

MANAGING TECHNOLOGY IN A PHYSICIAN-LED ORGANIZATION

ABSTRACT

Mayo Clinic Scottsdale has extended the concept of an integrated, multispecialty clinical practice to the management of information technology. This adaptation of a traditional patient care model has been highly successful in a recent decade of extensive technology investment and deployment that has culminated in a paperless, filmless multicampus electronic medical record to support the mission of the clinic.

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“The keynote of progress in the 20th century is system and organization — in other words, *‘teamwork.’*”

— Charles Mayo

Mayo Clinic is the oldest and largest private group specialty practice in the world. It was founded in the 1890s by William Worrell Mayo and his two sons, William and Charles, in a small rural community in Southern Minnesota. In the ensuing 100 years, Mayo has grown to include more than 2,000 staff physicians and more than 1,900 physicians in training practicing in three states in an integrated, multispecialty practice. Through the Mayo Group Practice

(MGP) operations in Rochester, MN (MCR), Jacksonville, FL (MCJ), and Scottsdale, AZ (MCS), Mayo Clinic supports its three-part mission of patient care, education, and research. To ensure a common approach, the missions of these group practices are overseen by the Mayo Foundation for medical research and education.

Mayo Clinic Scottsdale is the youngest of the three group practices. Starting with 45 physicians in one outpatient building in 1987, Mayo Clinic Scottsdale has grown to 300 staff physicians in 66 medical subspecialties practicing on seven separate campuses in the Phoenix metropolitan area. During the past 15 years, the clinic has seen more than 600,000 patients. Mayo Clinic Scottsdale serves as the largest academic and tertiary care facility in the Phoenix area.

KEYWORDS

*Physician leadership
Committee structure
Technology management*

*Physician-administrator teams
Electronic medical record (EMR)
Post-implementation review*

There is a strong research and education component to this not-for-profit group academic medical center. There are more than 100 physicians in training and more than 10 basic scientists working in laboratory research.

Geographically, the main clinic campus and the hospital campus are about 15 miles apart, and the four primary care group practices are also miles away but connected by an electronic medical record and PACS imaging system. Since early 2000, the entire practice has operated electronically without a paper medical record. Approximately 7 percent of the gross medical revenues go to information and communications technology to support this modern medical practice.

General Management Principles

The “Mayo Model of Care”² contains the guidelines and standards by which patient care is administered at Mayo Clinic. Among the 14 tenets noted in this work are that patient care will be provided through “collegial, cooperative, staff teamwork with true multispecialty integration” and that the patient care environment will be overseen by “physician leadership.”

Mayo ensures this spirit of cooperation and integration by means of its extensive committee structure. In total, some 250 committee and subcommittees exist in the Mayo system. Each committee focuses on a single area or problem that requires oversight and a cross-functional forum for discussion. It is this focus that creates a virtual “expert” in each respective area. Each subcommittee is formed at the disposition of its parent committee, and is generally established to serve a single functional area or problem. (For simplicity’s sake, in the discussion that follows, the word “committee” will be used to denote both committees and their respective subcommittees.)

Table 1. Mayo Clinic Scottsdale Subcommittee Structure

Board of Governors (BOG)	
Administrative Committee of the BOG	<ul style="list-style-type: none"> • Subcommittee of the Cancer Center Committee • Center Committee • Cancer Basic Science Subcommittee • Cancer Center Administration Subcommittee • Cancer Center Clinical Practice & Clinical Research Subcommittee
Clinical Practice Committee (CPC)	<ul style="list-style-type: none"> • Subcommittees of the CPC • Accreditation and Licensure Subcommittee • Clinical Pastoral Care Subcommittee • Clinic Operations Subcommittee • Clinic Space Subcommittee • Ethics Subcommittee • Hospital Practice Subcommittee • Medical Records / Documentation Subcommittee • Nursing Practice Subcommittee • Patient & Health Education Subcommittee • Patient Safety Subcommittee • Pharmacy & Therapeutic Subcommittee • Resuscitation Subcommittee
Continuous Improvement Committee (CIC)	<ul style="list-style-type: none"> • Subcommittees of the CIC • Environment Health/ Safety Subcommittee • Infection Control Subcommittee • Radiation Safety Subcommittee
Development Committee	
Education Committee	<ul style="list-style-type: none"> • Subcommittees of the Education Committee • Continuing Medical Education Subcommittee • GME-Internal Medicine Subcommittee • GME-Medical and Laboratories Specialties Subcommittee • GME-Surgery and Surgical Specialties Subcommittee • Humanities in Medicine Subcommittee • MCS Health Related Science Education Subcommittee • Nursing Education Subcommittee • Physician Assistant Subcommittee
Facilities Committee	
Finance Committee	
Information Systems Steering Committee (ISSC)	<ul style="list-style-type: none"> • Subcommittees of the ISSC • Information Technology Advisory Prioritization Review Subcommittee • Web Steering Subcommittee • Security Subcommittee • Office of Advanced Technology
International Activities Committee	
Personnel Committee	<ul style="list-style-type: none"> • Subcommittees of the Personnel Committee • Diversity Subcommittee • Health Benefits Oversight Subcommittee • Leadership Development Subcommittee
Provider Relations Steering Committee	
Research Committee	<ul style="list-style-type: none"> • Subcommittees of the Research Committee • Executive Subcommittee • Research Technologies Career Ladder Subcommittee • Space Subcommittee

Each committee is charged with a given set of responsibilities and expectations by either the board or its parent committee. These charges are revisited annually by each committee to ensure that the strategic objectives set by the Board of Governors are being met and to validate that the very existence of the committee is still important. Membership is limited to six to nine individuals to minimize cost (i.e., “non-patient-care time”) and maximize effectiveness. In committees of critical importance, membership may expand to 15 to 20 members, typically without a noticeable reduction in effectiveness. A physician chairs each committee, with a secretary who is generally from one of the business areas that is affected by its charge. Meetings are conducted according to “Robert’s Rules of Order”³ with agendas and required quorums. Minutes are generated, approved, distributed, and archived for future reference. In short, meetings are conducted in a polite, organized, business-like, and documented manner.

The Mayo committee structure greatly enhances its ability to be “physician-led” and is one of the most fertile grounds for leaders to practice their administrative skills. It is from the leadership position on the most prominent committees of Clinical Practice, Research, and Education that many board members are selected. Table 1 contains a list of the committees at Mayo Clinic Scottsdale, with those most involved in technology in boldface.

Physician-Administrator Partnership

Many physician-founded organizations eventually transfer administrative leadership to non-physicians with business and administrative training, but not so at Mayo. Instead,

selected practicing physicians are paired with non-physician administrative partners to form individual management teams. Physician leadership skills are honed through advanced business degrees and involvement in departmental, divisional, and committee leadership positions.

This business-medical teaming occurs throughout the entire organization. From the chairperson of Mayo Foundation and each of the three group practices to the chair positions of every committee and clinical department, physician leaders are teamed with administrative partners. The physicians remain actively engaged in the practice of medicine, but generally are provided with “administrative time,” as much as four hours a week, to perform their leadership duties. A spirit of volunteerism and a touch of peer pressure and esprit de corps are all necessary components to supply staff for committee work, because there is no significant financial reward for such involvement. Having 100 percent of our physician staff on salary instead of incentive pay also reduces a major barrier that exists in other practices, where time spent on committee work literally means a physician is money out-of-pocket.

This combination of “caregiver-business person” creates a highly effective team that keeps the needs of the patient uppermost in the minds of all staff, thus supporting the primary value of Mayo Clinic, that “the only interest to be considered is the best interest of the patient.”⁴ Mayo believes that physicians need regular encounters with patients so they are best suited to know what patients want and need from their healthcare provider. This is particularly evident in information technology, in which the business

“Mayo ensures this spirit of cooperation and integration by means of its extensive committee structure.”

Figure 1. Information Technology Governance Structure

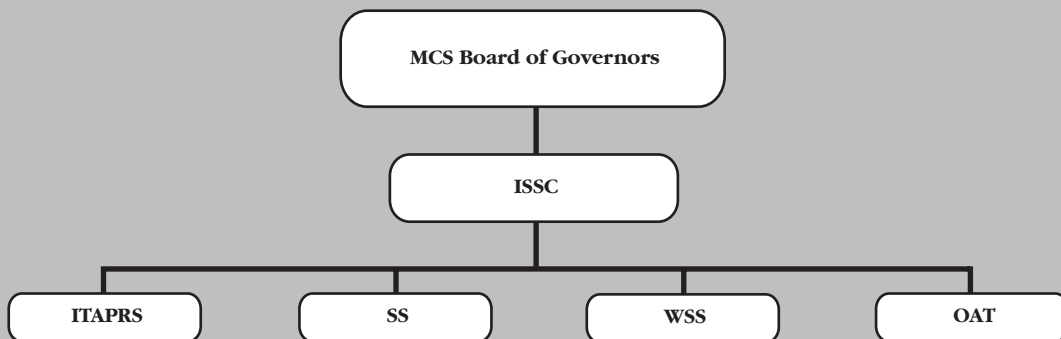


Table 2. Missions of Information Technology Governance Groups

Information Systems Steering Committee	Create and foster the Information Systems Strategy to meet all system-wide needs. This committee creates a structure and strategic direction for all IT activities that are complementary to the strategic business direction of Mayo Clinic Scottsdale. This is a high-level executive committee that concerns itself with what needs to be done on a short-term and long-term basis and monitors the status of IT activities to ensure adherence to the strategy. In addition, the ISSC has the responsibility to oversee the development and implementation of the IT Strategic Plan.
Information Technology Advisory Prioritization Review Subcommittee	Review, prioritize, and approve information system software applications, standards, and guidelines and monitor their implementations.
Security Subcommittee	Work collaboratively with the Mayo Foundation Information Security Subcommittee and local Scottsdale user population to recommend new information security policies, standards, and guidelines and monitor compliance to them.
Web Steering Subcommittee	Develop a strategy for the use of the MCS Internet and intranet and champion all projects in this area.
Office of Advanced Technology	Interact with Mayo Foundation in the area of emerging information technologies to create a forum to develop specific tool sets using information systems to solve Mayo Clinic Scottsdale institution problems and to serve as a resource for MCS to enhance scholarly activity by optimizing our use of information systems

value of a given solution is not always clear, resulting in “technology looking for a solution.” Mayo’s physician-led focus identifies this disparity earlier in the technology-adoption cycle, thus contributing to a higher-quality and more appropriate solution.

Division of Information Technology

The Division of Information Technology is approved for 133 full-time equivalents (FTEs) serving the functions of applications (administrative and clinical), development/engineering, networks, operations, customer service/support center, and visual communications. The division has developed and maintains a five-year strategic plan that supports and is closely related to the organization’s strategic objectives. All department activities, from normal maintenance to upgrades and new projects, must be related to the achievement of either a strategic objective or be a strong support component of the Mayo Model of Care.

Governance of Information Systems

Management of MCS Division of Information Technology is the charge of the Information Systems Steering

Committee (ISSC) and its four tactical/operational subgroups: the Information Technology Advisory Prioritization Review Subcommittee (ITAPRS), the Security Subcommittee (SS), the Web Steering Subcommittee (WSS) and the Office of Advanced Technology (OAT). Figure 1 presents a graphic depiction of this structure, while table 2 presents the missions for these groups.

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Information Systems Steering Committee

The 17 members of the ISSC hold the organizational roles as indicated in table 3. Meetings are conducted on a biweekly basis throughout the year and last for two hours. Activity is generally even throughout the year with some increase when planning for the new year is under way. Because the ISSC has members from administration, as well as the Practice, Research, and Education committees, it is closely tied to and has firsthand knowledge of the major initiatives of the organization.

The committee’s importance in the affairs of the clinic and hospital is underscored by the fact that the Chief Executive Officer (Chair of the Board of Governors), Chief Operational Officer, and Chief Financial Officer all sit on the ISSC. Furthermore, there are three members of the

Table 3. Organizational Roles Represented in the MCS Information Systems Steering Committee

Organizational Role	Primary Location	Key Role(s)	Representation
Physician	Group Practices	Committee Chair	Family Practice
Administrator	Clinic	Chief Information Officer	Information Technology
Physician	Clinic	Committee Vice Chair, Chair of ITAPRS	Neurology
Administrator	Clinic	Vice Chair, Information Technology	Information Technology
Nurse	Hospital	Vice President of Nursing	Nursing
Administrator	Clinic	Chair of Administration and Member of Board of Governors & Board of Trustees	Administration
Physician	Clinic	Chair of Security Subcommittee/ Advanced Technology	Hematology/Oncology
Administrator	Clinic	Co-chair of Advanced Technology	Information Technology
Physician	Clinic	Chair of Web Steering Committee and Regional Internal Medicine	Internal Medicine
Physician	Hospital	Chair of Emergency Medicine	Emergency Dept.
Administrator	Clinic	Member Board of Governors & Trustees	Administration
Physician	Hospital	Vice Chair of ITAPRS	Transplant & Hematology
Administrator	Clinic	Chief Financial Officer Administration	
Physician	Clinic	Member Board of Governors	Internal Medicine
Physician-Administrator	Clinic	Chair of Board of Governors & Member Board of Trustees	Thoracic Surgery
Physician	Clinic	Chair, Dept. of Radiology	Radiology
Chief Operations Officer	Hospital	Member of Dept of Hospital Medicine	Hospitalist

Board of Governors and three members of the Board of Trustees for Mayo Foundation who also sit on the ISSC.

A balance of the three geographical locations (hospital, clinic, and group practices) is maintained, and a breadth of representation from the various different surgical and medical disciplines is sought as well. Table 4 contains the major functions and responsibilities of this committee.

Information Technology Advisory Prioritization Review Subcommittee

The Information Technology Advisory Prioritization Review Subcommittee (ITAPRS) originally was formed to review for possible approval all changes to the standard desktop baseline, which were consider “variances.” MCS uses Windows NT 4.0 as its desktop operating system, configured so the individual system user does not enjoy “administrator” rights and thus cannot install any software packages that require administrator status. It is only through the variance process that a user-specific addition to a desktop can be requested.

Over time, the need to review all project requests, as an agent of the ISSC, was added to the ITAPRS charge. A project-submission process was crafted, approved by the ISSC, and submitted to the various user populations. In

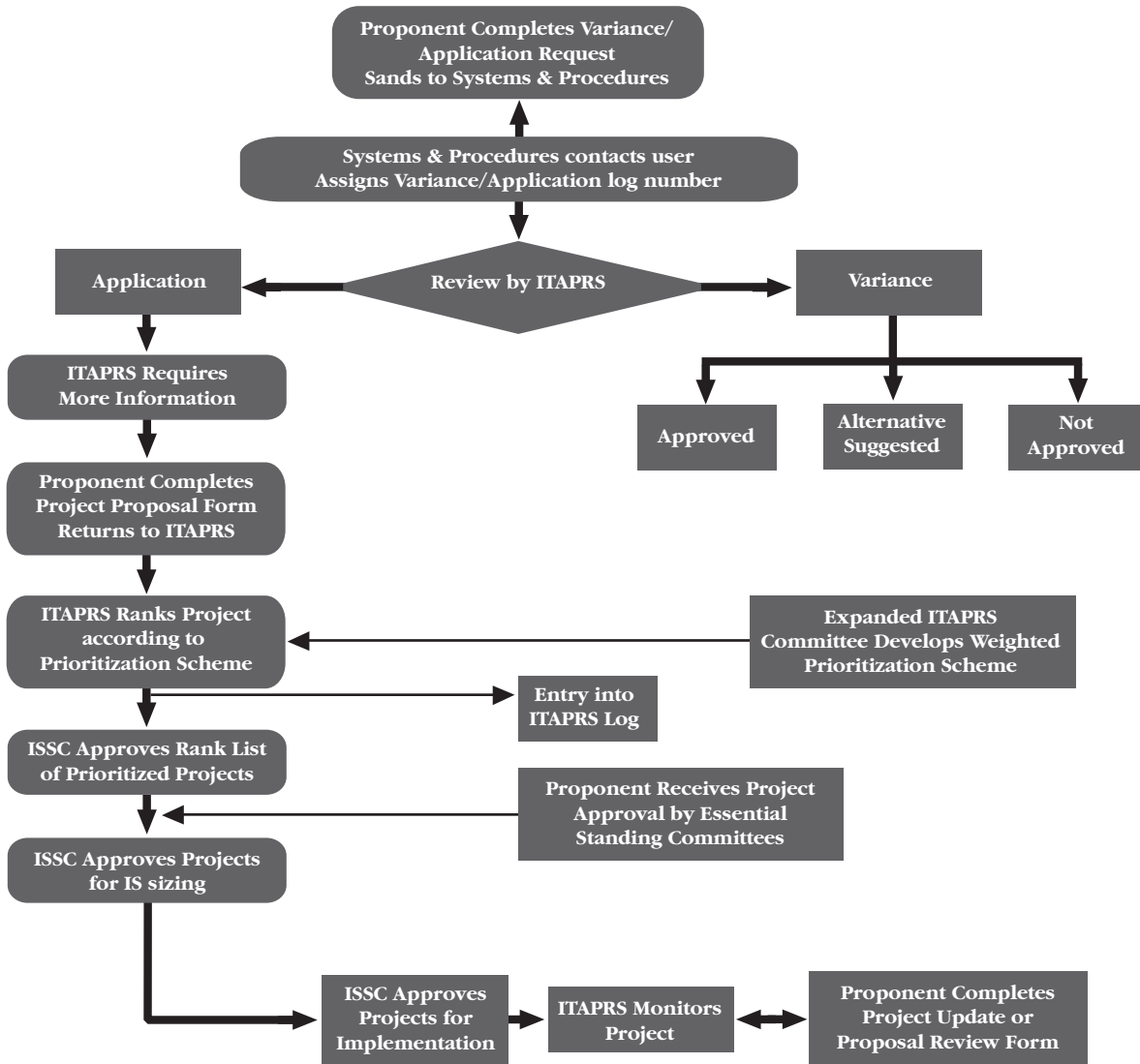
time, the agenda of the biweekly ITAPRS meeting consisted of both variance requests and new project requests.

Like most IT organizations, MCS IT spends more than 80 percent of its FTE effort maintaining and upgrading existing systems. As a “buy, not build” department, the steady flow of vendor upgrades and bug fixes keep a staff of more than application analysts quite busy.

As the organization matures, it has reached the realization that this ongoing system support must be balanced against the new technology needs of the organization. Expanding use of the Internet, enhancing referring physician relationships, and improving the practice are never-ending activities that require ongoing attention. More specifically, in a given year, instead of only 20 percent of staff effort allocated to new projects, perhaps this figure should be 50 percent, necessitating a delay in ongoing maintenance and suggested system upgrades. The most recent development is that the ISSC has expanded the ITAPRS charge to review and prioritize ongoing support and maintenance activities, in addition to its existing variance and new project review role.

The expanded role has resulted in a corresponding expansion in the size of the subcommittee and the populations represented. ITAPRS now has 16 members,

Figure 2. ITAPRS Project Request Workflow



with strong involvement from IT and the Practice Committee. Table 5 contains a summary of its membership.

Security Subcommittee

In like manner, the Security Subcommittee consists of a broad range of participants. It has 18 members who come from Legal, Medical Records, IT, Practice (Clinic and Hospital), Nursing, Human Resources, Patient Financial Services, Development, Internal Audit Services, Training and

Development, and Quality Assurance. This subcommittee attempts to anticipate the security needs of the organization and develop policies by which to manage risk.

In general, Mayo Clinic is not an “early adopter” of technology, choosing instead to have the marketplace work out the issues involved in full deployment. Current healthcare initiatives such as patient data on personal digital assistants, access to the medical record from remote sites, Internet usage, wireless PC usage, and others are considered

Table 4. Major Functions and Responsibilities of the ISSC

Development of the five-year IT strategic plan
Oversight of the annual IT operating and capital budgets, including direct approval of all projects that exceed \$100,000
Development of technology standards
Development of "balanced scorecard" metrics to monitor IT performance

Table 5. ITAPRS Membership

Organizational Role	Key Role(s)/Constituency
Physician (Chair)	Member of the MCS Board of Governors, Hospital
Physician	Hospital and Research
Physician	Emergency Department
Physician	To Be Determined
Administrative (Secretary)	Systems and Procedures
Administrator	Director, Graduate Medical Education
Administrator	Operations Administrator
Nursing Informatics	Nursing
Financial	Analyst Finance
Administrator	Chief Technology Officer
Administrator	IT Director, Administrative Systems
Administrator	IT Director, Clinical Systems
Administrator	IT Director, Operations & Customer Service and Service Delivery
Administrator	IT Director, Infrastructure and Support Services
Administrator	IT Lead, Project Manager

by this group. This subcommittee has much respect in the organization. A ruling by the Security Subcommittee citing unacceptable security risks of a given technology can prevent its widespread use in the organization.

The Project Life-Cycle

Perhaps the best way to illustrate how technology is managed at Mayo Clinic Scottsdale is through a recent example of decision making regarding a technology issue.

Figure 2 presents the process flow of a typical project request through the ITAPRS process.

In 1998, Mayo Clinic Scottsdale opened a new state-of-the-art hospital in Phoenix, about 20 miles from our primary clinic. This effort resulted in the establishment of an electronic medical record common between our primary multispecialty clinic and the new hospital. A PACS system was installed at that time, resulting in the eradication of printed film throughout nearly all of the clinic and hospital. This initiative was very successful, resulting in a reduction of more than \$1 million in annual film costs and a reduction of more than 15 full-time equivalent employees. The only remaining areas still requiring printing were mammography and the operating rooms.

The Clinical Practice Committee and the ISSC each received a request from surgeons and the radiology department in the practice to permit them to seek a technical solution that would eliminate the need to print film for the operating rooms.

The staff of MCS IT contains the position of Customer Relationship Manager, or CRM. The individuals who hold these roles are the single point of contact between IT and a given user population. As such, the CRM assigned to the Mayo Clinic Hospital was asked to explore a solution to the request.

The CRM met with the appropriate individuals, determined a project champion, coordinated the creation of the project finance effects analysis, and completed the IT project request form, which was subsequently submitted to ITAPRS for consideration.

At the next ITAPRS meeting, the project request was reviewed. While some of the subcommittee participants were familiar with the issue, others were not, so the project proponents and their CRM were invited to a meeting to present their case. The key question to be addressed was how did the project meet the goals of the Mayo Clinic Scottsdale strategic plan. A secondary question required of all projects exceeding \$3 million of capital is: "What is the return on investment?"

These questions were answered to the satisfaction of ITAPRS. They approved, as a high priority, a project to deploy software and hardware in the operating rooms (officially called "PACS in the OR").

In ITAPRS parlance, only "high" priority projects are actually undertaken in any given year. All others, deemed medium and low, are generally considered "declined" and must be either tabled or resubmitted the following year for reconsideration. This ensures a re-examination of a project request on an annual basis to determine appropriate need and alignment with the current organizational strategic plan.

The chair of ITAPRS then presented the project to the ISSC in order to receive approval to plan the project. This is the first step in the MCS project methodology. In this

phase, the complete project is planned and estimated. This information is then brought back to ISSC for their review and approval to proceed.

During the debate on this project, it was decided that a condition of approval included a post-implementation review, or PIR. Most projects that propose a cost savings or FTE reduction are subjected to such review. In fact, the date of the PIR is usually determined at the time of the project approval. Projects with PIR are then evaluated by internal audit from inception to completion so a post-implementation review can be honestly and independently verified.

This discipline of PIR is very useful and important in accomplishing two main objectives. First, it holds proponents to their promise to reduce costs or personnel. Second, it permits the committee and its members to be a learning organization. Successes and failures can be analyzed for lessons learned.

After ISSC review and approval, the "PACS in the OR" project was scheduled and subsequently begun. At the PIR presentation to the ISSC the "PACS in the OR" proponents were able to show a marked increase in physician satisfaction and clinical efficiency, as well as a projected film reduction rate that would slightly exceed that contained in the original cost/benefit analysis.

Summary

Mayo Clinic Scottsdale, like most medical centers today, is investing more in information technology and is becoming more dependent upon it. With about 7 percent

of our gross revenues going to technology, our need to use IT resources wisely has placed technology decisions in high prominence. With our entire medical record and the core processes of our workflow automated, IT is now mission-critical, and IT decisions cannot be made without the insight and overview of senior management.

To counterbalance a top-down, overly restrictive oversight environment, we have employed the time-tested model of physician-administrator teams to guide various technology initiatives from idea to reality. This has the advantages of keeping the patient first in all decisions involving technology and

increases the likelihood of embracing new technology by physicians and other caregivers.

To guide these teams, a heavy emphasis on the institutional strategic plan and balanced scorecard metrics has been reinforced at all levels of the clinic and hospital. To ensure that Mayo Clinic Scottsdale remains a learning organization, post-implementation is often done, especially when technology investment is defended on cost savings or staff reductions.

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About the Authors

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