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# Understanding the Process of Information Technology Implementation

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## INTRODUCTION

Research concerned with the implementation of information technology (IT) in organizations can be divided, roughly, into two streams: factor, or variance studies; and process studies (Markus and Robey, 1988). The great majority of work has adopted a variance approach where several factors that are likely to be associated with successful IT implementation are identified, made operational, and then tested, usually using a cross-sectional design, with statistical methods. In reviewing these studies, Lucas (1981) notes that although some 150 factors have been identified, only a relatively few, limited to "top management support" and "user involvement", are consistently associated with successful implementation. In addition, researchers tend to create new factor models rather than extending and confirming the most promising existing models, and no integrated model has emerged that explains a reasonable portion of the variance in implementation outcomes (although Lucas, Ginzberg and Schultz, 1990, made a valiant attempt in this regard).

Process studies, on the other hand, seek to understand the process by which IT is implemented in organizations, using interpretive techniques based on interview, observational, and collected data. Although there are relatively few process studies, they are particularly appropriate for theory building (Glaser and Strauss, 1967). Markus and Robey (1988) have pointed to the need for more process studies of technology implementation.

In this paper we describe an ongoing process study of IT implementation in five settlement houses in New York City, using an action research approach (Argyris et. al., 1985). Settlement houses are the primary way that social services are delivered to community members of inner cities. From a research perspective, the IT implementation in the settlement houses is important in several respects. First, while IT implementations in profit-seeking firms have been widely researched, relatively few studies have been conducted in not-for-profit businesses. Not-for-profit firms are likely to differ from their profit-seeking counterparts in terms of their organizational values, goals, reward and control structures of individuals, organizational processes, staffing, environmental influences, and acquisition of resources. Second, few existing studies address the dynamics involved in implementing IT in a group of cooperating, autonomous organizations. Our implementation study involves a confederation of five settlement houses and United Neighborhood Houses of NYC (UNH), an organization which

provides technical assistance to the houses. This confederation is analogous in structure to IT partnerships and alliances, which have become popular among businesses in the for-profit sector.

## **DESCRIPTION OF RESEARCH PROJECT**

In 1994, UNH was awarded a matching grant from the NTIA (U. S. Department of Commerce) to place an IT infrastructure in five settlement houses and in UNH. The grant provides resources to 1) install additional workstations at each house, 2) install or upgrade the local area networks (LANs) at each house and at UNH, and 3) construct a wide-area network (WAN) to connect the houses together and with UNH, and to provide a gateway to the Internet. In addition, UNH was able to secure sizeable donations of personal computers (PCs) and printers from IBM and of PC software from Microsoft. Altogether, the grant and donations provide several million dollars worth of resources to construct this IT infrastructure.

The goals for the IT infrastructure are to enable the settlement houses to improve the efficiency of their administrative operations, and to provide better service to their clients. To increase efficiency, the settlement houses plan to use software applications (i.e., off-the-shelf PC software, custom applications, and communications software) to lessen the burdensome information processing tasks required to administer social service programs. For example, the typical settlement house is required to submit approximately 1700 reports per year to various funding agencies. To provide better service, the settlement houses plan to allow their clients to access the IT infrastructure. For example, neighborhood-based family rooms are being created in settlement houses where members of the community can use personal computers to run various software programs and access the Internet.

The authors, having teamed with UNH, are responsible for the formative evaluation of the IT implementation process. Our objectives are to 1) document and interpret implementation events as they occur, 2) help guide the implementation to a successful conclusion by recommending improvements to the implementation process as it unfolds, and 3) develop implementation models, based on sound theory, that can be used to guide future IT implementations. Our intention is not to develop a unifying theory of IT implementation. Rather, our approach is to explore the application of more limited theories to explain and guide implementation in particular situations.

Much of our work focuses on identifying the sequence of implementation events that have transpired and explaining why these events have led to particular outcomes. It is our belief that patterns of behaviors can be identified and classified, and that these behaviors, in conjunction with other events and circumstances, lead to particular implementation results. Furthermore, we contend that interventions can alter these behaviors, and consequently influence outcomes. Finally, it is our notion that organizations, under the proper circumstances, can modify their behavior in the aggregate; that is, they can learn (Argyris and Schon, 1978; Levitt and March, 1988). Thus, we subscribe to the "emergent" perspective which, as described by Markus and Robey (1988), contends that

technology-related outcomes in organizations emerge over time as the result of complex, dynamic social and technical interactions.

## **OBSERVATIONS AND DISCUSSION**

As a vehicle for studying the implementation, the first author has joined the UNH implementation team as a consultant, requirements analyst, and observer. Based on our experiences to date, we offer initial observations relating to 1) the coordination of implementation activities, 2) the emphasis on technical and social aspects of the implementation, 3) environmental influences on the project, and 4) organizational learning.

Early in the project, implementation activities were being pursued in a disjointed fashion, with little forethought given to the ways in which these activities inform and constrain each other. For example, one of the team members was helping the houses to assess their needs for additional PC hardware and software, while another team member was simultaneously refining budget allocations for PC expenditures. Inadequate coordination between these team members resulted in confusion on the part of settlement house managers concerning the alignment of their computing needs and budget allocations.

These early coordination problems can be attributed to several factors. First, several key members of the implementation team had no previous history of working with each other or with the settlement houses. Second, due to resource constraints early in the project, the implementation team was not able to formulate a comprehensive implementation plan or institute project coordination meetings. Eventually, coordination improved as team members forged working relationships and adopted coordination mechanisms.

Our second observation concerns the change in emphasis among technical and social aspects of the IT implementation as the project progressed. In the early stages of the project, the implementation team focused its efforts almost exclusively on technical aspects of the IT implementation. For example, the team initially focused on such tasks as evaluating alternative WAN architectures and technologies, evaluating PC software and devices, and analyzing the existing LANs in the houses. There is little doubt that this work was necessary to design a technically efficient and cost-effective IT infrastructure. However, little systematic thought was given early in the project as to how the IT infrastructure might affect the existing work procedures, job responsibilities, employee satisfaction, and organizational structures in the settlement houses. This lack of emphasis on the social aspects of IT is somewhat ironic considering that the settlement houses are essentially social service organizations.

Recently, social issues have become more salient as settlement house managers have begun to consider various strategies for introducing the IT into their organizations. In particular, discussions about end user training seem to have raised the managers' awareness of the social aspects of implementation. Given that this increased awareness happened only recently, it is not yet clear how it will affect implementation efforts.

Our third observation is that influences from the environments of the settlement houses have significantly impacted IT implementation efforts. For example, the social service programs in the settlement houses are funded in large measure by government contracts. Just prior to the initiation of implementation efforts, a shift to Republican leadership occurred in the U.S. Congress, as well as in New York State and New York City governments. As a result, the funding for social service programs was curtailed by all three levels of government. Although funding from the NTIA grant remained intact, funding reductions in other programs affected IT implementation efforts in two significant ways. First, managers in the settlement houses were forced to focus their efforts on dealing with these budget cuts. Thus, their attention was diverted away from matters of IT implementation during the crucial early stages of the project. Second, social workers in the settlement houses typically place a high value on interpersonal relationships, and thus are centrally concerned with meeting the social needs of their clients and of each other. In fact, many workers were initially attracted to the settlement houses because of the emphasis the houses place on social services delivery. However, most staff workers are not familiar with the intricacies of administering government funding. Thus, workers were faced with a paradox when they attempted to interpret the way in which their houses changed resource allocations in response to budget cuts. Workers could not fathom why the settlement houses could still afford to buy new computing equipment (funds from the NTIA grant had to be spent on the IT infrastructure) at a time when their house was instituting staff layoffs and reducing services to clients (funds for other programs were reduced). This interpretation of events engendered some resentment by the settlement house staffs toward the IT implementation efforts.

Our fourth observation concerns the way in which UNH and the settlement houses have engaged in organizational learning as the implementation has progressed. Early in the project, ineffective communication channels existed between UNH and the settlement houses. At the urging of the authors, a project steering committee was eventually established. The committee currently meets bi-weekly, and consists of representatives from UNH and all five settlement houses. This committee has facilitated organizational learning by providing a forum for the exchange of ideas. Committee members have traded ideas related to user training and support, network security, and strategies for introducing IT into their organizations.

In addition, the steering committee has provided a mechanism that enables the houses to engage in cooperative boundary spanning activities. For example, a manager from one of the settlement houses gave a detailed report to the committee of a conference she had attended. At this conference, she had collected a good deal of information that was relevant to the creation of neighborhood-based family rooms in the settlement houses. The committee provided an efficient forum for disseminating this information to all of the houses. More importantly, however, the committee provided a forum for collaborative interpretation. As the manager gave her report, various committee members frequently interrupted with their analyses, thereby prompting lively group discussions.

Another learning mechanism that has been employed is a pilot study. Given the houses' relative lack of experience with IT, a large amount of uncertainty exists as to what IT-related services their staff and clients may find useful, and what resources will be required to support these services. To reduce this uncertainty, the houses believe that it would be beneficial to engage in trial-and-error learning via pilot studies. For example, one of the houses conducted a pilot project in which selected staff and clients were provided with access to the Internet. The study yielded useful information about what Internet resources might be useful to staff and clients, how to structure access to these resources, and what level of effort is required to support Internet users. Once again, the steering committee provided the forum for sharing the results of the pilot study with the other houses.

## **CONCLUSION**

In this paper, we have described an ongoing process study of an IT implementation project involving a confederation of not-for-profit organizations. We offer several observations of implementation events that have transpired, and offer tentative interpretations of these events. After implementation activities have concluded, we plan to synthesize our study data in order to construct implementation models.

Given the ongoing nature of our research, we believe that it would be premature to draw any conclusions about the phenomena we are studying. Based on our impressions to date, however, we believe that conducting formative research of IT implementations can contribute to our knowledge of implementation phenomena. In addition, we believe that organizational confederations offer a rich research environment that promises to inform us about interorganizational IT implementations.

## **REFERENCES**

Available from the authors upon request.