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PARADOXES OF INFORMATION SYSTEMS PLANNING

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ABSTRACT

During two research projects to identify the difficulties associated with information systems planning (ISP), it became apparent that IS managers and users often do not apply a number of commonly accepted guidelines for successful ISP. This paper reports some instances in which the guidelines were not applied. It also explains the neglect of the guidelines and the incentives ISP participants had for not applying them. The findings suggest further research and also have practical implications for IS managers.

INTRODUCTION

Information systems management has become increasingly complex in recent years (McFarlan and McKenney, 1982). At operational levels, the growing sophistication of hardware and software enables more and more intricate systems to be implemented. This places severe demands on scheduling and resource deployment skills. At strategic levels, firms are attempting to use information to gain an advantage over their competitors (Benjamin, et al., 1984; Ives and Learmonth, 1984). Thus top management must consider the impact of information on the organization as a whole during the strategic planning process. In addition, some firms have become so dependent upon their automated systems that they cannot operate when their computers fail (Gifford and Spector, 1984).

Given this increased complexity and dependence, the urgency to successfully perform information systems planning (ISP) has grown dramatically for all levels of the organization. However, as shown later, ISP remains a critical issue with IS managers. This paper explores some of the reasons why ISP is not as effective as managers would like.

BENEFITS OF IS PLANNING

The need for ISP was recognized as early as 1969 and the benefits of formalized ISP have been documented (Blumenthal, 1969). For example, a study showed that 16 of 18 successful computer users (out of a sample of 36 users) had formalized plans for their data processing activities (McKinsey and Co., 1968). In addition, an A.T. Kearney study reported that companies with integrated business and IS strategic plans financially outperformed those without these plans by a factor of six to one (Ball, 1982).

The benefits of ISP are clear. A 1982 study further substantiated the importance of ISP by finding that the MIS long range plan itself, together with its integration into the business plan, was a top priority with both professionals and academics (Ball and Harris, 1982). Two

years later a sample drawn from eight industries confirmed these concerns (Dickson, *et al.*, 1984). In light of these findings, the authors designed two research projects to provide extensive face-to-face contact with IS managers to probe the difficulties of ISP.

METHODOLOGY

The first research project involved 24 IS professionals drawn from the top, middle, and operating levels of MIS management. Each manager participated in one of three group sessions, depending on his or her management level. During these sessions the Nominal Group Technique (NGT) (Delbecq and Van de Ven, 1975) was used to elicit the difficulties which the managers faced in developing their IS plans (Lederer and Mendelow, forthcoming). The results of these NGT sessions were used to construct a comprehensive list of the most important difficulties. Table 1 shows the list.

This list was then used as the basis for a series of structured, indepth interviews with twenty senior MIS executives from a variety of industries (Lederer and Mendelow, 1986). Table 2 describes the participating firms. During the interviews, which lasted about three hours, the executives were asked why each item on the list would be a difficulty and how it could be overcome. In the course of these interviews it became clear that there were serious flaws in some of the underlying tenets of ISP when applied in practice.

The underlying tenets of ISP have been developed by both practitioners and academics to act as guidelines to achieve the benefits associated with the successful development and implementation of ISP. In addition to guidelines specifically applicable to ISP, further prescriptions were borrowed from general management and incorporated into the lore of ISP. Over the years these guidelines have become accepted. They are widely quoted in journal articles, trade magazines, textbooks and monographs. Professors teach them to their students. Consultants prescribe them to their clients. Generally the guidelines are very well known (indeed, almost trite) and remain unquestioned.

During the research project it became evident that although the participants passionately believed in the guidelines of ISP, and invariably tried to implement them, their ISP efforts were sometimes less successful than desired. Indeed, the IS executives indicated that ISP participants at times followed a course of action virtually opposite to that proposed by the guidelines. These cases represented paradoxes because the widely accepted guidelines for effective ISP either failed or were not applied.

Furthermore, the participants in this study were experienced and capable IS executives whose self-confidence permitted them to express their views honestly. The neglect of the guidelines by their organizations is assumed to be representative of other firms.

The research suggested that the paradoxes may be explained, at least in part, by the incentives which motivate ISP participants. Expectancy theories of motivation indicate that workers act to obtain rewards (Porter and Lawler, 1968). The application of expectancy theory to the ISP environment suggests that a paradox will arise if the reward for adhering to the guideline is less than the reward for doing otherwise. Clearly if ISP is to be successful, these paradoxes must be resolved. This paper describes a selection of nine significant guidelines of ISP, the paradoxes often associated with each, and how incentives cause the paradoxes. Despite the paradoxes, the intent of the paper is not to discredit the guidelines but rather to explain why they sometimes fail or are not applied. The guidelines should still be followed.

GUIDELINES, PARADOXES AND INCENTIVES

Develop a Formal Information Systems Plan

This guideline is clearly very trite. Professors in elementary management courses teach that planning is a primary function of management. In fact, research has demonstrated that organizations which develop formal information systems plans are generally more successful than organizations which do not (Ball, 1982; Davis and Olson, 1985; McLean and Soden, 1977).

Planning involves setting objectives and policies to enable an organization or department to

Table 1. ISP Difficulties

1. Determining top management's objectives.

2. Getting top management to understand that there exists a strategic role for information systems.

3. Determining the end users' needs.

4. Responding to both the short-term and long-term impact of changing environmental factors such as:
   a. new technology
   b. government regulation
   c. competitors' actions
   d. the market
   e. the user and the workforce

5. Establishing and maintaining priorities.

6. Coordinating information systems plans and priorities with corporate plans and priorities.

7. Estimating requirements for:
   a. hardware
   b. labor
   c. skills
   d. training
   e. space
   f. travel

8. Matching people to each project.

9. Allocating resources to new versus maintenance projects.

10. Obtaining support and commitment for resources from:
    a. the users
    b. the information systems department
    c. top·management

11. Implementing a planning methodology.

12. Maintaining flexibility in the planning process (ongoing nature of IS projects vs the discrete character of planning systems).

13. Justifying projects and their funding.

14. Planning for security and disaster.

15. Getting plans accepted.

Table 2. Profiles of the Companies .

1. A university providing undergraduate, graduate and professional education through 16 schools with an enrollment of over 27,000.

2. A manufacturer providing products and services to the construction industry with gross revenues of nearly $2 billion in 1984.

3. A worldwide manufacturer and marketer of processed food products with gross revenues of nearly $4 billion in 1984.

4. A steel producer with sales of a wide variety of steel mill products with gross revenues of $19 billion in 1984.

5. A multi-national producer of glass, chemicals, coatings, resins and fiber glass with net sales over $4 billion in 1984.

6. An explorer, producer and distributor of natural gas with gross revenues of $3.5 billion in 1984.

7. A coal producer with gross revenues of $1.6 billion in 1984.

8. A multinational diversified manufacturer of consumer and specialty products with gross revenues of over $2 billion in 1984.

9. A bank with domestic retain, worldwide commercial, trust and financial management services with assets over $30 billion in 1984.

10. A manufacturer of polyurethane raw materials, plastics, chemicals, dyes and pigments with net sales of over $1.5 billion in 1984.

11. A residential, commercial and industrial natural gas distributor.

12. A specialty food chain with gross revenues of $390 million in 1984.

13. A corporation providing energy, advanced technology, and broadcasting with gross revenues of over $10 billion in 1984.

14. An association providing standards and technical guidance to the transportation industry.

15. A provider of medical insurance to 2.6 million subscribers.

16. An urban hospital with over 550 beds.

17. A savings bank with total deposits of over $2 billion in 1984.

18. A privately held firm specializing in the management of large construction products.

19. A county government serving approximately 1.5 million people.

20. A retail drug chain with operations in 20 states.

deploy its resources effectively and efficiently to achieve its goals. The act of planning requires making risk-taking decisions at the present time with the best possible knowledge of their outcomes (Drucker, 1979). Clearly, without planning it is very difficult to achieve anything at all.

The Paradox All too often, interviewees stated that daily crises take precedence over planning. In one instance during the first phase of the study, a manager declined to attend an NGT session two weeks hence because he said that although he felt the meeting would be valuable, he knew that on that day he would be "running around like a chicken with its head cut off putting out fires" even though he did not know the specific crisis he would face.

In some cases, IS managers flatly stated that they did not have time to perform the same planning methodologies which their peers at other firms claimed to have successfully completed. In summary, planning will save time in the long term but there often is no time to plan!

The Incentives These comments suggest that in many organizations, the rewards for planning do not outweigh the sanctions for the failure to plan. That is, the rewards for short-term successes outweigh the rewards for long-term results. Furthermore, interviewees revealed that planning is not particularly gratifying. Well-thought out plans might never be executed, whereas the development of new systems actually demonstrates tangible, daily progress. Pay raises and promotions probably rely more heavily on tangible accomplishments immediately preceding evaluation than on carefully thought-out plans which may favorably impact the company in the distant future. The need for short-term results subverts efforts to formalize information systems plans.

Link the IS Plan to the Corporate Plan

The IS department should attempt to achieve the organization's goals and must adhere to corporate policies (McFarlan, 1971; Pyburn, 1983). By ignoring the goals and policies of the organization, it is impossible to deploy resources efficiently to support corporate objectives (King, 1978). Linking the IS plan to the corporate plan facilitates an optimal project mix.

The link between the IS plan and the corporate plan can be achieved in three dimensions— timing, content and personnel (Shank, et al., 1973). For example, the IS plan can be developed before, during or after the corporate plan. While each of these options has advantages and disadvantages, ideally the IS plan should be developed during the corporate planning process.

Furthermore, if the information services department (ISD) is to support the needs of the organization, those needs should be reflected in the content of the IS plan. Conversely, the resources required by the ISD to meet corporate needs should appear in the corporate plan. Thus there must be a consistency between the content of the IS plan and that of the corporation.

Finally, people can also act as a link. Personnel involved in the development of the corporate plan should also participate in the creation of the IS plan.

The Paradox Interviewees frequently indicated that their firms did not have a suitable corporate plan with which to link. In some cases, they had no corporate plan at all. In other cases, the corporate plans were glittering generalities or mere financial targets which could not be translated into IS plans. Some interviewees also stated that top executives liked to maintain confidentiality of the plan. If top managers had a plan, they might have been reluctant to share it with the IS department for fear of its possible disclosure to competitors. In addition, some interviewees maintained that top executives preferred flexibility which is lost when a plan is written. Written plans are more difficult to change. Thus the paradox is that linking, although mandatory, is impossible without a corporate plan.

The Incentives One interviewee demanded a formal plan from top management by pointing out, "If you don't give me a written plan I can use, I can't get you the value that computers can provide!" This comment illustrates the need for IS managers to demonstrate the benefits of formal plans. IS managers must convince top management that the value of the formal plan outweighs the value of confidentiality and flexibility so that top management has the incentive to develop a corporate plan. Indeed, the participant quoted above succeeded in his urging and top management began developing a formal plan.

Plan for Disaster

Organizations should plan for disaster because damage to facilities, hardware, software and data can seriously affect the operations of the organization. Damage can result from natural causes, equipment malfunction or willful acts (Allen, 1968; Burch, et al., 1983; Van Tassel, 1982).

Disaster planning is growing in importance as organizations become increasingly dependent on IS. Indeed, interviewees indicated that some of their users had forgotten how to operate their original manual systems after relying on computer-based systems for several years. As a result, the impact of a disaster could be especially severe. Users simply would not know what to do and the company could cease to function.

The Paradox The probability of disaster is rather minute and the cost of a disaster plan is rather high. Disaster planning represents insurance against disaster, but unlike life insurance its payoff is not guaranteed. Some participants related that when their top management declined their request for resources for disaster planning, they did not push the matter despite its importance. After all, although a disaster plan is highly recommended, its expected value is near zero.

The Incentives Many participants indicated that the greatest rewards in their firms accrue from developing applications which contribute significantly to the organization's effectiveness and not from providing good insurance policies.

In one particular case, a participant stated that nine of ten IS managers claim to have a *great* disaster plan. But what they really have is their resume in their hip pocket. In the unlikely event of disaster, these IS managers feel that they can get a new job very quickly. Then he stated that he too had a *great* disaster plan!

Audit New Systems

According to the system development life cycle approach, several months after a new system has been in production and has become stable, IS auditors should examine it to determine how well it has realized the expected benefits (Davis,

1974; Scott, 1986). The primary objective of this effort is to learn from previous mistakes so that they are never repeated. Also, developers should learn from their successes so they can be repeated. Furthermore, such audits may identify instances where small additional resource outlays for fine tuning can result in significant gains from the new system.

The Paradox Auditing requires time, energy and people. These resources could be used for application development. Several interviewees flatly stated that they do not audit new systems and therefore do not learn from their mistakes, and therein lies the paradox.

The Incentives Interviewees indicated that their top managers and users had a backlog of projects which they are eager to implement. The rewards and the pressures for starting new projects exceed the rewards and pressures for completing and auditing old projects with the quality that many IS managers would like.

Economic Feasibility Precedes Development

This guideline dictates that developers should identify costs and benefits before deploying significant resources to analyze and design new systems. Where the benefit-to-cost ratio is insufficient, intangible benefits may be used to bolster the case of a proposed system. The justification of a project before its analysis and design is an attempt to ensure that the desired returns are obtained from the deployment of resources (Emery, 1982).

The Paradox Often, systems developers cannot or do not understand the returns from a new system until it has been designed. It is difficult to forecast returns without a good picture of the final product. Many companies require their users to perform cost justifications. However, interviewees mentioned that users frequently experience difficulty conceptualizing a new system in sufficient detail to determine financial savings. Without a justification, many systems will never be developed. Thus the ISD sometimes depends on users for accomplishments which the users cannot perform (at least alone). In addition to the difficulty of dealing with quantifiable benefits, the issue is complicated by intangible benefits which are even more dif-

ficult to predict. In summary, the paradox is that although systems developers should identify the costs and benefits of a proposed system prior to its development, they often are unable to do so because they do not yet fully understand its objectives and outputs.

The Incentive Sometimes the reward for a good feasibility study is the authorization to begin a new project. Such authorization occurs because the analysts and users "found" the savings, but not because their projections were accurate. One participant mentioned that his training in accounting made it almost too easy for him to justify new projects. He claimed to be able to justify almost anything regardless of whether or not the returns really existed. Therefore, positive ROI often gets better rewards than accurate ROI.

Grow Your Staff

IS managers should expand the technical, business and managerial skills of their staff (Cash, et al., 1983; Couger and Zawacki, 1978). Managers must challenge their subordinates with more and more responsibility. Systems professionals are an investment. They were expensive to hire. Over time they become familiar with the organization's users and their applications. They would be expensive to replace.

The Paradox Many interviewees pointed out that generally those who develop a system are often also held responsible for its maintenance. It is economically wasteful for new analysts and programmers to expend time and energy learning the details of a system when its original developers are available and have the necessary expertise. The paradox is that although development offers greater challenge and responsibility and analysts and programmers prefer development to maintenance, they are nevertheless burdened with maintenance responsibilities.

Furthermore, the shortage of trained staff exacerbates the problem. To reduce the effects of staff shortages, particularly during peak periods, many interviewees reported hiring contract programmers. Although interviewees would have preferred to assign contract programmers to maintenance tasks so that in-house staff could have the growth potential of

systems development, contract programmers did not have the necessary background with existing applications to handle the maintenance tasks. Gaining this background requires time and is therefore costly. Hence managers often assign contract programmers to new development.

The Incentives While the guideline suggests training analysts and programmers for greater responsibility, it is often less costly, at least in the short-run, to keep in-house IS staff assigned to maintenance. Thus the growth of the IS department staff is curtailed.

Be Prepared to Change

The accelerating change in the environment is widely recognized. Organizations alter their products and their markets in response to this change. New products and markets in turn often result in altered reporting relationships within the organization. Thus information systems must be modified or redesigned to serve the changed organization. In the final analysis, being prepared to change is simply a matter of survival. Despite this, the ISD must be able to cope with user resistance to change arising from new systems and procedures.

The Paradox In some respects, IS specialists are very similar to users. According to several interviewees, IS experts hate change; this confirms a view held by Dickson and Wetherbe (1985). Change within ISD consumes resources which might be used for applications development. Moreover, the effects of the change may not be visible to the users. For example, one interviewee was considering upgrading his IBM DOS/VSE (Disk Operating System/Virtual System Extended) to MVS (Multiple Virtual System). The change would degrade user service during implementation. After implementation, users would be unlikely to experience any improvement in service.

Similarly, other interviewees suggested that many of their programmers and analysts would prefer to solve problems using old computer languages and methodologies rather than take the time and effort to learn new tools.

Nonetheless, the ISD exists as a result of change. Change keeps IS professionals employed. The paradox here is that the ISD re-

quires its users to change but prefers to remain stable.

The Incentives Once again incentives (or their lack) explain the situation. Clearly, the status quo appears more rewarding than new alternatives. People feel comfortable with what they know. They fear the unknown. Until rewards for change outweigh sanctions to remain constant, IS experts should expect no more of their users than they expect of themselves.

The ISD Should Satisfy Users' Needs

Guidelines for systems development state that systems developers should first understand users' jobs in great detail. Then developers should create systems to aid users to do their jobs more effectively and efficiently (Zani, 1970). If new systems fail to satisfy users' needs, they might be underutilized or not used at all (Ackoff, 1967).

The Paradox Some interviewees suggested that user needs are often undefinable. In many cases users do not really know their needs. Users can be highly effective without specifically considering the information which they require.

In addition, bad experiences with IS have caused some users to be skeptical about ISD requests. Users often question whether newly initiated systems will ever be completed. They tend to expend as few resources as possible when information needs are identified in detail during the early analysis and design phases. This results in a poor definition of user needs. However, as development proceeds and users see the increasing likelihood of implementation, they give additional thought to their information needs. Hence, the needs of the user appear to change during development.

The problem of creeping expectations leads to user dissatisfaction. Before a system begins production, the user may have little appreciation of its potential. However, once the system is up and running, the user often begins to see the potential and becomes dissatisfied that it is not being realized. Thus the paradox is that by the time users are willing to contribute to their needs definition, it is often too late to incorporate these into the system in the most effective manner.

The Incentives Clearly the users' incentive to cooperate in the definition of needs arises too late in the systems development life cycle. By the time users decide to apply resources to the definition of their needs, the design may be locked in place. Any alterations will probably cost both time and money. The incentive to participate early must outweigh the incentive to wait.

Establish Credibility via Successes

Systems managers should establish a record of successful contributions to their organizations. They should promote their successes. Then users and other managers will believe their future promises and provide cooperation when it is required (Powers and Dickson, 1973; Doll and Ahmed, 1983). Interviewees unanimously stated that credibility is crucial to the success of the IS effort.

The Paradox Some interviewees intimated that an occasional and not too costly failure sometimes strengthens the ISD's case for more resources. Credibility can be enhanced if an IS failure clearly results from the lack of requested resources which top management failed to authorize. Building credibility requires time and effort. But the paradox is that an occasional and predicted failure may help to get needed resources!

The Incentives More than one participant stated that a series of moderate successes do not create the visibility which is a prerequisite for promotions and pay increases in many organizations. Well functioning information systems become transparent because they do not present problems to users and managers. The incentive is for visibility and an occasional, minor failure might just help.

CONCLUSIONS

Information systems planning remains a key issue for management (Dickson, et al., 1984). IS managers rely on guidelines to expedite the planning process and to minimize the chances of failure. Although the guidelines were developed from the successful experiences of practitioners, the situations where organizations

fail to adhere to the guidelines have not been fully understood. The fault clearly lies in the adherence to the guidelines and not in the validity of the guidelines themselves.

This paper has explained the neglect of the guidelines in terms of incentives. Further research could thus be useful to clearly identify the incentives associated with the situations in which generally accepted ISP guidelines are observed or neglected. In the process, it would be useful to validate some of the explanations in this paper with a larger sample.

The implications of this research suggest that when IS planning is less successful than desired, IS managers might first identify the guidelines which they are attempting to apply. They would then evaluate the incentives for adhering to the guidelines, or for neglecting them. When the incentives to neglect the guidelines outweigh the incentives to observe them, managers must act to alter the incentives so that adherence is more worthwhile.

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