# The Hospital Information Planning Study at Groote Schuur Hospital, Cape Town

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## Summary

Information is an increasingly important resource in an academic hospital. Effective planning and control of this resource are essential in order to maximize its usefulness. The Hospital Information Planning Study (HIPS) undertaken at Groote Schuur Hospital, and based on the Business Systems Planning (BSP) methodology, is outlined, as are the results of the study. The recommendations arising from the study, which are of considerable significance to the hospital, are mentioned briefly.

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Groote Schuur Hospital, Cape Town, has become increasingly complex in both its functional and administrative tasks. Hospital management now requires objective indicators of activities and performance in order to plan effectively and allocate limited resources in the face of competing and conflicting demands. At the same time hospital clinicians are required to note, remember, retrieve and analyse increasing volumes of data about individual patients and groups of patients. They must also memorize information about new diagnostic tests and treatments, and this knowledge must be constantly updated.

In May 1981 Dr H.-R. Sanders, Chief Medical Superintendent of Groote Schuur Hospital, commissioned the Hospital Information Planning Study (HIPS) in the belief that modern information management techniques and existing computer technology can be of considerable benefit in dealing with these issues.

The objectives of the HIPS included a review of the existing information systems supporting the hospital, the creation of an information architecture depicting all potential information systems in the hospital, and the setting of priorities for immediate and long-term development. In broader terms the objectives were to formulate practical short- and long-term plans for the development of information systems, and to create management policies intended to guarantee the success of the hospital's data processing function.

A synopsis of the methodology of the HIPS and its outputs is provided in the hope that it may be of use to other organizations wishing to undertake similar projects. The information explosion and improvements in computer technology make it likely that increasing numbers of medical institutions will require sizeable computer installations. A detailed information systems

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planning study is strongly recommended before such institutions commit themselves to the purchase of any computer hardware or software.

## Choice of methodology

Traditionally, data processing systems have developed piecemeal, to deal with some specific tasks only. The absence of an overall information systems plan can lead to considerable difficulties in subsequent sharing of information between systems or in channelling information to management for control purposes. The outcome of an unplanned, non-integrated approach to systems development is often a suboptimal return on the data processing investment.

These problems can largely be avoided by intensive preliminary analysis, and development of a comprehensive statement of an organization's information systems requirements. In this way the interrelationship between a system and the data needed to support it can be identified before the system is developed. A structured and well-documented planning methodology has been designed by a major computer vendor, which facilitates the preparation of such a statement.[1]

This methodology is termed Business Systems Planning (BSP), and has been successfully used by many organizations worldwide. Originally designed for use in the business world, BSP is equally applicable to the public sector, including health care institutions, and has been successfully utilized by the USA Postal Service[2] and other large public and private organizations. This methodology, as applied at Groote Schuur Hospital, is outlined below.

## The study work plan

The HIPS was undertaken on a part-time basis over an 8-week period starting in July 1981. The study team consisted of nine senior staff members representing the hospital and the Faculty of Medicine of the University of Cape Town, and also included a data processing consultant from the Graduate School of Business of the University of Cape Town.

The scope of the study was confined to the hospital and those aspects and functions of the medical school which are directly affected by the hospital. During the study the hospital complex, its environment, goals and objectives, its managers and their problems as well as the current information systems support of the organization were reviewed. Twenty-seven senior members of the hospital and medical school staff with managerial responsibilities were interviewed by the study team. Ideas from successful hospital information systems reviewed in the literature[3] were evaluated for their possible application to Groote Schuur Hospital.

The study consisted of nine stages which are listed in Table I.

1. **Obtaining senior managers' and team members' commitment to the study.** A prerequisite for success is that the results of the study should reflect the views of senior management. The chief executive of the organization must sponsor the study, and the involvement of other senior managers as study team members and interviewees is equally important. This essential commitment was obtained.

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│          TABLE I. STAGES IN THE HIPS             │
│  1.  Gaining commitment                          │
│  2.  Preparing for the study                     │
│  3.  Establishing organizational goals and       │
│      objectives                                  │
│  4.  Defining hospital processes                 │
│  5.  Defining data classes                       │
│  6.  Determining executive perspective and       │
│      hospital problems                           │
│  7.  Creating the information architecture       │
│  8.  Determining information system priorities   │
│  9.  Reviewing information systems management     │
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2. **Preparing for the study.** Preparation entailed educating study team members to use the BSP methodology effectively, selecting interviewees, preparing background information on the hospital and its data processing activities, and formulating a working programme.

3. **Establishing goals and objectives.** The BSP methodology is based on a top-down approach, i.e. information needs, architecture and management strategy are derived from the primary goals and objectives of the organization and its subsystem. The first task was therefore to identify these goals and objectives.

4. **Defining the hospital's processes.** All the logically related activities occurring within the hospital (processes) were identified and described. The decision-making role of each level of management *vis à vis* these processes was then determined. This analysis provided a basis for the identification of all the varieties of data currently available in the hospital.

5. **Defining data classes.** The various data types within the organization were grouped into logically related categories (data classes). Categorizing data classes permitted the development of coherent, flexible information systems with a minimum of data redundancy.

6. **Determining the executive perspective and hospital problems.** Interviewees identified their involvement with each of the hospital processes, stated their objectives and responsibilities, their critical success factors,[4] significant problems and their input, their own information needs and the foreseeable changes in their departments. The results of these interviews were later used by the study team to identify requirements and priorities for information systems development.

7. **Creating an information architecture.** The information architecture is the blueprint of all the information systems which could be provided within the organization. It was created by identifying the information flows occurring between the organization's processes and data classes.

8. **Determining information system priorities.** The study team determined priorities by identifying subsystems of the information architecture, and then developing a set of criteria for ranking these in order of importance.

9. **Reviewing information systems management.** Existing management policies were evaluated, and some changes were suggested when it was felt that these would prove beneficial.

## Results of the study

1. A mission and a set of goals and objectives for Groote Schuur Hospital were defined during the study, and the hospital's information system requirements were related to these. This was the first time that such a statement had been formalized for the hospital.

2. The hospital's processes and data classes were identified and defined, facilitating the construction of an information architecture. The detailed information architecture for Groote Schuur Hospital is a 58 x 44 component matrix depicting hundreds of subsystems. By using this architecture a systems analyst is able to identify major data inputs, outputs and interrelationships for each system. Reproduction and interpretation of the hospital's information architecture is beyond the scope of this paper but is dealt with in more detail in the HIPS report.

3. The executive interviews indicated the need for more than thirty information systems which were subsequently refined to twelve specific subsystems derived from the information architecture. These were then ranked in order of priority by the study team, using a comprehensive, quantitative method which considered the benefits to be derived from each subsystem, as well as the associated costs and risks.

A laboratory reporting system, which is to make laboratory results available on computer terminals in wards and clinics, received top priority. Where managerial information needs involved very broad operational areas, follow-up studies were recommended to define the subsystems involved more precisely. Ten follow-up studies were identified and given priority. In this group the follow-up study to establish the requirements for a subsystem to deal with nursing care plans and records was considered most important.

4. The management information systems planning and development were reviewed, and suggestions were made for restructuring of the organization for improved co-ordination and control.

5. A comparison with successful installations elsewhere in the world, viz. Leiden University Hospital,[5] El Camino Hospital[6] and the Medical School, Hanover Hospital,[7] indicated that: (a) the potential for successful development was greater in single hospitals with 300-1 200 beds (unit development costs tend to be excessive in smaller hospitals; difficulties in obtaining user consensus result in delays and diseconomies of scale in larger, multi-hospital installations);[8] (b) an academic environment with professional rather than a bureaucratic approach to system development is conducive to success; and (c) a substantial financial commitment ($\pm$ 3,5% of hospital construction costs) is essential.

6. Many problems not related to information systems were identified during the study and referred to the Chief Medical Superintendent for further investigation and attention.

## Recommendations

Based on the results of the study, far-reaching recommendations were made:

1. Information subsystems should be established in accordance with the established priorities and information architecture.

2. Information systems management committees at all levels should be restructured and constituted to ensure the continuing commitment of senior management to the development of a hospital information system and to rationalize the mechanisms for control and co-ordination.

3. The information systems plan should be updated every 2 years.

4. Several alternatives to centralized multi-hospital development were proposed, for referral to the provincial authorities. The advantages of distributed data processing were emphasized.

5. The allocation of funds for the development of hospital information systems should be increased in view of the justified needs identified during the study and the cost-effectiveness of the high-priority systems.

6. The hospital/medical school complex should actively pursue research in and teaching of medical informatics (the science of information in medicine).

## Discussion

As far as is known, this is the first information planning study to have been undertaken in a South African hospital. The following

results have proved the study to be of value: (*i*) an awareness among senior management staff that information is a vital resource which should be personally planned and controlled by them; (*ii*) a renewed appreciation of the goals of the hospital and its managers, their functions and problems; (*iii*) an evolutionary approach to systems development, which allows for the sequential phasing in of subsystems, using an information architecture; and (*iv*) the infusion of potentially far-reaching concepts regarding information systems management, resource allocation and academic development of medical informatics.

In simpler terms, this study has provided a plan which identifies and supports the hospital's short- and long-term information needs. This plan has been completely accepted by members of the hospital management, who were involved at each stage of development and are committed to its implementation.

It is suggested that a similar study would benefit any large health care institution wishing to re-evaluate its data processing functions. Given the required amount of time, commitment and expertise, such a study can offer management a highly relevant and practical information systems plan and a mechanism for gaining maximum benefit from a costly but vital resource.

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