The Journal of Sociology & Social Welfare

Volume 23
Issue 2 *June*

Article 7

June 1996

Managed Computer System Conceptualization: Knowing When to Say No

Menachmen Monnickendam
Bar Ilan University

Managed Computer System Conceptualization: Knowing When to say No

MENACHEM MONNICKENDAM

School of Social Work
Bar Ilan University
Israel

Computer systems in human services are often abandoned after significant investments have already been made. A case study of preventing the utilization of a wrong computer system for a child development center illustrates how managed system conceptualization minimized damage. Critical consciousness and adherence to specific computer implementation technology created an environment which supported recurrent system efficacy evaluation. When the system, as initially conceptualized, could not meet practitioners' needs, early project abandonment was achieved. Some considerations for successful system development in human service are presented.

How can a human service administrator know if a highly touted computer system is the right one for the service in question and prevent the implementation of the wrong system? How can computer abandonment be achieved at the design phase and not after full system implementation? Clarification of these questions may help avoid the waste in money, time, effort and staff morale which occurs when final software product does not meet service needs.

Exploratory management research indicates that a substantial number of computer projects are abandoned. Moreover, most projects are abandoned mainly because of human factors, rather than cost-overruns or technological difficulties (Ewusi-Mensah & Przasnyski, 1991). At this time, no empirical data are available as to the frequency of abandoned computer projects in the human service arena.

Journal of Sociology and Social Welfare, June, 1996, Volume XXIII, Number 2

Abandonment often occurs when problems arise in planning, perceiving, analyzing, designing or configuring system objectives, as a result of which some group of stakeholders perceives major potential difficulties that may cause subsequent failure of the system (Ewusi-Mensah & Przasnyski, 1991; Keider, 1984). Specifically, system abandonment in the human services has been attributed to a lack of immediate system relevance to the direct service worker (Binner, 1988; Gripton, Liker & de Groot, 1988, p. 78; Phillips, 1993), and incongruence between workers' needs and system requirements (Dery, 1983; Orman, 1987). We submit that system abandonment is often rooted in failed system conceptualization.

System conceptualization is the process of creating the blueprint of a computer system. That includes a clear perception of the characteristics of the planned system, including its expected impact on non-computerized work procedures. The literature on system development for human services generally takes system conceptualization for granted (Schoech, Schkade & Mayers, 1982; Tighe, 1993), only rarely considering it as an issue warranting specific attention (Monnickendam & Morris, 1989). As we will show, the dynamics and difficulties of system conceptualization are of central concern in system development. Sound system conceptualization may prevent project abandonment. Conversely, it may lead to project abandonment, which is in itself not necessarily unacceptable. Abandonment is preferable to full system implementation and further investment in a nonproductive venture (Staw & Ross, 1987).

We shall present a case study of an abandoned computer project, originally intended for a child development center, to show how system conceptualization was successfully managed. Our focus will be on the utility of system conceptualization, rather than on the specifics of the computer system itself. We will first describe the process leading from the initiation of the project to its abandonment. We will then apply Gil's (1990) concept of critical consciousness to this process, and analyze how the creation of an unneeded system was prevented. Finally, we will discuss the application of managed system conceptualization to human services, and the role of management in preventing pitfalls in computer development for human services. We hope that this study will contribute to sound system development and to the increased use of computer systems in human services.

System Development

Impetus

The catalyst behind the project was a major research and development foundation in Israel which was interested in developing a computerized expert system to assist practitioners in clinical decision-making. The foundation assembled the project team, provided funding and computer resources, and selected a site for the program—a child development center which served developmentally disabled children in a multidisciplinary service. Many of the children suffered disabilities in or more of the following areas: speech, motor development and cognitive ability. The clinical decision for which the system was intended was selection of the problem area most amenable to further intervention.

The foundation felt that decisions were being based on inexact criteria and frequently could not be reconstructed. The project team assumed, as a working theory, that decision criteria can be modeled and applied to specific cases by using a computerized expert system. Such a system could be a tool for entering case data and would then output a prioritized list of the intervention areas together with reasons for each priority (Schoech, 1990, p. 600). The clinician would only have to decide whether to accept the computer's suggestion.

Need for project

Before project initiation the team met with most of the staff at the center to discuss whether an expert system was appropriate within the framework of the center. The staff considered the idea attractive, as it addressed their uncertainties in making correct decisions with multi-problem clients.

System development

The team investigated possible methods for expert system development and adopted a multifaceted approach. System development comprised three stages, which were actually overlapping and concurrent, though presented here in sequence for reasons of clarity.

The first stage, *clarification of the treatment flow and decision points*, aimed at mapping the professional and administrative framework of the center and at identifying the main treatment decisions. The center's staff (n=23) completed an open-ended questionnaire, which included items relating to job content, types of client, types of decision, case flow, case recording procedures, formal and informal structure of the center, and expected utility of the proposed system. In addition the team employed non-participant observation and observed practitioners from all represented disciplines in therapeutic sessions and case conferences (three case conferences and five treatment sessions). Finally fifteen case files were scrutinized to clarify the case-processing path (Fisher, 1978) and to understand the practitioners' thought processes. It was thus possible to achieve a better understanding of the center's actual practice.

The second stage, *decision analysis*, aimed at analyzing treatment decisions. To develop an expert system one analyzes the decision(s) which are to be simulated by it and maps the knowledge that is applied to it (Benbenisthy, 1992; Hart, 1986; Hayes-Roth, Waterman & Lenat, 1983; Schuerman, 1987). Knowledge engineers use knowledge acquisition techniques to query experts, e.g., how do they arrive at diagnoses. Working together, they explore these complex processes until they can specify and define them.

As in any action research the team took special care to ensure the validity and reliability of the data (Tripodi, 1983, p. 59). Accordingly, the initial findings, especially in the case of discrepancy between different sources, were corroborated with three parties. The first was the project team, which met frequently, compared notes, and tried to conceptualize the process and identify inconsistencies; these findings then provided a basis for further interviews. The second party was the administrator, who was knowledgeable, familiar with the inner workings of the center and responsible for daily operation, scheduling, file keeping, etc. The third side of the triangle consisted of the practitioners, who were requested to clarify inconsistencies. Their responses frequently acknowledged a process different from that initially envisaged by them, and provided new insights into their own actions.

The third stage relates to the outcomes of stages one and two, i.e., *system conceptualization* and, finally, abandonment. Reflecting on their own decision-making processes, practitioners expressed a vaguely defined but strongly felt dissatisfaction with the manner in which decisions were made, while at the same time believing in practitioner judgment. Asked point blank whether the center could use an expert system as envisaged by the research team, the polite answer tended to be: "Yes! that would certainly be very nice, but . . .", followed by a series of reasoned objections. The predominant objection was that, given a clearly defined case and situation, practitioners possessed adequate knowledge for decision-making, i.e., for selecting the most viable intervention. They did not feel the need for a computerized expert to propose choices for them.

Additional probing revealed a more fundamental problem, namely, how to formulate a clearly defined case prior to decision-making. Cases are frequently complicated, and involve many different disciplines. Retracing a case, understanding past decisions and framing the case for current decision-making often took considerable amounts of time and effort. The process was cluttered and difficult to follow, understand and assess. Practitioners felt that they could somehow utilize the computer's readily accessible memory, storage and organization to help them consider cases in an orderly and clear fashion, so that the decision-making process could be traced and past actions understood. In other words, their demand from the computer was that it would help to clarify what they were doing, not that it would do it for them.

This realization persuaded the team to inform both the foundation and the practitioners that the system, as initially proposed, and the practitioners' real needs as conceptualized in stage three, were incompatible. The team recommended the abandonment of the initially planned expert system. A different system which did cater to practitioner needs, was later developed.

Discussion

A system's concept is the blueprint of the computerized solution of a problem. However, despite tight problem definition, many constraints may remain hidden at the planning stage, to be discovered only during design and implementation (Giandomenico & Wildavsky, 1984; Korsmo, 1990). Thus, the concept needs redefinition and readjustment, without which it will fail. To manage this dynamic process, with its overlapping and often interwoven stages, specific tools are required. The implementors must constantly be on guard to identify developments not in line with the original intentions, or, conversely, check that these intentions are still appropriate. To that end, Gil (1990) coined the term *critical consciousness*. He sees critical consciousness as a medium for reflection on a project's *assumptions*, the magnitude of the *need*, the appropriateness of the *goals* and *theory* linking the problem to the expected end-result, and the suitability of the *implementation technique*. We will show how each of these five components were instrumental, on the one hand, in averting the creation of the wrong computer system; and, on the other, in clarifying the real needs of the service.

Managing with critical consciousness

Firstly, clarification of the *projects' assumption* was initially not successfully carried out. The assumption that an expert system was the solution to this specific problem was not objectively evaluated. The initial situation induced acceptance of an externally defined problem statement. Problem definition was largely imposed by the foundation, who also assembled the project team and provided a cooperative site. The project team, for its part, was also eager to create an expert system. This is not to say that the second component, *magnitude of the need* was not assessed. On the contrary, before implementation of the project, the team met with the center staff and discussed the need for the system, in keeping with accepted action research procedures (Tripodi, 1983). In those preliminary interviews, the center expressed considerable interest, and the team sincerely believed that the center could benefit from an expert system. Only at stage three did it become clear that such a system was unnecessary.

Could these misconceptualizations have been avoided? One might argue that this was a case of bad practice, that a solution had been imposed and/or that there had not been sufficient consultation. We contend, however, that at these early stages none of the participants were aware of the constraints that were later discovered (Giandomenico & Wildavsky, 1984; Korsmo, 1990). In view of the convergent interests of all parties, it would be unrealistic to expect a different scenario so early in the process.

Nevertheless, despite these early mishaps, and independent of them, system conceptualization occurred, due to constant reflection on two other attributes of critical consciousness, namely *goal* and *theory* appropriateness.

The goals faithfully reflected the project's initial assumptions and need: to design an expert system, and to provide the center with a relevant product for routine use. But while these two goals were initially thought to be fully compatible, it turned out that in practice they were not. That is, application of an expert system would not ipso facto lead to the creation of a relevant product. Constant critical attention to the congruence between solution and problem provides the desired mechanism which will initiate change, if needed, or project abandonment, if incompatibilities cannot be remedied.

The conflict which emerged was whether the desired project outcome was to generate knowledge in concert with the specific needs of the development site, i.e., to manufacture a useful product; or to create knowledge irrespective of those needs, i.e., to produce an expert system (Weiss, 1972, p. 100). That the team did *not* chose to produce an expert system was due to their success in selecting and applying the last, but not least, component of critical consciousness, namely *implementation technique.*

Expert systems development presupposes a sound personal rapport between implementors and end users (Ford et al., 1989; Stebbins, 1987; Tait & Vessey 1988); it can be done only *with* people, not *to* people. Its success depends on user participation (Mandell, 1987), on staff belief that the system will be useful and relevant (Overby, 1987; Werner, 1987) and will not pose a threat to the therapeutic aspects of treatment (Monnickendam & Eaglstein, 1993). The creation of an environment that promotes these conditions is dependent on appropriate staffing of the development team (White, 1984). White and Leifer (1986), reviewing implementation research results, concluded that in the majority of successful computer implementation projects, team members possessed complementary knowledge about computer technology, the type of organization to be conceptualized, the type of system to be implemented and implementation techniques.

Staffing of the project team met these requirements. They were all Ph.D.'s familiar with specific aspects of expert systems, who complemented each other's resources: a social worker expert in computer systems for human services and system implementation; a cognitive psychologist expert in decision modeling; and an educational psychologist proficient in the area of computer-aided instruction. This team composition provided the elements for participatory system development, thereby creating the conditions that enabled the goal conflict to surface. It also enabled staff to understand the system proposed was not what they needed, and to be clearer as to their actual requirements.

In compliance with participatory system development and based on their knowledge of computer systems in human services, the team unremittingly evaluated the second goal (relevance of the system) by asking, "What value will the expert system have for the center?" To acknowledge that there was an answer, but no problem to which it could be applied, requires intellectual integrity and freedom from preconceived notions (Campbell & Stanley, 1966, p. 3). The team's adherence to the implementation technique created an environment in which hard questions were not avoided. Had they adhered less strictly to implementation technique, they might well have created an unusable expert system.

Although outside the scope of this article some remarks regarding clinical expert systems are warranted. After the decision to drop the expert system, the center and team faced the question what system to develop, if at all. The practitioners wanted the computer not to make decisions but to clarify case complexities. This paradigm is in line with Weed's approach to medical decision making. That is, computers should not provide clinicians with all possible information and try to solve patient's problems, but rather systems should present options that let the patient and clinician see the complexity of a situation (Weed & Zimny, 1989; Zimny & Tandy, 1989). A system along these lines was eventually developed and is reported on elsewhere (Monnickendam, Yaniv & Geva, 1995).

Who's in charge?

Our discussion so far has stressed the central role of the team, implying that the management of the center transferred part of its responsibility to the team, as indeed it did. Practitioners viewed the proposed system as esoteric, something they understood only rudimentarily. Even when doubts began to surface, they were still prepared to accept the computer experts' diagnosis and solution. This raises the question: should computer implementation be left entirely to an external agent?

It was adherence to the second goal—projected use—that led to successful conceptualization. The team attributed much importance to constant goal reevaluation. They did so as result of their familiarity with the problems associated with computerization in human services. This enabled them to maintain close contact with their clients and listen to the latter's comments and provided a context for attention to practitioners. A management-oriented implementation team, however, unfamiliar with human service computing and human service practice techniques, might not have understood the practitioners reservations (Chaiklin, 1993). Such a team might well have assumed that the system would be useful, and would have created an expert system. It is management's responsibility, too, to set stringent controls on the development process (Fasano & Shapiro, 1991). If this approach implies an underlying uncertainty about development, that is justifiable, for uncertainty is a prerequisite for change. It is management's responsibility to hire experts in system development for human services, just as it is the project team's responsibility to involve service management in system conceptualization.

Conclusions

A project postmortem—a rare occurrence in itself (Boddie, 1987)—revealed that the key to successful project abandonment in this case was utilization of critical consciousness which in turn effected system conceptualization. Adherence to critical consciousness created an environment which permitted close attention to the practitioners. User involvement does not mean just listening and explaining, but also understanding the users and seeing the system from their viewpoint (Monnickendam & Eaglstein, 1993). From the users' perspective it provides the means to clarify their needs.

The case study showed that project abandonment does not necessarily reflect bad management. On the contrary, it reflected sound system conceptualization. Project abandonment should not be a chance occurrence: it should occur as early as possible in the development cycle, so as to minimize costs. We found this to be the case, as the centers' system was abandoned even before the design phase. It became clear, as well, that project abandonment was due to human factors, rather than technology or cost-overruns. Systems are often implemented in complex and dynamic environments. It is managements responsibility to guide the conceptualization process, even when not familiar with human service computing. Critical consciousness was shown to be effective in this regard.

References

Benbenisthy, R. (1992). An overview of methods to elicit and model expert clinical judgement and decision making. *Social Service Review, 66*(4), 598–616.

Binner, P. R. (1988). Mental Health Management Decision Making in the Age of the Computer. *Computers in Human Services, 3*(3/4), 87–100.

Boddie, J. (1987). The project postmortem. *Computer-world, 21*, 77–82.

Campbell, D. T., & Stanley, J. C. (1966). *Experimental and quasi-experimental designs for research*. Chicago: Rand McNally & Company.

Chaiklin, H. (1993). System analysts are perilous for social welfare organizations. *Computers in Human Services, 9*(3/4), 479487.

Dery, D. (1981). *Computers in Welfare: The MIS Match*. Beverly Hills: Sage.

Ewusi-Mensah, K., & Przasnyski, Z. H. (1991). On information systems project abandonment: An exploratory study of organizational practices. *MIS quarterly, 15*(1), 67–85.

Fasano, R., & Shapiro, J. J. (1991). Computerizing the small non-profit: Computer consultants' perspective. *Computers in Human Services, 8*(1), 129–145.

Fisher, J. (1978). *Effective casework practice. An eclectic approach*. New York: McGraw Hill.

Ford, K. H., Schmitt, N., Schechtman, S. L., Hults, B. M., & Doherty, M. L. (1989). Process Tracing Methods: Contributions, Problems, and Neglected Research Questions. *Organizational Behavior and Human Decision Processes., 43*, 75–117.

Giandomenico, M., & Wildavsky, A. (1984). Implementation as evolution. In J. L. Pressman, & A. Wildavsky (Ed.), *Implementation* (Third Edition) (pp. 163–180). Berkeley, California: University of California Press.

Gil, D. G. (1990). *Unravelling social policy* (Fourth Edition). Rochester, Vermont: Schenkman Books.

Gripton, J., Licker, P., & de Groot, L. (1988). Microcomputers in clinical social work. In B. Glastonbury, W. LaMendola, & S. Toole (Ed.), *Information technology and the human services* (pp. 76–96). Chichester: John Wiley & Sons.

Hart, A. (1986). *Knowledge acquisition for expert systems*. London: Kogan Page.

Hayes-Roth, F., Waterman, D. A., & Lenat, D. B. (1983). *Building expert systems.* Reading, Massachusetts: Addison-Wesley Publishing Company, Inc.

Keider, S. P. (1984). Why systems development projects fail. *Journal of Information Systems Management, 1*(3), 33–38.

Korsmo, F. L. (1990). Problem definition and the alaska natives: ethnic identity and policy formulation. *Policy Studies Review, 9*(2), 294–306.

Mandell, S. F. (1987). Resistance to Computerization. An Examination of the Relationship Between Resistance and the Cognitive Style of the Clinician. *Journal of Medical Systems, 11*(4), 311–318.

Monnickendam, M., & Eaglstein, A. S. (1993). Computer acceptance by Social Workers: Some unexpected research findings. In M. Leiderman, C. Guzetta, L. Struminger, & M. Monnickendam (Ed.), *Technology in people services: Research, theory, applications, and ethical issues* (pp. 409–424). Binghamton NY: The Haworth Press.

Monnickendam, M., & Morris, A. (1989). Developing an Integrated Computerized Case Management System for the Israeli Defense Forces: An Evolutionary Approach. *Computers in Human Services, 5*(1/2), 133–149.

Monnickendam, M., Yaniv, H., & Geva, N. (1995). The graphical case record: An interface congruent with professional work style. *Computers in Human Behavior.* (In press).

Orman, L. (1987). Information intensive modeling. *MIS Quarterly, 11*(1), 435–449.

Overby, M. A. (1987). Psyxpert: An expert system prototype for aiding psychiatrists in the diagnosis of psychotic disorders. *Computers in Biology and Medicine., 17*(4), 383–393.

Phillips, D. (1993). New technology and the human services: Implication for social justice. In M. Leiderman, C. Guzetta, L. Struminger, & M. Monnickendam (Ed.), *Technology in people services: Research, theory, applications, and ethical issues* (pp. 465–477). Binghamton NY: The Haworth Press.

Schoech, D. J., Schkade, L. L., & Mayers, R. S. (1982). Strategies for information systems development. *Administration in Social Work, 5*(3/4), 11–26.

Schoech, D. (1990). *Human services computing: Concepts and applications.* New York: The Haworth Press.

Schuerman, J. R. (1987). Passion, Analysis, and Technology: The Social Service Review Lecture. *Social Service Review, 61*(1), 3–18.

Staw, B. M., & Ross, J. (1987). Knowing when to pull the plug. *Harvard Business Review, 65,* 68–74.

Stebbins, R. A. (1987). Fitting in: the researcher as learner and participant. *Quality and Quantity, 21,* 103–108.

Tighe, R., J. (1993). Organizational development and information systems: A case study. In M. Leiderman, C. Guzetta, L. Struminger, & M. Monnickendam (Ed.), *Technology in people services: Research, theory, applications, and ethical issues* (pp. 145–152). Binghamton NY: The Haworth Press.

Tait, P., & Vessey, I. (1988). The effect of user involvement on system success: A contingency approach. *MIS quarterly, 12*(1), 91–108.

Tripodi, T. (1983). *Evaluative research for social workers.* Englewood Cliffs, New Jersey: Prentice-Hall.

Weed, L. L., & Zimny, N. J. (1989). The problem-oriented system, problem-knowledge coupling, and clinical decision making. *Physical Therapy, 69*(7), 565–568.

Weiss, C. H. (1972). *Evaluation research. Methods for assessing program effectiveness.* Englewood Cliffs, New Jersey: Prentice Hall.

Werner, G. (1987). Methuselah—An expert system for diagnosis in geriatric psychiatry. *Computers and Biomedical Research, 20,* 477–488.

White, K. B. (1984). A diverse, balanced team approach generates vital management strategy. *Data Management, 22*(9), 31–41.

White, K. B., & Leifer, R. (1986). Information systems development success: Perspectives for project team participants. *MIS Quarterly, 10*(3), 215–224.

Zimny, N. J., & Tandy, C. J. (1989). Problem-knowledge coupling: A tool for physical therapy clinical practice. *Physical Therapy, 69*(2), 155–161.

At the time of writing the author was visiting professor at the School of Social Work, Rutgers University, New Jersey. The research was supported by a grant from the Joint Distribution Committee, Israel and the Schnitzer Foundation for Research on the Israeli Economy and Society. The author is indebted to Charles Guzetta and David Ribner for their remarks on an earlier version of this paper.