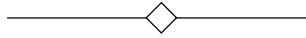


ARTICLES



The strategic planning of health management information systems

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Abstract

This paper discusses the roles and functions of strategic planning of information systems in health services. It selects four specialised methodologies of strategic planning for analysis with respect to their applicability in the health field. It then examines the utilisation of information planning in case studies of three health organisations (two State departments of health and community services and one acute care institution). Issues arising from the analysis concern the planning process, the use to which plans are put, and implications for management.

Introduction

A shift of emphasis has taken place in planning health information systems from a technical perspective, prevalent in the 1970s and 1980s, to a focus on management of information in the 1990s. The extent to which the movement has had an impact on health organisations is largely unknown. Health managers have to be deeply involved in the planning process to ensure that the functionality of information systems adequately meets the needs of their organisations.

The shift in thinking about the nature and purpose of health management information systems has involved extensive re-evaluation to the extent that the search for optimal solutions has become a relative rather

than an absolute concept. In addition, policy changes such as the introduction of casemix funding systems in some States and the concept of purchaser–provider arrangements have led to increased reliance on management information. In the light of these broad changes, it is timely to examine the role that information planning plays in strategic management, reassess some of the major methodologies, and study the ways in which it is carried out in different kinds of health organisations.

Health organisations have been relatively slow, on the whole, to make substantial capital investments in information systems. In a classic article, Herzlinger (1977) argued that public sector organisations such as health are not under the same pressures as private enterprise for strategic and competitive advantage in the market-place and consequently perform badly in information management. During the last few years the situation has changed as a result of:

- greater awareness of the importance of forward planning
- improved databases on client services
- increased monitoring of service levels
- the creation of databases for analysis and research
- improved financial and analytical models for program performance.

There are major obstacles to improving understanding of information as a management resource. They can be addressed through management education, promotion of accomplishments and greater sensitivity to the external environment. As the concept of strategic management has become established, the necessity for improved planning can be more easily identified. Information planning is an integral part of the process and one which requires a blend of broad concepts, specialist skills and methodological knowledge.

Information planning and the strategic management of health organisations

There is a widespread belief, but little supporting evidence, that strategic planning is associated with higher levels of performance in health organisations (Smith, Piland & Funk 1992). A feature of recent health management texts has been to cast planning firmly as the centrepiece of the strategic management process (Duncan, Ginter & Swayne 1992). The

model of strategic management that is typically presented is common to many management texts. Essential to strategic management is an understanding of vision, purpose and mission, objectives-setting, an ability to cope with the changing external environment, analysis of the internal organisation, definition of alternatives and choices, and setting in place of adequate controls. The general strategic management model has become widely accepted, not just in centres of health administration, but also in acute care facilities, community health organisations, and other types of health services such as drug and alcohol agencies (Moriarty 1992).

Part of any strategic management situational analysis and strategy formulation will be an appraisal of information and intelligence capabilities. Given that clinical practices of various kinds must remain at the core of health services organisation, patient record systems and clinical databases, their communication, efficiency and accuracy will continue to have an important bearing on the nature and quality of services. Health management requires finance and human resource databases, inventory control and office automation to maintain organisations efficiently. Where health organisations are adopting a more competitive stance, the necessity for marketing information systems in the form of demographic data, revenue forecasting, and market share assessment depends on the availability and quality of databases (Bognanni & Epstein 1992).

The increasingly popular generic strategic management model outlined above does, however, have limitations. A strategic plan, by its nature, will be general and will frequently be used as a performance measure for senior managers (Johns 1989). Strategic plans alone are insufficient to the planning needs of health organisations because of their lack of specificity. They must be complemented by an integrated and consistent collection of related, more specialist forms of planning. Foremost amongst these are finance and human resource plans. Planning of clinical and other forms of health services also fits into such a framework. If information is to be regarded as a major resource, there must also be a place for information planning in such a framework. Management information in public sector organisations is sometimes regarded as being destined to fail because of the non-competitive nature of public services. It is not uncommon for many millions of dollars to be invested in information technology with less than satisfactory results. A measured approach to health information management planning is essential so that value for capital investment, operational efficiency and sustained growth is feasible.

The framework of management information planning

Many larger organisations have some form of management information plan (Premkumar & King 1991) as a result of the increasingly significant impact of information technology and the need to develop longer term vision. Amongst factors which have changed the role of management information planning are the following:

- use of information systems for competitive advantage
- spread of information technology into every part of organisations
- critical dependence of organisations on information technology for their daily operations
- growth of inter-organisational systems
- integration of telecommunications with information technology.

As a result of these changes the strategic planning function is increasingly necessary to manage effectively in a complex and dynamic environment. The planning process is made more complex since opportunities are increasingly influenced by the external environment. A continuous interaction between management information systems planning and corporate planning is therefore essential.

Planning management information systems has become an elaborate and complex exercise for many organisations to the extent that often it is felt that it cannot be carried out without external help (Homan 1992). It is important to determine planning effectiveness and whether it is having the desired impact on the organisation. Many factors come between the impact of management information systems planning and financial performance so that a simple relationship between the two must be treated with caution. Planning may also result in many other intangible benefits which need to be considered in an evaluation process.

The primary inputs to a management information systems plan derive from the corporate or strategic plan and the resources for performing the planning process (Brunner 1992). The vision, mission, objectives, strategy and plans of the organisation, together with analysis of the external environment, provide the necessary background to guide the management information systems planning process. Information inputs to planning come from users, senior management and information technology staff. The first phase of the planning process is often a series of interviews with senior

management and users to collect the data. Planning consumes a great deal of time and energy. Some education and training is also necessary to help participants understand the process and significance of their inputs. Education and training of staff is a major input into management information systems planning.

The conversion of raw material into a written plan which sets strategic directions for management information systems is the planning process. An analysis is conducted, in the management information systems context, of the internal and external environment, to forecast industry trends and their likely effect, identify user requirements, develop an information architecture and, ultimately a set of programs and priorities for managing the information function.

The written document or plan which is produced at the end of the process provides guidelines for decisions that eventually determine the impact of management information systems on the organisation. The plan sets the direction for implementing individual programs within the organisation. Management information systems applications have a profound impact on the way in which an organisation conducts its business, and on overall performance. Their performance depends on three factors: planning effectiveness (the fulfilment of objectives of the plan); functional impact (improvement of the management information systems function); and organisational impact (improvement of organisational performance as a result of management information systems). The last is the measure which will be of prime interest to senior management.

Selected planning methodologies

The quality of the planning process is reflected in the extent of detailed analysis of planning dimensions. Organisations might develop their own approach by using the corporate planning model or systems analysis. There are also many generic approaches and proprietary planning models in existence. Commercial vendors frequently favour using their own planning methodology, especially at the beginning of a major project. This paper discusses four established approaches as examples of the types of approach in use. (See, for example, Martin (1989) for another approach not included here.) The four approaches discussed as a reasonably representative sample are: Critical Success Factors (CSF), Business Systems Planning (BSP), Method/1 and Soft Systems Methodology (SSM).

Critical Success Factors

CSF (Rockart 1982) is a relatively straightforward and uncomplicated form of management information systems planning and, for the beginner, perhaps a sensible beginning point. It takes the form of a set of ordered questions which are put to key members of the organisation:

What objectives are central to the organisation?

What critical success factors are essential to meeting these objectives?

What decisions are key to these critical success factors?

What variables underlie these decisions and how are they measured?

What information systems will produce these measures?

Responses to the questions are compiled into a report which is fed back to senior management.

There are strengths and advantages in using a method such as CSF for management information systems planning. The information plan can be accomplished in a reasonably short time and is relatively inexpensive. CSF focuses on the most crucial information needs of the organisation and is sufficiently robust to ensure that the principal participants have their views included. Normally, CSF would be initiated as a 'top down' project, giving a signal that senior management is action-oriented. The return to senior management is that there is immediate benefit from an improved understanding of what is important.

There are, on the other hand, some evident weaknesses of CSF analysis. Foremost is that it is not comprehensive. It is possible that in a CSF analysis important areas, which may not be 'critical', can be overlooked or missed. CSF tends to be topical and reflect issues of the moment and, where used, has to be repeated at regular intervals. It tends to be an end in itself rather than the beginning point for subsequent development and is therefore unlikely to lead to a more sophisticated product. Finally, CSF is thought of as being more an art than a science and therefore its success depends on it being carried out by a skilled analyst.

Business Systems Planning

BSP (IBM 1984) dates back to the early 1970s when many IBM clients, having acquired powerful and expensive mainframe computers, requested that the manufacturer of the machines offer guidance in planning their

requirements, and capital and recurrent expenditure on management information systems. The response was, through BSP, to devise a systematic way of analysing an organisation in terms of its data classes and elements, and its business processes or functions. Once identified, both of these can be related to the information needs of the organisation.

BSP needs both an executive sponsor and a study team. The executive sponsor reviews all major findings and recommendations and should understand the organisation and its requirements. The study team collects data, agrees on major issues and confirms resource allocations. A well-defined sequence of steps deals with matters of preparation, defining information architecture, analysing current systems, defining findings and conclusions, determining priorities and reporting results.

BSP makes extensive use of matrices, on which are plotted data classes and their use in the organisation. A process/organisation matrix identifies three classes of organisation: major responsibility and decision-making; major involvement in the process; and some involvement in the process for different aspects of the organisation. Process and data class groupings are identified in clusters at the next stage of analysis to create the basis of information architecture. Flows between classes of data are then plotted on the matrix. The grid lines are subsequently deleted to display a graphically arranged information architecture for the organisation.

BSP has been very influential in management information systems planning and, in different guises, many subsequent proprietary methodologies have used it as the basis for their own variations. The strengths of BSP are that it is comprehensive, thorough, and oriented to the organisation rather than to information technology. It has much to offer health organisations because it is linked to a database development approach. The techniques of BSP are easily acquired and are transferable between organisations. BSP produces an information architecture that is reasonably stable and robust. It does not, however, produce cost-benefit determinations and does not deal with matters such as implementation or quality assurance.

Method/1

Method/1 (Arthur Andersen 1982; Earl 1993) is a comprehensive package with some 24 modules and treats information planning within the context of systems design and support. Method/1 differentiates between types of information design. It proposes a methodology for selecting and designing

packaged systems and carries it into the installation phase. A different approach is adopted where customised systems are required and involves a different sequence of implementation. A third approach is known as iterative development. For each approach a support stage is proposed at the point where the project goes into production, involving matters such as liaison, system modification and status evaluation.

The management information systems planning section of Method/1, of primary interest here, draws a distinction between strategic information planning, systems implementation planning, and project definition and planning. Strategic information planning is concerned with issues such as scope, definition and organisation, the external environment, information technology opportunities, and a present status assessment. A management information systems strategy is developed which defines the conceptual architecture, identifies strategies, sets priorities and presents them to senior management. Implementation planning requires an organisation plan (human resources and change management). A data plan defines data, applications and maintenance requirements. Technical matters are addressed through a technology plan and implementation is coordinated in an information action plan to draw together all of these activities.

Method/1 treats project definition and planning as separate issues. It is broken down into no less than 11 separate stages. The preparation stages begin with project initiation and progress through status review, identification of business objectives, a needs survey and identification of hardware and software requirements. A second stage begins with a conceptual design and goes on to investigate packaged system alternatives and development of customised alternatives before preparing a project impact analysis. The project work plan is then prepared and submitted for management review and approval.

Method/1 is an advanced management information systems planning methodology developed and used by a private business in international corporate consultancy. It requires extensive training and is discussed here in brief outline as an example of the level of detail to which health information systems planning might be taken.

Soft Systems Methodology (SSM)

SSM grew out of dissatisfaction with information planning based solely on data content. A highly structured approach to systems design carries the danger of promoting a damagingly narrow content. It is argued that

creators and consumers of the information base, their perceptions of information needs, their attitudes towards personal and organisational information use, and operational constraints upon them are directly relevant to the success of the system (Checkland & Scholes 1990; Ward, Griffiths & Wentmore 1990). The basic pattern of SSM is to document and present in diagrammatic form a real world situation of concern. Initial analysis yields choices between relevant systems, a comparison of models with the perceived real situation, and the action needed to improve the situation. The perceived world yields a variety of ideas or 'holons' which constitute the basis of a methodology for enquiry into the perceived world.

The conventional seven-stage model of SSM is separated into two main parts, expressed in cyclical form as the real world and systems thinking about the real world. The problem situation and the way it is expressed (real world) leads to root definitions and conceptual models about it (systems thinking). In turn, these allow comparisons to be made between models and the real world, change deemed feasible and desirable, and eventual action to improve the problem situation (real world). The transformation process between stages is an important aspect of the conversion of input to output. SSM accommodates analysis of cultural, social and political issues in which the world view of actors, clients and owners are important determinants of environmental constraints.

SSM has been applied in at least one health setting (Hepworth et al. 1992) to bring a holistic approach to bear on a health promotion strategy. The first step was to define and depict the context and the major participant groups. A conceptual model, or root definition, was developed between system analysts and health professionals to produce an ideal system. A second round of workshops was held to validate the model and discuss the critical success factor analysis process. The technique was used to derive from the model an information systems audit. It was argued by the authors that SSM was more relevant to the health field than structured approaches because of the flexibility it allowed in developing information plans.

Summary

Each of the four different approaches to management information systems planning outlined above has inherent strengths and weaknesses. Elements of each, some or all have been characteristic of many large-scale projects implemented in health organisations in recent years. The esoteric, technical

language of information technology is undoubtedly a barrier to understanding and acceptance by many health service managers. Familiarity with a number of different planning approaches will, however, contribute to better decision-making by senior management. Persistence in coming to terms with the comprehensibility of management information systems planning methodologies is important in that it will ultimately lead to greater independence of judgement about policy and investment decisions. In the following section, three brief case studies are presented. They illustrate some features of the types of information plans in current use, and their impact on the organisations concerned. Some issues arising from the analysis are then discussed in the context from which they arise.

Selected case studies of information planning

Information planning in a Department of Health and Community Services (1)

The first case study of health management information systems planning is of an Australian system that is smaller in terms of the total number of physical locations and facilities, but large in terms of distances between them, communication problems and special needs (Northern Territory Department of Health and Community Services 1989). There had been a history of under-resourcing the management information systems function so a seconded staff member of the organisation worked with a consultant from the private sector for six months to develop an information plan. The planning process did not rigidly adhere to any particular methodology but eclectically utilised aspects of several different ones where appropriate to the perceived needs. Development of an information plan provided the basis for a rational approach to the improvement of management information systems resources throughout the organisation.

From a methodological point of view, BSP was influential in that during the planning process a series of matrices was developed to establish the information architecture. A function data matrix was created to identify clusters of information, the principal users of information and the communication pathways between them. A function location matrix plotted the major programs operated in the department against requirements of central office, regional offices, acute care facilities, community health and welfare services.

The organisational complexity of the department was recognised as being the motivation for setting broad directions rather than a detailed involvement in project planning. A review of present information status distinguished between corporate systems and departmental systems. Corporate systems, common to all departments in the public service, were payroll, human resources and accounting. The plan highlighted significant shortcomings in the payroll system where shift workers were concerned. Three strategic departmental systems were identified. An integrated hospital information system was, at the time, advertised for tender. The other two, community health and a welfare client information system, were approaching the end of their useful life. Replacement of these systems would assume increasing importance as degraded performance led to costly consequences.

An application strategy addressed the needs for upgrading the four major systems (hospitals, health extended services, community services and management information) and suggested that significant external resources would be required. The importance of cost justification for hardware and communications strategy led to the conclusion that, wherever possible, acquisitions should follow public service general guidelines. An organisational strategy identified the structures, procedures and resources required to optimise the use of information technology within the department.

A system security strategy established security and confidentiality for mainframe and distributed processing facilities. The measures proposed were of special significance for health databases. In a part of Australia prone to cyclones and floods, a disaster recovery plan was also needed. The implementation strategy recommended (in two pages) how the various projects should be initiated over the next five years, and in so doing established the priorities for action.

Recommendations of the plan (54 in total) were largely concerned with policy directions for management information systems. Ownership of the information plan by the senior executive was essential to ensuring the department's goals. Planned expenditure should be set aside so that information technology could be used to support health care and community services. Corporate systems should be developed within the wider public service environment. Local and office automation systems should be implemented in an environment consistent with departmental guidelines. Recommendations relating to targets, standards and organisation of information technology were referred to a newly formed information steering committee for further discussion and action.

Information planning in a Department of Health and Community Services (2)

Recognition of the vital role played by information technology in core activities of health and community services is the primary motivation behind a more recent information plan (Simsion Bowles and Associates 1994). The plan sets out the corporate vision of information requirements and is based on a series of major service reviews that were undertaken in the previous two years. The plan's major purpose is to establish a common infrastructure of hardware, software, communications, and core business systems by building on existing programs and projects.

The body of the information plan is organised into three parts: business and programs; applications portfolio; and technical architecture. The business and programs section outlines the need for increased information technology support for client management and funded agencies. The applications portfolio identifies requirements, assesses the current level of systems support, and proposes directions for both of these. The technical architecture proposes a progressive simplification of the software platform, utilising the Open Systems/Unix/Ingres strategy presently in place. A series of plans for each program area is developed. The plan argues that a consistent approach to the management of information technology has not been achieved and recommends the establishment of a customer services section to address the needs. The plan itself owes less to the structured methodological approaches discussed above, perhaps with the exception of CSF, and more to the SSM approach, particularly in the way in which it charts information flows within the organisation.

The principal recommendations of the plan concern the development systems for changing needs in the health service. A common Services Agreements Management System is required to replace existing systems which are incomplete, fragmented or manual. A client and case management system, presently subsumed under a number of unrelated subsystems is identified as a priority in the previous information plan and still remains an urgent requirement. Prominent amongst other identified requirements are the acquisition of a new payroll and personnel system. An information management group should coordinate the management of data across the department, and with external users. The proposed customer services section should also coordinate outsourcing activities.

Information planning in an acute care facility

Two practical problems confront health organisations in developing information systems: the need to meet requirements for mandatory reporting; and the need to contribute to improvements in institutional efficiency and effectiveness. The necessary skills to achieve these ends are frequently unavailable without significant investments of time and resources. External consultants are often employed to write a strategic information plan. In this case, a private not-for-profit hospital, the consultants prepared a plan over a seven-month period (Health Solutions 1992) and in six distinct stages:

1. A systems review gave an overview of existing systems, evaluated their effectiveness, identified manual systems which required automation, assessed supplier performance and security issues before making recommendations on them.
2. A systems support review, based on a questionnaire, laid the foundations for implementing and developing a systems development structure.
3. A request for information was developed which detailed the functional requirements of an integrated hospital information system: patient master index, medical record system, admissions and inpatient systems, patient accounting, general ledger, nurse management, theatre management, medical imaging, allied health and appointment scheduling, food services, personnel, equipment register and casemix.
4. An information systems strategic direction aligned business and information system objectives, defined priorities and examined issues such as key success and risk factors and the planned evolution of computer systems.
5. Evaluation of information system proposals analysed strengths and weaknesses of short-listed systems, together with a financial analysis of the proposals, before recommending a preferred solution.
6. A computer systems negotiation plan laid down strategies and the sequence of implementation together with an appraisal of contractual issues.

The project entailed considerably more than the preparation of a strategic information plan and was as broad in scope as a Method/1 initiative, although scaled down to institutional requirements. It required a level of expertise and technical knowledge which would not have been available within the organisation. The series of reports did, however, focus entirely on information technology matters and did not address issues of context and organisational culture which are so much a feature of SSM.

Discussion

From the foregoing study four issues are apparent: the context in which information planning takes place; the means by which it is done; the utilisation of information plans; and the management implications. If planning is a cornerstone of management practice, then in the 1990s information planning must be regarded as a major component. The increasingly popular concept of strategic management is built on evaluation of information accessible both within the organisation and the wider environment. Strategic plans are limited by their level of generality so that the potential for attention to fine detail that is offered by information plans coordinated with corporate, strategic, financial and human resource plans is appealing. Information technology is a field in which highly specialised knowledge is necessary so that some difficulties arise in creating information plans which are operationally sound and remain consistent with the organisational culture. It has, of course, also to be kept in mind that the present study has been a preliminary analysis of an area which has been studied very little. The conclusions which might be possible must by their nature be tentative and require validation by more exhaustive inquiry than has been undertaken in the present exercise.

The context of health information planning

It is apparent from the selective case studies of health organisations that many have developed information plans. Little is known of the way in which the task was accomplished or the effectiveness of information planning, suggesting that there is scope for sensitivity analysis of the process and the product. There is a need for further study of the problem which would reveal whether information planning in health organisations, along with other forms of planning, is merely a window-dressing exercise or whether it is really worthwhile. The unstable environment in which health

services have had to survive in recent years casts doubt on assumptions of stability and growth which underlie efforts to produce even short to medium-term plans. A wider and more comprehensive survey of information planning of different kinds of health organisations would yield valuable insights into the issue.

How information planning is carried out

The summary and analysis of information planning methodologies indicate that there are many possible approaches. Each has its own rationale, specialist (esoteric) language, and strengths and weaknesses. The view exists particularly in academic circles, and also where a product is being marketed commercially, that methodological purity is an important factor in information planning. However, a planning model developed in isolation from the situation by its nature can only address practices and procedures held in common by a number of organisations. The methodology employed is therefore of less importance than the quality of the analysis which results and in this sense the end-product is more important than the means by which it was achieved. It is doubtful whether detailed and prolonged training in any one methodology would by itself guarantee that a sound and useful information plan would be developed.

Utilisation of information plans

Corporate vision, mission and strategic goal-setting have become so much a feature of health management activity that their validity is hardly questioned. Boards of management and senior executives expect information plans as evidence of purposeful direction, eliminating duplication and waste. From the case studies included here there is little evidence to suggest that the information plans produced have ever been rigorously put into effect, which perhaps does a little to demonstrate that a planning approach to health service management has its limitations. The reasons are partly attributable to the unstable external environment and overdependence on external resources discussed above. A further essential weakness of health information planning is that unless it is closely aligned to financial outlays, the prospects for success are strictly limited. Information technology requires substantial capital investment and a high level of recurrent expenditure in order to have a reasonable expectation of justifying its existence. Information planning that is not supported by financial commitment will fail, no matter how good the plan might be.

Implications for management

Senior management must be given credit for the widespread awareness of the importance of health information and for changing the commonly held view of information technology as strictly of operational value, and suffering from credibility problems. Health information management is firmly established as an important resource to an action-oriented service. Continuing health management education is vital in sustaining these achievements. Health organisations are notable for being information-intensive, both for day-to-day operations and for policy and planning (Smith 1993). A high level of satisfaction with outcomes of investments in information systems is necessary for the managers who increasingly depend on them. While aspects of information systems such as cost-benefit analysis and determination of outcomes might be a preoccupation, a great deal of wastage might be avoided by addressing the issues embodied in the acquisition and evaluation of health management information systems along lines which eclectically utilise salient features of the planning approaches presented in this paper, suitably modified by a generic model of strategic management.

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