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William G. Chismar
College of Business Administration, University of Hawaii, chismar@dscience.cba.hawaii.edu

Rodney S. Moriyama
The Queens Health System

Daniel C. Davis Jr
John A. Burns School of Medicine, University of Hawaii, ddavis@uhunix.uhcc.hawaii.edu

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William G. Chismar
College of Business Administration, University of Hawaii
2404 Maile Way, Honolulu HI 96822
(808) 956-7276
chismar@dscience.cba.hawaii.edu

Rodney S. Moriyama
The Queens Health System
1301 Punchbowl St, Honolulu HI 96813
(808) 537-7483

Daniel C. Davis Jr.
The Queens Health System and
John A. Burns School of Medicine, University of Hawaii
1356 Lusitana St., Honolulu HI 96813
(808) 537-7483
ddavis@uhunix.uhcc.hawaii.edu

Introduction

The biggest challenge and most critical success factor in reengineering projects is persuading the people within the organization to cooperate. This task becomes much more difficult when the major players have a tradition of high independence, are often confrontational to management, and are irreplaceable independent contractors. CIO's in major health care organizations face exactly this situation; further complicated by the fact that the reengineering effort is crucial to the continued existence of the organization.

The current health care environment is transforming from a cottage industry made up of specialized craftsmen, into a more industrialized model requiring reporting standards and statistical outcomes for quality and cost improvements. Collaboration with these artisans, call them "doctors," entrepreneurs who prided themselves on their individuality, presents a formidable challenge in the development of new organizational information systems. This paper addresses the changing health care climate and the collaborative efforts by a number people in establishing a working environment for the implementation of a physician-driven clinical information system.

The Health Care Environment

The history of physicians and hospitals shows an evolution of two parallel lines of authority. The medical staff became a powerful group that successfully controlled the content and conditions of the medical practice and the management staff maintained the doctor's workshop by balancing the books and overseeing the day-to-day management of the facilities. Over the past century, the relative bargaining power of hospitals and physicians favored physicians. But, changes in the health care industry now require closer cooperation between these two groups.

Brought about by rising costs, the health care system in the United States faces a public outcry for reform and restructuring. Restructuring has been under way for some time in the form of managed health care, cost control initiatives, and the integration of various components of the delivery system. Information systems which help coordinate the delivery of medical services to patients, called clinical information systems, play a key role in these restructuring efforts.

The Queen's Medical Center, Hawaii's largest private health care institution, started on its journey of developing clinical information systems in the early eighties with little progress; the traditional view of information systems as primarily administrative failed to reflect the necessary changes in physician-hospital relationships. The physicians were never adequately convinced that the new systems, and the restructuring efforts in general, would improve the delivery of health services and, therefore, never committed to the development projects. But, this was not an experience unique to Queen's.

In an industry survey of administrative physicians and key hospital administrators, both groups indicated cooperation was inhibited by perceptions of dishonesty, incompetence, and a lack of initiative or enthusiasm on the part of the other. Beyond this, physicians were criticized for refusal to listen, arbitrary decision making, manipulation, and a lack of follow-through, while administrators were criticized for lacking intelligence or education, wasting time, and having divided loyalties. In addition, the very structure of the hospital has worked against collaboration between physicians and management.

The Clinical Information Systems Project

In September 1992, a new initiative, the "CliQ" (Clinical Information at Queen's) project, began which proved a very successful physician-hospital collaborative effort. The CliQ project is designed to provide Queen's with an advanced clinical management system which fully integrates operations, allowing Queen's to provide higher quality health care in a more cost effective manner. In addition to applications, the project includes the development of an infrastructure containing a clinical database, workstations, user interfaces, and network applications.

The CliQ project will have required three years and over $12,000,000 when completed in September 1995. It involved a project team of 22 full time personnel and the cooperation of a large number of Queen's 1,000 physicians and 2,300 support staff. The pilot system

is now under way, with full system roll-out scheduled for September. The conservative estimate of savings is $10.5 M/year with a potential savings of $42 M/year.

The CliQ system provides physicians, nursing staff, and other clinicians with the means to electronically enter and transmit therapeutic, diagnostic and other orders for all patients to the appropriate departments. It provides authorized users with electronic access to results from laboratories, pathology, and imaging and EKG departments. Additionally, the system allows nurses to electronically document medication administration. As a by product CliQ will improve the capture of cost data. The system replaces current processes that are time consuming, redundant, and prone to human error.

The conservative project benefits of CliQ include

- Improved patient care and service,
- A 50% minimum reduction of manual procedures within six months,
- A 90% reduction in medical errors within three years,
- Improved accuracy of the charge capture process by 50%, and
- A 95% clinician satisfaction rate within 3 years.

Development and Implementation Efforts

In late 1992 when the CliQ project was being planned, the chief of the medical staff at Queen's stated that "not over my dead body will my doctors use a clinical information system." This was not an unusual stance; in a Virginia medical center physicians threatened to go on strike rather than practice medicine with the proposed clinical information system. Traditionally, physicians viewed clinical information systems as a tool with which administrators could control the physicians. The key to the success of the CliQ project was making it physician-driven, which meant heavy physician involvement from the start.

To facilitate cooperation a new organizational structure was created for managing the clinical information systems project. The physician's project team consisted of 2 physicians working full time, and 5 physicians working ten hours per week. All of the salaries were charged to the project. In addition to defining system requirements, this team was responsible for determining the implementation process, the system's impact on physician practices, and validating the system. The team reported to the medical informatics sub-committee.

The sub-committee was comprised of 7 physicians from the medical executive committee of Queen's and the manager of the physician's project team. This sub-committee had policy making responsibility for the physicians for clinical information systems, resolved major physician issues, set physician priorities, and reviewed the systems design. The committee reported to the medical executive committee and had representation on the clinical information council.

The ancillary departments, which includes the labs, radiology, pharmacy, pathology, and EKG, and the nursing group also had user groups with input to the clinical information council. (See Figure 1.)

In addition to the above organization, physician input was garnered through four other channels: physician interviews, physician user committees, physician rounds, and attendance by physicians at vendor demonstrations. In the requirements phase, interviews with 15 physicians were conducted by the project team. Each of the interviews was written up in a standard form and made available for review in the project document library.

Several physician user committees were established to provide the project team with a reference group of individuals that could be consulted through out the course of the project. Members of the project team joined physicians on their patient rounds in order to experience first-hand the actual processes used by the physicians.

Two major demonstrations with selected vendors took place during the requirements phase to familiarize the project team and other users with potential features and functions of a clinical information system. During the system definition phase, members of the physician project team attended computer conferences and visited vendor R&D sites and other health providers with clinical information systems in place.

Phase I of the project, requirement definition, started in February, 1993, and was completed in July, 1993. The requirements document detailed 274 functional requirements. Phases II and III, system definition, generation of a request for proposals, and vendor selection, spanned the period from July '93 to February '94. Phase IV, coding and delivery of the system took only 18 months, completed in July, 1995. Currently, the live pilot system is being tested and full conversion to the system will take place in September, 1995.

Conclusion

Today, that same chief of staff who earlier strongly opposed any clinical information system is advocating 100 percent use of CliQ by physician from day one of the implementation--the project plans call for 80% participation within 6 months. While many of the physicians are taking a cautiously optimistic view of the CliQ system, there is no resistance to the system. This success is unique in the history of clinical information systems projects.

The success of the CliQ project is attributable to the major effort put on getting collaboration through out the project. Sixty to seventy percent of the project effort was devoted to people issues; over 150 physicians directly participated in the project. The CliQ project provides an excellent example of overcoming resistance to restructuring in an environment of very independent and sometimes hostile groups of professionals.

The collaborative effort on the CliQ project was just one instance of an organizational wide reengineering effort to change at the Queen's Health System, the parent company of the Queen's Medical Center. The next phase of the information systems strategy is the creation of an enterprise-wide repository and access to it. Disease management outcomes projects will be formulated to take advantage of this source of information, and the beginnings of clinical performance improvement protocols will be explored. Future plans call for expanding the information systems beyond the hospital to integrate physicians' practices, ambulatory clinics, home care, and long term care.

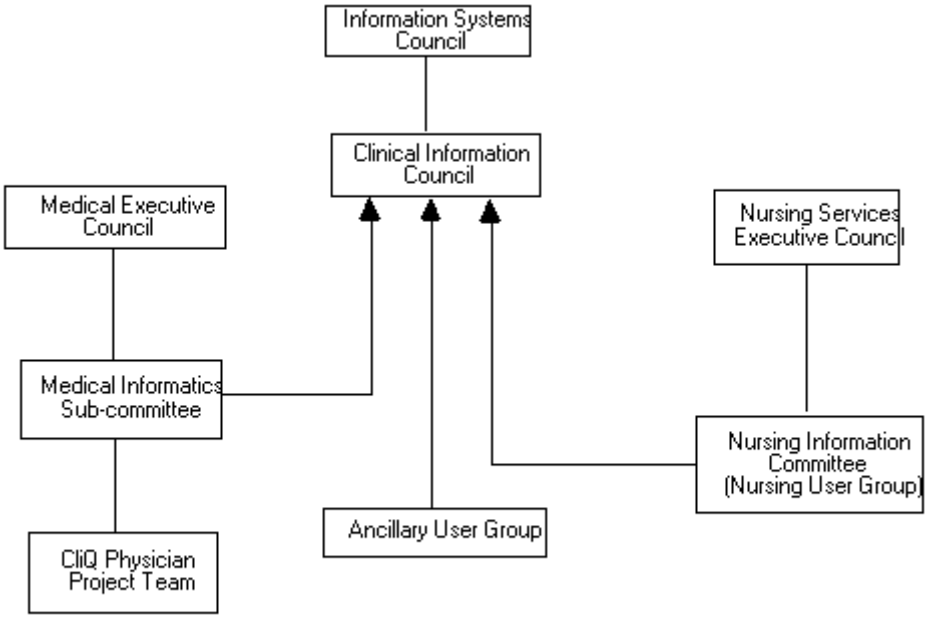

Figure 1: Organization for the Clinical Information Systems at Queen's