Management's Role In Information System Development Failures: A Case Study

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Introduction

Scope and purpose

This paper is an examination of an information system (IS) development project that failed. The IS project to be described and analyzed involved the efforts of approximately thirty-five full and part-time people covering a period of four to five years. The endeavor consisted of two or three principal projects with several secondary activities attached to them. It is very difficult to do a complete analysis of the project because of the sheer number of events, breakthroughs, crises, and problems related to the evolution of the project. It is important to document the general areas where hindsight can expose key management failures in order to learn from history, with the hope of avoiding similar mistakes in the future.

A presentation of the events surrounding the conception of the IS is followed by a discussion of the development project itself. The case description is followed by a breakdown of the major issues which the authors believe were the cause of the project's failure. Some conclusions are presented as to how this IS project could have been managed more successfully.

The setting

A state planning agency believed there was a need for better land management in the state, due to the increasing demands being placed on a fixed amount of land. Not only were the demands increasing, but they were being made by conflicting groups. Forest product companies wanted trees, farmers wanted drained land to plow, developers wanted to subdivide land and provide homesites, mining companies wanted to utilize the mineral potential of the land, and nature lovers wanted the aesthetics of land untouched by man. Even the demand for recreational land was broken into competing groups such as cross-country skiers, snowmobilers, fishermen, water-skiers, hunters, campers, and off-the-road vehicle owners. The agency needed a management information system to aid its planning process to approach the problem of formulating state policies concerning these multiple and conflicting land uses. The case

Abstract

This paper presents an example of an unsuccessful information systems development. The development failure is analyzed in case form, defined by nonuse of the system for its intended objective and an exodus of key systems developers. Organizational deficiencies in the area of project planning and control are highlighted. Practitioners and academics can benefit from the analysis and avoid similar pitfalls in their own work by sharing these experiences.

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describes how the agency attempted to build such a system.

It should be noted, before examining the case, that the authors were personally involved in the computer systems development effort undertaken to implement portions of the project. Hopefully the biases which are certain to be present in both the description and the analysis are of a constructive nature. One of those biases is the belief that the failure of the project was not due to mistakes made by specific groups or individuals, but to the inability of the interacting organizations to align their management goals and policies.

Because of this belief, the focus of the case is on the actions and omissions made by the organizations rather than the individuals and personalities. While it is important to remember that an IS development project exists in an extremely complex environment with complex social interactions present, the major errors made by the managers involved were not of the interpersonal nature but of the inter-organizational nature. The authors believe this case is not a unique situation, but one common to many organizations attempting to develop systems in a complex environment.

Case Description

The case involves a state agency faced with a decision-making problem and their attempt to solve it. The agency’s function was to examine the present resource and land use situation in the state, and make decisions concerning the emphasis the state should place on using these resources and legislation to implement these decisions. However, the agency was not sure what the specifics of these decisions were to be, since this was a new area of endeavor. The agency proceeded to contact the local university’s research group (URG) which had a reputation for having experts in the area of resource planning. The group within the URG which was contacted, which we will call “the Researchers,” was interested in the agency’s problem and agreed to assist the agency.

Hindsight reveals some very good reasons why the URG was selected rather than a commercial consulting firm:

1. A university has considerable freedom in selecting projects since it seeks academic and social value in areas profit motivated firms would shun.
2. The university has a history of successful research projects and its faculty are trusted and respected.
3. The computer and human resources available at a university are substantial.

The URG proceeded to organize a special project team to work on the agency’s problem. This team was made up of the Researchers and the “Systems Group.” The Researchers were geography professionals and graduate students while the Systems Group consisted of programmer/analysts. There were, of course, administrative departments connected with both the agency and the URG, but these played no significant part in the project’s outcome.

The specific project referred to in this paper was a continuation and broadening of previous projects successfully completed for the planning agency by the URG. The most significant project involved the creation of a multi-colored land use map of the state. The source for the map was a series of aerial photographs from which the land use and water orientation were interpreted for each of the state’s 1.3 million forty acre parcels. These interpretations and the public land survey location code were converted into machine readable form and these became the computerized input for the mapping procedure as well as the structure for holding additional resource data. This initial data collection process had created sequentially accessible tape files which were to be the foundation for the next phase of development.

This next phase is the project of concern. Other data variables, such as soil type, forest type, highway orientation, and geomorphic region, were to be inserted into the data records of a pilot study area chosen by the URG. This data would then be used to compute a set of land use suitability scores for each parcel of land. These scores were then to be used by the planning agency to improve its land use decisions in regard to policies concerning agriculture, preservation, and development.

The Researchers began to develop the theoretical models of the physical resource properties with which they thought the agency
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should be concerned and the data was collected to feed these models. The agency, however, had only stated the goals of the project in general terms and these were subject to change. This situation plus the fact that the researchers were academicians led to the development of maps, tables, and products that were appealing to the agency, but not specifically useful. A product typically would be presented to the agency, explained, and then returned to the URG offices after the presentation. The agency was satisfied for a period of time with the results it was receiving from the URG even if the results were just progress reports of the data entry effort. This was the case because the agency viewed any results as being satisfactory—even those that did not align with the general goal statements. Anything the URG did was thought to fit, because the goals had been stated so vaguely.

It is difficult to say flatly that this project failed. First of all, a failure implies the termination or completion of the project. This project is still functioning at present; it has not been terminated by the funding agency. As Stephen P. Keider so aptly stated in his article, "Why Projects Fail":

"... projects never terminate. Rather, they become like Moses, condemned to wander till the end of their days without seeing the promised land." [7]

This is true with this particular URG project. It is the authors' belief that this project can be considered a failure because 1) the planning agency does not use the outputs of the project to do land use planning, and 2) the fact that several of the full time personnel left the project because of frustration caused by their inability to change the course of events. The reasons for this are rooted in the nature of the two organizations, the generality of the goal specification, and the weakness of the contractual agreements. The following section describes these and other reasons for this project's lack of success.

Analysis of Case

The failure of any project to reach its goal is usually regarded as a failure of the management of that project. IS development failures are no exception. It could be said that IS's require a higher degree of management attention than, for example, the construction of an apartment complex because the building materials for an IS, its goals, products, and the creative demands on the personnel, are often based on abstractions. This makes IS management very difficult and fraught with pitfalls. Morgan and Soden [8] studied ten MIS projects that failed either operationally, economically, technically, or developmentally. Their conclusion was that most failures were due to management's inability to control, organize, and plan, which is to say, manage.

Knowing that IS projects fail because of poor management is not very instructive. It is instructive, however, to point out that these management failures are often hidden from view of the untrained observer and, surfacing in various forms, they lead to an attack on the symptoms rather than the problem itself. A classic example of the failure to recognize a task management problem is demonstrated by the software project director who adds additional programmers to a project which is falling behind schedule only to have the project fall further behind [2]. This article examines the types of management errors made in the case from this perspective.

Inactive decision maker

It is apparent, looking closely at the state agency funding this IS project, that they were not active decision makers. This is not to imply that they were negligent in performing their duties, but, as in the case of many strategic planners, their decision process and requirements were not of a pressing nature. The agency was not in a decision provoking environment and had no land use planning decision history it could fall back on, which an inventory analyst might do when faced with deciding inventory levels for a department store. The agency's decision process had not yet been developed at the time they contracted for the IS. The agency was, in fact, still in the process of defining its role in the state bureaucracy.

The question of accepting a contract for development of an IS for an inactive decision maker is crucial to this case. This was the pivotal mistake made by the two organizations. It is simply impossible to design a decision support system for an organization with a decision recognition
problem. The problem itself must be identifiable in order to compile information for a decision to solve a problem. International Business Machines Research Laboratory in San Jose, California will not accept contracts for interactive decision making projects unless the people who are to use the system are the active decision makers [3]. IBM's philosophy is that an information system should be an extension of the decision maker's mind. If that mind does not have a specific problem to solve, the information system constructed to support problem solving will be superfluous.

Contract deficiencies

The agency underplayed the importance of the contract as a management control tool. We could be very critical of them for allowing such a weak contract to be signed in the first place, but upon examining the circumstances leading up to the drawing of the contract, our criticism is somewhat diminished. The nature of the two organizations, a state agency and a state university, along with the awe and respect the agency had for the URG personnel caused the agency to allow an unstructured contract that it would not have agreed to with a commercial consulting firm.

The project's goals were as vague as "to improve land use decisions," and the contract was equally as vague in its description of what the URG was to produce. There was no formal work plan submitted to the agency. Once signed, the contract was to run for a fiscal year, and while it was modified slightly from year to year, it was never re-drawn.

The reasoning behind the agency's lapse in contract management procedures can be better understood by examining concepts of Organizational Development theory that apply to the relation of change agents and the problem solver [5]. Figure 1 demonstrates the search cycle a problem solver goes through in developing problem solutions. A need arises which is diagnosed to be a problem requiring a search for resources either inside or outside the user's environment. These resources are used to

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**Figure 1. Problem Solver View of Solution Cycle**

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fabricate a solution which is applied to the problem. If the solution is not a good fit, the cycle is repeated. It is important to see that this model shows that the problem solver ventures out of his solution cycle only to broaden the search for resources with which to fabricate a solution and returns soon afterwards to apply it to the problem.

The agency's attempt to solve what it saw as its problem fits very nicely into this model. A need was felt, a problem diagnosed, and the search for resources to construct a solution involved using an outside agent. Unfortunately, the agency's view of the working relationship between the two organizations began to modify the workings of its problem solving cycle. The agency began to think of the URG as an integrated part of the cycle rather than as an outside agent. The agency trusted the URG to lead it around the problem solving cycle by asking the URG to define as well as solve the problem. This viewpoint led directly to the laxness of the contract. Once the agency began thinking of the URG as part of its normal problem solution mechanism, the contract was viewed as merely a vehicle for the transferring of funds.

**Project control**

One of the immediate effects of the poor contract negotiation procedures between the agency and the URG was the agency's loss of control of the development of the IS that was to aid it in performing its planning function. This was obviously a serious loss of one of the managerial functions. Since neither the contract nor a work plan contained exact specifications of what the URG was to produce, control over development became a mute point. The agency was literally at the mercy of the URG for delivery of any product. Project review meetings were characterized by table poundings by agency personnel demanding some product, resulting in promises of delivery by the URG, followed by partial or no product delivery to the agency.

Although the IS project consisted of more than just software development, the lessons learned by P. G. Hill [6] on control of large software projects could have been applied by the agency or the URG. Hill suggests controlling projects by means of a series of system documents. These documents consist of a general system description, functional descriptions of the system's modules, detailed functional descriptions, program descriptions, and a change history. His experience using these documents to monitor projects has shown that projects whose schedules have slipped have done so when the project control mechanisms were allowed to relax.

The agency should have insisted via the contract that general and explicit system descriptions be compiled with changes requiring prior approval of the agency. These documents could have been used as a control device, and would have provided the agency with insights into the decision process it was attempting to define. The project-control-by-documentation approach requires considerable discipline by the parties involved, but the rewards are worth the effort.

All research does not support strict and regimented project planning and control. Powers and Dickson [9] found in a study of 20 MIS projects in 10 firms, that formalized project control systems were negatively related to project success. This implies that specific user requirements should evolve based on general development objectives. It must be realized, however, that lack of any plan or direction is as detrimental as a strict "frozen" development plan. The objectives in this case were so general that any product developed by the URG was believed to fit within the scope of the project.

**Single system approach**

One of the IS design errors frequently made is the attempt to solve a multiple system information problem with a single system approach. The agency apparently viewed its information needs as if it were an island in the state organization and as such wanted its own semi-private information system. This attitude indicates how the agency viewed its relationship to other agencies. It thought of itself as a separate entity apart from the other agencies, instead of seeing itself at the top of a federation of interlocking state agencies.

It should be mentioned that a complete systems analysis of the agency was never undertaken, at least not in relation to this project. The agency believed it was headed in the correct direction.
once the contract had been signed with the URG. The concept of the single information system belonging to the agency was considered a foregone conclusion. What the agency viewed as its information problem was actually an inter-agency information problem. The planning agency’s information should have been developed from the federation of subsystems existing in the neighboring agencies.

System user identification

The contract, as general as it was, called for the URG to develop an IS, implying that once the system was completed it would be turned over to the agency. This, however, was not the case. The system was developed outside the funding agency, and it was not designed to match the functional operations of the agency which was to be the user. Although the agency looked upon the system as theirs, the system was also designed to serve the research needs of the URG. The URG viewed itself as a user organization. This resulted in the perceived needs of the URG Researchers taking precedence over the agency needs, since the Researchers were closer to the systems development.

It was logical for the URG Systems Group to see the Researchers as the system user since it was the Researchers who had the immediate and defined information needs. The Researchers were developing the decision structures, and consequently they became the “users.”

Data collection

The decisions of which data variables to collect and add to the computer files were made by the Researchers or the Systems Group itself, since the agency was not considered to be the immediate active user of the IS. The agency was often informed after the fact and was regularly pleased that progress was being made. Progress was easily defined and measured. The agency was relieved to hear of the completed entry of a new data variable, since they seemed to confuse data with information and had been told that data collection and entry were often the most difficult parts of building an IS.

The data collection phase of the project was a problem from the beginning. The agency sought help from the URG because it did not know the specifics of the problems it wanted to solve. The URG was not in the position to know what level of data would be sufficient for the creation of resource management policy since such policies had not been developed previously. The result was that all data elements were collected to the lowest level of detail. The theory behind this situation was that the data had to be accurate to the smallest level so that all future decisions could be defended.

The data collection syndrome that resulted was due to the participants overlooking a principle of information system theory. Davis [4] discusses the need for matching the information requirements of the system to the user’s operational function in content and characteristics. This principle was ignored by default since neither the agency nor the URG had defined their operational functions well enough to specify information requirements. Adams and Schroeder [1] examined the need for accuracy of data for planning purposes in their study of the trend of information characteristics among departments in an organization. Their study of middle managers indicated that information used for planning could be less accurate, less precise, older, more aggregated, and less descriptive than information used for operations and budgeting purposes.

The agency continued to support the data collection process despite its lack of defined data needs. The URG proceeded to concentrate its resources on data collection, editing, and correction with only a fraction of its efforts being devoted to developing decision models. When and if the agency would press the URG for some results relating to analysis of the data already collected, the response was that the analysis could not start until a new data variable was collected. This “data scarcity” syndrome came about because the agency and the Researchers had no definition of the decision-making/problem-solving process they were trying to support with the IS.

Abortive decision process

It is informative to compare the decision process exhibited by the agency and the URG with the decision processing model designed by Herbert Simon [10], because the decision process of the
information system user is extremely important to successful IS design. Simon's decision model consists of three phases as shown in Figure 2.

The first phase is a condition labeled "Intelligence," in which the decision maker searches the environment looking for situations requiring decisions. Raw data is then obtained, processed, and problem areas are identified. The second phase in the process is called "Design." This phase consists of inventing, developing, and analyzing possible courses of action to be taken. Possible solutions to problems are generated and tested for feasibility. The third phase is the selection of a particular course of action. A "choice" is made and implemented. The decision process can be described as a flow from intelligence to design and then choice with any of the phases resulting in a feedback loop to a previous phase. Simon views these phases as elements in a continuous process.

The behavior exhibited by both the agency and the URG in terms of the decision processing model can be thought of as an abortive decision process similar to the one shown in Figure 3. The continued emphasis on data collection can be viewed as a failure to exit from the intelligence phase of the model. Sporadically, however, the parties do enter the design phase only to return quickly to the intelligence mode. The fact that a particular course of action is never chosen to be implemented indicates that the "choice" phase is never entered.

Figure 2.
Simon Decision Process Model

Figure 3.
Decision Process Displayed In Case

An abortive decision process, such as the one displayed in this case, soon becomes degenerative. Little discipline is applied to the intelligence phase in the form of positive feedback since the phases of design and choice are never or seldom entered. The intelligence phase soon becomes omni-directional, and the decision process deteriorates further with an increased loss of selectivity.

Conclusions

Network of errors

The mistakes made by the organizations in the case described cannot be viewed as isolated occurrences. Morgan and Soden [8] noted in their study that MIS projects which were late or failed were usually characterized by more than one mistake. The authors believe the errors in system development in the case just examined
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Figure 4. Error Network
form a degenerative network that is difficult to escape once it is entered. Figure 4 shows the relationship of the management mistakes observed in the case.

The inactivity or immaturity of the agency's decision-making process and the lack of involvement by systems analysts in the original definition of the agency's information needs were the two conditions which caused the case organizations to enter the error network. These conditions led the agency to trust the URG since they were perceived as the experts. Unwarranted trust in the consultant resulted in a weak contract which led to the system being developed as a single system outside the agency. This led to minimum agency involvement in system design and data selection, which contributed to a weak product for aiding planning decisions. The entire process can become a degenerative cycle until the agency, which is committed to the project because of the lack of an alternative, performs corrective surgery and gets out of the network.

It should be noted that the URG has had a number of successfully completed projects and to a large degree deserves the professional respect it receives. That acclaim, however, is for work in urban studies and geography, rather than in information systems. This particular project's failures can be traced to the fact that the top managers of the project, the Researchers, and the planning agency had limited knowledge of information systems development. They are for the most part geographers and think of the project as a "land" management project when it is, in fact, an "information" management project.

Corrective steps

The agency must change its management philosophy in order to be successful in its future efforts to develop policies and legislation related to land and resource management. The planning process must be seen in relation to other management functions such as control and goal definition, and not as an entity in itself. Managers cannot control a project without a plan and every plan must have a defined goal. The lack of a well-defined goal caused this project to wander aimlessly without direction, being wherever it happened to be.

The first step to revive this project or any counterpart would be for someone with power, possibly a fund controlling legislator, to require that the agency define its goals. This could be done in formal sessions or informal meetings. The goals should then be examined in brainstorming sessions with other agency representatives in order to test their political feasibility. Once these goals are defined, a set of simplistic simulations or decision games could be formulated to test the reasonableness of the goals. These simulations should be based on the problem areas the agency had in mind when it defined its objectives, with the criteria for successful completion of a simulation to be the goals themselves. This gaming process would enable the agency personnel to develop a better perspective of the problem areas with which they are concerned and the decision process and information needed to solve these problems. The agency's goals may subsequently be modified under scrutiny of actual decision-making, even in a simulated environment.

This entire process is aimed at forcing the potential decision maker to examine the decision environment, specify what the limits are to the problem, and make decisions which are judged against stated goals. Once the agency has matured in its decision-making/problem-solving ability, it can then proceed to build a federated information system in conjunction with other state agencies to supply the information it has determined as relevant to its planning function.

This case may serve as a lesson for information system development management that can be heeded by others attempting to create information systems for public, nonprofit organizations. The failure of this information system was sufficiently painful that the lessons to be learned should not go unrecognized.

References


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