24 Years of Strategic Information Systems Planning: How Far Have We Come?

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Introduction

Strategic information systems planning is consistently identified as the most critical issue facing the information systems community [10, 17, 66, 95]. Leaderer and Sethi define strategic information systems planning as

the process of identifying a portfolio of computer-based applications to assist an organization in executing its business plans and realizing its business goals. Strategic information systems planning also include the search for applications with a high impact and the ability to create an advantage over competitors [47].

The need for formal information systems planning can be traced back to the early 1970s. In a Harvard Business Review article, F. Warren McFarlan stated that,

As computer applications have multiplied in size and complexity, the task of managing a company's computer-based resources has become tough and intricate. To maintain good managerial control over this activity, companies are beginning to develop formal plans and formal planning methods for their computer-based information systems [53, p.75].

McFarlan's statements were supported by McLean and Soden [59], who also attempted to establish a theoretical foundation for strategic information systems planning.

The result of appropriate strategic information systems planning is information systems architecture that contributes to the following objectives [27, 28, 46, 47, 59, 71]:

1. Provide an information systems plan that supports the business's short and long-term information needs and is integral with the business plan.
2. Satisfy the information needs at all levels of management within the company.
3. Provide a formal, objective method for management to establish

information systems priorities without regard to provincial interests.

4. Provide management with data processing resources for the most efficient and effective support of business goals.
5. Increase executive confidence that high-return information systems which contribute to the success of business activities will be produced.
6. Provide consistency of information throughout the organization.
7. Be capable of surviving organizational and managerial change.
8. Be implementable project-by-project to support the total information systems architecture.
9. Improve relationships between the information systems department and users by providing for systems that are responsive to user requirements and priorities.
10. Identify data as a corporate resource that should be planned, managed, and controlled in order to be used effectively by everyone.

Information Systems Architecture

During the 1980s, Venkatraman [92] detected four significant trends that indicated the growing importance of information systems planning. These trends and their impact on information systems planning are summarized in Table 1.

In recognizing these trends, it is increasingly critical to an organization's success

Table 1.--Significant Trends and Their Impact on Information Systems Planning

Trends	Impact on IS planning
Rapid changes in the technical base of IS	Ensuring compatibility of isolated systems through forecasting key technological trends and adopting a more "macro" perspective in system design
Significant increase in the level of resource commitment to the IS function	Initiating and organizing the overall IS planning efforts to allocate (and control) efficient and effective deployment of resources
Organization-wide impact ramifications of IS decisions	Integrating IS plan with other functional plans and the overall organizational strategic plan
The recognition of IS as a tool for competitive advantage	Planning for and developing ways for exploiting information and IS for achieving competitive superiority

that it integrate strategic and information systems planning and take advantage of changing information systems technologies. The result is a shift from a formal but general perspective information systems planning approach to a more strategically focused one. According to Dansker et al. [15], the process of strategic information systems planning should encompass

1. the development and management of a set of strategic technical objectives which address specific problems or opportunities facing the organization, or which position the organization to take advantage of new technologies,
2. an applications plan that is synchronized with the needs of the business, and
3. a systems architecture plan to assure the orderly and planned use of information technology [15, p.223].

Intensive competitive pressures are clearly evident as organizations proceed into the 1990s. These pressures are forcing all major organizations to become global in scope, to decrease time to market, and to effectively manage risk, service, and cost on an international scale [79]. Executives of these organizations can no longer view their information needs within the context of national and regional boundaries [95].

Access to data from various organizational subsystems is often required in order to respond to these demands for an increasingly competitive marketplace. Although it was found that many large organizations can access data from multiple functions, the lack of logical data integration in terms of common data definitions and codes across information systems makes it difficult or impossible to answer cross-functional or cross-divisional questions. This problem can reduce the ability of organizations to take advantage of potential opportunities to respond to business problems [27, 28].

In order to keep a business from disintegrating, it is necessary to use a logical construct for defining and controlling the interfaces and the integration of information systems. Thsi logical construct is generally called information systems architecture.

Information systems architecture is the overall structure of information systems that will satisfy an organization's immediate and long-term information needs. The architecture shows how major classes of information are related to major functions of the organization. In its pure form, the information mapping is independent of personnel staffing, organization structures, and technology platforms. Information systems architecture is also used to guide applications development and sharing of data and to serve as a basis for building a

coordinated, responsive, longlasting set of business applications [66].

The emergence of the need for information systems architecture calls for a formalized, top-down, data-centered planning approach that builds a model of the enterprise, its functions, its processes, and its underlying data as a basis for identifying and implementing an integrated set of information systems that will meet the needs of the business. This strategic information systems planning approach can be distinguished from other approaches by its focus on the definition of the underlying shared data used by the organization's many functions, and an information systems architecture to guide future systems development efforts [46].

Based on this planning approach, IS planning literature indicates that several methodologies have been developed and used. One of the most widely used is IBM's business systems planning (BSP) [3, 9, 27, 28, 33, 34, 41, 42, 46, 49, 60, 71, 87]. Although the methodology is based on solid theoretical foundation, there are associated strengths and weaknesses. Prior research has also revealed that these problems are attributable to the effectiveness of the BSP methodology itself [7,26, 44, 46, 47], and the plausible impact from a wide array of organizational context, individual, and environmental variables [22, 23, 24, 27, 28, 45, 71, 89].

IBM Business Systems Planning

IBM's business systems planning (BSP) methodology was originally developed by the Systems Control and Planning Department at IBM's Data Processing Group headquarters in 1970 [38]. The methodology is regarded as a structured approach to assist companies in establishing information systems plans to satisfy their short and long-term information needs. The scope of the methodology is primarily internal operations based upon the notion that information systems structure exists to support an organization's functions. With the BSP, an organization recognizes its business mission, objectives and functions, and how these determine its business processes. The active involvement required of organizational management results in process definitions that encompass the three planning and control levels identified by Anthony [2]. The planning and control levels described by Anthony are strategic planning, management control, and operational control. The processes are further analyzed for information needs, and data classes are then identified. Data bases are developed by combining similar data classes. The final stage of BSP describes an overall information systems architecture as well as the installation schedule of individual systems. Therefore, BSP places heavy emphasis on top management's commitment and

on executive involvement for their perspectives about the organization and its information needs through intensive interviews.

According to Highsmith [33], the development of information systems should be based on a specific analysis of the business system supported and the feedback/control required to ensure successful operation. Highsmith praises the fundamentals of BSP that focus on the integration of information systems plans with business plans, and top management participation in the system development process. Highsmith also expresses concern regarding the linkages between current system, those under development, and future systems.

Zachman [99] and Vacca [90] indicate that BSP serves as an excellent vehicle in establishing communications among data processing, the user community, and top management. The methodology is also indicated for help in dealing with priority issues and for identifying areas in which the information system resource can best be invested for the overall interest of the business.

Top management participation is also identified by Lee and Adams [49] as the strength of BSP. Top management participation enhances the communication between management and information systems departments and consequently ensures that management obtains a better understanding of the capabilities and costs of information systems.

Several comments have been made regarding the use of BSP methodology. Rockart [77) notes that the methodology is time consuming in scope and expensive in manpower. Rockart further comments that the amount of data and opinions gathered is staggering, and that analysis of all the input is a difficult task. Rockart also notes that the determination of the correct level of aggregation of decision making, data gathering, and analysis at which to work is extremely difficult.

Highsmith [33] points out the time consuming issue of BSP methodology. Problems in relating to the difficulty in translating information systems architecture into definitons of systems application and in maintaining documentation are also indicated by Highsmith.

Difficulties in bridging the planning activity and implementation are also noted by Zachman [99]. Because BSP study is a creative analysis in which the study team manually performs several tasks, such as classsifying, defining, relating, analyzing, and concluding, the quality of study is very dependent upon the team's

understanding of what they are looking for and their ability to find it. The contention that because the information systems architecture obtained is highly customized to the businesses studied, the architecture may have little transferrability to, or comparability with, other BSP studies.

Bowman, Davis, and Wetherbe [7] agree that the methodology is time consuming due to the significant personnel time required to collect and analyze information. A sizeable number of managers have to be interviewed in order to develop a broad understanding of an organization's processes and the associated information requirements. Bowman, Davis, and Wetherbe also point out that analysis and synthesis of the rather large volume of data obtained into a viable information systems architecture can be somewhat difficult.

Bakos and Treacy [3] indicates that the BSP methodology is not easily applied to poorly structured functions such as senior management roles, which are not amenable to formal modeling. Kottemann and Konsynski [42] point out that, in analyzing business processes with respect to organizational units, data classes, and systems, the lack of thorough taxonomy of these four variables may hamper the meaningfulness, ease of identification, and anambiguity of organizational characteristics.

Lee and Adams [49] also indicate that the quality of the methodology depends upon the quality of the task force and that the results of the BSP study can be difficult to implement. The fact that BSP was designed for a centralized environment because it was developed at a time when IBM's principal revenue products were mainframe computers might cause strategic problems when a proposed corporate stragegy is based upon a decentralized architecture.

Problems of using the BSP methodology are summarized by Lederer and Sethi [46] in the following abbreviated problem statements:

1. Documentation is inadequate,
2. Difficult to secure top management commitment,
3. Success dependent on team leader,
4. Requires further analysis,
5. Methodology lacks sufficient computer support,
6. No priorities for developing databases,
7. Ignores plan implementation issues,
8. Difficult to find team leader meeting criteria,
9. Very expensive, and
10. No analysis of technological environment [46].

Finally, Allen and Boynton [1] assert that advances in planning technologies have not kept pace with the size, complexity, or expectations of information systems. They also point out that BSP methodology is too complex to apply to today's large and complex corporations such as General Motors or American Express.

Recommendations

From the literature review, it is clearly evident that the irresponsiveness of the methodologies is the prime contributing factor to their inappropriateness for use in strategic information systems planning. The BSP methodology may not be capable to cope with today's dynamic and changing business environment. As a result, the methodology needs to be revamped for its flexibility.

Allen and Boynton [1] propose two architectural solutions to this problem namely the high road and the low road. The high road approach is characterized by the centralization of the organization's IS activities. These activities are based on the concept of central data collections, common business practices, common application systems, corporate-wide networks, and standardized hardware, operating systems, and databases.

On the contrary, the low road is characterized by the decentralization of computing resources encompassing data, computers, networks, applications, and programming. Management of these resources including their ownerships are the responsibility of all operating managers instead of IS managers. The decentralization is made possible through inter-linked communications such as electronic data interchange, the policy of full access to information, and standards for data-exchange processes.

Strengths and weaknesses of the two approaches are identified along with several dimensions such as implementation time, effectiveness, efficiency, innovation, integration, integrity, and expenses. Due to the fact that all organizations are different, neither of these two solutions would be ideal. The middle road approach should be considered by taking into considerations strengths and weaknesses as well as combining the elements of these two extreme approaches.

The BSP methodology clearly falls into the high road category. Therefore, it is recommended that the methodology be modified to accommodate the middle road perspective.

For this purpose, several beneficial considerations are provided by Goodhue et. al.[27, 28]. These considerations are described as follows:

1. Top management should perceive that data integration are critical to the strategic goals of the organization.
2. The balance between global integration and local flexibility should be considered in the implementation effort for data integration.
3. The scope of the planning domains should be appropriately determined.
4. Architectures should be enforced to ensure an effective data integration.
5. Architectures shoulde not be reinvented.

With respect to the intensified global competition, BSP methodology might fall short of treating strategic consideration as the driving force for the identification of information technologies opportunities. The methodology focuses primarily on internal strategy which is concerned with the development of efficient and effective organizational structures and processes for achieving goals and objectives [3].

On the other hand, competitive strategy focuses on competitive moves within the industry in which the organization did business. Business portfolio strategy concerns the choice of which industries to compete in and how to position the organization in those industries [3].

The IS architecture as defined by the BSP methodology is based on Anthony's [2] model of the organization's planning and control processes. According to the model, processes involved in strategic planning are related to an organizations's objectives and resources allocation policy while management control those related to assuring that strategic objectives are attained and operational control are related to assuring that tasks are executed efficiently.

While this model serves well to identify opportunities to improve internal business functions, it does not lead to the discovery of competitive use of information technologies. According to Rackoff, Wiseman, and Ullrich [73], a new foundation for information systems planning is needed. This foundation is based on the world of competitive strategy, rather than the arena of planning and control.

Based on this framework, much literature can be found that significantly contributed to strategic perspective of

information systems and the identification of strategic information systems opportunities. These include the works of Bergeron, Buteau, and Raymond [6, 49, 70, 73, 98].

Another contribution to strategic information systems planning is from the work of Earl [20] who asserts that strategic information systems planning can not be fully understood by considering methodologies alone. The process of planning and the implementation of plans are equally important. Based on this notion, five planning approaches are proposed namely, business-led, method-driven, administrative, technological, and organizational approaches.

The underlying assumption of the business-led approach is that current business direction or plans are the only asis upon which IS plans can be built. Business plans or strategies are therefore analyzed to identify the required information systems.

The method-driven approach is based on the assumption that strategic information systems planning is enhanced by

Table 2.--Strengths and Weaknesses of Strategic Information Systems Planning Approach

Business -led	Method -driven	Adminis -trative	Techno -logical	Organiza -tional
Strengths				
Simple	Provides a methodology	System viability	Rigor	Becomes normal
Business first	Plugs strategy gaps	System synergies	Focus on infra-strcture	Emphasis on implementation
Raises IS status	Raises strategy profile	Encourages user input	Favors integrated tools	Promotes IS-user partnership
Weaknesses				
Ad hoc method	User involvement	Non-strategic	Lacks management support	Generation of new themes
Lacks management commitment	Too influenced by method	Bureaucratic	Only partial implementation	Soft methodology
Depends on quality of business	Implementation unlikely	Resource-constrained	Complexity	Architecture becomes difficult

or dependent on the use of formal methods. Therefore the emphasis is placed on the selection of the best method available.

For the administrative approach, the underlying assumption is that strategic information systems planning should follow and conform to the organization's management planning and control procedures. The emphasis of the approach is on the identification and allocation of IS resources. The outcome is a one or multi-year development portfolio of approved projects. No application is developed until it is on the plan.

The technological approach is based on the assumption that strategic information systems planning is an exercise in business and information modelling. Therefore analytical modelling methods are appropriate. The emphasis is on the development of architectures for data, communication, and information systems. The BSP methodology falls obviously into this category.

The assumption of the organizational approach is that strategic information systems planning is based on IS decisions being made through continuous integration between the IS function and the organization. The emphasis is on organizational learning about business problems and opportunities and the contribution of information technologies.

Strengths and weaknesses of these five approaches are also identified as summarized in Table 2. It is proposed that the organizational approach appears superior in terms of planning success, concerns, and the potential for generating competitive advantage applications.

Explanations can be found in the strategic planning literature. Quinn [72] indicates that strategies often evolve from fragmented, incremental, and largely intuitive processes. The processes porceed flexibly and experimentally from broad concepts to specific commitments. Mintzberg [61] argues that strategy is formed rather than formulated as actons converge into patterns and as analysis and implementation merge into a fluid process of learning.

Quinn [72] also believes that this process is quite natural for general managers who attempt to understand complex and foreign concepts such as computer and information technologies. Henderson and Sifonis [32] praise the strategic planning process that emphasized learning.

Further analysis reveals that the strengths of the organizational approach lies in the area where the BSP

methodology exhibited its deficiencies. However, the organizational approach tends to be informal and unstructured. Incorporating both the organizational and technological approaches for strategic information systems planning could prove to be beneficial for the organization. Moreover, since the organizational approach differs significantly from conventional approaches that can be found in literature and practices, this particular approach should be further investigated to understand it in more detail and to assess its effectiveness in strategic information systems planning.

Finally, Hackthorn and Karimi [30] propose an analytical framework consisting of two dimensions to compare strategic information systems planning methodologies namely, breadth and depth. The breadth dimension encompasses five phases; organizational analysis, strategy-to-requirements transformation, logical system design, logical-to-physical transformation, and systems implementation.

Organizational analysis involves the examination of the mission and nature of the organization and its environment and the translation of these aspects into a set of organizational strategies. This strategy set is then transformed into a model of information systems architecture which will be further refined to data, application, and geographic architecture in the logical-to-system design phase. In the logical-to-physical transformation phase, these architectures are decomposed into portfolio of applications which would be prioritized and scheduled for implementation. The actual implementation takes place in the systems implementaton phase.

The depth dimension consists of three levels namely methodology, technique, and tool. The methodology emphasizes the conceptual basis for performing the strategic information systems planning activities. Technique is a procedure for accomplishing a desired outcome whereas tool is an instrument for performing a procedure.

The literature review reveals that the BSP methodology supports the organizational analysis and strategy-to-requirement transformation phase of the breadth dimension and encompasses the methodology and technique level of the depth dimension. It is therefore recommended that in order to cover the entire range of the breadth and depth dimensions, additional methods, techniques, and tools should be employed along with the BSP methodology. Several of them are already existing such as Strauctured Analysis and Design Techmique [82] for logical system design and Excelerator [36] for logical-to-

physical transformation and systems implementation.

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