adoption and/or satisfaction by individuals within the organization becomes a critical factor within the context of adoption of communication technologies.

A fundamental characteristic of a communication system is that the value of a network is a function of its universality within a given group; or that the utility of a communication network is a function of universal access and use by functionally-related individuals (Acker, 1985). He states:

A network consists of linkages among and between individuals. An increase in network membership increases the number of linkages geometrically. For example, if a two-person network can add a third member, the number of linkages increases four-fold; whereas the two-person system has only one potential use, when Person 1 and Person 2 communicate, the three-person network allows communication between any two persons as well as among all three (p. 210).

Thus, individuals choosing not to participate (or are unable due to lack of access) have a disproportionately disruptive effect on the value of the network. For example, if the "universe" of functionally-interrelated individuals who need to be in regular contact is four, there are eleven possible linkages among the four persons. However, if one individual does not participate in the network, the
number of possible links drops to four. In other words, a 25\% decrease in network membership results in over 63\% decrease in possible communication linkages (see Figure 3).

These calculations of network disruption are relatively clear and straightforward for instances of non-use by individuals. Experience has shown, however, that with authority decisions, it is not a case of adoption vs. non-adoption by individuals. Rather, it is a matter of the extent of use which impacts the utility of the network. Also, consequences of the innovation are not based on adoption or non-adoption, but again on extent of use. The contention here is that extent of use and innovation consequences are directly related to implementation factors under authority decisions. This is similar to the distinction between "binary diffusion" models (Rogers & Shoemaker, 1971), which treat adoption as an adopt/non-adopt phenomena; and "use diffusion" models which focus on the rate of use of an innovation, which treat the phenomena as a continuous variable (Hamblin, Jacobsen & Miller, 1973).

As an example of the distinction, Grieve (1985) examined the diffusion of an electronic mail system in an academic Department of Communication, and found that of 32 initial potential users, three were subsequently classified as non-adopters, six as discontinued users, and 22 adopters: an overall adoption rate of 68.75\%. Again, it is possible to calculate the number of possible communication links for a network of 32 and of 22 individuals, and determine the loss of functional communication links and thus network disruption. However, this analysis would be misleading, and underestimates the actual network disruption which is evident when one factors in levels of use. Indeed, Grieve found that while 22 individuals subsequently adopted e-mail, only slightly over half of the network members accessed the system once or more weekly. Consider, then, that network members who must (or would like to) maintain frequent or constant contact with others (which e-mail is designed in part to facilitate), are faced with communicating with unreliable users (who may not log in and receive a message for days or weeks). Hence, members will typically resort to other methods of
Network Membership = 4
Individual Links = 6
Multi-Party Links = 5
(1-2-3, 1-2-4, 2-3-4, 1-3-4, 1-2-3-4)
Total Functional Links = 11

Network Membership = 3
Individual Links = 3
Multi-Party Links = 1 (1-2-3)
Total Functional Links = 4

NETWORK MEMBERSHIP LOSS = 25%
FUNCTIONAL LINK LOSS = 63.6%

Figure 3. Utility Of An Electronic Communication Network As A Function Of Universal Access And Use By Functionally Related Individuals.
communication with these individuals. They may attempt to telephone, which has a demonstrated initial contact failure rate in excess of 80% (Knopf, 1982), or turn to written memos or face-to-face contact. Thus, the same disruptive impact on the network occurs with unreliable users (but technically "adopters") as with non-adopters.

Therefore, in situations where Authority decisions to adopt an innovation are made, and therefore individual "adoption" is not optional, the dichotomy between either adopters and non-adopters, or continued and discontinued users in determining the success of a system is not useful: the focus must shift to the communication processes associated with influencing extent of use. Typically, the communication strategies focus on facilitating implementation in such a way as to maximize levels of use among individuals within the proposed communication networks, in order to maximize the number of potential communication links. However, such a perspective assumes that maximized use of an electronic communication network (and its features) is equated with the most efficient use of the system: a perspective which is closely aligned with the theory of technological rationalism (Shon, 1983; Joiner, 1983), and Model I theory of organizational learning (Argyris & Shon, 1978). Each of these theories suggests a view which sees technology as the merging of science and technique (practice); or the determination of means based upon the rationally most efficient (input-output ratio) manner: which is then equated with system effectiveness.

The perspective of technical rationality tends to assume 'a framework of stable, compatible objectives for which rational (organizational) inquiry consists of choosing the most effective means.' If the perspective of technical rationality acknowledges the existence of conflicting objectives, it tends to assume that these conflicts can be resolved through trade-off analysis. Yet trade-off analysis, while it acknowledges multiple objectives and alternatives, ultimately assumes a shared framework, because it requires agreement on a value system according to which the costs and benefits of various alternatives can be scored. Either way, the
perspective of technical rationality assumes a conventional definition of effectiveness [quantification of input/output ratios--efficiency]...

By contrast, the dialectic perspective recognizes that there are zones of organizational experience in which there are 'incompatibilities of norms and objectives which are not resolvable by a search for the most effective means. For norms set the criteria by which effectiveness may be judged.' Incompatibilities of norms and objectives can arise in different ways, but the central feature of this kind of situation is that a dilemma is created because of underlying assumptions and criteria for effectiveness that are in conflict (Joiner, 1983, p. 172, boldface added).

This search for efficiency of technology use as system effectiveness is likely to be closely aligned with the evaluation perspective of technicians and engineers. Due to their training and expertise, technicians may tend to focus on hardware capabilities rather than end-user needs. Thus, a communication system may be configured based on the technical efficiency of a certain set of hardware features. However, this efficiency of the design is likely to be predicated upon use of all the available features by individuals. When individuals do not use the system as anticipated or desired by the technicians who designed it, the technical criteria for effectiveness may not be met. In the use of an intelligent telephone system for example, engineers and technicians may consider the ratio between features available and features used as a measure of system effectiveness. As Kling and Scacchi (1980) (as well as Joiner, 1983; Klemmer & Dooling (1983); Argyris & Shon (1978); Rogers, 1976; and Shon (1983)) point out, this is but one of several perspectives which analysts use to explain why organizations adopt technologies, why some people exhibit different levels of use, and espouse different criteria for system effectiveness.

For example, Kling and Scacchi (1980) feel that there is an important distinction to be made in defining the success or failure of a system implementation: those that treat success or failure in terms of management goals, and those that treat them in terms of technical criteria. Writing specifically about computer systems, they state:
Thus construed, a system implementation project could be considered by computing specialists to be a technical success, while failing to meet organizational or management goals; and conversely, a system implementation project might succeed in involving satisfied users and attaining management goals, yet be considered a technical failure (p. 272).

Indeed, Klemmer and Dooling (1983) recall their experiences with studying the implementation of an intelligent telephone system, and state that:

Originally, we thought that the fact that people do not use all of the features was a training problem. We now view this finding much more broadly. Different users have different needs and no one person needs all of the system features. The issue of feature usage is better directed at the delivery system to ensure that each individual has access to the features needed (p. 282).

These authors conclude that "it becomes clear that feature configuration represents a major human factors challenge. The problem is to understand the needs of individual users and to ensure that the right features end up on each telephone" (p. 281, boldface added).

Indeed, the findings that failures to involve end users who could assist in specifying system's design features can lead to dissatisfaction with jobs and/or the technology itself suggests that the perspectives of end users should be considered much earlier in the system life cycle; which Kling and Scacchi outline as:

1) Initiation and adoption;
2) Requirements specification;
3) Selection;
4) Design;
5) Implementation;
6) Testing and validation;
7) Documentation (instructions, etc.);
8) System use;
9) Maintenance, modification, and conversion; and
10 Evaluation.

These stages have clear relationships with the stages of the diffusion process, both individual and organizational, as outlined by Rogers (1983). Kling and Scacchi's stage of initiation and adoption would include Rogers' diffusion process of knowledge or awareness of the innovation, formation of attitudes and beliefs about the innovation through persuasion by various individuals within and/or outside the organization, and adoption. The selection stage of Kling and Scacchi's outline could occur either during the adoption stage or the implementation stage of Rogers' diffusion model: depending upon whether the actual system had been selected or just the decision to adopt "a new telephone system." Where Kling and Scacchi's design stage fits into Rogers's diffusion process depends upon the degree to which the design was already built into a particular system adopted. With communication systems, much of the design may be flexible, and configured in various ways. Stages 7, 8, 9, and 10 of Kling and Scacchi's outline would all be part of Rogers' implementation phase of the diffusion process. Finally, the evaluation stage above would correspond with Rogers' confirmation phase, where the relative advantages to the organization and users either confirm or disconfirm prior expectations.

However, Kling and Scacchi point out that their conception of the 'system life cycle' "does not refer to some predetermined sequence of steps through which all systems must inevitably pass" (p. 262); but rather points to beginnings, middles, and endings of systems which might lead to new systems beginnings. As step 9 suggests, modification or conversion (re-invention) may occur as a direct result of system use and evaluation by end users.

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3. For example, a telephone system can be configured such that all incoming calls into an office or complex are channeled through a main answering point, or ring directly into individuals.
As Klemmer and Dooling (1983) state in regards to business telephone systems: "human factors specialists [who focus on end-user needs] can add and should contribute to decisions at every stage of the system development cycle...[including:]") (p. 279)

* Customer studies to define new services.
* Physical design of equipment.
* Design of operating procedures for users.
* Instructions and training.
* Delivery and operational support systems.
* System evaluation with customers in the field.

Such contributions are in sharp contrast to implementation efforts which involve only engineers and technicians, and focus only on technical criteria for success. Klemmer and Dooling (1983) report laboratory studies and field evaluations in which human factors specialists have succeeded in improving services, physical design, and operating procedures of telephone systems, based on experiences of end users.

When considering this study of the implementation of the new telephone system at The Ohio State University, several principles regarding instructions and training based upon these studies are of particular interest. First, Klemmer and Dooling suggest that as systems have more capabilities, more features need to be learned; and the cost of traditional instructional methods (live trainers, classes, and hands-on practice) becomes prohibitively expensive. Their summary of research concludes that "training time could be cut in half without reducing the level of customer feature use and feature knowledge" by applying the following principles:

1. Hands-on training is not required for cognitive skills such as operating a feature-rich telephone system. Laboratory studies with subjects and field experiments with actual customers have failed to show an advantage for the hands-on approach...
2. Initial training should introduce system capability and teach the use of performance aids (e.g., instruction card). It should not attempt to teach all operating procedures for all features...The validity of the principle is demonstrated by
the fact that even after two hours of conventional training, users typically did not understand all the specific feature procedures.

3. Self-instruction training is just as effective as instructor training in terms of knowledge of system features and operations." (p. 281).

These principles hold particular significance for the study of implementation at the Ohio State University. Conventional methods of instruction, using live trainers and hands-on experience with specific feature procedures, were used for training individuals on the new telephone system (See Chapter III for a description of training methods used by Ohio State University Telephone Services).

High and Low Involvement

A focus by practitioners on appropriate needs assessment and training techniques can do much to facilitate effective use of an innovation, and perhaps increase individual levels of use. Recall that latent needs and other situational factors such as available financial resources, and communicated experience from others about the innovation are "intervening variables" which mediate between individual psychological traits and time of adoption of an innovation (Midgley & Dowling, 1978). These variables are also likely to affect individual levels of use of an innovation which has been adopted by an organization. Another intervening variable identified by Midgley and Dowling is termed "interest in the product category." The following discussion argues that interest in the product category is analogous to a concept known as product "involvement" (Greenwald & Leavitt, 1984; Zaichkowsky, 1985). Involvement with the product category is likely to affect not only rates of adoption of innovations, but more importantly for the Ohio State University, rates of telephone feature use. In addition, it is argued that latent needs for the innovation's perceived benefits, and hence level of use are likely to be highly dependent upon the individual's job classification or responsibilities; which have been
demonstrated to affect telephone feature use (Knopf, 1982; Rice & Manross, 1986). Indeed, level of use is the only relevant measurement regarding innovativeness here, as the adopting unit is the University itself. Under this circumstance, all potential users will receive new telephone equipment and service, and thus "adopt." The key question is to what extent will individuals "adopt" available features -- measurable by extent of feature use.

According to Greenwald and Leavitt (1984), "high involvement means (approximately) personal relevance or importance" (p. 538). Zaichkowsky (1985), in her review of the involvement literature, suggests that a person can be involved with advertisements, products, or purchase decisions. Clearly, involvement with a product (the new telephone system) is of concern for the present study, since the purchase decision had been made for end-users, and users were not exposed to any advertising campaigns. Accordingly, it is important to note that involvement with the product appears to lead to greater perception of attribute differences, perception of greater product importance, and greater commitment to brand name (Zaichkowsky, 1985). Since in the context of the situation at Ohio State users had no chance to discriminate between brands of telephone equipment, only the first two perceptions above are of current relevance.

Further, there appear to be three areas which may affect a person's involvement level:

1) Personal--inherent interests, values, or needs that motivate one toward the object [product]
2) Physical--characteristics of the object that cause differentiation and increase interest
3) Situational--something that temporarily increases the relevance or interest toward the object" (Zaichkowsky, 1985, p. 342).

There appears to be a relationship between the above areas and the perceived attributes of an innovation as important indicators of innovativeness. The personal area of inherent interests, values, and needs are consistent with the definition of compatibility, while the physical area of object characteristics which cause differentiation and
increase interest are consistent with the definition of relative advantage. In addition, it may be that the situational area defined above may relate to Midgley and Dowling's conception of the communicated experience as an intervening variable in personal innovativeness. Hence, the concern for the implementation process becomes one of identifying communication strategies whereby increased interest due to greater perceived relative advantages can be generated.

Krugman (1965) argues that one can expect communication effects with either high or low levels of involvement, although the effects will likely be different. For high involvement, communication would most likely directly modify beliefs, while with low involvement, the effects would likely be more on perceptions related to brand logos or package recognition -- occurring more gradually and only through repeated exposure. Obviously, these effects are postulated in terms of product advertising, specifically on television. However, if one has an understanding of the possible impacts of communication on certain levels of involvement, it may be possible to formulate communication strategies with these goals in mind.

For example, Ray (1973) outlines a hierarchy of effects which marketers commonly use as goals associated with communication responses: awareness, comprehension, conviction, and action. In other words, when implementing an innovation such as an intelligent telephone system, potential users must become aware of the impending change (service, equipment), gain comprehension of the systems capabilities, etc., form a conviction to use the new system, and finally take action (use). However, Ray finds that depending upon an individual's level of involvement with the product, differentiation of alternatives, and the communication source, the hierarchy of effects may occur in different orders -- which has implications for communication message strategies. While there are numerous hierarchy of effects classifications, each have three major structures: cognitive, affective, and conative. The cognitive component includes attention, awareness, comprehension, and
learning; the affective component includes interest, evaluation, attitude, feeling and conviction; and the conative includes intention, behavior, and action (propensity to behave).

The important question concerns the relationships within the hierarchy; that is, in which temporal order will the effects occur. Ray states that "The question of whether man thinks before acting or acts before thinking is as old as Plato and as new as Skinner" (p. 172-173). Originally it was posited that the hierarchy would occur in a "stairstep" fashion: learning before attitude change before behavior change. Yet, empirical evidence and theory indicate that this model is too simple, and that a cognitive (learning) response is often not a measurable antecedent to affective or conative responses. Ray claims that research indicates that response situations occur mainly in three elemental orders: 1) Learning hierarchy (cognitive-affective-conative); 2) Dissonance-Attribution hierarchy (conative-affective-cognitive); and 3) Low Involvement hierarchy (cognitive-conative-affective).

The three orders model, then, is a specification and exploration of the conditions under which each is found. These conditions are said to be a particular combination of involvement, differentiation of alternatives, and the communication source. It was found that the Learning hierarchy typically occurs under conditions of high involvement, and where there are clear differences between alternatives. Hence, individuals who have high involvement with the product first become aware, develop interest, make evaluations, try the product, then adopt (adoption process hierarchy). Under such conditions, mediated messages which create awareness and knowledge may be very effective in achieving communication goals.

Next, the Dissonance-Attribution hierarchy typically occurs under conditions of involvement, but where alternatives have been almost indistinguishable. Here, interpersonal communication and persuasion may cause behavior changes before attitude change and learning. In other words, the individuals are forced to decide on the basis of some non-media communication source. "Then he or she changes attitude in order to bolster that choice -- often on the basis of experience with
the chosen alternative. Finally, learning itself occurs on a selective basis, in order to bolster the original choice by response to messages that are in support of it" (p. 152). The Low involvement hierarchy occurs most often when there are minimal differences between alternatives, or when low involvement makes actual differences unimportant to the individual. Under such circumstances, individuals have very little perceptual defenses against communication messages (here particular to advertisements), and will likely not directly change attitudes. Hence, attitude changes are likely to be the result of experience with the product.

Although communication source and differentiation of alternatives are important factors in determining the order of the hierarchy, there is an indication that involvement seems to explain the hierarchy of effects more that the former two variables: in fact is the "key explanatory variable in the three orders model" (p. 161). In addition, within the context of the present situation at the Ohio State University, "consumers" of the telephone service have not been presented any alternatives (of product); although there is the potential for alternatives of telephone features. The implications for implementation of innovations seems to be related to the involvement of particular individuals (or types of individuals perhaps based on job category), and the source(s) of communication which should be used to elicit certain responses from potential users. The expected responses will, of course, be dependent upon the level of involvement.

Interestingly, in their study of adoption of an intelligent telephone system, Rice and Manross (1986) found that individual's assessments of the attributes or benefits of the new telephone system did not interact with needs and use of the system.

For managers and administrators, positive attitudes here are not related to adoption [measured as the number of functions used]; real task needs are not related to subsequent perceived benefits...Of importance to the study of adoption of new communication technologies is that affective aspects studied in the present research -- attitudes toward and benefits of the innovation -- are independent of behavioral aspects -- phone use and level of adoption" (p. 739-740).
This finding has significant implications for implementation of innovations. Large amounts of time and effort may be directed at developing positive attitudes or changing negative attitudes towards the innovation and attempting to establish relative advantages and benefits for the users. Yet these efforts may be unsuccessful or unjustified in light of an absence of attitudinal and behavioral linkages if the objective is to maximize available feature use.

**Job Category**

Earlier research posited that an individual's latent need for an innovation would be related to that individual's "innovativeness" and therefore likelihood of adoption (Midgley & Dowling, 1978). Within the context of organizational authority-based adoption, latent need for the adopted innovation would likely influence the extent of use of the innovation. This need might in part be based on job function or responsibility. Empirical evidence lends support to this claim. Knopf (1982), for example, identified fifteen office tasks performed by different classes of workers, along with time distributions. These tasks were divided into three classifications: face-to-face, document, and telephone. While managers spent only 9% of their time using the telephone, executives spent 16%, knowledge workers 17%, and secretaries spent 20% of their task time on the telephone. On the basis of these findings, one would expect that the numbers of features used on an intelligent telephone system would be related to the total time spent using the telephone in daily office interaction.

A study done by Rice and Manross (1986) lends support to this hypothesis. These authors looked at the adoption of an intelligent telephone system in a Fortune 500 organization, and used the number of features used by individuals as the measure of adoption. It was hypothesized that three major factors would be indicators of the level of adoption: organizational role (as measured by job category), attitudes toward the technology (as measured by perceived appropriateness of the intelligent telephone), and the amount of time
spent using the telephone in one's daily work. The data showed significantly lower levels of telephone usage for managers and technical personnel than for administrative personnel for an average working day (14%, 11%, and 28% respectively). "This differential usage of the business phone--implying differential needs for the innovation (the intelligent telephone)--was associated with different levels of adoption" (p. 735). While administrative personnel adopted more features than managers and technical personnel, the number of functions adopted was lower for managers than technical personnel. Interestingly, the level of perceived benefits did not differ significantly by job category, nor did the perceived appropriateness of the system. In fact, "the only strong and consistent relationship was between time spent using the telephone and number of functions used...That is, need leads to use" (p. 737, 739). Managers and technical personnel "adopted" or used fewer features than administrators. Yet a path analysis looking at job category separately from appropriateness and time spent on the telephone showed administrators derived significantly less benefit from the system. "They 'adopt' the system, but do not really 'accept' it" (p. 739).

Recall that in the same study individual's assessments of the attributes or benefits of the new telephone system did not interact with needs and use of the system. Taken together, the findings of this study support Klemmer and Dooling's (1983) contention that conventional live and hands-on training (time consuming and expensive) may not be justified in that self-instruction is just as effective in terms of knowledge of system features and operations. It would seem that since users are likely to use system features as a result of job-related need, perhaps implementation programs should indeed focus more on enabling users to access self-instruction materials or alternative learning/instruction sources as these needs arise. Other mechanisms to promote the benefits of the system and modify attitudes may be unsuccessful.
Research Questions and Hypotheses

Based on the preceding review and analysis of the literature, the following research questions will be examined in this study:

1) How is a telephone used in an organizational setting and how can it be implemented to more effectively fulfill its functions?

2) What are the factors which influence the extent of individual use of the telephone system once adopted by an organization?

3) How can an understanding of these influential usage factors promote successful implementation?

It will here be argued that subsequent to an authority based adoption decision within an organization, many of the factors which affect the diffusion and adoption of innovations may affect the extent of individual use of the innovation. These factors therefore become critical to the successful implementation of the innovation. Under most of these authority decisions, most potential end users have not participated in the diffusion process prior to adoption. Hence, in addition to installation of the physical hardware of an innovation such as an intelligent telephone system, implementation involves a secondary diffusion process to create awareness, knowledge, and skills among end users prior to installation. Recall Rogers' (1983) definition of diffusion: "the process by which an innovation is communicated through certain channels over time among the members of a social system" (p. 5). Clearly, within the context of an authority adoption decision, this becomes part of the implementation process.

Although some research concludes the opposite (Rice & Manross, 1986), one would expect that the attributes of the innovation would affect extent of use as well as the adoption decision. For example, individuals who perceive more relative advantages to particular features of a telephone system (based on diffusion factors during implementation) would likely use those functions more often. Similarly, the job category or responsibility also would likely affect extent of use. The communication channels (i.e. mediated and/or interpersonal) used to
create awareness, knowledge, training and documentation are also critical to the successful implementation program. The organizational culture and communication networks one is involved in might determine the need for system features and/or the information one receives regarding the innovation. Finally, prior research has also shown that increased contact with the change agent(s) increases the rate of adoption, and subsequent to the decision facilitates user effectiveness with technology.

These factors also will influence implementation by determining needs as mentioned, as well as generating expectations and skills. Subsequent to system use, system effectiveness will be defined as the relationship between an individual's actual experience (uses) with the innovation and their desired uses. In other words, effectiveness is based upon an individual's perception of their own communication needs and the technology's ability to satisfy these needs. Certainly much of the technology's ability to accomplish desired functions depends upon the appropriate design of the system based on needs and the individual's ability (skill) to use the functions as needed: both implementation factors. A model of these proposed relationships is presented in Figure 4.

The following hypotheses will also be tested:

1) There will be significant differences in involvement with the telephone system between users of different job classifications: with clerical staff and administrators showing higher involvement than faculty. This hypothesis is based on the assumption that clerical staff will spend more time using the telephone, and it will therefore be a more salient product for them. Administrators however, may be more highly involved with the telephone system due to salient budgetary concerns.

2) There will be significant differences in extent of telephone use between users of different job classifications: with administrative personnel (clerical staff as defined by Ohio State University) using the
Figure 4. A Proposed Model of Factors Affecting Individual Levels of Technology Use and Perceived Effectiveness.
telephone more frequently and thus greater extent of features use than managers (administrators as defined by Ohio State University) and faculty.
CHAPTER III
METHOD

The implementation of any innovation in an organization will require and produce organizational changes related to skills, procedural, structural, or social/cultural factors. Thus, adoption and implementation of innovations becomes a learning experience for the organization—both as an entire unit and for each individual within the organization to be affected by the changes. The learning involves development of methods which allow the organization to plan desired and beneficial changes which will maximize the effectiveness of the innovation, and successfully institute and manage them. What follows is a discussion of certain principles associated with change, and a set of two research and analysis principles (Action Research and Sociotechnical Analysis) which can assist the organization in accounting for human factors and thus the employment of a marketing perspective of implementation: hence decreasing resistance to change through an appropriate learning experience. In addition, these principles stress the uniqueness of each organization and the individuals which comprise it. Thus, the prime objective of the researcher is not to find generalizable results from his or her investigation, although these may arise as a consequence. Rather, the main objective is to use Action Research and Sociotechnical Analysis to guide the organization through its learning process. Hence, both Action Research and Sociotechnical analysis deal with both the organization and individuals as units of analysis.

Following the discussion of these research principles, the context of the research, the role of the researcher, and the methods used in this study will be described. Using principles of Action Research and elements of Sociotechnical Analysis, the research goals were both
pragmatic and academic -- pragmatic in assisting the organization (both Telephone Services and individual university departments) in problem identification and collaborative problem solving and learning -- and academic in examining factors which influence innovation implementation within organizational authority adoption contexts.

Innovation and Change

Huse (1980) describes two fundamental principles involved with organizational change:

1) factors increasing resistance to change, where the perceived benefits are non-existent or not readily apparent to individuals (high uncertainty); or where the organizational objectives of the change are not consistent with the goals and objectives of individuals.

2) factors decreasing resistance to change, including creating shared perceptions of the need for change (ownership) through participation in information gathering, problem identification, data analysis, and evaluation: in the form of a dialogue which reduces uncertainty related to the innovation and its potential consequences.

The latter requires an opening of communication channels within and between different levels of the organization in order to foster this collaborative inquiry and enhance sharing of information. This participatory process results in a broad understanding of and support for change due to the high degree of ownership and commitment for action by the members. These principles of decreasing resistance to change are related to managed change: controlling and directing change in a desired way to benefit the organization and its members both. Leonard-Barton and Kraus (1985) allege that managing implementation must account for the perspectives and needs of both the technology developers and the users. "Perhaps the easiest way to accomplish this task is to think of implementation as an internal marketing, not selling, job. This distinction is important because selling starts with a finished product; marketing with research on user needs and preferences" (p. 103).
Adoption of such a "marketing" perspective requires management to seek out user involvement in several key stages of implementation: 1) early examination of the fit between a product or process and user needs; 2) preparing the organization to receive the innovation (awareness and knowledge of the innovation, training, and other necessary changes); and 3) gradual shifting of "ownership" of the innovation to the end users.

This proactive perspective is in sharp contrast to viewing change as something which "happens" and is reacted to -- generally with new strategies consistent with pre-established, authoritarian objectives of the organization -- reflecting a more technically rational perspective. The action research model guides the organization through collaborative objectives and strategy planning, information gathering, problem diagnosis, and action step implementation. Sociotechnical analysis uses action research principles to achieve the "best match" in adoption or implementation between the technical system and the social system within the organization. While the human factors literature would stress the earliest possible involvement by potential users in the diffusion process (ideally prior to any actual adoption decision), both Action Research and Sociotechnical Analysis emphasize an open-ended, or cyclical research and development design. Thus, continuing evaluation of new technology use will require further data gathering and analysis, and may require further problem identification and possibly new adoption decisions, implementation procedures, or other organizational changes to enhance the effectiveness of the innovation. Principles from both these models, then, can be facilitative in managing organizational change during either or both the adoption and implementation processes, as well as throughout the organization's use of the innovation.

**Action Research**

Huse (1980), in his book on organizational development, suggests that the overall purpose of action research is to help the client (organization) increase its own problem solving skills. This is achieved through a cyclical process of collaborative inquiry; where joint
diagnosis (between the change agent(s) or consultant(s) and members of the organization) of problems, collaborative analysis of data, and joint strategy formation are underlined by the concepts of decreasing resistance to change. Huse suggests that new scientific knowledge is also created through this process. The key point here is that action research promotes participatory or collaborative inquiry, organizational learning, and increased problem solving capabilities of the organization. Huse then suggests that intervention (which here presupposes managed change) can be focused on any or all of the following three levels:

1) **organizational structural level**: the formal organizational structure, and forms of control (task differentiation).

2) **work-flow level**: on the technical aspects of converting inputs to outputs, and the channels and networks of communication.

3) **human level**: on the more individual/psychological level of the organization's members.

As an example of the first level, one could change the configuration of a telephone system from a decentralized answering design with many individual incoming lines to a more centralized answering point system with few or no direct individual incoming lines. Such a change might require a new job description for an existing employee or a new position altogether which assumes the duties of answering and transferring calls. A change of this type would clearly be an example of the second level: re-distributing task assignments or procedural requirements of the workers. Alternatively, changing from a centralized answering system to decentralized individual incoming lines would also re-distribute tasks and procedures, and possibly call for a change in structure (even elimination of some job responsibilities such as receptionist).

Re-organization of structure and/or the work flow of the organization could require new interpersonal relationships, result in resistance to a change in procedure or job responsibility, or result in other human factors issues. The point is that action research as it will be
described suggests that as a system, each of the above levels are interrelated, and changes in one will result in changes at all other levels.

William Joiner (1983) reviews the work of Kurt Lewin, who he argues developed the initial model of action research. Equating it with collaborative inquiry, Joiner describes collaboration as a joint form of inquiry based upon shared power and common understanding. Lewin tried to account for the interrelationship between the three levels of intervention described earlier (Organizational structural level, work-flow level, and human level) by infusing democratic leadership styles with humane scientific inquiry. He felt that collaborative inquiry would lead to more effective social action.

In several early experiments during the 1930's, 40's and 50's, two fundamental principles of action research were derived. In studies related to leadership styles, it was found that more democratic leadership created a more cohesive and productive group climate (Lewin, Lippitt, & White, 1939). It also allowed for more individual differences to be exhibited while still retaining cohesiveness.

Next, in experiments related to different methods of communicating information related to social change, the effectiveness of participatory data gathering and analysis were demonstrated. In classic experiments related to worker stereotypes, for example, it was concluded that even when the findings of the inquiry were contradictory to the expectations of the members, the findings were believed more and commitments for action made because they themselves had participated in the data gathering and analysis which produced the findings (Marrow & French, 1945). Lewin conducted several studies which arrived at similar conclusions (Lewin, 1945, 1951; Marrow, 1969). The findings from these early research efforts reflect the participative aspect of action research: that participation leads to greater internal commitment due to ownership of ideas and decisions, which decreases resistance to change.

Joiner (1983) summarizes four kinds of action research: diagnostic, empirical, experimental, and participant. Diagnostic action research closely corresponds to typical consultant activities where a
problem is specified by a client group, and the data is collected by the social scientist or consultant. A diagnosis is made by the researcher or consultant and presented to the client group, along with recommendations for action. Diagnostic action research has some features which are similar to participant action research.

Empirical action research relies on factual records of actions kept by organizational members. In theory, the organizational members learn by reflecting upon the records they keep of their actions. Joiner points out that this method is limited to a focus on individuals rather than a larger organizational unit, and by the subjectivity of the methodology.

In experimental action research, conventional variable-isolating controls are used "to test the relative effectiveness of various action techniques" (Joiner, 1983, p. 73). Most often, experimental research attempts to produce scientific generalizations about action rather than attempting to guide the client group through a learning process, or "producing generalizations that are valid and useful for practitioners" (p. 74).

Finally, participant action research involves those who are to take the action steps in the entire research process from the beginning. The premise of this involvement stems from Marrow and French's (1945) and Lewin's (1945, 1951) findings that research findings were believed more and greater commitments for action made because those to be affected had themselves participated in the data gathering and analysis. According to Joiner, "Lewin place[d] very strong emphasis on the importance of collaboration in the fact-finding stage, in discussing the findings, and in making decisions and commitments to action" (p. 75). Therefore, greater internal commitment arises from increased ownership of ideas and decisions by those who produced them -- decreasing resistance to changes resulting from action.

In authority-adoption decision situations, end users of the innovation are often not given a chance to participate in a collaborative inquiry identifying problems which ultimately lead to the change; nor are they likely to participate in the adoption decision.
However, collaborative inquiry can still play a positive role in enhancing the implementation process -- leading to more effective levels of individual use of the innovation. Many of the design characteristics of an intelligent telephone system and other communications media are flexible: that is, features and communication flows can be tailored to the needs of the organization, various sub-units or departments within an organization, and individuals within the organization. Assuming a marketing perspective would allow end users to participate in a collaborative effort to design and configure the system to best match the unique technical and social needs of the organizational unit.

Based on Lewin's work, Joiner (1983) developed a model of action research pictured in Figure 5.

In its initial step, uncertainties and ambiguities related to the problem may require an objective of more fact finding, which results in the devised strategy to collect such data; after which the analysis of the data provides more insight into the perceived problem. This leads into another phase of formulating strategies and objectives for correction/intervention. Upon completion of the action step implementation, further evaluation of the effects is made, which again may lead into further diagnosis of possible modifications, etc. However, the initial step may be anywhere in the process, exemplifying the cyclical or continuing nature of the research model. The major characteristics of this model include the democratic manner in which the process occurs; suggesting collaborative/participatory involvement in all phases of change by members of the organization who are to be affected, as well as leading to increased internal commitment for action. These characteristics are carried further by the work of Argyris (1968; 1970) and Argyris & Schon (1978), as will be seen.
Argyris (1970) extends these principles by considering interpersonal or individual factors of "psychological success" and "confirmation," which can be argued to affect resistance to change and commitment to action. The following assumptions describe psychological success:

1) individuals can define their own goals, values, and aspirations.
2) these goals, etc. can be linked to the goals, values, and objectives of an organization (and either be consistent with or in conflict).
3) individuals can chart their own paths to the achievement of these goals and aspirations.
4) the goals, values, and aspirations can reflect realistic aspirations within the work environment.
Again, change processes which account for these psychological factors will decrease resistance and foster internal commitment. Related to these assumptions, then, is the notion of confirmation. This supposes that feedback from others can confirm (or deny) assumptions one holds about themselves, but only in a collaborative environment where information is freely exchanged (here is where management or leadership style becomes important). Confirmation of one's self-perceptions or "worth", can lead to confidence and commitment through a feeling of ownership of information and alternatives. This is accomplished in the following communication environment:

1) feedback about one's behavior is linked to confirmable or observable examples. If the data is not confirmable, then it becomes opinion rather than information.

2) feedback is minimally evaluative, and more descriptive. This reduces feelings of defensiveness (Argyris, 1968).

Argyris (1970) outlines three intervention strategies which form the basis of internal commitment to change, as well as serve as the governing principles in what will be described as Model II organizational behavior and Model 0-II organizational learning theory. These are:

1) **valid information**: observable or verifiable information, which is generated through the above communication environment.

2) **free and informed choice**: which presupposes participation in data gathering and decision making, and selection of strategies based on shared needs.

3) **internal commitment**: which presupposes that the participation and valid information will lead to broader support through increased ownership of information and decisions.

From these individual perspectives, Argyris (1979) and Argyris and Schon (1978) bring important concepts into the organizational level of learning. They describe Model I and Model II as theories-in-action which represent basic patterns of response by the organization to "errors" in accomplishing instrumental objectives. Model I is based on "traditional" concepts of altering **strategies** in response to errors. It assumes that
the objectives and values of the organization are not open to question; thus strategy failures are attributed to the strategies themselves, and not to incompatible objectives within the organization. This environment is characterized by win/lose assumptions of competing strategies which foster defensive and evaluative communication and unilateral control (authoritarian) of the process. Generation and expression of negative feelings are suppressed in order to protect the status-quo of the organizational culture. Individuals also protect themselves by censoring or withholding information, which leads to much private testing (confirmation) of perceptions and ideas, and little public testing. One can see how these tendencies are the antithesis of the three intervention strategies outlined by Argyris. Indeed, in order to protect oneself or others in the work group during problem definition, much feedback is disconfirmable for just such purposes.

In contrast, Model II assumes that under circumstances where the goals and or values of the organization are not clear, or where assumptions and criteria for effectiveness are in conflict within the organization, these governing principles must be open to reflection and question; particularly in situations where the dynamics of the organization or changes in the environment render a mere change of strategy ineffective for control of errors. Thus, the organization's goals and values are brought into question based upon the assumptions of valid information, free and informed choice, and internal commitment. This results in "double-loop" learning, and a Model II learning system in which the organization's values and goals are continually open to question based on the assumption that the rapidly changing environment may require this for adaptation and success. Finally, in order to accomplish "double-loop" learning, which Argyris and others describe as learning to double-loop learn, the organization must become accomplished at:

- Advocacy of the skill of communicating what is thought to be true or should be.
- Illustration of the skill of using verifiable information based on observable examples.
3) inquiry: or the skill of inviting question to the advocacies.

Model II organizations must be adept at combining these three skills for effective change. The principles of double-loop learning work equally well within any phase of organizational change related to adoption and implementation of new technology.

Sociotechnical Analysis

Sociotechnical analysis incorporates many of the same communication principles found in Action Research. However, as the title of Pava's (1983) Managing New Office Technology: An Organizational Strategy suggests, sociotechnical analysis and design is more specific with respect to the entire management spectrum of new communication technologies within the organizational context. Pava describes sociotechnical design as "analytical and procedural methodology." Sociotechnical principles can contribute to any phase of the diffusion or adoption-decision process, and equally to the implementation process. Once the decision to adopt an intelligent telephone system has been made, the analysis would stress managing change in the design of the social and technical systems to provide the "best match:" which is presented as the key to individual effectiveness and organizational success.

Pava states that matching the social and technical systems adequately in a rapidly changing environment requires organizational learning; which provides the flexibility by which change can be accomplished effectively. This may require learning and change in:

1) operator skills;
2) procedures and structure (work design), including:
   - distribution of responsibility;
   - information flows (communication networks);
   - coordination of roles;
   - incentives and compensation;
3) cultural fabric and management principles.
Clearly, within the context of authority adoption decisions, these changes are necessarily dependent upon the implementation procedures.

The basic assumptions of sociotechnical analysis and design which provide the framework for development are:

1) **the work organization is an open system which is affected by the environment, which must be constantly monitored.** In a rapidly developing age of telecommunications applications, concerns over cost-control, or competition from other firms, for example, may encourage or force the adoption and implementation of innovations, or modification of current communications systems.

2) **the work organization exhibits systematic complexity which requires scrutiny of the work flow.** In the case of a new telephone network, the work flow may be an extremely important factor in implementing design features. Recall that both Knopf (1982) and Rice and Manross (1986) demonstrated that different job classifications and responsibilities played an important role in determining the amount of time spent using the telephone, as well as the extent of features used on an intelligent telephone system.

3) **the organization must maintain a level of variety which meets the requirements of flexibility in an ever-changing environment.** The organization has two methods for organizing people in the social system for maximum variety (flexibility in terms of ways to cope with change): redundant parts and redundant functions. The concept of redundant parts reflects a view that workers should specialize within a limited set of tasks and roles. This allows for more rapid replacement of employees because recruits can be more easily trained for a limited set of skills. Redundant functions reflects a management view which encourages more generalization by individuals and creates variety for the organization and enhances psychological success. This concept also allows for more effective work groups. Members can rotate tasks and gain better understanding about how their own work affects others, and assume other roles when needed due to absences, structural changes, etc. For example, suppose all clerical staff members of an office were
given knowledge of the way the telephone system has been configured to process calls, as well as skills in using features of the system designed to effectively process calls. This would enable a variety of employees to assume those responsibilities when necessary, and help them understand how their own use of the telephone system can make the office more productive, or conversely how failure to effectively use the telephone system can decrease their own productivity of and that of others.

Sociotechnical analysts and designers strive to promote organizational flexibility and ability to learn; fostered by a work system which is characterized by:

1) **maximized self-design**: pressures to change must come from within and allow for participation/collaboration from representatives of all potential user groups;

2) **minimum critical specifications**: this allows for the system to accomplish pre-set goals, but allows for subsequent individual contributions, and modification in light of future contingencies.

3) **open-ended design process**: this not only allows for future modifications, but also assumes that the design [implementation] process is never-ending, and that not only are the strategies open for question, but also the objectives and values.

The participatory, collaborative nature of the proposed communication environment (closely aligned with that of action research) enhances development of new values and skills by intergroup and relational learning. This learning is facilitated by utilizing the concept of redundant functions as previously described.

In order to design strategies and implement changes, Pava outlines four phases of the Sociotechnical Analysis:

1) **Initial Scan**. The initial scan identifies the status of the organization as a system, and typically includes:
   - identification of environmental factors which influence the organization;
   - specification of inputs and outputs of the work groups;
   - summarization of the major historical, social, and physical
features of the organization;
- [collaborative] formation of the mission of the organization (goals and objectives of each work unit);
- [collaborative] formation of the management philosophy.

2) **Analysis of the Technical System.** This analysis involves the specification of each step in the conversion process, identifies units of operation, and specifies key "variances" in relation to the conversion process. Variances are defined as aspects of the conversion process which can go "awry," or create errors.

3) **Analysis of the Social System.** The social analysis maps role and communication networks which collectively contribute to production, and explores the extent to which psychological job criteria is met for individuals.

4) **Work System Design.** Following the characteristics of maximized self-design, minimum critical specifications, and open-ended design processes, the organization formulates goals and objectives of the work units. The necessary inputs and desired outputs must be specified, and team boundaries and spheres of responsibility defined. Necessary skills must be communicated and obtained, and new reward structures may be beneficial. Pava feels that consistent with the concept of redundant functions, reward structures should be based on the number of skills/roles individuals master. Leonard-Barton and Kraus (1985) suggest that "Managers must bring the criteria used to judge performance of innovation users into conformance with the demands of the new technology" (p. 109). Also, criteria for effectiveness must also be considered for the goals and objectives of the innovation itself. For example, top management is most concerned with "an innovation's likely effect on the bottom line, is accustomed to receiving proposals that specify return on investment and paybacks...[but]...some companies are beginning to realize the limitations of traditional capital budgeting models" (Leonard-Barton & Kraus, 1985, p. 104). According to these authors, organizations are realizing payoffs from innovation in
unanticipated ways: improved quality, increased market shares, and
ability to diversify product lines. The work system design also
creates coordination and evaluation mechanisms among work teams
and provides for desired technical enhancements for modification.
Finally, Leonard-Barton and Kraus suggest conducting pilot
programs for innovations that 1) serve as an experiment to prove
technical feasibility to top management and 2) serve as a credible
demonstration to other potential user groups. These pilot programs
may also serve as "trialability" sites whereby users can observe
relative advantages and learn necessary skills.

Pava argues that organizations which manage change following
sociotechnical principles foster psychological job criteria which are
closely aligned with those of Argyris:
1) autonomy and discretion, or increased responsibility for job
   coordination;
2) opportunity to learn and grow professionally;
3) feeling of worthwhile contribution to and future with the
   organization.

The importance of these criteria are assumed to reflect an increased
commitment to organizational change and a decrease in resistance to
innovation. Thus, sociotechnical analysis provides human factors
principles which can assist in the successful implementation of an
innovation within an organization. The strength of sociotechnical
analysis and design is in its equal consideration of both the technical
and social subsystems within the organization, facilitating the best
match between the two in order to promote organizational learning and
flexibility to adapt in the age of rapid technological and environmental
change.
Process of the Investigation

As Joiner's model indicates, action research is process oriented and cyclical: a continuing process of problem diagnosis, action planning, action implementation, and evaluation leading to further problem diagnosis. Recall, however, that the initial step can begin at any stage in the process. The research presented here took place during the implementation process of the new telephone system at the Ohio State University. The activities of the researcher involved collaboration with Ohio State University Telephone Services in each of the stages of the action research process, as well as collaboration with individual departments. Prior to describing the actual research activities, it will be helpful to describe the context in which the research took place.

Context of the Research

The Ohio State University is a very large university with campuses located in Columbus, Lima, Mansfield, Marion, and Newark, Ohio. In addition, there is an Agricultural Technical Institute in Wooster. Enrollment at the Columbus campus was nearly 50,000 students during the Spring Quarter 1988. The University structure consists of 20 Colleges and seven Schools (including the Graduate School), offering degrees in 469 different majors. The Ohio State University Bulletin of course offerings (1988-89) lists over 140 different departments, divisions, and centers.

Several factors ultimately led to the decision to adopt the intelligent telephone system at Ohio State University. According to Carroll Notestine, Assistant Vice President Emeritus of University

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1. The information contained in this chapter was gathered in eight separate interviews with personnel from University Systems and Telephone Services, between February 1986 and February 1987, and from analysis of existing documentation.
Systems, and Dino Pezutti, Director of Telephone Services, existing switching capabilities did not allow increased touch-tone dialing and other needs such as direct station to station transferring to be met effectively. Second, telephony costs were escalating at the same time these changing needs were not being met. Third, a lack of control over erratic rate increases and lack of feature provision resulted in a desire to assume management capabilities over telephone service on campus.

It should be noted that voice communications are only one planned application of what is officially called University Network/Integrated Telecommunications System (UNITS). Therefore, the need to expand data and video transmission capabilities throughout campus later became a factor as well—particularly after the idea of a fiber optic infrastructure emerged. However, since telephone service was considered the necessary first step in the overall UNITS project, the focus of this analysis will be restricted to the implementation of the telephone system. What follows is a description of the factors leading to the adoption of the new telephone system and the adoption decision itself, a discussion of how the implementation timeline and pricing schedule was derived, and initial implementation procedures.

**Historical Background**

**Factors leading to the adoption of the telephone system.**

During late 1969 and early 1970, Ohio Bell installed a Centrex system, designed specifically to support The Ohio State University telephone needs. Apparently, the Ohio State University's Administration philosophy was to provide only basic telephone service, in order to eliminate the perceived problem of individuals requesting different types of telephone devices or features. At the time, touch-tone dialing was a new feature in demand. The administration felt that selective provision of touch-tone capability would be perceived as a status or prestige indicator, such that if one individual received it, everyone
else would want it as well. Thus, the decision was made to put no capability for touch-tone telephones into the Centrex switch. About 10 years later, after Administrative personnel had changed, and telephone costs were escalating, the University looked at implementing their own long-distance network, which could provide discounted service of the same quality -- saving the University considerable money. However, the new long distance service required users to first dial a three-digit access number, followed by a six-digit authorization code, followed by the ten digit long distance number -- a total of 19 digits. Naturally, this was very time consuming on a rotary-dial phone, and therefore increased demand for touch-tone telephones.

With some engineering work on the Centrex switch, it was possible to begin to provide touch-tone capability. Initially, sufficient capability to handle about 600 lines was installed, with plans to gradually build up capacity. Although there were expectations of demands exceeding capability, these demands never materialized. Due to the additional costs associated with touch-tone service, only 300-400 telephones were ever converted. In fact, until the University began installing the new telephones in November 1985, 85 percent of the telephones on campus remained rotary dial.

Once touch-tone capabilities became available, users began to find out about other advantages than dialing ease. Apparently, individuals noticed that features such as message waiting lights, call forwarding, and call waiting were available at businesses, in hotels, and at home; and they began to understand that basic telephone service was changing. Certain "innovators" on campus, or according to Carroll Notestine, Assistant Vice President of University Systems, "the people who stir things up in that regard," began requesting features to which they had been exposed elsewhere. However, Ohio Bell was not able to satisfy these requests due to the limited capabilities of the Centrex switch.

Replacement of the existing equipment was not feasible due to the long depreciation schedule of this equipment. Due to regulatory factors, this
equipment was amortized over a 20 year period. Consequently, there were no plans to significantly change telephone service until after the 20 year depreciation period.

Moreover, the building which housed the equipment was itself built at that time specifically to service the University. This further complicated the capital investment problem. As Notestine put it, "So we could look ahead and say 'they [Ohio Bell] are not going to offer us different service for a million years...simply because the situation, and that switch just can't provide those kinds of things.' So we could look ahead and say 'it isn't going to get any better, it's only going to cost us more. And is that what we want?'"

During 1980-81 then, the University went to Ohio Bell expressing their need to convert to a new telephone system. Based on increasing requests for advanced features, the University felt that a digital system would be desirable, if not necessary, in order to meet these needs. In addition, the University had begun to think about assuming management capability of telephone service on campus. Rate increases had become a more acute problem. Yet more importantly, price increases for service were not occurring uniformly, making planning very difficult. There were many different kinds of phone service on campus, with some individuals using six-line phones, some using standard single-line phones, and some using phones with different consoles on them. Six-line phones might get a rate increase of 40 percent in a year, then no increase for several years, while single-line increases were different. Moreover, overall rate increases were occurring rapidly. While average cost increases between 1969 and 1984 were around 14 percent a year, some

2. The idea of a fiber optic network and owning the wiring system was an outgrowth of the fact that improving the telephone system was not the only communication system which needed improvement. A lack of wiring facilities to provide expanded data and video applications to classrooms, laboratories, and even faculty offices were factors which led to the expansion of a new telephone system into the UNITS concept.
years it would be as high as 35 percent. These increases occurred at
times when Ohio Bell was granted PUCO approval to increase rates to
realize their allowed 9 percent rate-of-return. Carroll Notestine of
University Systems recalled that:

...even when we could get some information that would say
Ohio Bell was going to increase their rates by 'x' we had
inadequate records to do a good job at predicting where those
increases were going to occur. So we really didn't tell
departments ahead of time very well. We could pick out some
big ones and say 'you're going to get a big hit.' But we
couldn't do a good job of saying 'here's the way this rate
increase is going to be distributed over the university.' And
historically, the university has been very poor at directly
responding to those kinds of budget aberrations. Departments
just get 6 percent a year [budget increase] and they kind of
have to live with that. And if they got a 40 percent increase
in their phone bill, it's kind of tough luck. Maybe you'd
better not travel so much this year...For as long as mankind
kept records, this was the way it would be. It wasn't every
six months you got a little bit, it was nothing for two
years, and then a big jolt.

Thus, although telecommunications costs would probably continue to
increase, a university managed system would afford rate increases at a
much more gradual pace. Dino Pezutti, Director of Telephone Services,
felt that this would be preferable to "having these spikes that created
serious impacts on peoples' budgets."

In their first attempt to satisfy the University's requests for a
new system (during 1980), Ohio Bell could not provide a Private Branch
Exchange (PBX) which had enough capacity to serve the entire University.
AT&T engineers proposed to develop some Dimension PBX systems modified
specifically for the University. However, the University had several
concerns about these proposals. First, the highly specialized nature of
the switches would have made it difficult to have all of the software
work properly; particularly when new enhancements would be needed in a
very unique system. Second, this proposal would have left most of the
management of the system with Ohio Bell -- something the University had
already decided against. Finally, the issue of non-digital equipment was
seen as problematic. Dino Pezutti reflected that
one of the problems with Dimension is that it is not a digital switch. And so at the time they [AT&T] came back with quite a few Ph.D. engineers from New Jersey to show the University that we really didn't need digital equipment: that analogue would suffice...And we listened to them. We obviously didn't argue with them, because you're talking to Ph.D.'s who are, you know, credible engineers who know what they are talking about. But the damaging point was in their annual report for that year, that came out something like three months before, it stated right in there, one of their top paragraphs, that digital was the way of the future. So why should the University come up with a sizable investment in another piece of equipment, that they're going to have to keep for at least ten years, and it still isn't what AT&T itself projected in their annual report to be the way that telecommunications was going, ok? And so they were able to delay us for at least another three or four years before we eventually made a decision we were going to go out and buy our own equipment. That bought them some time, and they were hoping that by that period of time they could have some equipment that could meet our needs...

Disappointed with the AT&T proposal, the University began to look into different telephone switches. When divestiture of AT&T became a reality in 1984, new options for the University became available. Consequently, the University opened bids for equipment, specifying approximate numbers of telephones and desired functions/features. Because of divestiture, the non-regulated division of Ohio Bell, Ohio Bell Communications, could market equipment, but ironically, not Western Electric (AT&T) equipment. "Consequently, here is a group of people who over the years were promoting and selling Dimensions. Now all of a sudden they can't sell them anymore. But they could sell other equipment" (Dino Pezutti, Director, Telephone Services). The reason was that Ohio Bell, under divestiture, had become part of Ameritech -- one of the seven regional operating companies now separate from AT&T. Under the divestiture agreement, the regional operating companies could not sell Western Electric equipment, as Western Electric remained part of AT&T. Ohio Bell Communications, then, came in with a bid proposing a
digital switch manufactured by Northern Telecom. Apparently, Northern Telecom also submitted a bid independently, but several factors led to the acceptance of the Ohio Bell bid.

First, price was an obvious factor, and Ohio Bell had apparently submitted the lowest bid. The service relationship between the University and Ohio Bell was also a major consideration. The University would continue to do well over a million dollars worth of business a year just in leasing lines from Ohio Bell to connect to the external environment. "There's some notion of the service that Ohio Bell can provide, because they are the folks who know where all the manhole covers are, and the telephone poles, and the wires and that sort of thing" (Carroll Notestine, Vice President, University Systems).

Maintaining a good relationship with the local telephone company, then, was seen as an important side benefit.

Another thing that fell into place around the time of the bid process was the purchase of the building which housed the Centrex switch. Once it was clear that the University was going to own and manage its own telephone system, and since the building and switch was built primarily to service the University, Ohio Bell could no longer justify maintaining the 8th Avenue complex. Indeed, the University comprised around 65 percent of the business from the office, with an additional 15 percent of the business supporting Battelle Memorial Institute -- who had also decided to install their own switch. This would effectively remove 80 percent of the office's business. Consequently, Ohio Bell then agreed to sell the facility to the University.

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3. A description of the telephone system and its features appears in Appendix A.
The adoption decision.

Prior to the final decision to accept the Ohio Bell bid, the University had a series of meetings with telecommunications equipment vendors and consultants. Some were companies like Ohio Bell who could sell and install the equipment, others were contractors who could only do part of the job, such as install wires or the switch. These meetings were generally open to anyone who had an interest in telecommunications at the University. Naturally, University Systems was involved as the administrative data processing center, of which Telephone Services is a sub-unit. In addition, representatives from the Instruction and Research Computer Center (IRCC), the WOSU broadcast stations, the Medical Center, the Office of the Provost, Business Administration, and Offices of Finance and Treasury were also present. Dino Pezutti recalled that "we were sort of taking the lead from the Administration building to tell us who it is we need to involve here...And so we had sort of a cross section that attempted to to try to give every area of interest on this campus so they could all be represented."

In addition, when the entire UNITS concept was proposed, prior to the Board of Trustees meeting where it was resolved to issue bids for equipment, University Systems prepared a report which described the proposed system. This report was sent to every Dean and every Vice President on campus.

And we solicited a written response from everybody. And we went back and got it from those who didn't. So that for every area on this campus that's represented by a Vice President or a Dean, we have on file a letter that says they support this system. We felt that that was absolutely critical to this project. So no one can say that we put UNITS in and that no one knew. Now, if the Dean or Vice President chose not to pass it down to any of the people within his organization, well, that's obviously within his purview to do that. So we don't know that. But we do have written response on file from every one of these people -- without exception (Dino Pezutti, Director, Telephone Services).
Carroll Notestine also recollected: "Now, some of them said 'well, you ought to be careful about, and you shouldn't do this.' But nobody said 'this is the worst damn thing I ever heard of, and all of our faculty will resign' and that sort of thing." Thus, an attempt was made to provide representation from the University community to have some influence over proposed telecommunications development.

Ultimately, however, the evaluation of the bids themselves was not open to such wide representation. At this point, representation was limited to Telephone Services, the Treasurer's Office, Office of Finance, Vice President Jackson (Business Administration), and President Jennings. The final decision likely was not made by a single individual. Clearly Vice President Jackson was responsible for allocating financial resources for the UNITS project. However, asked about President Jennings' role in the final decision, Carroll Notestine stated "I think it's fair to say that if he had decided that this was not the thing for the University to do, we would not have done it."

Implementation: technical factors.

Once the decision had been made to adopt and implement new telephone service on campus, an implementation program was begun. Telephone Services began to write down various contingency factors. Naturally, these tended to focus on the technical requirements of installing the new switch, wiring, and telephones terminals. One of the main initial factors was the the cut-over from Ohio Bell. It was scheduled to happen on March 17, 1987 (the date the Centrex switch would become inoperative). That target date, then, along with other technical factors and human factors such as assessing customer needs and designing training programs, led to the formation of the UNITS Management Plan. 4

Essentially, telephone service would be cut over to the new system building by building in order to increase efficiency of wiring and

4. A complete version of the UNITS Management Plan appears in Appendix B.
equipment installation. This was to occur in three major phases. The first phase included installation of approximately 1,100 phone stations by January, 1986 (although completion actually occurred in February), and included six buildings. During phase 2 (1986-87) the equipment needed to eliminate Centrex was installed. This included providing uniform dialing at the completion of phase 2, as the new UNITS telephones were on a 292 exchange, while the Centrex phones were on a 422 exchange. The fact that until October 1986, both exchanges were operating on campus, created considerable confusion for both internal calls and for people dialing into the university—a point discussed in greater detail in Chapter IV. This situation also created some cost concerns. A person on the 422 or 292 exchange needed to dial 9 to get an outside line in order to call someone on the other exchange. This meant that on-campus calls from 422 to 292 had to go out through Ohio Bell circuits. Although the departments were not incurring those costs, Telephone Services was, and were therefore anxious to eliminate Centrex entirely. Phase 3, then, included installation of the remaining approximately 10,000 stations during 1986-88. The new Chemistry building on campus was to be occupied by July 1, 1986, and was therefore activated on the new system at that time. The remainder of Phase 3 installation resumed in October 1986.

_Implementation: pricing schedule._

The pricing schedule was also a major aspect of implementation. Telephone Services had been charged with trying to "provide like telephone service as the phone company" (Dino Pezutti, Director, Telephone Services). The University had borrowed part of the 24 million dollars needed to finance the UNITS project. The longer money is borrowed to make a purchase, the more it costs. The University wanted to make that time period as short as "reasonably" possible. The assumption was made that the average 14 percent annual increases from Ohio Bell would continue for at least three more years. Thus, UNITS was priced at the same amount that people would have paid at that rate. Consistent
with the objective of making inevitable cost increases more gradual, the
increases then were to be flattened out to 6 percent thereafter for six
years. Carroll Notestine of University Systems reflected:

So we came up with that, if you will, financial model. And
that revenue stream will pay for [the telephone system] in
whatever the number is, 8 or 9 years. People looked at that
and said "Ok, that's reasonable." Now we could have increased
it 50 percent per year and paid for it in 2 years, and people
would have said "That isn't reasonable." We could have
increased it 1 percent per year over 40 years, and I'll bet
[President] Jennings would have said "That isn't reasonable
either." [The rate increases were set] I'm going to say
deliberately, at the same amount that Ohio Bell's had been,
sort of with the statement that this system will not hurt
anybody more than if we had just stayed on Ohio Bell, and you
will have additional facilities, features that you would not
have had.

Using this "financial model," Telephone Services put together a
"predictive spreadsheet," which compared UNITS costs to phone bills
based on existing service. This was distributed to every Dean along with
a report of their current use. "And...with the exception of maybe three
cases, the bill was lower" (Dino Pezutti, Director, Telephone
Services). This predictive representation made two basic assumptions.
First, it assumed that about 15 percent of the telephones would be
electronic sets -- the rest being single-line sets. Electronic sets are
telephones with multiple incoming lines and push-buttons on the side
which allow for one-touch feature access, and are more expensive per
month. Single-line telephones are more like standard telephones with a
single incoming line. On these sets, accessing features requires the
user to depress a series of numbers on the dialing keys themselves. The
5. In fact, every department which was interviewed reported increased
telephone costs, typically citing a doubled phone bill over that with
Centrex. This point will be discussed in greater detail in Chapter IV.

6. See Appendix A for a description of these telephones.
second assumption built into the cost structure was that all telephones on campus would be touch-tone. Thus, what the added costs would have been for touch-tone service from Ohio Bell were embedded in the UNITS costs. Although the Northern Telecom system is fully capable of providing rotary-dial service, almost all new telecommunications applications require touch-tone. For example, the Registrar's office introduced a voice-conversant system which allows students to register for classes by phone; entering in code numbers and other information on their telephone key pad. Hence, installing rotary dial phones would have hindered planned and potential applications of phone registration and access to reduced-rate long distance service.

Implementation: human factors.

The human factors component of implementation included equipment operation manual and other documentation preparation, orientation programs, needs assessment consultation, and user training. The UNITS Management Plan also included promotion of labor saving features of the system. Naturally, these procedures were modified during the process, both as a reaction to experiences with users and as a result of ongoing research findings presented to Telephone Services.

In October 1985, Northern Telecom representatives came to campus and held an orientation and training session for 40-50 people. These individuals had been identified as departmental coordinators for Phase 1 installation. Due to limited staff resources, Telephone Services wanted each department to have its own telephone coordinator -- a person well trained on the functions of the new telephones able to serve as both a departmental resource person and trouble shooter. Ideally, this coordinator was an individual who had both a working knowledge of the telephone communication patterns of the departmental members, and knowledge of budgetary matters which would permit realistic cost evaluations during system configuration. Once the coordinators for the first implementation phase were identified, an orientation session was held to explain what their responsibilities would be and give them
proband solving information/skills. The four hour training essentially consisted of a description of available features of the SL-100 system, and some hands on practice with the features. This training and orientation occurred two to four months before actual Phase 1 installation.

The next steps in the implementation program included three major activities. First, the coordinators received a document titled "UNITS Feature Package Options explaining the available telephone features and prices during the orientation/training given by Northern Telecom (see Appendix C). This "notebook" also contained telephone selection worksheets to assist the coordinators in planning the selection for each departmental phone. These worksheets included a summary cost sheet where the total numbers of each type of phone, and optional features ordered could be listed, resulting in a total estimated cost for service. The coordinator (often with the Dean or Chairperson who could provide purchase approval) would meet with the Telephone Services consultant(s) to design the office system (how many phones and where) and designate features for each phone. Typically this involved preparation of a phone inventory of the existing Centrex needs, and configuring the new system to meet those needs.

Second, within a week of the actual installation of the phones, group training (described shortly) was offered to each user. The coordinator was responsible for signing up departmental members for one of the training sessions, which were held in groups of about 10 persons. During phase 1, training occurred at the temporary offices of Telephone Services in Lincoln Tower. Training was moved to the customer sites during phase 3. Ongoing training for new employees and those needing review continued to be offered in a training room in the 8th Ave. facility. Between the two facilities, using two instructors, and holding five training sessions per day, Telephone Services could train approximately 300 users per week. During phase 3 training was held Monday through Thursday while the phones were being installed, and cut over to the new system occurred on Friday. Individuals serving as answering points for the departments were trained on Thursday so that
the information about more complicated activities such as call transfer would be fresh in their minds. A person at the answering point would not have time to look up feature instructions while trying to handle the calls.

The training consisted of two sections. The first section was lecture/discussion about why the new telephone system was selected, the function of their coordinator (and who that person was, if known), the components of the telephones themselves, new audible tones, and standard and optional features. The audible tones alert the user to how the telephone call or access to a feature is progressing. For example, at certain points during access to particular features, the user must listen for proper audible tones before continuing. A videotape was shown, where the President of the university explained the rationale for the purchase and operation of the system as improved telephone service, including more efficient and time saving features such as touch tone and speed dialing, and long term cost stabilization. Flip charts and the instruction manuals themselves were used to explain the audible tones and what they meant, and the features themselves. Then users spent most of the time receiving dialing instructions while they had hands-on access and practice of features. Optional features were typically not covered unless the trainer knew what optional features the users had. Later (1987), training was customized to provide information more specific to features which the departments had selected, and training was divided into single line and electronic set classes. In addition, a new videotape was produced for the single line classes, which included a description of the telephone system components, audible tones, standard features, and scenarios depicting typical staff and faculty applications. After each standard feature scenario, the tape was stopped to allow users to practice accessing the feature.

Once cut over (deactivation of the old system and activation of the new system) at the department occurred, users were provided with operation manuals which provided feature access and dialing instructions (See Appendix D). In addition, the single line sets were equipped with faceplates containing feature access instructions. Initially, the single
line instructions were in a three by eight and three-quarter inch brown vertical flip card format, while the electronic set manual was a 20 page document duplicated on standard white paper and stapled together. Included were dialing instructions for the following areas: main campus, local, calls to other UNITS users (prior to uniform dialing), University Hospitals, Residence and Dining Halls, PLUS access (the university's long distance system), long distance without PLUS,7 international, OSU operator, off campus operator, Columbus area information operator, and Telephone Services Repair. These instructions were necessary due to the changes which occurred in the dialing sequence for many of these areas, as well as the complexity of the sequences. The electronic set manual also included definitions of audible tones, and a condensed three page summary of feature access procedures which followed 13 pages of instructions -- one feature per page. Both manuals had places for listing speed dial and call pick up lists. Later (January 1987), both manuals were revised. First, the manuals more clearly differentiated standard and optional features. Secondly, audible tone descriptions were added to the single line manual. Thirdly, the electronic set manual was simplified into a five and a half by eight and a half booklet which included a graphic diagram of the electronic set to identify dialing, feature access, hold and volume buttons. A feature checklist page was also added to the single line manual so that coordinators could identify

7. In Chapter IV, it is reported that many users were frustrated by the fact that long distance calls placed using PLUS could not be transferred to another party. On Centrex, typically an administrator would expect the secretary to initiate a long distance call, then the secretary would transfer the call to the administrator after the party was reached. A 'bug' in the software prevented this on UNITS. In order to appease users, Telephone Services offered users access to the regular long distance network without adding on the usual 50 percent "administrative load charge." Users did not receive the PLUS discount, but neither did they incur the surcharge.
for the users which optional features (if any) they had. Finally, due to complaints that the brown color of the original single-line flip card made the document look "old," both manuals were changed to a scarlet and gray color to reflect Ohio State University colors. The revised operations manuals appear in Appendix E.

Finally, Telephone Services did a two week and four week follow up at the departments to see if they had any questions or problems, and to see if the configuration needed to be modified. Departments were allowed to have necessary changes made in feature assignment or other design characteristics, such as re-assignment of members to a call pick-up group, free of charge for 30 days subsequent to cut over. Beyond that time limit, charges were assessed for changes.

An additional component of the implementation program was an attempt to disseminate information to current and future users about UNITS and the change in telephone service on campus through mediated sources. These included several informational articles in the "On Campus" publication (an employee-targeted newsletter), articles in the "Lantern" (the student newspaper), and the development of a newsletter published by Telephone Services called "UNITS Network." While these media sources will be discussed in Chapter IV, two things should here be noted. First, several of the articles in the Lantern appeared as responses to news articles and editorials which had been written about UNITS -- which were perceived by Telephone Services as portraying aspects of UNITS in a negative manner. For example, several articles reported technical problems users were experiencing with the telephone system, and focused on confusion that was being created as a result of the change.

Secondly, begun in Summer 1986 and published each quarter, the UNITS Network newsletter was mailed to department coordinators. UNITS Network contained general information about UNITS and implementation progress, training, new feature enhancements/changes, coordinator and consultant profiles, and answers to commonly asked questions about UNITS. It was hoped that the coordinators would share this information with the members of their departments.
Role of the Researcher

Origins of the study.

The original research conception was to look at diffusion, adoption, and implementation of voice mail as one of the options available on the UNITS telephone system. The research process began with preparation for a January 1986 meeting with Carroll Notestine, Assistant Vice President, Ohio State University Systems. Academic Journal articles and trade publication articles about diffusion, implementation and applications of intelligent telephone systems and voice mail were photocopied and abstracted. Consistent with the action research objectives of assisting the organization in the learning process, the abstracts were formalized into a report which was presented to Notestine. The purpose of providing the report was to introduce Notestine, the top level implementation manager, to some background literature on the importance of human factors research and it's implications for diffusion and implementation of innovations. In addition, it would present examples of the type of research being proposed by the researcher.

The meeting was basically an information seeking activity during which Notestine gave an overview of the new telephone system and the then-current status of implementation. During that initial meeting, it was learned that voice mail would not be an available feature of the new telephone system until at least early 1987.

Coincidentally, the day following this initial meeting an article appeared in the student newspaper "The Ohio State Lantern" concerning a problem with the new telephone system in the residence halls (Greene, 1986). Residents were often the subject of phone harassment by other students. One solution was to leave the phone off the hook. However, a phone left off the hook appeared to the new computerized switch as a problem in a circuit. The switch continually tried to find the problem, and in doing so, caused the computer's card to overload and burn up. Each telephone in the system has it's own card (analogous to a memory
and instruction chip) which controls the functions of that phone. Each card cost Telephone Services $400.00. In addition, a phone left off the hook rang an alarm at the main switch which "annoy[ed] the staff and technicians." The length of time the phone was left off the hook was not relevant.

In response to the problem of burned up cards, Telephone Services instituted a policy of disconnecting service for two days on phones left off the hook. The following Monday (February 3), the Lantern published an editorial criticizing this policy -- citing unfairness to students having no other way of preventing prank calls in the middle of the night, as well as creating unnecessary safety risks of not being able to call police or the fire department in case of emergency. In addition, the editorial claimed that

(Ohio State University) administrators heralded the new system's "advanced technology and increased capabilities." But so far, students are still awaiting evidence of the new system's benefits.

After a month of headaches caused by phone number changes and crossed lines, students are now facing two days of silenced dial tones for leaving their phones off the hook (p. 4).

The Lantern article and editorial instigated an interest by the researcher in the effects of this negative publicity on the diffusion and implementation process, as this publicity occurred early in the implementation process (during Phase 1). Moreover, several days of communications ensued with Carroll Notestine regarding this publicity, and a technical solution to the problem under consideration by Telephone Services. The "Make Set Busy" feature was proposed for all Residence Halls phones. During this time, Notestine asked this researcher and another researcher (and their Faculty Advisor) if they wished to assist in the campaign to introduce this feature to the residence halls administration and students. Notestine also then provided the researcher with the names of Telephone Services representatives to contact so that collaboration could begin.
In discussing the residence halls issue, and in further reading and talking about the complexity of both the telephone system and the implementation process under way, two things became apparent. First, since this was an authority adoption decision, traditional concepts of diffusion and adoption of innovations would not provide a complete understanding of the situation at Ohio State University — either from a theoretical standpoint or for pragmatic purposes of maximizing the effectiveness of the system. As the discussion in Chapter II points out, since users are not given the option of adopting the new system, individual levels of use would provide a more accurate understanding of system effectiveness. Second, individual levels of use would be determined in part by the implementation procedures. Clearly, appropriate system design and levels of individual use were more important issues for system effectiveness within the academic, service, and research departments than within the residence halls, at least in terms of the majority of routine University business functions.

Therefore, it was decided to focus the research efforts on implementation of the new telephone system within academic, service and research departments, and limit examination of factors influencing individual levels of use to faculty, staff, and administrators. Upon further consideration of the problem, and review of the relevant literature, the research questions and hypotheses posed at the end of Chapter II were formulated.

Research Issues

As is the case with any activity involving a researcher/client relationship, problems may arise when the research goals and processes conflict with the desires of the client. These problems may be more acute in action research where the problem identification and data gathering methods are at least in part jointly formulated by the researcher and client. Much of the success of action research, then, depends upon the researcher establishing and maintaining a good working relationship with the client organization. In maintaining this
relationship, certain methodological tradeoffs or sacrifices may be
exacted, and the researcher may be required to relinquish part of his or
her control over the research process itself. In addition, in order for
maximum organizational learning to occur, the researcher must constantly
maintain a position of independence from the client group, and thus
objectivity as perceived by those ultimately involved in the research
process. Independence and objectivity are necessary to enhance the
honesty and accuracy of information which is offered by the research
participants. Further, the perception that the researcher is truly
independent from the client organization, and objective in his or her
interpretation of the research findings, enhances the perceived
credibility of these findings, hopefully leading to more effective
organizational learning.

One of the first steps involved in engaging in action research
within organizations is to make initial contacts with those individuals
within the organization with whom the researcher must share information.
Often, this involves gaining permission to carry out the research
project within their jurisdiction. Research on the implementation of the
new telephone system at the Ohio State University could have been done
without permission from Telephone Services, simply by accessing publicly
available documents, and contacting individual departments. However,
establishing a cooperative relationship with Telephone Services was
critical to the success of action research, if the objective of
client-learning was to be met. In addition, interviews with Telephone
Services representatives added to the richness of the historical data
and the researcher's understanding of the implementation process; as did
participation in a training session and observation of a department's
UNITS phone inventory (ordering and configuration of phones and
features). All of these latter activities would have been impossible
without first developing a cooperative relationship. As Schatzman and
Strauss (1973) state:
In a mutually voluntary and negotiated entree, the host holds options not only to prevent entree but to terminate relations with the researcher at almost any stage thereafter. This suggests that how one gets in and manages to stay will shape, if not determine, what one gets out of the site and its host.

Furthermore, it suggests that entree is a continuous process of establishing and developing relationships, not alone with a chief host but with a variety of less powerful persons. In relatively complex sites, particularly those with multiple leadership and jurisdictions, there are many doorways that must be negotiated...(p. 22).

Indeed, with the number of departments with which the researcher contacted for interviews, focus groups, and distribution of survey data, many relationships had to be established for cooperation. However, relationships with members of individual university departments were generally limited in duration and relatively easy to establish. Thus, maintenance of these relationships were much less important than with Telephone Services, with whom the researcher had a much longer, and more mutually dependent relationship.

Maintaining this cooperative relationship with Telephone Services ultimately required the researcher to make some methodological sacrifices, and resulted at times in a lack of direct control over the research process. Further, the researcher had to continually take care not to sacrifice the perception by the users of objectivity and independence from Telephone Services.

**Maintaining independence and objectivity.**

The issue of maintaining perceived independence from the client, and therefore objectivity arose first during discussions about the Lantern articles on the residence halls phones with Carroll Notestine of University Services. During these discussions, it was initially suggested that the researcher could write a guest editorial explaining the difficulty of implementing a new technology on such a large scale as UNITS. The idea was to try to diffuse or counter some of the negative publicity on UNITS which University Systems and Telephone Services felt
the articles were presenting. The fact that the researcher was not employed by Telephone Services would presumably make the editorial seem more objective and less "defensive" and therefore more credible. In addition, the difficulty of the implementation could be covered in more depth with a guest editorial than would be possible in a shorter news article written by a reporter or letter to the editor (one of the reasons Telephone Services had not responded to the articles).

Eventually, however, this strategy was rejected by the researcher for one main reason. It was felt that the readers of the guest editorial could still potentially view the researcher as taking the position of defending Telephone Services, and thus jeopardize the researcher's perceived independence and objectivity during subsequent data gathering.

In contrast, at times maintaining independence and objectivity can work against the principles of organizational learning and action research, and/or threaten the client/researcher relationship. For instance, during many interviews and focus groups, issues and questions arose concerning Telephone Services' pricing schedule and technical problems with the system (see Chapter IV for a complete discussion). The researcher attempted to impart information regarding these issues to the individuals and groups, consistent with the principles of action research. However, there were two potential problems in doing so. First, there was always the potential for the individuals to perceive that the researcher was trying to defend Telephone Services' actions. This was especially a danger when trying to explain the rationale behind decisions that were made. In such situations, the researcher must always make sure to be clear in stating that this explanation is his or her understanding of the issue, rather than a statement of accurate fact. On several occasions, the researcher was tempted to not impart the information at all; yet did so because of the importance of the learning experience for the individuals.

Second, the researcher has to be careful not to engage in activities which are clearly within the client's sphere of responsibility. By doing so, one risks making the client look unresponsive to the organization's members in addition to jeopardizing
independence. As an example, recall that most of the coordinators contacted had never seen the transition dialing card which was supposedly mailed to all faculty and staff. The researcher had obtained a number of these which were given to users who did not have one. Once these were gone, the researcher promised to deliver one to the remaining coordinators. Subsequently, the researcher realized that provision of these and other relevant documents was Telephone Services' responsibility. If the researcher assumed that responsibility, users could perceive Telephone Services as unresponsive to their needs. Conversely, identifying these individuals or even departments to Telephone Services so that they could respond would jeopardize the users' anonymity. This presented a rather difficult research dilemma. Eventually, this was solved by Telephone Services agreeing to contact all departments who had been switched over to UNITS and asking them if there were materials they did not have, and if so, delivering them.

A related problem was that during most of the interviews and focus groups, the researcher informed the users of Telephone Services' attempts to solve software problems which were responsible for technical problems with the system; an issue which was repeatedly a major topic of discussion. On several occasions, users were upset that this information was not being provided by Telephone Services themselves. Again, the users were perceiving Telephone Services as unresponsive to their needs. Potentially, the users could bring this situation to the attention of the client (in this case Telephone Services), which could negatively affect the client/researcher relationship. In other words, the client

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8. According to Telephone Services representatives during one interview, departmental members were being told of progress being made toward solving software problems. It is unclear whether these individuals were simply venting their frustration on the researcher, or whether they truly were not aware of the attempts by Telephone Services to correct software problems. Ultimately, Telephone Services began to address some of these concerns in the UNITS Network publication.
could perceive that the researcher is making them look bad from the perspective of the other organizational members. In fact this did occur in one research department where two individuals were interviewed simultaneously. An excerpt from the researcher's field notes describes the problem:

I was amazed to find that [one of the interview participants] thought the change from 422 to 292 was the new phone system. She had heard nothing else...It was an uncomfortable ending to the interview in that [the coordinator] seemed to have appeared negligent [to the other participant] in not bringing potential changes into awareness as coordinator. I understood [the coordinator's] not wanting to call attention to this [the change] without full knowledge...yet others in the department [the other participant] for example, may feel that they should have heard something sooner. I was uncomfortable being the one to initiate this potential issue, but how else can I get at levels of awareness and attitudes/perceptions without asking these questions?

Potentially, an issue such as this could result in the client terminating the relationship with the researcher or denying further access to the organization.

Methodological tradeoffs.

Methodological tradeoffs may be necessary to maintain a cooperative working relationship with the client. The collaborative nature of action research dictates at least some joint formation of the problem identification and data gathering methods. Sometimes, the objectives of the researcher and the desires of the client may be in conflict. Schatzman and Strauss (1973) discuss the bargaining that must take place between the researcher and the client as "negotiation in the context of reciprocity" (p. 28-32). The researcher in action research offers the client a service which ultimately leads to organizational learning and the ability to engage in more effective managed change. In return, the researcher is granted access to the organization, and/or access to otherwise unavailable sources of data. Again, since the client
hold the power to deny access or terminate the relationship at any time in the research process, methodological negotiations may be necessary for the researcher to maintain these privileges.

In several meetings, the pilot survey (as well as the final survey and interview/focus group scripts) were discussed with Telephone Services representatives. One of the first problems encountered was a potential conflict between the theoretical issues of importance to the researcher, and the pragmatic issues of implementation which are of more importance to the client. Recall that the research goals of the study of the implementation of the telephone system were both pragmatic and academic, as described at the beginning of this chapter. From the researcher's perspective, these goals are not mutually exclusive. Indeed, the theoretical issues are intimately interrelated with the pragmatic issues. Thus the researcher tries to translate theoretical interpretations of the findings into strategies and action steps, in collaboration with the client and within the unique context of the research project.

Therefore, a major task facing the researcher during this collaboration is to educate the client about the utility of the methods in meeting their pragmatic desires. In discussing the pilot survey with the Telephone Services representatives for example, significant amounts of time were spent clarifying what the purpose of particular items were: what information was the researcher trying to obtain and how would it be useful. At times, the client may not agree with the methodological strategies of the researcher, and compromises may need to be negotiated. For instance, originally the factors affecting attitudes scale was labeled as "factors affecting resistance to change." Also, each item on the scale was negatively worded, reflecting barriers to implementation. However, Telephone Services representatives felt there was too strong a negative bias in the survey. They did not want barriers to implementation identified, only the users' perceptions of UNITS. Apparently, they felt that the negative bias would negatively influence attitudes towards UNITS and/or Telephone Services. At the time, the researcher felt that this "defensive" posture taken by Telephone
Services was the result of much negative publicity generated by articles in the "Lantern," as well as negative attitudes which were being communicated interpersonally by users to others on campus.

Ultimately, the scale was revised and split into two versions, each with the re-worded title and each with half positively and half negatively worded items, as described in the data gathering section of this chapter. Potentially, conflicting perceptions of appropriate data gathering strategies could face the researcher with decisions regarding compromising his or her methodological preferences and/or rigor in favor of maintaining a cooperative relationship with the client. However, in the situation here described, the collaboration with Telephone Services possibly resulted in a better questionnaire scale; though at the time the researcher felt that the rewording of the title and the items defeated the purpose of the scale: to identify the most important barriers to implementation to be overcome by formulating more effective implementation procedures. Using more neutral terminology in the scale instructions and randomly alternating positive and negative wording on a scale may in fact reduce the potential of negatively biased terminology affecting subjects' responses. In addition, the randomly alternating positively and negatively worded items may reduce "response set" among some respondents. When all items on a scale are of the same linguistic orientation, the respondents may develop a pattern of, say, agreeing with all the statements. That would be especially likely if the set of statements began with several that indicated a particular orientation...with only a few, later ones representing the opposite orientation...This problem can be reduced somewhat by alternating statements representing different orientations (Babbie, 1986, p. 208-209).

A related issue concerns the amount of control over the research process in terms of timing and sequence of observation (Schatzman & Strauss, 1973). First, the researcher can conduct interviews or focus
groups only when it is convenient or possible for the members of the organization. In addition, the client may at times either prevent or delay contact with certain organizational members or units.

During June, 1986, the researcher had planned on interviewing members of an academic department who were moving into a new building on campus on July 1. UNITS was scheduled to be activated on that date as well. The researcher wanted to assess then-current levels of awareness about the rationale behind the change and features of the telephone system, perceived advantages and disadvantages of the system and the origins of these perceptions (media, interpersonal, etc.), intentions to attend training, and perceptions of appropriate strategies for learning how to effectively use the system. The objective was to assess individual's levels of awareness and perceptions prior to training and cut-over, but close enough to these events that UNITS implementation would presumably be a higher priority on the departmental agenda. Further, it was assumed (based on Telephone Services' implementation schedule described earlier in this chapter) that the closer to actual installation of the telephones a department was, the greater amount of information members would potentially be exposed to by Telephone Services and the coordinator. The main criteria was to elicit more accurate and less biased information about these issues than the respondents could provide by recollection subsequent to use of and experience with the telephone system.

However, the day before these interviews were to begin, Telephone Services requested that the researcher not contact anyone from this department until after the July 1 cut-over. Apparently the department was running into difficulty in meeting the July 1 occupation date due to fire inspections and other impediments. Telephone services did not want any the researcher to present any additional obstacles to meeting the cut-over date (such as time consuming interviews or focus groups). 9

9. In addition, the researcher's field notes indicate that Telephone Services was concerned that the researcher might impart information about the costs or technical problems to the departmental members which
Thus, the researcher had to later conduct a focus group based on recollections; thereby sacrificing methodological rigor in order to maintain the relationship with Telephone Services. Further, this accommodation to Telephone Services resulted in nearly a four month delay in this part of the research process, as the next departments to be cut-over, and therefore meeting the research objectives described above, would not be done until late October.

All of these research issues lead to one major conclusion. Within action research and field study contexts, it becomes impossible for the researcher to formulate a-priori methodological absolutes; both in terms of data gathering strategies (questionnaire development, interview questions, etc.) and data gathering timelines. Thus, the researcher should be aware at the outset of an action research project that these issues will always be potentially present, and that their influence can lead to process set backs and delays, and thus a very time consuming research project. He or she should be prepared to experience conflicting researcher/client objectives and strategies, and be aware that negotiation and methodological compromise may be necessary. This also means that, as with any field study, the researcher must be adaptable to changing circumstances within the research context. Yet, if the principles of action research are followed, the process can be very rewarding for both the researcher and the client.

Methodology

The methodology used in this study included elements of both diagnostic and participant action research as described earlier. Some implementation problems were identified by Telephone Services in initial meetings, as well as in early conversations with Carroll Notestine of University Systems. Consistent with diagnostic action research, the ______________ might negatively influence their attitudes, as the previous discussion on maintaining independence and objectivity describes.
researcher used various qualitative and quantitative methods to gather data related to these problems. Consistent with participant action research, the data gathering strategies and many of the findings were discussed with members of Telephone Services, and recommendations for action were made and discussed in a collaborative manner. A total of eight formal meetings were held with representatives from University Systems and/or Telephone Services. Numerous other conversations were held by electronic mail or telephone.

Moreover, many of the problems identified by Telephone Services, as well as findings from earlier data gathering, were discussed with actual end users of the new telephone system during interviews. Respondents also identified other problems unique to their organizational unit, and discussed possible solutions and action steps to overcome these problems with the researcher.

**Data collection.**

Due to the continuing, cyclical nature of action research, the data collection methods are described in a topical format rather than in chronological order. Five different methods of data collection were used: analysis of written documents, interviews, focus groups, a pilot survey instrument, and a final survey instrument.

**Written documentation.**

The analysis of written documentation included technical literature on the Northern Telecom SL-100 Digital Switch and telephone terminals, as well as the written documentation prepared by Telephone Services.

10. In action research, the interviewing process differs from the typical approach of the researcher eliciting information from the respondent. This issue is discussed in more detail in a succeeding section on data gathering.
Services. These included the UNITS Feature Package Options notebook which coordinators used in preparing their telephone orders, the original and revised telephone operation manuals, the transition dialing procedures, and the UNITS Network publication, each described earlier. The researcher also obtained various documents such as the UNITS Management Plan, which outlined the tasks and timelines for implementation, and noted various individuals and departments with implementation responsibilities. The researcher also monitored the Lantern and On Campus publications for articles which made reference to UNITS.

Interviews.

In late February 1986, the researcher met with 2 representatives of Telephone Services responsible for UNITS training and office consultation. One function of this meeting/interview was to obtain further historical background concerning implementation of UNITS. The Telephone Services representatives described the desired role of the departmental coordinators, the initial Northern Telecom coordinator orientation/training (October 1985), the process of meeting with coordinators to design the departmental systems, and the user training procedures. During the meeting, issues and problems which Telephone Services had observed were discussed. First, Telephone Services was concerned about non-attendance of training by administrators and faculty. Secondly the representatives felt that often the person who was in charge of configuration and ordering of the new system was a Dean or other administrator who was not close to or knowledgeable of the everyday communication needs of the users -- leading to feature design errors which later had to be corrected. Further, Telephone Services felt that departments were not configuring the system, nor were some users operating the system, as effectively as it was designed. For example, departments were ordering only one incoming line for a receptionist, where the system was designed to allow a receptionist to efficiently process several incoming calls. Next, there was a perception that
coordinators were not communicating many of the problems within their departments to Telephone Services. Apparently, Telephone Services was made aware of problems later during the two and four week follow up sessions, and from contact with individual users.

Upon further discussion, the following questions arose from the meeting:

1) what are the most effective methods of maintaining ongoing communications about the UNITS with individual departments?
2) how can departmental coordinators be motivated to devote additional time and effort to the duties requested of them?
3) how can reliance on the departmental coordinator be reduced (individual operations assistance in particular)?
4) what can be done about individuals who do not use the features of the system as they were designed?
5) what are the most effective training methods for those who attend?
6) how can individuals who do not attend training be encouraged to attend?
7) what are the most effective methods of providing information about telephone operation to those individuals who will not attend training?

Two additional activities preceded actual interviews with UNITS users. First, in mid-May 1986, Telephone Services conducted a "typical" training session for the researcher and two colleagues. The purpose of the training was to familiarize the researchers with the features and operations of the telephone system, and the training procedures to better understand the users' experiences. The training was "typical" in that the normal training procedures occurred as they ordinarily would for departments. Naturally, the researchers asked questions about what procedures would be changed during training for Phase 3 implementation.11

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11. Recall that training was moved on-site, split into separate sessions for single-line sets and electronic sets, and the videotape was revised.
Secondly, in late May, the researcher observed a department during the preparation of the UNITS phone inventory (ordering phones and configuring features). Again, the purpose was to familiarize the researcher with the ordering procedures and consultation provided by Telephone services -- in this case to better understand the experiences of the coordinators and administrators who made the decisions.

Based on the analysis of written documents, and the initial meetings and activities described above, three sets of open-ended interview question guides were developed. These questions reflected both issues that were of concern to Telephone Services, and issues that were identified by the researcher. The interview guides appear in Appendix E. The first question guide was used during interviews with departmental coordinators. The second guide was used during interviews with other "current" users. The third guide was used with individuals who had not yet had the new system installed ("future" users). The interview guides helped the researcher introduce issues of relevance to the study, but respondents were free to diverge into their own areas of interest and concern throughout the process.

Between late May 1986 and early February 1987, twenty-seven user interviews were conducted with a total of 55 then-current users representing academic, service, and research departments. Fifteen departments were represented by these interviews. During February 1987, nine interview were conducted with a total of 16 "future" users who had not at the time been switched to the new system, representing six departments.

Typically, interviews proceed as a process whereby the researcher elicits certain information from the respondent. In Action Research, the interview process has an expanded research goal. Findings from prior data gathering are discussed with the respondent in an attempt to obtain confirmation for their organizational unit. Moreover, the respondents are given an opportunity to contribute to the generation of solutions to problems already identified by others, as well as those they themselves
identify. This process promotes organizational learning by informing the respondents of the prior data findings, and by feeding further information and solution ideas back to the change agent or management.

**Focus groups.**

Morgan and Spanish (1984) state: "As a qualitative method for data gathering, focus groups bring together several participants to discuss a topic of mutual interest to themselves and the researcher" (p. 253). Typically focus groups involve from 4 to 10 participants. Morgan and Spanish feel that the major advantage of focus groups is the ability to observe participants interacting on attitudes and experiences which are of interest to the researcher. While certain issues deemed important by the researcher for the purposes of the study are introduced, focus groups also allow for issues of importance to the respondents to emerge and be discussed. In Action Research, this type of discussion among participants is an especially useful organizational learning experience. Participants can engage in shared information generation and analysis, and joint formation of possible solutions to problems identified -- perhaps leading to a greater commitment to proposed action.

Originally, focus groups were to be conducted with representatives from different departments. However, it was decided that the focus groups would consist of members of the same department, ideally representing different functional roles and status levels. This would allow the most representation of different uses and attitudes about the new phone system. Moreover, in each case, the departmental coordinator would be involved. It was hoped that the coordinator could learn more about perceptions and problems within their departments, and how to effectively deal with them. In essence, the departmental members could learn from each other -- how they had dealt with particular problems, what common concerns they had and how these problems could be alleviated, and perhaps most importantly, how their own use of the
telephone might be affecting others within their department. Ideally, this would instigate a joint formulation of design and use strategies to make telephone communications of the department more effective.

Between early July 1986 and mid-February 1987, six focus groups were conducted with a total of 38 users. Five focus groups were held with departments who had already been using the new telephone system, and one focus group was conducted with a department who had not yet been switched over. Consistent with the procedure for the individual interviews, the researcher used an interview "script" to guide the groups through a discussion of issues relevant to the research, but participants were allowed to diverge into their own areas of interest and concern.

Pilot survey.

Based on the review of literature, and issues emerging from the interviews and focus groups completed through July 1986, three versions of a pilot survey instrument was designed. The purposes of the instruments were to:

A) identify the type of telephone the user had, and assess types and levels of system use -- numbers of functions used/not used and the reasons for existing usage patterns within specific user groups.

B) identify weekly office task times devoted to various communications (face-to-face, documents, telephone, other) by individuals within user groups, and assess weekly telephone time engaging in various communication actions (seeking information, giving information, problem solving). The University classifications of Administrator, Faculty, Technical Staff, and Clerical Staff were used to define user groups.

C) assess factors affecting user perceptions and attitudes towards the telephone system. A portion of a questionnaire which appeared in Information Center magazine (January, 1986) was modified to be consistent with the context of implementation of the new telephone system at the Ohio State University. The portion of the questionnaire dealt with factors which led to the resistance of a new technology
within an organization. The resistance factor item was formatted as a 31-
six-choice, strongly agree (0) to strongly disagree (5) scale, and was
re-worded to reflect the context of the telephone implementation. Two
additional questions were included: one identifying the three most
important factors, and one identifying how the user perceived resistance
to the new technology affecting implementation.
D) measure individual levels of involvement with the telephone as a
product, and compare this involvement with two other technologies
(computer/word processor, copy machine). A 20-item bipolar adjective
scale, the Personal Involvement Inventory (PII), developed by
Zaichkowsky (1985) was used to measure involvement. Zaichkowsky states
that:

This Personal Involvement Inventory was developed over four
data sets of 268 undergraduate psychology majors; two data
sets with 49 M.B.A. students; and two data sets with 57
clerical and administrative staff members. The scale was
demonstrated to have content validity by expert judges at two
phases of the scale development: first for the selection of
items, and second, rough classification of open-ended
responses from subjects. The reliability or stability of the
scale over time was checked over two subject populations for
an average test-retest correlation of 0.90. The
criterion-related validity of the scale was checked by
demonstrating agreement with the order of various products as
found in previous studies. The construct validity -- the test
of the scale to theoretical propositions -- was then carried
out. The scale was administered to clerical and
administrative staff and covered three different product
categories and several statements of behavior proposed to be
representative of involvement. Over all three product
categories there was a positive relationship between the
scale scores and the subjects' responses to the statements of
theoretical propositions pertaining to involvement (p. 349).
E) assess the extent of internal and external communication with members
of each of the job classifications, and the communication type.

Due to the quantity of information which was to be included in the
survey instrument, two versions were originally formed. The first form
(form 1) would include the involvement scale, while the second version
would include the factors affecting perceptions and attitudes towards the new telephone system. Both forms were to include identification of office job functions performed by individuals within user groups, and assessment of current types and levels of system use and extent of internal and external communications types. The second version containing the factors affecting perceptions and attitudes towards the new system was later split into two versions, because of some concerns Telephone Services had with the title of the attitude factors instrument and wording of the items, and their perception that this would negatively influence the users (as previously discussed in the section on research issues). The title "factors affecting resistance towards the implementation of a new technology" was changed to "factors affecting employee's attitudes towards implementation of a new technology."

In addition, the original wording of the instrument contained all negatively worded items describing factors leading to resistance towards implementation. Subsequent to discussions with Telephone Services, two forms were produced in order to minimize instrument bias. Half of the items on the scale were randomly reverse worded; resulting in two versions. In the first version (form 2) half of the items were positively worded, and half negatively worded, while the wording for the items was reversed for the second version (form 3). The three versions of the pilot survey instrument appear in Appendix F.

In early August, 1986, 200 pilot survey instruments were distributed to 7 departments representing three Academic, two Service, and two Administrative departments. Since each department had a designated coordinator who served as the telephone resource person, these individuals were contacted, and agreed to have the questionnaires returned to them. It was felt this would be the easiest way for respondents to return the questionnaire. The researcher later returned to pick up the completed questionnaires from the coordinators. For those departments included, each member of the unit received the questionnaire. Of the 200 surveys distributed, 64 completed surveys were returned, resulting in a 32% response rate. The response rate broke down into 26 returned form 1 surveys, 17 returned form 2 surveys, and 21
returned form 3 surveys. There are 2 possible explanations for the low response rate. First, the surveys were distributed during the Summer academic Quarter, when many faculty are not on campus much, and some staff may have been on vacation. The second possible explanation concerns the length and complexity of the survey, which combined with the lack of interest or perceived importance of the new telephone system shown by many respondents during the interviews, may have decreased willingness to complete the survey.

Final survey instrument.

Based on the results of the pilot survey, and findings from the remaining interviews and focus groups (mid-July 1986 through mid-February 1987), three versions of a final survey instrument were designed. Several items were deleted from the pilot survey due to poor user responses, and several items were added, based on additional issues arising from the interviews and focus groups. Moreover, the analysis of the pilot instrument suggested desired information which was not elicited from the pilot survey design.

First, the call waiting feature was dropped from the feature use question on all three forms because it was no longer being offered by Telephone Services. Also, the hold feature, inadvertently left off the pilot survey, was added as a feature. The "0-5" times per week category was changed to separate "0" and "1-5" columns to distinguish between very low use and non-use. In addition, the "don't have" and "not sure I have" categories were moved from the last two columns to the first two columns. It was felt that many respondents who didn't have features or weren't sure they had features may have checked the "0-5" column (which was the first column) without looking to see if there were a more appropriate choice.

Second, in order to identify which features users perceived to be the most beneficial, two questions were added to all three forms. The first question identified which feature that the user did have was the most beneficial to them. The second question asked which feature they
would add if they could. Three additional questions were added to each form. The first question measured the frequency that users accessed various instruction and help sources when using features, in an attempt to assess the utility of the available instruction sources. The second measured overall attitude toward the new telephone system. It was felt this was a more direct measure of attitude than making inferences from the factors affecting attitudes scale. The third question measured the extent of influence various mediated and interpersonal sources of information had on users attitudes towards the new system. This question was added as a result of interview data which suggested that information sources had affected attitudes towards the system, particularly interpersonal contacts with other users. In addition, Telephone Systems was interested in the effects of the articles in the Lantern, On Campus, and the effectiveness of the UNITS Network newsletter in providing information and promoting more positive attitudes among users. Moreover, this question would indicate the whether or not individual users were exposed to the newsletter. Recall that the newsletter was sent to coordinators only, with the expectation that it would be shared with departmental members.

Third, two questions rank ordering frequency of telephone communication with various user groups within and outside the respondents' departments were deleted from all three forms due to a high non-response rate. It was felt that the questions were too confusing for the respondents to correctly answer, and therefore did not provide information of sufficient quality to justify their inclusion in the final survey.

Finally, several items on the factors affecting attitudes scale were revised. Several questions were re-worded to more accurately reflect the context of the Ohio State University. Also, the item which read "The new telephone conversion generated too little, too much, unclear, or unnecessary information" on form 2, and "The new telephone conversion generated the right amount, and necessary information" on
form 3 was split into three separate items to distinguish between amount of information, clarity of information, and necessity of information. The three versions of the final survey instrument appear in Appendix G.

On April 1-3, 1987, approximately 1000 final surveys (500 form 1, and 250 each form 2 and form 3) were distributed to each member of 26 Ohio State University departments and one student organization/business. Similar procedures were followed as for the pilot survey. Departmental coordinators were asked to receive the completed questionnaires in an envelope and send them to the researcher's department via campus mail. Of the approximately 1000 questionnaires distributed, 301 were completed and returned to the researcher, resulting in a 30% response rate. The responses included 160 form 1 surveys, 69 form 2, and 72 form 3 surveys. Follow up telephone calls to the coordinators did not produce additional completed questionnaires.

Unlike the pilot instrument which was distributed during the summer, the final questionnaires were distributed during the normal Spring academic quarter when classes were in session. Therefore the low response rate cannot be attributed to faculty and staff absences as was hypothesized for the pilot survey. A more plausible explanation is that the questionnaire was lengthy (4 pages for form 1, 5 pages for forms 2 and 3) and complex, and the subject (new telephone system) was not important or interesting enough to most individuals to increase the response rate. This was probably most true for faculty members, who showed the least interest about the new telephone system during interviews. Indeed, of the near 1000 surveys delivered, 650 were to 16 academic departments, who returned only 147: resulting in a 22.6% response rate. This compares with 349 questionnaires delivered to 11 service and administrative departments who returned 154. This latter 44.1% response rate was twice that of the academic departments whose members are mostly faculty.

Moreover, in several instances it appeared that some members of academic departments often filled out questionnaires, and eventually tired of the process. An excerpt from the researcher's field notes of April 1, 1987 is illustrative:
I think faculty/administrators will be trouble in terms of response rates. One faculty member went to his mailbox while I was there and said "Oh God! Another Survey!" He began reading the cover letter, and I explained the purpose and suggested that his response would benefit him as a user, and explained past influences on Telephone Services I had had. Yet he seemed skeptical anyway. I think this may be a common attitude towards surveys.

Data analysis.

Interviews and focus groups.

The interviews and focus groups were tape recorded and transcribed. Subsequently, "thematics" or recurring themes were identified among the respondents' comments and answers to questions. Patton (1980) describes qualitative evaluation as an inductive approach. As such, the research approaches phenomena from the standpoint of identifying and describing them without presupposing expectations: the important dimensions and their characteristics gradually emerge from the experience of the situation without presupposing what those dimensions will be ahead of time. Thus, the researcher moves from observation of specific instances or behaviors toward building more general patterns (thematics or emerging, recurring comments), without imposing a-priori categories on them. This approach enables the researcher to gain a richer understanding of the concepts and variables which emerge as influential to the processes under study, form more valid items on survey instruments, and serves as a source of triangulation for the validation of other research findings and further data collected for the study.
Pilot survey.

Descriptive statistics were calculated for all questions on the pilot survey instrument. The purposes were to identify any areas of the questionnaire where respondents appeared to have difficulty (measured by frequency of missing values, and errors in responses to items), and to present a preliminary summary of findings to Telephone Services.

Chronbach's Alpha model was used to assess reliability of the two scales (Personal Involvement Inventory, and factors affecting attitudes towards the technology). The reliability analysis resulted in a Standardized Item Alpha of .859 for the factors scale. The Personal Involvement Inventory with Computer/Word Processing as the technology yielded a Standardized Item Alpha of .957; with Telephone as the technology .950; and with Copy Machine as the technology .960.

Final survey.

The final survey was designed to assess how the telephone was used in this organizational setting, availability and extent of use of the system's features, reasons for non-use, and affective user responses to the new technology. Percent of weekly office task time spent on the telephone, as well as the percent of weekly telephone task time spent engaging in information seeking, information giving, and problem solving were two measures used to assess how the telephone was used. In addition, the extent of internal versus external telephone communications was also measured to assess how the telephone was used. Extent of feature use was operationalized as the frequency of use of features that respondents did have, and knew they had. Affective responses to the technology were operationalized by level of involvement, attitude, and factors affecting attitudes towards the technology.
Descriptive statistics were again calculated for all questions on the final survey instrument. In addition, all comments handwritten on the surveys were recorded, and formed into categories based on their similarity and which part of the survey they were addressing. There were three places on the survey where comments were asked for if necessary for clarification. First, question V on each form asked for any reasons (other than those listed) for not using features that the respondents did have. Second, respondents were asked what might have encouraged them to attend training if they had not. Finally, the last item on the factors affecting attitudes scale was for "other" reasons, with space for written specification. These were also coded into categories, as were "unsolicited" comments which appeared in various locations on the survey. Thus, all comments pertaining to a particular question were coded into the same category reflecting that issue. Comments elsewhere on the survey which reflected these and other issues were also coded into appropriate categories. Descriptive statistics were then obtained for each of these categories.

Reliability.

Chronbach's ALPHA was used to calculate a reliability coefficient for the factors affecting attitudes towards the technology and Personal Involvement Inventory scales. The factors scale yielded a Standardized Item Alpha of .929. The Personal Involvement Inventory with Telephone as the technology yielded a Standardized Item Alpha of .954; with Computer/Word Processor .941; and with Copy Machine as the technology .951.

Involvement and attitude.

Mean involvement scores were again calculated for each of the three technologies and Analysis of Variance, along with two post-hoc tests (Duncan's Multiple Range Test and the Scheffe Procedure) were used to assess differences in involvement across technologies and job
categories. In addition, a repeated measures MANOVA, using technology as the dependent variable (the 3 machines as different levels), was used to assess within subjects responses to involvement with each of the three technologies. ANOVA and post-hoc analyses were also used to assess differences in attitudes between members of different job categories.

Extent of telephone and feature use.

Analysis of Variance, along with two post-hoc tests (Duncan's Multiple Range Test and the Scheffe Procedure) were used to assess differences in task time spent on the telephone and extent of feature use. An overview of feature use among members of different job categories was obtained using an SPSS-X multiple response procedure. This procedure combines a number of elementary variables into a group, displaying the items in a univariate table and a multivariate crosstabulation (SPSS-X, 1983). Thus, for each response category (i.e. "0" "1-5" "6-10" "11-15" ">15") the 14 features (elementary variables) are combined into a single group and tabulated by percent of response. These percentages were then crosstabulated by job category. In addition, an overall extent of feature use index score was calculated for each of the job categories by summing the frequency of use responses (excluding "don't have" and "not sure I have") to all 14 features. The ANOVA and post-hoc analyses were used to assess mean differences among the extent of feature use index scores. Pearson correlations between extent of feature use, task time spent on the telephone, job category, attitude, and telephone involvement scores were obtained to examine any relationships between these variables. The multiple response procedure was also used to tabulate frequency data for reasons that respondents did not use features that they did have.
Factors affecting attitudes.

The factors affecting attitudes toward the technology scale was subjected to a principle components factor analysis with oblique rotation, since there was no a-priori reason to believe the factors would be orthogonal. A scree test (Cattell, 1966) was employed to identify the number of factors needed. Items were assigned to factors when their loadings exceeded .50 and exceeded secondary loadings by at least .30. Factor scores for each respondent were obtained, creating new factor score variables: one for each of the emerging factors suggested by the Scree test. Subsequently, correlations were obtained to examine relationships between the factor score variables and extent of feature use, attitude, job category, and task time spent on the telephone.
CHAPTER IV

RESULTS

The results of this study will be presented by topical categories of factors which ultimately influence implementation and the extent of individual use of the new telephone system. For each factor, results from interview data and focus groups will be reported, followed by results from pilot survey and final survey data. Nine principal themes or factors affecting implementation and extent of individual use of the telephone system emerged from the data sources, and are summarized as follows: a) telephone and feature costs; b) needs assessment and feature selection; c) role of the coordinator; d) awareness of the system/features and information dissemination; e) training; f) documentation; g) technical issues; h) perceived needs; and i) attitudes.

Telephone And Feature Costs

One of the first things which influenced the implementation of the new telephone system was the cost of the telephones and optional features. In fact, this is an adoption issue in part. While departments "adopt" the new system by default due to the authority adoption decision of the system itself, departments do have some options in terms of selecting particular telephones for individuals, and adopting particular optional features. Thus, these decisions directly affect the features available to individuals, and therefore extent of feature use. More importantly, availability of features influences users' perceptions of system effectiveness.
Effects on system configuration and feature availability

Of the 20 coordinators interviewed, only three did not specifically mention that the cost of the telephones themselves and the optional features affected the selection of features and configuration of the telephones for their departments. One of the three did state that the cost factor later became an issue as the Dean began to receive the bills. All of the coordinators (with the exception of the two who did not mention cost at all) reported at least a 50% increase in their monthly telephone charges after the change, with several reporting a near 75% increase. As discussed later in the section on needs assessment and feature selection, all but three of the coordinators felt highly constrained by their budgets when ordering phones and features. First, many departments reduced the number of Direct Incoming Lines to offices (DID's) which cost $2.75/month (later increased 14% during Phase 3 implementation). Indeed, one academic department reduced the number of telephones they had by 10 due to the costs associated with the new system. Reducing the number of DID's resulted in several problems for users, and led to decreased perceptions of system effectiveness, as discussed in a succeeding section on technical issues.

Further, two of the objectives stated in the UNITS Management Plan (see Appendix B) were to "Advertise, train, and support speed dialing as part of Phase 1" (item 3b), and "Promote labor saving features in customer communications" (item 3c). Yet, interview and focus group data shows that speed dialing and other optional features (call forward programmable and group intercom were the most frequently cited) which the users felt would increase system effectiveness for them were rarely ordered due to their cost. The survey data also supported this finding, as shown in Table 1. Over 44% of the respondents (N=291) did not have speed dialing (18.9% not sure), 30% did not have call forward programmable (16.7% not sure; N=263)), and over 48% did not have group intercom (21.3% not sure; N=286)). Interview and focus group data suggests that the numbers of users who do not have these features (based on what coordinators claimed they were able to afford) is likely higher...
Table 1
Percent Of Users Not Having Or Not Sure They Have Optional Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Don't Have</th>
<th>Not Sure</th>
<th>Total Percent</th>
<th>#Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forw Programmable</td>
<td>30.4%</td>
<td>16.7%</td>
<td>47.1%</td>
<td>263</td>
</tr>
<tr>
<td>Group Intercom</td>
<td>48.3%</td>
<td>21.3%</td>
<td>69.3%</td>
<td>286</td>
</tr>
<tr>
<td>Speed Dial</td>
<td>44.3%</td>
<td>18.9%</td>
<td>63.2%</td>
<td>291</td>
</tr>
<tr>
<td>Make Set Busy</td>
<td>49.8%</td>
<td>36.2%</td>
<td>86.1%</td>
<td>287</td>
</tr>
<tr>
<td>Speakerphone</td>
<td>64.0%</td>
<td>19.0%</td>
<td>83.0%</td>
<td>289</td>
</tr>
<tr>
<td>Call Park</td>
<td>53.4%</td>
<td>31.5%</td>
<td>85.3%</td>
<td>292</td>
</tr>
</tbody>
</table>

than indicated by the number of "don't have" responses: and is probably more accurately reflected by including most of the "not sure I have" responses. Moreover, as shown in Table 2, speed dialing was identified most often by users (28.2% of the responses; N=171) as the feature they would add to their phone if they could, followed by group intercom (10.6% of the responses). Though not mentioned in the interviews or focus groups, speakerphone and ring again were the next most frequently cited features users would add (9.4%). Importantly, since ring again is a standard feature on all UNITS telephones, this response indicates a lack of awareness of what features individuals had on their telephones (as does other survey data): an issue discussed further in a later chapter on awareness and information dissemination.
Table 2
Frequency of Features Most Often Listed as Wanting to Add

<table>
<thead>
<tr>
<th>Feature</th>
<th>Frequency Listed</th>
<th>Percent Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed Dial</td>
<td>48</td>
<td>28.2</td>
</tr>
<tr>
<td>Group Intercom</td>
<td>18</td>
<td>10.6</td>
</tr>
<tr>
<td>Ring Again</td>
<td>16</td>
<td>19.4</td>
</tr>
<tr>
<td>Speakerphone</td>
<td>16</td>
<td>19.4</td>
</tr>
<tr>
<td>Call Forward (not spec.)</td>
<td>15</td>
<td>8.4</td>
</tr>
<tr>
<td>Message Waiting</td>
<td>12</td>
<td>7.1</td>
</tr>
<tr>
<td>Make Set Busy</td>
<td>11</td>
<td>6.5</td>
</tr>
<tr>
<td>Forward Programmable</td>
<td>10</td>
<td>5.9</td>
</tr>
</tbody>
</table>

Effects on attitude

Another important issue related to the costs of the system to the departments: it was commonly reported that the cost increases experienced did not match the users' understanding of the rationale presented by the University administration for the technology adoption. In other words, the users' reported that they were told by the administration that UNITS would decrease the cost of telephone service to the University, yet cost increases to departments were quite apparent. As will be discussed in the section on awareness and information dissemination, this perceived discrepancy appears to be due to a lack of understanding by the users of the financial model used to set UNITS prices. Nonetheless, the cost issue negatively affected users' attitudes towards UNITS and Telephone Services: not only because telephones and desired features were seen as too expensive, but also because users felt they were not involved in the decision to adopt UNITS
and therefore departments felt the costs were being forced upon them. Users frequently suggested that the new system cost twice as much, yet didn't have enough advantages to justify the costs, or in fact didn't have as many advantages as the old system. "For what we get and what we're paying for, I just don't think it's right" was how one user who had been on the system for over six months phrased his/her feelings. A coordinator who had yet to order the phones for his/her department said

Well, one of the things that troubled me -- I'm sure other areas of the university are having this experience too -- is that we're making an advance in technology in bringing in a new instrument that will do more things. It's just unfortunate that there are a few very convenient things that either it won't do or it will only do at a higher cost than what we're paying now and that's really moving backwards. Sorry, but if the costs increase and we're on the same budget because we're putting in a new phone system... and we have to take funds from somewhere else and supplement the phone system to have the same conveniences we have now.

These issues will be described in more detail in succeeding sections on attitudes, perceived needs and technical issues.

An examination of the three items which referred to cost issues on the factors affecting attitudes towards the technology scale is also informative, but does not reflect the significance of the cost that the interviews and focus groups did. Interestingly, when asked which of the 30 items on the final survey most affected their attitude, only one of the 141 respondents listed enough money allocated (item 15) as the most important factor, and eight respondents listed budget did not have to be cut back (item 31). These items were listed twice each as the second most important factor. As the third most important, enough money allocated was again listed twice, while budget did not have to be cut back was listed only once. "My economic security was enhanced" (item 7) was not listed at all.

A summary of responses to these items is presented in Table 3. Clearly, the cost items did not stand out by themselves as extremely important factors affecting attitudes towards the telephone on the scale. In fact, the means on these three items \( F_7 = 2.34, F_{15} = 2.5, \)
F31 = 2.44) show that the respondents tended to be almost exactly neutral in their ratings that economic security was enhanced by the new telephone system (F7), that there was enough money allocated for equipment (F15), and that important portions of their department's budget did not have to be cut back and reallocated to the new system (F31). However, the responses to item 7 were quite polarized, with 41.3% of the responses strongly agreeing with the statement and 31.4% strongly disagreeing. Responses to the other two items were more evenly distributed, though 16.2% of the respondents strongly disagreed that there was enough money for equipment allocated by the organization to support the new telephone system (F15). Finally, 4 individuals wrote comments on the final survey which stated that the system was too expensive (25% of all comments about the service).

<table>
<thead>
<tr>
<th>Item</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>7: economic security was enhanced (N=121)</td>
<td>41.3</td>
<td>4.1</td>
<td>6.6</td>
<td>9.1</td>
<td>6.6</td>
<td>31.4</td>
<td>2.34</td>
</tr>
<tr>
<td>15: enough money for equipment allocated (N=111)</td>
<td>13.5</td>
<td>7.2</td>
<td>31.5</td>
<td>27.9</td>
<td>3.6</td>
<td>16.2</td>
<td>2.50</td>
</tr>
<tr>
<td>31: Parts of Depts. budget not cut back (N=107)</td>
<td>11.2</td>
<td>16.8</td>
<td>24.3</td>
<td>24.3</td>
<td>11.2</td>
<td>12.1</td>
<td>2.44</td>
</tr>
</tbody>
</table>

Note. 0 = strongly agree, 1 = agree, 2 = somewhat agree, 3 = somewhat disagree, 4 = disagree, 5 = strongly disagree, M = mean for item.
Yet, all three of the cost factors had small, but statistically
significant negative correlations with attitude (F7 r = -.16, P = .04)
(F15 r = -.18, P = .03) (F31 r = -.20, P = .02). Further, the factor
analysis scree test suggested a three factor solution on the factors
affecting attitudes scale, one of which clustered items about budgetary
issues. The results of the factor analysis (pattern matrix) are
presented in Table 4. Factor 1, Effects, clustered items about the
effect of the new telephone system implementation. Factor 2, Process,
clustered items about the process of the implementation, and Factor 3,
Budget, clustered items about the budgeting of the new telephone system.
Items were assigned to factors when their loadings exceeded .50 and
primary loadings exceeded secondary loadings by .30. The factor
correlation matrix showed that Factor 1 correlated with Factor 2 at
-.02, and .26 with Factor 3. Factor 2 and Factor 3 were correlated at
.27.

Factor 3, Budget, attracted four items meeting the inclusion
criteria: "Important portions of my department's budget did not have to
be cut back and reallocated to the new telephone system" (F31); "There
was enough money for equipment allocated by the organization to support
the new telephone system" (F15); "The University, who decided to adopt
the new telephone system, could be trusted" (F16), and "I was not
involved in the planning" (F2). The structure matrix revealed exactly
these same clusters, with one exception. In the structure matrix, item
7: "My economic security was enhanced by the new telephone system"
loaded into both Factor 1 and Factor 3 (.85 and .52 respectively). As
would be expected, item 7 showed strong and significant correlations
with Items 2, 15, 16, and 31; the other items in Factor 3 (r = .27, p =
.003; r = .37, p = .000; r = .56, p = .000; r = .48, p = .000). Mean responses
to all items on the final survey scale are presented in Table 5, as they
were clustered by the factor analysis.

Additionally, two items in Factor 1 double loaded into Factor 3:
item 25 "Boss not really supportive of the new system," and item 24
"Telephone Services could not be trusted." Item 25 loading into the
Budget factor can probably be explained by the fact that users did not
### Table 4
Principle Components Analysis With Oblique Rotation (Pattern Matrix)

<table>
<thead>
<tr>
<th>Questionnaire Items:</th>
<th>Factor 1 Effects</th>
<th>Factor 2 Process</th>
<th>Factor 3 Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>F11: Increased level of challenge to job</td>
<td>.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F10: Responsibility enlarged</td>
<td>.85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F30: Productivity less accessible</td>
<td>.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F12: Decreased job importance</td>
<td>.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F8: Contact with coworkers hampered</td>
<td>.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F6: Job status threatened</td>
<td>.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F9: Capacity to meet production hampered</td>
<td>.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F7: Economic security was enhanced</td>
<td>.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F32: Negative modifications to work area</td>
<td>.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F13: Changes required incompatible w/beliefs</td>
<td>.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F20: Univ. had history of poor changes</td>
<td>.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F5: More job security w/ existing methods</td>
<td>.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F25: Boss not really supportive of change</td>
<td>.68</td>
<td>-.33</td>
<td></td>
</tr>
<tr>
<td>F27: Conversion generated too little info</td>
<td>.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F24: Telephone Services could not be trusted</td>
<td>.60</td>
<td>-.48</td>
<td></td>
</tr>
<tr>
<td>F23: Added burden of conversion too much</td>
<td>.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F4: Many incentives offered for adapting</td>
<td>.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F22: New telephone would work as planned</td>
<td>.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F17: Not enough training provided</td>
<td>- .74</td>
<td>.43</td>
<td></td>
</tr>
<tr>
<td>F28: Conversion generated clear info</td>
<td>.70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F19: Adapting did not disrupt work habits</td>
<td>.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F18: Timing of conversion was good</td>
<td>.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1: Technology was not needed</td>
<td>-.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F21: Did not fear being viewed incompetent</td>
<td>.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F29: Conversion generated unnecessary info</td>
<td>.32</td>
<td>-.43</td>
<td></td>
</tr>
<tr>
<td>F3: Communication about change clear</td>
<td>.41</td>
<td>.32</td>
<td></td>
</tr>
<tr>
<td>F31: Parts of Dept.'s budget not cut back</td>
<td>.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F15: Enough money for equipment allocated</td>
<td>.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F16: Univ., who adopted, could be trusted</td>
<td>.60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2: Was not involved in the planning</td>
<td>.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F26: Speed moving info positively affected</td>
<td>.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F14: Changes consistent with OSU's values</td>
<td>.36</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Eigenvalue</th>
<th>Percent of Variance</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10.97</td>
<td>34.3</td>
<td>34.3</td>
</tr>
<tr>
<td></td>
<td>3.85</td>
<td>12.0</td>
<td>46.3</td>
</tr>
<tr>
<td></td>
<td>1.73</td>
<td>5.4</td>
<td>51.7</td>
</tr>
</tbody>
</table>

Note. Coefficients with an absolute value <.30 are not reported.
### Table 5
Mean Responses To Factors Affecting Attitudes Scale

<table>
<thead>
<tr>
<th>Statements:</th>
<th>M*</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(Items clustered about Effects)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F11: The new telephone caused an increase in the level of challenge to the job.</td>
<td>2.22</td>
<td>2.12</td>
</tr>
<tr>
<td>F10: My power, influence, responsibility, or authority was being enlarged because of changes brought on by the new telephone.</td>
<td>2.43</td>
<td>2.13</td>
</tr>
<tr>
<td>F30: My day-to-day activities or individual productivity levels had become less accessible to my superiors.</td>
<td>2.54</td>
<td>1.87</td>
</tr>
<tr>
<td>F12: The new telephone caused a decrease in the degree of importance my department placed on the job.</td>
<td>2.63</td>
<td>2.07</td>
</tr>
<tr>
<td>F8 : Contact with my coworkers was hampered or I felt isolated from others.</td>
<td>2.75</td>
<td>1.92</td>
</tr>
<tr>
<td>F6 : My job status or prestige was threatened by the new telephone.</td>
<td>2.68</td>
<td>2.16</td>
</tr>
<tr>
<td>F9 : My capacity to meet production standards was hampered while converting to the new system.</td>
<td>2.41</td>
<td>1.90</td>
</tr>
<tr>
<td>F7 : My economic security was enhanced by the new telephone.</td>
<td>2.34</td>
<td>2.24</td>
</tr>
<tr>
<td>F32: Negative modifications to the physical work area occurred because of the new telephone system.</td>
<td>2.53</td>
<td>1.67</td>
</tr>
<tr>
<td>F13: The changes the new telephone required were incompatible with my own beliefs about how the work should be done.</td>
<td>2.84</td>
<td>1.73</td>
</tr>
<tr>
<td>F20: The University had a history of poorly planned and executed change projects, and this was just another in a long series of failures.</td>
<td>2.51</td>
<td>1.52</td>
</tr>
<tr>
<td>F5 : There was more job security in maintaining the existing methods or procedures.</td>
<td>2.64</td>
<td>1.88</td>
</tr>
<tr>
<td>F25: My boss was not really supportive of the new telephone system.</td>
<td>3.23</td>
<td>1.47</td>
</tr>
<tr>
<td>F27: The new telephone conversion generated too little information.</td>
<td>2.31</td>
<td>1.55</td>
</tr>
<tr>
<td>F24: Telephone Services, responsible for implementing the telephone system, could not be trusted.</td>
<td>3.21</td>
<td>1.54</td>
</tr>
<tr>
<td>F23: The added burden of implementation or converting to the new telephone was too much to handle along with other pressures that already existed in my job.</td>
<td>3.53</td>
<td>1.67</td>
</tr>
<tr>
<td>F4 : There were many incentives offered for adapting to the changes in operating methods or procedures required by the new telephone.</td>
<td>2.85</td>
<td>1.58</td>
</tr>
<tr>
<td>F22: The new telephone would work as planned, and that the University would reverse its decision once implementation had taken place.</td>
<td>2.72</td>
<td>1.67</td>
</tr>
</tbody>
</table>

Note. * 0 = strongly agree, 5 = strongly disagree.
Table 5 (continued)

Table 5
Mean Responses To Factors Affecting Attitudes Scale

<table>
<thead>
<tr>
<th>Statements:</th>
<th>M*</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Items clustered about Process)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F17: There was not enough training provided by the organization to support the new telephone system.</td>
<td>3.14</td>
<td>1.62</td>
</tr>
<tr>
<td>F28: The new telephone conversion generated clear information.</td>
<td>2.27</td>
<td>1.48</td>
</tr>
<tr>
<td>F19: Adapting to the new telephone did not disrupt my work habits.</td>
<td>2.16</td>
<td>1.67</td>
</tr>
<tr>
<td>F18: The timing of implementation or conversion was good.</td>
<td>2.21</td>
<td>1.45</td>
</tr>
<tr>
<td>F1: The technology was not needed.</td>
<td>3.37</td>
<td>1.53</td>
</tr>
<tr>
<td>F21: When learning new skills or concepts required by the new telephone, I did not fear being viewed as incompetent.</td>
<td>1.27</td>
<td>1.45</td>
</tr>
<tr>
<td>F29: The new telephone conversion generated unnecessary information.</td>
<td>2.68</td>
<td>1.44</td>
</tr>
<tr>
<td>F3: Communication about the change was clear.</td>
<td>2.37</td>
<td>1.52</td>
</tr>
<tr>
<td>(Items clustered about Budget)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F31: Important portions of my department's budget did not have to be cut back and reallocated to the new telephone system.</td>
<td>2.44</td>
<td>1.49</td>
</tr>
<tr>
<td>F15: There was enough money for equipment allocated by the organization to support the new telephone system.</td>
<td>2.50</td>
<td>1.51</td>
</tr>
<tr>
<td>F16: The University, who decided to adopt the new telephone system, could be trusted.</td>
<td>1.65</td>
<td>1.48</td>
</tr>
<tr>
<td>F2: I was not involved in the planning.</td>
<td>1.14</td>
<td>1.17</td>
</tr>
<tr>
<td>F26: The speed of moving information from place to place was being positively affected by the new telephone.</td>
<td>2.51</td>
<td>1.57</td>
</tr>
<tr>
<td>F14: The changes required by the new telephone were consistent with O.S.U.'s values.</td>
<td>2.05</td>
<td>1.49</td>
</tr>
</tbody>
</table>

Note. * 0 = strongly agree, 5 = strongly disagree.
receive optional features which they desired -- a departmental manager's ultimate decision. It may be that had the users more clearly understood the budgetary constraints departments were under, this impression may have changed. The explanation for item 24 loading into the *Budget* factor may be the same as for the University trust: formal communications from Telephone Services indicated potential cost savings, and the reality did not meet expectations. However, the double loadings of these items make clear interpretation difficult.

In summary with respect to costs then, interview and focus group data suggested that the cost of the system was a very important factor -- especially for administrators and coordinators who had close contact with the budget. The costs affected the availability of optional features, and therefore user perceptions of system effectiveness in meeting their needs. The factor analysis data also show an important budget cluster affecting attitudes towards the technology; though the three items which specifically referred to budgetary issues did not stand out by themselves as important.

**Needs Assessment And Feature Selection**

In only six of the 18 departments contacted for interviews and focus groups (who had already ordered the telephones) were any end users consulted by the coordinator or managers in terms of which features they thought they would need. With few exceptions, then, the features were selected on the basis of cost alone. Most departments ordered only the most basic phones and features, trying to get by with the minimum amount of features and electronic phones, due to cost increases. As previously discussed in this chapter, every department contacted reported an increase in their telephone costs -- most citing a doubled phone bill compared to Centrex service. "The first thing we considered was cost" said one coordinator. Another said

The chairperson and I sat down and decided what we could afford. And basically what we could afford was the $30 monthly charge, and an incoming line which serves [the
department]...they could receive phone calls...we got none of the other features. We couldn't afford them...I know what their [the departmental members] needs are, and I know what they'd like. But what it comes right down to is the bottom line of what you can afford.

The telephone and feature selection decisions, then, were typically made by the coordinators, with consultation with department heads/managers (who have fiscal authority), based on 1) the budget; and 2) their knowledge of office communication patterns and end user needs. In certain circumstances, individuals with special needs were consulted: for example those with hearing impairments were asked about special equipment they might need to order. With respect to not consulting with other end users, many of the coordinators explained that they did not want to solicit information from members of their department because individuals would request too many features that could not be afforded. They would then have to tell them that they could not have the requested features. In effect, most coordinators felt that their knowledge of user needs was sufficient, and several saw consultation with users pointless due to the budgetary constraints which would have prohibited them from ordering features users desired. For example, one focus group discussion went as follows:

BR:...you realize if I went up and asked you what you what kind of computer you wanted, are you going to pick the Chevy little Chevette thing? Or are you going to go "maybe I could use this Ferrari up here?"
MB: Well, but what I'm saying is you're going to get a higher complaint level simply because people weren't involved, whether as a courtesy thing it would have meant anything.
KJ: But I think if you told them the different things that were available, they're first reaction would be, like [BR] says, the top of the line. They're going to pick that no matter what. Then when you tell them "No, you can't have that, I'm picking this for you." "Well, what did you bother to ask me for anyway?"
MB: It's kind of a catch 22.
In fact, one department refused to send individuals to training, and had telephone face plates removed so that individuals would not be aware of the features that were not ordered for them.

The final survey showed that 61.8% of the 123 respondents strongly agreed with the item 2 statement "I was not involved in the planning," though this item was not significantly correlated with attitude. Cumulatively, 25% of the respondents disagreed with the statement. Only two respondents listed this item as the factor most affecting their attitude. Three respondents listed the item as the second most important factor, and six individuals listed the item as the third most important factor. Additionally, some respondents wrote comments about the system configuration. Eight users wrote that they did not have necessary features on their phones (47.1% of comments about configuration).

Another problem was that several of the coordinators felt they did not have enough time to consult with all of the users. In other words, the turnaround time between going to the orientation and receiving the feature package ordering booklet and having to meet with Telephone Services and order the phones was too short to allow for extensive user consultation. This was especially true in larger departments. One department cut-over during Phase 1 reported they had 2 or 3 days subsequent to receiving the ordering information to meet with Telephone Services and order the phones. "During the whole process from last October [1985] through January [unintelligible] we changed the specs quite a bit. And we changed it based on the fact that we didn't have initially the information and a good grasp of that information at the time. Because, again, it was 'Hurry up, we need it in two days.' 'Here it is.'...there was no time to go out and consult with people. It just wasn't there." One other department, cut-over during Phase 3 reported the same. Other departments reported that they had two to three weeks in which to make selections, which still wasn't enough time.

Feature selection is only one part of system configuration. Other important issues include where calls should be forwarded to, who should have a direct inward dial line (as opposed to calls screened by a
secretary), which functionally related individuals should be in the same pick-up group, etc. All but six of the coordinators interviewed said they designed the system based only on their own knowledge of office communication patterns. Only four of these six coordinators solicited input from most or all of the departmental members. Two of the six consulted staff members but not faculty. Two coordinators who had yet to order the phones planned on extensively consulting with users in order to configure the system effectively. One new coordinator planned on extensively consulting with users who were soon to move to another building.

slv: Now is that because you don't currently really understand well enough who's communicating with whom, how often, either internally or externally?

r: That's probably part of it. But I think I would feel much more comfortable communicating with each one of them individually, knowing that what we were putting in there was going to suit their needs. That's just me though. And I know it's going to take a great deal of time.

Yet, since approximately 99% of all departments have changed the system configuration within the first 30 days of installation (although only about five percent re-design the total flow of calls), one could question the validity of the coordinators' knowledge of office telephone communications needs.¹ Notwithstanding, a good part of the problem may be due to the fact that with two exceptions, the coordinators felt they did not have an adequate understanding of the system, the features, and their capabilities/ limitations/ applications prior to designing and ordering the phones. It should be noted that the two coordinators who did feel they had adequate knowledge both had experience with similar telephone systems while working elsewhere. This lack of understanding

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¹ These estimates were obtained during an interview with a Telephone Services Representative during April, 1987.
could be explained in part by the fact that during Phase 1, there was typically about a one month lag period between orientation and receiving the materials for ordering. Interview data suggests that individuals did not remember much from the orientation sessions by the time they ordered their telephones. Further, most coordinators felt that the pictures and descriptions of phones and features in the Feature Package Options booklet (see Appendix C) were insufficient to provide an adequate understanding of the system for ordering. In fact, during one consultation/ordering session which the researcher observed, it was quite apparent that the coordinators (this department had two who were sharing the responsibility) did not understand the system well. Both continually asked for clarification from the Telephone Services representative on what particular features did. For example, several minutes were spent clearing up confusion about the different types of call forwarding, and how they would operate in certain circumstances. In addition, the make set busy, pick up, transfer, and line hunting on multi-line phones features were clarified. Further, the coordinators were not sure which features were standard, and which were optional. Finally, the coordinators were not even clear on the differences between the various types of telephones.

Additionally, several coordinators reported that the coordinator orientation program (initiated subsequent to phase 1) provided insufficient information to allow them to understand the system well enough to have confidence to adequately design the system configuration.

sly: Now, what was it about the orientation that left you so confused?
j: Ah, they really, you know, the people obviously understood the telephone system and what it could do. But they were talking about things and they were kind of covering things very quickly, you know, and going over things. "And you have this feature which allows you to..." But they were throwing it at you so quickly that unless you made a point of interrupting and saying "hey look, explain this to me. I don't know what you're talking about." Some of the people that were in the group had already had a type of telephone system that was very similar to UNITS, you know, totally different than ours, where they were already doing things
that were very similar to UNITS. And they kind of treated us all like we all had the same understanding of what these people did, and that wasn't the case.

SIV: I see.

J: So I think they, you know, we who were using old, old phones that were nothing like this were kind of, ah, you know, I wouldn't say mistreated. But we weren't being given an opportunity to ask questions that they automatically assumed that some of us knew...I'm not even still sure [after two weeks] that we made all the right selections, you know.

This issue will be discussed in greater detail in the following section, as it relates to awareness of the telephone system's features and capabilities, and also to information dissemination.

While the Telephone Services representative(s) attempted to provide consultation with departments in terms of telephone and feature selection and system configuration during ordering, four of the coordinators felt that Telephone Services should do more in this respect. Each felt that Telephone Services should develop a fuller understanding of their particular office situation to help advise departments about which features would make for higher productivity or less disruption of normal work patterns. Rather than the coordinators understanding the telephone system then, they felt Telephone Services should better understand office functions in order to facilitate feature selection and system configuration; though one coordinator stated that he/she realized Telephone Services did not have enough people to effectively engage in this type of consultation. It should be noted that each of these coordinators were from large service departments which rely heavily on telephones to accomplish their work. These departments

2. It should be noted here that during interviews with users, most reported that the new system did not have features which had been on the Centrex system that were perceived as beneficial, and that in fact using the telephone had become more difficult. A common statement was that the users had to change their behaviors to accommodate the telephone system, which was seen as disruptive and counterproductive.
need much more complex system configurations (pick up groups, forwarding paths, etc.) than do smaller service departments or academic departments with one or two answering points.

In one focus group and one interview with two individuals (both coordinators for an academic department), the competence of the Telephone Services consultant(s) was questioned. In both cases, the individuals felt that while the representative appeared to know the features well, he/she did not seem able to solve their particular problems or meet their needs. One individual said "We need [acceptable] answers before this person will present confidence for us to accept [his/her] suggestions when ordering." In another interview:

e: And one of the disadvantages that we saw to that is that you have one entry point in the department. Then we have faculty that work here in the evenings, and unless...there's no way for them to know that they have a call, or...
m: They really can't even pick it up.
e: ...know that there's anything coming in. Ah, now it was suggested, "Well, you could hang a bell out in the hallway!" Well, I...
m: That's not going to do any good either.
e: ...that won't do any good either.
m: I mean even if a faculty member would get up and answer it, what if it's John's clear down at the end of the hall, the far end of the hall? By the time he gets up, comes out of his office and all the way down here...
sly: They'd hang up.
m: They'd hang up. Or maybe he couldn't hear it.

However, on the final survey, just over 66% of the 115 users responding disagreed with the statement "Telephone Services, responsible for implementing the telephone system, could not be trusted" (M = 3.21; 0 = strongly agree, 5 = strongly disagree). These data are presented in Table 6. In eight instances, this item was listed as one of the three most important factors affecting attitudes (once factor most, five times factor second, twice factor third).

The data show then, that few users were involved in departmental decisions about feature selection and system configuration, because of coordinator fears of unaffordable requests, a lack of time for user
consultation, and coordinator perceptions that they adequately understood the telephone needs of the department. This lack of participation led to some negative user attitudes. Further, feature selection and system configuration was hindered by a lack of understanding of the system by coordinators and department heads/managers who made the decisions -- leading to persistent necessary design changes. While several interview/focus group participants questioned Telephone Services' competence in consulting with departments, the survey data suggested that most users did trust Telephone Services.

Table 6
Response Percentages to Factors Affecting Attitudes Scale Item 24

<table>
<thead>
<tr>
<th>Item</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>24: Telephone Services could be trusted (N=115)</td>
<td>7.8</td>
<td>5.2</td>
<td>20.9</td>
<td>15.7</td>
<td>25.2</td>
<td>25.2</td>
<td>3.21</td>
</tr>
</tbody>
</table>

Affecting Most | Affecting Second Most | Affecting Third Most

| 1 (<1%) | 5 (3.5%) | 2 (1.4%) |

Note. 0 = strongly agree, 1 = agree, 2 = somewhat agree, 3 = somewhat disagree, 4 = disagree, 5 = strongly disagree, M = mean for item.
Role Of The Coordinator

As previously mentioned in Chapter III, Telephone Services initiated the coordinator program so that each department would have an on-site trouble shooter and resource person for users. This was expected to be an individual who had both a working knowledge of the telephone needs of departmental members, and knowledge of budgetary matters, since they were to provide assistance with system configuration and purchasing. With three exceptions out of 20 coordinators interviewed, each was appointed by the Chair, Director, or Dean by default. In other words, the coordinators were almost all administrative assistants who oversaw budgetary matters and had always taken care of the phone budget. Thus, the role of UNITS coordinator was seen as falling within their normal job responsibilities. One individual was asked to be coordinator by Telephone Services because he/she was responsible for management of an entire service department. Thus, he/she felt, like the administrative assistants did, that the responsibility fell within the parameters of the job. Another coordinator was the director of a research facility, and thus was also responsible for the department. One individual accepted the role due to interest in the project and a long-standing knowledge of the office organization and functions. However, this coordinator subsequently took a position in another Ohio State University department, and did not resume a coordinator position.  

3. Coordinator turnover became a problem for Telephone Services subsequent to Phase 1 implementation. A discussion of this problem appears later in this section.
Coordinator Roles

The coordinators perceived their role as directing the system configuration (including selecting the phones and features for users); planning for the location of wall jacks for the telephones; scheduling training for users, communicating telephone problems to Telephone Services; training new employees until such time as formal training could be scheduled; and persuading individuals to use the available features effectively (typically persuading them to learn how to access features). One coordinator had no idea what his/her role as coordinator was or would be -- they had just taken over the position recently and had not performed any functions as coordinator yet. One coordinator's department had not yet received their telephones, and this individual did not have any particular expectations about his/her role as coordinator beyond feature selection which had already been done.

Generally, the coordinators accurately anticipated these roles. Most felt their job as coordinator turned out as expected, although many underestimated the amount of continual time spent trouble shooting and persuading individuals to learn to use the telephone effectively. Several features designed to increase the efficiency of handling telephone calls were not being used by departmental members due to their perceived complexity compared to the previous Centrex system. Typically, the coordinators reported these members were faculty, although some administrators and staff were also included. However, other interview data suggests that faculty are more likely not to use features due to a lack of perceived need for the features than due to complexity. A more thorough discussion of these reasons follows in the sections on technical issues and perceived needs. Still, it important to note that the role of the coordinator is perceived by many coordinators to be very important in insuring that features available are used properly. As one focus group discussion pointed out:

k: So then I showed him how to do it. "Oh, it does work." You know, it's almost like it's, you have to hold hands and go around...
aly: So then do you think that that's, that the coordinator under these circumstances really is going to have to play a crucial role in leading people by the hand and showing them...

k: Uh huh.

aly: Well it seems that you've already been doing that though.

l: That's the truth [k]. The coordinator becomes a very important person, especially if you have the [reluctance to learn].

Yet the final survey data suggests that the users do not perceive the importance of the coordinator as a source of assistance. A summary of these data are presented in Table 7. Of the 273 individuals responding to the item, 158 (57.9%) never used the department coordinator as an instruction/help source, and 81 (29.7%) rarely used the coordinator. Cumulatively, then, over 87% of the users rarely or never sought assistance from the coordinator. A crosstabulation of the data by type of department (service, academic) and Chi Square analysis showed no real differences in the frequency of coordinator access between service and administrative departments ($X^2(4df) = 1.27, p = .87$). Similarly, crosstabulating the data by job showed no real differences in the frequency of coordinator access ($X^2(12 df) = 5.44; p = .94$); although faculty and clerical staff seemed more likely to seek occasional help from the coordinator than administrators or technical staff.

Only two of the coordinators indicated that they continued to think about new configurations or features which could make the system more effective in their office. Two of the 18 coordinators interviewed had no idea that their role was intended to carry beyond system configuration and feature selection. Both of these coordinators indicated that they had no intention of expending additional time and effort to monitor and facilitate use within their departments. These functions were seen as entirely Telephone Services' responsibility by both.
Table 7
Frequency of Coordinator Access by Job and Department Type

<table>
<thead>
<tr>
<th>Job</th>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Fairly</th>
<th>Frequently</th>
<th>Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator  (N=52)</td>
<td>57.7</td>
<td>32.7</td>
<td>7.7</td>
<td>1.9</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Faculty (N=66)</td>
<td>54.5</td>
<td>30.3</td>
<td>15.2</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Clerical (N=105)</td>
<td>56.2</td>
<td>29.5</td>
<td>12.4</td>
<td>1.0</td>
<td>1.0</td>
<td>---</td>
</tr>
<tr>
<td>Technical (N=44)</td>
<td>61.4</td>
<td>29.5</td>
<td>9.1</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Department</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service (N=147)</td>
<td>58.5</td>
<td>29.9</td>
<td>10.2</td>
<td>.7</td>
<td>.7</td>
<td></td>
</tr>
<tr>
<td>Academic (N=126)</td>
<td>57.1</td>
<td>29.4</td>
<td>12.7</td>
<td>.8</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Total Overall (N=273)</td>
<td>57.9</td>
<td>29.7</td>
<td>11.4</td>
<td>.7</td>
<td>.4</td>
<td></td>
</tr>
</tbody>
</table>

Note. Data are presented in percentages of responses.
Some of the coordinators felt that they could have played an additional role in leading an awareness campaign prior to training and cut over. All but one coordinator felt that increased awareness of the capabilities and limitations of the new system, and the rationale behind the change on the part of the users prior to training might have increased commitment to the change; as will be discussed in the section on awareness and information dissemination. This feeling was primarily a result of the reluctance of many departmental members to attend training and use features effectively. Faculty and administrators in particular did not perceive a need to be trained on a device which they had been using all their lives -- an issue presented in more detail in the perceived needs and training sections of this chapter. In addition, many individuals were satisfied with the current system, and saw no need to change to a system which they perceived as more complex. Thus, the coordinators felt that discussing the rationale for the change with members (even though the rationale was presented to the university community in numerous ways as described in Chapter III) might have fostered an increased commitment to learn. Moreover, the perceived lack of need for training might have been averted by creating additional awareness of the increased complexity of the system as compared to Centrex. Yet, only three coordinators identified this specifically as a necessary coordinator function. Others felt that this awareness could be accomplished more effectively by using media sources such as On Campus or The Lantern, and/or personal letters sent by Telephone Services. Indeed, some of the coordinators tried to communicate this complexity to departmental members. However, it was commonly reported that faculty and administrators wanted only to place calls and answer their own calls -- the more complicated functions could be handled by secretaries. This attitude was later confirmed by interviews with faculty and administrators themselves.

It is apparent that many of the coordinators expend significant amounts of time continually dealing with telephone matters, particularly ongoing trouble shooting and consultation with users.
But the mechanical problems we had initially with the training and everything else, that puts pressure on the coordinator, because when the trainers come in, they even say "If you have any problems, you know, you talk to your coordinator." Well right away you've just created a whole new job description for somebody who's already got a defined job.

Yet in no case was there any formal reward structure within the departments for compensation of their efforts. Since the role of coordinator was perceived as falling within their job parameters, a reward structure was absent. Most of the coordinators did express intrinsic satisfaction of doing the job well at times when they felt they had achieved some success. Generally, these successes were reported as achieving the proper design configuration, solving user problems, and training and encouraging effective use of available features. When asked what might encourage a coordinator to devote additional effort to facilitating departmental implementation, all but two coordinators felt incentives were unnecessary. Since being coordinator was perceived as part of their job, they tried to accomplish the functions to the best of their abilities. However, while incentives were not seen as necessary, all of the coordinators (with the two exceptions) felt that recognition and appreciation of their efforts would be the kind of reward system which they favored. The coordinators reported that they were not receiving either from within their departments. There were no reports of users thanking them for a job well done, or for helping them with the phones, etc. Instead, they were likely to be confronted with irate users who could not get a feature to work properly, or faced other complaints about the system. The coordinators were, though, receiving some external recognition from Telephone Services which the coordinators did acknowledge and appreciate. For example, during Phase 1, a luncheon was held for the coordinators where they received this appreciation, along with a free lunch (an additional incentive which was reported after the topic arose). As previously mentioned, two of the coordinators did not perceive their role as extending beyond feature selection. Both of these individuals felt that a reward structure was essential for compensating their efforts. Yet neither could think of any incentives to encourage
them to devote additional time or effort, since they both felt that these functions (trouble shooting, training, etc.) were Telephone Service's responsibility.

**Coordinator Turnover**

Subsequent to phase 1 implementation, turnover of coordinators who left the department became a continual problem for Telephone Services. Often, Telephone Services had incomplete records of who the current coordinator was. In March 1987, Telephone Services attempted a walk-through follow-up with departments to identify coordinator changes. Since some departments claimed they didn't have time to meet with the representatives, a questionnaire was sent out to query this, and encourage coordinators to share the UNITS newsletter with departmental members. However, during distribution of the final survey at the beginning of April 1987, the researcher found three more coordinators who had left the position. Two had left the University altogether, and one had gotten tired of the obligation and delegated the responsibility to someone else. Indeed a check of the coordinator list of Phase 1 coordinators (no date listed, but received by the researcher sometime prior to May 28, 1986), and the list dated March 31, 1987, showed that 13 of the 47 original coordinators had changed -- representing a 28% turnover.

There are two main issues of importance related to this coordinator turnover. First, this turnover is disruptive of the implementation process. As was the case in at least one department, the newly assigned coordinator may not have been trained or oriented to the new responsibility. One new coordinator was not only unfamiliar with the role and its responsibilities, but also unaware of procedures to effect changes in telephone service, unaware of the features and capabilities of his/her own phone, and unaware of the ongoing training sessions being offered by Telephone Services. Further, two of the new coordinators were unfamiliar with how and why the system had been configured, and what information, if any, had been shared with other members of the
department. Additionally, one pointed out that "[the old coordinator] kept a lot of things in her head. And as a result I can't find some things around here."

The second issue relates to the possibility that the coordinators were being overworked as a result of the additional responsibilities. While this idea is contrary to the interview findings above, there was some evidence that the additional responsibilities were indeed considered a burden, and in some cases might have led to coordinator turnover. First, one new coordinator interviewed, with respect to the workload and lack of compensation, said:

the person that was here before me felt that there should have been [compensation]. Because she felt that the position was terribly overloaded [as a result of the additional responsibilities of coordinator]...she said that [the conversion] was a major, major project that was very, very time consuming...I should be honest. I am dreading, probably about 6 months from now we'll be starting with [a new building]. And I imagine I will be getting into the phone system very soon. And I am dreading it.

This excerpt indicates that coordinator turnover might also affect the attitudes and expectations of the new coordinators. Moreover, although it might have been an isolated case, recall that one coordinator had become tired of the obligation and had delegated the responsibility to another individual.

Second, just prior to distributing the final survey instrument, a representative from Telephone Services warned the researcher that the coordinators might not cooperate with collection of the surveys, because many were already feeling overworked. This did not turn out to be the case, since all of the coordinators contacted were willing to collect the surveys (though as mentioned in Chapter III no surveys were returned from one entire department). However, it is important to note that coordinators were making it clear to Telephone Services that they felt overworked.
In summarizing the role of the coordinator, it is apparent that they play an important role in several aspects of implementation, including:

- planning for physical requirements (wall jacks, etc.);
- feature selection and system configuration; and
- scheduling training sessions.

Moreover, they perceived playing an important role in information dissemination, user assistance (and persuading staff to use the phones properly), and trouble shooting. Yet the survey data suggest that they were not frequently accessed as a source of assistance by users. More importantly, perhaps, the coordinators recognized that they could have engaged in increased efforts to promote awareness about the change prior to installation. In fact, most reported that they underestimated the amount of continual time these activities would require — particularly trouble shooting. This is an important finding in that there were no formal reward structures for coordinators. Thus, coordinator turnover became a problem subsequent to phase 1; which disrupted the implementation process.

Awareness Of System and Features and Information Dissemination

**Awareness of System and Features: Rationale**

Nearly all of the users felt that there was a general lack of information dissemination to the University community about the new telephone system — leading to a lack of awareness about UNITS. The first awareness issue relates to the rationale behind the change. Some users wondered the same thing that one coordinator did:

I guess I'm still curious, you know, it's probably something you can't answer, but I'm curious as to why the University went with this telephone system. And just kind of forced it on the departments.
Although many individuals were aware that one reason for the change is to control telecommunications costs, all departments reported an increase in the cost of telephone service: most reporting a 50% increase and some up to 75%. Among those departmental members with fiscal management responsibilities, these increases were identified as one of the biggest problems with the new system. Information coming from the upper Administration focuses on cost savings, while increases to departments are quite apparent.

Thus, what coordinator and others with budgetary knowledge/concern see as the financial actuality of the system, does not match their understanding of the rationale behind the UNITS decision (cost savings). This appears in part to be a function of the fact that the cost savings are projected over an eight or nine year period; with increases paralleling projected increases from Ohio Bell for the first three years, and stabilizing below projected Bell increases thereafter, as discussed in Chapter III. Yet there seems to be a general lack of understanding of or agreement with this "financial model" within departments. The following excerpt from an interview with an academic department is illustrative of the typical perceptions:

sly: Was there anything else that you came across that influenced your expectation at all?

e: Well I'll put it this way, the cost. Yeah the cost of it, the cost for what it was going to do for us is prohibitive. It's going to cost the department instead of 20 to 25 dollars, it's now going to cost roughly 38, 39 dollars to use.

m: And that is with a minimal amount of features. I mean, there are very few options in there.

e: And why we have, the university has seen fit to do this, that is the question I don't know.

m: It seems like they are cutting off their nose to spite their face.

sly: So in other words you feel that you don't understand or have not been told what the university justification or rational for putting in the new telephone system has been?

m: I understand what they're putting it in for but not why they're charging the departments so much per unit.

e: Why the cost is 1 1/2 times, 2 times as much as it costs...
slv: Could you briefly tell me what you believe the university's rational behind putting in the new system is?
m: To better link the campus together; to also be able to use the computer...to link over these fiber optic things.
slv: Okay so your understanding is it has to do with better facilitating the communication networking among the departments?
m: That's part of it and I've also heard that the university said that they could save a lot of money if they had their own phone system. The university may be saving money but the departments sure aren't.
slv: I think that is the issue I'm trying to get at here is that is there is some discrepancy between what you think the telephone system is supposed to do and what in fact it appears to be doing.
e: Now whether this actually is true or not, my at least perception with the university controlling its own destiny as far as its own telephone or communications cost within the campus area, my perception was that this is going to reduce the cost, and instead at least to the departments -- now maybe these are costs overall to the university -- but it sure has not reduced the cost to the individual departments.
m: What it looks like to me is that instead of Telephone Services budget absorbing the entire cost of re-cabling and re-running the lines they are siphoning the cost or spreading it out over the university and having the departments defray that cost instead of making Telephone Services go into the hole.
slv: Okay, so your impression was that the phone was being put in to try and lower the cost but not necessarily as a response to offsetting inevitable increases? See, there is a difference there between cutting costs and minimizing inevitable increases.
e: Well, I think one thing that you would have to know is what is going to be considered the inevitable increases. And from at least from what I could see, and this is down here at the working level not up at the big picture, that that would have to take a lot of perceived increase to come up some time between 1 1/2 to 2 times what the additional cost is going to be of the department. That comes out of the departmental budget that we could use.

As discussed in Chapter III, all Deans and Vice Presidents received information detailing these budgetary matters. It would appear, then, that the information was generally not disseminated to lower levels. Even the coordinators were often unsure of the financial picture.
They haven't really been able to confirm to me that what I've worked up and figured out on paper is actually what we're going to be billed for the telephones. I still, we were paying the University load charge before, which I don't know whether we're still going to have the load charge, or whether all that's built into the cost of the telephones.

Another issue which added to the uncertainty of the financial aspects of UNITS was the billing of long distance charges. About half of the 18 coordinators interviewed who had already received their telephones complained that they had not received any itemized listings of long distance charges since the conversion. Many of these departments had been on UNITS for four to six months. The major problem reported was that administrative assistants were unable to keep accurate and current records on expenditures ledgers. "And so when I get a proper bill, I am going to be months behind." A second problem had to do with the inability to collect for personal long distance calls charged to the department.

While the majority of departmental members do not have close contact with budgetary matters, those administrators and their assistants who do often have frequent contact with other campus departments. Thus, these budgetary issues are being communicated through the "grapevine," leading to negative expectations about costs among those who have not yet had their telephones installed; a point discussed later in the section on attitudes.

Awareness of System and Features: Capabilities and Limitations

The next issue identified pertains to awareness about the capabilities and limitations of the new system and its features. While the issue of the system's technical capabilities and limitations will be expanded in a succeeding section on technical issues, incomplete technical awareness was particularly salient to coordinators who reported a lack of thorough knowledge of the system and features during ordering, as previously discussed in the section on needs assessment and feature selection. Further, several coordinators felt that Telephone
Services could have provided a more clear understanding of the differences between the new system and Centrex: that is, they felt there were some critical limitations of the new system which Telephone Services did not identify, which affected their ability to configure the system for their department effectively. For example, the old phones had a row of lights which indicated which lines were in use, and the centrex system allowed for any number of extensions to share the same phone number. However, the MADNs (Multiple Line Directory Numbers) and Line Status Indicator (LSI) features which would allow for these capabilities on the new system were not available until March 1987, and were not being made widely available due to the demands which MADNs placed on the switching equipment, and cost and reliability of LSI. Adding MADNs to UNITS slows the system down because the computerized switch must give redundant instructions to all of the telephones sharing the same line. A Telephone Services representative said that the LSI feature was very expensive to purchase (though no figures were quoted), and that the life of the equipment was short.

Another major issue reported by interview respondents was the lack of ability to transfer long distance calls made on the PLUS system (the University's discount long distance service). Most coordinators and users reported that Telephone Services did not tell them about this limitation. Rather, they found out later after continually trying and failing. Only when they finally called Telephone Services were they told about the software problem which prevented that capability.

**Awareness of System and Features: Necessary Behavioral Changes**

The key point here is that neither the coordinators or other users seemed to be aware of these differences prior to ordering and receiving their phones. These and other technical differences led to necessary behavioral changes which users: 1) felt many individuals would never find compatible with their beliefs about how the work should be done; and 2) felt should have been better communicated prior to implementation of UNITS. Indeed, many users reported that they would have accepted what
they saw as technical limitations more readily had they been aware of
them from the beginning rather than finding out "the hard way" through
experience. Many users interviewed had perceptions similar one vocalized
by a coordinator:

s: I guess what I'm really asking is how much should I, as
somebody that's in a building that's not scheduled to be cut
over until the fall; how much should I, prior to that time,
know about the phone system? What do you think would be
important for me to know before hand to help generate
realistic expectations about the phone?

o: I guess the first thing, probably, let features and things
alone, and probably some of the offices need just a more
general background why are we going to this phone system? How
does it affect human behavior? It seems to me we're spending
so much time on particular features. You can do this or you
can do that. It's $2 more, or $3 less. And frankly most
people using them don't pay the bill. So the cost difference
doesn't make that much difference. Knowing about a feature in
isolation from the function of the total system doesn't make
much difference. It seems to me that a better way to approach
it would be more conceptually first, and pragmatically
second. And there certainly wasn't any discussion about the
overall phone system-like approach. And I think probably many
of us that are in large offices where we've had more
centralized answering -- I don't know how to put it -- might
have been able to change away from that [focus on individual
features] had there been some discussion of that [conceptual
information about the system] ahead of time not just...
basically when we approach phones, we're approaching them how
can we get the new phones to serve our way of operation. And
I think the bottom line we're learning is we may have to
change ways of operation. Learning that after the fact is not
pleasant. And is certainly not a good will builder.

The actual mechanics of how the new telephone system required behavioral
changes will be discussed more thoroughly in the following section on
technical issues. However, Telephone Services had expectations that
users should take responsibility to perform more telephone tasks such as
transferring calls; answering their own calls (by having DID's); using
call pick up, message waiting, and ring again; and placing their own
long distance telephone calls (particularly faculty and administrators).
Presumably, these activities would allow for more effective telephony
and operations for the departments as groups and therefore the University as a whole (recall the UNITS management plan called for promotion of labor saving features). While this issue will be explored in more detail in the section on perceived needs, it is important to note here that the consensus among the users was that these expectations (which often resulted in undesirable behavioral changes as perceived by the users) were not communicated very clearly by Telephone Services as part of the rationale for the system.

O: One of the thoughts appears to have been that most of us should answer our own phones directly.
SLV: Right.
O: That's a long way from happening.
SLV: That's been one of the major issues...
O: Yeah. And that's changing behavior. Now, if that was a goal, then I think that goal should have been discussed first, and we find out whether people are willing, able -- does it suit operations to do that? -- rather than say "Here's the instrument, now start answering your own phone."

Awareness of System and Features: Implementation Process

Perhaps the biggest lack of awareness issue was centered around the technology of the new system itself -- beyond the differences between UNITS and Centrex as previously described. One major issue reported by users during interviews and focus groups was a lack of awareness of which other buildings and departments on campus had been switched over to UNITS during any given period of time. In other words, unless the individual took it upon themselves to call Telephone Services periodically (several said they had been) to receive an update on who was now on a 292 exchange and who was still on the 422 exchange, they had no idea which exchange the department they were going to reach was on. During an interview with a coordinator and a faculty member in a department which had yet to order their phones or be trained, neither individual was even aware that that some buildings had been switched over more than a year before. In fact, the faculty member thought the completion of uniform 292 dialing was the conversion. He/she had no idea
the department would be receiving new telephone service. The coordinator indicated that the rest of the department's members were probably even less aware of the impending change than he/she was.

During the transition (before all exchanges had been put on the SL-100 switch and uniform 292 dialing was achieved in December 1986), a recording was provided by Ohio Bell which told a caller that a number had been changed, and the caller was to dial 292 and the same four last digits as before. However, while Telephone Services tried to leave original last four digits unchanged, this was not possible in every case. Phones were added or removed from departments, etc. In one instance, the main number for a large service department was removed, and this department's phone system was integrated with another large service department. The recording then, told the caller to dial a non-existent number. Many users reported this specific instance as a major source of frustration for several weeks.

The recording, then, was useful to the caller only under certain circumstances. This was continually reported as a major source of frustration by users both on UNITS and those yet to be converted.4 It was apparent from the interviews that this inconsistency added to the lack of trust and credibility the users had in the system -- similar to that generated when the telephones did not work properly during training or actual use, as described later. Probably the biggest source of

4 Telephone Services attempted to work with Ohio Bell to change the recording. Ohio Bell's response was that they might be able to change the recording for $150,000. Clearly Telephone Services was not interested in investing that sum for a maybe. Thus, the recording was left until March 1987, at which time it was changed to a recording stating the 422 number was no longer in service, and the user was told to call the university operator. From Ohio Bell's point of view, it is understandable that they would no longer feel responsibility for providing university telephone information, as they were no longer the service provider.
frustration was with individuals calling into UNITS. As an example of the frustration for both the caller and receiver: if someone calling into campus reached a UNITS telephone, but was not connected to the party they needed to talk with, the UNITS user might try to transfer the call to the appropriate location (which is exactly what the system is designed to encourage, as it provides better service and increased efficiency). However, calls on UNITS could not be transferred to telephones still on Centrex -- the caller would be cut off if this were attempted. Yet, the campus person trying to transfer did not know if the appropriate location was on UNITS yet or not. Hence, the UNITS user would attempt to do what they were encouraged to do, but often ended up with an irate person calling them back thinking it was their incompetence which had lost them.

Another recurring comment was that users were generally unaware of the complexity of UNITS as compared to Centrex. This had a major impact on users' perceived need to attend training. Most commonly, users felt that "a phone is a phone" -- they seemed unaware that the UNITS system was much more sophisticated and complicated than the old rotary dial phones. In fact, several coordinators even reported that they initially failed to see any need for training, until they had gone to training or orientation and themselves observed the complexity of the system. The exception to this perception seemed to be some of the answering point receptionists, who (perhaps because the telephone was a more salient and important tool for them) seemed to be more aware of the complexity, and therefore the need to attend training.

A major lack of awareness was also related to Telephone Services' progress towards solving software problems on UNITS. As will be described in the technical issues section, software problems were responsible for several technical problems and limitations of the phones. At the time, Telephone Services was not able to correct them. Instead, they had to communicate the problems to Northern Telecom, the manufacturer, and wait for Northern Telecom to take corrective action. Most users were unaware that these were temporary problems, and further that other users were experiencing the same difficulties. Most users
reported that at first, they believed they were operating the phones incorrectly (reporting a lack of confidence in their knowledge). Later, most found out that it was a technical problem either by calling Telephone Services for assistance, or through talking with other users. In fact, several coordinators reported that only when they attended the luncheon that Telephone Services held for them, did they find out about the software problems; that others were experiencing similar difficulties; and that Telephone Services was working with Northern Telecom to correct these technical problems (that they were temporary).

Awareness of System and Features: Individual Telephone Feature Access

Finally, interviews and focus groups repeatedly revealed that users (especially faculty) were unsure about how the features worked, or whether in fact particular features were accessible from their phone or not -- in other words, what the system could or could not do. A typical example:

_q: You know, in terms of all these nice features, why, I'm not used to them either. And what I guess one of my main frustrations is that I think to get one of the secretaries I have to dial my own number, which is 5 digits or something like that. And then if they're on another, you know, I don't have the intercom equivalent. I think, I don't know, if that's true or not.
_s: Is that what we've lost? You see, we had the intercom on the old one, but I don't know if we have those now.
_q: I don't either. I don't have any idea. Do you know?

Initially, part of the confusion seemed to result from some inaccurate information received from Telephone Services: who users reported at first were not sure about certain features themselves. "It doesn't always work the way you think it's going to work, or the way you're told it works...I've got to think that they aren't quite sure as well, sometimes, what some of the nuances of this system are." For example, during phase 1, several coordinators said that Telephone Services told them they could transfer PLUS long distance calls. Later, they received a memo from Telephone Services telling them the couldn't.
Also during phase 1, Telephone Services informed some users that the PLUS system could be accessed using speed calling, but users found later that it would not (though both these capabilities were later made available).

Many users (particularly faculty) were unsure how such features as forward-busy/no answer and conference calling worked, or if these were standard features or available on the single-line sets. Even several coordinators were unaware that these were standard features available on all phones. The survey data supports the interview findings, and are summarized in Table 8. Call transfer, conference calling, and speed dialing had the lowest incidents of uncertainty (1.6%, 3.2%, and 4.8% respectively).

On the final survey, again all features received some response in the "Not sure I have" column. Make set busy had the highest incidence of uncertainty (36.2% of respondents). This feature was followed by call park, intercom, speakerphone, speed dialing, and call forwarding. One could speculate that with call forwarding, it may not be as much that they are uncertain if they have call forwarding, but rather are more uncertain as to which type of forwarding is activated. The lowest incidents were for call transfer and hold (4.1% and 9.5% respectively). It is important to note that while all of the features which users were most uncertain about were optional features (except for call forwarding preprogrammed -- no answer or busy), at least 10% of all users were uncertain about all of the standard features except transfer and hold.

In addition, while group intercom is an optional feature available only on electronic sets, all phones have the capability to access internal extension numbers -- which effectively served as an intercom, as described in the operations manual's dialing instructions (see Appendices D and E).

Additionally, each of the standard features were listed on the final survey at least twice as features users would add to their phone if they could. In fact, the third most frequently "requested" feature was the standard ring again (16 "requests" = 9.4%). Twelve users (7.1%) also "requested" the standard message waiting feature. These findings
Table 8

Frequency of "Not Sure I Have" Responses to Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Percent of &quot;Not Sure&quot;</th>
<th>Number of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Responses</td>
<td>To Item Overall</td>
</tr>
<tr>
<td>Make Set Busy</td>
<td>36.2</td>
<td>287</td>
</tr>
<tr>
<td>Call Park</td>
<td>31.5</td>
<td>292</td>
</tr>
<tr>
<td>Intercom *</td>
<td>21.3</td>
<td>286</td>
</tr>
<tr>
<td>Speakerphone</td>
<td>19.0</td>
<td>289</td>
</tr>
<tr>
<td>Speed Dial</td>
<td>18.9</td>
<td>291</td>
</tr>
<tr>
<td>Forw Programmable</td>
<td>16.7</td>
<td>263</td>
</tr>
<tr>
<td>Ring Again *</td>
<td>16.3</td>
<td>288</td>
</tr>
<tr>
<td>Forw Busy *</td>
<td>16.3</td>
<td>264</td>
</tr>
<tr>
<td>Message Waiting *</td>
<td>16.0</td>
<td>288</td>
</tr>
<tr>
<td>Forw No Answer *</td>
<td>14.3</td>
<td>252</td>
</tr>
<tr>
<td>Call Pick Up *</td>
<td>12.4</td>
<td>291</td>
</tr>
<tr>
<td>Conference/Consult *</td>
<td>10.4</td>
<td>288</td>
</tr>
<tr>
<td>Hold *</td>
<td>9.5</td>
<td>285</td>
</tr>
<tr>
<td>Transfer *</td>
<td>4.1</td>
<td>293</td>
</tr>
</tbody>
</table>

Note. * indicates standard feature on all UNITS telephones.
clearly show a lack of awareness on the part of users about the capabilities of their phones, since all UNITS phones have these features.

Finally, when asked why users did not use features that they did have on the survey, "Don't know how to use it" received the second highest number of responses (77 = 12.6% of responses to all reasons). Every feature was listed at least twice. The results of the multiple response procedure are summarized in Table 9. The data revealed that two standard features on all phones, message waiting and ring again were listed most frequently. These features were followed by call transfer, call park, and conference/consult. Call pick up, forward busy, and intercom were listed the least number of times. Further, several features which operate independently of other telephones or are preconfigured by Telephone Services to work with other UNITS telephones were listed under the reason "Other's I need to communicate with don't have the feature." For example, only one of the telephones needs to be a UNITS phone (the user's) in order to use the conference feature. Also, a call parked using the call park feature can be retrieved from any other UNITS telephone, regardless of whether this feature is assigned to that phone or not. Speed dial, speakerphone, and make set busy also were listed, each of which operate independently from other phones -- in other words, the features could be used whether anyone else had them or not. These findings indicate additional lack of awareness of the system and its features.

In summarizing the topic of awareness, the data show a general lack of awareness throughout the university community with respect to the rationale behind the change. In particular, users did not seem to understand the "financial model" Telephone Services employed to retire the bond issue. A more prevalent lack of awareness concerned the system's capabilities and limitations. This was an acute problem for coordinators as they attempted to select appropriate features and system configurations, as well as for users who weren't sure which features they had, or how features worked. The data indicate that users did not
Table 9
Percentage of "Don't Know How To Use" As A Reason For Not Using Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Percent of &quot;Don't Know How&quot; Responses (N=77)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ring Again *</td>
<td>18.2</td>
</tr>
<tr>
<td>Message Waiting *</td>
<td>14.3</td>
</tr>
<tr>
<td>Transfer *</td>
<td>9.1</td>
</tr>
<tr>
<td>Call Park</td>
<td>9.1</td>
</tr>
<tr>
<td>Conference/Consult *</td>
<td>7.8</td>
</tr>
<tr>
<td>Forward (unspecified)</td>
<td>6.5</td>
</tr>
<tr>
<td>Forw No Answer *</td>
<td>6.5</td>
</tr>
<tr>
<td>Speed Dial</td>
<td>5.2</td>
</tr>
<tr>
<td>Hold *</td>
<td>3.9</td>
</tr>
<tr>
<td>Make Set Busy</td>
<td>3.9</td>
</tr>
<tr>
<td>Speakerphone</td>
<td>3.9</td>
</tr>
<tr>
<td>Forw Programmable</td>
<td>3.9</td>
</tr>
<tr>
<td>Intercom *</td>
<td>2.6</td>
</tr>
<tr>
<td>Forw Busy *</td>
<td>2.6</td>
</tr>
<tr>
<td>Call Pick Up *</td>
<td>2.6</td>
</tr>
</tbody>
</table>

Note. * indicates standard feature on all UNITS telephones.
know how to use many of the features they had — which affected extent of use. In addition, users were unaware that some technical problems they were experiencing were temporary software "bugs," and that Telephone Services was attempting to correct them. This was in addition to a lack of awareness of the progress of other aspects of implementation, such as which buildings were converted or soon to be. Generally, this lack of awareness led to formation of inaccurate expectations of the technology which were not met.

Information Dissemination

The interview, focus group, and survey data indicate, then, that more information dissemination needs to occur with respect to the rationale behind the conversion to UNITS; the pricing and billing procedures; and the technology itself. Several coordinators felt that new coordinators should be given the opportunity to meet with experienced coordinators who could help them better anticipate how features would function within their offices, anticipate potential problems, and suggest possible solutions to likely user problems. Most of these suggestions were based on the successful outcomes of the coordinator luncheon given by Telephone Services in accomplishing these benefits.5

When coordinators were asked how information about the new system should be communicated to users, several felt that mediated information, such as articles in The Lantern or On Campus would be the most effective. It was reported that in some departments, The Lantern is widely read by individuals. Yet in other cases, the coordinators reported that faculty and staff never read The Lantern. Several users claimed they were highly skeptical of any information presented in the

5. However, these outcomes were unanticipated side benefits to the actual purpose of the luncheon: recognition and appreciation of the coordinators' work.
Lantern. The final survey data showed that 36% of the 267 respondents claimed no exposure to UNITS information presented in the Lantern, and 38% of the 266 respondents claimed no exposure to UNITS information in the On Campus publication.

Several coordinators felt that personalized, informative letters from Telephone Services would be the most effective way to educate users. Subsequently, during interviews with other users, it was found that memorandum and letters were the least likely to be effective for information dissemination. Most users and all faculty interviewed reported that unless a memo appeared to be of extreme importance, it was usually thrown away immediately. Two of the faculty members reported that they might pay attention to a memo if it contained awareness information (particularly about progress towards solving technical problems), if it were appropriately flagged to their attention. These conflicting reports suggest that attention to various information dissemination sources differ among the diverse members of departments at Ohio State University.

The consensus among users was that information from Telephone Services should be funneled through the departmental coordinator, and disseminated interpersonally (orally during faculty meetings, for example) by the coordinators themselves. Users felt that this type of dissemination of awareness information (about the systems capabilities and features, and progress towards solving technical problems in particular) would be received more effectively, would be the least likely to be ignored, and would be communicated within the context of the particular office climate. Indeed, this was how Telephone Services conceived of information dissemination within departments; using the coordinator as a channel of information. However, interview data with users suggests that very little, if any of this kind of communication actually occurred, in academic departments; given that few faculty members interviewed even knew that there was a coordinator for their department. In addition several faculty members said that if indeed they had received any memoranda from their coordinator, it had almost certainly been thrown away without being read. Recall also that
responses to the final survey showed that over 87% of the users rarely or never sought assistance from the coordinator. One limitation to this study is that the survey data did not assess the extent to which users had contact with the coordinators regarding other, more general information about UNITS. Finally, recall that Telephone Services began publishing a newsletter (UNITS Network) which was sent to all coordinators, who were encouraged to share the information with their users. The final survey revealed that 39.1% of the 266 respondents had no exposure to the newsletter.

In addition to information dissemination from Telephone Services to the University in general, the interview and focus group data suggested that better internal communications within departments was also needed; particularly with respect to procedural issues. For example, several coordinators reported that users were reluctant to pick up others' phone calls when individuals were gone from their desks. Thus, they had to spend time deciding who would be responsible for picking up particular phones, and clarifying procedures -- often mandating the responsibility. In addition, several secretaries reported that they used the message waiting feature to alert other's that there was a message waiting for them. Yet most people who had messages waiting were unaware that the flashing red light on the telephone meant a message was waiting either at the answering point, or in their mailbox. While this feature is covered in training, internal communications appear necessary to create awareness about the feature for those who don't attend. Equally important is to create awareness within the department about how the messages are to be received by the individuals -- from their mailbox or the answering point, for example -- since these are departmental procedure decisions. Interviews revealed that different methods were being used in different departments -- though the operations manuals state that messages can be retrieved from the answer point (which presumably activates the message waiting light). However, the manuals do not instruct the answer point how to handle the messages; only how to activate the light on the user's phone.
In summary, the data indicate that more information about UNITS needed to be disseminated to users: about the rationale behind the change and the pricing strategies, as well as the characteristics of the technology itself. Most users reported that formal written communications would be the least effective mechanism of information dissemination. The consensus, then, was that information should be funneled through the coordinator and disseminated interpersonally to users.

Training

The response to the training was generally very positive, with a few notable exceptions. Without exception, though, hands-on experience and practice with accessing features was reported as the most beneficial aspect of the training process. Interestingly, this is contrary to the literature which states that hands on training is not required for operating a feature-rich telephone system, but that initial training should instead introduce system capabilities and teach the use of instructional materials (Klemmer & Dooling, 1983). However, many users felt that the training would have been more effective had the trainers stressed the differences between the old system and UNITS in accomplishing tasks. The users felt this would have helped them understand what the new features were designed to accomplish in relation to how the same tasks were accomplished on the old system.

6. In several instances, technical problems with the telephones at the time of training prevented users from practicing features. Departments which experienced phones that did not work properly during training typically reported not only a lack of expertise in later accessing features, but also a more negative attitude towards the system in general -- mostly related to a lack of confidence in the system's reliability.
The original videotape with the President, and the conceptual information presented on the flip charts was identified as the least useful parts of the training. The coordinators felt that the rationale and conceptual information should have been presented prior to training. Since training for users occurs just prior to cut over, the pragmatic need to learn the features ahead of time (since it is difficult at the time of use, particularly for busy answering points) is of paramount concern at that time. Most of the users also reported that while training focused on using necessary features, it failed to adequately simulate actual working conditions. For example, transferring a call to another party in the training situation is not analogous to transferring a call while another caller is on hold, and a third line is ringing. In other words, the training failed to simulate the stress and complexity of performing multiple telephone tasks simultaneously.

There were mixed perceptions about the numbers of features which were covered during training. Several users felt that too many features were covered, and that this made training too complicated and confusing. These individuals felt that training should focus only on those features which had been selected for the department (a method implemented by Telephone Services subsequent to phase 1 as discussed in Chapter III). However, several other users felt that it was beneficial to learn about all of the features, as employees may move to other departments where they may be using additional or different features, or have occasions to use others' telephones which may have different features. Moreover, some of these coordinators recognized that knowledge of all of the features could help departmental members understand the functions of other members, and gain a better understanding of how their own work, and in this case use of the telephone, affects the work of others. In fact, in a couple of departments, users spent time during the first week after cut over practicing features and getting used to the changed

environment. In one case though, this was a response to the telephones not operating correctly during training, and was seen as a necessary learning alternative.

Most of the users also felt that there should be follow-up training sessions on site one or two weeks after the initial training session. Although there were opportunities for the users to ask questions during the training, most users reported that they did not know what questions to ask until they had a week or two of experience using the telephone under actual work conditions. One user summarized the typical feeling in this way: "I feel there should have been a follow up training. They came on and asked questions, but there should have been just another training just like it was before, because you don't know what you need to know until you've actually worked on it." Another user agreed, saying follow up training would be helpful "Because after experiencing it, we know what kind of problems we're going to run into." It was also reported that the follow up session would have refreshed users' memories about features to use under certain circumstances, which they might have forgotten about subsequent to initial training. User's typically felt that there was too much information to remember presented all at once.

On the final survey, 67.5% of the 120 respondents disagreed with the statement "There was not enough training provided by the organization to support the new telephone system" (item 17). Slightly more than 26% of the respondents strongly disagreed. Four respondents listed this item as the most important factor, three listed it as the second most important factor, and five users listed it as the third most important factor.

Training Attendance

One problem which Telephone Services was particularly interested in addressing was the failure of a significant number of users to attend training. Indeed the survey data shows that many did not. Results from the pilot survey show that 25.8% of the users responding (16 out of 62)
did not attend. The final survey showed that 30.8% of the respondents (89 out of 289) did not attend. According to interview data with coordinators, this tendency was most prevalent among faculty and administrators. Consistent with their reports, none of the faculty members interviewed attended training. While coordinators in academic departments suggested that they can usually convince or "coerce" staff to attend, they have no such power over faculty and administrators.

The final survey data supports the interview data to some extent. These data are summarized in Table 10. A crosstabulation of training attendance by job category shows that consistent with the interview data, indeed faculty reported significantly lower training attendance than the other groups ($X^2(3 \ df) = 23.56, p < .000$). In addition, members of academic departments reported significantly lower training attendance (61.7% of 141 respondents) than did members of service departments (76% of 154 respondents; $X^2(1 \ df) = 6.38, p < .05$). However, contrary to interview data, administrators reported very high training attendance; second only to clerical staff. Technical staff reported the next to least frequency of attendance.

Table 10

<table>
<thead>
<tr>
<th>Job</th>
<th>Attended</th>
<th>Did Not Attend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator (N=59)</td>
<td>76.3</td>
<td>23.7</td>
</tr>
<tr>
<td>Faculty (N=68)</td>
<td>47.1</td>
<td>52.9</td>
</tr>
<tr>
<td>Clerical (N=115)</td>
<td>80.0</td>
<td>20.0</td>
</tr>
<tr>
<td>Technical (N=47)</td>
<td>66.0</td>
<td>34.0</td>
</tr>
</tbody>
</table>
When assessing the reasons for non-attendance at training, interview data found that many users could not understand why they needed to attend training. As discussed previously in the perceived needs section, they perceived that the telephone was an instrument which they had been using all their lives, and thus there was no need to be trained. One coordinator said "They're offended! 'I'm a professor! Why do I need to go to a session to learn how to use the telephone?'"

During interviews with faculty, the most common reasons for non-attendance at training was that they were too busy, and didn't see the importance of taking time to learn about a phone. This perception was partially resulting from a lack of awareness about the complexity of the new system, and lack of understanding of the potential for increasing telephony effectiveness through proper use of available features.

Secondly, administrators and faculty often feel that they have no need to learn or use features, as they have secretaries who perform such tasks as transferring calls or placing calls for them. One faculty member said "at this point in time I don't feel like I'm missing a whole lot by not having that capability [accessing features]. If I want to do it, I'm simply going to ask the secretary to set it up for me and have her do it." In fact, comments on the final survey instrument showed that "Did not need to know to use the features" was the most frequently written comment with regard to non-attendance at training (along with "Did not fit schedule": seven comments each. Four of the seven listing "Did not need to know" were faculty, two were clerical staff members, and one was a technical staff member.

Four other comments had equal frequencies as the second most frequently occurring comments made with respect to training. All were reasons for non-attendance at training, and included: "Did not know about training;" "Training sessions were too long;" "Wasn't employed at the time;" and "The documentation was sufficient." Four of five individuals who felt the documentation was sufficient were faculty. The
third most frequently cited reason was "I was too busy" (4 instances). Three additional people wrote that they weren't invited to training. Interestingly, one of the three was an administrator.

An additional item on the factors affecting attitudes scale read "When learning new skills or concepts required by the new telephone, I did not fear being viewed as incompetent" (item 21). Of the 122 respondents, 78.8% agreed with the statement (43.4% strongly agreeing).

Encouragement To Attend Training

Given that creating awareness of features and their relative advantages for individuals might lead to increased feature use, and that one way to gain awareness is through training, it is here relevant to summarize user perceptions of how to encourage attendance at training.8 First, coordinators were asked how reluctant individuals could be encouraged to attend training.9 The most common response was that nothing could convince most faculty and administrators to attend, given the above types of attitudes. In fact, three of four users who wrote comments that nothing would encourage them to attend training were faculty, while one was a technical staff member. None of the faculty members interviewed could think of anything which would have convinced --

8. Recall that the training procedures, as described in Chapter III, contained not only information about how to access features, but also attempted to cover some of the rationale for the change and other awareness issues.

9. This question was asked at the request of Telephone Services, who was convinced that training was essential for all users. This assumption will be examined in Chapter VI. Training attendance, and/or the training methods used by Telephone Services may not be the most effective, or even desirable for certain users with limited phone needs or infrequent phone use.
them to attend training. All of these individuals felt that learning should occur at the time that the need to use a feature arose -- by using documentation or secretary assistance.

There were, however, a number of recurring suggestions by other users, including: don't give individuals telephones until they have attended training (an obviously unrealistic form of coercion); try to communicate the complexity of the new system and identify feature advantages to users specific to the functions of a particular individual or office; demonstration of the complexity of accessing advantageous features and trialability (have reluctant users try to access features) prior to training to establish the need to attend; use support or coercion from management; and encourage a "team" effort (highly participatory group effort). The latter was the strategy reportedly used most often to encourage training attendance. Frequently, coordinators were asked who else was attending. If influential members of the department could be convinced to attend or encourage others, the idea of a team effort emerged in a few instances. Interestingly, one coordinator was successful in persuading all of the male administrators in the unit that the "girls were going to need help." In essence, she put the administrators in the role of not going to learn for themselves, but rather they were going to learn so they could help the "office girls."

In summary, users who attended training felt that the hands-on practice was more beneficial than the conceptual information; which they felt should have been presented to users prior to training. There were mixed perceptions about the number of features which should be covered during training. However, it was consistently suggested that on-site follow up training sessions should have been offered, since users would know better what questions they had and problems they would experience after some experience in an actual work situation. The data also showed that a significant number of users did not attend training, particularly faculty members. Most people not attending saw no reason to learn about the features (faculty felt it was a secretarial responsibility), or felt they already knew how to use a telephone.
Documentation

The users unanimously favored the step-by-step access instructions; particularly the single line flip card format (this was prior to the revision of the electronic set manual). The telephone faceplate was also favored by those who had single line sets, although the original faceplate was found to have several inaccuracies, leading to its later replacement. On several features, users needed to hit the "tap button" before a sequence of numbers to activate a feature. The instruction to hit tap was left off the original face plate. However, these inaccuracies led individuals to experience initial failures when trying to access features: often leading to negative attitudes about the technical system (since they were not aware it was a documentation error rather than a technical failure).

Further, neither the original single line phone flip card or electronic phone manuals distinguished between standard and optional features (with the exception of ring again on the single line manual which later became a standard feature). Nor was there any place on the manuals to indicate which optional features were activated on an individual's telephone. The original operations manuals appear in Appendix D, and the revised manuals appear in Appendix E. Thus, users would try to access features which they did not have, which again led to initial failures. Several users reported these initial failures resulted in no further attempts to access other features. This tendency is illustrated in the following excerpts from an interview with a faculty member.

I got this [the single line flip card manual], and I guess I remember taking the time to read it. The two or three things that I wanted to do, ah, I really haven't had good luck with. And so I paid little attention to this...some of your directions here just don't make any sense. You can't direct

10. Recall that later both manuals were revised, and these features were added, based on recommendations by the researcher.
dial long distance overseas. It says here that you can. I know I've tried that, and you can't do it. So, you know, this doesn't work...I guess what I'm saying is that I had two or three things like that, which told me that this wasn't any damn good. It's inaccurate...I tried to do that [speed call]. I think that's one of the things I tried to do, and it didn't work. And now, this little document here led me to believe that was a characteristic of this phone. So I ran into a couple of things here that I tried to do that I couldn't do, and so I said "What the heck. They really didn't put in a fancy new phone system."...I think part of my frustration is that I've tried things in here that do not work. And so I've wound up not trying anything. I just assumed it doesn't work on this single line phone.

It should be noted here that many of the coordinators, while apparently finding the documentation adequate for their own use, indicated that certain members of their departments would never consult these documents; but would instead prefer someone show them how to access a feature. For example, one coordinator stated that "[faculty] don't do things for themselves. They come and tell you they have a problem, and you straighten it out." In another department: "I think it's easier for them to ask someone who uses the phones constantly. Because, like in [an area of the department], the Professors didn't come to the training. They didn't do anything. They said 'You guys go and learn. You tell us how to do it.'" Consistent with these reports, one faculty member stated that "my recall when I saw it [the instruction manual] was I'll probably never use this. I'll probably have the secretary make the arrangements for me, and then I'll deal with it from there." In one department, the coordinator and a receptionist felt that this phenomenon was more of an individual personality trait than typical of a category of individuals:

slv: ...it's [the instruction] right there in the documentation, which is right next to the phone.
j: Right, and all they had to do was look it up. And they'd rather walk down here...I think it's just the nature of certain "themes" (pointing to a faculty member in the hallway). 'Cause you know, I can, could almost tell you before we put the phones in, you know, just knowing people as
I do. I've worked with these people for almost 10 years now, ...and I can almost tell you which ones, you know. We have a lot of helpless people here, you know. d: They like to be done for. 
j: ...You know, you can kind of easily pinpoint those people who are going to keep coming back time after time, because it's easier to get the answer from you, or it's easier to get you to do something for them than it is for them to take their valuable time to figure it out. 
slv: So you think that it's generally just an individual personality trait? 
j: Um hm, I do.

More commonly, it was reported that many departmental members (particularly faculty and administrators) would not consult the documentation because they felt that using the advanced features was a secretarial function. If and when these needs arose, the secretary was typically asked to perform the telephone task. This issue is presented in more detail in the section on perceived needs. In several departments, it was reported that failures to use the documentation resulted from a lack of understanding of the technical terminology. Thus, users did not know what feature to look up when they needed to accomplish a certain task. One would expect that this lack of understanding would result from not attending training. Yet it was commonly reported among those who had attended training. 

During interviews with faculty members, three did not know if they had documentation for their phones, or if so, where it was (two found the manual after looking through their desks). In addition, one faculty member reported never receiving any documentation, and had to contact Telephone Services to obtain a manual. This individual only became aware that manuals were available during a conversation with a coordinator from another department. Of interest here is that faculty were the only users interviewed who did not know if they had manuals or where they were. Two individuals wrote comments on their surveys indicating that they did not have manuals. One of these individuals was a faculty member, the other a clerical staff member.
Interview and focus group data suggested that some entire departments were more technically oriented and tended to rely more on documentation for learning, while other departments as a whole made less use of the documentation and relied more on personal assistance from the coordinator or other staff persons. This was also found true for individuals who differed in their level of technical orientation or competence (those with computer experience for example).

Prior to conducting the interviews, the researcher had obtained a memorandum from University Systems dated December 2, 1985 which had an attached transition dialing procedures card which, using a matrix format, explained how to dial desired numbers from either Centrex, UNITS, University Hospitals, or Residence Halls. It also included a list of unchanged dialing procedures and a list of characteristics which enabled the user to know if their telephone was in fact on the UNITS system (see Appendix I). Interestingly, only three of the users interviewed had ever seen this memo, even though it had been addressed to all faculty and staff. Most users felt that they could have used the card to alleviate dialing confusion during the transition prior to uniform dialing (as described in the previous section on awareness), and many asked how they could obtain one.

A series of items on the final survey instrument attempted to assess the frequency that users accessed various instruction or help sources. These data are summarized in Table 11. Of the 286 users responding, 59.8% rarely or never accessed the instruction manual. For the telephone face plate, 41% of the 283 users responding rarely or never used it. The 2-UNITS telephone help line is listed in the instruction manuals as being for "help or repairs." 200 of the 279 users responding (71.7%) never used the help line. A crosstabulation of these data by job showed no significant differences in accessing instruction sources, with the exception of the 2-UNITS phone line ($X^2(12 \text{ df}) = 25.35$, $p < .02$). Here, clerical staff were most likely to call the repair/help number occasionally and fairly often than the other groups. Faculty were the least likely to call this help number.
Table 11
Frequency Of Access To Instruction/Help Sources Overall And By Job

<table>
<thead>
<tr>
<th>Source</th>
<th>Never</th>
<th>Rarely</th>
<th>Occasionally</th>
<th>Fairly Often</th>
<th>Frequently</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual (N=286)</td>
<td>35.3</td>
<td>24.5</td>
<td>29.4</td>
<td>7.3</td>
<td>3.5</td>
</tr>
<tr>
<td>Admin (N=56)</td>
<td>39.3</td>
<td>14.3</td>
<td>28.6</td>
<td>14.3</td>
<td>3.6</td>
</tr>
<tr>
<td>Faculty (N=66)</td>
<td>36.4</td>
<td>16.7</td>
<td>33.3</td>
<td>9.1</td>
<td>4.5</td>
</tr>
<tr>
<td>Clerical (N=113)</td>
<td>36.3</td>
<td>28.3</td>
<td>29.2</td>
<td>4.4</td>
<td>1.8</td>
</tr>
<tr>
<td>Technical (N=45)</td>
<td>28.9</td>
<td>35.6</td>
<td>24.4</td>
<td>4.4</td>
<td>6.7</td>
</tr>
<tr>
<td>Faceplate (N=283)</td>
<td>23.7</td>
<td>17.3</td>
<td>28.6</td>
<td>20.5</td>
<td>9.9</td>
</tr>
<tr>
<td>Admin (N=55)</td>
<td>23.6</td>
<td>10.9</td>
<td>34.5</td>
<td>18.2</td>
<td>12.7</td>
</tr>
<tr>
<td>Faculty (N=66)</td>
<td>30.3</td>
<td>19.7</td>
<td>22.7</td>
<td>24.2</td>
<td>3.0</td>
</tr>
<tr>
<td>Clerical (N=111)</td>
<td>25.2</td>
<td>15.3</td>
<td>27.9</td>
<td>19.8</td>
<td>11.7</td>
</tr>
<tr>
<td>Technical (N=45)</td>
<td>13.3</td>
<td>24.4</td>
<td>33.3</td>
<td>17.8</td>
<td>11.1</td>
</tr>
<tr>
<td>Phone Help (N=279)</td>
<td>71.7</td>
<td>16.5</td>
<td>9.0</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Admin (N=53)</td>
<td>75.5</td>
<td>9.4</td>
<td>9.4</td>
<td>1.9</td>
<td>3.8</td>
</tr>
<tr>
<td>Faculty (N=66)</td>
<td>89.4</td>
<td>10.6</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Clerical (N=110)</td>
<td>61.8</td>
<td>20.9</td>
<td>13.6</td>
<td>2.7</td>
<td>.9</td>
</tr>
<tr>
<td>Technical (N=44)</td>
<td>68.2</td>
<td>22.7</td>
<td>6.8</td>
<td>--</td>
<td>2.3</td>
</tr>
</tbody>
</table>
In summary, users favored simplified, step-by-step instructions such as those on the telephone faceplate, and the flip cards. However, initial inaccuracies on the documentation led to user failures in accessing features, and hence negative perceptions of system effectiveness since they thought technical problems with the system were the cause. This also resulted from initial documentation which did not clearly differentiate between optional and standard features. Moreover, the data show that a significant number of users never or rarely made use of the available documentation and instruction sources.

Technical Issues

During interviews and focus groups, users identified a number of technical limitations which they viewed as problematic. As will be explained, some were temporary software "bugs" which only Northern Telecom could solve — thought they lasted throughout the period of the research project — or were temporary circuit problems during the initial transfer of operations from Ohio Bell. Others were permanent differences between UNITS and Centrex which users saw as incompatible with preferred methods of operation, or as more complicated/cumbersome than accomplishing the same task on the old system. Still others were the result of departmental configuration decisions which had been made because of budgetary constraints. The commonly reported effects of these technical issues will be summarized in the following section on attitudes, but included displeasure at having to change work behaviors to methods perceived as less productive, and lack of confidence resulting in anxiety over the technical inconsistency of the system (not knowing when or if it would work as expected).

First, during phase 1, almost all of the users reported complaints by those calling into campus (or from another campus phone not on UNITS) about an excessive number of busy signals when trying to reach UNITS users. Even though the UNITS user was not on the telephone, their line could still ring busy to the caller.
Yeah, we discovered the problem, my wife and I, the following way. She was trying to call me, and finally I called her, and she said "I've been trying to call you all morning!" And we have two phones at home, two numbers. So she says "Wait, you hang on the phone and I'll call [another user] next door." And I went next door and looked at the phone, and it was there, not being used. She got the message, I heard it the other phone: a busy signal.

During one interview with Telephone Services representatives, it was explained that UNITS had two types of lines: direct inward dial (DID) and direct outward dial (DOD). These two types of lines are totally separate in function, so that even if all lines coming into the department were busy, each user could still call out. Apparently what happened initially was that there were not enough lines coming into campus leased from Ohio Bell (the Telephone Services representative estimated the number of DID's and DOD's at about 50 each). What would happen, then, was that if all 50 DID's were busy, the 51st caller would get a busy signal, even if the person being called were not on his or her phone. The important point here is that the users were not aware of this "architectural" design, nor the initial circuit limits, and therefore thought there must be something wrong with the phone system.

A similar problem with excessive busy signals resulted from internal department decisions to reduce the number of DID lines coming into the departments. In this case however, the busy signals were received by callers from both within and outside the university. Typically, there were two reasons were reported for these DID decreases. One was a cost factor, as DID lines were initially priced at $2.75/month.

pm: See, this is what happened over in [a large service department] I have to deal with [several student services]. And it was like taking an ocean and putting it through a garden hose over there in Lincoln Tower, because they had one phone going in for all of these departments. And I mean it was hard enough to get into those numbers when they were all on their individual numbers. But they ended up putting...
?
: That was a management decision...
g: Yeah.
?: That was a management decision to have a single number.
Second, Telephone Services told departments that by using features such as transfer, call pick up, and forward busy, fewer incoming lines would be needed than were on Centrex. However, because of several technical limitations, and this was not always the case. A combination of factors minimized the ability to quickly transfer calls. First, most users did not have a group intercom feature (near 70% of the 286 respondents didn't have or weren't sure on final survey), and UNITS did not have the ability for shared lines with lights which indicated whether someone's line was busy. Thus, the receptionist or person answering the call would have to dial a five-digit internal extension number to find out if the desired person was on their phone. If they were, there was no way to alert them of the second call. Most users then, reported that they had to walk into the person's office and show them a note saying they had another call -- usually if it was an important call. Moreover, if the person the call was supposed to be transferred to had a single line set (78% of users on final survey), they could not place the original caller on hold in order to answer the transferred call. Meanwhile, the receptionist or person who originally answered the call could not put that person on hold and answer another call, unless they were on an electronic set with two or more incoming lines.

One of our assistant deans was in his office. A phone call came in. They [the receptionists] had the call shifted back to a call forwarding stop. It was after hours. I went to that phone, picked it up. I dialed him, it was busy. The caller said "He just called me, he needs an answer to this." So I took a note, put it in front of his face, and said "Here, this person's on the phone." He says "Oh, I need to talk to him." He couldn't put the person that he had on the phone on hold and go to the next phone call. He had to go to another desk. Henceforth he walked out to her desk, and I couldn't transfer the call back there because the calls were forwarded from that phone. So he had to go to the third phone to answer that call. Now, that's ridiculous. Meanwhile, after I put the note, I could not pick it up. I had to go back to the answering point, and forward the call to another point. That is really useful! And the argument is, that's the way it's set up. I mean that just doesn't seem efficient. We have another problem...The front desk had a light system. The
light system, anybody in the outside offices that were on a line, a light would be lit. The receptionist who answered the phone could say "That person's on another line. Would you like to hold, or could I have them call you back?" without dialing 5 digits or pushing 5 buttons [to find out if they were on their line]. Now, there's no way, mechanism to do that now.

Referring to the lack of visual indicators that a line was busy, another user summarized a very common scenario:

And so I have to get up and physically walk to [the Dean's] office to see if he's in there, unless I want to just buzz and take a chance. But if he's got somebody in his office, you don't want to ring it, you know, and there's no way to tell unless you get up and walk in there and walk all the way back to tell somebody "I'm sorry, he's got somebody with him," or "Can I take a message?" or "Yes he's there I can ring him" you know. But it's very time consuming, it's not efficient at all. It's like going back 30 years or more on the phone system.

Another commonly reported problem with not having DID's due to cost was that individuals working after hours could not receive phone calls, unless they were in close enough proximity to the main answering point to hear the phone ringing. With respect to lack of shared lines, another common problem in service departments: "I can't just put this call on hold and go out to the computer or over to the files and get the answer and pick up that phone and give the answer there. On the old system we were able to do that." Also users complained that on a single line set a caller could not be put on hold another call made. For example:

And the other thing you can't do [unintelligible] is I get an incoming call, and I know, oh, [another person's] got the answer. Well why make the person call, or try to transfer her to [the other person]? I used to be able to put that person

11. The optional call park feature did allow for this capability, but the final survey indicated that over 85% of the users did not have call park or weren't sure they had it.
on hold, use another line on my phone, and call or use the inner-office phone and call somebody else and find out the answer for the person on the phone, as a service to them, so that they didn't get frustrated. They may already be irate, in having to call somebody else yet.

It should be noted here that the standard 3-way conference feature allowed for this capability; and by using the consult feature the original caller could essentially be on hold while the information was obtained (see Appendices D and E). This appears to be an instance of either lack of awareness about how the conference/consult feature works, or perhaps users felt the feature was more complex and cumbersome than the previous method.

Three additional problems were reported with transfers. First, users on UNITS could not transfer calls to others still on Centrex, as described earlier in the awareness section. Second, due to a "bug" in the software, there was a brief audio drop off when a secretary hung up after announcing a transfer call using the conference feature. In other words, the conference feature allowed a secretary to establish a 3-way conference in order to announce that there was a call, or that "so-and-so" was on the line, then hang up -- as opposed to using the direct transfer feature which did not allow the call to be announced. However, as the secretary hung up, the first three or four words would be cut off. The most common complaint with respect to this drop out was with secretaries receiving transferred calls from another department (usually the caller had reached the wrong source of information). Since the caller's name was included in the first several words of the conversation, and were thus dropped out, the secretary always had to ask them to repeat it; which was commonly reported as frustrating and tiresome.

Third, also due to a software "bug," long distance calls made on the PLUS system could not be transferred. Almost all of the users interviewed felt this was a major limitation. The most frequently occurring problem was with administrators making a lot of long distance calls for faculty recruiting or other reasons. As one user stated: "A
department Chair who is trying to recruit candidates cannot sit at the telephone and place his own calls, or her own calls. They can't use their time that way!" Similarly: "[The Chairperson] may give me six or seven people to call. And you know, if their line's busy, you keep calling and keep calling. He doesn't want to deal with that!" Thus, either one of two methods must be used: the person making the calls does so from the other person's desk, or the person requesting the call has to come out to the secretary's desk to talk.

In response to this limitation, Telephone Services felt that administrators and faculty should be making and receiving their own calls, thereby reducing this as a secretarial responsibility. Most of the secretaries were upset with faculty who asked them to call other faculty members for them because they did not know how to dial internal extension numbers, or refused to place their own campus or local calls. While several of the secretaries interviewed agreed that this would be nice, all felt that it would never happen. Typical comments were:

Looking at it as a faculty member, and knowing faculty members in my own department, and knowing administrators, there is no way in the world. You know, I can't even imagine President Jennings having to make his own phone calls. That is absolutely insane!

Now, everybody knows that Deans and executives in the business world do not make their own long distance phone calls. Their secretary places the call, and then transfers it to them when they get the party.

You get to be an administrator, you are not going to make your own calls, and you're not going to answer your own calls. Never mind whether it's cost efficient or the rest of it. That's one of the purposes of being an administrator. And they're not going to give it up.

Further, PLUS numbers could not be programmed as a speed call number, nor would using speed call to transfer a call work consistently. According to the Fall 1986 UNITS Network newsletter, the system was not designed for users to activate more than one feature at a time. Several users identified this as a major limitation to UNITS. It should be noted
here that by early 1987 the problems with inability to transfer PLUS calls and the inability to program PLUS numbers into the speed call list had been corrected.

Another limitation identified by several users (primarily faculty) was an inability to forward calls to non-UNITS telephones. First, some faculty had other offices or labs which were located in buildings not yet converted. Of course, this was a temporary problem during the conversion of the remainder of the campus. However, the majority of complaints centered on the inability to forward calls to their homes, which they saw as a desirable activity. In addition, the call forward no-answer feature was designed to ring into an office five times, and then roll over to the specified answering point. Most of the interview respondents agreed that this was of limited use to faculty and administrators. Most people calling these individuals know that offices are relatively small (compared to homes, for example), and that if a person hasn't answered by the third or fourth ring, the person isn't there, and hang up.

In general, most users felt that accessing features on UNITS were much more complicated and cumbersome than on Centrex. The most commonly cited examples were transfers and hold. With respect to transfers, in fact transferring calls from department to department was much easier, as on Centrex the user would have to enlist the assistance of the University operator. Most users, then, were comparing internal transfers on UNITS (a sequence of 8 buttons to activate the feature and dial the 5-digit internal extension number) to the old shared line extensions and intercoms (2 button sequence: the 2-digit extension number and announce "You have a call on line X."). The hold complaints came from individuals with single-line sets, since the electronic sets had hold buttons as did the old phones. On the single line sets, activating hold was a four button sequence, along with a series of audible tones which needed to be acknowledged. Moreover, the hold feature on the single line set created problems for some service departments where phones were being shared:
slv: What was the difficulty with putting them on hold?

?1: Well, uhm, on the standard rotary black phone with six buttons and a red button, you just push that red button to put somebody on hold. But this one you've got to read the directions and hit three different buttons to put somebody on hold.

?2 And wait for the beep.

?1 And wait for the beep.

?2 And wait for the beep. If we hang up before the beep, we cut them off.

slv: And this is with the single line?

?1 Yes. You also can't tell if there is somebody on the line. I mean, if you walk away from your desk, and somebody comes up and wants to use the phone, you pick it up and there's somebody there, they can start dialing and cut them off.

Further, some users reported that they occasionally forgot that they had put someone on hold, and cut them off when they went back to place a call. As noted in the telephone system and feature description which appears in Appendix A, eventually the system was programmed to ring the user back every two minutes to remind them that someone was on hold. However, other users reported that this was annoying when some information took up to five minutes or longer to retrieve. Hence, it was frequently reported that users simply put the handset on the desk rather than activate the hold feature.

I know a lot of people resort to just leaving it off the hook instead of putting them on hold. You can hear anything going on in the office. They're obviously not on hold, you can hear all those noises. So that doesn't give a real professional presentation to them of office procedure here either. And I don't know if you've heard that complaint before, but I'm sure you'll hear it in other departments where they do have to research problems.

One other feature -- call pick up -- was also identified by many users during interviews and focus groups as too complicated. With this feature, it seemed that dialing the activation sequence was not complicated, but rather the user needed to know first which phone was ringing, and second what the 5-digit extension number was for that phone. Most users complained that it took too much time to look this extension number up. The optional universal call pick-up, however,
allowed the user to pick up any telephone in a defined pick-up group by
dialing a three button sequence; the user did not have to dial in the
extension number of the phone they wanted to answer.

The survey instruments asked respondents to list features that
they did have, but did not use, next to the appropriate reasons why they
did not use the features. On the pilot survey, "Too complicated/time
consuming" received the fewest responses as a reason for feature non-use
(only 3 responses; behind "don't really have need for it" (29
responses), "Others I need to communicate with don't have the feature"
(9 responses) and "Don't know how to use it" (8 responses).

On the final survey, "Too complicated/time consuming" received the
third most responses (45 = 7.4% of all reasons for non-use); behind
"Don't really have need for it" (469 responses = 76.8% of all reasons),
and "Don't know how to use it" (77 responses = 12.6% of all reasons).
"Others I need to communicate with don't have the feature" received the
fewest responses with 20 (3.3% of all reasons). The multiple response
procedure revealed that three standard features on all phones were
listed most often as too complicated/time consuming. Ring again and hold
each were listed eight times, and message waiting was listed seven
times. These features were followed by call pick-up and call forward
(type not specified) which were listed four times each. Interestingly,
call forward no answer was listed as too complicated/time consuming
three times; yet the user does not have to activate this feature since
it works automatically. This is also true for call forward busy, which
was listed once. Intercom, speed dialing, and make set busy were not
listed. In addition, 17 written comments on the surveys pertaining to
the technical system stated that the system was too complicated. This
was the highest number of comments about the technical system, followed
by "Poor quality" (15 comments) and "Doesn't work" (10 comments).

Several users reported problems encountered with the ring again
feature and with call forwarding programmable, relating to user
circumvention of the system. In other words, some users had learned how
to use these features to reduce their incoming calls. As explained in
one focus group:
g: But they also do something that's extremely irritating -- they forward their calls to another phone, and then when you want to use call back on your telephone, it won't work. Because, so you know, like if I rang downstairs, and the line rings busy and I want to push call back, then normally if you push it you get a couple little beeps and your light lights up, and your other line goes off. And then when they get finished then you hear beep, then you can dial their number. You can't do that, because they forward their calls to another phone and they know that it works that way. And it's sort of a sneaky thing. That way...I suppose they figure they're cutting down on the amount of phone calls that's coming in that way. If you're using call back, then as soon as they've hung up the phone rings again they have to pick it up again. So that way they can do whatever they want to...So they use the forwarding system which makes it impossible for us to use call back.

a: Where do they forward the phones to?

g: To another telephone in their office.

e: I tell you, it's very frustrating too, to the person who they give the call forward to, especially when that person has another phone [from which] the calls are being call-forwarded to them. And all of a sudden they are swamped with these phone calls, and their work is sitting there waiting. And they have a habit of call forwarding and not alerting the person at that desk. That's one office that needs more than one line going in.

slv: [later in the discussion] I'd like to go back to something you were talking about a little earlier with the way that the people are forwarding their numbers so you can't ring again, those kind of issues that seem to be disrupting your job in trying to accomplish what you're trying to do. Do you think that people are aware of what's happening to you when they do that?

g: I'm sure they are.

slv: And they're doing that purposely to...

g: Yeah, because they didn't know at first, and the one particular person in one meeting spoke up and said, you know, she'd been trying to do different things, and she mentioned the fact that "Oh, well in order to get rid of that, we just forward the calls over to this side."

Other users reported instances where individuals forwarded calls to an office they knew was not occupied, in order to cut down on their incoming calls.
A summary of these findings suggests that initial circuit limitations and temporary software bugs created frustrations for users and callers into campus locations. Some of these limitations, along with permanent differences between UNITS and Centrex resulted in undesirable and inefficient behavioral changes as perceived by the users, as well as decreased system effectiveness in meeting their perceived needs. Some of the perceived limitations were a result of lack of awareness about the system's functions and capabilities. For other temporary limitations and permanent differences, Telephone Services responded by suggesting that these behavioral changes met their criteria for effectiveness; which was in conflict with others' criteria for effectiveness. In general, most users felt that accomplishing tasks on UNITS was much more complicated and cumbersome that on Centrex.

Perceived Needs and Feature Use

**Perceived Needs**

Generally, users reported their perceived needs in relation to features that were on the old Centrex system which were either not available on UNITS, or were perceived as more complicated/cumbersome to use. As described in the previous section on technical issues, the two most frequently cited needs were for multiple shared lines with a group intercom system, and the row of lights which indicated when an individual was on their line. Users expressed these needs in terms of easier intra-departmental transfers. A related need expressed continually by clerical staff and administrators was for the ability to transfer long distance PLUS calls.

In terms of faculty needs, the overwhelming perceptions of all users and coordinators was that faculty feel they only need to be able to place and receive calls. With few exceptions, faculty felt they did not need to know anything about features. Basically, faculty felt that using the telephone for anything but making and receiving calls was a secretary's job. In fact, several clerical staff reported that some
faculty even expected the secretary to place calls home for them. Other clerical staff reported that faculty asked them to place calls to other faculty in the same building.

a: [e], do they [faculty] buzz your number and ask you to place a phone call?
e: Yes.
a: Because they don't know how to use the phone?
a: That's right.
m: Well, sometimes you wonder if it's ignorance, you know, or if they're making a call outside, you know. It might be more a power play type thing...I've had a professor on the second floor would call you and ask you to buzz a professor on the third floor...
e: Yes!
m: ...instead of just using the extension.

While interviews did suggest that some faculty members in fact did not know how to dial extension numbers, the above example illustrates the fact that if the faculty member was capable of dialing the secretary's extension to ask him or her to place a call, they were obviously capable of dialing another professor's extension. The consensus among clerical staff, coordinators, and faculty themselves was that more advanced telephone functions was secretarial work. Typical comments included:

And they're faculty, and they do research and teach, and that's all. They aren't expected to know how to use the telephone.

See, most of the faculty seem to think that telephone answering is something that a secretary or clerk or whatever; or telephone operators do. And all they want to know is how to call home when they want to. And some of them even wanted the secretary to call home for them (laughs)...and I think they treated them more or less like typewriters. You know, something that the girls in the office use. "I shouldn't have to do anything about that."

[A faculty member]: I'm not sure I want to know all that stuff about the phones. I've been thinking about talking with you. I think my analogy is like buying a VCR. You know when you go in, you buy, they give you all these things that you want to do with it. But when you take it home, you just play and record. And I guess my answer on the phones today is I want to make a phone call and get one.
However, some faculty expressed needs for several features such as speed dialing. Yet, some of the features they felt they needed were restricted by technical limitations of UNITS. For example, most faculty expressed a need for call forward programmable so that their calls could be forwarded to their homes. But this was not a capability of UNITS. Further, several faculty pointed out that if they forwarded calls to another campus location where they would be, they would miss calls while in transit from one location to another. Moreover, if they decided to go to lunch with someone, or go elsewhere instead of returning to their office, the forwarding could not be deactivated from the remote location. Since the call forward no answer is designed to ring into the secretary only after the fifth ring, most callers would have already hung up. Thus, they typically felt an answering machine would be superior to these forwarding options.

Finally, there was some differences among faculty in terms of needs for direct lines into their offices (DID's). Some felt that they needed DID's to receive calls when working after hours or weekends when there was no secretary to answer, and they had no way of knowing a call was coming in (no shared lines, or lights). Alternatively, some faculty were annoyed with their DID's: preferring to have the secretary screen calls for them so that they would not be interrupted when busy. It is interesting to note (as shown later, Table 14) that no faculty members listed make set busy as a feature that they would add to their phone if they could. Perhaps this is indicative of their lack of feature knowledge. These interview and focus group findings about user needs are somewhat corroborated by the survey data which is summarized below in the sub-section on system and feature benefits.

**Perceived group needs.**

A final issue specific to needs which arose during interviews and focus groups concerned a lack of perceived need to use the telephone for the benefit of the group. It was apparent that many users perceived the telephone as an individual convenience rather than a tool for the whole
office. Recurring symptoms of the tendency included many individuals who were reluctant or refused to use call pick up to answer someone else's phone; using call forward programmable to send incoming calls to others so they would not have to answer the phone; individuals who refused to use call transfer, thus making someone else look up a number or re-dial; and faculty who relied on secretaries to place calls for them, which disrupted other work needed to be done.

e: You've got some persons, faculty members and secretaries who could care less whether they're inconveniencing somebody else, as long as their path goes smoothly.

g: ...[in reference to secretaries forwarding their phones to empty offices or other users]...It's a nice feature if it's used properly. But you can't tell people that you can't use the feature unless you want to be good little kids and do it the right way. They're going to use it however they want to. And like in this case, any of us complaining about it "Hey look. You don't have to sit down here and listen to the phone ring day in and day out." And no, we don't. But we sit up here and listen to our phones ring day in and day out.

a: [later in the discussion]: It seems that we've been talking about some changes in the technology that [unintelligible], and also the fact that people will use the technology to their best benefit rather than for the benefit of the group.

g: Yeah, you're right. I couldn't have said it any better.

In another department:

j: I do. I think if they're using, if in fact they're using the function that they intend for us to use, that it is a little more complicated that what they think. I think most of them figure all they have to do is have the basic knowledge, and they're not, they're not willing to utilize some of those functions that are available on the phone that are going to involve some time. And I cite as one example the call transfer. I know, I'd almost...

d: One person. There's one person that uses it.

j: I'd almost be willing to guess that most of these faculty people who are getting wrong numbers in their office who are referring calls down to this office will not go to the trouble to try to transfer that call. They're going to tell that person; they'll give the person the number, or possibly if it's a number they're not familiar with, they won't even look it up. They'll just tell them to call the university operator. And they won't be bothered with transferring calls.
slv: Ok, now you think that, is that a function that it's too complicated, or is it a function that they just don't see that's their job responsibility?

j: They think they don't have time and don't...exactly, exactly.

d: That's exactly it [not job responsibility].

j: They don't think it's their job to do that, you know. "I'm not an operator, why should I have to do that?" kind of attitude. I think the staff has always felt kind of differently about that, you know, as far as transferring calls is concerned. For me, I think it's much easier to do it this way, because before we always had to look the number up in the book and then get a university operator on the line and get the university operator to transfer the call for us, where now you don't have that time where you're just sitting there waiting for this person, you know, 20 rings, you know. You can go ahead and assist this person. There are times, you know, when you're busy, where you've got other calls coming in or things happening where I admit, I'll tell them the same thing: "I'm sorry I don't" you know, "I can't transfer that call for you right now. You'll have to call the number yourself." And let them do it. But I think, you know, it's something that I think the University is expecting us to do, you know. More and more I think they're kind of encouraging this.

Yet, as the latter part of the above excerpt indicates, the telephone system was in part designed to make the communications of the offices and the university as a whole more effective; including assistance to people calling in. As Dino Pezutti stated:

p: But some faculty member said that getting a new telephone is not a religious experience, ok? Well, if you've got that kind of attitude, that's ok. If that's all he wants to do is to place calls and receive calls, that's fine too. But what they're going to find is that in their operation with the rest of the office, if features have been implemented to try to make the organization of running of the office as a whole, ok, more effective by making use of features, all of a sudden that individual finds that they have to address themselves to certain features whether they like it or not. And they don't like that because as far as they're concerned, they're being forced to do something that they didn't want in the first place. However, it is not a decision that we've made, it's a decision that the office made. And that's not to say it's a bad decision. What I'm saying is that we have no control over that.

slv: Right.
p: But what it does, is it does force people to do things that on the surface they probably felt they never had to worry about.
slv: So would you agree then, that individuals who are reluctant to utilize the features of the telephone that have been selected by the department to try to make the operation of the department more effective; those individuals who are very reluctant to do that are hurting the overall goals of UNITS, the objectives of UNITS?
p: It could.

Involvement.

The interview data strongly suggested that faculty were far less involved with the telephone than other groups. In other words, the new telephone system was simply not a very important issue to them. As several faculty members themselves suggested:

slv: [in reference to not going to training]: Had you known and been aware that Telephone Services was offering training sessions, would you have been willing to attend and participate in one?
c: Depending upon when they were offered.
slv: But if it had been offered at a time that was convenient for you, in the building here, would you have?
c: I might have, but I don't know that I attached all that much importance to using the telephone.

slv: You seem to not exactly be all that sure of what you do have and what capabilities you don't have on the phone. Do you have any desire to know what you have available and what you don't? Would that be something that might be important to you?
o: Important to me? No! It really wouldn't be important to me at all. I just use it for calling and, ah...if there's speed calling to outside numbers, that might catch my attention, and I'd want to learn about that. Other than that, really nothing...Like doorknobs, there's certain implicit limitations of doorknobs: likewise telephones...a phone is a phone (laughing). I really don't pay much attention to telephones.

slv: [after explaining how the user's call forward no answer was operating]: Would you feel comfortable, more comfortable if you were more aware of what your phone is doing when it's
ringing? What the status-quo of it is so that you could perhaps; if you knew you had a particular feature that you're unaware of now, that you might have some reason for using it?

s: Well, I'll get back to my original statement. All I do is make phone calls, and I don't get into all that bull...the phones are not on my topic of discussion...I know how to use a phone, and I just use it.

However, some users, including a couple of faculty members themselves, suggested that faculty might pay more attention to the phone if they were made more aware of advantageous features and capabilities of the system (as suggested by the second quote above). One coordinator said:

Now, down the line, with fiber optics and their computers, and all that kind of thing, the phone may be the most important tool that they have. When you can convince them of that; that they can use the phone in conjunction with their computer, and they can get the library, or you know, the library catalogue or whatever it is, if they can use it like that, that's an entirely different thing.

The results of the finals survey involvement scale are summarized in Table 12. Faculty had the lowest involvement scores; compared with administrators who had the highest involvement scores. Clerical staff had the second highest mean score, followed by technical staff. A one way analysis of variance revealed significant differences between job categories on telephone involvement scores ($F(3,122) = 5.06, p< .01$). The Scheffe Procedure revealed that faculty had significantly lower telephone involvement scores than administrators and clerical staff. The less conservative Duncan Multiple Range Test found faculty significantly less involved than all three other groups. However, there were no significant correlations between telephone involvement, attitude, or extent of feature use scores.

Compared to the other two technologies, telephone involvement was in the middle ($M = 116.9$; computer/word processor $M = 129.2$; copy machine $M = 113.85$), as on the pilot survey. A repeated measures design
### Table 12

Mean Involvement Scores By Job

<table>
<thead>
<tr>
<th>Job</th>
<th>M*</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator</td>
<td>123.00</td>
<td>11.82</td>
<td>23</td>
</tr>
<tr>
<td>Faculty</td>
<td>105.86</td>
<td>21.70</td>
<td>22</td>
</tr>
<tr>
<td>Clerical</td>
<td>118.64</td>
<td>14.16</td>
<td>55</td>
</tr>
<tr>
<td>Technical</td>
<td>115.58</td>
<td>15.75</td>
<td>26</td>
</tr>
</tbody>
</table>

Note. Minimum = 20, Maximum = 140. N=126 valid cases.

MANOVA was used to compare involvement with each of these technologies to each other, and between job categories. Conceptually, each technology was considered as a different "level" of a Machine variable. The overall F of the between subjects Job effect was $F(3,110) = 2.0$, $p = .12$. The overall F for the within subjects Machine effect was $F(2,220) = 37.89$, $p < .001$. The overall F for the within subjects Job x Machine interaction was $F(6,220) = 1.27$, $p = .27$. Scheffe contrasts were used as a follow up test to find where the differences between involvement scores were. Simultaneous confidence intervals are set up at a known value, and when the upper and lower values of the confidence interval do not include 0, the difference between Machine means ($M_p$) is statistically different. In this case the confidence intervals were set at 95% ($p < .05$). The results showed that subjects had higher involvement for computer/word processor technology than for telephones ($203.56 < M_p < 211.72$), and that involvement with computer/word processor technology was higher that
for the copy machine ($7.24 < M_D < 11.87$). The difference between involvement with the telephone and the copy machine was not statistically significant ($-.95 < M_D < 3.86$). The acceptance of these findings as valid is predicated upon the data not violating assumptions of sphericity. The Mauchly sphericity test was not significant ($p = .86$); therefore the data do not appear to be violating this assumption.

**System and feature benefits.**

Several features on UNITS were identified during interviews and focus groups as beneficial. The most frequently "praised" aspect of UNITS were the touch-tone phones. Additional features which users identified as beneficial were call transfer (between departments); call forward, and ring again. While not consistently mentioned in interviews or focus groups, the final survey revealed that call pick up was listed most frequently as the feature which offered users the most personal benefit (63 instances = 26% of responses). Next, call transfer was listed 56 times (23.1%); followed by ring again (26 instances = 10.7%), speed dial (25 instances = 10.3%), call forwarding (unspecified, 19 instances = 7.9%), hold (17 instances = 7%), and conference call (15 instances = 6.2%). The remaining features each received less than 2% of the listings.

A summary of the crosstabulation data is presented in Table 13. Administrators listed call pick up most frequently, followed by call transfer, speed dial and conference call. Faculty members listed call forwarding (unspecified) most frequently, followed by speed dial, ring again, and call pick-up and hold. Clerical staff listed call transfer most, then call pick up, ring again, and hold and speed dial. Technical

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12. Recall that until the conversion, approximately 85% of the phones on campus were rotary dial.
Table 13
Percentage of Most Beneficial Features by Job Category

<table>
<thead>
<tr>
<th>Job</th>
<th>Feature</th>
<th>Pick-up</th>
<th>Trans</th>
<th>Conf</th>
<th>Forw</th>
<th>R Again</th>
<th>Hold</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admin (N=49)</td>
<td></td>
<td>20.4%</td>
<td>16.3%</td>
<td>12.2%</td>
<td>-----</td>
<td>10.2%</td>
<td>10.2%</td>
<td>14.3%</td>
</tr>
<tr>
<td>Faculty (N=42)</td>
<td></td>
<td>9.5%</td>
<td>4.8%</td>
<td>7.1%</td>
<td>23.8%</td>
<td>14.3%</td>
<td>9.5%</td>
<td>16.7%</td>
</tr>
<tr>
<td>Clerical (N=106)</td>
<td></td>
<td>30.2%</td>
<td>31.1%</td>
<td>3.8%</td>
<td>3.8%</td>
<td>11.3%</td>
<td>6.6%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Technical (N=39)</td>
<td></td>
<td>33.3%</td>
<td>33.3%</td>
<td>2.6%</td>
<td>2.6%</td>
<td>7.7%</td>
<td>2.6%</td>
<td>10.3%</td>
</tr>
</tbody>
</table>

staff listed call pick-up and transfer first, followed by speed dial and ring again. No users listed make set busy, speakerphone, or call park as offering them the most personal benefits.

A summary of the features which users most wanted to add to their phones is presented in Table 13. The data showed that speed dial was the feature users from every job category listed most often as the feature they would add to their phone if they could. For administrators, speed dial was followed by speakerphone, and equally between call forward (unspecified), message waiting, and make set busy. Faculty listed call forward (unspecified) after speed dial, followed by message waiting and speakerphone. Clerical staff listed group intercom second after speed dial, followed equally by call forward programmable, ring again, make set busy, and speakerphone. Finally, technical staff listed ring again after speed dial, followed by speakerphone, and equally message waiting and group intercom. A summary of these results is presented in Table 14.
Table 14
Percentage of Features Most Often Listed Wanting to Add by Job Category

<table>
<thead>
<tr>
<th>Job</th>
<th>Feature</th>
<th>Forw</th>
<th>Forw P</th>
<th>*MW</th>
<th>*R</th>
<th>Again</th>
<th>Icom</th>
<th>Speed</th>
<th>MSB</th>
<th>Sphone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admin (N=33)</td>
<td></td>
<td>9.1%</td>
<td>3.0%</td>
<td>9.1%</td>
<td>3.0%</td>
<td>9.1%</td>
<td>33.3%</td>
<td>9.1%</td>
<td>12.1%</td>
<td></td>
</tr>
<tr>
<td>Faculty (N=37)</td>
<td></td>
<td>21.6%</td>
<td>5.4%</td>
<td>8.1%</td>
<td>10.8%</td>
<td>----</td>
<td>29.7%</td>
<td>----</td>
<td>8.1%</td>
<td></td>
</tr>
<tr>
<td>Clerical (N=64)</td>
<td></td>
<td>4.7%</td>
<td>7.8%</td>
<td>1.6%</td>
<td>7.8%</td>
<td>15.6%</td>
<td>29.7%</td>
<td>7.8%</td>
<td>7.8%</td>
<td></td>
</tr>
<tr>
<td>Technical (N=31)</td>
<td></td>
<td>3.2%</td>
<td>6.5%</td>
<td>9.7%</td>
<td>19.4%</td>
<td>9.7%</td>
<td>22.6%</td>
<td>6.5%</td>
<td>12.9%</td>
<td></td>
</tr>
</tbody>
</table>

Note. Forw P = Call forward programmable; MW = Message waiting; Icom = Group intercom; MSB = Make set busy; Sphone = Speakerphone. *Denotes standard feature on all UNITS telephones.

It is interesting to note the frequency with which standard features on all UNITS telephones were listed as features users would add, as discussed in the section on awareness.

Task time on the telephone.

The interview and focus group data clearly suggested that clerical staff spend much more time using the telephone than do other groups, while faculty spend the least amount of time. In fact, some coordinators reported that some faculty never use their phones while on campus. In some academic departments, faculty apparently spend little time in their offices: but are elsewhere doing research except for office hours held. One coordinator said "I'll bet you that half our faculty never pick up
their phone. I'll bet you." Yet, interviews with faculty themselves, while still suggesting that they use the phone much less than other groups, revealed that there are differences among faculty, as illustrated by the following:

O: Sometimes I make a lot of long distance calls.
S: I don't use the phone a lot. I don't. So I don't have to know the phones. It's very different [from a secretary].
O: I use it a lot. I suppose I'm on the phone an hour a day.
S: I don't use it that much.

The mean data on telephone task time are summarized in Table 15. Clerical staff using the phone 27% of weekly task time. Administrators spent 22.9% of their weekly task time on the telephone, while technical staff spent 22.3% of their time on the phone. Faculty spent 14.2% of their weekly task time on the phone. An analysis of variance showed that there was a significant difference in these amounts between different jobs ($F(3,259) = 7.63$, $p < .001$). The Scheffe procedure found that faculty used the phone significantly less than clerical staff. The less conservative Duncan Multiple Range Test found faculty used the phone significantly less than all other groups.

With respect to telephone activities (seeking information, giving information, and solving problems), giving information was overall the largest activity on the telephone (37.6%), followed by seeking information (29.7%) and solving problems (26.1%). Mean data on telephone task activities by job are summarized in Table 16. One-way analyses of variance showed significant differences between jobs in amount of time seeking and giving information, as well as for solving problems. The $F(3,257)$ for seeking information was 4.94 ($p < .01$); for giving $F(3,259) = 3.50$ ($p < .05$); and for solving $F(3,254) = 6.75$ ($p < .001$). The Scheffe procedure found that technical staff spent significantly more time seeking information than administrators and clerical staff. The less conservative Duncan Multiple Range Test found that both technical
Table 15
Mean Task Time On The Telephone By Job

<table>
<thead>
<tr>
<th>Job</th>
<th>M*</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator</td>
<td>22.87</td>
<td>16.26</td>
<td>52</td>
</tr>
<tr>
<td>Faculty</td>
<td>14.23</td>
<td>10.33</td>
<td>61</td>
</tr>
<tr>
<td>Clerical</td>
<td>26.98</td>
<td>17.20</td>
<td>103</td>
</tr>
<tr>
<td>Technical</td>
<td>22.34</td>
<td>21.19</td>
<td>47</td>
</tr>
</tbody>
</table>

Note. * Means represent percent of weekly task time using the telephone.
Table 16
Mean Telephone Time Seeking/Giving Information and Solving Problems

<table>
<thead>
<tr>
<th>Activity</th>
<th>Job</th>
<th>M*</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seeking</td>
<td>Administrator</td>
<td>24.22</td>
<td>15.23</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Faculty</td>
<td>33.35</td>
<td>20.77</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>Clerical</td>
<td>26.55</td>
<td>21.81</td>
<td>103</td>
</tr>
<tr>
<td></td>
<td>Technical</td>
<td>37.58</td>
<td>21.60</td>
<td>45</td>
</tr>
<tr>
<td>Giving</td>
<td>Administrator</td>
<td>33.06</td>
<td>17.61</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Faculty</td>
<td>41.27</td>
<td>21.94</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>Clerical</td>
<td>40.32</td>
<td>24.44</td>
<td>106</td>
</tr>
<tr>
<td></td>
<td>Technical</td>
<td>30.62</td>
<td>16.64</td>
<td>45</td>
</tr>
<tr>
<td>Solving</td>
<td>Administrator</td>
<td>35.86</td>
<td>19.54</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Faculty</td>
<td>20.69</td>
<td>16.21</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>Clerical</td>
<td>24.36</td>
<td>18.44</td>
<td>101</td>
</tr>
<tr>
<td></td>
<td>Technical</td>
<td>26.64</td>
<td>20.10</td>
<td>45</td>
</tr>
</tbody>
</table>

Note. * Means represent percent of weekly telephone task time.
staff and faculty spent significantly more time seeking information than clerical staff and administrators. In contrast, the Duncan Test found that technical staff spent significantly less time giving information than faculty and clerical staff; though the Scheffe procedure found no significant differences. Finally, as would be expected, The Duncan Test found administrators spent significantly more time solving problems than all other groups, while the Scheffe procedure found administrators spending more time solving problems than faculty and clerical staff.

Feature Use

Levels of feature use can be calculated for all users on those features which come standard on each UNITS telephone. However, it is first important to note whether or not users have the optional features (or more accurately were given), or know that they have them. It will here be assumed that if users do not know whether or not they have a feature, they most likely have never used it. A summary of the percentage of users not having optional features or not being sure if they have them is presented in Table 17. The data show 30.4% of the respondents not having call forward programmable (16.7% not sure); 48.3% not having group intercom (21.3% not sure); 44.3% of the respondents not having speed dialing (18.9% not sure); 49.8% not having make set busy (36.2% not sure); 64% not having a speakerphone (19% not sure); and 53.4% not having call park (31.5% not sure).

On the final survey, "Don't have" and "Not sure I have" were recoded to missing values in order to assess more accurately the frequencies with which users accessed features that they knew they had. Further, since call forward busy and no answer were features which the user did not have to actively access, they were not included in the analysis. A summary of the percent of users accessing features is presented in Table 18. Call transfer was the most used feature, followed by call pick up, hold, and speed dial. No users reported using make set busy or call park.
An interesting trend was observed with use of several features. The use of message waiting and speakerphone begins with most users accessing the feature zero times per week, and the number of users accessing the feature more frequently per week declines in a linear fashion. However, use of the other features exhibits a different trend. With these features, instead of the number of users accessing more frequently declining linearly, the number of users accessing the features begins to increase at more than 15 times per week. This trend was most pronounced with call pick up, transfer, forward programmable, hold, and speed dialing. Interestingly, more respondents listed "0" times per week than any other single category for each feature, with the exception of call transfer.
Table 18
Frequency Of Feature Use (Per Week) By Users Who Know They Have Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>0</th>
<th>1-5</th>
<th>6-10</th>
<th>11-15</th>
<th>&gt;15</th>
<th>&gt;0</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pick Up</td>
<td>30.6%</td>
<td>19.2%</td>
<td>13.1%</td>
<td>7.9%</td>
<td>29.3%</td>
<td>69.4%</td>
<td>291</td>
</tr>
<tr>
<td>Transfer</td>
<td>22.9%</td>
<td>29.8%</td>
<td>11.5%</td>
<td>5.0%</td>
<td>30.9%</td>
<td>77.1%</td>
<td>293</td>
</tr>
<tr>
<td>Conference</td>
<td>61.8%</td>
<td>27.3%</td>
<td>3.8%</td>
<td>1.3%</td>
<td>5.9%</td>
<td>38.2%</td>
<td>288</td>
</tr>
<tr>
<td>Forw Program</td>
<td>62.6%</td>
<td>16.5%</td>
<td>5.8%</td>
<td>3.6%</td>
<td>11.5%</td>
<td>37.4%</td>
<td>263</td>
</tr>
<tr>
<td>Messg Wait</td>
<td>72.0%</td>
<td>19.7%</td>
<td>4.7%</td>
<td>1.0%</td>
<td>2.6%</td>
<td>28.0%</td>
<td>288</td>
</tr>
<tr>
<td>Ring Again</td>
<td>57.4%</td>
<td>29.7%</td>
<td>7.9%</td>
<td>1.5%</td>
<td>3.5%</td>
<td>42.6%</td>
<td>288</td>
</tr>
<tr>
<td>Hold</td>
<td>34.9%</td>
<td>25.7%</td>
<td>8.0%</td>
<td>9.2%</td>
<td>22.1%</td>
<td>65.1%</td>
<td>285</td>
</tr>
<tr>
<td>Intercom</td>
<td>50.6%</td>
<td>14.9%</td>
<td>12.6%</td>
<td>6.9%</td>
<td>14.9%</td>
<td>49.4%</td>
<td>286</td>
</tr>
<tr>
<td>Speed Dial</td>
<td>40.2%</td>
<td>17.8%</td>
<td>8.4%</td>
<td>5.6%</td>
<td>28.0%</td>
<td>59.8%</td>
<td>291</td>
</tr>
<tr>
<td>Make Set Busy</td>
<td>100.0%</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>287</td>
</tr>
<tr>
<td>Speakerphone</td>
<td>75.5%</td>
<td>12.2%</td>
<td>2.0%</td>
<td>6.1%</td>
<td>4.1%</td>
<td>24.5%</td>
<td>289</td>
</tr>
<tr>
<td>Call Park</td>
<td>100.0%</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>292</td>
</tr>
</tbody>
</table>

Note. N = number of responses to each item.
The multiple response procedure shows the same trend for feature access overall. When feature access is collapsed across all features, "Don't have" was listed most frequently (29% of responses), and "Not sure" was listed by 17.4% of the respondents. Of those who did have the feature, "0" times per week attracted the largest listing (27.6%), followed by "1-5" times per week (11.5%), "6-10" times (4.2%), "11-15" times (2.4%) and back up to 8% for ">15" times per week. If the data are recoded into four categories instead of five (collapsing "11-15" and ">15", the trend becomes even more pronounced, as shown in Figure 6. When these multiple response data are crosstabulated by job category, these same non-linear trends in feature use are exhibited, and is much more pronounced among clerical staff than the other groups, and least pronounced among faculty, as shown in Figure 7.

Extent of feature use by job.

An extent of feature use index was calculated for each job category in order to assess differences in extent of feature use among each group, and test Hypothesis 2. "Don't have" and "Not sure" were recoded to missing values, and the responses were summed across each feature, and divided by the number of features (14). These data are summarized in Table 19. The analysis of variance revealed a significant difference in extent of feature use between job categories ($F(3,276) = 22.2, p< .0001$). The Scheffe Procedure found that faculty used features significantly less than all other groups, while clerical staff used features significantly more than all other groups. There was no difference in extent of feature use between administrators and technical staff. Thus, the hypothesis that clerical staff would have a higher extent of feature use than administrators and faculty was supported.
Figure 6. Non-linear Trend In Overall Feature Access. Feature Use Has Been Collapsed Across All Features. Number Of Responses = 2066. Note. Low = 1-5 Times/Week; Medium = 6-10 Times/Week; High = >10 Times/Week.
Figure 7. Non-Linear Trend In Overall Feature Access By Job Category. Feature Use Has Been Collapsed Across All Features. Number Of Responses = 2066.
Note. Low = 1-5 Times/Week; Medium = 6-10 Times/Week; High = >10 Times/Week.
Table 19
Mean Extent Of Feature Use Scores By Job

<table>
<thead>
<tr>
<th>Job</th>
<th>M*</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator</td>
<td>.56</td>
<td>.42</td>
<td>59</td>
</tr>
<tr>
<td>Faculty</td>
<td>.24</td>
<td>.29</td>
<td>62</td>
</tr>
<tr>
<td>Clerical</td>
<td>.81</td>
<td>.49</td>
<td>114</td>
</tr>
<tr>
<td>Technical</td>
<td>.51</td>
<td>.56</td>
<td>45</td>
</tr>
</tbody>
</table>

Note. 0 = no use, 1 = 1-5 times/week, 2 = 6-10, 3 = 11-15, 4 = >15.

Finally, correlations were obtained to examine relationships between extent of feature use and other constructs. As would be expected, there was a significant positive correlation between feature use scores and amount of task time spent on the telephone \((r=.40, p<.001)\). Further, there were a significant positive correlations between feature use scores and feature use scores and attendance at training \((r=.18, p<.01)\). There was no significant correlation between task time or extent of use scores and extent of contact with the coordinator. Other relationships between feature use scores and attitude factors will be reported in the following section on attitudes.
Feature Non-Use

Item 1 on the factors affecting attitudes scale read "The technology was not needed." Table 20 summarizes the means of this item by job. Of the 123 respondents, 30.9% agreed with the statement, with only 4.9% strongly agreeing. Over 69% of the respondents disagreed, then, with 33.3% strongly disagreeing. A one way analysis of variance showed no significant differences between job categories on this item \( F(3,116) = .24, p = .8 \).

Yet, on the final survey, "Don't really have a need for it" was the most frequently cited reason for not using features that respondents did have (469 responses = 76.8% of all reasons). Conference call was the most frequently cited feature that users did not perceive a need for (71 instances = 15.4% of responses). Next, message waiting was listed 57 times (12.2% of responses), then ring again (47 instances = 10% of

<table>
<thead>
<tr>
<th>Job</th>
<th>M</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator</td>
<td>3.46</td>
<td>1.53</td>
<td>26</td>
</tr>
<tr>
<td>Faculty</td>
<td>3.33</td>
<td>1.63</td>
<td>30</td>
</tr>
<tr>
<td>Clerical</td>
<td>3.30</td>
<td>1.52</td>
<td>47</td>
</tr>
<tr>
<td>Technical</td>
<td>3.65</td>
<td>1.62</td>
<td>17</td>
</tr>
</tbody>
</table>

Note. * 0 = strongly agree, 5 = strongly disagree
responses). A crosstabulation of the data by job category showed that administrators perceived the least need for conference call, pick-up, and ring again. Faculty listed hold, pick-up, and equally conference call and message waiting. Clerical staff reported the least use for conference call, ring again, and speakerphone. For technical staff, conference call, message waiting, and ring again were listed most frequently. Moreover, "Features were not useful" was written most frequently as a comment about perceived needs for features (25 instances = 41.7% of all perceived need comments): although "No need yet" was the second most frequent comment about perceived needs for features (16 instances). "Used less than weekly" was the third most frequent comment (11 instances).

As previously reported in the section on awareness, "Don't know how to use it" was the second most frequently cited reason for not using features that the respondents did have (77 instances). The third most frequently cited reason was "Too complicated" (45 instances), followed last by "Others I need to communicate with don't have the feature" (20 instances).

To summarize the data on perceived needs and feature use, generally faculty perceived the least individual and group task needs for the new telephone system, and frequently asked secretaries to place and screen calls for them. However, some features were seen by faculty as beneficial and desirable, including touch-tone dialing, speed dial and call forwarding. Further, faculty had the lowest level of involvement with the new telephone system, while administrators had the highest, perhaps due to salient budgetary concerns. Interestingly, overall levels of involvement with the new telephone system across job categories were not significantly higher than scores for copy machines.

Extent of feature use was largely determined by task time spent on the telephone. Clerical staff showed significantly more task time on the telephone than faculty, as well as significantly greater extent of overall feature use than all other groups. There were also significant differences between job categories in amount of telephone task time spent seeking and giving information, and solving problems. Call
transfer, pick up, hold, and speed dial were the most frequently used features of the system, while call park, message waiting, and call forward programmable were the least used features. The most commonly reported reason for not using features was "Don't really have a need for it," though a majority of users agreed on the survey that the technology was needed.

**Attitudes**

The interview and focus group data suggested that there was a great deal of variability in people's attitudes toward the new telephone system. Some hated it, some liked it a great deal (with minor exceptions to technical problems). The results of the attitude measure are summarized in Table 21. The data indicate that more users reported having neutral attitudes towards UNITS (37.3%) than other attitudes. Nearly as many had positive attitudes towards the system. In fact, almost twice as many users had positive or very positive attitudes as had negative or very negative attitudes. The responses tended not to be extreme. The mean score overall was 3.16 (1 = very negative, 5 = very positive). An analysis of variance which a significant difference in attitude between jobs \( F(3,281) = 3.05, p<.05 \). The Scheffe Procedure found that administrators had significantly more negative attitudes than did technical staff. There were no differences between the other groups. The less conservative Duncan Multiple Range Test found administrators had significantly more negative attitudes than all of the other groups.

According to the interview and focus group data, most of the negative attitudes towards UNITS were generated by four main issues: 1) technical feature limitations which resulted in necessary behavioral changes; 2) lack of perceived reliability of the system (due to early software "bugs" -- leading to uncertainty and anxiety about using the phone; 3) costs associated with UNITS and the perception that the technology was being "forced" on the departments, and 4) individual problems coping with change.
Table 21

Attitude Responses By Job Category

<table>
<thead>
<tr>
<th>Job</th>
<th>Very Neg</th>
<th>Negative</th>
<th>Neutral</th>
<th>Positive</th>
<th>Very Pos</th>
<th>M*</th>
<th>SD</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admin</td>
<td>12.1%</td>
<td>24.1%</td>
<td>34.5%</td>
<td>25.9%</td>
<td>3.4%</td>
<td>2.85</td>
<td>1.06</td>
<td>58</td>
</tr>
<tr>
<td>Faculty</td>
<td>5.9%</td>
<td>14.7%</td>
<td>39.7%</td>
<td>35.3%</td>
<td>4.4%</td>
<td>3.18</td>
<td>.95</td>
<td>68</td>
</tr>
<tr>
<td>Clerical</td>
<td>8.0%</td>
<td>10.6%</td>
<td>38.1%</td>
<td>38.9%</td>
<td>4.4%</td>
<td>3.21</td>
<td>.98</td>
<td>113</td>
</tr>
<tr>
<td>Technical</td>
<td>6.5%</td>
<td>8.7%</td>
<td>32.6%</td>
<td>41.3%</td>
<td>10.9%</td>
<td>3.41</td>
<td>1.02</td>
<td>46</td>
</tr>
</tbody>
</table>

Note. * 1 = very negative, 5 = very positive.

Sources of Negative Attitudes: Technical Limitations

The first issue, technical limitations, has been previously described in the technical issues section. It appeared though, that it was the necessary behavioral changes that users saw as resulting in less productivity that generated negative attitudes, as illustrated by this excerpt from an interview with coordinators in an academic department:

m: And one lady said "Well, we want 4 numbers and we want the intercom." The intercom fell in where one of those 4 numbers would be. And they said "Well, you can't have an intercom with 4 numbers." And she said "We have to have an intercom with 4 numbers." And she said "Well, ok (reluctantly). I guess we could take something out up above and put an intercom. But we don't like to do that." Well, why not? If the feature's there and it's on the phone, and they can take it off, why can't they take something else off and bump it up? So it sounds to me like Telephone Services somewhere, somebody sat down and said "Ok, this is what we're going to
do. We're not going to let them do anything any different than this. We're going to set 5 rings, we're going to tell them they can have an intercom, but they can't have an intercom with 4 numbers, and etc. So that's what makes me think that for their convenience...and I can understand it to a point.

m: Up until such a point that you have to change your work patterns and habits to accommodate the technology.

s: Right.

In another large service department, almost an entire focus group discussion centered around the behavioral changes that would be necessary as a result of the technology. The users reported that Telephone Services insisted on making them change their work patterns to accommodate the technology, while they felt the technology should be adapted to suit their preferred methods of operation. The following quote is typical of a very common report from departmental receptionists: "It just takes a lot of time to keep dialing [to activate transferring, hold, etc]. And my job has gone from one of the answering points to now I'm pretty much a switchboard operator sometimes."

Next, the technical problems associated with software "bugs" which were also described earlier in the technical issues section generated negative attitudes towards UNITS. In this context, it seemed to be partly the lack of information provided by Telephone Services about the temporary nature of these problems.

Well, for a while we were getting calls and I would go to transfer them, and they would get cut off. Sometimes it happens, and sometimes it seems to clear up by itself. Other times, I have to call Telephone Services about it. And one day they told me that, was I doing it with speed call? And I said yes. "Oh, well that will work most of the time, but not all of the time if you transfer calls using the speed call."

Well, when we ordered the phone system and we ordered the speed call, the representative from Telephone Services knew what we were going to use it for. Why didn't they tell us at that time that it wasn't going to work all the time? They said it's something that they're working on, you know, and said "just be patient." But that, it made me kind of mad.
After a discussion of features that Telephone Services did not tell him/her had software problems, another user expressed his/her concern this way: "If you expect a problem, you can deal with it. But if it just blows up in your face, you know, you're going to react in a totally hostile way."

In most cases, however, the attitudes seemed to be a function of the uncertainty about whether the phone would work as expected. Many users complained about the reliability of the system, claiming that sometimes it would work, and other times it would not, for no apparent reason; although several coordinators reported that they felt some, but not all of the perceived unreliability of features was caused by operator errors. Many users reported that this inconsistency created a lot of anxiety while using the phones, as follows:

It's sometimes like Las Vegas odds, you know. Sometimes it works, and sometimes it doesn't...but I think the uncertainty that bothers you is not knowing today whether the phone is going to do the same thing it did yesterday. While you're in the process of arranging a call, or transferring a call, is it really going to work the way I think it is?

Now if that software, there's some gremlins in the software, which is dealing with computers enough, that could very well be true. But it doesn't handle the anxiety everybody goes through every time they pick up the phone wondering whether it's going to work or not.

An additional issue which many users reported generated negative attitudes towards UNITS was the perception that the new system should not have been implemented throughout the whole campus (subsequent to phase 1) until all of the technical problems had been corrected. In one academic department, this was the topic of most of an entire focus group.

Many users also reported developing negative attitudes about the technology itself before receiving their phones from: a) calling into UNITS and getting cut off, receiving an unacceptable number of busy signals, and not being able to reach desired locations due to the
inaccuracy of the recording (as discussed in the awareness section)\textsuperscript{13};
and b) through interpersonal contact with other users who had already
been switched over: although not all users developed negative attitudes
from these contacts. With respect to the second reason, the following
interview and focus group excerpts are illustrative:

\begin{quote}
?: I had a great deal of contact with [a service department],
and they made the transition with absolute chaos.
\textit{slv}: Ok, so you...
?: And I think their system, their operating system is
different than ours. But I'm unhappy with calling them under
their present operating system. That's a different issue than
this, but I've been aware of the transition of the 292 system
[unintelligible].
\textit{slv}: So is it fair to say that based on your contact with the
[this service department] and the problems that they had
encountered that you then began to form negative
expectations?
?: Absolutely. (laughter).
\end{quote}

\begin{quote}
?: [A building] warned us! [They] warned us "You'll be
sorry!"
\textit{b}: I mean you should do an interview with [them]. They are
the, of all the people we talked to on campus, they still [6
months after the switch] hate the phone system more than
anyone else I know.
\textit{slv}: Have any of you had any exposure to other individuals,
have you heard anything from other people that had already
switched over, good or bad about the phone?
?: Um hm.
\textit{slv}: What had you heard from...
\textit{m}: (interr) We heard horror stories!
\textit{b}: Oh boy! You know what they said...
\textit{b}: One whole college...
\textit{slv}: [later in the discussion] So you don't really get the
impression then, that these horror stories that you were
hearing really then, started to cause you to resist, or
generate negative expectations. You understood that it was
just a learning problem that you would have to go through,
and...
\end{quote}

\textit{-------------------}

\textit{13. In fact, the researcher experienced similar problems while calling
departments to arrange interviews and focus groups.}
bri: You're probably looking at the six most positive people in the college here...
?1: That's right.
?2: Yes.

Sources of Negative Attitudes: Media

With respect to other sources of information about UNITS, few interview or focus group participants made mention of the Lantern, and no users made reference to the On Campus newsletter or the UNITS Network newsletter. For the lantern, only one individual claimed he/she developed negative attitudes from the newspaper articles and editorials about UNITS. One additional individual claimed the articles confirmed previously formed negative attitudes, and several users reported that they had no effect on their attitudes.

The final survey data show that while only 23.3% of the respondents reported that communication about the phone with other users negatively affected their attitudes, these responses were more than twice the 10.3% of the users who reported that contact with others positively affected their attitudes. The majority of the respondents (37.8%) reported that these interpersonal contacts had no influence on their attitude, while an additional 27.4% reported no exposure to others' attitudes. Users were also asked about what influence other information sources (Lantern, On Campus, and UNITS Network) had on their attitudes. Only 6% reported that articles in the Lantern had negatively affected their attitudes, and 5.2% reported positive influences. 36% had no exposure, while 52.8% reported no influence. For the On Campus newsletter, less than 1% of the users reported being negative influenced by articles in the publication, while 8.7% reported being positively affected. 38.3% reported no exposure, and 52.3% reported no influence. Finally, the UNITS newsletter created more negative attitudes in 3.4% of the users, and more positive attitudes in 18.1% of the users. Almost equal numbers 39% of users had no exposure, or reported no influence.
Sources of Negative Attitudes: Cost

Many users reported feeling resentful that the University had "forced" the technology on them, without giving them any choice in the matter. Most of these comments were in relation to the costs of the system.

And of course the cost factor is another very negative perception that people have about the telephone system. I don't think there's any departments I've talked to, and I've talked to dozens, that have not said something about their phone bills increasing. And they couldn't figure out why it had to go up so much. And they, most of the departments felt that what they were getting was not worth the amount of money they had to pay for it.

I don't think so. I don't think it is...I guess I've resigned myself to the fact that we have no choice. So it doesn't do any good to get real negative about it. You have to try to look to the positive side. Because you know you're going to have it. It doesn't matter whether you like it or whether you don't. It's here.

Indeed, it was common to hear Telephone Services compared to "Ma Bell:" -- pay or go without. Some users even specifically mentioned their resentment of what they perceived as yet another monopoly. Each time, this reference was with respect to external attachments (answering machines and modems were the two items mentioned) which had to be approved by Telephone Services and purchased through the University.

During one focus group, the conversation went as follows:

?1: Let me address another point which bears on this and is coming from two other ways: and that is with the introduction of UNITS and this entire system, there seems to have been the development of the attitude of a monopoly as far as telephone service. And this has been reflected, I first saw it when one of the lab supervisors, wanted to purchase a recording service for telephones and computers. I know the 422 exchange, and he located such a device that was available on sale at Lazarus, you know. And he put the purchase order through, and he was not able to purchase it. Instead, it had to go to Telephone Services, and they sold him one at 50% more -- identical.

?2: Than Lazarus?
Yep. That's right. Exactly. The same brand, the same model, no difference. For 50% more than Lazarus.

The university is foolish to put itself in that kind of position.

This constitutes a monopoly of which I am, is actually totally unacceptable. And not in the best interest of the university.

Units is doing the same thing now, with regard to requirements of the new phones. If you go to a modem, if we want to go to anything that attaches to their phone, they want to purchase it. They want to say that other phones are not compatible with theirs. And this constitutes a growing monopoly. And this is something which is absolutely intolerable.

In fact, this issue appeared as a concern to users in a January 29, 1987 issue of the Lantern (Clifthorne, 1987). According to the article, Telephone Services would only approve Code-A-Phone or Panasonic answering machines for use with UNITS. Duane Bennett, Assistant Director of Telephone Services reported to the Lantern that some answering machines respond only to a specific ring pulse and that "Cheaper models may not work on either the electronic or single line units" (p. 1). While it is a fact that some answering machines will not work on certain types of telephone systems, the perception of a monopoly apparently resulted from the fact that approved models had to be purchased through Telephone Services at a cost which users reported higher than the same models could be purchased at other retail outlets.

Sources of Negative Attitudes: Resistance to Change

The final issue which interviews and focus group data identified as an attitude issue was basic resistance to any kind of change. Many users reported that those in their departments who complained the most, and refused to learn how to use features were simply unwilling to cope with the change. As one coordinator said,

Just listening to other people on campus, whenever the new telephone system is brought up, it's been overwhelmingly negative. And I can understand the reasons why. I think a lot of it has to do with coping with change...dealing with a
sophisticated system compared with the old seems to be a psychological burden for a lot of people...it's a problem. Because those bad feelings have really permeated the rest of the university.

In another department:

m: But the ones that are complaining the most are the ones that don't take the time to learn how to use it...that's a human nature problem.

b: People hate change.

m: [later in the discussion] It's anything new. Look at the computers.

k: That's right. That's right.

Clusters of Factors Affecting Attitudes

Several other findings were obtained from the final survey data. First, the factors affecting attitudes toward the new technology were subjected to a principle components factor analysis of variance with oblique rotation. As reported at the beginning of this chapter, the scree test suggested a three factor solution. The results of the factor analysis (pattern matrix) were presented in Table 4. Factor 1, Effects, clustered items about the effects of the new telephone system implementation. Factor 2, Process, clustered items about the process of the implementation, and Factor 3, Budget, clustered items about the budgeting of the new telephone system.

Factor scores for each respondent were then obtained; creating three new factor score variables: one corresponding to each of the factor analysis clusters. Correlations were then calculated for each of these factor variables and job, attitude, extent of feature use scores, attendance at training, and amount of task time on the telephone. Significant negative correlations were found between Factor 2 Process and attitude ($r = -0.45, p < 0.001$) and attendance at training ($r = -0.23, p < 0.05$). No other significant correlations were observed. Interestingly, when factor indexes were calculated by summing scores across all items included in a particular factor, these same constructs were significantly correlated (negatively) as before. However, two additional
significant correlations were observed: the Factor 2 \textit{Process} index was negatively correlated with the extent of use score index ($r = -0.18, p < 0.05$); and the Factor 3 \textit{Budget} index was negatively correlated with the extent of use score index ($r = -0.22, p < 0.05$).

Lastly, as indicated by the significant differences in attitudes between administrators and other jobs, there was a significant positive correlation between job and attitude ($r = 0.17, p < 0.01$). There were no significant correlations between training attendance; frequency of assistance by the coordinator; extent of feature use; or task time spent on the telephone; with attitude.

Summarizing the findings with respect to attitude, the data show that overall, attitudes towards the technology tended to be more positive and neutral than negative. There were differences among jobs, with administrators reporting significantly more negative attitudes than the other groups. Most of the negative attitudes were generated by technical limitations, lack of perceived reliability of the technical system, costs, and general resistance to change. Many of the perceptions of lack of technical reliability was generated by users calling into UNITS and experiencing problems before they received their new telephones, and through interpersonal contacts with others who reported these technical problems to them. Most users reported no influence from mediated sources such as the student newspaper, the On Campus newsletter, and the UNITS network newsletter; though the latter was the most successful in generating more positive attitudes. It appears that the \textit{Process} cluster of items from the factor analysis was most strongly associated with attitude. This cluster was also associated with extent of use, though not as strongly as the \textit{Budget} cluster of items.
CHAPTER V
DISCUSSION

The results of this study suggest that nine implementation factors affected the extent of individual use of the new telephone system and users' perceived effectiveness of the system at the Ohio State University:

- authority decisions: costs of the telephones and of the optional features;
- awareness of the system and of its features: information dissemination;
- perceived needs for the system's features: needs assessment procedures and resulting system configuration;
- the departmental coordinator: role as information provider;
- ease of use: technical issues related to the technology itself;
- training: procedures and user attendance;
- system documentation: complexity;
- compatibility: user attitudes towards the technology.

From a macro perspective, these factors collapse within two major categories of issues: extent of use and affective responses to the innovation. Subsequent to the discussion of these macro issues, their relationships to each other, and to the above sub-factors, recommendations for more effective implementation will be presented.
Macro Issue 1: Extent of Use

The extent of individual telephone and feature use was a function of three, interrelated and overriding issues: authority decisions, compatibility, and perceived needs.

Authority Decisions

The first issue concerned secondary authority decisions by departmental coordinators and department heads/managers which dictated which type of telephone and which optional features particular users would have, as well as the configuration of the system within the department. The configuration of the system entailed such design factors as the number of direct inward dial lines which would ring into individual offices, where calls would automatically be forwarded to when a phone was busy or went unanswered, and who members of universal pick-up groups would be. With few exceptions, these decisions were made primarily on the basis of avoiding the perceived high cost of the system and optional features, with only secondary emphasis placed on meeting perceived user needs. Thus, even though Telephone Services formally planned to "advertise, train, and support speed dialing" and "promote labor saving features in customer communications," the results suggest that speed dialing and labor saving features as perceived by the users were largely not offered to users due to the pricing structure of UNITS. This pricing structure placed the costs of these features and telephones that support them on the departments themselves. Without additional monies from the administration to support these increased telephony costs, most departments ordered a minimum number of direct inward dial lines, electronic phones (multiple lines, one-touch hold feature), and few or no optional features: which satisfied only those with low-level needs.
Compatibility

Secondly, most of the features that were available to users as standard features on all UNITS telephones were largely seen as unneeded or incompatible with existing (previous), preferred telephone task behaviors. These perceptions of incompatibility arose partly from a lack of awareness of the system's capabilities. For example, many clerical staff reported that on the old system, they routinely put a caller on hold, and would then call another individual to find an answer to a question. Many reported this was not possible on a UNITS single line set, and would therefore have to walk over to get the answer, or hang up, call someone to get the answer, and dial the original caller back. However, the consult feature standard on all UNITS phones, allowed just this capability -- though it was a slightly different "conceptual" procedure than before. In effect, the user was establishing a 3-way conference call, leaving the original caller on hold rather than connecting them to the conversation (see Appendices D and E).

Perceptions of incompatibility arose mostly, though, from perceived complexity and technical limitations of the system. First, recall that Rogers (1983) outlines complexity as one of the attributes of an innovation which affects rates of adoption, and defines it as "the degree to which an innovation is perceived as relatively difficult to understand and use" (p. 230). In the context of this discussion, users' perceptions of "complexity" will be interpreted as more closely aligned with the attribute of compatibility. Although a few interview respondents indicated that accessing certain features looked too complicated, and thus did not attempt to use them, most respondents described the new system as too complicated and time consuming as compared to previous methods of accomplishing the same tasks on the old system. It wasn't that the users found the system too difficult to use in the sense of having trouble figuring out how to do so. Rather, accomplishing tasks on the telephone were seen as more cumbersome (and therefore less efficient and productive) than on the old system. For example, a hold function on the single line set becomes a four button
sequence with waiting time for audible tones to be acknowledged instead of a one button sequence. An internal transfer becomes a six button sequence with the same waiting time for audible tones instead of a 3 button sequence. These findings are more consistent, then, with Rogers definition of compatibility: "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (p. 233, boldface added). Again, the system favored those with low-level task needs.

With respect to technical issues, three limitations were seen as the most incompatible technical characteristics of the new system. These included the lack of shared lines and lights which indicated when another user was on the line (especially for transferring calls), inability to transfer long distance calls made on the Plus system, and inability to place a caller on hold to answer a second call (single line set): though transferring long distance calls later became possible. Moreover, some features which were seen as compatible with preferred methods of operation and/or could increase perceived system effectiveness were too expensive and thus not ordered. What is of theoretical importance here is the necessary behavioral changes which resulted from these technical characteristics and/or lack of optional features which, as perceived by the users, could more effectively accomplish these tasks. These necessary behavioral changes were perceived by the users as less desirable than previous methods as well as resulting in reduced productivity -- hence affecting their perceptions of the effectiveness of the system. Perceived effectiveness will be discussed in the next major section of this chapter.

Yet, one of the behavioral changes which Telephone Services encouraged was for administrators and faculty to place and receive their own phone calls, including long distance -- part of their criteria for effective use. As Joiner (1983) noted regarding technological

1. Regardless of the extent to which users perceived this objective as incompatible with their preferred methods of operation, the goal was to a large degree constrained by the cost of direct inward dial lines to
rationalism, "a dilemma is created because of underlying assumptions and
criteria for effectiveness that are in conflict" (p. 172). In other
words, the system was compatible with Telephone Services' criteria for
effectiveness, but incompatible with most users' criteria since
undesirable behavioral changes resulted. While the system worked well
from a technical standpoint (save some software "bugs"), in many cases
it did not work well from a user or departmental management perspective.
For example, secretaries were unable to tell if other users were on
their phone or not, and therefore available to receive a transferred
call. If they were on their phone, and wanted to take an important call,
they could not place the original caller on hold briefly to take the
second call (unless they had an electronic set with multiple lines —
again restricted by costs). While this is a technical incompatibility,
it is also an example of incompatible criteria for effectiveness between
users and management (in this case Telephone Services). This is
consistent with Kling and Scacchi's (1980) distinction between defining
the success or failure of a system implementation using user and
management criteria, and using technical criteria. In addition, these
issues support Klemmer and Dooling's (1983) contention that operating
procedures are more important than physical design. Indeed, ideally
physical design is predicated on accounting for compatible operating
procedures. The key point here is that these issues arose subsequent to
the initial implementation phase. Apparently, these technical
incompatibilities and criteria for effectiveness were not discussed
prior to implementation, and many users did not even perceive them
during training; which has implications for decision making and
information dissemination. As discussed below, the Action Research
process can be effective in clarifying and/or resolving conflicting
criteria for effectiveness.
First, according to Argyris and Schon (1978), Model I theory in action within organizations is based on traditional concepts of altering strategies (behaviors in this case) within the organization to accomplish goals. It assumes that the goals and objectives themselves are not open to question. Strategy failures are attributed to the strategies themselves, and not to incompatible objectives within the organization. Interestingly, each time the issue of incompatible characteristics of the system (primarily about the incompatible transfer procedures) arose during interviews, the responses were consistent. Telephone Services responded to complaints about these perceived technical "limitations" by telling users the system was not being used properly — it was rude to place a caller on hold to answer another call, or individuals should be placing and receiving their own calls (behavioral strategies). Again, Telephone Services' objective of individuals placing and answering their own calls and other behavioral goals were not discussed prior to installation. An excerpt from an interview with a coordinator, who was also an administrator, is worth repeating: "Here's the instrument, now start answering your own phone." This is an excellent example of the contrast between Model I organizational theory in action, and Model II, which assumes that often goals and/or values within the organization are not clear, or assumptions and criteria for effectiveness may be in conflict. Where these ambiguous or conflicting circumstances are present, Model II theory in action states that these "governing principles" must be open to reflection and question (Argyris, 1979; Argyris & Schon, 1978). Sociotechnical analysis proposes that pressures to change must come from within, and allow for participation and collaboration from representatives of all potential user groups (Pava, 1983). Further, the first phase of the analysis (designed to develop strategies to implement change) stresses a collaborative formation of the mission of the organization, and the goals and objectives of each work unit. Organizational (top management) objectives of any change which are not consistent with the goals and objectives of individuals within the organization increase resistance to change (Huse, 1980). Indeed, the
findings of this study show that these incompatible objectives led to decreased perceptions of system effectiveness among users, and more negative attitudes towards the system. There were recurring reports of users refusing to learn how to use features because of resistance to the change. In fact, several whole departments reported they were exploring alternative equipment in part to circumvent perceived technical limitations and resulting behavioral changes.

The incompatibility of the system with users' perceived needs (and hence less perceived system effectiveness) was exacerbated by a lack of participation by end users in the feature selection and configuration decisions made by departments. Since those responsible for these decisions were constrained by costs, time, and a lack of technical understanding of the system, very little consultation with end users was done. The result was more authority decisions. Secondary authority decisions, then may lead to users ending up without features they perceive as necessary and/or desirable. Alternatively, features that they do receive may hold few or no relative advantages for them. Therefore, it is here posited that less participation by end users in decision making leads to increased incompatibility with needs, values about how the work should be done, and hence more ambiguity about criteria for effectiveness.

Perceived Needs

The results of this study suggest that use of available telephone features in a University setting is primarily dictated by the perceived needs of the end user. It appears that these perceived needs are composed of two levels: individual convenience needs, and individual and group task needs. Some individuals, depending on their real and perceived job responsibilities, were allowed more discretionary use of the telephone than others. Faculty particularly seemed to perceive the telephone as more of an individual convenience technology than a tool; though they did have some task use of the telephone. For the most part however, use of the telephone for faculty was not a mandated
responsibility. Faculty tended to use the phone for placing calls (both business and non-business related) at their convenience. Further, many faculty and administrators preferred that a secretary screen calls rather than have calls ring directly into their offices. Under these conditions, then, even answering a call can be done at the user's discretion. All other telephone tasks were mostly seen as a secretarial responsibility. Therefore, any use of more advanced features was likely to be dictated mostly by perceived relative advantages that these features held for their convenience.

Indeed, the features which faculty reported as the most beneficial were call forward, speed dial, and ring again: all features which made using the telephone more convenient for their particular uses. Moreover, features faculty would add exhibited the same characteristics: speed dial, call forwarding, and ring again. These findings are consistent with past research which suggests that relative advantage may be one of the most important attributes of the innovation in terms of enhancing adoption (Rogers, 1983; Bolton, 1983). Midgley and Dowling (1978) also suggest that latent need for an innovation's perceived benefits is one of three intervening variables between psychological traits of innovativeness and time of adoption. Perhaps this is also true of extent of use of an innovation, since "Don't really have a need for it" was the most frequently cited reason for not using features that respondents did have. Yet, perhaps this lack of perceived needs was in part a function of lack of awareness about the technology's capabilities. There may have been features that would hold relative advantages for these users of which they were unaware. Evidence of this can be seen by the fact that many users listed standard features on all UNITS telephones not only in the "Not sure I have" column, but also as features they would add if they could. Clearly, if individuals want to add a feature to their telephone, they must see some relative advantage to using it. In addition, this lack of awareness, particularly among faculty, explaining part of their lack of perceived needs and relative advantages, was probably also a function of the minimal exposure to information about the innovation. Faculty had the lowest attendance at training sessions,
and reported during interviews the least amount of communication about the technology with others. Hence, while Midgley and Dowling (1978) posit one's network of interpersonal messages relating to the innovation as another intervening variable in adoption, it may also be important in extent of use of an innovation: as it relates to both awareness about the potential benefits as well as observability of these benefits (perhaps in the form of testimonials by peers). All of these findings are consistent with the previous research in that the studies focused on individual optional adoption: and faculty seem to have the greatest degree of optional telephone use.

In contrast, clerical staff do not enjoy as much discretion in their use of the telephone. Rather than being an individual convenience technology for them, the telephone is primarily an individual and group task tool. Much of their use of the telephone is mandated by their job responsibility. Some serve as departmental answering points, in which case answering the phone and transferring calls is an unavoidable duty. Others are included in pick-up groups and required to answer others' telephones when they are away from their desk, or a call reverts to them when others are engaged with another call. Still others must research students' and others' questions at computers and file cabinets away from their phones, or retrieve information from other staff. Hence, these individuals should make use of such features as hold, intercom and conference/consult. However, the results indicate that many users were in fact not using these features, primarily because they were perceived as too cumbersome and time consuming (incompatible with preferred methods). Thus, when use of the telephone is a non-discretionary job responsibility, use of these features is likely to be dictated more by perceived compatibility than by perceived relative advantages. Indeed, clerical staff and administrators reported during interviews and focus groups more disruption of "normal" behavioral patterns as a result of the new system than did faculty or technical staff. The contention here is that relative advantage, as an attribute of the innovation, is not as important as compatibility in affecting levels of feature use under authority adoption situations and mandated task use.
Interestingly, administrators, technical staff, and clerical staff had similar responses to features which they perceived as the most beneficial; and these features were more group task oriented. This finding suggests that these users all have more of a task orientation to telephone use than do faculty. Support for this conclusion is also found in the survey data which showed that faculty spent significantly less time on the telephone than all other groups, had significantly lower involvement with the telephone than all other groups, and had a significantly lower extent of feature use than all other groups. Evidence of this task orientation is suggested by the fact that administrators, clerical, and technical staff each listed pick up and transfer as the most beneficial features. These features are clearly individual and group task oriented features. Further evidence for this task orientation to the telephone is seen in administrators' responses that the conference feature was also highly beneficial; in that they reported spending most of their time on the telephone solving problems. Similar to faculty, all groups listed speed dial as the feature they would add if they could. However, as opposed to faculty, the findings on "complexity" (cumbersome, time consuming multi-button access to features) suggests that perhaps other groups desired speed dial for simplification of telephone tasks. Further, clerical staff listed intercom next, which also permits simplification of internal consultations.

It is unclear to what extent administrators and technical staff perceived such features as ring again and speakerphone (their next most "desired" features) as task-oriented features or convenience features. One could speculate that both could enjoy the hands-free operation of the speakerphone as they engaged in other task activities (looking up information in files or technical manuals, etc.). In addition, technical staff reported spending most of their telephone task time seeking information. The ring again feature would be beneficial for continuous calling into a busy number to acquire information. More research is clearly needed to further define the concepts of discretionary and non-discretionary telephone use, and the degree to which compatibility
and relative advantage are more or less important attributes in determining the extent of feature use. A prerequisite to these research efforts would be an attempt to further define and develop measures for the compatibility attribute. As Rogers (1983) points out, though past statistical analyses show compatibility to be of relatively less importance in predicting rates of adoption than other attributes (particularly relative advantage), these results "may be in part an artifact of difficulties in measuring perceived compatibility" (p. 226). Indeed, Bolton (1983) found both compatibility and relative advantage to be the most important attributes in influencing adoption. Previous research on these attributes however, have focused on individual optional adoption decisions, and the Bolton study viewed the attributes as predictors to potential optional adoption. Therefore, further research is needed to assess the effects of these attributes on actual feature use under non-discretionary telephone use conditions, as found in authority adoption decisions. The key point, however, is that compatibility as discussed here will always be an obstacle to innovation, rather than a draw; as opposed to relative advantage.

Overall, the findings from this study at The Ohio State University are consistent with previous research which suggests that differential use of the telephone would be based in part by job function (Knopf, 1982; Rice & Manross, 1986). In terms of task time on the telephone, faculty used the telephone significantly less than all other groups, and though not statistically significant, clerical staff spent the most time. However, stronger evidence for differentiating levels of telephone use by job is suggested by the finding that faculty used features significantly less than all other groups, while clerical staff used features significantly more than all other groups. Further, extent of feature use was positively correlated with amount of telephone task time. Thus, Rice and Manross's conclusion that "the only strong and consistent relationship was between time spent using the telephone and number of functions used...That is, need leads to use" (1986, p. 737, 739) is also supported here. These conclusions again point to compatibility as the attribute of an innovation which may most affect
extent of feature use for those with less discretionary use of the innovation. The findings also suggest that needs may lead to greater efforts towards seeking out information about the innovation, since those with the greatest telephone needs had the highest training attendance.

From an applied standpoint, knowledge of differential use may allow decision-makers to select features and design systems which are more compatible with users' criteria for effectiveness. Since clerical staff and faculty report spending most of their telephone task time giving information, it is probable that they generally receive more calls than they place. Hence, it may be more effective for these individuals to have DID's into their offices. This would minimize the receptionist/secretary work load with transfers, and alleviate some of the work disruptions caused by the technical incompatibilities (no shared lines, no lights). Further, since administrators spend most of their telephone time solving problems (and almost as much time giving information), it may be more effective for these individuals to have electronic sets with multiple lines, so that more than one call could be attended to simultaneously. For example, an administrator may be engaged in a lengthy discussion when an important call with needed information rings in. On the single line set, the administrator could not answer the second call from his/her phone. Technical staff on the other hand, spend most of their telephone time seeking information, and thus likely place more calls than they receive. Moreover, technical staff report the most internal communications as well as the longest internal communications. Thus, having features such as speed dial, group intercom, and using ring again would probably more effectively meet their needs.

The data also indicate that many clerical staff (particularly in service departments) spend significant amounts of time researching questions at file cabinets, computers, and other locations away from their telephone. Features such as group intercom and call park would more effectively meet their particular needs. Further research on telephone use by different job categories in particular types of organizations would help determine what type of features and
configurations would most effectively meet perceived needs, and help clarify different criteria for effectiveness which must be discussed prior to installation.

The data from this study are somewhat informative on organizational telephone use, within a university setting. Understanding different telephone uses between job categories and/or types of departments may help clarify realistic criteria for effectiveness among these groups. Ideally, criteria for effectiveness are discussed and clarified prior to physical installation of an innovation. One indication of the unintended consequences of not addressing and clarifying criteria for effectiveness can be seen in the recurring "disdain" for faculty values which seemed to emerge from non-faculty sources during interviews and focus groups. It appeared that faculty were treated with this "disdain" because their values about telephone use (individual convenience technology) were the most incompatible with technical values and orientations (group task tool) to telephone use as espoused by Telephone Services and many clerical staff (i.e. placing and answering their own calls, transferring, etc.).

This creates an interesting dilemma, in that faculty are presumed to be central to the functioning of a university. Yet non-faculty felt that the faculty should adapt their values and behaviors to the technical criteria: which was oriented towards support/process functions of the university rather than the creative/product functions supplied by the faculty. The question is raised, then, as to what is central to the functioning of a university? Should criteria for technology effectiveness be centered around its ability to meet the needs of those engaged in process functions as opposed to those engaged in product functions? Again, these are issues which, if left unattended, can create animosity among the organization's members, increase resistance to the change, and hence negatively affect successful implementation.
Macro Issue 2: Affective User Responses

Perceived System Effectiveness

While compatibility has here been argued to be an important factor affecting individual levels of feature use, the results of this study indicate that it is even more important in affecting perceptions of system effectiveness. In Chapter II, system effectiveness was defined as the relationship between an individual's actual experiences (uses) with the innovation and their desired uses. In other words, effectiveness is based upon an individual's perception of their own communication needs and the technology's ability to fulfill these needs. Several factors appear to affect these perceptions of effectiveness.

Cost influences on perceived effectiveness.

The high cost of the system negatively affected perceptions of the system's effectiveness in several ways. It affected the availability of optional features and the telephones (electronics) which supported some of them (multiple incoming lines, one button hold, speakerphone). Therefore, in many cases the system did not meet users' perceived needs due to a lack of these desired features; including both (perceived) necessary features and (desired) convenience/labor saving features. System configuration was also affected by the cost factor, particularly with respect to the number of direct inward dial lines (DID's) departments felt they could afford. In some cases, too few DID's led to an unacceptable number of busy signals when dialing a UNITS number. These experiences led to negative perceptions of effectiveness for both UNITS users and those not yet converted. Further, many users desired DID's so that they could receive calls after normal business hours; which became impossible for many who were not in proximity to the answering point(s).
Also, the cost of the system to departments did not match users' understanding of one major rationale behind the change: telecommunications cost savings. Reports of doubled phone bills were consistent throughout the interviews and focus groups, and the data also indicated that these cost issues were communicated to departments not yet converted. Once UNITS became a reality, the budgeting process/effects did not meet expectations of reduced telecommunications costs, and therefore the system was not seen as effective in meeting this objective. Thus, secondary authority decisions about the cost distribution, subsequent to adoption, affected real and perceived system effectiveness, as well as other affective responses to the innovation. This is another example of conflicting criteria for effectiveness — between University and departmental budgetary objectives. These conflicting criteria in part resulted from a lack of shared understanding about the nature of university telecommunications cost savings. The fact that these unmet expectations led to increased resistance toward the change again points to the importance of clear communication and shared understanding about the rationale for change.

Moreover, it was consistently reported that any advantages to the new system that users did perceive were reported as not significant enough to justify the capital expenditure for the technology. Yet, these findings are somewhat contradicted by the survey data which indicated that users felt the technology was needed. There are two possible explanations for this contradiction. First, it may be that users felt new telephone technology was needed, but that this particular system was not effective in meeting the perceived needs. The findings with respect to incompatible characteristics of the system would tend to support this conclusion. Second, the conclusions drawn here from the interview and focus group data may need to be qualified by the possibility that those who agreed to participate in interviews and focus groups may have done so as an opportunity to complain about the system and/or instigate action. In fact, it became clear during interviews with Telephone

2. Recall that the researcher briefly explained the purpose (action
Services representatives that users seemed to impart information to the researcher (typically in the form of complaints) that they did not impart to the Telephone Services representatives during follow-ups described in Chapter III. In other words, there may have been an unintentional overrepresentation of participants who had more negative perceptions of the system's effectiveness, and participated with a "hidden" agenda: to influence the cost structure of UNITS. This may have been a reaction to perceived unresponsiveness of Telephone Services about system decisions. With respect to diffusion theory, these individuals may have been seeking information to confirm perceptions that the university was saving telecommunications costs at the expense of departments -- which again illustrates possible conflicting criteria for effectiveness.

Participation.

On the final survey, fully 75% of the users agreed that they were not involved in the planning for the implementation. Many users reported that because they were not consulted about their needs prior to receiving their telephones, they did not receive features they felt were needed. Moreover, lack of consultation resulted in system configurations which were not perceived as effective in meeting their needs, particularly with respect to having or not having DID's into their offices. Recall though, that this lack of consultation with end users was a function of two factors: costs and time. Most coordinators reported that they did not consult with users due to fears that they would request too many features which could not be afforded. Further research is needed to assess how appropriately or realistically users will report their actual perceived needs as opposed to perceived research and organizational learning) of the interviews and focus groups to potential participants prior to the meetings, and potential effects on implementation.
desires, and what, if any, the actual differences between the two are. This is in effect a satisfaction issue: will users be satisfied with the minimum number of features to meet needs, or unsatisfied due to a lack of convenience features? Additional research on organizational telephone use could also further define the differences between "real" and "perceived" task and convenience needs for particular types of jobs. Further, this research could assist in more clearly defining the compatibility and relative advantage attributes of an innovation, and how they relate to affective responses: such as satisfaction with the technology and attitudes towards the change.

Technical issues.

As briefly mentioned earlier in this chapter, perceived technical limitations of not being able to transfer long distance calls placed on the Plus system, lack of shared lines and lights indicating when individuals were using the phone, and inability on the single line phones to place a caller on hold answer a second call were reported as the most incompatible characteristics of the new telephone system. Again, these limitations led to undesirable and inefficient behavioral changes. When administrators (and sometimes faculty) would not place their own long distance calls -- which was more often than not -- the secretaries and/or administrators were forced to engage in procedures which they felt were very inefficient and negatively affected their productivity, as described in chapter IV. While this problem could have been alleviated by placing one's own calls, the same effects occurred with calls coming into the department as described earlier. However, what is not known from this study is how correction of the long distance transfer inability (early 1987) affected perceptions of effectiveness. Longitudinal studies with data collected from the same users subsequent to the integration of the Plus system into UNITS was not done, and could have assessed the extent to which this and other modifications to the system increased perceptions of effectiveness. Recall that Telephone Services also began to offer the Multiple Line Directory Numbers (MADNS)
and Line Status Indicator (LSI) features in the Spring of 1987, which allowed for shared lines and visual indicators of line use. However, due to the additional costs for these features, it is unlikely that many departments acquired them.

Additional technical issues which affected perceptions of effectiveness included other software "bugs" which resulted in lost calls during transfers and audio drop-outs on transfers (first three words cut off); as well as experiences calling into UNITS -- usually associated with receiving an excessive number of busy signals. Further, users reported several occasions when the phones were not working properly during training. This resulted in users questioning the system's reliability before actually receiving and using their phones. As reported by coordinators, some of these technical problems were likely caused by user operation errors. The key point is that users perceived these difficulties as technical problems, and often communicated their evaluations of the system to other individuals not yet converted -- as evidenced by nearly one-fourth of the survey respondents developing more negative attitudes about UNITS based on contact with other users. This was twice the number developing more positive attitudes from these contacts. Interestingly, interview data suggested that those experiencing problems calling into UNITS tended to perceive the problems as operator errors (except for the number of busy signals).

The most important point, however, is that early management decisions and real technical incompatibilities (both temporary "bugs" and permanent design characteristics) result in decreased perceptions of system effectiveness, and may in fact lead to increased resistance to the change, and thus resistance to learning. In other words, under an authority-based adoption, the technology may not function as effectively as end users would like. Nonetheless, in order for the group to function as effectively as the technology does allow, mechanisms to decrease resistance to change and promote effective learning must be engendered.
Early non-response by Telephone Services about technical issues fostered uncertainty about the system, created perceptions of permanence of temporary technical limitations, and allowed negative communications through the grapevine to take the most important awareness/influence role among users. Indeed, Rosnow (1988), in his discussion of rumor as communication, suggests that uncertainty increases the probability of use of the grapevine as a source of confirmation about one's hypotheses. Rosnow suggests that rumor generation is a "process of explanation, an attempt to make sense of change or novelty and what it portends for the future" (p. 14). While there is some debate over the significance or importance of the topic in rumor transmission, Rosnow contends that "rumors are launched and sustained by anxieties and uncertainties" (p. 23). In the context of the Ohio State University, reliance on informal communication networks, or the grapevine, seemed to result from uncertainty and anxieties about the negative behavioral effects of the technology, as well as the budget.

Within an action research perspective, this points to the need for change agents to continually intervene in the implementation process with communication strategies designed to actively monitor and feed accurate information into informal communication networks, thus reducing uncertainty and creating accurate expectations of the innovation. In theory, creating accurate expectations is important because of the strength of first impressions of an innovation in dictating subsequent attitudes, behaviors, and communications about the innovation with others. According to Rosnow (1988), the first principle in rumor management is to "anticipate and confront anxieties and uncertainties" in order to prevent negative and/or inaccurate rumors (p. 24). The use of informal communication networks is critical because information is interpreted by individuals within a socio-cultural environment. In other words, information can be interpreted differently depending upon how and from whom it was received. Recall that communication tends to be more effective -- that is, greater understanding occurs -- between individuals who are more homophilous: as are members of informal communication networks (Rogers, 1983). From a pragmatic standpoint, it
was the informal communication networks from which users tended to receive most of their information. Hence, although ultimately formal communication channels were implemented to disseminate information to users (as discussed shortly), many were not exposed, or their attitudes were not influenced by them. This is consistent with findings that some people will accept "grapevine" allegations as true no matter what the evidence to the contrary (Rosnow, 1988).

**Awareness.**

Much of the effort to decrease resistance to change is predicated upon minimizing negative perceptions of system effectiveness which result from a lack of awareness about the system, and the implementation process. First, the data strongly suggest that the users were not aware of the actual budgeting rationale of offsetting inevitable Ohio Bell increases and long term cost stabilization. Instead, they seemed to be expecting immediate cost reductions -- as appears to be the case from the data presented on the first page of the Feature Package Options workbook (see Appendix C) -- or at least a smaller price increase. This lack of awareness led to expectations about cost savings which were not met. Next, lack of awareness about the technical differences between Centrex and UNITS, as well as the behavioral changes which were expected by Telephone Services and necessary as a result of the change, also led to expectations about the system's effectiveness which were not met.

Third, a lack of awareness about implementation progress affected users perceptions of the system's effectiveness. Most critical here is the fact that most users seemed unaware that technical problems with transfers and busy signals were temporary problems rather than permanent. Early in the implementation process, users were receiving little of this information from Telephone Services (except where they took it upon themselves to call and ask about the technical problems; which typically was a coordinator activity). Rather, information was transmitted through informal "grapevine" channels. Dino Pezutti (p), Director of Telephone Services, explained it in the following way:
Are there any issues or considerations that you can think of that you would like to have some information on, that you think would help you in your future planning?

Yes, I think the one that really bothers me more than anything else, and I think it bothers several people, is how do we keep people informed as to what UNITS is doing on an ongoing basis? So it's almost like second nature. The system does change. We may need to continue to bring up to them some of its capabilities because as you're well aware of too, one of the drawbacks of going to a system like this is you've taken a very simple instrument and you've complicated it. Consequently, because it is complicated, people are used to using it as a simplified instrument, there is some resistance there having to sit down and read the book. And consequently, they don't use the system to its utmost capability. Over the years, I think that will probably come through. But I know there are a lot of people who say "We've got a lot of questions about this UNITS thing, and nobody's telling us anything." Both of those are probably true statements. We are not deliberately not trying to tell people something. We're so much involved in trying to get it implemented and on schedule, and trying each day to just train new people as opposed to the ones who are there, that we tend to take most of our efforts away from the individual who now has the telephone and needs to know maybe a little more about it.

Consequently, the researcher began to inform Telephone Services of important information which users needed/desired, and they began to address these user concerns in the UNITS Network newsletter with some apparent success; as will be discussed in the next section.

Finally, and most importantly, lack of awareness of the system's capabilities led to less perceived benefits of the system. This finding is of particular importance because lack of perceived benefits directly affected use of features that might have increased user productivity and therefore perceptions of effectiveness. Moreover, a lack of understanding of the system's capabilities and limitations by coordinators and department heads/managers who made the selection and configuration decisions also may have had some impact on perceived effectiveness. The fact that almost all departments changed the configuration within the first month of operation suggests that mistakes were made as a result of this lack of awareness (reported by coordinators as a lack of available information). While Telephone
Services had a very beneficial policy of allowing configuration changes free of charge within this first month -- one recurring positive comment about the implementation policies -- (although charging thereafter for any changes in configuration or additional hookups, etc.), these initial ineffective configurations may have exacerbated early user frustrations and negative perceptions of effectiveness of the system. Again, this is an issue of negative first impressions which were communicated through informal communication networks, increasing resistance to the technology and learning.

Attitudes

The data from this study suggest that attitudes towards the new telephone system were mostly neutral to positive. In fact, almost equal numbers of users reported positive, neutral, and negative attitudes (about one-third of responses each). It appears that the positive attitudes mostly resulted from the availability of touch-tone dialing, and some of the beneficial convenience and task features described earlier. In addition, the interview and focus group data suggests that relatively fast (compared to Ohio Bell) in-house repair was another factor which contributed to positive attitudes. One limitation of this study is that most of the data concerns factors which negatively affected feature use and affective responses. More research is needed to assess implementation factors that positively affect outcomes. In terms of negative attitudes, the data suggest that three major factors affected these attitudes — compatibility, awareness/uncertainty, and costs — and a fourth factor (effects of job) was a function of the first and third factors.

Compatibility.

The results suggest that negative attitudes were mostly generated from the incompatible characteristics of the system which resulted in undesirable behavioral changes. The factor analysis of the items
affecting attitudes scale produced a factor which clustered items about the effects of the change. An examination of these items suggests that they are mostly indicative of the incompatible changes in behaviors which resulted from the change -- and the Effects factor accounted for over one-third of the variance. This supports the earlier conclusion that for most non-faculty users, there is little discretionary or convenience use of the telephone, and therefore compatibility is likely to affect responses to the technology more than the other attributes. This provides further evidence that compatibility may be the most important attribute of an innovation in determining affective responses. Indeed, item one "The technology was not needed" was listed the most number of times as both the item affecting attitudes the most, and the third most. It would appear from the data that this particular system was not needed -- again indicating the importance of incompatibility in affecting attitudes toward the new system.

Awareness/uncertainty.

The lack of awareness and uncertainty about the technology appears to be the second most important issue affecting attitudes. The data suggest that the lack of awareness and uncertainty presented problems in coping with the change. The training and information items in the Process factor are communication items, which may have led to this uncertainty (inaccurate expectations). Indeed, the item about adapting to the technology was listed second most frequently as affecting attitudes most, and the timing of the conversion was listed most frequently as the second most important factor. It is unclear why item 27 "The conversion generated too little information" was not clustered in Factor 2 instead of Factor 1; since on the surface it appears to be a process variable. The mean of this item suggested that users tended to agree that there was too little information. One interpretation of this is that the methods and communication channels used to disseminate information were incompatible with users preferred methods of receiving
information, and hence less information was received. This interpretation will be explored more in a succeeding section on involvement.

**Cost effects on compatibility.**

Finally, the costs of the system, and lack of choice/participation in the decision making was the third most important issue relating to attitudes. The factor analysis produced a third factor which clustered items about the budget. The first two items are specifically about money. The item about trusting the University as the adopter of the system is probably clustered in the Budget factor because of the lack of perceived effectiveness of the system in meeting the espoused adoption rationale of telecommunications costs savings. Further, "Was not involved in the planning" is likely clustered in the Budget factor because of perceptions that the costs of the system were being "forced" on the departments, and thus there was no choice: pay or go without telephone service. The item about the department's budget was listed most frequently behind technology not needed and adapting to the change as the most important item affecting attitudes; which supports the conclusion that the Budget factor was the third most important in affecting attitudes toward the new system.

One confounding finding is the means for the cost items on the final survey, which show respondents almost exactly neutral in their ratings. One possible explanation is that many people simply were not responsible for the budget, and thus paid little attention and had no opinion about the costs -- which is supported by the fact that the Cost factor accounted for less variance than the other two factors did.

**Occupation/level of decision-making.**

Briefly, administrators showed significantly more negative attitudes than the other groups. There are two plausible explanations for this finding. First, administrators often experienced the
incompatibility of the system. The inability of their secretaries to place and transfer long distance calls for them (perhaps forcing more self-reliance), and not being able to use a single line phone effectively for problem solving are two examples. More probable however, is the explanation that administrators were more involved and concerned with the budgetary issues, and the cost factor contributed to their more negative attitudes. Support for this explanation can be seen by the fact that administrators listed cost items as factors affecting their attitudes more than the other groups did.

It is less clear why technical staff reported the most positive attitudes towards the system. Perhaps their familiarity with new technologies and experience working with technical issues made the transition easier for them. They may have also more clearly understood the technical "shake-down," or temporary technical problems which need to be solved, and which are normal for most technical implementations.

Interestingly, the survey data suggest that attitude toward the new telephone system is not significantly related to either task time spent on the telephone, or extent of feature use, except for clerical staff. Of interest here is Rice and Manross's conclusions that affective aspects they studied (attitudes towards and benefits of the telephone system) appeared to be independent of behavioral aspects of telephone use. The results of the study at Ohio State University suggest that these are not independent aspects, but attitude does not necessarily affect extent of telephone use, particularly where little discretionary use is found due to job responsibilities. Instead, it seems that attitudes are affected more by experience with the technology, and by networks of communication with others. Therefore, implementation strategies which attempt to increase levels of innovation use through persuasive campaigns aimed at modifying attitudes towards the technology prior to individual use may be ineffective and unjustified. Further research is needed to examine responses to these types of communication, as well as to assess these affective/behavioral relationships within the context of varying degrees of discretionary telephone use, and to examine causal directions.
Involvement

The final affective response issue centers around users' involvement with the new telephone technology. Here, involvement is considered as an affective response to the technology because it refers to personal relevance or importance of the "product." The importance of involvement is reflected by it's apparent relationship to information reception (and hence awareness about the technology) and perceived needs/benefits of the technology -- all of which have been argued here to affect levels of telephone and feature use. Recall also that involvement, or "interest in the product category" was identified by Midgley and Dowling (1978) as an intervening variable in optional adoption time.

It should be noted at the onset of this discussion that overall, involvement scores on the final survey were very high for each job category. Zaichkowsky's (1985) analysis of involvement with many products revealed a distribution over all products with a mean involvement score of 89.5. On the basis of the distribution, low involvement was assigned to respondents scoring between 20 and 69; medium involvement assigned to those scoring 70 to 110; and high involvement to those scoring 111 to 140. The mean score for telephone scores on the final survey was 116. According to Zaichkowsky's distribution, then, users reported very high involvement with the telephone. Indeed, even the mean score for copy machine as the technology was almost 114. It was assumed that a copy machine would be one of the least interesting office technologies. Yet the repeated measures MANOVA revealed that there were no significant differences between involvement scores with the copy machine and the telephone; yet involvement scores for computer/word processing technology were significantly higher than scores for the other two technologies. It appears that the telephone is perceived much as a background technology; interest arises only at the time of need or use. Moreover, the computer and word processing are typically perceived as an extension of calculating and writing skills/activities. Perhaps the telephone is
considered a duplicate process for voice communications (as copy machines might be for print communications) instead of an extension of voice communication opportunities. Of importance here is that if the telephone is seen as a duplicate, background technology, users will likely not expect relative advantages from advanced features, and may be more concerned with compatibility as already suggested. Further research is needed to assess the degree to which the telephone is seen as an instrumental tool to extend and enhance communications as opposed to a necessary substitute for face to face voice communications.

One explanation for these overall high involvement scores is that they were an artifact of survey bias. In other words, the involvement scales were placed at the end of the survey, after the respondents (supposedly) read the cover letter and filled out the first pages -- all dealing with the new telephone system. This would not, however, explain the high involvement scores for either copy machine or computer/word processor. Another explanation is that high involvement with the telephone was in part due to the newness (novelty effect) of UNITS on campus. Yet, this would not explain the high involvement for the other technologies either. The most plausible explanation is the possibility that interest or involvement with each of the technologies was an artifact of the focus of the survey. This is consistent with Zaichkowsky's claim that situational factors can affect involvement by temporarily increasing the relevance or interest toward the object.

Future research should focus on defining what these situational factors for office technologies are, and what effect they have on involvement levels. In addition, the effects of survey bias could also be assessed by varying the placement of the scale(s) within the survey, and by varying the focus of the survey's content.

With respect to different levels of telephone involvement between job categories, the interview, focus group, and survey data clearly show faculty having the lowest involvement with the telephone. This finding is consistent with Zaichkowsky's claim that personal interests, or needs can also affect a person's involvement level, in that faculty perceived the fewest needs for the telephone. On the other hand, administrators,
clerical and technical staff showed significantly higher involvement scores, indicating that due to less discretionary use than faculty, the technology was a more salient object. Again, the telephone is a more integral part of these job responsibilities. Further, Zaichkowsky states that physical characteristics of the object can cause differentiation between products, and therefore increase interest and involvement. In Chapter II it was proposed that these physical characteristics were consistent with the definition of relative advantage. The fact that faculty perceived the fewest relative advantages of the system, and had the lowest involvement supports this claim.

However, it is here proposed that higher involvement scores for administrators and clerical staff than for faculty and technical staff can in part be explained by incompatible physical characteristics which differentiated UNITS from Centrex and/or other systems users may have had some contact and use with. Thus, the physical characteristics are also consistent with the conception of compatibility as described earlier. In other words, much of the involvement with the telephone seems to be generated mostly by experience with the product, and resulting negative behavioral changes. Interview data suggests that there was a much greater degree of indifference towards the telephone (largely a function of lack of awareness) in departments which had not yet been converted. Thus, rather than getting "positively excited" about the system's capabilities, users got "negatively excited" about tasks which were perceived as more cumbersome and difficult (incompatibility). In this context, then, "excitement" or involvement refers to frustration with and animosity towards the product. Also, administrators may have been more negatively involved with the technology due to salient budgetary concerns. These conclusions are supported by Hupfer and Gardner (1971) who defined involvement as general interest in or concern about an issue, without reference to a specific position. Hence, the behavioral changes and budgetary matters can be seen as issues arising from the change which users had more or less involvement with.
The important practical aspects of involvement for implementation efforts have to do with information dissemination and reception. Previous research has found that different communication effects can be found under varying levels of involvement (Krugman, 1965; Ray, 1973; Zaichkowsky, 1985). For example, Zaichkowsky claims that "high involvement consumers should be more interested in acquiring information about the product than low involvement consumers" and "should indicate more interest in product information" (p. 347). However, these findings are made within the context of optional consumer behaviors. The question remains how well these involvement theories hold under authority adoption decisions and non-discretionary product use. The final survey data showed no significant correlations between levels of involvement with the telephone and frequency of access to help sources (documentation, coordinator, phone help) or training attendance. Nor were there any significant correlations between involvement and exposure to or effects from other information sources. Thus, it appears that under an authority adoption decision, where alternatives are generally not available, involvement with the product or technology does not lead to increases in information seeking.

Recall that Ray (1973) outlined a hierarchy of effects which are commonly used as goals associated with communication responses. The fact that training attendance was correlated with extent of feature use but not with telephone task time might lead one to conclude that in some cases at least, high involvement with the technology led to learning and feature use, consistent with the Learning Hierarchy of effects posited by Ray (1973). With respect to responses to other communications about the new system, the UNITS Network newsletter created nearly six times the reports of positive influences on attitudes than negative influences. However, these positive influences were reported by less than one-fifth of respondents, while over half reported no influence. This finding supports Ray's (1973) conception of a low involvement hierarchy of effects -- that where there are minimal differences between product alternatives (or in this case no alternatives), individuals will unlikely change attitudes as a result of exposure to communicated
messages. Attitudes, then, are more likely to result from experience (either calling into UNITS and/or using the new system). Indeed, the other mediated information sources (the student newspaper The Lantern and the On Campus newsletter) produced even less effects on attitudes: with over half of the respondents reporting no influence for each source.

However, the final survey data indicate that attitude toward the new telephone system was not correlated with either task time spent on the telephone (except for clerical staff) or extent of feature use. Thus, it may be that interpersonal communications are the most important source of attitude formation. Slightly more users reported some attitude influence from other users than from the UNITS newsletter, and much more influence from these two sources than from the other sources. However, of importance is that interpersonal contacts appear to be much more significant in producing negative attitudes than positive attitudes, while the opposite is true for the UNITS newsletter. Thus, it is clear that creating early positive attitudes with users is critical in minimizing negative effects of the interpersonal communication "grapevine."

Since the data show that many users paid little or no attention to communications about UNITS, or had no exposure (particularly faculty), there is evidence of an effects hierarchy that will here be called the Latent Need hierarchy. These effects are suggested to occur in the following order: conative (intention, behavior, action or propensity to behave) -- cognitive (attention, awareness, comprehension and learning) -- affective (interest, evaluation, attitude formation, conviction). Typically, faculty reported paying no attention to the features of the telephone unless a need to use one arose -- typically a convenience need. They at that point had developed an explicit need from a latent need, and consulted the documentation or had the secretary arrange the use for them. Again, faculty in particular paid little attention or had no exposure to interpersonal communications about UNITS (in fact most faculty did not even know there was a departmental coordinator). Nor did they pay any attention to memos or other written communications about
UNITS. Most faculty members interviewed did not even know where their instruction manual was. Therefore, they must have derived their attitudes from experience with the technology (or subsequently would upon activation of latent needs). More research is needed to assess the order in which affective responses to technology occur, since these findings are inconsistent with the lack of a relationship between telephone and feature use and attitude in the survey data.

In contrast to the proposed Latent Need hierarchy, many users seemed to exhibit what will here be termed a Non-discretionary Use hierarchy. These effects are suggested to occur in the following order: conative — affective — cognitive. Here, the intention or propensity to behave is inherent in the fact that using the telephone will be required as part or most of the job responsibility (particularly receptionists and some clerical staff). Further, many of these individuals reported forming attitudes about the technology from other users and/or some experience (calling into UNITS). Hence, preliminary attitudes were formed, and subsequently learning took place, generally through attendance at training, since most clerical staff were given no choice but to attend.

These two proposed hierarchies of effects are not presented as conclusive. Rather, they suggest possible testable models of involvement and communications effects within authority adoption decisions where there are varying degrees of optional or discretionary technology and feature use. As already proposed, much more research is needed on the causes and effects of different levels of involvement within organizational authority adoption decision contexts.

The results of this study suggest two sets of issues which need to be addressed. The first, presented below, operates on an applied level, and consists of a set of recommendations to facilitate successful implementation of a new intelligent telephone system (innovation) within an organization. The second set of issues operates on a more theoretical level, and represents generalizable principles that are presumed to affect the implementation process for any communication technology within any organization. These issues are presented in the next chapter.
Based on the findings of this study, a set of recommendations is presented for a system operator or management-level decision-makers to accomplish the following:

* foster increased awareness of the rationale behind the change, and an accurate understanding of the technology's capabilities and limitations -- thereby creating more accurate expectations;
* promote greater participation in departmental decision making with respect to system configuration in order to maximize the effectiveness of the system in meeting user needs;
* create effective learning procedures to allow for effective use of the system once installed; and
* maintain evaluation and modification efforts to insure that the technology continues to meet user needs effectively.

It should be noted here that these recommendations are based on the assumption that an authority decision to adopt an innovation has already occurred, and that implementation efforts are directed at enabling the most effective use of the adopted innovation's capabilities.

Creating Awareness

First, a large scale, multimedia information campaign must be initiated to create an understanding of the rationale behind the change. The data suggest that mediated information, in the form of the campus newspaper, the campus newsletter, and direct faculty/staff mailings may be appropriate for disseminating general awareness issues. However, this information is not likely to be attended to by individuals with low levels of involvement with the technology. Therefore, interpersonal communications with more homophilous individuals is likely to be more effective in creating awareness among these users. The consensus among interview and focus group respondents was that information would best be
received if funneled through the departmental coordinator, and disseminated orally. Thus, these coordinators should be identified as early as possible in the implementation process. In addition, the high incidence of coordinator turnover experienced suggests that more than one coordinator for each department be identified. Coordinator turnover negatively affected the implementation process, as described in Chapter IV. The Coordinator must be an individual who has a working knowledge of the communication patterns within the department, and is regularly available for consultation with users. In addition, coordinators should be selected (where possible) in part on the basis of their commitment to facilitating office efficiency. This will increase the extent to which they later continue to monitor the effectiveness of the system configuration and execute modifications. A commitment to these efforts must be supported by departmental administration. Given the high instance of coordinator turnover, efforts expended as coordinator should be compensated when possible by a reduction in workload in other functions, or by additional monetary incentives. When these incentives are not possible, efforts should be made to recognize coordinator contributions; perhaps in the form of special functions as exemplified by the luncheon Telephone Services held.

Further, much more extensive orientation procedures for these coordinators must be effected in order to allow them to disseminate the most thorough and accurate information about the innovation possible -- as well as better enable them to effectively make later feature selections and configuration designs. Recall that initial failures with and incompatibilities of the technology decrease perceptions of system effectiveness and therefore increase resistance to the change. Moreover, initial failures led to discontinued efforts to use features. The orientation programs should initially focus on a complete understanding of the rationale behind the change, the budgeting processes, and the capabilities and limitations of the technology as it functions within a university system.
Awareness efforts concerning the technology, then, for both coordinators and end users, should minimize detailed feature descriptions. The focus should instead be on the rationale behind the change, the complexity of the change, and potential relative advantages that the innovation holds over the previous system for particular types of users. This effort is not necessarily designed to affect attitudes, since there is evidence that attitudes do not necessarily affect use of the innovation. Rather, communications about the innovation should be designed to promote accurate expectations about the innovation. These expectations could result in more positive attitudes towards the innovation, as well as more observable relative advantages, both of which would be additional positive outcomes of the awareness campaign. Another suggestion would be to hold various early demonstrations of the technology at conveniently located sites, where potential users could observe the functions of the system, and perhaps experiment with features in a low-risk (no consequences of failures) environment. Not only could this add to the trialability and observability of relative advantages, but observing the differences and complexity of the innovation might motivate potential users to engage in effective learning. Again, this strategy would likely be more effective in influencing those with higher involvement with the technology.

Evidence suggests that formal, written, top-down communications frequently are not read. This confirms the desirability of a network diffusion program (as depicted in Figure 1). This involves selection of appropriate coordinators and communications funneled through them and disseminated orally. In addition, the literature suggests that more effective communications occur between individuals who are homophilous, or similar to each other. Hence, it may be worthwhile to engage the assistance of other "opinion leaders" within academic and service departments. For example, an attempt should be made to identify faculty, administrators, and technical staff who would attend orientation programs. These individuals perhaps would understand better the needs of other their colleagues than the coordinator (who is likely to be a clerical staff person), and communicate potential relative advantages.
With respect to the timing of the awareness efforts, most individuals do not attend to information about the change until such time as installation is pending. Therefore, orientations should be held for coordinators and other willing/interested participants within a few weeks of the installation date. For larger departments, the timing may need to be lengthened to allow time for more end user participation in the needs assessment process to be described shortly. The point is, the timing needs to be close enough that the impending change may increase the salience of the information to users, yet still allow time enough for an adequate coordinator training program and needs assessment.

One strategy which the system operator and coordinators should discuss is how to successfully monitor and feed information into the "grapevine." Since temporary technical problems implementation mistakes are inevitable in such large scale projects as at The Ohio State University, coordinators must continually pay attention to complaints and rumors about the new technology and where they originate, and report these issues to the system operator. The system operator must provide accurate information about the causes of technical problems and the progress towards solving them. Then, the coordinators should identify and inform key opinion leaders in the department and/or others central to the informal communication networks of these causes and corrective actions. This may minimize the extent to which uncertainty about the technology and negative expectations are communicated to other potential users. In a large organization such as The Ohio State University, the coordinators must serve as the system operator's "eyes and ears:" keeping them involved in the informal communications which are affecting perceptions of the technology and implementation process. In this way, the system operator understands what information needs to be disseminated to act upon negative communications and create more positive, accurate expectations. In other words, the system operator must plan to deal with the effects of informal communication channels in a proactive manner, rather than reactively or defensively. Recall that Rosnow's (1988) first principle of rumor management is to anticipate and confront anxieties and uncertainties. Second, he suggests
give people the facts and keep lines of communication open...be open and truthful. Do not distort the facts for short-term gains. Beliefs, like prejudices, become more difficult to alter once people have built up defenses (p. 25).

Thus, failure to respond to and act upon negative grapevine information tends to perpetuate perceptions of non-responsiveness of the system operator, foster uncertainty and anxiety, and amplify negative expectations and informal communications.

Needs Assessment, Feature Selection, and System Configuration

The coordinator serves a critical role as an advisor to (or ultimate source of) the departmental decisions regarding feature selection and system configuration. Prior to conducting the needs assessment and configuring and ordering phones for the department, then, the coordinator must participate in a thorough training session which will be described in the following section. This would alleviate many of the ineffective design decisions which evidence suggests were made due to a lack of understanding of the system prior to ordering. However, evidence suggests that involving end users in the needs assessment process will also facilitate effective feature selection and system configuration. Depending upon the size of the department, and the interest level among members, participation could range from a coordinator holding a departmental meeting where individual and group needs are discussed, to circulating a short survey which would assess feature needs, and configuration needs (where calls should automatically be forwarded to, should the phone ring directly in to the office, or through an answering point, etc.).

It will here be suggested that whenever possible, the former option should be attempted. First, end users can better express their needs by describing them than by checking boxes or filling in blanks on a survey. More importantly, however, is the fact that more intradepartmental learning will occur if certain issues are openly
discussed -- as the principles of action research suppose. For example, it has been argued that for many users who have less discretionary use of the phone due to job responsibilities, compatibility may be the most important attribute of the innovation in impacting both levels of feature use and affective responses to the technology. Thus, involving end users in the feature selection and configuration process may lead to a design which is more compatible with their needs. Further, the goals and objectives of using the innovation within the group context should be formulated in a collaborative manner. Technical characteristics of the innovation, and/or departmental decisions may exact necessary behavioral changes. Discussions should focus on whether or not discretionary changes are compatible with the needs and values of the individuals. With the diversity of members within both academic and service departments at a large university, it is unlikely that a consensus will be achieved. However, if the system is to be designed to facilitate better telephone communications for the group, and expectations of certain behaviors derived, these objectives must be discussed prior to installation. If the goals and the rationale behind them are made explicit, greater commitment for action (learning and effective use) may be achieved through a shared understanding for the group needs. At the very least, users will have an accurate expectation of the system's functions and their expected roles, perhaps leading to greater acceptance of the changes. Finally, such internal decisions as how to arrange for message retrieval when using the message waiting feature could be decided.

Since most decisions pertaining to feature selection were made by departmental administrators and/or coordinators primarily on a cost basis, allowing users to participate in the identification and selection of appropriate features may require the System Operator to re-consider the pricing structure of certain features which are perceived to be of the most benefit to users in order that they may become more available to users who perceive a need for them. If budgetary matters remain
inflexible, users should at least be given an explanation of why certain features are not available to them, while still allowing them to participate in the system configuration.

Two other advantages should result from a collaborative approach to needs assessment. First, a thorough understanding of how the system operates as a system will allow users to understand how their behaviors affect the work of others. This understanding, combined with a potential for increased commitment to the group goals may minimize some of the circumvention of the system described in Chapter IV. This understanding of the effects of one's behaviors on others is consistent with the concept of redundant functions (Pava, 1983). More will be said about redundant functions in the next section. Secondly, collaborative needs assessment procedures can provide the mechanism whereby individuals can learn more about functions of the system which may hold relative advantages for them. These communications are likely to be very important for learning about the potentials of the system, since it is clear that many users will not attend training: where this information is traditionally imparted. This is where the role of the homophilous opinion leaders can play an important role in providing examples of beneficial attributes of the system to their counterparts within the department. Presumably, these "testimonials" could even occur between departments -- where a faculty member or administrator from one department could facilitate in part of the needs assessment process of another department. Not only would this add to the observability of potential relative advantages, but also help foster accurate expectations about the system's capabilities and limitations based on actual user experiences with the technology. These homophilous individuals would more likely have both competence credibility (experience) and safety credibility (trustworthiness): the ideal characteristics of a change agent (Rogers, 1983). Indeed, it is recommended that coordinators who have been through the needs assessment and subsequent experiences of the transition meet with new coordinators prior to their needs assessment and ordering processes. The interview data consistently suggested that coordinators learned a great deal from
each other about recurring problems and potential solutions at the luncheon held for them. This action research approach could help new coordinators develop accurate expectations about problems they may encounter, and arm them with a repertoire of potential solutions.

**Learning Procedures**

It is here suggested that learning procedures be made available to users on two basic levels: extensive hands-on training; and short, conceptual orientations which enable users to effectively use the available documentation. First, extensive, conceptual and procedural hands-on training is necessary for coordinators for several reasons. A thorough knowledge of the features, and how they operate within a system is critical for information dissemination to departmental members. The findings of this study point to the importance of the informal "grapevine" in creating expectations of the technology. Hence, this thorough understanding of the system will enable a coordinator to interpersonally disseminate accurate information to users which, through subsequent "grapevine" contacts users had with others, would result in more accurate expectations. It also enables the coordinator to serve as an effective consultant to users during collaborative needs assessment.

Further, extensive knowledge of the system and accessing features is crucial if the coordinator is to serve as an effective trouble-shooter and on-site resource person for the department. This coordinator training should occur as close to the needs assessment and ordering dates as possible, so the information remains fresh.

Coordinators should be trained thoroughly on each type of phone and on all features. First, coordinators will have to serve as needs assessment consultants, trouble-shooters and resource persons to other users. They will be less effective in these roles with incomplete understanding of features and telephone types (as several interview reports suggested). This in depth training program should also be recommended for high use individuals such as answering point receptionists who will need to use many of the features immediately upon
installation. This is not to say that they will remember all they learned; but rather that it would facilitate subsequent point-of-need learning. Some form of incentive may be necessary to encourage coordinators and high use individuals to engage in these training activities; such as release time from other duties.

Training should begin with overall conceptual information about the technology, including networking strategies and effects, and terminology. The networking issues focus on how operation of features affects the system. For example, what are the differences between transfer, hold, and other procedures for single line and electronic sets? How are calls channeled through the system when a hunt group is formed? In addition, training should stress similarities and differences between accomplishing tasks on the old system in comparison to the new; using familiar terms as analogies. Finally, to the extent possible, hands-on training should simulate actual working conditions, such as transferring a call while another is ringing in (processing several calls simultaneously). The conceptual and pragmatic (practice) aspects of training should probably be split into separate sessions to minimize information overload. Further, the hands-on training should also be split into perhaps two sessions. Though very time consuming, this extensive coordinator training will likely pay long term dividends in increased system effectiveness through more informed feature selection and configuration. Follow-up training sessions should also be made available for refreshing skills as well as addressing problems/questions users have subsequent to actually working with the system in a "live" environment.

The second level of training should focus on applications and benefits of the system's features. Evidence suggests that most users probably don't need the kind of extensive hands on training detailed above. First, most users may not have need to use many of the available features. Secondly, those features that they do use may be accessed infrequently. Thus, the procedures learned during hands on training will probably not be remembered at the time of need. This would be particularly true of those individuals who exhibit a latent need
hierarchy of effects: that is, involvement with the technology and learning only occurs at the time of need activation. However, conceptual information and terminology should be covered in its entirety in order to enable users to effectively access available documentation. Thus, training should also emphasize teaching the use of performance aids (manuals, faceplates), and make users aware of the resource/help role of the departmental coordinators. This approach facilitates the achievement of redundant functions principles as mentioned. Some users may have occasion to use others' telephones, and/or may be hired into another position on campus which requires use of different phones and features. Further, additional features may later be added to the system. Thus, if users move to different jobs on campus, or receive new features, learning can take place either through existing documentation, with the assistance of the coordinator, or through ongoing hands-on training sessions, as necessary.

Much of this type of orientation/training can be accomplished when collaborative, group needs assessment is possible, and handled by the coordinators. The system operator (Telephone Services or the equivalent) should make such training sessions available for larger departments where this collaboration is not feasible, and make consultants available to assist coordinators when it is feasible. Regardless, these orientation/training sessions should be made available at user locations (convenience) just after installation, since for many, interest or involvement with the technology is not activated until it is actually available to them.

Since evidence suggests that many users (perhaps up to or exceeding one-third) will not attend training/orientation sessions, documentation must allow for easy access and self-learning. Therefore, probably the most effective documentation would be the telephone face-plate on the single line sets. Instructions should be simple, step-by-step access instructions which include audible tones and waiting times. If space limitations become problematic, the most frequently used (as this and other research could suggest) standard features should be included. An additional manual which included these and all other
features for both single line and electronic sets should also be
developed, following the same simplified format. The documentation
should also include the following:
1) Feature checklist filled in by the departmental coordinator attached
to the documentation/instructions for each separate telephone, to
inform the user of his or her available features.
2) Design of the telephone faceplate to highlight available features or
addition of "stickers" which could be applied next to the features
available.
3) Clearly marked, replaceable stickers indicating available sources of
application assistance, including departmental coordinator names
and telephone numbers, and a System Operator number to call for
on-line assistance.

Before making documentation available to users, it should be thoroughly
field tested to insure that the instructions are both usable by typical
end users, and error free. Documentation inaccuracies and/or attempts to
access features not available led to a lack of confidence in the
technology's effectiveness and discontinued attempts to access other
features by both faculty and staff.

Ongoing Evaluation

Coordinators need to maintain an active role in monitoring the
effectiveness of the system configuration and user effectiveness within
their departments. First, this involves periodically contacting users to
make sure the system is meeting their needs; both in terms of available
features and configuration. If behaviors such as transferring calls and
being part of a pick up group have been assigned to facilitate group
goals, then the coordinators will have to insure that these users are
aware of their expected roles and capable of fulfilling them. Some users
may need to attend refresher training sessions if new responsibilities
or features are assigned, and the documentation may need to be updated.
A thorough knowledge of the system's capabilities would also enable the
coordinators to continually think about modifications which would more effectively meet departmental needs, and respond to changing circumstances.

The system operator should maintain contact with coordinators in order to keep them informed of changes in the system (new features, software corrections) and progress of the implementation campus-wide. This would include availability and scheduling of ongoing training sessions, and lists of departments on the system and those expected to be converted shortly (and possibly a short-term conversion plan) to be distributed periodically to individuals. More important than these procedural issues, is the contact with the coordinators which keeps the system operator in touch with the informal "grapevine" communications -- which alerts them to the information necessary to impart to users. Each Coordinator, then, would best understand what the most effective method of information distribution would be within their department. In addition, the system operator needs to carefully monitor coordinator turnover, and provide for immediate orientation and training for replacements.

Final Recommendation

The overall purpose of these Recommendations are to foster successful conversion and continued use of the new technology by users in authority-based implementation situations. Perceptions of the value and desirability of the system by those not yet converted are affected to a large extent by the communicated experiences of those currently using the new system. Unsuccessful experiences are often communicated through interpersonal contacts to future users, which may create negative expectations: perhaps resulting in increased resistance, and decreased use due to expectations low system effectiveness. The key to a successful technological implementation is to promote successful user experiences at the earliest possible stages of implementation in order to foster the communication of success to future users and thus create accurate, and perhaps positive expectations. Although installation
deadlines and complexity of implementation on such a large scale as occurred at the Ohio State University make this goal an exceptional challenge, one final recommendation is deemed important. To the extent possible, the technology should be implemented on a small scale as a pilot implementation before full scale implementation is attempted. Software bugs and documentation errors could be identified and corrected if possible. If not, these issues should be communicated to users before they find out through experience. Even where technical problems cannot be solved before implementing them into the larger university setting, generating accurate expectations of the limitations imposed by technical problems can facilitate the end of the implementation process: an absence of unfulfilled expectations.
CHAPTER VI
CONCLUSIONS

The one overriding theme which was consistently related to all of
the macro and micro implementation issues presented in this study, and
which most affected extent of technology use was the lack of awareness
about, and understanding of, the reasons for and effects of the change.
This included not only lack of awareness about the technology itself,
but also the rationale behind the change and the process of
implementation. The key point is that the most important overall finding
of the study is the extent to which successful implementation is
dependent upon communication activities. This is in sharp contrast to
traditional conceptions of implementation as simply hardware
installation. A model of the relationships between major implementation
factors affecting technology use and perceived effectiveness is
presented in Figure 8.

At this point, two additional definitions will be presumed. First,
recall that Rogers (1983) proposed that the end of the implementation
stage of the innovation-decision process (see Figure 2) occurs when "the
new idea becomes an institutionalized and regularized part of the
adopter's ongoing operations" (p. 175). However, Rogers states that for
some adopters, a fifth stage in the innovation-decision process may
occur as the last stage: confirmation. Individual adopters may seek out
information after the adoption decision (and implementation) to
reinforce the decision. Yet, under authority adoption decisions, users
are unlikely to seek information reinforcing a decision they did not
make. Rather, information is sought in order to confirm expectations
about the innovation, and expectations are validated or disconfirmed as
a result of experience with the innovation and communication with
others. The results of this study strongly suggest that many inaccurate
Figure 8. Relationships between factors affecting individual levels of feature use and affective responses to a new technology. Note. Boxes with double lines indicate strongest affecting factors. Heavier lines indicate strongest direct relationships.
expectations about the technology arose as a result of ineffective communications. Under authority adoption decisions, users generally do not have the option to discontinue use: particularly where there are low levels of discretionary use. Therefore, the key to effective implementation becomes developing accurate expectations through communication processes.

Thus, the end of the implementation process will be defined as an absence of unfulfilled expectations. Note the definition does not claim that implementation is completed when there is an absence of unfulfilled desires. It is unlikely that any one technology will fulfill all needs and desires within any large and diverse organization. Moreover, once the authority adoption decision has been made, modifications to the system to more effectively match users needs are somewhat constrained by the characteristics of the adopted system. Thus, the goal of implementation becomes allowing use of the technology as effectively as its characteristics do permit. Hence, a proposed definition of effective use: the individual can and does use appropriate available features when the need arises. Obviously, the key term here is appropriate. A user can use a feature if it is available and if he or she has the appropriate skills. Although not a trivial factor, developing skills in using an innovation is not as difficult as developing an understanding of the function of the technology within a group task context, and generating commitment to effective group task uses of the innovation's features as a goal of implementation. Therefore, developing an accurate understanding of the rationale and goals of the change, and accurate expectations about the technology's capabilities and limitations are predicated upon communication processes. Even if these communications do not generate a greater commitment for action towards group goals, they may generate a greater acceptance of the changes resulting from implementation.

With an intelligent telephone system and other communication technologies, then, important implementation actions and decisions include such things as: 1) developing communication strategies for creating a shared understanding of the rationale behind the change;
2) developing communication strategies for creating awareness about capabilities and limitations of the system among end users -- allowing them to perceive the advantages of the new system for themselves and the organization; 3) developing needs assessments techniques in order to make appropriate decisions regarding configuration of the system and its features to maximize effectiveness of functional communication linkages (maximize compatibility); 4) designing and carrying out effective learning procedures which enable the users to operate the system effectively; and 5) developing ongoing evaluation on modification procedures.

This chapter will focus on generalizable principles that are presumed to affect the implementation process for any communication technology within an organization. These factors include 1) the type of adoption decision; 2) attributes of the innovation; 3) size of the organization; 4) and the diversity of the organization's members.

Type of Adoption Decision

As discussed in Chapter II, the type of adoption decision will affect the extent to which organizational members are involved with certain decisions. First, it affects the extent to which organizational members are involved with the decision to adopt any new communication technology at all. Second, it affects the extent to which they participate in the selection of a particular communication system, as well as the actual brand name of the technology, and/or model of a brand. These decisions impact on the characteristics of an innovation, and subsequently the compatibility with perceived needs and values, and relative advantages the technology holds for end users. The literature suggests that representative end users and human factors specialists be involved as early in the diffusion process as possible -- including them in the adoption decision to maximize the appropriateness of the selected technology. However, decisions are often made within organizations by decree -- that is, authority adoption decisions where users have little or no input into the selection of the technology, brand, or model.
Further, use of the technology may be mandated by management. Nonetheless, the effectiveness to which organizational members use the technology is a function of the implementation process.

Attributes of the Innovation

Clearly, the type of adoption decision will affect the characteristics of the innovation which is ultimately adopted. Most importantly, it will affect the compatibility of the system with perceived needs and beliefs of the members about how the work should be accomplished. It is here postulated that the greater the participation organizational members have in the adoption decision, the more compatible the selected technology will be with their perceived needs and beliefs. Therefore, one would expect a greater probability of innovation incompatibility under authority adoption decisions. This is of particular importance, given that the results of the study at the Ohio State University suggests that compatibility may be the most important attribute with respect to both levels of individual use (depending upon the degree of discretionary use of the technology allowed by one's job responsibility) and affective responses to the technology. The perceived relative advantages may be more important for those with a greater degree of discretionary use, and is clearly important for those with less discretionary use. However, it is here postulated that perceived relative advantages will not be enough to offset the negative effects of a high degree of incompatibility with perceived user needs and beliefs about how the work should be accomplished. In fact, these two attributes will likely co-occur: with relative advantage and compatibility being flip sides of the same issue. Relative advantage tends to serve the rhetoric of change, while compatibility serves the critique of change.

Further, evidence suggests that early negative experiences with the technology resulting from unmet expectations and/or incompatibility may affect a user's propensity to experiment with other features which may hold relative advantages -- and/or increase resistance to the change
which reduces attempts to learn and therefore observe potential relative advantages. Moreover, these early negative experiences are communicated to others through informal communication networks. This "grapevine" effect spreads negative expectations throughout the organization, potentially amplifying resistance to the change.

These authority decisions are also affected by and affect another attribute of the innovation which in the previous literature on diffusion and adoption is treated as an alternate measure of relative advantage: cost. In part, this is a compatibility attribute, as minimizing costs may be a need of the organization. Regardless, the cost of the innovation, and particularly pricing structures of various levels of technical sophistication (number of features) will affect the degree of compatibility and number of potential relative advantages the innovation holds. In other words, when the costs of the technology, and costs of adding compatible and beneficial optional features are decentralized and placed directly or indirectly on users, or apportioned inequitably (data communications subsidized by voice communications -- see for example Acker & Albarran, 1988), the numbers of these features available to users decreases.

Finally, the complexity of the innovation affects the implementation process in several ways. First, the more complex the innovation, the more difficult it is for the organization to create adequate understanding of the technology's capabilities, limitations, and intended benefits, and hence the more important but difficult developing effective communication strategies becomes. This complexity also affects the kind and amount of training which will be necessary to enable members to effectively use the innovation, and the difficulty in developing effective documentation.

Size of the Organization

The size of the organization and/or magnitude of the implementation will have major effects on the implementation process. Rogers (1983) suggests that implementation may be more difficult in a
larger organization due to the increased diversity of its members, and the increased number of their competing goals and objectives. This issue will here be treated in a separate section on diversity of organizational members. Still, the size of the organization can affect the magnitude of implementation if the innovation is to be implemented throughout the organization. First, it increases the time between initiation (the adoption decision) and completion. Thus, different organizational departments and/or members are in different stages of implementation at different time sequences. This makes managing the communications about the innovation more difficult, primarily by increasing the amount of necessary information and complicating the timing of various communications throughout the organization. More information must be disseminated to generate a shared understanding of the rationale behind the change, create an understanding of the capabilities, limitations, and potential effects of the innovation, and keep members informed of the implementation progress. Finally, the size of the organization and magnitude of the implementation increases the difficulty of needs assessment and system configuration, and increases the number of possible technical problems which may result from ineffective decisions and communications.

Diversity of the Organization's Members

As Rogers (1983) suggests, the larger the organization, the more difficult the implementation process will be due in part to the increased numbers of competing goals and values of its members. It must be considered that any organizational change takes place within a social, economic, and cultural context, which may have unintended consequences on implementation. Certainly, for example, the relationships between decision-makers at various levels of the organization and the top management who makes an adoption decision can affect commitment toward the change by these lower-level managers, regardless of other "pragmatic" factors -- and hence affect human and economic attention and resources allocated to the change within their
departments. The past history and success of other organizational innovations may also affect commitment and responses to the current change. Further, there may be inherent biases against members of an organization who hold values which contradict or are divergent from the group task oriented, technical values and criteria for effectiveness espoused by management. The paradox is that these may be the very individuals who are central to the functioning of the organization. Thus, developing shared perceptions for the need to change, understanding of the technology itself, balancing of competing criteria for effectiveness, and generating accurate expectations about the technology will be affected by a greater diversity of individuals within an organization, and the political and social context in which they operate.

First, to the extent that the members are diverse, they will exhibit increasingly different levels of involvement with the technology. This will affect their reception of information about the technology, and their responses to communications which they are exposed to. If the organization was a high technology firm, for example, one would expect more similar involvement levels with a new communication technology. However, if the organization is as large and diverse as a major university or multi-product manufacturing firm, these levels of involvement with the technology will exhibit more heterogeneity.

Thus, increasingly different levels of awareness about the technology, and hence perceived benefits, will affect levels of use. Further, more heterogeneous users will exhibit different levels of perceived individual and group needs for the technology. Moreover, the greater the diversity of job responsibilities, the greater the variability of discretionary use will be found. This means that there is a greater probability that the technology will require or facilitate both positively and negatively perceived behavioral changes. Hence, developing shared group goals will become more difficult. In other words, there will likely be conflicting criteria for effectiveness found which will create tensions within the organization. Again, this necessitates more time consuming and complex communication strategies to
resolve these dissonances.

In addition, the social, economic, and political context of the change has implications for the focus of the action science practitioner. When attempting to account for all of these factors within a large and diverse organization, it becomes problematic to place manageable boundaries around the research project. In essence, the researcher's task becomes one of selecting among, and clearly defining the level of analysis necessary to answer particular research questions. For example, the researcher may choose to include as many various organizational departments and occupational categories as possible in order to get the best representation of the organization as a whole. The benefits include greater generalizability of findings, not only to the organizational units, but also the the larger business community. The tradeoff, however, is that he or she may not be able to devote sufficient time to any one department or category of worker to adequately understand the subtleties of the social and political context within which the change is taking place. Further, this context is likely to be unique to that particular department. An entirely different set of social and political relationships and factors may be operating in any given other department.

The alternative level of analysis, of course, is to intensely focus the research on one or a few departments, and seek to explore these social and political, and economic factors. The tradeoff here is that by restricting the focus of the investigation, the researcher cannot assess the extent to which factors affecting implementation in one or a few departments are common issues affecting implementation throughout the entire organization. Again, the researcher must determine what type of question(s) he or she seeks to answer, and define a manageable level of analysis, given time and economic resources available, which will most appropriately yield the desired answers.
Major Issues of Effective Implementation Stages

All of the above factors will impact the effectiveness of implementation of technologies within organizations. In turn, the implementation process will affect the extent of effective individual use of the technology, as well as affective user responses. While further research is needed to assess the relationship between affective responses and ultimate use, it is here postulated that affective responses will affect user satisfaction with the innovation, and expectations of other users; since these affective responses tend to be communicated throughout the organization. What follows are suggested major implementation issues which will influence the effectiveness of implementation.

1) Social, economic, and political context of the change, and unintended consequences of implementation arising as a result of these factors.

2) Shared perception of the need for the change, and/or a shared understanding of the rationale behind the change.

3) Understanding of the innovation's capabilities, limitations, and expected consequences; including expected benefits and proposed behavioral changes.

4) Compatibility, desirability, and feasibility of proposed behavioral changes and pricing strategies.

5) Individual and group needs of members, and organizational learning.

6) Selection of features and configuration of the system to effectively meet group and individual needs.

7) Effective learning mechanisms.

8) Accurate expectations of the technology's capabilities and limitations.

9) Evaluation procedures which continually assess the technology's ability to effectively meet group and individual needs.

10) Mechanisms to promote effective modification of the technology.

11) Conflicting criteria for effectiveness.
Ethical Responsibilities of the Researcher

Certain research issues dealing with the process of action science, including maintaining objectivity and independence, and methodological tradeoffs, were discussed in chapter III. However, there are other ethical issues revolving around the product of action science. First, in any examination of organizational behavior, including implementation of innovations, there is an element of evaluation. Inevitably, the researcher finds himself or herself in a position to evaluate the decisions and actions of the organization's members. In fact, maintaining the greatest degree of objectivity possible during the research process by maintaining independence may in fact place the researcher in the least biased position to render evaluations of an organizational process. Thus, the researcher may find himself or herself with certain ethical responsibilities with respect to reporting findings to various constituencies. Yet, this also presents the researcher with certain ethical dilemmas.

First, there is likely to be perceived shortcomings, or "mistakes" made during an implementation process. Indeed, the researcher may conclude that major mistakes were made before and/or during the implementation process. To what extent does the researcher have an obligation to assign culpability to various entities or individuals within the organization? Second, given a set of conclusions drawn by the researcher about an organizational process, and culpability for perceived errors, to whom does he or she have a responsibility to report these findings? Further, to what extent is the researcher responsible for advocating particular policy directions which the data suggest rather than describing alternatives, or merely presenting "facts?" One of the goals of action science is to promote change from within the organization through organizational learning. Yet adherence to this principle puts the researcher in a "double-bind," because the client with whom the researcher is working may be the entity which stands to be injured by advocated policy, or to which blame for error is assigned. Moreover, when the researcher is not a true member of the client group,
he or she holds no power to initiate suggested changes in procedure. Thus, while the researcher's reported findings to the client may clearly show things which have "gone awry" with the change process, and may recommend corrective actions, the client ultimately decides what, if anything, to act upon. It may be within the best interest of the organization as a whole (from the perspective of the researcher) to initiate particular actions, yet not in the best interest of the client entity as perceived by them -- which reduces or eliminates the probability of prescribed action being taken.

What, then, becomes the researcher's obligation with respect to informing other organizational entities who have some power to select and initiate alternative actions? It is here proposed that the only real ethical obligation to the action scientist is to make his or her findings available to all members of the organization who are potentially affected by the change. If the findings are reported only to the management, for example, the objective of organizational learning may be restricted -- particularly if the management perceives it is not in their best interest to share the findings or act upon them. However, this intention to make available findings should be understood by the client at the beginning of the research process. If the researcher so chooses, then, he or she may explicitly assign culpability to those perceived as responsible for errors. Further, he or she may suggest alternative policy options, and perhaps even advocate a particular set of actions. However, the degree to which the reporting of findings moves from assessment of policy to advocacy, and the degree to which he or she is more evaluative than descriptive of the organizational process, must be left to the judgment of the researcher.

Yet, when the researcher chooses to take the "safe" route by presenting findings in the most neutral, descriptive manner possible, he or she is presented with another dilemma. Whenever the researcher publicizes his or her findings, they are subject to individual interpretation and use in unintended ways by members of the organization who may have their own agendas. In other words, the researcher loses control over how the findings are interpreted and used, and for what
purpose. Hence the major double-bind: remain descriptive and neutral on policy and blame for errors, and risk having the findings re-interpreted and used by organizational members to suit their own agendas, or take a more evaluative, advocative position and risk the indignation of the client or other organizational constituencies, and probable termination of the research relationship. These are issues which researchers must be prepared to resolve before undertaking any organizational research project which involves a client relationship -- if they are to remain faithful to the principles of action science.

Suggestions for Future Research

Given the complexity of implementation of innovations within large and diverse organizations, many research issues seem to be in need of further investigation. First, since the level of analysis of the study at the Ohio State University tended to focus on individual use of, and affective responses to the technology, further research is needed in order to assess the social and political factors which may affect implementation on a larger level -- that is, the social, economic, and political relationships among lower-level decision makers and top management, between various academic and service departments, etc. What are the various political agendas operating within organizations with respect to technology implementation and values about how the work should be accomplished? Second, more research is needed to assess the relative importance of relative advantage and compatibility as attributes of the innovation under authority-based adoptions. Further, additional research is needed to examine the concepts of discretionary and mandated use of technology within organizations, and the effects of these uses and their relationship to attributes of the innovation with respect to actual use of the innovation.

Third, much more research is needed to examine the effects of different formal and informal communication networks and messages on attitudes towards and use of the innovation among various job categories, levels of involvement, degrees of mandated/discretionary
use, particularly under authority adoption decisions. Factors which contribute to the use of the informal "grapevine," and the immediate and long-term effects of these communications are of particular interest. Finally, the relationship between attitude and extent of use remains unclear, particularly when the concept of mandated and discretionary use confounds the issue. The causal relationships among these variables is also of interest, although probably the most difficult to establish.

Concluding Remarks

The issues presented in this chapter are issues which not only must system operators and other management-level decision makers address, but also should be considered by end users of an adopted innovation. These issues will impact upon how well their perceptions of an innovation's effectiveness in meeting perceived needs matches others' criteria for effectiveness. The key point for the end user is that how these issues are addressed by management may directly or indirectly affect their own behaviors and use of the technology.

Equally important, these are issues which should be of interest and relevance to scholars interested in human factors issues of implementing technology within organizations. This study attempted to identify important issues of implementation, and provide preliminary answers to some important theoretical questions. The list of issues generated by this study provides a framework for further study of the process by which adopted innovations are put into use within organizations, as well as the outcomes of this process. Many theoretical questions about implementation of technology within organizations remain unanswered. Hopefully, this study has identified significant questions which scholars in the field will address.
APPENDIX A

UNITs TELEPHONE SYSTEM DESCRIPTION
The Northern Telecom SL-100 Digital Communications System is a digital-multiplexed, voice and data switching system designed for large corporations and institutions. It has a total capacity for over 30,000 lines. Since it is software driven, functions and features are controlled from the switch itself, although some of the programming can be done from individual telephones (call forward numbers, speed dial lists). Two major types of telephones are available to users: single line telephones (Northern Telecom model SL-2500) and electronic telephones (Northern Telecom model SL-100 Electronic Set, of which there are three types).

1) **Single Line**: this is a "standard" appearing telephone with 12 push buttons and a "tap" button which is used in the process of activating features—pressing the tap button and dialing special feature access numbers. The single line set has the capacity to handle two calls at a time (one on hold). You must always lift the handset to dial on a single line set.

2) **Electronic**: these are larger telephones with a column of buttons on the right in addition to the 12 dialing buttons. These telephones can handle multiple calls at once, the number depending upon how many lines it accommodates. Features are automatically accessed by depressing the appropriate button to the right of the 12 dialing buttons. Numbers can be dialed without lifting the handset.

   a) **executive**: 2-line electronic set.

   b) **electronic high usage**: 3-line electronic set.

   c) **electronic answering point**: 4-line electronic set.

1. In 1987, new telephones were made available to users, which were essentially "dressed up" single line sets with different shape consoles as one would find in an AT&T phone store. Telephone Services built such a "phone store" at their 8th Ave. facility.
Feature Description

Call Pick Up: permits an individual to answer incoming calls to another telephone set from their own set, without leaving the desk. A pick up group is specified which defines which telephones the user may pick up.

* a) universal: allows user to pick up any incoming call within the group simply by activating the feature, without knowing the ringing set's extension number.

b) directed: allows user to pick up calls within the group, provided that the user knows the extension number (which must be dialed subsequent to the activation code or button).

Call Forward: allows calls made to a number to be automatically forwarded to another campus number within UNITS.

a) preprogrammed: call will be forwarded to another campus number either after 5 rings, or upon getting a busy signal. This number is preprogrammed at the user's request and cannot be changed by the user, only by Telephone Services.

* b) programmable: allows user to activate and deactivate call forward, and program the number that the incoming call is to be forwarded to. This number can be changed at any time by the user.

Call Transfer: allows the user to transfer a call to another UNITS number.

Conference: allows the user to make a conference call between themself and 2 other parties.

Consultation: allows user to place a caller on hold while talking privately with a third party.

Hold: allows user to place caller on hold and return handset to cradle.

An enhancement to the single line phone makes it ring every two minutes to remind the user a caller is on hold.

2. The enhancements to the single line telephones were implemented as a result of user complaints about the original operation of the feature.
Message Waiting: allows the central answering point to activate a message waiting indication on a telephone (tap button flashing on the single line set) if the number is busy or doesn't answer. Indicates to the user that a message is waiting for them at the central answering point. An enhancement to the single line set allows the user to place and retrieve calls and activate other features while this feature is activated.

Ring Again: if a busy number is reached, the user is notified when the busy number is free by a distinctive ring on the users phone, and the call is automatically placed when the handset is lifted.

*Call Park: allows user to place a call on hold while retrieving a call on another UNITS telephone. An enhancement to the single line set eliminated a call back which occurred after 4 minutes. The caller continues to hear music until you retrieve the call.

*Speed Call: allows the user to program a list of frequently called numbers that can be dialed by a 1 or 2 digit code.
   a) short: allows users to program a list of up to 10 numbers.
   b) long: allows users to program a list of up to 70 numbers, and can be included in a group or individual long list.

*Group Intercom: allows user to call another person in the intercom group by dialing a 1 or 2 digit code.

*Make Set Busy: allows user to make set appear busy to all incoming callers, while still being able to place calls.

*Speakerphone: an alternative telephone which has a speaker and microphone separate from the handset to allow for totally hands-free operation.

* Denotes optional feature which is available at additional cost per telephone.
APPENDIX B

UNITS MANAGEMENT PLAN
I. System Goals and Objectives

A. Telephony Goals

1. Provide fully featured telephone facility

Objectives:
   b. Provide TouchTone telephones as new instruments.
   c. Install about 1100 stations as Phase I by January, 1986.
   d. Install equipment needed to eliminate Centrex as Phase II during 86–87.
   e. Install about 10,000 stations as Phase III during 1987–88.

2. Install equipment meeting customer needs

Objectives:
   a. Provide needs assessment prior to equipment specifications.
   c. Obtain high level commitment for training participation.
   d. Contact 80% with orientation program prior to use of new facility.

3. Provide facilities efficient for human resources

Objectives:
   a. Provide uniform numbering for dialing plan at the completion of Phase II.
   b. Advertise, train, and support speed dialing as part of Phase I.
   c. Promote labor saving features in customer communications.

4. Make PLUS functionally and economically competitive with AT&T

Objectives:
   a. Choose various long distance carriers to keep service costs 30% below AT&T retail rates.
   b. Provide service no poorer than P01 level (1% call blockage).
   c. Reduce number of digits in access code by the end of Phase III.
   d. Permit charges to stations as a customer option by Fall Quarter, 1986.

5. Improve communications service for Residence & Dining Hall students

Objectives:
   a. Install TouchTone telephones by Fall Quarter, 1986.
   b. Access to PLUS for long distance service by Fall Quarter, 1986.

6. Provide access to state and national communications networks

Objectives:
   b. Evaluate Ohio Teleport service to Wooster when the facility is available.

B. Data Goals

1. Provide data access to University information processors

Objectives:
   a. Provide asynchronous data connections to IRCC and University Systems by Fall Quarter, 1987.
b. Provide 3270 connection within nine months of availability from Northern Telecom.
c. Provide connection facilities for other information processors by Fall Quarter, 1988.
d. Provide data usage statistics by January, 1988 to management of information processor sites.

2. Utilize UNITS facilities for college/administrative level network requirements
   Objectives:
   b. Establish price and assignment procedures for transferring ownership of building circuits to departments by Fall Quarter, 1986.

3. Enhance data communication among campus departments
   Objectives:
   b. Offer asynchronous to 3270 protocol conversion by Fall Quarter, 1986.

C. Video Goals
1. Provide the medium for freeze-frame, annotated freeze-frame, and full-motion video transmission facilities
   Objectives:
   a. Install the fiber optics backbone network during late 1986.

2. Evaluate Ohio Teleport and alternate video uplink facilities for access to inter-campus, national, and international videoconferencing applications.

3. Examine delivery of commercial cable television as a potential revenue center for UNITS.

4. Explore linkage with Columbus' Institutional cable network to extend "private network" concept to other local educational institutions and government offices.

5. Plan for a constructive interface with the Board of Regents' Telecommunication Committee proposed Regents' Telecourse Program and Regional Learning Resource Consortia in Ohio.

D. Integrated Technology Goals
1. Provide reserve capacity for future communications growth
   Objectives:
   a. Use the Standard Communications Wiring Plan as requirements when renovation and new construction alters campus rooms.
   b. Install the fiber optics backbone network during late 1986.
   c. Plan availability of T1 point-to-point digital service about Spring, 1987.

2. Provide compatible connectivity for communications devices
   Objectives:
a. Use the Standard Communications Wiring Plan for specifying interface requirements.
b. Use industry standards for target compliance with future communication interface.

3. Integrate the facilities of different communication techniques
   Objectives:
   a. Use the Standard Communications Wiring Plan for campus voice and data usage, and for college level communication facilities.
   b. Consolidate billings for voice, data, video, and dedicated usage onto a single statement.

4. Promote use of UNITS through a well-developed diffusion plan. For each identified service, provide a comprehensive educational program to extract tangible benefits from UNITS' capability.
APPENDIX C

UNITS FEATURE PACKAGE OPTIONS
UNIVERSITY NETWORK/INTEGRATED
TELECOMMUNICATIONS SYSTEM
(UNITS)

FEATURE PACKAGE OPTIONS
Forward:

Because there have been many questions about the financial impact of UNITS on your budgets, we thought it would be helpful to provide you with some background information on UNITS. If after receiving this synopsis you have specific questions, please call Telephone Services at 422-3687.

The task of developing the UNITS recommendation to the University's Board of Trustees was not confined to a small group of University personnel. During its development, the Telephone Services staff sought and received input from all University Vice Presidents, Deans and selected department heads in order to better understand their priorities and to explain the financial impact of conversion to UNITS. Your Deans and Vice Presidents each received a copy of the UNITS Report, including a Telephone Cost Projection for Fiscal Year 1986-87 for your respective areas.

Since the middle 1970's, the University's cost for Centrex telephone service has increased at an average rate of 14% per year, with no improvement in service. The UNITS system will also require annual increases but at a rate less than current and projected telephone company increases.

Your existing telephone costs are made up of charges for Centrex lines, wiring, access to the long distance network, intercoms, lights and the Telephone Services administrative load charge in addition to the telephone itself. Rates on UNITS include all of the above plus selected features of the new system and network.

A comparison is shown below, showing costs projected to the start of Fiscal Year 1986-87.

<table>
<thead>
<tr>
<th>Description</th>
<th>Centrex</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-Line Set</td>
<td>$56.34</td>
<td>$55.00</td>
</tr>
<tr>
<td>Single Line Set</td>
<td>$33.76</td>
<td>$30.00</td>
</tr>
</tbody>
</table>

Optional features that you may select on UNITS will increase the cost of either type of telephone.

As you can see, the cost of UNITS service may, depending on your department's needs, actually be less. Further, since the University will own the UNITS system, future increases may be expected to be less than those you have recently experienced.

The Telephone Services staff thanks you in advance for your cooperation.

October, 1985
**TELEPHONE RESTRICTION**

You are able to choose specific dialing restrictions for specific sets. Listed below is a description of the restrictions.

<table>
<thead>
<tr>
<th>RESTRICTION NUMBER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Unrestricted provides full access to campus, local, PLUS, long distance, and operator</td>
</tr>
<tr>
<td>2</td>
<td>Campus Only provides access to faculty, staff, administrative offices and student dorms</td>
</tr>
<tr>
<td>3</td>
<td>Campus and PLUS provides access to faculty, staff, and administrative offices, and student dorms. PLUS, the Phone Line Utilization System, of The Ohio State University can be accessed</td>
</tr>
<tr>
<td>4</td>
<td>Campus and Local and PLUS provides access to faculty, staff and administrative offices and dorms. Local calls and PLUS calls can be dialed. Direct Long Distance calls are restricted.</td>
</tr>
<tr>
<td>5</td>
<td>Campus and Local provides access to faculty, staff and administrative offices and dorms. Local calls can also be placed.</td>
</tr>
</tbody>
</table>

**TELEPHONE PLANNING**

Enclosed are Telephone Selection Worksheets to assist you in planning your telephone selection for each person within your department.
Electronic Telephone and Single Line Telephone

Several differences exist between the Electronic Telephone and the Single Line Telephone. Knowing these differences will assist you in making an informed decision about which type of equipment will best suit your department's needs.

1. The Electronic Telephone can handle multiple calls at once, but the Single Line Telephone only has the capability to handle two at a time.

2. With an Electronic Telephone, you push a button which automatically accesses the features. With the Single Line Telephone, you access the features by pressing the Link button and dialing special feature access numbers.

2. With the Electronic Telephone, you can dial a number without lifting the handset from the cradle. You must always lift the handset to dial on a Single Line Telephone.

Feature Description

Both the Electronic Telephone and Single Line Telephone offer a variety of features. Listed below is a brief description of all the available features which should assist you in making a decision about a feature package.

Call Pickup - This feature permits an individual to answer incoming calls to another telephone set.

* Call Forward - This feature allows all calls made to a number to be automatically forwarded to another campus number within the UNITS system. (55¢ per month)

Transfer/3 Way Conference - This feature permits you to establish a 3-way conference call or transfer a call to another number.

* Speed Call - This feature will allow you to program from 10 to 70 frequently dialed numbers.
  (10 number list-$5.00 per month; 30 number list-$15.00 per month; 50 number list-$25.00 per month; 70 number list-$35.00 per month)

* Intercom - This feature enables you to call another person within your intercom group with a one or two digit code. Every user automatically has a 5 digit intercom number. (50¢ per month)

Ring Again - Upon encountering a busy signal, an individual can opt or be notified through the Ring Again feature when the number becomes free.

* Make Set Busy - This feature allows you to make your set appear busy to all incoming calls. ($2.00 per month)
FEATURE PACKAGES

You have a choice of four different feature packages for each individual within your department. Attached are descriptions of each feature package.
Message Waiting - This feature provides an indication that a message is waiting for you at an answering point. It also permits you to activate a message waiting indicator if the number you call is busy on an individual telephone in the system.

Call Forward Don't Answer and/or Call Forward Busy - This feature is programmed by Telephone Services upon request. If an outside caller receives a busy signal or after 4-5 rings nobody answers, the call is automatically routed to an answering point within the department.

Call Waiting - On a single line telephone, should you be on the telephone and a second call comes, a beep tone will alert you that you have a second call. You have the option of alternating between the two calls or terminating the first call and accepting the second call. (55¢ per month)

Optional Features
Single Line Telephone

Standard Features

1. Call Forward to answering point if
   a. line is busy
   b. no answer
2. Call Pick-Up
3. Message Waiting
4. Ring Again
5. Transfer/3-Way Conference

Options

1. Speed Call
   a. 10 number short list
   b. 30, 50, 70 number long list
2. Call Forward
   (User programs number)
3. Direct Incoming Line (DID) - provides a private line to a set
4. Restriction
   0 unrestricted
   2 campus only
   3 campus + PLUS
   4 campus + local + PLUS
   5 campus + local
5. Call Waiting

Costs

1. Leased: Full access,
   Standard features-$30.00/mo.
2. Purchased: Full access,
   Standard features-$27.50/mo.
3. Optional Features
   a. Speed Call Short List-$5.00/mo.
   b. Speed Call Long List
      30 number list-$15.00/mo.
      50 number list-$25.00/mo.
      70 number list-$35.00/mo.
   c. Call Forward (user programmed)
      $55/mo.
   d. Direct Incoming Line (DID)-$2.75/mo.
   e. Restriction-$1.25/mo.
      (You will have unrestricted access to campus, local, PLUS, long distance and operator unless you specify otherwise.)
   f. Call Waiting-$55/mo.
**Electronic Executive Telephone**

Designed for individuals with administrative/management responsibility.

<table>
<thead>
<tr>
<th>Standard Features</th>
<th>Options</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Release</td>
<td>1. <strong>Call Forward</strong> (user programmed number)</td>
<td>1. Leased: Full access, standard features-$55.00/mo.</td>
</tr>
<tr>
<td>2. Call Pick-Up</td>
<td>2. <strong>Speed Call</strong></td>
<td>2. Purchased: Full access, standard features-$47.50/mo.</td>
</tr>
<tr>
<td>3. Transfer/3-Way Conference</td>
<td>3. <strong>Make Set Busy</strong></td>
<td></td>
</tr>
<tr>
<td>4. Call Forward to answering point if a. Line is busy</td>
<td>4. <strong>Direct Incoming Line</strong> (DIND) provides a private line to a set</td>
<td></td>
</tr>
<tr>
<td>5. Ring Again</td>
<td>5. <strong>Restrictions</strong> (no monthly charge)</td>
<td>5. Optional features</td>
</tr>
<tr>
<td></td>
<td>7. <strong>Restrictions</strong></td>
<td>b. Speed Call Long List-30 number list-$15.00/mo.</td>
</tr>
<tr>
<td></td>
<td>8. <strong>Speakerphone</strong></td>
<td>50 number list-$25.00/mo.</td>
</tr>
<tr>
<td></td>
<td>9. <strong>Speakerphone</strong></td>
<td>70 number list-$30.00/mo.</td>
</tr>
<tr>
<td></td>
<td>10. <strong>Restrictions</strong></td>
<td>c. Intercom-$50.00/mo.</td>
</tr>
<tr>
<td></td>
<td>11. <strong>Restrictions</strong></td>
<td>d. Make Set Busy-$2.00/mo.</td>
</tr>
<tr>
<td></td>
<td>12. <strong>Restrictions</strong></td>
<td>e. Call Forward (user programmed)</td>
</tr>
<tr>
<td></td>
<td>14. <strong>Restrictions</strong></td>
<td>g. Speakerphone-$11.50/mo.</td>
</tr>
<tr>
<td></td>
<td>15. <strong>Restrictions</strong></td>
<td>h. Restrictions-$1.26/mo.</td>
</tr>
<tr>
<td></td>
<td>16. <strong>Restrictions</strong></td>
<td>i. You will have unrestricted access to campus, local, PLUS, long distance and operator unless you specify otherwise.)</td>
</tr>
</tbody>
</table>

Purchased telephones: Telephone maintenance is sole responsibility of purchaser.
**Electronics High Usage Telephone**

Designed for individuals who make or receive a large volume of calls as well as secretaries who do not serve as a main answering point for the department.

<table>
<thead>
<tr>
<th>Standard Features</th>
<th>Options</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Release</td>
<td>1. Speed Call</td>
<td>1. Lased: Full access, standard features-$55.00/mo.</td>
</tr>
<tr>
<td>2. Call Pick-Up</td>
<td>a. 10 number short list</td>
<td>2. Purchased: Full access, standard features-$47.50/mo.</td>
</tr>
<tr>
<td>3. Call Forward</td>
<td>b. 20, 50, 75 number long list</td>
<td></td>
</tr>
<tr>
<td>4. Transfer/</td>
<td>2. Call Forward (user programmed number)</td>
<td></td>
</tr>
<tr>
<td>3-Way Conference</td>
<td>3. Direct incoming line (S100)-provides a private line to a set</td>
<td></td>
</tr>
<tr>
<td>5. Message Waiting</td>
<td>4. Extra key lampstrip (to ask additional features)</td>
<td></td>
</tr>
<tr>
<td>6. Ring Again</td>
<td>5. Speakerphone</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Restrictions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Unrestricted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(no monthly charge)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Campus only</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Campus + PLUS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. Campus + local + PLUS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>e. Campus + local</td>
<td></td>
</tr>
<tr>
<td></td>
<td>f. Restricted-$1.25/mo.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(You will have unrestricted access to campus, local, PLUS, long distance and operator unless you specify otherwise.)</td>
<td></td>
</tr>
</tbody>
</table>

*Purchased telephones: Telephone instrument maintenance is a sole responsibility of purchaser.*
Electronic Answering Point Telephone - Designed for departments requiring primary answering point.

<table>
<thead>
<tr>
<th>Standard Features</th>
<th>Options</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Release</td>
<td>1. Call Forward (user programmed number)</td>
<td>1. Leased: Full access, standard features--$55.00/mo.</td>
</tr>
<tr>
<td>2. Call Pick-Up</td>
<td>2. Speed Call (a. 10 number short list; b. 30, 50, 70 number long list)</td>
<td>2. Purchased: Full access, standard features--$47.00/mo.</td>
</tr>
<tr>
<td>3. Transfer/3-Way Conference</td>
<td>3. Direct Incoming Line (1111) provides a private line to a set</td>
<td>3. Optional features (a. Speed Call Short List--$8.00/mo.; b. Speed Call Long List--$11.00/mo.; c. 30 number list--$15.00/mo.; d. 50 number list--$25.00/mo.; e. 70 number list--$35.00/mo.; f. Call Forward (user programmed)--$55.00/mo.; g. Direct incoming line--$6.75/mo.; h. Speakerphone--$14.50/mo.; i. Restriction--$1.00/mo. (You will have unrestricted access to campus, local, PLUS, long distance and operator unless you specify otherwise.)</td>
</tr>
<tr>
<td>4. Call Forward to answering point if (a. line is busy; b. no answer)</td>
<td>4. Speakerphone (unrestricted (no monthly charge))</td>
<td>4. Optional features</td>
</tr>
</tbody>
</table>

- Purchased telephone: Telephone instrument maintenance is sole responsibility of purchaser.
### Single Line Telephone Costs

<table>
<thead>
<tr>
<th>Feature</th>
<th>Cost</th>
<th>Total Monthly Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leased</td>
<td>$30.00</td>
<td></td>
</tr>
<tr>
<td>Purchased</td>
<td>$37.50</td>
<td></td>
</tr>
<tr>
<td>Speed Call 301</td>
<td>$15.00</td>
<td></td>
</tr>
<tr>
<td>Speed Call 501</td>
<td>$25.00</td>
<td></td>
</tr>
<tr>
<td>Speed Call Tel</td>
<td>$25.00</td>
<td></td>
</tr>
<tr>
<td>Call Forward</td>
<td>$0.55</td>
<td></td>
</tr>
<tr>
<td>Direct Line</td>
<td>$2.75</td>
<td></td>
</tr>
<tr>
<td>Restriction</td>
<td>$1.25</td>
<td></td>
</tr>
<tr>
<td>Call Waiting</td>
<td>$0.55</td>
<td></td>
</tr>
</tbody>
</table>

**Total Monthly Cost for Single Line Phones:**

**Single Line Telephone Costs**

### Electronic Answering Point Telephone Costs

<table>
<thead>
<tr>
<th>Feature</th>
<th>Cost</th>
<th>Total Monthly Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leased</td>
<td>$55.00</td>
<td></td>
</tr>
<tr>
<td>Purchased</td>
<td>$47.50</td>
<td></td>
</tr>
<tr>
<td>Speed Call 301</td>
<td>$15.00</td>
<td></td>
</tr>
<tr>
<td>Speed Call 501</td>
<td>$25.00</td>
<td></td>
</tr>
<tr>
<td>Speed Call Tel</td>
<td>$25.00</td>
<td></td>
</tr>
<tr>
<td>Call Forward</td>
<td>$0.55</td>
<td></td>
</tr>
<tr>
<td>Direct Line</td>
<td>$2.75</td>
<td></td>
</tr>
<tr>
<td>Restriction</td>
<td>$1.25</td>
<td></td>
</tr>
<tr>
<td>Spikerphone</td>
<td>$12.50</td>
<td></td>
</tr>
<tr>
<td>Icon</td>
<td>$0.55</td>
<td></td>
</tr>
<tr>
<td>Make Set Busy</td>
<td>$2.00</td>
<td></td>
</tr>
</tbody>
</table>

**Total Monthly Cost for Electronic Answering Points**

### Electronic Executive Telephone Costs

<table>
<thead>
<tr>
<th>Feature</th>
<th>Cost</th>
<th>Total Monthly Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leased</td>
<td>$55.00</td>
<td></td>
</tr>
<tr>
<td>Purchased</td>
<td>$47.50</td>
<td></td>
</tr>
<tr>
<td>Speed Call 301</td>
<td>$15.00</td>
<td></td>
</tr>
<tr>
<td>Speed Call 501</td>
<td>$25.00</td>
<td></td>
</tr>
<tr>
<td>Speed Call Tel</td>
<td>$25.00</td>
<td></td>
</tr>
<tr>
<td>Call Forward</td>
<td>$0.55</td>
<td></td>
</tr>
<tr>
<td>Direct Line</td>
<td>$2.75</td>
<td></td>
</tr>
<tr>
<td>Restriction</td>
<td>$1.25</td>
<td></td>
</tr>
<tr>
<td>Speakphone</td>
<td>$12.50</td>
<td></td>
</tr>
<tr>
<td>Icon</td>
<td>$0.55</td>
<td></td>
</tr>
<tr>
<td>Make Set Busy</td>
<td>$2.00</td>
<td></td>
</tr>
</tbody>
</table>

**Total Monthly Cost for Electronic Executive Phones**

### Electronic High Usage Telephone Costs

<table>
<thead>
<tr>
<th>Feature</th>
<th>Cost</th>
<th>Total Monthly Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leased</td>
<td>$55.00</td>
<td></td>
</tr>
<tr>
<td>Purchased</td>
<td>$47.50</td>
<td></td>
</tr>
<tr>
<td>Speed Call 301</td>
<td>$15.00</td>
<td></td>
</tr>
<tr>
<td>Speed Call 501</td>
<td>$25.00</td>
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<tr>
<td>Speed Call Tel</td>
<td>$25.00</td>
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</tr>
<tr>
<td>Call Forward</td>
<td>$0.55</td>
<td></td>
</tr>
<tr>
<td>Direct Line</td>
<td>$2.75</td>
<td></td>
</tr>
<tr>
<td>Restriction</td>
<td>$1.25</td>
<td></td>
</tr>
<tr>
<td>Speakphone</td>
<td>$12.50</td>
<td></td>
</tr>
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</table>

**Total Monthly Cost for Electronic High Usage Phones**
<table>
<thead>
<tr>
<th>NAME</th>
<th>ROOM NUMBER</th>
<th>CURRENT TELEPHONE NO.</th>
<th>TYPE OF SET</th>
<th>OPTIONS</th>
<th>RESTRICTION</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>
APPENDIX D
ORIGINAL OPERATIONS MANUALS
CALL FORWARD

This feature allows all calls made to your number to be automatically transferred to another number within UNITS.

TO ACTIVATE

Lift handset, hear dial tone —
Touch Star 71 — listen for
3-beeps followed by dial tone —
Touch-in UNITS extension where
you are sending your calls — listen
for confirmation beeps — then
replace handset to cradle.

TO DEACTIVATE

Lift handset, hear dial tone —
Touch Star 70 — listen for
beeps followed by silence — then
replace handset to cradle.

FEATURE VERIFICATION

Lift handset, hear dial tone —
Touch your extension number
from your telephone — call is
then forwarded to extension
number requested.
### CAIL PICK-UP LIST

<table>
<thead>
<tr>
<th>Name</th>
<th>Extension *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

### UNIVERSAL CALL PICK-UP

This feature allows you to answer a call to any extension in your pick-up group without knowing the extension number.

Lift handset, hear dial tone — Touch Star 72 — call comes to your phone.

### DIRECTED CALL PICK-UP

Lift handset, hear dial tone — Touch Star 73 — listen for 3-beeps plus dial tone — touch in extension number — call comes to your phone.

### CALL TRANSFER

#### 3-WAY CONFERENCE

This feature allows you to EITHER transfer a UNITS call to another extension OR make a 3-way conference.

TO TRANSFER CALL

Answer phone, put call on “hold” by touching TAP button once — listen for 3-beeps followed by dial tone — touch-in UNITS extension transferring to. When third party answers, hang-up.

TO CONFERENCE CALL

Answer phone, put call on “hold” by touching TAP button once — listen for 3-beeps followed by dial tone — touch-in number of third party. When third party answers, touch TAP button once and all three are connected.

### CALL TRANSFER/CONF.

**Note:** At least one phone must be in UNITS to access a 3-way conference!

TAP twice slowly if busy
HOLD

Two different kinds of ‘hold’ are available.

First, Consultation Hold allows you to put a caller on ‘hold’ while you consult with a third party.

Second, Permanent Hold allows you to put a call on ‘hold’ and return the handset to its cradle.

CONSULTATION HOLD

On an established call, place caller on ‘hold’ by touching TAP once — listen for 3-beeps with a dial tone — touch third party’s number. Consult. To return to first call, touch TAP button twice.

PERMANENT HOLD

On an established call, place caller on ‘hold’ by touching TAP once — Touch Star 76 — replace handset to cradle — when ready, lift handset and call is re-established.

MESSAGE WAITING

This feature permits you to retrieve messages left for you by calling your department answering point. When your message light is lit, you must retrieve your messages before other features can become available.

TO ACTIVATE

When TAP button is lit, lift handset, hear dial tone — Touch Star 84 — automatically, you are connected to answering point. Light goes out when you hang-up handset.

CALL WAITING

This optional feature informs you, while you are on a call, a second call is waiting.

While talking, you hear a single beep — inform caller you have to put them on “hold” — touch TAP button once — you talk to the second caller.

You are returned to your first caller when you touch TAP once. The second caller is either put on ‘hold’ or hangs up.

HOLD

MESSAGE/CALL WAITING
RING AGAIN

This optional feature notifies you when a busy UNITS extension is free and redials automatically.

TO ACTIVATE

Lift handset — hear dial tone — touch IN UNITS extension — get a busy signal — touch TAP button once — hear 3-beeps followed by dial tone — Touch Star 77 — hear confirmation beeps, hang-up
UNITS will call you when the busy number is free with one long and two short rings — lift handset before end of second signal ring — you are connected to UNITS extension.

TO DEACTIVATE

Lift handset, hear dial tone —
Touch Star 77 — get beeps
followed by silence — replace handset to its cradle.

RING AGAIN

RING AGAIN

SPEED CALL LIST

0
1
2
3
4
5
6
7
8
9

RING AGAIN

SPEED CALL

This feature allows you to program a list of frequently called numbers which then can be dialed by touching a single-digit code instead of the entire number.

TO PROGRAM/CHANGE

Lift handset, hear dial tone —
Touch Star 78 — touch any number from 0 to 9 — touch-in number to be stored — Touch pound (*) — replace handset to cradle.

TO ACTIVATE

Lift handset, hear dial tone —
Touch Star plus the single-digit — number is automatically dialed.

TO DELETE NUMBER

Lift handset, hear dial tone —
Touch Star 78 — Touch single-digit—then touch pound (*)

SPEED CALL
DIALING INSTRUCTIONS

TO CALL ON MAIN CAMPUS:
Touch — "2" then the 4-digit extension number

TO CALL A UNITS:
DEPARTMENT INTERNAL
EXTENSION: Touch — "4" then the 4-digit extension number.

TO CALL UNIVERSITY HOSPITAL
or RESIDENCE & DINING
HALLS:
Touch — "3" then the 4-digit extension number

TO CALL LOCAL OFF-CAMPUS:
Touch — "9" then the 7-digit number

TO ACCESS PLUS (the University's
low-cost long distance system):
Touch "1" then your authorization code,
area code and then the number

WHEN USING PLUS UNITS,
REQUIRES AREA CODES BE
USED ON ALL LONG DISTANCE
CALLS INCLUDING AREA
CODE 614.

TO CALL LONG DISTANCE WITHOUT
PLUS:
TOUCH "9", then "1",
then the area code
(except in Area Code 614),
and then the number.

TO PLACE AN INTERNATIONAL
CALL:
Touch "0", then "011", and then
the country code, then the number.

TO CALL THE OSU OPERATOR:
Touch "0"

TO CALL THE COLUMBUS
OPERATOR:
Touch "9", then "0"

TO CALL COLUMBUS
INFORMATION:
Touch "9", then "411"

TO CALL TELEPHONE SERVICES
FOR REPAIRS OR HELP:
Touch "2" then U-N-I-T.

OR Touch "2-66-40".

OSU The Ohio State University
ELECTRONIC TELEPHONE
(ETS)
USER MANUAL
Dialing Instructions

To call anyone on Main Campus:
1. Dial "1" plus the 4-digit extension number.

To place an off-campus Local call:
1. Dial "9" plus the 7-digit number.

To call anyone on the UNITS system:
1. Dial "2" plus XXXX.
2. Dial "4" plus XXXX for department internal extension number.

To call the University Hospitals Complex:
1. Dial "3" plus the 4-digit extension number.

To call a Residence and Dining Halls number:
1. Dial "3" plus 4-digit number.

To access PLUS, the University's low cost long distance system:
1. Dial "1".
2. Dial your authorization code.
3. Dial the area code plus the 7-digit number. (Area codes for all calls including calls in Area Code 614 must be used.)

To make a Long Distance phone call without accessing PLUS, the University's low cost long distance system:
1. Dial "9".
2. Dial "1" plus area code (except Area Code 614) plus the long distance number.

To place international calls:
1. Dial "9" plus "011" plus Country code plus number.

To call an OSU Operator:
1. Dial "6".

To call an Off-Campus Telephone Operator:
1. Dial "9" plus "0".

To call a Columbus Area Information Operator:
1. Dial "6" plus "411".

To call Telephone Services/Repair:
1. Dial "2" plus UNIT.
Definition of Audible Tones

<table>
<thead>
<tr>
<th>Signal/Tone</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dial tone</td>
<td>Informs you that dialing may commence.</td>
</tr>
<tr>
<td>Busy signal</td>
<td>Informs you that the station party or trunk group you are calling is busy.</td>
</tr>
<tr>
<td>Past busy signal</td>
<td>Informs you that improper use of your telephone or restricted operation was attempted.</td>
</tr>
<tr>
<td>One short buzz heard through one way speaker.</td>
<td>Informs you that a call is waiting on your line.</td>
</tr>
<tr>
<td>Three beep tones followed by silence.</td>
<td>Informs you that the feature you accessed was successfully completed.</td>
</tr>
<tr>
<td>A short burst of tone heard through the loudspeaker</td>
<td>Informs you that the called station or trunk is now free when Ring Again feature is activated.</td>
</tr>
<tr>
<td>Three beep tones followed by a steady dial tone</td>
<td>Informs you that you may proceed with feature activation.</td>
</tr>
</tbody>
</table>
Placing A Call

With handset off cradle:
1. Lift handset.
2. Dial required number.

With handset in cradle:
1. Press unused extension button.
2. Dial required number.
3. Lift handset to talk or press release to disconnect if busy or no answer.
Features

Call Forward (Call Fwd)

This feature allows you to forward calls to another number within the UNITS system.

To Activate:
1. Press Call Fwd button without lifting the handset.
2. Dial number to which your calls will be forwarded.
3. Press Call Fwd button again.

To Deactivate:
1. Press Call Fwd button.

Additional Information

If you always Call Forward to the same number, you do not need to re-program that number each time. Simply press the CALL Forward button twice and your calls will automatically be forwarded to that number.
Call Pick-Up Universal

This feature permits you to answer any call within your Call Pick-Up group.

To Activate:
1. Listen for another extension ringing.
2. Press an unused extension button.
3. Press Call Pick-Up button; call is automatically rerouted to your extension.

Directed Call Pick-Up

This feature allows you to answer calls in your area, but you must know extension of the telephone you want to answer.

To Activate:
1. When you hear ringing from another phone, lift the handset.
2. Dial the Directed Call Pick-Up code (*73).
3. Dial extension number of ringing telephone.
Call Transfer/3 Way Conference (Conf 3)

This feature permits you to transfer calls from one extension to another or sets up a 3-way conference.

1. Press 3-call transfer/3 way conference button (Conf 3).
2. Dial other party's telephone number.
3. To connect all parties, press Conf 3 button again.
4. To complete transfer, press Release button; you are disconnected from the other 2 parties.
Hold

This feature permits you to place or receive a call while putting someone on hold.

Place a call while another call is on hold:
1. Press unused extension button which puts first call on hold automatically.
2. Dial number of second party.
3. To return to original caller, press button next to quickly flashing light.

Answer a call while another call is on hold:
1. When you hear a short buzz through loudspeaker, press extension button next to slowly,
   flashing light.
2. You are connected with second call; first call automatically put on hold.
3. To return to original caller, press button next to quickly flashing light.

Listen On Hold

If someone puts you on hold, this feature lets you listen for the person to return to the call
without holding the handset.

To Activate:
1. Press hold button.
2. Place handset in cradle.
3. Press extension button next to quickly flashing light.
4. When you hear the other party through the loudspeaker, lift the handset and continue
   conversation.
Intercom (I/C Group)

This feature allows you to call another person in your Intercom group by dialing a one or two digit code.

To Activate:
1. Press I/C group button.
2. Dial one or two digit code assigned to person you're calling.
3. Lift handset.
Make Set Busy (Make Busy)

This feature prevents calls from coming into your extension.

To Activate:
1. Press Make Busy button once.

To Deactivate:
1. Press Make Busy button once.
Message Waiting (Msg Indic)

This feature permits you to retrieve any messages left for you by calling the Central Answering Point for your department.

Retrieval:
1. Lift handset.
2. Press Conf 3 button.
3. Dial *83.
4. Automatic connection to Answering Point is established.

Message Waiting for Central Answering Point

This feature permits you to leave a message indication for someone to call you, to cancel a single message you have left for someone, or to cancel all messages.

Activation:
1. Lift handset.
2. Dial required number.
3. Press 3-Way Conference button (Conf 3) and dial MESSAGE WAITING activation code (*82).
   Other party is now notified that a message is waiting.

Cancel a Specific Message Waiting Indication:
1. Lift handset.
2. Press 3-Way Conference (Conf 3) button and dial MESSAGE WAITING delete code (*85).
3. Dial extension number of person for whom message was left.

Cancel All Message Waiting Indications:
1. Lift handset.
2. Press 3-Way Conference (Conf 3) button and dial MESSAGE WAITING delete code (*84).
Release (RLS)

This feature terminates a call without replacing the handset in the cradle by pressing the release (RLS) button.
Ring Again

This feature notifies you that a busy line is now free and redials the UNITS extension number for you automatically.

To Activate:
1. Dial number.
2. If line is busy, press Ring Again button once.
3. One long and two short rings heard through loudspeaker will indicate that both lines are free.
4. Lift handset.
5. Listen for dial tone.
6. Press Ring Again button.

To Deactivate:
1. Press Ring Again button before receiving ring back notification.

Additional Information

Press the Ring Again button immediately. If you delay, the person may use the phone again and you will hear a busy signal.

If you lift the handset and you hear a busy signal, the other person has lifted the phone to place or receive a call. Activate the Ring Again a second time.
Speed Call Short or Long List

This feature programs as few as 10 or as many as 70 frequently dialed numbers.

To Program:
1. Press Speed Call button without lifting handset.
2. Dial one digit code for Speed Call short list (0-9) or two digit code for Speed Call long list (00-69) associated with telephone number to be stored.
3. Dial telephone number to be stored plus #.
4. Press Speed Call button.

To Use Once Programmed:
1. Press unused extension button.
2. Press Speed Call button.
3. Dial the one (0-9) or two (00-69) digit code for the number you wish to dial.

To Delete a Number:
1. Press Speed Call button without lifting handset.
2. Dial the one or two digit code for number to be erased plus #.
3. Press Speed Call button again.
Volume Control

This can be used to increase or decrease all tones heard through the one-way speaker. It will not affect voice or tone levels heard through the receiver. To change the volume level, press either the volume up or volume down buttons located at the bottom of your phone. To lock the volume level, press both buttons simultaneously.
Repairs

To request repair service, please contact your UNITS coordinator (department telecommunication coordinator) who will make the repair request.
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>How To Activate</th>
<th>How To Deactivate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call Forward</td>
<td>Forwards calls to another campus number.</td>
<td>1. Press Call Fwd button once without lifting handset.</td>
<td>1. Press Call Fwd button once.</td>
</tr>
<tr>
<td>(Call Fwd)</td>
<td></td>
<td>2. Dial number to which your calls will be forwarded.</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>3. Press Call Fwd button again.</td>
<td></td>
</tr>
<tr>
<td>Call Pick-Up Universal</td>
<td>Answers any call within your pick-up group.</td>
<td>1. Press unused extension button.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Press Call Pick-Up button.</td>
<td></td>
</tr>
<tr>
<td>Directed Call Pick-Up</td>
<td>Answers any call if you know the ringing extension number.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Call Transfer/</td>
<td>Transfers calls from one extension to another. Allows</td>
<td>1. While talking, press Conf 3 button.</td>
<td></td>
</tr>
<tr>
<td>3-Way Conference</td>
<td>private consulting with person to whom call is being transferred. Sets up a 3-way conference.</td>
<td>2. Dial other party's number.</td>
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</tr>
<tr>
<td>(Conf 3)</td>
<td></td>
<td>3. Connect all 3 parties by pressing Conf 3 button.</td>
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<td></td>
<td></td>
<td>4. Complete transfer by pressing Call Conf 3.</td>
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<tr>
<td>Hold</td>
<td>Place or receive a call while on hold.</td>
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<td></td>
<td>To place a call while another call is on hold:</td>
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<td></td>
<td></td>
<td>1. Press any unused extension button which automatically puts first call on hold.</td>
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<td></td>
<td>2. Dial required number.</td>
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<td></td>
<td></td>
<td>3. To return to first call, press button next to quickly flashing diamond.</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
<td>How To Activate</td>
<td>How To Deactivate</td>
</tr>
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<td>----------------------------------------</td>
</tr>
<tr>
<td>Hold (cont'd.)</td>
<td></td>
<td>Answer a call while another call is on hold:</td>
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<tr>
<td></td>
<td></td>
<td>1. When you hear a short buzz through loudspeaker, press extension button next to slowly flashing diamond.</td>
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<tr>
<td></td>
<td></td>
<td>2. You are connected with second call; first call automatically put on hold.</td>
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<tr>
<td></td>
<td></td>
<td>3. To return to first call, press button next to quickly flashing diamond.</td>
<td></td>
</tr>
<tr>
<td>Listen On Hold</td>
<td>Listen for person who has put you on hold through loudspeaker.</td>
<td>1. Press HOLD button.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>2. Place handset in cradle.</td>
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<tr>
<td></td>
<td></td>
<td>3. Press extension button next to quickly flashing diamond.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. When you hear other party through loudspeaker, lift handset and continue conversation.</td>
<td></td>
</tr>
<tr>
<td>Intercom (I/C group)</td>
<td>Calls another person in your Intercom group by dialing a 1 or 2 digit code.</td>
<td>1. Press I/C group button.</td>
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<tr>
<td></td>
<td></td>
<td>2. Dial 1 or 2 digit code for person whom you are calling.</td>
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<td></td>
<td></td>
<td>3. Lift handset.</td>
<td></td>
</tr>
<tr>
<td>Make Set Busy (Make Busy)</td>
<td>Prevents any calls from coming into your extension.</td>
<td>1. Press Make Busy button once.</td>
<td>1. Press Make Busy button a second time.</td>
</tr>
<tr>
<td>Message Waiting (Msg Indic)</td>
<td>Retrieve a message from a Central Answering Point</td>
<td>To retrieve a message:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Press Conf 3 button.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Dial *83.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Automatic connection is established with a Central Answering Point.</td>
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<tr>
<td></td>
<td></td>
<td>4. After retrieving your messages and hanging up, the diamond beside the Message Waiting button goes out.</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
<td>How To Activate</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------------------------</td>
<td>------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Release (RLS)</td>
<td>Terminates call.</td>
<td>Press RLS button.</td>
<td></td>
</tr>
<tr>
<td>Ring Again</td>
<td>Notifies you line is free.</td>
<td>1. Dial number.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. If line is busy, press Ring Again button once.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>3. A short burst of tone will indicate that line is free.</td>
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<td></td>
<td></td>
<td>4. Listen for dial tone.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>5. Press Ring Again button.</td>
<td></td>
</tr>
<tr>
<td>Speed Call</td>
<td>Programs as few as 10 or as many as 70 frequently used numbers.</td>
<td>To program: 1. Press Speed Call button without lifting handset.</td>
<td></td>
</tr>
<tr>
<td>Short List/Speed Call</td>
<td></td>
<td>2. Dial 1 (0-9) or 2 (00-69) digit code associated with the number being stored.</td>
<td></td>
</tr>
<tr>
<td>Long List</td>
<td></td>
<td>3. Dial number to be stored plus #.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Press Speed Call button.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>To delete number: 1. Press Speed Call button without lifting handset.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Dial 1 or 2 digit code of number to be erased plus #.</td>
<td></td>
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<td>3. Press Speed Call button again.</td>
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<td></td>
<td>To use once programmed: 1. Press any unused extension button.</td>
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<td>2. Press Speed Call button.</td>
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<td>3. Dial 1 or 2 digit code for number you are dialing.</td>
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</table>
## CALL PICK-UP LIST

<table>
<thead>
<tr>
<th>NAME</th>
<th>TELEPHONE NUMBER</th>
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## NOTES:
NOTES:

SPEED CALL LIST

<table>
<thead>
<tr>
<th>CODE</th>
<th>NAME</th>
<th>TELEPHONE NUMBER</th>
<th>CODE</th>
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</tbody>
</table>

NOTES:
APPENDIX E

REVISED OPERATIONS MANUALS
# CALL TRANSFER

**CONFERENC/E/CONSULTATION**

**CALL FORWARD PRE-PROGRAMMED**

**CALL PICKUP**

**HOLD**

**MESSAGE WAITING**

**RING AGAIN**

**AUDIBLE TONES**

## DIALING INSTRUCTIONS

**CALL FORWARD PROGRAMMABLE**

**CALL PARK**

**SPEED CALL/SHORT**

**SPEED CALL/LONG**

---

### CHECKLIST

The following optional features are assigned to your telephone:

**Optional Features**

- **Call Forward Programmable**
  - Activation code • 71.
  - Deactivation code • 70.
- **Call Park**
  - Activation code • 87.
  - Retrieval code • 86.
- **Speed Call**
- **Short List**
  - Programming code • 78.
- **Long List**
  - Programming code • 79.
  - Group Controller is Universal Call Pickup
  - Activation code • 72.
- **Call Forward Preprogrammed**
- **Call Forward Busy, Forward to**
- **Call Forward Don't Answer**

---

### CALL TRANSFER

This feature allows you to transfer a call to another UNITS extension.

**TO TRANSFER**

On an established call, advise the party you're going to transfer the call.

1. Depress TAP button (hear 3-beeps and dial tone); caller is on "hold".
2. Dial the UNITS extension to which you're transferring the call.
3. When the party answers, announce you're transferring a call to them, and hang-up.
4. Your parties are then connected.

**GET A BUSY SIGNAL or NO ANSWER?**

Slowly depress TAP button twice to return to the original party.

---

**OSU**

The Ohio State University
THREE-WAY CONFERENCE

This feature allows you to make a conference call between yourself and two other parties.

TO CONFERENCE

1. You are talking with someone and want to add a third person to your conversation.
2. Depress TAP button [hear 3 beeps and dial tone]; caller is on "hold".
3. Dial number of third party.
4. When third party answers, announce you're establishing a 3-way conference, depress TAP button to connect all parties.

NOTE: At least one telephone must be in UNITS to access a 3-way conference. You may establish 3-way conferences with parties outside UNITS.

CONSULTATION

This feature allows you to place a caller on "hold" while you talk privately with a third party.

TO CONSULT

On an established call:

1. Depress TAP button [hear 3 beeps and dial tone]; the original party is on "hold".
2. Dial third party's number.
3. When the third party answers, consult. The original party is on hold and can't hear the conversation.
4. When consulted party hangs up, you are automatically reconnected to your original caller.

CALL FORWARD PRE-PROGRAMMED

These standard features are pre-programmed by UNITS at your request.

CALL FORWARD BUSY

When calling an extension that has call forward busy, and that party is on the line, you will hear ringing. Your call is re-routed to another extension within the department.

NOTE: If you hear a busy signal then both parties are busy.

CALL FORWARD, DON'T ANSWER

If the party you're calling is unable to answer the phone after five rings, your call is automatically forwarded to another telephone within the department.

CONFERENCE/CONSULTATION
UNIVERSAL CALL PICKUP

This optional feature allows you to answer a ringing telephone in your call pickup group without leaving your desk.

1. Hear ringing of another phone in your pickup group.
2. Lift handset, hear dial tone.
3. Press Star [*] 72. You are connected with the incoming call.
4. Answer the call in your normal manner.

CALL PICKUP GROUP

<table>
<thead>
<tr>
<th>Name</th>
<th>Telephone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

DIRECTED CALL PICKUP

This feature allows you to direct which ringing telephone you answer provided you know the extension number.

1. Hear telephone(s) ringing.
2. Lift handset, hear dial tone.
3. Press Star [*] 73 (hear 3-beep and dial tone).
4. Dial specific extension number.
   You are immediately connected to the incoming call.
5. Answer the call in your normal manner.

HOLD

This feature allows you to place a call on hold and return the handset to the cradle. Your caller hears music from WOSU-FM.

TO PLACE PARTY ON HOLD

On an established call:

1. Depress TAP button (hear 3-beeps and dial tone).
2. Press Star [*] 76 (hear completion beeps and silence). The call is held on your telephone.
3. Return handset to cradle. The caller hears music from WOSU-FM until call is retrieved.

TO RETRIEVE A HELD CALL

1. Lift handset from cradle. You are immediately reconnected with original caller.

NOTE: You hear one ring every two minutes to remind you that a caller is on hold. While on hold, the caller continues to hear music.
MESSAGE WAITING
This feature indicates that messages are waiting for you at your department answering point. The TAP button is lit and flashing.

MESSAGE RETRIEVAL
1. Lift handset to hear dial tone.
2. Press Star [*] 83. You are automatically connected to the answering point where your messages are waiting.
3. Identify yourself to the other party and explain you are retrieving messages.
4. When conversation is finished, return handset to cradle. Message waiting light goes off after all messages are retrieved.

DEACTIVATE MESSAGE WAITING LIGHT
1. Lift handset; hear dial tone.
2. Press Star [*] 84 [hear completion beeps and silence]. This cancels all indications that messages are waiting.

NOTE: You may still place calls, receive calls, and activate features when the message waiting light is lit.

RING AGAIN
If you reach a busy UNITS number you can be notified when the busy number is free. Your telephone rings in a distinctive style, and the call is placed automatically when you lift the handset. Only one ring-again request can be activated at a time.

TO ACTIVATE
1. Lift handset; hear dial tone.
2. Dial UNITS extension - hear busy signal.
3. Depress TAP button [hear 3-beeps and dial tone].
4. Press Star [*] 77 [hear completion beeps and silence].
5. Return handset to cradle.

You may continue to place or receive other calls while waiting to be notified the line is free.

6. UNITS will call you when both the busy line and your extension are free. You will hear one long and two short rings.
7. Lift handset before the end of the third cycle of rings. The UNITS extension you called will begin to ring. You are connected to the UNITS extension you called.
8. If you hear a busy signal when you lift the handset, the other person has lifted his handset to place or receive a call. Return your handset to the cradle. Ring Again is still activated.

NOTE: UNITS will ring back with three cycles of one long and two short rings and then deactivate.

TO DEACTIVATE
Before you receive the ring-back notification:
1. Lift handset; hear dial tone.
2. Press Star [*] 77 [hear completion beeps and silence].
3. Return handset to cradle.

RING AGAIN
AUDIBLE TONES

DIAL TONE
A continuous tone indicates dialing may begin.

BUSY SIGNAL
A repeating buzz indicates you are calling a busy number.

FAST BUSY SIGNAL
A repeating buzz, about twice as fast as the busy signal, indicates improper use of your telephone, restricted operation was attempted, or all circuits are busy.

ACTIVATION TONES
Three beeps followed by a steady dial tone indicates you can proceed with activating a feature.

COMPLETION TONES
Beeps followed by silence indicates a feature was successfully completed.

RING AGAIN NOTIFICATION
A cycle of one long and two short rings indicates a busy line is now free.

DISTINCTIVE RINGING
One long ring indicates a call is coming to you from within UNITS.
One long and one short ring indicates a call coming from outside UNITS.
One long, two short rings is the Ring Again cycle.

NOTE: Operations of modems, answering machines, and other devices may be affected by distinctive ringing. Call 2-UNIT [2-8648] for assistance.

TAP BUTTON
The TAP button is used when you want to access a UNITS feature while you are already on the line.
Depressing the TAP button puts a call on "hold" and you hear 3-beeps and dial tone. You can either dial another number or dial an access code.
Features which use the TAP button include: Call Transfer, Three-Way Conference, Consultation, Hold, Ring Again, and Call Park.

DIALING INSTRUCTIONS

TO CALL UNITS FOR PHONE HELP OR REPAIRS:
Dial - "2-UNIT".

TO CALL MAIN CAMPUS:
Dial - "2" then the 4-digit extension number.

TO CALL A UNITS DEPARTMENT:
INTERNAL EXTENSION:
Dial - "4" then the 4-digit extension number.

TO CALL UNIVERSITY HOSPITALS or RESIDENCE & DINING HALLS:
Dial "3" then the 4-digit extension number.

TO CALL LOCAL, OFF-CAMPUS:
Dial "9" then the 7-digit local number.

TO ACCESS the University's LOW-COST LONG DISTANCE System:
Dial "1" [hear 3 beeps and dial tone], then your authorization code [hear dial tone], then the area code, and then the 7-digit number.

TO CALL LONG DISTANCE WITHOUT AN AUTHORIZATION NUMBER:
Dial "9", then "1", then the area code (except in area code 614), and then the 7-digit number.

TO PLACE AN INTERNATIONAL CALL:
Dial "9", then "011", next the Country code, then the number.

TO CALL THE OSU OPERATOR:
Dial "0".

TO CALL A COLUMBUS OPERATOR:
Dial "9", then "0".

TO CALL COLUMBUS INFORMATION:
Dial "9", then "411" [This will get information for any number in area code 614].

TO CALL LONG DISTANCE INFORMATION:
Dial "9", the area code, and then 555-1212.
CALL FORWARD
PROGRAMMABLE
This optional feature allows ALL
calls made to your telephone to be
automatically rerouted to another
UNITS extension.

TO ACTIVATE:
1. Lift handset; hear dial tone.
2. Press Star [*71] (hear 3-beeps
and dial tone).
3. Dial the UNITS extension to
which you are forwarding your
calls (hear completion beeps
and silence).
4. Return handset to the cradle.

TO VERIFY CALL FORWARD:
1. Lift handset; hear dial tone.
2. Dial your extension number
from your telephone. The call is
rerouted to the extension you
programmed.
3. Tell the person answering that
you are confirming the Call For­
ward feature.

TO DEACTIVATE:
1. Lift handset; hear dial tone.
2. Press Star [*] 70 (hear com­
pletion beeps and silence).
3. Return handset to cradle.

HOW DO YOU KNOW IF YOUR
PHONE IS CALL FORWARDED?
Dial Star [*] 71. You will hear fast
busy if your phone is call forwarded
or 3-beeps and dial tone if your
phone is not call forwarded.

CALL PARK
The optional feature allows you to
place a call on hold on your tele­
phone and retrieve the call from
another UNITS telephone:

TO "PARK" A CALL:
1. Depress TAP button (hear 3­
beeps and dial tone).
2. Press Star [*] 87 (hear comple­tion
beeps and silence).
3. Return handset to cradle. Caller
hears WDSU-FM until call is
retrieved.

While a call is parked, you may use
your telephone to place calls, re­
der calls and activate features.

TO RETRIEVE A PARKED CALL:
1. Lift handset; hear dial tone.
2. Press Star [*] 86 (hear 3-beeps
and dial tone).
3. Dial the extension number you
parked the call against. You are
connected to original caller.

NOTE: Call Park does not have to
be assigned to the telephone from
which you are retrieving a call.
SPEED CALL/SHORT

This optional feature allows you to program a list of frequently called numbers that can then be dialed automatically by dialing Star [*] and a one digit code instead of the complete number.

SHORT SPEED CALL LIST
A short speed-call list consists of ten numbers (0-9) and is restricted to your exclusive use.

PROGRAMMING/CHANGING A SHORT LIST NUMBER
1. Lift handset; hear dial tone.
2. Press Star [*] 78 (hear 3-beeps and dial tone).
3. Dial the one digit code assigned to the number to be stored (C to 9).
4. Dial the number to be stored, including “9” for outside calls.
5. Press Pound (#) sign (hear completion beeps and silence).
6. Return handset to cradle. Number is stored.
7. Repeat steps 1 through 6 to store up to 10 numbers or to override existing ones.

USING A SHORT LIST NUMBER
1. Lift handset; hear dial tone.
2. Press Star [*] and the one digit code.
3. After a short pause, the number will be dialed automatically.

DELETING A SHORT LIST NUMBER
1. Lift handset; hear dial tone.
2. Press Star [*] 78 (hear 3-beeps and dial tone).
3. Dial the one digit code assigned to the stored number.
4. Press Pound (#) sign (hear completion beeps and silence). Code and number are deleted from short list.

NOTE: The maximum number of digits you can program for each Speed Call code is 24; this includes dialing “9” for outside calls.

SPEED CALL SHORT LIST

0
1
2
3
4
5
6
7
8
9

SPEED CALL/SHORT
SPEED CALL/LONG

This feature allows you to program a list of frequently called numbers that can be dialed automatically by dialing Star [*] and a two digit code instead of the complete number.

LONG SPEED CALL LIST

A long list can have a maximum of 70 numbers (00-69), and can be included in a group or individual speed call long list.

PROGRAMMING/CHANGING A LONG LIST NUMBER

1. Lift handset; hear dial tone.
2. Press Star [*] 79 (hear 3 beeps and dial tone).
3. Dial the two digit code to be assigned to the stored number (00-69).
4. Dial the number to be stored, including "S" for outside calls.
5. Press Pound (#) sign (hears completion beeps and silence).
6. Return handset to cradle. Number is stored.
7. Repeat steps 1 through 6 to store up to 70 numbers or to override existing ones.

USING A LONG LIST NUMBER

1. Lift handset; hear dial tone.
2. Press Star [*] and the two digit code.
3. After a short pause, UNITS will dial the number automatically.

DELETING A LONG LIST NUMBER

1. Lift handset; hear dial tone.
2. Press Star [*] 79 (hear 3 beeps and dial tone).
3. Dial two digit code assigned to the stored number.
4. Press Pound (#) sign (hears completion beeps and silence).
Code and number are deleted from long list.

NOTE: The maximum number of digits you can program for each speed call code is 24; this includes dialing "S" for outside calls.
THE ELECTRONIC TELEPHONE
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
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<tbody>
<tr>
<td>ANSWERING A CALL</td>
<td>6</td>
</tr>
<tr>
<td>AUDIBLE TONES</td>
<td>4</td>
</tr>
<tr>
<td>CALL FORWARD PREPROGRAMMED</td>
<td>20</td>
</tr>
<tr>
<td>CALL FORWARD PROGRAMMABLE</td>
<td>28</td>
</tr>
<tr>
<td>CALL PICKUP</td>
<td>21</td>
</tr>
<tr>
<td>CALL TRANSFER</td>
<td>15</td>
</tr>
<tr>
<td>CONSULTATION</td>
<td>19</td>
</tr>
<tr>
<td>DEFINITIONS</td>
<td>5</td>
</tr>
<tr>
<td>DESCRIPTION</td>
<td>2</td>
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<tr>
<td>DIALING INSTRUCTIONS</td>
<td>9</td>
</tr>
<tr>
<td>GROUP INTERCOM</td>
<td>32</td>
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<tr>
<td>HOLD</td>
<td>11</td>
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<tr>
<td>To Answer a Call</td>
<td>11</td>
</tr>
<tr>
<td>To Place a Call</td>
<td>13</td>
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<tr>
<td>Listen On Hold</td>
<td>14</td>
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<tr>
<td>ILLUSTRATION</td>
<td>3</td>
</tr>
<tr>
<td>MAKE SET BUSY</td>
<td>33</td>
</tr>
<tr>
<td>MESSAGE WAITING</td>
<td>22</td>
</tr>
<tr>
<td>Activate Message Waiting</td>
<td>22</td>
</tr>
<tr>
<td>Deactivate an Indication You Initiated</td>
<td>23</td>
</tr>
<tr>
<td>Message Retrieval</td>
<td>24</td>
</tr>
<tr>
<td>Deactivate Message Waiting</td>
<td>25</td>
</tr>
<tr>
<td>PLACING A CALL</td>
<td>7</td>
</tr>
<tr>
<td>RING AGAIN</td>
<td>26</td>
</tr>
<tr>
<td>SPEED CALL</td>
<td>30</td>
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<tr>
<td>To Program/Change</td>
<td>30</td>
</tr>
<tr>
<td>To Use</td>
<td>31</td>
</tr>
<tr>
<td>To Delete</td>
<td>31</td>
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<tr>
<td>THREE WAY CONFERENCE</td>
<td>16</td>
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</tbody>
</table>
The electronic telephone is one instrument of the University Network Integrated Telecommunications System (UNITS). It offers those in answering point positions, high usage areas, and executive positions unique capabilities. This manual is designed to help you learn about the components, audible tones, and the features of the electronic telephone.
AUDIBLE TONES

AUDIBLE TONES are used by UNITS to identify the functions performed by the digital switch at the Telecommunications Network Center. Users must listen to these signals in order to know how a telephone call is proceeding through UNITS.

DIAL TONE — A continuous tone indicating dialing may begin.

BUSY SIGNAL — A repeating buzz informing you the party you are calling is busy.

FAST BUSY SIGNAL — A repeating buzz, twice as fast as the busy signal, informs you improper use of your telephone or restricted operation was attempted.

RING AGAIN NOTIFICATION — One short tone heard through the one-way speaker informs you the called line is now free.

ACTIVATION TONE — Three beeps followed by a steady dial tone informs you to proceed with feature activation.

COMPLETION TONE — Beeps followed by silence informs you the feature you established was successfully completed.

DEFINITIONS

DISTINCTIVE RINGING — ONE LONG RING — indicates a call is coming to you from within UNITS.

ONE LONG & ONE SHORT RING — indicates a call is coming to you from outside UNITS.

LIQUID CRYSTAL DISPLAY (LCD) — The diamonds next to the extension numbers and feature buttons that are displayed when the telephone is in use. SLOW FLASH — indicates an incoming call. QUICK FLASH — indicates a party is on hold.

VOLUME CONTROL — The loudness of any sound which comes through the one-way speaker may be increased or decreased.

ADJUSTING DIAL TONE — Press an unused extension number to get a dial tone. Press the VOL UP or VOL DOWN key to adjust loudness. Press both keys simultaneously to lock-in the desired volume level.

ADJUSTING RINGING — While your phone is ringing, press the VOL UP or VOL DOWN keys to set the desired ringing volume. Press both keys simultaneously to lock-in the ringing volume. This loudness remains constant until you lock in a new level. NOTE: Volume control will not increase the loudness of sounds coming through the handset.

RELEASE — The RLS button at the top of the liquid crystal display allows you to terminate a call without replacing the handset in its cradle. You must depress the RLS button when you are finished with a call before you can answer another call.
### ANSWERING A CALL

#### WHAT TO DO

<table>
<thead>
<tr>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
<th>DISPLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ringing/warble tone</td>
<td>LCD at extension flashes slowly.</td>
</tr>
</tbody>
</table>

2. Lift handset and talk.

#### ANSWERING MULTIPLE CALLS

1. Buzz through one-way speaker. LCD next to extension flashes slowly.

2. Press extension next to slowly flashing LCD which automatically puts first caller on hold. LCD next to first extension flashes quickly. LCD next to second extension is solid.

3. To return to original caller, press extension button next to quickly flashing LCD. LCD next to extension is solid.

### PLACING A CALL

#### PLACING A CALL: WITH HANDSET IN THE CRADLE

You may dial a number on any unused extension number while the handset is still in the cradle.

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
<th>DISPLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Press unused extension button.</td>
<td>Dial tone heard through one-way speaker.</td>
<td>LCD next to extension number is solid.</td>
<td></td>
</tr>
</tbody>
</table>

2. Dial desired number. Ringing or busy heard through one-way speaker. Dailed number.

3. When you hear called party's voice, lift handset to talk.

- **OR-**

If you hear a busy signal or if no one answers, press RLS to disconnect.
PLACING A CALL: WITH HANDSET OUT OF THE CRADLE

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
<th>DISPLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lift handset</td>
<td>Dial tone</td>
<td>LCD next to extension number is solid.</td>
<td>LCD indicator*</td>
</tr>
<tr>
<td>2. Dial desired number.</td>
<td></td>
<td></td>
<td>Dialed number</td>
</tr>
<tr>
<td>2. Lift handset.</td>
<td>Dial tone through one-way speaker.</td>
<td>LCD next to extension number is solid.</td>
<td>LCD indicator*</td>
</tr>
<tr>
<td>3. Dial desired number.</td>
<td></td>
<td></td>
<td>Dialed number</td>
</tr>
</tbody>
</table>

DIALING INSTRUCTIONS:

To call UNITS for phone HELP or REPAIRS: Dial - "2-UNIT" or "2-8648".

To call MAIN CAMPUS: Dial - "2" then the 4-digit extension number.

To call a UNITS DEPARTMENT INTERNAL EXTENSION: Dial - "4" then the 4-digit extension number.

To call UNIVERSITY HOSPITALS or RESIDENCE & DINING HALLS: Dial - "3" then the 4-digit extension number.

To call LOCAL OFF-CAMPUS (Columbus area): Dial - "5" then the 7-digit number.
**DIALING INSTRUCTIONS (Cont.)**

TO CALL LONG DISTANCE WITHOUT AN AUTHORIZATION NUMBER: Dial "5", then "1", the area code (except in area 614) and the 7 digit number.

TO PLACE A DIRECT INTERNATIONAL CALL: Dial "9", then "011", next the Country code, and then the number.

TO PLACE AN OPERATOR ASSISTED INTERNATIONAL CALL: Dial "9", then "01", next the country code, and then the number.

TO CALL AN OSU OPERATOR: Dial "0".

TO CALL THE COLUMBUS OPERATOR: Dial "9", then "0".

TO CALL COLUMBUS INFORMATION & AREA CODE 614 INFORMATION: Dial "9", then "411".

TO CALL LONG DISTANCE INFORMATION: Dial "9", the area code, and then "555-1212".

TO CALL LONG DISTANCE INFORMATION: Dial "9" "1" "9" the area code, and then "555-1212".

---

**HOLD**

The HOLD/AUTOMATIC HOLD feature permits you to place or receive a call while putting an established call on hold.

**USING HOLD TO ANSWER ANOTHER CALL**

You are speaking with someone and another call comes in on another extension number.

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MANUAL HOLD</strong></td>
<td>LCD Indicators</td>
<td>DISPLAY</td>
</tr>
<tr>
<td>1. Press the HOLD button.</td>
<td>One short &quot;buzz&quot; through one-way speaker</td>
<td>LCD next to extension flashes slowly indicating a new call.</td>
</tr>
<tr>
<td>2. Press the extension button next to the slowly flashing LCD.</td>
<td>LCD next to extension flashes quickly</td>
<td>Clears</td>
</tr>
<tr>
<td>3. Press the extension button next to the slowly flashing LCD.</td>
<td>LCD next to first call flashes quickly</td>
<td>Calling number</td>
</tr>
</tbody>
</table>
### HOLD (Cont.)

#### USING HOLD TO ANSWER ANOTHER CALL

You are speaking with someone and another call comes in on another extension number.

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
<th>DISPLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTOMATIC HOLD</td>
<td>One short buzz through one-way speaker</td>
<td>LCD next to extension flashes slowly indicating a new call</td>
<td>LCD Indicators</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Press the extension button next to slowly flashing LCD.</td>
<td>LCD next to first extension flashes quickly.</td>
<td>Calling number</td>
<td></td>
</tr>
<tr>
<td>3 You're connected with the second call and the first call is automatically on hold</td>
<td>LCD next to second extension is solid.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 To return to original caller, press the extension button next to the quickly flashing LCD</td>
<td>LCD next to the extension is solid</td>
<td>Number of original call</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** To terminate a call on hold, first press the extension next to the quickly flashing LCD, then press RLS or hang up.

### HOLD (Cont.)

#### USING HOLD TO PLACE ANOTHER CALL

You are speaking to someone and you want to hold this call while you place another call.

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
<th>DISPLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press the Hold button.</td>
<td></td>
<td>LCD next to original extension flashes quickly.</td>
<td>LCD Indicators</td>
</tr>
<tr>
<td>1</td>
<td>Dial tone</td>
<td>LCD next to extension is solid.</td>
<td>Cears</td>
</tr>
<tr>
<td>2 Press an unused extension button.</td>
<td>Dial tone</td>
<td>LCD next to original extension flashes quickly.</td>
<td>Cears</td>
</tr>
<tr>
<td>1. Press an unused extension button. This automatically puts first caller on hold.</td>
<td>Dial tone</td>
<td>LCD next to original extension flashes quickly.</td>
<td>Cears</td>
</tr>
<tr>
<td>2 Dial the second party</td>
<td></td>
<td>LCD next to extension is solid</td>
<td></td>
</tr>
<tr>
<td>3 To return to original caller, press extension button next to quickly flashing LCD</td>
<td>LCD next to number is solid</td>
<td>Number of original caller</td>
<td></td>
</tr>
</tbody>
</table>
LISTEN ON HOLD: When the person you are talking to places you on hold, you are able to place your handset in the cradle and hear through the one-way speaker when the party returns to the telephone.

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Press the HOLD button</td>
<td>LCD next to extension flashes quickly</td>
<td>Clear</td>
</tr>
<tr>
<td>2. Place handset in cradle</td>
<td>LCD is solid</td>
<td>Number reappears</td>
</tr>
<tr>
<td>3. Press button next to the handset</td>
<td>Hear other party's voice through one-way speaker</td>
<td></td>
</tr>
<tr>
<td>4. Lift handset and continue conversation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CALL TRANSFER**

CALL TRANSFER allows you to route a call to another UNITS extension number.

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. On an established call, depress CONF 3, call goes on &quot;hold.&quot;</td>
<td>Hear 3 beeps and a dial tone</td>
<td>LCD at CONF 3 is solid</td>
</tr>
<tr>
<td>2. Dial the UNITS extension to which you are transferring</td>
<td>LCD at extension flashes quickly</td>
<td></td>
</tr>
<tr>
<td>3. When party answers, announce transfer of call.</td>
<td>Hear ringing</td>
<td>Called number</td>
</tr>
<tr>
<td>4. Depress CONF 3 to connect all parties.</td>
<td>LCD at CONF 3 disappears</td>
<td>++ + + + +</td>
</tr>
<tr>
<td>5. Inform parties call is transferred</td>
<td>LCD at extension is solid</td>
<td></td>
</tr>
<tr>
<td>6. To complete the transfer, depress RLS button and hang up. Call is transferred and you are disconnected from call.</td>
<td>LCD at extension disappears</td>
<td>Clear</td>
</tr>
</tbody>
</table>
### THREE WAY CONFERENCE

**WHAT TO DO** | **WHAT YOU HEAR** | **WHAT YOU SEE** | **DISPLAY**
---|---|---|---
1. You're talking with someone and want to add a third party to your conversation. | LCD next to number is solid. | LCD next to CONF 3. caller goes on "hold". | LCD indicator.
2. Depress CONF 3. caller goes on "hold". | Hear 3 beeps and a dial tone. | LCD next to CONF 3 is solid. LCD next to extension flashes quickly. | Display.
3. Dial number of third party. | Calling. | Called number. | LCD indicator.

If the number is busy, depress RLS button and number next to the flashing LCD to return to the original call.

### THREE WAY CONFERENCE (Cont.)

**WHAT TO DO** | **WHAT YOU HEAR** | **WHAT YOU SEE** | **DISPLAY**
---|---|---|---
4. When the third party answers, you may consult privately before completing the 3-way conference. The original party can't hear the conversation. | LCD at CONF 3 disappears. LCD at RLS flashes. LCD at extension is solid. | LCD at CONF 3 disappears. LCD at RLS flashes. LCD at extension is solid. | LCD indicator.
5. Depress CONF 3 button to connect all parties. | LCD at CONF 3 disappears. LCD at RLS flashes. LCD at extension is solid. | LCD at CONF 3 disappears. LCD at RLS flashes. LCD at extension is solid. | LCD indicator.

**NOTE:** At least one telephone must be in UNITS to access a 3-way conference. You may establish a 3-way conference with parties outside UNITS. The maximum number of parties in a conference is three.
GET A BUSY SIGNAL OR NO ANSWER? This feature allows you to return to your original party when you are trying to establish a call transfer, three-way conference or consultation.

**WHAT TO DO**

**WHAT YOU HEAR**

A busy signal or ringing particle to whom you are transferring doesn't answer.

1. Depress the RLS button.

Hear silence (busy signal or ringing stops).

LCD next to extension flashes.

2. Depress the extension number to return to original call.

LCD next to extension is solid.

---

CONSULTATION allows you to put a caller on 'hold' while you talk privately with a third party.

**WHAT TO DO**

**WHAT YOU HEAR**

Hear 3 beeps and a dial tone.

1. On an established call, depress CONF 3 button. Caller is put on "hold."

Hear ringing.

2. Dial third party's number.

When third party answers, consult privately. The original party is on hold and can't hear the conversation.

3. When third party answers, consult privately. The original party is on hold and can't hear the conversation.

To return to the original party, press the extension button next to the flashing LCD. The "consult" call is placed on hold.

4. To return to the original party.

Depress CONF 3 to return to the consultation call.

5. Depress CONF 3 to return to the consultation call.

**WHAT YOU SEE**

LCD indicators

LCD next to CONF 3 is solid.

LCD next to extension flashes quickly.

LCD at CONF 3 flashes quickly.

Consult number

NOTE: You may "no-hold" between the conference and the consult call as many times as you desire.
CALL FORWARD PREPROGRAMMED

CALL FORWARD, PRE-PROGRAMMED is a feature installed by UNITS upon request. It functions when you are using your telephone and/or if you are out of your office.

CALL FORWARD BUSY

When calling an extension that has call forward busy and that party is on the line, you will hear ringing. Your call will be routed to another extension within the department.

NOTE: If you hear a busy signal both parties are busy.

CALL FORWARD DON'T ANSWER

When you call a UNITS extension and it rings five times without being answered, your call is automatically routed to another telephone within the department.

CALL PICKUP

UNIVERSAL CALL PICKUP allows you to answer a ringing telephone in your call pickup group without leaving your desk.

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
<th>LCD Indicators</th>
<th>DISPLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ringing of a telephone in your call pickup group</td>
<td>LCD next to extension is solid.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Lift handset</td>
<td>Hear a dial tone</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Press CALL PICKUP button
   - The call is automatically routed to your phone and you are connected.
   - Calling number
   - and
   - other UNITS extension

4. Answer the call in your normal manner.

NOTE: If you hear a last busy signal when trying to activate this feature, someone in your pickup group has simultaneously answered the call.
MESSAGE WAITING is the feature that allows the central answering point to activate a "message waiting" indication on a telephone if the number is busy or does not answer.

**TO ACTIVATE MESSAGE WAITING**

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
<th>DISPLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lift handset.</td>
<td>Hear dial tone.</td>
<td>LCD next to extension is solid.</td>
<td></td>
</tr>
<tr>
<td>2. Dial desired number.</td>
<td>Ringing or busy signal</td>
<td></td>
<td>Number dialed</td>
</tr>
<tr>
<td>3. Depress CONF 3 button, and press Star (*) 82.</td>
<td>3-beeps and a dial tone</td>
<td>Beeps and silence</td>
<td>Activation code</td>
</tr>
</tbody>
</table>

Party is notified that a message is waiting.

**MESSAGE WAITING (Cont.)**

**TO DEACTIVATE A MESSAGE WAITING INDICATION YOU INITIATED**

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
<th>DISPLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lift handset.</td>
<td>Dial tone</td>
<td>LCD next to extension is solid.</td>
<td></td>
</tr>
<tr>
<td>2. Press Star (*) 85</td>
<td>3 beeps and a dial tone</td>
<td>Activation code</td>
<td></td>
</tr>
<tr>
<td>3. Dial number of person for whom message was left</td>
<td>Beeps and silence</td>
<td>Requested number</td>
<td></td>
</tr>
</tbody>
</table>
MESSAGE WAITING (Cont.)

If an answering point activates your message waiting LCD, you may retrieve your messages or deactivate your LCD.

MESSAGE RETRIEVAL

WHAT TO DO
1. Lift handset.
2. Press Star (\*) 83.
3. When conversation is finished, replace handset in cradle.

WHAT YOU HEAR
LCD next to MSG
Hear dial tone.
Ringing
Beeps and silence

WHAT YOU SEE
WAITING is solid.
LCD next to extension is solid.
Characters displayed
LCD next to MSG.
WAITING disappears.

DISPLAY

You are automatically connected to the answering point where your messages are waiting.

WHAT TO DO
4. Identify yourself to the other party and explain you are retrieving your messages.

WHAT YOU HEAR

WHAT YOU SEE

DISPLAY

MESSAGE WAITING (Cont.)

DEACTIVATE MESSAGE WAITING

WHAT TO DO
1. Lift handset.
2. Press Star (\*) 84.
3. Return handset to cradle.

WHAT YOU HEAR
Hear dial tone.
Beeps and silence

WHAT YOU SEE
LCD next to MSG
WAITING is solid.
Characters displayed

DISPLAY

You may deactivate your LCD.
**RING AGAIN**

RING AGAIN notifies you when a busy UNIT extension is free and dials it automatically.

### WHAT TO DO

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Dial UNIT extension number</td>
<td>Hear busy signal</td>
<td>LCD next to RING AGAIN is solid, LCD next to extension disappears.</td>
</tr>
<tr>
<td>2. Depress RING AGAIN button once</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**WHILE WAITING TO BE NOTIFIED THE LINE IS FREE, YOU MAY MAKE OR RECEIVE CALLS**

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td>Hear Ring Again tone, one short buzz, through one-way speaker indicating the busy number is free.</td>
<td>LCD next to RING AGAIN flashes.</td>
</tr>
<tr>
<td>4. Lift handset or press unused extension number</td>
<td>Dial tone</td>
<td>LCD next to extension is solid.</td>
</tr>
<tr>
<td>5. Depress RING AGAIN button. The number is automatically dialed</td>
<td>Ringing</td>
<td>LCD next to RING AGAIN disappears. Number called.</td>
</tr>
</tbody>
</table>

### RING AGAIN (Cont.)

**OR:**

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Depress RING AGAIN button</td>
<td>Busy signal</td>
<td>LCD next to RING AGAIN disappears.</td>
</tr>
<tr>
<td>6. Depress RING AGAIN button another time</td>
<td></td>
<td>LCD next to RING AGAIN is solid.</td>
</tr>
</tbody>
</table>

**TO DEACTIVATE**

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Depress the RING AGAIN button again before you receive your RING AGAIN notification ring</td>
<td></td>
<td>LCD next to RING AGAIN disappears. Feature request is deleted.</td>
</tr>
</tbody>
</table>

**OR:**

1. RING AGAIN tone | LCD next to RING AGAIN flashes. |

2. Don't respond to RING AGAIN tone | LCD next to RING AGAIN disappears. |

**NOTE:** If you press the RING AGAIN button and hear a busy signal, the other party has lifted the phone to place or receive a call. Activate RING AGAIN a second time. When you hear the RING AGAIN notification, press the RING AGAIN button immediately. If you delay, the feature will de-activate or the party you're calling may use the phone again and you'll get a busy signal.
CALL FORWARD PROGRAMMABLE

CALL FORWARD PROGRAMMABLE is an optional feature that forwards calls made to your telephone to another UNITS extension number.

TO ACTIVATE

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCD Indicators</td>
<td>LCD next to CALL FWD</td>
<td>Displays quickly.</td>
</tr>
</tbody>
</table>

WHEN PROGRAMMING CALL FORWARD, YOU WILL NOT HEAR A DIAL TONE

1. Without lifting the handset, depress the CALL FWD button once.

2. Dial the UNITS number to which your calls will be forwarded.

3. Depress CALL FWD button again.

ALL CALLS MADE TO YOUR NUMBER ARE AUTOMATICALLY FORWARDED. YOU MAY STILL PLACE CALLS

4. Verify CALL FWD has been entered correctly by dialing your own number.

5. Tell the person answering that calls are forwarded to their telephone.

NOTE: YOU MUST VERIFY THE CALL FORWARD FEATURE EVERY TIME YOU USE IT.

TO DEACTIVATE FEATURE

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCD Indicators</td>
<td>LCD next to CALL FWD</td>
<td>Disappears.</td>
</tr>
</tbody>
</table>

NOTE: If you call forward to the same number regularly, you do not need to reprogram that number each time. Simply depress the CALL FWD button TWICE, and your calls go automatically to that number.

VERIFY THE CALL FORWARD FEATURE BY DIALED YOUR OWN NUMBER.

CALLS ARE FORWARDED TO YOUR TELEPHONE

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCD Indicators</td>
<td>LCD next to extension</td>
<td>Calling number is located on right of display.</td>
</tr>
</tbody>
</table>

1. Someone calls a number that is forwarded to you

RINGING

LCD next to extension flashes slowly.
SPEED CALL is the optional feature that allows you to program a list of frequently called numbers and then dial them automatically by a one or two digit code.

**TO PROGRAM CHANGE SPEED CALL LIST**

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
<th>DISPLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Without lifting handset, depress SPEED CALL button</td>
<td>LCD next to SPEED CALL flashes quickly.</td>
<td>All numbers entered</td>
<td>LCD Indicators</td>
</tr>
<tr>
<td>2. Dial the one digit code assigned to the stored number (0-9).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OR. If your station is the controller, dial the two digit code assigned to the stored number (00-69).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Dial the number to be stored, then press Pound (#) sign.</td>
<td>LCD next to SPEED CALL clears</td>
<td>Clear</td>
<td></td>
</tr>
<tr>
<td>4. Depress SPEED CALL button.</td>
<td>LCD next to SPEED CALL button disappears.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** To program more numbers or change existing ones, repeat the procedure for each entry. Remember: use a different code for each number to be stored. The maximum number of digits that can be stored per entry is 24; this includes dialing "9" for outside calls.

**TO USE SPEED CALL LISTS**

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
<th>DISPLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Press unused extension.</td>
<td>Dial tone</td>
<td>LCD next to extension disappears.</td>
<td>LCD Indicators</td>
</tr>
<tr>
<td>2. Depress SPEED CALL button.</td>
<td>LCD next to SPEED CALL is solid.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Dial the one or two digit number to be dialed.</td>
<td>LCD next to SPEED CALL disappears.</td>
<td>Code and programmed number</td>
<td></td>
</tr>
</tbody>
</table>

**TO DELETE A SPEED CALL NUMBER**

<table>
<thead>
<tr>
<th>WHAT TO DO</th>
<th>WHAT YOU HEAR</th>
<th>WHAT YOU SEE</th>
<th>DISPLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Without lifting handset, depress SPEED CALL button.</td>
<td>LCD next to SPEED CALL button flashes quickly.</td>
<td></td>
<td>LCD Indicators</td>
</tr>
<tr>
<td>2. Dial the one or two digit code assigned to the stored number.</td>
<td></td>
<td>All digits entered</td>
<td></td>
</tr>
<tr>
<td>4. Depress SPEED CALL button.</td>
<td>LCD next to SPEED CALL disappears.</td>
<td>Clear</td>
<td>LCD Indicators</td>
</tr>
</tbody>
</table>

**NOTE:** You can override existing stored numbers by following programming instructions.
GROUP INTERCOM

GROUP INTERCOM (GIC) is the optional feature permitting you to call another person in your intercom group by dialing a one or two digit code.

TO PLACE A GROUP INTERCOM CALL

WHAT TO DO
1. Depress I/C group button.
2. Dial the one or two digit code assigned to the person in your group.
3. Lift handset.

WHAT YOU HEAR
1. Dial tone
2. Ringing

WHAT YOU SEE
1. LCD next to I/C button is solid.
2. Diated number.

TO RECEIVE A GROUP INTERCOM CALL

1. Ringing
2. Depress I/C button.
3. Lift handset for a two-way conversation.

WHAT YOU SEE
1. LCD next to I/C flashes slowly.
2. Calling number is solid.

MAKE SET BUSY

MAKE SET BUSY is an optional feature that allows you to make your telephone appear busy to all incoming calls.

TO ACTIVATE

WHAT TO DO
1. Depress the MAKE BUSY button once.

WHAT YOU HEAR
1. LCD next to MAKE BUSY button is solid.

TO DEACTIVATE

1. Depress the MAKE BUSY button once.

WHAT YOU SEE
1. LCD next to MAKE BUSY button disappears.

NOTE: You may still place calls while Make Set Busy is activated.
### SPEED CALL SHORT LIST

<table>
<thead>
<tr>
<th>SPEED CALL CODE</th>
<th>NAME</th>
<th>TELEPHONE NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### CALL PICKUP GROUP

<table>
<thead>
<tr>
<th>NAME</th>
<th>TELEPHONE NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
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</table>

**NOTES**
APPENDIX F

INTERVIEW AND FOCUS GROUP GUIDES
Coordinator Interview Guide

* Brief interviewee on purpose of study; relationship with Telephone Services; explain procedures for reporting information to Telephone Services.

* Assure anonymity; secure permission to tape.

QUESTIONS:
1) How did you become the coordinator for the new telephone system in your department?
2) Please briefly describe what you think your job as coordinator is. Describe significant activities of your job as coordinator.
3) How is this different than what you originally thought your job as coordinator would be?
4) What do you think your job as coordinator should be?
5) Please briefly describe the procedures you experienced at the coordinator orientation and training sessions you attended. Length, level of complexity, timing (from cut over day); trialability.
6) What part(s) of the training session(s) did you find most useful, and why?
7) What part(s) of the training session did you find least useful, and why?
8) What parts of the documentation do you find most useful, and why?
9) What parts of the documentation do you find least useful, and why?
10) Please describe the procedures whereby the features for the telephones within your department were selected for particular individuals (needs assessment). How were the end-users involved? — what contributions? Who made the final decisions?
11) (Since there have been instances reported where faculty/staff have not participated in training sessions) How can faculty/staff be encouraged to participate in training?
12) How should information about the new system be communicated to users?
   - awareness, skills, etc.

13) Is there any reward structure within your department for compensating the efforts of the coordinator?

14) What might encourage a coordinator to devote additional efforts toward facilitating departmental implementation?

15) Would you be willing to meet with other coordinators and share experiences/ideas?

16) Would you be willing to share your own experiences/ideas with new coordinators?

17) Are there any additional issues you would like to address that we have not covered?
Current User Interview Guide

*Brief interviewee on purpose of study; relationship with Telephone Services; explain procedures for reporting information to Telephone Services.
* Assure anonymity; secure permission to tape.

QUESTIONS:

1) Describe early experiences.
   -think back to the first day the new phone was on your desk.
   -did you try any of the new features?
   -was the phone easier or more complicated than you expected?
   -what successes and failures did you experience in trying to use the features?
   -what do you wish you knew then that you did not? (prior awareness)

2) What is your impression of what others feel about the new phones?
   -what attitudes/experiences have you heard from your colleagues?
   -how do you think these attitudes are formed? -- experience?
     -- testimony?
   -are there similarities or differences between these and your impressions?

3) What do you think the role of the departmental coordinator should be?
   -creating awareness, helping others understand the purpose and functions of the technology?
   -needs assessment (extent of end user consultation)?
   -training, troubleshooting?
   -continuing education (how should information about changes, new features, etc. be communicated to users)?
   -by what mechanisms would you be most receptive to information?
4) Did you attend training? If so, please briefly describe the procedures you experienced at the training session you attended. -length, level of complexity, timing (from cut over day); trialability.

5) What part(s) of the training session(s) did you find most useful, and why?

6) What part(s) of the training session did you find least useful, and why?

7) If you did not attend, what were the reasons?

8) What might have encouraged you to attend training?

9) What parts of the documentation do you find most useful, and why?

10) What parts of the documentation do you find least useful, and why?

11) What might be the most effective teaching/learning strategies for you and other users?

12) Are there any other issues you would like to address that we have not covered?
Focus Group Guide

*Introduce self; explain purpose of focus group.

*Assure anonymity; secure permission to tape; explain relationship with Telephone Services and methods of reporting information to Telephone Services.

*Round of introductions, job responsibilities.

QUESTIONS:

1) Describe early experiences.
   -think back to the first day the new phone was on your desk.
   -did you try any of the new features?
   -was the phone easier or more complicated than you expected?
   -what successes and failures did you experience in trying to use the features?
   -what do you wish you knew then that you did not? (prior awareness)

2) What is your impression of what others feel about the new phones?
   -what attitudes/experiences have you heard from your colleagues?
   -how do you think these attitudes are formed? -- experience?
     -- testimony?
   -are there similarities or differences between these and your impressions?

3) What do you think the role of the departmental coordinator should be?
   -creating awareness, helping others understand the purpose and functions of the technology?
   -needs assessment (extent of end user consultation)?
   -training, troubleshooting?
   -continuing education (how should information about changes, new features, etc. be communicated to users)?
   -by what mechanisms would you be most receptive to information?

4) Relate examples of reluctance to attend training. Why do you think individuals might be reluctant to attend training and learn about the new telephones?
5) What might encourage reluctant individuals to attend training?
6) What might be other effective teaching/learning strategies for you and others?
7) Are there any other issues you would like to address that we have not covered?
Future User Focus Group and Interview Guide

*Introduce self; explain purpose of focus group/interview.
*Assure anonymity; secure permission to tape; explain relationship with Telephone Services and methods of reporting information to Telephone Services.
*Round of introductions, job responsibilities (if necessary).

QUESTIONS:
1) What have you heard from current users about the new phone system?
   -interpersonal, media.
2) What exposure have you had to information distributed by Telephone Services?
   -documentation, etc.
3) What stage of implementation are you currently in?
   -ordered phones?
   -attended orientation or training?
4) What do you expect the phone system to be able to do for you that the current system cannot? Is there anything that you think the new system will not be able to do as well as the current system?
5) What would you like the new system to be able to do?
6) What type of training or learning strategies do you think will be necessary to enable you to use the telephone as you would like to?
7) Are there any other issues you would like to address that we have not covered?
July 31, 1986

From: Steve R. Levitt
Dept. of Communication
154 N. Oval Mall-205 Derby Hall
422-8940 (O); 459-0244 (H)

Attached is one version of a short survey about the new telephone service at Ohio State and your experiences with it so far. We need to gather information in order to be sure that this new telephone system continues to meet the needs of present and future users and their Departments. Results of this survey, and recommendations based on the results will be communicated to Telephone Services. In order to accomplish this, we need your help.

Would you please take a few minutes to fill out the survey and return it to your departmental UNITS coordinator by Wed. Aug. 6. If for some reason you are unable to complete the survey by this date, your input will still be useful. Please return it to your coordinator, or mail it to me via campus mail at the above address as soon as you are able.

Thank you very much for your valuable input. Not only will you be facilitating the smooth transition to the new telephone system for your colleagues, but will be providing information which could have positive effects on your own department.

Sincerely,

Steve R. Levitt
I) INSTRUCTIONS: Please think about each of the three office machines presented on the first two pages. Then place an "X" on the scale that represents how you feel about the technology.

COMPUTER/WORD PROCESSOR

important | unimportant
of no concern | of concern to me
irrelevant | relevant
means a lot to me | means nothing to me
useless | useful
valuable | worthless
trivial | fundamental
beneficial | not beneficial
doesn't matter
matters to me | interested
uninterested | not beneficial
significant | significant
vital | superfluous
boring | interesting
unexciting | exciting
appealing | appealing
mundane | fascinating
essential | nonessential
undesirable | desirable
wanted | unwanted
not needed | needed
### TELEPHONE

<table>
<thead>
<tr>
<th>important</th>
<th>of no concern</th>
<th>unimportant</th>
<th>of concern to me</th>
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<tbody>
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<td>irrelevant</td>
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<td>relevant</td>
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<td>needed</td>
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</table>

### COPY MACHINE

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</table>
II) Which telephone do you have? (check the appropriate space).

a. single-line ("standard" looking phone with 12 push buttons and "tap" button) ____
b. executive (larger phone with a column of buttons on the right in addition to the 12 push buttons; 2 lines) ____
c. electronic high usage (same as executive, but with 3 lines) ____
d. electronic answering point (same as executive, but with 4 lines) ____
e. not sure ____

III) Please mark an 'X' next to each feature of the telephone system, indicating how often you use the feature per week:

<table>
<thead>
<tr>
<th>Feature</th>
<th>0-5</th>
<th>6-10</th>
<th>11-15</th>
<th>more than 15</th>
<th>don't have</th>
<th>not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. call pick-up</td>
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<td>2. call transfer</td>
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<td>3. 3-way conference</td>
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<td>4. call forward:</td>
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<td>a. if line is busy</td>
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<td>b. if no answer</td>
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<tr>
<td>c. user programs number</td>
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<tr>
<td>5. message waiting</td>
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<td>6. ring again</td>
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<td>7. call waiting</td>
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<td>8. intercom</td>
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<td>9. speed dialing</td>
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<td>10. make set busy</td>
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<tr>
<td>11. speakerphone</td>
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<td>12. call park</td>
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</tbody>
</table>

IV) Of those features that you do have, but do not use, write in the number of the feature (from above question III) next to the appropriate reason(s) why you do not use this feature.

a. don't really have need for it_____________________________________________________

b. don't know how to use it_____________________________________________________

c. others I need to communicate with don't have the feature______________________

d. too complicated/time consuming_____________________________________________

e. other reasons (please use this space and the back if necessary to explain why you do not use these features more).
V) Please estimate the percent of your weekly office task time engaging in these types of communication:

<table>
<thead>
<tr>
<th>Face-to-face</th>
<th>Document</th>
<th>Telephone</th>
<th>Other</th>
</tr>
</thead>
</table>

VI) Please estimate the percent of your weekly telephone time engaging in these communication actions:

a. Seeking information
b. Giving information
c. Problem solving

VII) Which of the following category best describes your primary function or job responsibility

- administrator
- faculty
- clerical staff
- technical staff

VIII) Most of us communicate with persons inside our unit and outside our unit. These people could be classified as: students, faculty, staff, administrators, and non-university personnel. Please rank order the frequency with which you communicate over the phone with each group. Assign each group one ranking. The group with whom you communicate the most frequently would be ranked one (1); the second most frequent two (2); ... and the least frequently would be ranked five (5).

<table>
<thead>
<tr>
<th>INSIDE</th>
<th>OUTSIDE</th>
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<tbody>
<tr>
<td>STUDENTS</td>
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<td>FACULTY</td>
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<td>ADMINISTRATORS</td>
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<td>NON-UNIVERSITY</td>
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</tbody>
</table>

IX) Now think about who initiates the communication most often— you or a member of one of these groups. Are the majority of conversations over the phone initiated by you or by them?

<table>
<thead>
<tr>
<th>BY ME</th>
<th>BY THEM</th>
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<tbody>
<tr>
<td>STUDENTS</td>
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</table>

X) With which group do you communicate most often over the telephone on your job?

<table>
<thead>
<tr>
<th>INSIDE UNIT</th>
<th>OUTSIDE UNIT</th>
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</table>

XI) With which group do your interactions over the telephone typically last the longest?

<table>
<thead>
<tr>
<th>INSIDE UNIT</th>
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XII) Did you attend training? yes____ no____

If not, what might have encouraged you to attend training?
July 31, 1986

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Dept. of Communication  
154 N. Oval Mall–205 Derby Hall  
422-8940 (O), 459-0244 (H)

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<td>a. if line is busy</td>
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<td>b. if no answer</td>
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<td>c. user programs number</td>
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<td>5. message waiting</td>
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<td>6. ring again</td>
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III) Of those features that you do have, but do not use, write in the number of the feature (from above question II) next to the appropriate reason(s) why you do not use this feature.

a. don't really have need for it

b. don't know how to use it

c. others I need to communicate with don't have the feature

d. too complicated/time consuming

e. other reasons (please use this space and the back if necessary to explain why you do not use these features more).
Please estimate the percent of your weekly office task time engaging in these types of communication:

- Face-to-face
- Document
- Telephone
- Other

Please estimate the percent of your weekly telephone time engaging in these communication actions:

- a. Seeking information
- b. Giving information
- c. Problem solving

Which of the following category best describes your primary function or job responsibility?

- Administrator
- Faculty
- Clerical Staff
- Technical Staff

Most of us communicate with persons inside our unit and outside our unit. These people could be classified as: students, faculty, staff, administrators, and non-university personnel. Please rank order the frequency with which you communicate over the phone with each group. Assign each group one ranking. The group with whom you communicate the most frequently would be ranked one(1); the second most frequent two(2), ... and the least frequently would be ranked five(5).

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Now think about who initiates the communication most often you or a member of one of these groups. Are the majority of conversations over the phone initiated by you or by them?

- By Me
- By Them

With which group do you communicate most often over the telephone on your job?

INSIDE UNIT
OUTSIDE UNIT

With which group do your interactions over the telephone typically last the longest?

INSIDE UNIT
OUTSIDE UNIT

Did you attend training? yes  no
If not, what might have encouraged you to attend training?
This question has 30 parts based on the typical factors affecting employee’s attitude towards implementation of a new technology. When your department implemented the new telephone, to what degree was each of the 30 reasons a factor in your attitude toward the change? Please rate each factor on a scale of zero to five, with zero (0) indicating you strongly agree, and five (5) indicating you strongly disagree.

Please respond to all 30 items. It is important to rate each factor even if you are not sure about some or if some have no significance for your situation.

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>RATINGS</th>
<th>FACTORS</th>
<th>RATINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The technology was not needed.</td>
<td>0 1 2 3 4 5</td>
<td>9. My capacity to meet production standards would be hampered while converting to the new system.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>2. I was not involved in the planning.</td>
<td>0 1 2 3 4 5</td>
<td>10. My power, influence, responsibility, or authority was being enlarged because of changes brought on by the new telephone.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>3. Communication about the change was clear.</td>
<td>0 1 2 3 4 5</td>
<td>11. The new telephone caused an increase in the level of challenge in the job.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>4. There were many incentives offered for adapting to the changes in operating methods or procedures required by the new telephone.</td>
<td>0 1 2 3 4 5</td>
<td>12. The new telephone caused a decrease in the degree of importance the organization placed on the job.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>5. There was more job security in maintaining the existing methods or procedures.</td>
<td>0 1 2 3 4 5</td>
<td>13. The changes the new telephone required were incompatible with my own beliefs about how the work should be done.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>6. My job status or prestige was threatened by the new telephone.</td>
<td>0 1 2 3 4 5</td>
<td>14. The changes required by the new telephone coincided with the organization’s value.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>7. My economic security was enhanced by the new telephone.</td>
<td>0 1 2 3 4 5</td>
<td>15. Contact with my co-workers was hampered or I felt isolated from others.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>FACTORS</td>
<td>RATINGS</td>
<td>FACTORS</td>
<td>RATINGS</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>15. There was enough money for equipment allocated by the organization to support the new telephone system.</td>
<td>0 1 2 3 4 5</td>
<td>23. The person or group who decided to install the new telephone system could be trusted.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>16. There was not enough training provided by the organization to support the new telephone system.</td>
<td>0 1 2 3 4 5</td>
<td>24. The person or group responsible for implementing the technology could not be trusted.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>17. The timing of implementation or conversion was good.</td>
<td>0 1 2 3 4 5</td>
<td>25. My boss was not really supportive of the new telephone system.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>18. Adapting to the new telephone did not disrupt my work habits.</td>
<td>0 1 2 3 4 5</td>
<td>26. The speed of moving information from place to place was being positively affected by the new telephone.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>19. The University had a history of poorly planned and executed change projects, and this was just another in a long series of failures.</td>
<td>0 1 2 3 4 5</td>
<td>27. The new telephone conversion generated too little, too much, unclear, or unnecessary information.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>20. When learning new skills or concepts required by the new telephone, I did not fear being viewed as incompetent.</td>
<td>0 1 2 3 4 5</td>
<td>28. My day-to-day activities or individual productivity levels had become less accessible to my superiors.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>21. The new telephone would work as planned and that the University would reverse its decision once implementation had taken place.</td>
<td>0 1 2 3 4 5</td>
<td>29. Important portions of my department's budget did not have to be cut back and reallocated to the new telephone system.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>22. The added burden of implementation or converting to the new telephone was too much to handle along with other pressures that already existed in my job.</td>
<td>0 1 2 3 4 5</td>
<td>30. Negative modifications to the physical work area occurred because of the new telephone system.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>31. Other (specify any other reason for your attitude that affected the use of the new telephone).</td>
<td>0 1 2 3 4 5</td>
<td></td>
<td>0 1 2 3 4 5</td>
</tr>
</tbody>
</table>
XIII) From the "factors affecting your attitudes" list you just completed, select the three items that most affected your attitude towards the new telephone system. (Place the number of the reason, i.e. some number between one (1) and thirty-one (31) in the blank beside its ranking).

Most important factor
Second most important factor
Third most important factor

XIV) The purpose of implementing the new telephone system was to (solve a problem and/or take advantage of an opportunity i.e. telecommunications cost savings) within the University. Which of the following statements best describes how resistance to the new telephone affected the technology's intended purpose? (circle only one answer).

Resistance was a major obstacle to achievement of the new telephone system's intended purpose ..................... 01
Resistance was a minor obstacle to achievement of the new telephone system's intended purpose ..................... 02
Resistance was no obstacle to achievement of the new telephone system's intended purpose ..................... 03
July 31, 1986

From: Steve R. Levitt
Dept. of Communication
154 N. Oval Mall-205 Derby Hall
422-8940 (O); 459-0244 (H)

Attached is one version of a short survey about the new telephone service at Ohio State and your experiences with it so far. We need to gather information in order to be sure that this new telephone system continues to meet the needs of present and future users and their Departments. Results of this survey, and recommendations based on the results will be communicated to Telephone Services. In order to accomplish this, we need your help.

Would you please take a few minutes to fill out the survey and return it to your departmental UNITS coordinator by Wed. Aug. 6. If for some reason you are unable to complete the survey by this date, your input will still be useful. Please return it to your coordinator, or mail it to me via campus mail at the above address as soon as you are able.

Thank you very much for your valuable input. Not only will you be facilitating the smooth transition to the new telephone system for your colleagues, but will be providing information which could have positive effects on your own department.

Sincerely,

Steve R. Levitt

Steve R. Levitt
SUB ID _________________________ DEPT. CODE __________________ FORM 3

I) Which telephone do you have? (check the appropriate space).

   a. single-line ("standard" looking phone with 12 push buttons and "tap" button) ______
   b. executive (larger phone with a column of buttons on the right in addition to
      the 12 push buttons; 2 lines) ______
   c. electronic high usage (same as executive, but with 3 lines) ______
   d. electronic answering point (same as executive, but with 4 lines) ______
   e. not sure ______

II) Please mark an "X" next to each feature of the telephone system, indicating how
    often you use the feature per week:

   0-5   6-10  11-15 more than 15 don't have not sure

   1. call pick-up ................. ______ ______ ______ ______ ______ ______
   2. call transfer ................. ______ ______ ______ ______ ______ ______
   3. 3-way conference ............ ______ ______ ______ ______ ______ ______
   4. call forward:
      a. if line is busy ............. ______ ______ ______ ______ ______ ______
      b. if no answer ............... ______ ______ ______ ______ ______ ______
      c. user programs number ... ______ ______ ______ ______ ______ ______
   5. message waiting ............. ______ ______ ______ ______ ______ ______
   6. ring again .................... ______ ______ ______ ______ ______ ______
   7. call waiting ................... ______ ______ ______ ______ ______ ______
   8. intercom ..................... ______ ______ ______ ______ ______ ______
   9. speed dialing .................. ______ ______ ______ ______ ______ ______
  10. make set busy ............... ______ ______ ______ ______ ______ ______
  11. speakerphone ............... ______ ______ ______ ______ ______ ______
  12. call park ..................... ______ ______ ______ ______ ______ ______

III) Of those features that you do have, but do not use, write in the number of the feature
      (from above question II) next to the appropriate reason(s) why you do not use this
      feature.

   a. don't really have need for it ____________________________________________
   b. don't know how to use it ______________________________________________
   c. others I need to communicate with don't have the feature
      _________________________________________________________________
   d. too complicated/time consuming _______________________________________
   e. other reasons (please use this space and the back if necessary to explain why you
      do not use these features more).
IV) Please estimate the percent of your weekly office task time engaging in these types of communication:

- Face-to-face ___
- Document ___
- Telephone ___
- Other ___

V) Please estimate the percent of your weekly telephone time engaging in these communication actions:

- a. Seeking information _________
- b. Giving information _________
- c. Problem solving _________

VI) Which of the following category best describes your primary function or job responsibility:

- administrator ___
- faculty ___
- clerical staff ___
- technical staff ___

VII) Most of us communicate with persons inside our unit and outside our unit. These people could be classified as: students, faculty, staff, administrators, and non-university personnel. Please rank order the frequency with which you communicate over the phone with each group. Assign each group one ranking. The group with whom you communicate the most frequently would be ranked one (1); the second most frequent two (2); ... and the least frequently would be ranked five (5).

<table>
<thead>
<tr>
<th>INSIDE</th>
<th>OUTSIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>STUDENTS</td>
<td>______</td>
</tr>
<tr>
<td>FACULTY</td>
<td>______</td>
</tr>
<tr>
<td>STAFF</td>
<td>______</td>
</tr>
<tr>
<td>ADMINISTRATORS</td>
<td>______</td>
</tr>
<tr>
<td>NON-UNIVERSITY</td>
<td>______</td>
</tr>
</tbody>
</table>

VIII) Now think about who initiates the communication most often: you or a member of one of these groups. Are the majority of conversations over the phone initiated by you or by them?

<table>
<thead>
<tr>
<th>INSIDE</th>
<th>OUTSIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>STUDENTS</td>
<td>______</td>
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<td>______</td>
</tr>
<tr>
<td>STAFF</td>
<td>______</td>
</tr>
<tr>
<td>ADMINISTRATORS</td>
<td>______</td>
</tr>
<tr>
<td>NON-UNIVERSITY</td>
<td>______</td>
</tr>
</tbody>
</table>

IX) With which group do you communicate most often over the telephone on your job?

- INSIDE UNIT ______
- OUTSIDE UNIT ______

X) With which group do your interactions over the telephone typically last the longest?

- INSIDE UNIT ______
- OUTSIDE UNIT ______

XI) Did you attend training? yes____ no____
If not, what might have encouraged you to attend training?
XII. This question has 30 parts based on the typical factors affecting employee's attitudes towards implementation of a new technology. When your department implemented the new telephone, to what degree was each of the 30 reasons a factor in your attitude toward the change? Please rate each factor on a scale of zero to five, with zero (0) indicating you strongly agree, and five (5) indicating you strongly disagree.

Please respond to all 30 items. It is important to rate each factor even if you are not sure about some or if some have no significance for your situation.

<table>
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<tr>
<th>FACTORS</th>
<th>RATINGS</th>
<th>FACTORS</th>
<th>RATINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>strongly agree</td>
<td>strongly disagree</td>
<td>strongly agree</td>
</tr>
<tr>
<td>1. The technology was needed.</td>
<td>0 1 2 3 4 5</td>
<td>9. My capacity to meet production standards would be enhanced while converting to the new system.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>2. I was involved in the planning.</td>
<td>0 1 2 3 4 5</td>
<td>10. My power, influence, responsibility, or authority was being eroded because of changes brought on by the new telephone.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>3. Communication about the change was unclear.</td>
<td>0 1 2 3 4 5</td>
<td>11. The new telephone caused a decrease in the level of challenge in the job.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>4. There were little or no incentives offered for adapting to the changes in operating methods or procedures required by the new telephone.</td>
<td>0 1 2 3 4 5</td>
<td>12. The new telephone caused an increase in the degree of importance the organization placed on the job.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>5. There was less job security in maintaining the existing methods or procedures.</td>
<td>0 1 2 3 4 5</td>
<td>13. The changes the new telephone required were compatible with my own beliefs about how the work should be done.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>6. My job status or prestige was enhanced by the new telephone.</td>
<td>0 1 2 3 4 5</td>
<td>14. The changes required by the new telephone conflicted with the organization's value.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>7. My economic security was threatened by the new telephone.</td>
<td>0 1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Contact with my co-workers was enhanced or I felt less isolated from others.</td>
<td>0 1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### FACTORS

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>RATINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. There was not enough money for equipment allocated by the organization to support the new telephone system.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>16. There was enough training provided by the organization to support the new telephone system.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>17. The timing of implementation or conversion was poor.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>18. Adapting to the new telephone disrupted my work habits.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>19. The University had a history of well planned and executed change projects, and this was just another in a long series of successes.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>20. When learning new skills or concepts required by the new telephone, I feared being viewed as incompetent.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>21. The new telephone would not work as planned and that the University would not reverse its decision once implementation had taken place.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>22. The added responsibility of implementation or converting to the new telephone was not too much to handle along with other pressures that already existed in my job.</td>
<td>0 1 2 3 4 5</td>
</tr>
</tbody>
</table>

### RATINGS

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>RATINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. The person or group who decided to install the new telephone system could not be trusted.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>24. The person or group responsible for implementing the technology could be trusted.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>25. My boss was really supportive of the new telephone system.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>26. The speed of moving information from place to place was being adversely affected by the new telephone.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>27. The new telephone conversion generated the right amount, and necessary information.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>28. My day-to-day activities or individual productivity levels had become too accessible to my superiors.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>29. Important portions of my department's budget had to be cut back and reallocated to the new telephone system.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>30. Positive modifications to the physical work area occurred because of the new telephone system.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>31. Other (specify any other reason for your attitude that affected the use of the new telephone).</td>
<td>0 1 2 3 4 5</td>
</tr>
</tbody>
</table>
XIII) From the "factors affecting your attitudes" list you just completed, select the three items that most affected your attitude towards the new telephone system. (Place the number of the reason, i.e. some number between one (1) and thirty-one (31) in the blank beside its ranking).

Most important factor
Second most important factor
Third most important factor

XIV) The purpose of implementing the new telephone system was to (solve a problem and/or take advantage of an opportunity i.e. telecommunications cost savings) within the University. Which of the following statements best describes how resistance to the new telephone affected the technology's intended purpose? (circle only one answer).

Resistance was a major obstacle to achievement of the new telephone system's intended purpose.
Resistance was a minor obstacle to achievement of the new telephone system's intended purpose.
Resistance was no obstacle to achievement of the new telephone system's intended purpose.
APPENDIX H

FINAL SURVEY FORMS
From: Steve R. Levitt
April 2, 1987

Attached is one version of a short survey about the new telephone service at Ohio State and your experiences with it so far. We need to gather information in order to be sure that this telephone system continues to meet the needs of present and future users and their departments. Results of this survey, and recommendations based on the results will be communicated to Telephone Services. Several beneficial changes for users have already directly resulted from previous information collected and recommendations I have made to Telephone services. In order to continue this success, I need your help.

Would you please take a few minutes to fill out the survey and return it to your departmental UNITS coordinator by Friday April 10. If for some reason you are responding to this letter after this date, your input will still be useful. Please return it to your coordinator, or mail it to me via campus mail at the above address as soon as you are able.

Thank you very much for your valuable input. Not only will you be facilitating the smooth transition to the new telephone system for your colleagues, but will be providing information which could have positive effects on your own telephone service.

Sincerely,

Steve R. Levitt
I) Which telephone do you have? (check the appropriate space).

a. single-line ("standard" looking phone with 12 push buttons and "tap" button) ____

b. executive (larger phone with a column of buttons on the right in addition to the 12 push buttons; 2 lines) ____

c. electronic high usage (same as executive, but with 3 lines) ____

d. electronic answering point (same as executive, but with 4 lines) ____

e. not sure ____

II) Please mark an "X" next to each feature of the telephone system, indicating how often you use the feature per week:

<table>
<thead>
<tr>
<th>Feature</th>
<th>don't have</th>
<th>not sure</th>
<th>0</th>
<th>1-5</th>
<th>6-10</th>
<th>11-15</th>
<th>more than 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. call pick-up</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. call transfer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. 3-way conference</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. call forward:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. if line is busy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. if no answer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. user programs number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. message waiting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. ring again</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. hold</td>
<td></td>
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<td></td>
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<tr>
<td>8. intercom</td>
<td></td>
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</tr>
<tr>
<td>9. speed dialing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. make set busy</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>11. speakerphone</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. call park</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

III) Which of the above features that you do have offers you the most personal benefit? (write the number of the feature in the space) ____

IV) If you could add one of the above features to your telephone, which one would you choose? (write the number of the feature in the space) ____

V) Of those features that you do have, but do not use (from question II above: anything checked in the "0" column), write in the number of the feature next to the appropriate reason(s) why you do not use this feature.

a. don't really have need for it
b. don't know how to use it
c. others I need to communicate with don't have the feature
d. too complicated/time consuming
e. other reasons (please use the back if necessary to explain why you do not use these features).
VI) Please estimate the percent of your weekly office task time engaging in these types of communication:

Face to Face ____ Document ____ Telephone ____ Other (please specify) ____

VII) Please estimate the percent of your weekly telephone time at work engaging in these communication actions:

a. Seeking information ________
   b. Giving information ________
   c. Problem solving ________

VIII) Which of the following category best describes your primary function or job responsibility?

Administrator ____1 Faculty ____2 Clerical Staff ____3 Technical Staff ____4

IX) Please indicate how frequently you use the following instruction/help sources when using features of the new telephone.

never1 rarely2 occasionally3 fairly4 frequently5

a. Instruction manual/flip chart ________ ________ ________ ________ ________
   b. Telephone face-plate ________ ________ ________ ________ ________
   c. Department Coordinator(s) ________ ________ ________ ________ ________
   d. "2-UNIT" phone help line ________ ________ ________ ________ ________
   e. Other (please specify) ________ ________ ________ ________ ________

X) What is your overall attitude towards the new telephone system?

very negative1 negative2 neutral3 positive4 very positive5

XI) What influence, if any, did your exposure to communications about the new telephone system from the information sources listed below have on your attitude towards the new telephone system?

no exposure1 more negative2 somewhat more negative3 much more negative4 no influence4 somewhat more influence5 much more influence6

a. Other users ________ ________ ________ ________ ________ ________
   b. "Lantern" ________ ________ ________ ________ ________ ________
   c. "On Campus" ________ ________ ________ ________ ________ ________
   d. "UNITS Network" ________ ________ ________ ________ ________ ________
    (newsletter)

XII) With which group do you communicate most often over the telephone on your job?

INSIDE DEPT. ____1 OUTSIDE DEPT. ____2

XIII) With which group do your interactions over the telephone typically last the longest?

INSIDE DEPT. ____1 OUTSIDE DEPT. ____2

XIV) Did you attend training? yes1 no0

If not, what might have encouraged you to attend training?
INSTRUCTIONS: Please think about each of the three office machines presented on the remaining two pages. Then place an "X" on the scale (in the blanks, not on the colons that separate the blanks) that represents how you feel about the technology.

**TELEPHONE**

important __:__:__:__:__ unimportant
of no concern __:__:__:__:__ of concern to me
irrelevant __:__:__:__:__ relevant
means a lot to me __:__:__:__:__ means nothing to me
useless __:__:__:__:__ useful
valuable __:__:__:__:__ worthless
trivial __:__:__:__:__ fundamental
beneficial __:__:__:__:__ not beneficial
matters to me __:__:__:__:__ doesn't matter
uninterested __:__:__:__:__ interested
significant __:__:__:__:__ insignificant
vital __:__:__:__:__ superfluous
boring __:__:__:__:__ interesting
unexciting __:__:__:__:__ exciting
appealing __:__:__:__:__ unappealing
mundane __:__:__:__:__ fascinating
essential __:__:__:__:__ nonessential
undesirable __:__:__:__:__ desirable
wanted __:__:__:__:__ unwanted
not needed __:__:__:__:__: needed
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<td>necessary</td>
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<td>essential</td>
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<tr>
<td>important</td>
<td></td>
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</tr>
</tbody>
</table>

**Note:**
- "Meaning to be" refers to the intended meaning or value.
- "Important" indicates something of high significance or importance.
- "Essential" signifies something indispensable or compulsory.
- " Necessary" denotes something required or requisite.
- "Significant" highlights something noteworthy or of great importance.
- "Secondary" refers to something of lesser importance or significance.

**Copy Machine**
From: Steve R. Levitt  
April 2, 1987

Attached is one version of a short survey about the new telephone service at Ohio State and your experiences with it so far. We need to gather information in order to be sure that this telephone system continues to meet the needs of present and future users and their departments. Results of this survey, and recommendations based on the results will be communicated to Telephone Services. Several beneficial changes for users have already directly resulted from previous information collected and recommendations I have made to Telephone services. In order to continue this success, I need your help.

Would you please take a few minutes to fill out the survey and return it to your departmental UNITS coordinator by Friday, April 10. If for some reason you are responding to this letter after this date, your input will still be useful. Please return it to your coordinator, or mail it to me via campus mail at the above address as soon as you are able.

Thank you very much for your valuable input. Not only will you be facilitating the smooth transition to the new telephone system for your colleagues, but will be providing information which could have positive effects on your own telephone service.

Sincerely,

Steve R. Levitt
I) Which telephone do you have? (check the appropriate space).

a. single-line ("standard" looking phone with 12 push buttons and "tap" button) _1_
b. executive (larger phone with a column of buttons on the right in addition to the 12 push buttons; 2 lines) _2_
c. electronic high usage (same as executive, but with 3 lines) _3_
d. electronic answering point (same as executive, but with 4 lines) _4_
e. not sure _5_

II) Please mark an "X" next to each feature of the telephone system, indicating how often you use the feature each week.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Don't Use</th>
<th>Never</th>
<th>0</th>
<th>1-5</th>
<th>6-10</th>
<th>11-15</th>
<th>More than 15</th>
</tr>
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<tr>
<td>1. call pick-up</td>
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<td>2. call transfer</td>
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<td>3. 3-way conference</td>
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<td>4. call forward:</td>
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<td>a. if line is busy</td>
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<td>b. if no answer</td>
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<tr>
<td>c. user programs number</td>
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<tr>
<td>5. message waiting</td>
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<tr>
<td>6. ring again</td>
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<td>7. hold</td>
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<td>8. intercom</td>
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<tr>
<td>9. speed dialing</td>
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<td></td>
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<tr>
<td>10. make net busy</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>11. speakerphone</td>
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<tr>
<td>12. call park</td>
<td></td>
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</tr>
</tbody>
</table>

III) Which of the above features that you do have offers the most personal benefit? (write the number of the feature in the space) ________

IV) If you could add one of the above features to your telephones, which one would you choose? (write the number of the feature in the space) ________

V) Of those features that you do have, but do not use (from question II above; anything checked in the "0" column), write in the number of the feature next to the appropriate reason(s) why you do not use this feature.

a. don't really have need for it
b. don't know how to use it
c. others I need to communicate with don't have the feature
d. too complicated/time consuming
e. other reasons (please use the back if necessary to explain why you do not use these features)
VI) Please estimate the percent of your weekly office task time engaging in these types of communication:

- Face to Face
- Document
- Telephone
- Other (please specify)

VII) Please estimate the percent of your weekly telephone time at work engaging in these communication actions:

- a. Seeking information
- b. Giving information
- c. Problem solving

VIII) Which of the following category best describes your primary function or job responsibility?

- Administrator
- Faculty
- Clerical Staff
- Technical Staff

IX) Please indicate how frequently you use the following instruction/help sources when using features of the new telephone.

- Instruction manual/flip chart
- Telephone face-plate
- Department Coordinator(s)
- "2-UNIT" phone help line
- Other (please specify)

X) What is your overall attitude towards the new telephone system?

- very negative
- negative
- neutral
- positive
- very positive

XI) What influence, if any, did your exposure to communications about the new telephone system from the information sources listed below have on your attitude towards the new telephone system?

- a. Other Users
- b. "Lantern"
- c. "On Campus"
- d. "UNITES Network" (newsletter)

XII) With which group do you communicate most often over the telephone on your job?

- INSIDE DEPT.
- OUTSIDE DEPT.

XIII) With which group do your interactions over the telephone typically last the longest?

- INSIDE DEPT.
- OUTSIDE DEPT.

XIV) Did you attend training? yes

If not, what might have encouraged you to attend training?
This section is about things affecting employee's attitudes towards a new technology. When your department started using the new telephone, to what degree were the following reasons a factor in your attitude toward the change? Please rate each factor on a scale of zero to five, with zero (0) indicating you strongly agree, and five (5) indicating you strongly disagree.

Please respond to all items. It is important to rate each factor even if you are not sure about some or if some have no current significance for your situation.

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>RATINGs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The technology was not needed.</td>
<td>strongly agree/disagree</td>
</tr>
<tr>
<td>2. I was not involved in the planning.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>3. Communication about the change was clear.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>4. There were many incentives offered for adapting to the changes in operating methods or procedures required by the new telephone.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>5. There was more job security in maintaining the existing methods or procedures.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>6. My job status or prestige was threatened by the new telephone.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>7. My economic security was enhanced by the new telephone.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>8. Contact with my coworkers was hampered or I felt isolated from others.</td>
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<td>10. My power, influence, responsibility, or authority was being enlarged because of changes brought on by the new telephone.</td>
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<tr>
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<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>13. The changes the new telephone required were incompatible with my own beliefs about how work should be done.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>14. The changes required by the new telephone were consistent with OSU's values.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>15. There was enough money for equipment allocated by the organization to support the new telephone system.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>16. The University, who decided to adopt the new telephone system, could be trusted.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>17. There was not enough training provided by the organization to support the new telephone system.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>18. The timing of implementation or conversion was good.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>19. Adapting to the new telephone did not disrupt my work habits.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>20. The university had a history of poorly planned and executed change projects, and this was just another in a long series of failures.</td>
<td>0 1 2 3 4 5</td>
</tr>
</tbody>
</table>
21. When learning new skills or concepts required by the new telephone, I did not fear being viewed as incompetent. 0 1 2 3 4 5

22. The new telephone would work as planned and that the University would reverse its decision once implementation had taken place. 0 1 2 3 4 5

23. The added burden of implementation or converting to the new telephone was too much to handle along with other pressures that already existed in my job. 0 1 2 3 4 5

24. Telephone Services, responsible for implementing the telephone system, could not be trusted. 0 1 2 3 4 5

25. My boss was not really supportive of the new telephone system. 0 1 2 3 4 5

26. The speed of moving information from place to place was being positively affected by the new telephone. 0 1 2 3 4 5

27. The new telephone conversion generated too little information. 0 1 2 3 4 5

28. The new telephone conversion generated clear information. 0 1 2 3 4 5

29. The new telephone conversion generated unnecessary information. 0 1 2 3 4 5

30. My day-to-day activities or individual productivity levels had become less accessible to my superiors. 0 1 2 3 4 5

31. Important portions of my department's budget did not have to be cut back and reallocated to the new telephone system. 0 1 2 3 4 5

32. Negative modifications to the physical work area occurred because of the new telephone system. 0 1 2 3 4 5

33. Other (specify any other reason for your attitude that affected your use of the new telephone).

XVI) From the list of "factors affecting your attitudes" you just completed, select the three items that most affected your attitude towards the new telephone system. (Place the number of the reason, i.e. some number between one (1) and thirty-three (33) in the blank beside its ranking).

Most Important Factor _____ Second most Important Factor _____ Third most Important Factor _____

XVII) The purpose of implementing the new telephone system was to control telecommunications cost and improve services for the University. Which of the following statements best describes how resistance to the new telephone affected the technology's intended purpose? (Circle only one answer).

Resistance was a major obstacle to achievement of the new telephone system's intended purpose. 01

Resistance was a minor obstacle to achievement of the new telephone system's intended purpose. 02

Resistance was no obstacle to achievement of the new telephone system's intended purpose. 03
From: Steve R. Levitt

 Attached is one version of a short survey about the new telephone service at Ohio State and your experiences with it so far. We need to gather information in order to be sure that this telephone system continues to meet the needs of present and future users and their departments. Results of this survey, and recommendations based on the results will be communicated to Telephone Services. Several beneficial changes for users have already directly resulted from previous information collected and recommendations I have made to Telephone services. In order to continue this success, I need your help.

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 Sincerely,

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I) Which telephone do you have? (check the appropriate space).

a. single-line ("standard" looking phone with 12 push buttons and "tap" button)  
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      the 12 push buttons; 2 lines)  
   c. electronic high usage  
   d. electronic answering point (same as executive, but with 4 lines)  
   e. got none  

II) Please mark an 'X' next to each feature of the telephone system, indicating how  
    often you use the feature per week:

<table>
<thead>
<tr>
<th>Feature</th>
<th>don't not sure have</th>
<th>I have</th>
<th>0</th>
<th>1-5</th>
<th>6-10</th>
<th>11-15</th>
<th>more</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. call pick-up</td>
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<td>2. call transfer</td>
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<td>4. call forward:</td>
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<td>b. if no answer</td>
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<td>c. user program number</td>
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<td>5. message waiting</td>
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<td>6. ring again</td>
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<td>10. make set busy</td>
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<td>11. speakerphone</td>
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III) Which of the above features that you do have offers you the most personal  
     benefit? (write the number of the feature in the space)  

IV) If you could add one of the above features to your telephone, which one would  
    you choose? (write the number of the feature in the space)  

V) Of those features that you do have, but do not use (from question IIf above:  
    anything checked in the "0" column), write in the number of the feature next to  
    the appropriate reason(s) why you do not use this feature.

   a. don't really have need for it  
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VI) Please estimate the percent of your weekly office task time engaging in these types of communication:

Face to Face ____ Document ____ Telephone ____ Other (please specify) ____

VII) Please estimate the percent of your weekly telephone time at work engaging in these communication actions:

a. Seeking information ________
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   c. Problem solving ________

VIII) Which of the following category best describes your primary function or job responsibility?

Administrator ____ 1 Faculty ____ 2 Clerical Staff ____ 3 Technical Staff ____ 4

IX) Please indicate how frequently you use the following instruction/help sources when using features of the new telephone.

never1 rarely2 occasionally3 fairly4 frequently5

a. Instruction manual/flip chart ________ ________ ________ ________ ________
   b. Telephone face-plate ________ ________ ________ ________ ________
   c. Department Coordinator(s) ________ ________ ________ ________ ________
   d. "2-UNIT* phone help line ________ ________ ________ ________ ________
   e. Other (please specify) ________ ________ ________ ________ ________

X) What is your overall attitude towards the new telephone system?

very negative1 negative2 neutral3 positive4 very positive5

XI) What influence, if any, did your exposure to communications about the new telephone system from the information sources listed below have on your attitude towards the new telephone system?

no more no more somewhat much

exposure1 negative2 negative3 influence4 positive5 positive6

a. Other Users ________ ________ ________ ________ ________ ________
   b. "Lantern" ________ ________ ________ ________ ________ ________
   c. "On Campus" ________ ________ ________ ________ ________ ________
   d. "UNITS Network* ________ ________ ________ ________ ________ ________
     (newsletter)

XII) With which group do you communicate most often over the telephone on your job?

INSIDE DEPT. ____ 1 OUTSIDE DEPT. ____ 2

XIII) With which group do your interactions over the telephone typically last the longest?

INSIDE DEPT. ____ 1 OUTSIDE DEPT. ____ 2

XIV) Did you attend training? yes1 no0

If not, what might have encouraged you to attend training?
XV) This section is about things affecting employee's attitudes towards a new technology. When your department started using the new telephone, to what degree were the following reasons a factor in your attitude toward the change? Please rate each factor on a scale of zero to five, with zero (0) indicating you strongly agree, and five (5) indicating you strongly disagree.

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<thead>
<tr>
<th>FACTORS</th>
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<tbody>
<tr>
<td>1. The technology was needed</td>
<td></td>
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<tr>
<td>2. I was involved in the planning</td>
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<td>3. Communication about the change was unclear</td>
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<tr>
<td>4. There were little or no incentives offered for adapting to the changes in operating methods or procedures required by the new telephone</td>
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<tr>
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<td>17. There was enough training provided by the organization to support the new telephone system</td>
<td></td>
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<tr>
<td>18. The timing of implementation or conversion was poor</td>
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<tr>
<td>19. Adapting to the new telephone disrupted my work habits</td>
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</tr>
<tr>
<td>FACTORS</td>
<td>RATINGS</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>---------</td>
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<td>20. The university had a history of well planned and executed change projects, and this was just another in a long series of successes.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>21. When learning new skills or concepts required by the new telephone, I feared being viewed as incompetent.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>22. The new telephone would not work as planned and that the University would not reverse its decision once implementation had taken place.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>23. The added responsibility of implementing or converting to the new telephone was not too much to handle along with other pressures that already existed in my job.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>24. Telephone Services, responsible for implementing the telephone system, could be trusted.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>25. My boss was really supportive of the new telephone system.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>26. The speed of moving information from place to place was being adversely affected by the new telephone.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>27. The new telephone conversion generated too much information.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>28. The new telephone conversion generated unclear information.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>29. The new telephone conversion generated necessary information.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>30. My day-to-day activities or individual productivity levels had become too accessible to my superiors.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>31. Important portions of my department's budget had to be cut back and reallocated to the new telephone system.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>32. Positive modifications to the physical work area occurred because of the new telephone system.</td>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>33. Other (specify any other reason for your attitude that affected your use of the new telephone).</td>
<td></td>
</tr>
</tbody>
</table>

XVI) From the list of "factors affecting your attitudes" you just completed, select the three Items that most affected your attitude towards the new telephone system. (Place the number of the reason, i.e. some number between one (1) and thirty-three (33) in the blank beside its ranking).

Most important factor________ Second most important factor________ Third most important factor________

XVII) The purpose of implementing the new telephone system was to control telecommunications cost and improve services for the University. Which of the following statements best describes how resistance to the new telephone affected the technology's intended purpose? (Circle only one answer).

Resistance was a major obstacle to achievement of the new telephone system's intended purpose.......01
Resistance was a minor obstacle to achievement of the new telephone system's intended purpose.......02
Resistance was no obstacle to achievement of the new telephone system's intended purpose...........03
APPENDIX I

UNITS TRANSITION DIALING PROCEDURES MEMO
Subject: Transition Dialing Procedures for UNITS
Telecommunications System

Date: December 2, 1985

From: J. Carroll Notestine, Assistant Vice President

To: University Faculty and Staff

Installation of the University Network/Integrated Telecommunications System (UNITS) has reached the point at which telecommunications for the first few UNITS buildings will be managed through the system's new digital switch. The first buildings to be placed on the system include Townshend Hall, Arps Hall, University Hall, Public Safety, Baker Systems Engineering, Lincoln Tower, and Residence Halls. These buildings will have the University's new 292 and 293 telephone exchanges, which will necessitate special dialing procedures during the transition from the old Centrex system to UNITS.

Attached is a chart showing these new procedures. I urge everyone on campus to keep this chart in your faculty and staff telephone directory or posted near the telephone. The chart also was published in the November 21 OSU onCampus.

If you have additional questions, please call the UNITS staff at 9-292 UNIT (9-292-8648).

JCN/sms
# UNITS Transition Dialing Procedures for The Ohio State University

**Effective November 1985**

<table>
<thead>
<tr>
<th>From</th>
<th>To Main Campus Centre Locations*</th>
<th>To Main Campus UNITS (new system) Locations</th>
<th>To University Hospitals Locations</th>
<th>To Residence Halls UNITS (new system) Locations**</th>
<th>Long Distance via PLUS</th>
<th>International Calls</th>
<th>Telephone Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centre (old system) Locations</td>
<td>Dial 2 + last 4 digits</td>
<td>Dial 9 + 292 + last 4 digits (except emergency dial 2-2525)</td>
<td>Dial 134 + last 4 digits</td>
<td>Dial 9 + 293 + last 4 digits</td>
<td>Dial 122 + authorization number + long distance number</td>
<td>Dial 9 + 0 for assistance</td>
<td>Dial 2 + 4141</td>
</tr>
<tr>
<td>UNITS (new system) Locations*</td>
<td>Dial 2 + last 4 digits</td>
<td>Dial 2 + last 4 digits</td>
<td>Dial 3 + last 4 digits</td>
<td>Dial 3 + last 4 digits</td>
<td>Dial 1 + authorization number + long distance number</td>
<td>Dial 9 + 011 + country code + number</td>
<td>Dial 2 + UNIT (2-8848)</td>
</tr>
<tr>
<td>University Hospitals (effective approximately Dec. 1, 1985)</td>
<td>Dial 2 + last 4 digits</td>
<td>Dial 2 + last 4 digits</td>
<td>Dial 3 + last 4 digits</td>
<td>Dial 9 + 293 + last 4 digits</td>
<td>Dial 122 + authorization number + long distance number</td>
<td>Dial 9 + 0 for assistance</td>
<td>Dial 4444</td>
</tr>
<tr>
<td>Residence Halls UNITS (new system) Locations**</td>
<td>Dial 2 + last 4 digits</td>
<td>Dial 2 + last 4 digits</td>
<td>Dial 3 + last 4 digits</td>
<td>Dial 3 + last 4 digits</td>
<td>N/A</td>
<td>N/A</td>
<td>Dial 2 + UNIT (2-8848)</td>
</tr>
</tbody>
</table>

* UNITS customers will not be able to transfer calls to Centre customers.  ** Residence Hall conversion from Centre to UNITS is scheduled for January 1, 1986.

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**Unchanged Dialing Procedures (Identical Service for All Users)**

1. **Off-Campus/Local**
   - Dial 9 + 7-digit number

2. **Direct Long Distance**
   - Dial 9 + 1 + area code (unless area code is 614) and 7-digit number

3. **Long Distance Operator**
   - Dial 8 + 0

4. **University Information Operator**
   - Dial 0

5. **Local Columbus Area Information Operator**
   - Dial 9 + 411

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**How do I know when my phone is on the UNITS system?**

1. The telephone label shows a 292-XXX, 4-XXXX (internal extension number), or 293-XXXX number.

2. A single-line telephone shows the UNITS logo on the right hand side of the telephone face plate.

3. The bottom of the face plate is stamped with the UNITS logo.
LIST OF REFERENCES


Resistance at mid-decade. (1986, January) Information Center, pp. 44-47.


