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The purpose of the investigation was to determine the impact of pilot projects employing multifunction information systems at three Navy facilities. A cross section of the civil service personnel at the three sites (39 support, 44 technical, and 35 managerial) was interviewed regarding system acceptance, usage, impact on performance, and implementation problems. The results indicated that resistance to change was not a major problem in the introduction and implementation of these systems. Barriers encountered by members of the organization such as insufficient management commitment and lack of personnel and material resources were more serious problems.

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IMPLEMENTATION OF MULTIFUNCTION INFORMATION SYSTEMS AT THREE NAVY FACILITIES

NAVY PERSONNEL RESEARCH
AND
DEVELOPMENT CENTER
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IMPLEMENTATION OF MULTIFUNCTION INFORMATION SYSTEMS AT THREE NAVY FACILITIES

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FOREWORD

This effort was performed in support of work unit WR30162, Office Automation, and is part of a larger effort investigating the management of multifunction information systems. Results are directed primarily at persons who research and manage the implementation of technological change in organizations.

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Commanding Officer

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Technical Director

SUMMARY

Problem

The accelerated rate of the introduction of office technology systems in both the private and public sectors has had important effects on organizational functioning. In light of the developments and increased usage of this technology, it is important to address issues and problems that arise in the course of implementing these new systems.

Objective

The objective of this investigation was to evaluate the impact of pilot projects employing multifunction information systems at three Navy facilities. The major aims of the study were to determine (1) the receptiveness of organizational personnel toward the technological system, (2) pattern of usage of the systems, (3) the major factors impeding and facilitating operation of the system, (4) the impact of the systems on work performance, and (5) the organizational problems and issues associated with the introduction and implementation of the systems.

Approach

A cross section of civil service personnel (39 support, 44 technical, and 35 managerial) involved with the implementation and/or use of the systems at the three sites was interviewed. The interviews were designed to obtain information about acceptance of the system, usage, system impact on performance, and system implementation problems.

Results

The results indicated the following:

1. There was a high degree of receptivity for the three systems.

2. Document preparation and electronic mail were the features used most frequently.

3. The two major factors designated as impeding operation of the systems were system specific problems and not enough terminals to meet the demand; the major factors instrumental in facilitating the operation of the systems were its capabilities and the training given.

4. All three systems appear to have a positive effect on work performance.

5. As expected, initial resistance did not pose a major problem.

6. Managers and personnel involved in operating the systems identified five areas of concern: introduction of the system, vendor relationship, top management commitment, organizational structure, and organizational conceptualization of the system.

Conclusion

Resistance to change was not a major problem in the introduction and implementation of these systems. The greater problems were concerned with the relationship of the system to broader organizational issues such as conceptualization of the system, organizational structure, personnel issues, and material resources.

Recommendation

To facilitate use of multifunctional information systems, the implementing facility should:

1. Develop and communicate a clear image of the function and purpose of the system in its present stage of development and for the future.

2. Map out in detail the organizational arrangements necessary for the implementation of the system. This would include the establishment of objectives and ways to keep the implementation program on schedule.

3. Expand the representativeness of the group responsible for coordinating efforts to plan, develop, and implement the system.

4. Develop and maintain hands-on training programs.

5. Establish implementation strategies; for example, regular meetings for users that focus on practical system related problems.

6. Develop a multidimensional measurement approach to ascertain the technological system's value to the organization.

7. Management and supervisors should be open to the possible development of resistance and be prepared to deal with it.

8. Acknowledge and deal with the political dynamics of such a change by cultivating support of key groups, providing unambiguous support signals from top managment to subordinates, dealing with conflicts over ownership and control, and building in stability to attenuate the upset and turmoil created by the change.

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Problem

It is becoming increasingly evident that we are in a transition from an "industrial" to an "information society" (Strassman, 1980). The impact of these changes has been most pronounced in the office setting where the changes already wrought by computer technology are considerable. A case in point is the word processing industry where the sales volume was expected to soar from the $1.5 billion realized in 1978 to $6 billion in 1983 (Dunn, 1979). These trends, in addition to the spate of feature articles in popular magazines, the increasing coverage in trade journals, and the widespread offerings of symposia and workshops on white collar technology and its impact on organizational functioning are indications of the significant changes that are taking place. The growth of office technology is not limited to civilian settings. As noted in Government Executive ("Office automation," 1981), "There is a fast moving information technology exploding across both the Government and commercial market centers." In light of the dramatic developments in office technology with its increased usage, it is important to address the issues and problems that arise in the course of implementing these new systems.

Purpose

The purpose of this study was to evaluate the impact of pilot projects employing multifunction imformation systems at three Navy facilities. A fundamental idea guiding the investigation was that the contribution of these technological systems to personal user needs would be fairly clearcut and less problematic than their value to the overall functioning of the organization. The major aims of the study were to determine (1) the receptiveness of organizational personnel toward the technological system, (2) the pattern of usage of the systems, (3) the major factors impeding and facilitating operation of the systems, (4) the impact of the systems on work performance, (5) the organizational problems and issues associated with the introduction and implementation of the systems.

Background

The current level of activity and interest in office technology can be attributed to several factors. Since the 1940s the composition of the U.S. work force has shifted from being predominantly blue collar to white collar. By the year 2000, information workers will comprise over 60 percent of the working population, far outstripping the percentages for other service occupations, agriculture, and manufacturing (Molitor, 1981). Moreover, during the last 10 years, white collar productivity has not kept pace with these other sectors. White collar productivity increased only 4 percent during this time period, whereas manufacturing and farming productivity increased 90 percent and 185 percent respectively (Kurshan, 1981; "Now the Office," 1980; Schatz, 1981). Thus, the sharp increase in the white collar work force, the steep rise in labor costs, the tremendous drop in the cost of computer hardware components, and the growing capabilities of these technological systems have combined to make the use of office technology a potentially practical, realistic, and cost-effective response to the present productivity problem.

It is increasingly evident from the literature on office technology that factors apart from the technology itself play an important role in determining whether such technologies will benefit an organization (Martin, 1982). One issue that is germane to the introduction of office technology is the resistance of prospective users to the new systems. These highly complex technological systems have the potential for producing stress and possibly resistance in two ways. First, the technology has advanced to the

stage where the way work is conducted is fundamentally changed. For example, it is possible for managers to accomplish their work in paperless, deskless offices. Second, interacting with the technological hardware may be psychologically stressful and inhibiting to some individuals (Elam, 1980). The user at an on-line terminal may feel intimidated by the immediate response of the system and may feel pressured to respond hastily. In addition, the user may view the computer as remote, self-governing, and unfriendly causing feelings and attitudes unsympathetic toward the system, (Klee, Sojka, & Crisp, 1981). In agreeing, Zuboff (1982) reasons that computer-mediated work is more abstract, demands more conceptual skills, and deemphasizes direct experience. If this were indeed the case, it is only natural that employees would resist the technology that is introduced. Brod (1982) takes a similar view. He coined the term "techno stress," a state of distress that results from the inability of an individual or organization to adapt to the operation of new technology.

Certainly, resistance as expressed by users' attitudes may have a bearing on their acceptance of the systems. However, others have argued that the widely held assumption that the fate of planned organizational change is a function of the initial resistance to the innovation by the members of the adopting unit is overextended (Gross, Giacquinta, & Bernstein, 1971; Berman & McLaughlin, 1978). Elam (1980) reports that most new users have a provisional, noncommital attitue toward the system. For example, in a study of a public sector organization, attitudes indicative of resistance to the newly introduced technological system were not evident at the time of implementation of the system (Sheposh & Hulton, 1981). In general, office support personnel were in favor of the new system with 60 percent positive or very positive, 30 percent neutral, and only 10 percent negative. A similar pattern of acceptance was obtained for managers and professionals. Overall, the proposed office automation was welcomed as an opportunity to do something new and different, and its advantages outstripped any disadvantages. These findings are consistent with those of Bikson and Gutek (1983), who, in their analysis of 26 organizations, found users were quite satisfied with the technology.

Initial resistance to change is not the only possible danger. As Gross et al. (1971) found in their intensive study of an educational innovation, resistance can develop after an innovation has been introduced; that is, during the period when implementaiton is attempted. Significant attitude changes may occur as a function of the experiences one has with the equipment. Thus, the way change is implemented (e.g., the kind and amount of information about one's role vis-a-vis the innovation) may have a greater bearing on optimal use of the system than initial resistance.

Factors other than initial resistance may play a significant role in the introduction and implementation of innovation. Gross et al. (1971) discovered that more serious barriers to implementation were unclear project goals, unavailability of instructional materials, and the failure of the administration to provide effective operational procedures. Consistent with previous research on implementation of innovations (e.g., Berman & McLaughlin, 1978; Gross et al., 1971), initial resistance of personnel was not anticipated to be the most serious problem in this particular effort. The more serious problems were anticipated to be those associated with incorporating these systems into the organization; for example, insufficient training and resources, absence of conceptual consensus regarding the scope and goals of the new technology, and incompatibility of the system with organizational needs and goals.

APPROACH

A number of facilities within the Naval Material Command were considered as potential research sites. However, only three met both of the following criteria: First, they had already implemented a multifunction automated office system and, second, they had a sizeable number of employees using the system. The three sites chosen are research and development (R&D) facilities. Two are located on the east coast and one on the west coast.

The three facilities had initiated pilot projects involving multifunction information systems that would eventually be able to access various data bases and communicate between disparate locations as well as supply the functions provided in stand-alone systems. Each site conducted some form of needs analysis and researched existing technology to find the most compatible system for their needs. Each site selected a different system. Each computer system combined the features of word processing, management communication (electronic mail), calendar, message file, tickler file, calculator function, and advanced text management (proofreads spelling)--the tools deemed necessary to increase productivity. Only one of the systems had a graphics software capability. At the time of the interviews, all three pilot systems had been in operation for approximately 1 year.

Sample

A cross section of the civil service personnel (39 support, 44 technical, and 35 managerial) involved in the implementation and/or use of the pilot system at the three sites was interviewed. All 118 interviewees had some experience with the system and most had incorporated the system into their daily pattern of work (113 out of 118 respondents).

Interview Procedures

Interviews were conducted with (1) top management (commanding officer, technical director, department heads), (2) middle management (branch and division heads), (3) technical personnel (scientists, engineers, programmers, analysts, technicians), (4) administrative personnel, and (5) support personnel (clerical/secretarial) at each facility. All participants were interviewed individually to maximize individual responses that may be suppressed in group interviews. All interviews were tape recorded and content analyzed. Topic areas included in the interviews were: biographical/demographical characteristics, overall reaction to the system, changes in work as a result of the system, problems with the system, benefits of the system, and implementation problems. While most of the questions were open-ended, several required use of a 5-point scale. (See the appendix for a more detailed account of interview questions.)

RESULTS

The results are presented in two major sections. The first section deals with personal concerns of respondents from the three sites, including level of acceptance, perceived system goals, system use, factors impeding and facilitating system operation, system contribution to effective work performance, and advantages and drawbacks in using the systems. The second section deals with broader organizational concerns such as implementation problems and the ability of these systems to meet the needs and aims of the organization.

Respondents' Personal Concerns

Acceptance

Level of acceptance was measured by four items: initial reaction to the system, evaluation of personal work performance using system, change in reaction toward the system, and evaluation of system's ability to meet goals. Table 1 presents the mean responses of support, technical, and managerial personnel at the three sites to these items. The responses mostly ranged from "fairly positive" to "positive." Overall the results suggest that the systems received substantial acceptance. Two-way analyses of variance (organizational level by pilot system) indicated no significant differences for any of the four items as a function of the pilot system, despite the fact that certain of the system features differed. The only statistically significant finding was that support personnel reported greater positive change toward the system in comparison to the other two user groups ($F(2,108) = 5.80$, $p < .05$). The means for support, technical, and managerial personnel were 4.47, 3.67, and 3.67 respectively.

Table 1

Acceptance of the System by Site

	Responses								
	Site A			Site B			Site C		
Item	Support	Technical	Managerial	Support	Technical	Managerial	Support	Technical	Managerial
1. Initial reaction to system	3.67	3.53	4.20	3.46	4.18	4.22	3.88	3.59	4.00
2. Evaluation of personal work performance using the system	4.50	4.09	4.23	3.54	4.31	4.20	4.44	4.04	3.75
3. Change in reaction toward the system	4.57	3.70	3.93	4.23	3.50	3.50	4.31	4.14	3.44
4. Evaluation of system's ability to meet goals	3.66	3.68	3.60	3.33	3.07	3.50	3.08	3.62	3.62

Note. All responses are based on a 5-point scale, where 1 = negative and 5 = positive.

Perceived Goals of the System

Table 2 presents the general classifications derived from the users' comments about the goals of their respective systems. Increased efficiency was given most frequently, followed by improved communication and increased productivity. No differences were found across systems.

Table 2

Perceived Goals of the System by Site

	Responses							
	Site A		Site B		Site C		Total	
Perceived Goal	N	%	N	%	N	%	N	%
Increased efficiency	20	51	10	33	19	45	49	44
Improved communication	11	28	9	30	10	24	30	27
Increased productivity	8	21	7	23	9	21	24	22
Increased quality	0	0	4	13	4	10	8	7

Notes.

1. An individual could give more than one response.
2. Percentages do not always total 100 due to rounding.

System Use

Table 3 presents the system use combined over the three organizational levels for the three pilot systems. Document preparation, which includes letter and memorandum preparation as well as the composition of longer reports, is the most frequently used feature. Differences in usage are also evident. Greater use of electronic mail was reported for system A relative to the other two. Because only sytem C had a graphics capability, the use of the graphics function is limited to site C. The differences in use was found to be statistically significant ($\chi^2(6) = 38.22$, $p < .01$). Table 3 indicates that the systems are used in a variety of ways that aid and accommodate the manner in which work is accomplished.

Factors Impeding System Operation

Table 4 presents the major factors impeding the successful operation of the system that the users identified. Shortcomings inherent in the systems (i.e., language restrictions, lack of mathematical packages) and insufficient number of terminals were the most frequently cited. Table 4 clearly shows that user resistance was not regarded as a major issue. In fact, reference to the need for more terminals and insufficient computer capacity implies increased user interest and acceptance. As one user remarked, "Well, it's a pilot system and, yet, so many of us want to use it as a production system." These findings are consistent with and reinforce the earlier findings reported on user acceptance.

Table 3

Use of System by Site

System Use	Responses							
	Site A		Site B		Site C		Total	
	N	%	N	%	N	%	N	%
Document preparation	41	52	33	70	36	63	110	60
Electronic mail	27	34	11	23	7	12	45	25
Calendar	11	14	3	6	0	0	14	8
Graphics[a]	--	--	--	--	14	25	14	8

Notes.

1. An individual could give more than one response.
2. Percentages do not always total 100 due to rounding.

[a]The systems at sites A and B had no graphics capability.

Table 4

Factors Impeding System Operation by Site

Impediment	Responses							
	Site A		Site B		Site C		Total	
	N	%	N	%	N	%	N	%
Inherent system shortcomings	5	13	13	42	16	37	34	30
Insufficient number of terminals relative to demand	17	44	3	10	11	26	31	27
Insufficient computer capacity	9	23	5	16	7	16	21	19
Training deficiencies	5	13	5	16	6	14	16	14
User resistance	3	8	5	16	3	7	11	10

Notes.

1. An individual could give more than one response.
2. Percentages do not always total 100 due to rounding.

Table 4 also reveals some differences between the three systems. In comparison to System B and C users, System A users identified inherent system shortcomings significantly less frequently, but insufficient number of terminals significantly more often ($\chi^2(8) = 15.95$, $p < .05$).

Factors Facilitating System Operation

The factors that users identified as contributing to the successful operation of the system are provided in Table 5. The major reason, according to the users, is the system itself. In their view, the system provides them with the means to do their work better or more efficiently.

Table 5

Factors Facilitating System Operation by Site

	Responses							
	Site A		Site B		Site C		Total	
Facilitator	N	%	N	%	N	%	N	%
System	16	42	11	27	23	72	50	45
User acceptance	5	13	9	22	7	22	21	19
Training	7	18	18	44	1	3	26	23
Top management support	10	26	3	7	1	3	14	13

Notes.

1. An individual could give more than one answer.
2. Percentages do not always total 100 due to rounding.

A comparison of these factors for the three pilot systems indicates some differences between systems ($\chi^2(6) = 19.66$, $p < .01$). System A users mentioned top management support more often than did users of the other two systems. System B users cited training more often. System C users pointed to the system--and its positive features--as the major facilitative factor.

System Contribution to Effective Work Performance

The contribution of the respective systems on work effectiveness was examined by descriptions of behavioral events. These were instances in which the users felt that their work was accomplished in a more effective manner. Table 6 presents the percentage of users for each pilot system who described situations where their work was enhanced and percentages of users who described situations where their effectiveness was lowered because of the system.

Table 6

Percentage of Users Describing Positive and Negative Incidents by Site

Incident	Percentage of Users		
	Site A	Site B	Site C
Increased effectiveness	79	72	79
Lowered effectiveness	15	18	17
No response	6	10	4

Clearly, the number of situations in which effectiveness was improved far exceeded the number of negative incidents described. Furthermore, the percentages for positive and negative incidents are similar for the three pilot systems. It is evident that users from all three sites view their respective system as an aid for accomplishing their work more effectively. These results are consistent with users' evaluation of personal work performance (see Table 1).

An examination of the users' descriptions of effectiveness enhancing incidents suggested that several types of effectiveness seemed to be operating. A breakdown of the six effectiveness indices derived from the user's descriptions is shown in Table 7. Accomplishing a task faster was the most frequently mentioned index. A chi-square analysis performed on these data was not significant. Therefore, the frequencies were fairly uniform across the pilot systems.

The specific user or system applications described in the accounts were tallied. Not surprisingly, the pattern of use is similar to that obtained for general usage as in Table 3; 56 percent of the incidents involved document preparation and 23 percent involved electronic mail.

The users' accounts of the behavioral events provide a picture of the ways these systems enhance work effectiveness. Several are presented below:

> 1. An important document had to be prepared by a person who was recovering from surgery. He couldn't come to work but his doctor wanted him active. So, we temporarily assigned a terminal to his home. The document was completed. Further, it allowed the Center to make maximum use of this individual.
>
> 2. We rigged a system display of a working document on a full screen and could work a revision right there. By the end of the day, people with diverse interests settled on an agreed-upon document. More impressive was the fact the document held up in subsequent reviews. No further revisions were required.

Table 7

Types of Effectiveness Described in Positive Incidents by Site

Type of Effectiveness	Responses							
	Site A		Site B		Site C		Total	
	N	%	N	%	N	%	N	%
Faster	20	38	12	31	13	32	45	34
Increased ease	14	26	6	15	5	12	25	19
More convenient	6	11	10	26	9	22	25	19
Better quality	6	11	4	10	7	18	17	13
Fewer people needed	3	6	4	10	4	10	11	8
Increased flexibility	4	8	3	8	2	5	9	7

Notes.

1. An individual could give more than one answer.
2. Percentages do not always total 100 due to rounding.

3. Classification of jobs normally takes three to four days. With the system, the material is put on the system and stays there and classifying now takes a day or less. Also, outgoing correspondence is available for signature no matter where the person is located.

4. It's convenient to arrange, put ideas together--notes and such can be done in 1/3 of the time. . . . The other thing that I think that has made some difference and has helped me to analyze and establish schedules here and at other locations is to look at the pattern of meetings and accomplishments. Here is a clue as to where my time is better spent. It has affected the way I set up meetings. Ordinarily, I wouldn't have this information available.

5. I do my technical presentations on the system. I'm able to respond the last minute, put the very latest information in my presentation without a day or two days' delay needed by the Technical Information Center. It has the ability to let me start at 9 o'clock the night before and to give a presentation at 9 o'clock the next morning, and still have the same quality presentation. That's something valuable to me as a manager. I don't know if the Center would say I'm getting their money's worth. . . . The things that are important to me are qualitative. However, I've probably budgeted $20,000 this year to get the viewgraphs prepared. . . . I doubt whether I'll spend more than $1,000 of that because we're able to use the system to do virtually everything we need.

6. I really think the value of the system is going to come from things we don't envision right now. We're using the system now as we did things in the past. I feel I am more effective. I have been able to initiate more tasks and to keep more tasks going at any one time than I did before. The system has put me in communication with many different people I deal with whether it's on the contracting side, the administrative side or the technical side. We can communicate with each other now, very freely. I can quickly send documents to them that are relevant. For time critical areas, the fact that we can communicate by electronic mail and that we can share files has kept many things going simultaneously rather than sequentially and I think in many instances it has shortened the time to reach an objective. This is particularly true where we had to prepare budgets or prepare contracts. We've put pieces of these documents together either in existing files or from different people and welded them together in a much quicker time than we could have without the system.

The main theme of the reported accounts underlines the ability of these systems to allow individuals to accomplish their work in new ways. In addition, instances in which the system enhanced an individual's work effectiveness were not rare. As indicated earlier, fully 75 percent of the users were able to describe at least one such behavioral event. It is important to point out that some of the accounts involved tasks that were a routine part of the person's work. The benefits realized, therefore, were not limited to one-shot events, but would in all likelihood continue.

Organizational Issues

The preceding results suggest that, overall, there was substantial acceptance of the three systems and that each system had emerged as a significant factor in the way personnel do their work. In this section, the focus shifts from the personal-use perspective of the system to broader organizational concerns. This information was obtained from the observations of managers and pilot project teams members concerning problems encountered in the implementation of the new equipment. The comments are grouped in terms of the five areas of concern most frequently mentioned: introduction of the pilot system, vendor and contractor issues, management commitment, organizational structure problems, and organizational conceptualization of the system. At least 15 percent of the sample commented on each of the issues. As no site-specific patterns were evident, the comments are presented as issues and concerns symptomatic of the implementation of multifunction information systems.

Introduction of the Pilot System

Comments concerning the introduction of the systems raised questions about the overselling of the system to prospective users and the lack of planning for its introduction. The following quotations serve as examples:

1. Personally, I would have approached it differently. I would have presented this system more as an experimental system where we want various people to volunteer to be part of the experiment, instead of the way it was handled: "Thou shalt be part of it." I would have solicited assistance and not tried to say how wonderful the system was going to be until it got here and we could see actually how it was doing.

2. I would have spent more time getting input of people who were going to be using the system and then trying to realize a system that was going to accommodate their needs, as opposed to their coming in and trying to accommodate what the system has to provide. They could have spent a little more time planning that. Sometimes I think they tried to accommodate the needs of those who don't use the system as much.

3. Of course, I have the benefit of hindsight so I can see what they faced at the time. . . . However, there were certain steps that I think should have been followed that haven't been, layouts and clear goals as to what we wanted to accomplish, and some orderliness in doing that which. . . we haven't done. . . . It seems to me it's quite a gamble to go out and buy a system without having a clear view of what you intend to do with (it). . . . Who should get terminals and why; a rationale for that I think should have been worked out more clearly.

4. Overselling it is my concern. Along with that has been some indication from top management that we can only devote so many resources to this kind of thing. Eventually it has to be tailored to the local requirements.

Vendor and Contractor Issues

Several managers mentioned relationships with vendors and contractors as an impediment to system implementation. In their view, one problem was the unresponsiveness of some vendors, another problem, overreliance on the contractors in the development of the pilot systems.

1. I would recommend some firm manner of acquiring what you pay for. That's been a problem because the system is functionally specified to do certain things and there are tradeoffs involved in the contracting process that don't always allow you to crack the whip as you would like on certain vendors. There are deficiencies and the contracting process is such that it is difficult to maintain a working relationship with the same people that you're threatening to take to court to get those things that are deficient. So I recommend, if practical, the establishment of some mechanism for enforcing the actual literal interpretation of the contract.

2. The way the system was bought there was a lot of good faith involved. Some things are subject to interpretation in the contract and even though we may have had oral discussions with the vendor and he assured us that he would have what we thought we were getting, it didn't turn out that way. When it gets down to the nitty gritty, it is not black and white all the time. If we had any idea of the struggle, we would have spent a lot more time on the specifications phase. The industry is such that terms are ambiguous.

3. I would like to see more of the management, more of the direction, more of the day-to-day operation done by our own employees. I think that makes far better commitment and, in a long term, I

think would pay larger dividends than to use too many people on the outside. Because of very real people constraints, we rely too much on other folks to assist us in managing and directing and so we lost leverage regarding the management decisions and we didn't realize that until it was well down stream. We didn't devote enough attention to dealing with the problem.

4. We should have been more rigorous on specification. Then, we wouldn't have had as much problems with the vendor. We should have taken things as they came. For example, if a specific contractor gave us a problem, we should have addressed the problem at the time rather than deferring it, because we are real busy.

5. Insufficient work done on requirements. One of the major problems is that the emphasis has been on hardware and not on the concept. We've got into a situation where we're trying to come up with a product to meet management's requirements and not necessarily Center requirements. This has led to greater dependence on outside sources, where we're relying more on external rather than internal working teams.

Management Commitment

Management's commitment and involvement in planning and implementing the project were also identified as major sources of concern in the interviews.

1. The one thing that I've seen that really is going to have to be in place is some overall commitment from top management to make sure that somewhere there is authority that's needed. That some Center person has the ultimate authority to make sure that this integration (e.g., development of corporate level data base) really can occur. Right now I see a lot of fragmented, or what appear to be fragmented efforts. A couple of people over here are looking at a financial data base, somebody else is feeling that they have the responsibility for doing everything that has to do with personnel, and they're really not looking at the Center from a top down approach.

2. I see the top management knowing that the need for this technology exists, but I really haven't seen the organizational structure provided that makes it happen and I'm not sure how that should happen. How formal does it need to be done in order to make it happen? From my viewpoint, that's the biggest concern. It's the coordination. It's just not clear sometimes. We know what we want to do and everybody sort of agrees with us. But to really make it happen you need that coordinated effort.

3. One of the problems we are having is it's hard to condense and condense and condense and condense. I keep having the feeling that they (upper management) want us to write down on one page that explains everything to their satisfaction, that gives them insight to the project so they can answer any and all questions about it themselves because they personally want to feel like they are in the know about this project that everybody's talking about.

4. It's a little bit of a problem mainly because I don't think they understand so well what's going on and how it's going to help them. I'd love to see much more support. If we could get the top management support that we really need--they could kick this project up, realize it's a Center project, put it at a Center level, command level, the highest possible level on this base and make sure its managed properly, and it has the visibility that's really necessary, support it with people and money--it would make all the difference in the world to the project.

5. It (the introduction of the system) has caused space problems. This has caused some problems and will continue to cause problems, unless people plan. If top management is really committed to this type of technology coming into the Center, they have to think about more than just buying hardware and things like that. There are other considerations.

Organizational Structure Problems

The organizational structure was also seen as an important factor. On the one hand, the introduction of this pilot system was seen as creating perturbations throughout the structure. It raised questions such as who should control the system and at what level of the organization the actual management of the system should be located.

1. I would like to see realistic commitment. One of the biggest problems we have is that a lot of things are not under our control, and yet they're our responsibility. For example, communications is the backbone of our system, tying different nodes of the network together. That falls in another group. The person tasked with that has a communication project that is very important to him. But our aspect of it is only as important as someone else makes it and is something that is beyond our control, and something that is typical I am sure of all projects, but is also something that is very frustrating and keeps us from getting where we could be.

2. The project team has (an ownership) problem. They tend to think of the system as theirs. They don't want to let loose of it. That to me is one of the problems. If you really want the system to work and you really want it to expand, then you have to give other people in the system, and you have to depend on other people. You cannot take a group of 12 people and support the whole Center. So, I think that's a problem definitely. We are working on it but we have to constantly be aware of that.

3. The major obstacle, I would say, is people's unwillingness to give up their authority over certain areas. It's a turf problem. People don't want to give up their little empires or their areas of authority. If they have something that gives them some control over something, they're not going to want to give it up even if it means doing better for everybody at the Center. I think to get people on that same wavelength is going to take some doing. If the need for a centralized word processing organization came to pass, then somebody is going to lose, if not their job, their title. There's a division that's going to be

dissolved, a branch. I would say the biggest concern for people is not just losing their job, but losing their authority and their power and their prestige, or having to switch. That's my prediction.

4. It (the technology) did disrupt things, yes. It rocked the boat, so to speak. It caused a lot of problems. We needed a sophisticated communication system for our system and, prior to our project, there was no planning for that, I could tell. So, it has caused a lot of problems and some of the problems we have caused ourselves by continuing to push.

5. My biggest concern with this project is really getting it at the right level. I think that's been a big detriment to us, being at the organizational level it is, and the management having to comply with a lot of little rules that are just peculiar to that particular branch or division. This is a big thing in concept, and people at a division level cannot see the big picture. It's just a project in their division. Putting it at the Center level where we have somebody who is actually strategically planning the direction in which the Center is moving is required. I think if we can get enough department heads thinking that way, then the pressure would be put on the Command.

Organizational Conceptualization of the System

Respondents cited differing interpretations as to the functions and purpose of the system. They questioned the degree to which any system can serve all functions.

1. A clear and concise and direct plan of action must be written and made understandable to all the participants of the project so they are all working toward one goal and not at cross purposes. That has been the problem in the past. If that happens and they do develop a plan of attack which is comprehensible to the people, I think it will be a success. If they don't, it will be subject to question.

2. (The system) is going to be more widely spread. . . down to group leader level or below. It's going to have to support technical work as well. People do not want to see one terminal for their scientific, engineering work and another for their office automation work. Management should be probing as hard as they can to add those features on right now that are missing.

3. The total scope of the system, the way it was planned was that eventually every scientist, engineer, secretary would have access to the system to perform some portion of their job. From that standpoint, I think people looked at the system as being able to do more than it really could; so, it really didn't fit the organizational arrangement. The descoping of the office automation fits the organization very well, at the office level, the management level.

4. Right now better and faster communication, especially among the managers appears to be one of the goals of the pilot system. Many people are concerned about what's called the engineering work station that, when the system gets to the point where it's beyond the

pilot, it's going to be able to do more technical type tasks as opposed to managerial or report writing. Since we are heavily scientifically oriented, it's going to have to do both tasks and they're working on that.

5. I would be quite surprised if they would be able to find a system that satisfies those office related functions and also doesn't do any good at all to the scientific area. I know he thinks we have the mandate to serve everybody's need but my feeling is that it is an impossible task and we have to go for a smaller piece of the apple.

6. The system was bought by the original project office as a demonstration of what they thought was advanced state-of-the-art office automation. It may well be that. However, it is not office automation that would be satisfactory for the scientist or engineer. It may be satisfactory for someone who deals totally with words on paper and who does not deal with any numerical concepts. The system does not do any calculations, it is reflective of the narrow view of the project office.

7. Initially, the system was designed for administrators. However, our primary business is centered around scientific and engineering enterprises. Why can't it help them on their specific jobs? All scientists and engineers have to do a certain amount of paper work, report writing, etc. What the administrative side was hoping to do was to alleviate all that paper shuffling to allow scientists and engineers to do it more effectively so they can get back to their real creative jobs.

Summary of Comments

The preceding observations call attention to some of the problems associated with the implementation of these pilot technological systems that have ramifications for the operation of the respective organizations. Many factors must be taken into account and dealt with concurrently. One manager said:

> I don't think it's going to be easy. . . . It is going to be expensive. . . . There is always going to be a battle to have a large enough staff to do the necessary things.

Another said:

> There are a lot of people who like the way they are doing things. . . . We've got a system that is largely an impersonal communication system. . . that might mess with the social fabric of the organization.

Adding to the difficulty is the need to expend effort and resources over a protracted period of time. As one manager observed, "Leadership changes; people who weren't party to original agreements, understandings come in and want it explained and justified." The implementation of these systems requires the resolution of problems related to resource allocations, establishment of priorities, organizational adjustments, and the need for periodic reaffirmation of what is being attempted.

On the positive side, computer technology is increasingly seen as a necessary tool in conducting one's work. These comments by one of the managers touches on the point.

> So far every place that has installed some form of automation of their job has not wanted to give it up. We haven't seen a single soul--secretarial, technical, scientific--willing to turn it back, even with equipment that doesn't work that well.

DISCUSSION

Before discussing the results, it should be pointed out that each of the three pilot systems falls short of attaining the status of a truly integrated multifunctional information system. A major factor is simply the limited distribution of terminals at all three sites. For this reason, the experimental nature of the systems should be emphasized in evaluating the results. With the rapid advancements in microcomputer technology, the system that eventually will operate center-wide at each site may differ from pilot systems studied here. Therefore, the findings should be treated and interpreted on the basis of the experimental nature of the systems.

Similarities and Differences Across Pilot Systems

A high degree of similarity was evident across the pilot systems on a number of dimensions (e.g., system's contribution to increase effectiveness, acceptance of the system). The system acceptance is probably attributable to the fact that all three systems possess capabilities to enhance the user's ability to get the work done in a more effective manner. This line of reasoning is plausible given that the major application of all three systems is the document preparation function. The behavioral event descriptions indicated that document preparation was the application involved in the largest number of the accounts given by users of all three systems. Another factor contributing to the similarity is that the sites of the three systems are R&D activities. The users, therefore, are more likely to be similarly disposed to technology, particularly computer technology, by virtue of their training and the mission of their respective activities.

There were also differences, however. Beyond the document preparation function, the pattern of use differed because of the different capabilities of the three systems. Additionally, these differences may be in part a reflection of the decisions and actions of the pilot system project teams and possibly those of high level management.

The differences in the factors impeding and facilitating the projects suggest issues and problems confronting personnel that are specific to each of the systems. For example, top management support was seen as playing a more significant role in the effective utilization of the system at one site relative to the others. The different pattern of obstacles also suggest issues and problems specifically associated with each pilot system.

System Acceptance

The results from measures of system acceptance present a consistent pattern. The majority of users were found to be positively disposed toward the system. This finding is particularly important because it controverts the widely held assumption (cf. Zuboff, 1982) that organization members are resistant to the introduction of innovations.

The users did not accept the system uncritically as is evident from their descriptions of negative incidents associated with use of the system as well as the identification of aspects of the system as major obstacles to the pilot projects. Those who expressed dissatisfaction with the system, while in the minority, should not be overlooked. This may be particularly problematic if the person who resists the system occupies a central role. A final point, despite the fact that there were at most small pockets of resistance, the development of resistance to the equipment should be considered a possibility. Therefore, management should be open to this eventuality and be prepared to deal with it.

Evidence of Increased Effectiveness

The findings concerning the respective systems' impact on work effectiveness are encouraging. Effectiveness information was obtained in three distinct ways: responses to a structured item, descriptions of behavioral events, and identification of benefits associated with the use of the system. The behavioral event descriptions provide a rich qualitative dimension to the effectiveness question. The types of effectiveness that flowed from the users' accounts describe the variety of ways in which the system facilitated their work performance. What is impressive about these data is that personnel from all levels--from typists to department heads--provided examples of increased effectiveness. The breadth of this testimony regarding the contribution of the three systems cannot be dismissed. Furthermore, these descriptions provide a better idea of the ways in which support personnel and principals adopt such technology to their working lives.

The limited capabilities of the systems as presently configured obviously limit the ways in which the systems can increase work effectiveness. This problem will be partially rectified by a wider distribution of terminals that will enable, for example, greater use of electronic mail and thereby increase the effectiveness. Other system defects are more problematic. Presently, none of the systems provide scientists and engineers with sufficient applications that are directly relevant to their work (e.g., computational capabilities). Without question, this lack has a profound bearing on evaluation of these systems. These limitations drive home the present "experimental" nature of these systems. Despite this serious problem, the data suggest that the work of scientists and engineers as well as management and support was upgraded as a function of using the system. As one project head observed:

> Our primary business is centered around scientists and engineers. All scientists and engineers have to do a certain amount of paper work (e.g., report writing). What the administrative side was hoping to do was to alleviate all that paper shuffling to allow the scientists to do it more efficiently so that they can get back to their creative jobs.

In summing up, there appears to be a consensus that the respective systems exert a positive influence, although in limited ways, on the way people conduct their work. One manager made a pertinent point with respect to the effectiveness issue: "I really think the value of the system is going to come from things we don't envision right now."

Assessment of Effectiveness

The need to assess the impact of the system on organizational behavior is obvious. Clearly, information is desirable particularly when there is a need to justify the expenditure of time, money, and resources. Operationally, this is extremely difficult when the system under study may alter the work of managers and scientists as well as

that of support personnel. As more complex tasks are involved, the measurement becomes even more difficult. The complexity issue, however, is only one part of the problem. The other issue, which has been alluded to before, is the stage of development of the system under study. The question of the cost effectiveness of one of the systems was raised by one project head when he observed that:

> You have to get a critical mass of people tied into the system in order for it to be an effective tool for any one individual. For example, support services when you have those on the system and the key management people, you at least have the business operations information flowing. The analogy is like the telephone.

The major point then is the recognition of the constraints that the stage of development of the system places on the availability and nature of the outcome measures, which suggests that the justification be considered in a different light. The important question becomes, "Can we afford not to do it?" rather than, "Can we afford to do it?" (cf. Boczany, 1981).

The conclusion drawn from a survey of 200 word processing installations (Johnson, Taylor, Smith, & Glina, 1983) is pertinent here. They report that the typical individual performance appraisal involves number of lines, pages, or documents, or some measurement of turnaround time. Many users considered these to be "inappropriate or degrading" measures of productivity and, in some cases, they were abandoned as invalid. The task force conducting this survey concluded that organizations do not need to develop measures of word processing output. They maintain that success has been no mystery and is evident to both users and decision makers. The criteria, they suggest, are simple: Do people use it? Are users satisfied? The results from the present investigation are in agreement on both counts.

Organizational Issues

It was stated earlier that a lag in successful implementation of automated systems is generally due to two major factors: technological and organizational behavior (cf. Wetherbe, Davis, & Dykman, 1981). In this study, such factors as training, or lack thereof, availability of resources, and top management commitment were identified as impediments or facilitators to the implementation of the project. The organizational issues became particularly evident from the comments of managers and project team members concerning issues relevant to implementation. The introduction of multifunction technological systems that will one day meet the needs of users at all organizational levels can understandably create misunderstanding and confusion as to their focus, capabilities, and purpose. It is not surprising then that concern was expressed about the introduction of the system, vendor and contractor relationships, and conceptualization of the system. Overall, the pattern of findings conforms to the implementation model developed by Gross et al. (1971). According to this model, successful implementation depends on such factors as a clear understanding of the innovation and compatibility of the innovation with existing organizational arrangements. The following conclusion from a round table discussion among professionals is aprapo (Roadblocks, 1983):

> Perhaps the greatest problem in automating an office right now is lack of organization once the equipment has been installed. . . . People need to set up standard procedures, rearrange the staff to work cooperatively and establish in-house training programs that orient all users. . . to the benefits of the equipment (p. 30).

The conclusion to be drawn from the present results is that it would be a mistake to focus exclusively on the technological capabilities of the system and their impact on the user. An array of factors must be considered in planning and executing such implementations. Effective implementation requires attention to, and concurrent improvement of, the nuts and bolts of the managerial process.

CONCLUSIONS

Resistance to change was not a major problem in the introduction and implementation of these systems. Such barriers as insufficient management commitment and training encountered by members of the organization appear to pose a greater problem. One of the implications that emerges is that the value of a technological system from a personal perspective may or may not coincide with its value at the organizational level.

All three pilot systems are on the threshold of moving beyond their original boundaries. Given that all three systems presently have personnel with technical expertise, established training programs, and a central group with responsibility for planning, developing, and implementing the system, the prospects for successful implementation of this larger effort are good. Two areas appear to require more careful attention:

1. The need for top management to express more clearly their commitment to these projects by being more directly involved in decisions regarding the direction the projects should take and providing support in terms of allocation of resources for the conduct of the projects.

2. The development and communication of an articulated philosophy concerning the multifunctional information system that defines its mission. scope, the functions it serves, its impact on people at each level of the organization, and its impact on the formal and informal organizational structure.

RECOMMENDATIONS

An elaboration on the two preceding observations provides the basis for a general implementation model that may serve as a heuristic for future implementation efforts in this area. A multifunction information system has organization-wide implications. The potential for a myriad of changes that are triggered as a result of its introduction is great. Therefore, the proposed system must be defined with reference to the total organizational context. This necessitates the involvement of top management at the very outset and their interest and commitment throughout the implementation process. The proposed implementation model, which is loosely adopted from Mears' integrated planning and controlling model (1978), is a continuous process going through several phases from conceptualization to implementation to operation. The three phases with the major elements or issues and suggested processes and strategies associated with each phase are outlined in Figure 1.

Phase	Conceptualization	Implementation	Operation
Elements and Issues	Objectives	Procedures	Modification
	Policies	Operations	Expansion
	Programs	Structure of Authority and Responsibility	Assessment and Evaluation
			Feedback
Processes and Strategies[a]	Nominal Group Technique	Sociotechnical Analysis	Cost Benefit Analysis
	Judgmental Analysis Technique	Process Charts	Program Evaluation and Review Techniques
	Negotiations	Task Analysis	
	Priority Setting	Delphi Technique	Control Charts
		Goals Achievement	Process Charts
		Goals Analysis	
		Team Building	
		Training	

[a]A summary of these and other strategies can be found in Nadler (1981).

Figure 1. Implementation model.

In the conceptualization phase, the purpose, scope, and functions--as reflected by the objectives, policies, and programs on Figure 1--of multifunction information system within the context of the overall organization is determined. All parties who may be affected by the introduction of the system should be involved in these determinations. Ideally, this would include top management and key individuals who have a stake in the operation of the new system. Their functions would be to (1) define the objectives of the new system particularly with respect to the organization's mission, (2) explicate and develop policies for conducting the implementation effort, and (3) designate the programs that would provide the conditions for a full and fair test of the new system. A variety of strategies or techniques could be employed in this phase. For example, the judgment analysis technique (Christal, 1968) could be conducted, employing key managers, to provide a hierarchical listing of the major objectives that a prospective system should meet. Another strategy that might be called for would be negotiations among departments that may be used to settle, a priori, such issues as distribution of the technology, control, and funding. By addressing these problems prior to the selection of a specific system, the most basic problem affecting the implementation effort--the incompatibility of the proposed system with other factors operating in the organization--may be ameliorated.

The implementation phase deals more directly with the specific procedures, operations, and structure of authority and responsibilities involved in running the system. Project teams, steering committees, and task forces that cut across hierarchical and department lines should be employed to (1) provide the guidance and procedures to effect proper development and implementation of the system, (2) develop mechanisms for detecting the needs of organization members, (3) make organizational members aware of the system, and (4) crystallize the focus and thrust of the new system in the day-to-day operations. Numerous strategies or techniques are applicable at this phase. For example, the sociotechnical analysis (e.g., Davis & Wacker, 1982) may be particularly useful in aligning the technological properties of the new technology with existing skills, knowledge, and other aspects of the organization's social system so that the technology is used as effectively as possible.

In the third phase, the major work of the project is accomplished and the operation of the technology is expanded and modified to become a part of a larger system into which other innovations will be assimilated. Data collection, analytic, and modeling techniques should be instituted at this point to determine empirically the effectiveness of the technology (assessment and evaluation) and to provide information for the improvement of the operation of the system (feedback).

In summary, the proposed model asserts that the following conditions should be in place for a multifunction information system to be implemented effectively. First, a support system for implementation of technology with heavy involvement from top management must be operative. This would include such specific techniques as provision of funds, training materials, rearrangement of prevailing organizational structure so that it is compatible with the function and goals of the innovation, and availability of local resource personnel who could provide practical advice. Second, an organizational philosophy concerning the technology is articulated. This defines the scope of change, the function it serves, its impact on people at each level of the organization, and its impact on formal and informal organizational structures. Third, socialization mechanisms are established in which attention is given to ways in which people's interactions with the innovation fit with those articulated by the organization. This might invoke such specific techniques as emphasis on personal benefits of the innovation and creation of pockets of commitment. The degree to which the implementation effort is effective determines the extent to which the technology is integrated into the organization that ultimately strongly influences organizational effectiveness.

To facilitate use of multifunctional information systems, the implementing facility should:

1. Develop and communicate a clear image of the function and purpose of the system in its present stage of development and for the future.

2. Map out in detail the organizational arrangements necessary for the implementation of the system. This would include the establishment of objectives and ways to keep the implementation program on schedule.

3. Expand the representativeness of the group responsible for coordinating efforts to plan, develop, and implement the system.

4. Develop and maintain hands-on training programs. Coordinate training programs and implementation of equipment.

5. Establish implementation strategies; for example, regular meetings for users that focus on practical system related problems.

6. Develop a multidimensional measurement approach to ascertain the technological system's value to the organization.

7. Management and supervisors should be open to the possible development of resistance and be prepared to deal with it (e.g., adopt a stance that permits interim setbacks and disappointments).

8. Acknowledge the political dynamics of such a change by cultivating support of the key groups, providing unambiguous support signals from top management to subordinates, dealing with conflicts over ownership and control, and building in stability to attenuate the upset and turmoil created by the change (e.g., identifying and communicating to those affected by the system the aspects of their work or the features of the organization that will not change as a result of the introduction of the equipment).

REFERENCES

Berman, P., & McLaughlin, M. W. (May 1978). Federal programs supporting educational change, Vol. VIII: Implementing and sustaining innovations. Santa Monica: Rand Corp.

Bikson, T. K., & Gutek, B. A. (February 1983). Advanced office systems: An empirical look at utilization and satisfaction (N-1970-NSF). Santa Monica: Rand Corp.

Boczany, W. J. (January 1981). Objections to objective costing. Journal of Systems Management, 15-17.

Brod, C. (October 1982). Managing technostress: Optimizing the use of computer technology. Personnel Journal, 753-757.

Christal, R. E. (1968). JAN: A technique for analyzing group judgment. The Journal of Experimental Education, 36(4).

Davis, L. E., & Wacker, G. J. (1982). Job design. In G. Salvendy (Ed.). Handbook of industrial engineering. New York: John Wiley & Sons.

Dunn, N. (July 1979). The office of the future: Part I. Computer Decisions, 16-19, 23, 26.

Elam, P. G. (1980). Human considerations. In Depth, 2-10.

Gross, N., Giacquinta, J. B., & Bernstein, M. (1971). Implementing organizational innovations: A sociological analysis of planned educational change. New York: Basic Books.

Johnson, B. M., Taylor, J. C., Smith, D. R., & Glina, T. R. (1983). Innovation in word processing: Report of a maturing technology. National Science Foundation Project 811079.

Klee, K., Sojka, D., & Crisp, W. (August 1981). Changing the shape of work. Datamation, 28-31, 34.

Kurshan, R. P. (1981). White-collar productivity. The Rotarian.

Martin, A. (February 1982). The human connection: A strategy for making automation work. Administrative Management, 33-37.

Mears, P. M. (March/April 1978). Integrated planning and controlling. Managerial Planning.

Molitor, G. T. T. (April 1981). The information society: The path to post-industrial growth. The Futurist, 15(2), 23-30.

Nadler, G. (1981). The planning and design approach. New York: John Wiley & Sons.

Now the office of tomorrow. (17 November 1980). Time, 80-82.

Office automation: Government's Alice in Wonderland approach to the automated office. (1981). Government Executive, 38-52.

Roadblocks of office automation. (February 1983). Office Administration and Automation, 28-105.

Schatz, W. (January 1981). Advice for Uncle Sam. Datamation, 67-68.

Sheposh, J. P., & Hulton, V. N. (1981). Summary of interview data on office technology project (Unpublished manuscript). San Diego: Navy Personnel Research and Development Center.

Strassman, P. A. (December/January 1980). The office of the future: Information management of the new age. Technology Review, 54-65.

Wetherbe, J. C., Davis, C. K., & Dykman, C. A. (1981). Implementing automated office systems. Journal of Systems Management, 6-11.

Zuboff, S. (September/October 1982). New worlds of computer-mediated work. Harvard Business Review, 142-152.

APPENDIX

MULTIFUNCTION INFORMATION INTERVIEW SCHEDULES

MULTIFUNCTION INFORMATION INTERVIEW SCHEDULE:
SUPPORT AND TECHNICAL PERSONNEL

I'd like to begin by asking a few background questions.

Present Job

1. What is your present job title? and pay grade?

2. How long have you had this job? what code?

3. Were you interviewed last May when we were here?

Now, let's talk about the automated office equipment. Throughout the remainder of the interview we will be referring to the office automated pilot project as either the "system" or "pilot" for simplicity's sake.

4. When you first heard about the system, what was your reaction? (Show scale)

5. Did you feel it would work here? (Show scale)

6. Do you feel management supports the idea of office automated equipment? (Show scale)

7. Have you received training in the use of the automated equipment? (Probe: If yes, what type and was it practical and helpful?)

8. How familiar are you with the new system? (Show scale)

9. Do you have your own terminal or easy access to one?

10. Do you have easy access to a printer?

11. When you need help or information in using the equipment, whom do you go to? (Do you get your question answered satisfactorily?)

Productivity

12. What is your overall impression of your individual work performance (effectiveness or productivity) since the implementation of the automated equipment? (Show scale)

Change

13. Has your reaction toward the system changed since you first heard about it? (What is it now and why?) (Show scale)

    a. Has your reaction toward the system changed since you were last interviewed? (What is it and why?) (Show scale)

Implementation Factors

14. What do you feel is trying to be accomplished with the system? (The user requirements)

15. In general, to what extent are these goals currently being met by the system? (Show scale)

16. What would you say is the major problem or obstacle for the pilot not working here as smoothly or as well as you think it could?

17. On the positive side, what is the major reason for the pilot working here as smoothly or as well as it could be?

18. Briefly describe what you use the equipment for on your job? (Probe: What parts of your job can you not use if for?) Is your use hampered by the pilot implementation? (If they only use it for typing manuscripts.)

19. What specific things does the system let you accomplish easier? Quicker? Better? (Probe: Give examples.) What tasks take longer? Are more difficult? (Give examples.)

MULTIFUNCTION INFORMATION INTERVIEW SCHEDULE:
MANAGEMENT PERSONNEL

I'd like to begin by asking a few questions on your background.

Present Job

1. What is your present job title? and pay grade?

2. How long have you had this job? what code?

3. Were you interviewed last May when we were here?

Now, let's talk about the automated office quipment. Throughout the remainder of the interview we will be referring to the office automated pilot project as either the "system" or "pilot" for simplicity's sake.

The System

4. When you first heard about the system, what was your reaction? (Show scale)

5. Did you feel it would work here? (Show scale)

6. Are you involved in using office automated equipment? (Show scale)

7. What is your role in managing the implementation of the pilot program? What are your responsibilities?

8. As a manager, how important are such skills as--computer terminal skills in performing your present job effectively? (Show scale)

9. (Skip if T.D. or C.O.)

   Did top management at any time ask you about your feelings, attitudes, or ideas about the system? (Probe: Did you help out with the design?)

10. Do you feel top management (C.O. or T.D., board of directors) supports the idea of office automated equipment?

11. To what extent do you understand what the office automated equipment is supposed to accomplish in this unit? (Probe: How familiar are you with the new system?) (Show scale)

Productivity

12. Do you have your own terminal (or easy access)?

13. How immediate is your access to a printer?

14. What is your overall impression of your individual productivity since the implementation of the automated equipment? (Show scale)

15. Has your reaction toward the system changed since you were interviewed? (What is it and why?) (Show scale)

    a. Has your reaction toward the system changed since you were last interviewed? (What is it and why?) (Show scale)

Implementation Factors

16. What do you feel is trying to be accomplished with the system? (Probe: user requirements)

17. In general, to what extent are these goals currently being met with the system? (Show scale)

18. Given that it is not working up to ideal, what are the reasons?

19. What would you say is the major obstacle for the system not working here as smoothly or as well as you think it could?

20. On the positive side, what is the major reason for the pilot working here as smoothly as it is or could be?

Unit Factors

21. Do you feel the pilot has changed the work procedures of your unit? If so, how? (Show scale)

22. Do you feel the formal management structure has changed since the automated equipment pilot? If no, do you think it should or will change?

23. Do you think the automated equipment will make the aims of the people you work with more achievable? If so, how? (Probe: give examples)

24. Do you feel middle management supports the idea of the office automated equipment?

25. What do you use the office automated equipment for on your job? (Probe: What parts of your job can you not use if for)

26. What specific things does the system let you accomplish easier? Quicker? Better? (Give examples) What tasks take longer? Are more difficult? (Probe: Give examples)

27. Would you suggest any specific management strategies in order to alleviate problems in the implementation or to set the stage for full use of the system?

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