

LEADERSHIP: THE CASE OF THE HEALTHCARE CIO

Learning Objectives

1. List job duties and analyze functional responsibilities of senior health-care leadership and the chief information officer (CIO).
2. Identify key knowledge, skills, and abilities of the CIO position.
3. Describe the alternative paths to leadership of healthcare information technology (HIT).
4. Prepare and assess an organizational chart for the HIT department or area of a healthcare organization.
5. Illustrate future challenges faced by healthcare CIOs.

Overview

This chapter discusses the leadership, human resources, and management expertise required to make effective use of information and the healthcare information technology (HIT) infrastructure in healthcare organizations. In past editions of this book, this chapter was located at the end. Moving the chapter to the front of the book reflects both the increased complexity of information management in today's healthcare delivery environment and the important role that HIT leadership plays in that environment. Senior management of HIT departments must now plan for and implement systems to meet today's information needs (which have administrative and clinical applications), anticipate tomorrow's information needs, and ensure a smooth transition between current and future systems and technologies. While doing so, these leaders confront rapidly evolving hardware and software capabilities and ever-changing government interventions—both of which shift the rules that influence the collection, transmission, storage, retrieval, and dissemination of healthcare information.

Senior leadership cannot hope to master all or even most of these complex HIT tasks. They must, however, understand the associated challenges in sufficient detail to effectively manage technology and clinical content experts. Consequently, this chapter details the functional responsibilities of

chief information officers (CIOs); the organization, staffing, and budgeting of the HIT department; and the organizational challenge of outsourcing or multisourcing HIT functions. It concludes with a brief examination of future trends related to the role of the CIO and the HIT leadership team.

Today's HIT Management

Determining what area of leadership is responsible for the management of information technology in the healthcare organization has always been a key responsibility of the CEO and the governing board. Historically, many healthcare organizations assigned information management responsibility to the chief financial officer (CFO), reflecting the high priority the organization reserved for accurate and timely financial information generally and patient billing particularly. The administrative functions were well served in the early days of HIT.

Because of the increasing importance of clinical information systems, the regulatory reporting requirements, and the use of information in strategic planning and decision support, most healthcare organizations now assign the responsibility for information management and communications to a separate executive-level position—the CIO. This shift has led to the publication of a host of books concentrating on the CIO and its evolving roles (e.g., Broadbent and Kitzis 2005; Smaltz et al. 2005a).

The Senior Management Role

A discussion of the roles that HIT management plays begins with the active engagement of the senior executives in the organization. In a study of organizations that successfully managed information technologies, Weill and Ross (2004) identify ten characteristics that these successful organizations have in common. Exhibit 4.1 summarizes these ten traits.

Many of the characteristics on this list contribute to the success of organizational information technology endeavors, and this list reinforces the important role of the CIO and other senior leaders. Governance design (item 1) must focus on organizational objectives and performance goals rather than simply on considerations of HIT's internal operations. Senior executives must design, lead, and regularly review HIT governance. Similarly, in effective organizations, senior management must get involved (item 3) not only in strategic decisions but also in technology decisions that have strategic implications. More than just involvement, good HIT governance requires leaders to make choices (item 4). Conflicting goals have become the norm in complex organizations and, if not handled appropriately, may lead to various problems within the institution.

1. Actively design governance
2. Know when to redesign
3. Involve senior managers
4. Make choices
5. Clarify the exception-handling process
6. Provide the right incentives
7. Assign ownership [of] and accountability for information technology governance
8. Design governance at multiple organizational levels
9. Provide transparency and education
10. Implement common mechanisms across the six key assets

SOURCE: From *IT Governance: How Top Performers Manage IT Decision Rights for Superior Results* by F. Weill and J. Ross, Harvard Business School Press, 2004. Reprinted with permission.

At a fundamental level, successful HIT governance must provide the right incentives and rewards (item 6) within the organization and assign ownership/accountability for the function (item 7). In healthcare, incentives are important to foster synergy between and among operating units. Likewise, accountability for HIT design, implementation, and performance must be firmly assigned at the CEO, CIO, or board committee level. Weill and Ross (2004) recommend that the board or CEO hold the CIO accountable for HIT governance and define and implement clear, measurable success metrics as part of the CIO's performance appraisal. With these considerations, the selection of the CIO leader is vital. Because excellent information technology performance depends on all organizational components working together smoothly, those who are accountable for these components must possess a broad view of the organization; that is, no leader can protect her turf. Organizational leaders (other than the CIO) must be aware that they, too, contribute to information technology governance, and all must understand the symbiotic relationship between HIT and the organization's overall strategic direction.

While considered relatively novel and obtained from a variety of industries, the ten-item list of success indicators presented in Exhibit 4.1 is not that far removed from the list of traits found historically in healthcare. Austin, Hornberger, and Shmerling (2000), for example, reported on management audits conducted by senior management at ten healthcare organizations. The audits evaluated how well the following seven responsibilities for HIT management were carried out: (1) HIT strategic planning, (2) employment of a user focus in system development, (3) recruiting of competent

EXHIBIT 4.1
Ten Characteristics
Common to
Successful
HIT
Governance

personnel, (4) system integration, (5) protection of information security and confidentiality, (6) employment of effective project management in system development, and (7) postimplementation evaluation of systems. Virtually all of these responsibilities receive substantial direction from HIT governance. Blisten (2012) lists seven organizational areas in which HIT management is expected to actively participate or lead: business alignment, project selection/delivery, technology selection, financial management, organizational structure, risk management, and performance measurement.

Building on these ideas is a practice-oriented book aimed at helping CIO leaders achieve success—see Waller, Rubensrunk, and Hallenbeck 2010. The book identifies seven leadership skills that support the need for CIOs to have management skills as opposed to purely technical skills; these leaders do the following (Waller, Rubensrunk, and Hallenbeck 2010):

1. *Commit to leadership.* Success depends on the ability of the CIO to fully embody the role people play in success. Consequently, the CIO does not just “talk” the leadership mantra but “walks” or adopts behaviors consistent with leadership.
2. *Lead differently.* The point of this characteristic is to not abandon the core analytical approach to problem solving but to make sure that the current processes are collaborative in nature.
3. *Embrace the “softer” side.* This tired rhetoric has a grain of truth in that leaders should become open, caring, and mentors for others. This may involve empowering those around you to enable them to grow professionally. Key to this are not just words but also actions.
4. *Forge the right relationships.* Because HIT is still largely a people, not a technology, function, the leader must devote time and effort on managing relationships. As discussed later in this chapter, those relationships refer to not just with direct reports but also with other leaders inside the organization as well as vendors/suppliers outside the organization.
5. *Communicate effectively.* What a successful leader says and does are constantly being watched for signs of commitment and direction. The ability to effectively communicate at all times and in all manners is essential.
6. *Inspire others.* Getting people to go the extra mile to meet goals requires more than reminding them to do a good job. A leader must learn to inspire employees and convince them to firmly believe that they are working on something grander than their immediate set of tasks. Working for a greater good is inspiring and seems vital to success.

7. *Build people.* Professional development for your employees serves as the greatest success for the organization. It breeds success in the short run and helps to generate the future leaders of the organization.

To make these traits a reality, a solid and mutually supportive relationship between the CEO and the CIO is essential. According to Charles Emory, CIO of Horizon Blue Cross Blue Shield of New Jersey, “Two-way communication, especially between CIOs and CEOs is particularly critical now . . . with use of the Internet making the results of senior management efforts visible to everyone, inside and outside the organization” (Hagland 2001, 19). The gap between these institutional leaders pervades a host of environments. The challenges arise from poor communication as well as misaligned goals between the organization and information technology; diverse education and training, and basic lack of understanding of the environment each leader faces (Perelman 2007).

Functional Responsibilities of the CIO

Information systems can be useful to management, provided the process for planning, designing, installing, and operating such systems is itself well managed. The CEO and other senior managers of a healthcare organization must assume the responsibility for planning and controlling the development of effective information systems to serve their needs. These tasks cannot be delegated to technical personnel if information processes are to be truly supportive of high-quality patient care and managerial decision making. In today's competitive environment, information is essential for strategic planning, cost and productivity management, continuous quality improvement, and program evaluation purposes. Important senior management responsibilities are summarized in Exhibit 4.2.

The person assuming these responsibilities—increasingly recognized to be the CIO—must have broad corporate and system understanding and also must have the ability to lead teams of technical experts responsible for complex information technology. Reporting directly to the CEO (or chief operating officer [COO] in some large organizations), the CIO has two important duties: (1) to assist the senior management team and governing board in using information effectively to support strategic planning and management and (2) to provide management oversight and coordination of information processing and telecommunications systems throughout the organization.

The functions of the CIO are integral to any healthcare business, irrespective of organizational size and complexity. In a large organization, the CIO should be a full-time position. In a small hospital or clinic, the CIO responsibilities may be assigned to an administrative officer. A small physician

EXHIBIT 4.2

Senior
Management
Responsibilities

- Management must insist on a careful planning process that precedes all major decisions related to the installation of computer equipment or the design of complex information systems. A master plan for information systems development should be created and updated at least once a year. The master plan should be linked to the strategic plan of the healthcare organization and should guide all specific implementation decisions.
- Management must employ a user-driven focus throughout the development process. Active involvement of personnel from all segments of the healthcare organization is essential. This participation should begin with a definition of information requirements before the organization considers acquisition of hardware and software. It should continue through all phases of analysis, design, system evaluation and selection, and implementation.
- Management must take the responsibility for recruiting competent personnel for the design and operation of information systems. Consideration should be given to recruitment of a CIO to serve as a member of the senior management team. When outsourcing is used, careful selection of vendors and contract negotiations with the assistance of legal counsel should precede the award of contracts for software, equipment, or services.
- Managers at the corporate level must establish policies and procedures to ensure integration of data files or interfacing among individual information systems for tracking patient flows, consolidating cost and financial data, monitoring quality of care, and evaluating individual products and services. Interoperability of data among systems is an absolute necessity in complex healthcare organizations, particularly those involving subsidiary units and central corporate management.
- Management personnel at all levels must adhere to legal and ethical obligations to maintain security of information systems and to protect the confidentiality of patients, human resources, and other sensitive information.
- The design of individual computer applications must be carried out by an interdisciplinary project team. Systems analysts and computer programmers will take the lead on technical analysis and design activities. Representatives of user departments should help guide the specification of system requirements and evaluate the technical design plans of the analysts. Management should be involved in all major design projects to ensure congruence with organizational goals and objectives, and it should insist on a user-driven system focus rather than a technology-driven focus.
- Once a project team has been organized, careful systems analysis should precede any implementation decisions. Shortcuts in the systems analysis phase will inevitably lead to problems later in the process.
- Managers must ensure that the preliminary design specifications for computer applications are in harmony with the master plan for information systems development.
- Detailed system specifications must be required before any implementation activities take place. These specifications should be reviewed formally and approved by all user departments and by management before proceeding with the next steps in system development.

(continued)

EXHIBIT 4.2

Senior
Management
Responsibilities
(continued)

- Throughout the analysis, design, and implementation phases of a project, management must require careful scheduling of all activities and should receive periodic progress reports as the project proceeds.
- Managers must ensure thorough training of all personnel involved in the implementation phase of the new system.
- No computer application should be put into operation without first carrying out a comprehensive system test. The testing should cover all phases of system operation, including computer programs and procedures, personnel training, user satisfaction, ability of the system to meet original objectives, and accuracy of the initial cost estimates.
- Provisions must always be made for adequate maintenance after an application is operational. Maintenance procedures are essential to correct operational errors, to make system improvements, and to facilitate changes necessitated by shifts in organizational needs.
- Management must make certain that information systems are periodically audited and that all systems are formally evaluated once they are installed and operating normally.

group practice must also assign CIO functions or technical oversight to someone—often the group practice manager or a physician in the practice who has an interest and/or expertise in managing information technology. In short, even if an individual with the CIO title does not exist in the organization, someone must be responsible for making strategic and operational decisions regarding information technology for the enterprise.

The range and scope of specific CIO job responsibilities flow from the senior management duties. The scope can be defined in a number of ways, but the job's common parameters are synthesized from job descriptions and from leading healthcare search firms (including In-Village.com, Community Clinics Initiative, Witt/Ketler, Healthcare Recruiters International, Heidrick & Struggles, Korn/Ferry International, and Tyler & Company). The range and scope generally include the following:

- Enterprise-wide planning
- Leadership
- Management oversight
- Human resources management
- Financial management

Notice from this list that technical expertise is not mentioned as a separate responsibility. While the successful CIO cannot be ignorant of healthcare information systems and communication systems, he does not generally

become directly involved in the details of software development or hardware design. At the same time, some degree of technical competence is crucial for the CIO to effectively manage an organization's HIT functions. Generally, the CIO must provide a vision for healthcare technology for the organization and leadership for developing and implementing HIT initiatives throughout the institution—from the boardroom to the clinical suites and in between. Many HIT initiatives are often designed to improve the cost-effectiveness of clinical and administrative functions, enhance the quality of healthcare services, and support business development. All initiatives assist the organization in navigating the constantly changing, competitive marketplace.

The CIO leads in planning and implementing enterprise information systems to support all aspects of both distributed and centralized clinical and business operations. Exhibit 4.3 provides a select list of knowledge, skills, and abilities of CIOs. Notice that a significant portion of the skill set and demonstrated abilities extends beyond the traditional HIT domain. This does not mean to imply that those with significant technical expertise cannot become the next CIO. Many paths lead to a leadership position in information technology, and technical expertise provides as good a path as any other. However, moving to the C-suite, as the CIO title implies, does require a skill set beyond technical expertise.

Recently, Healthcare Information and Management Systems Society (HIMSS) released a report on the priorities of information technology leaders, information garnered from responses to HIMSS's comprehensive survey. These are the five key priorities for the next two years identified in the survey (HIMSS 2012a, Figure 6):

EXHIBIT 4.3

Select Knowledge, Skills, and Abilities of CIOs

- Collaboration
- Understanding the nature of the health system
- Formulation of HIT components of strategic plan
- HIT strategic business and market planning
- HIT needs analysis
- Organization's HIT situation
- HIT culture
- State-of-industry assessment
- Technology assessment
- Evaluation, adoption, and implementation standards
- HIT policy development

SOURCE: Applied Health Informatics Learning and Assessment (n.d.).

Priority	Percentage of Respondents
1. Achieving meaningful use	38
2. Focusing on clinical systems	15
3. Leveraging information	13
4. Optimizing use of current systems	11
5. Completing ICD-10 conversion	11

This same publication also identified clinical, financial, and information technology infrastructure focus points for 2012 (HIMSS 2012a, figures 7, 8, and 9). Exhibit 4.4 summarizes these findings.

Characteristics of a Successful CIO

The CIO must possess a good understanding of the healthcare environment and clinical care processes, be an experienced manager, and have sufficient understanding of information technology to ensure that HIT is properly planned and implemented. Following are some justifications for these CIO traits:

- As discussed in chapters 2 and 3, the external environment and government policy have a direct impact on HIT. The CIO must monitor

Category	Percentage of Respondents
<i>Clinical</i>	
Fully operational EHR	25
Physician systems	16
CPOE installation	16
Linking clinical systems to quality measures	15
Data warehouse/clinical analytics	9
<i>Financial</i>	
ICD-10 implementation	67
Upgraded patient-billing system	6
Upgraded patient-access system	2
<i>Infrastructure</i>	
Servers/virtual servers	19
Mobile devices	18
Desktops/virtual desktops	16
Security systems	16

SOURCE: Data from HIMSS (2012a), Figures 7, 8, and 9.

EXHIBIT 4.4

HIMSS's Primary Clinical, Financial, and Infrastructure Focus for HIT, 2012

these activities, understand their implications, and prepare information technology and the organization to respond to these trends.

- As part of the executive team, the CIO must understand clinical processes sufficiently to intelligently discuss issues with the organization's chief medical officer (CMO). This implies that a basic anatomy-and-physiology course and familiarity with common medical terminology should be a part of the CIO training.
- Except in small organizations, the HIT function involves an array of individuals with diverse backgrounds. The CIO must be adept at communicating with and motivating this heterogeneous group.
- Technical skills are important for a CIO because the staff responsible for the technical aspects may have limited respect for a leader who is not conversant with actual and potential technical challenges.

In addition, the CIO must ensure that all HIT internal systems work properly. As a simple example, pharmacy systems (whether stand-alone or integrated) must operate continuously; otherwise, the organization will be unable to control dangerous drugs (particularly narcotics) and to manage drug ordering and inventory, drug distribution to patients, storage and retrieval of drug information, construction of patient drug profiles, the organization's formulary, and the generation of charges for billing (see chapters 9 and 10).

CIO success depends on many factors that are both internal and external to the leader's areas of influence. In an article outlining the secrets of success, Kramer (2006) summarized the skills that, according to CIOs who responded to a national survey, contributed to effective governance: business, clinical processes, leadership, administration, and communication skills—in addition to “technical savvy.”

According to HIMSS (2012a), six key factors are the responsibility of information technology executives. These are not success factors per se, but they are factors that the CIO must be capable of handling or supporting: value of information technology investments, overall business strategy, business/clinical processes, organizational management improvement, HIT department management, and process change management. Each factor received 83 percent or higher positive responses from HIMSS's survey respondents. Furthermore, survey data obtained by Scottsdale Institute and HIMSS Analytics (2005, Figure 20) suggested that a key element of success for the CIO was a focus on meeting budgets and timelines for projects, although survey respondents recognized (but found less important) the broader goals of exceeding financial or organizational business measurements. Nearly two out of three respondents indicated that success depended in part on the active

support of the CEO for HIT projects. The implication here was that even though the CEO does not set the vision or direction of HIT in most cases, the CEO must still actively support the CIO's initiatives.

More important to a successful CIO than specific training is work experience in healthcare. The Scottsdale Institute and HIMSS Analytics (2005, Figure 8) report indicated that most CIOs and directors of information systems who responded to the survey had HIT experience. Fewer than one out of eight CIO respondents got their start in other industries. Nearly a quarter indicated that they had formal management education specific to information systems, and an equal percentage had technical HIT training. More than one-third (38 percent) had business training, and relatively few had clinical origins. In the future, as HIT supports care delivery, it will be important for CIOs to have a clinical and a healthcare management background. Alternatively, the CIO may need a medical information officer to serve on the HIT team as a liaison with clinical healthcare delivery.

Organization of the HIT Department

The organizational structure of the HIT department should be guided by the institution's strategic objectives or plans and HIT strategic plan (see Chapter 5). Thus, the CIO must be aware of where she fits into the broader organizational framework and how best to structure the internal operating responsibilities. With respect to reporting relations, the pervasive nature of HIT management and the key role HIT leaders and managers play in achieving the organization's strategic initiatives suggest that the CIO should report directly to the CEO. Despite this seeming necessity, data from the Scottsdale Institute and HIMSS Analytics (2005, Figure 2) publication suggested that only a little more than a third (37 percent) of CIOs reported to their CEO, and an almost equal percentage (38 percent) reported to the head of finance or the CFO. The remainder of the CIO respondents reported to a COO, a CMO, or another senior executive. Today, however, the CIO has a somewhat different reporting relationship (Gamble 2012). In a recent survey, 38.2 percent of CIO respondents said they report to the CEO, 17.6 percent report to the COO, and 26.4 percent report to the CFO. The remaining 17.8 percent report to the CMO, chief innovation officer, board of directors, or other leaders.

As mentioned, the CIO oversees a broad range of functions, so the organizational chart must be sufficiently complex to fully capture that scope of responsibility. Organizations have not standardized the range of services reporting to the CIO; thus, organizational charts look different from one

institution to the next. The size and complexity of tasks to be carried out by a central HIT department are affected by a number of factors, including the following:

- Degree of centralization or distribution of computer systems throughout the organization
- Use of in-house developed systems
- Use of packaged software or contracts with application service providers
- Extent to which functions/tasks are outsourced to contractors

Despite this variety in organizational approaches, a fairly typical HIT department organizational chart for a large hospital or system can be presented (see Exhibit 4.5). In this case, the complexity of the large organization often necessitates a chief medical information officer (CMIO) taking responsibility for the structured relations between HIT and the clinical staff. In 2012, 36 percent of survey respondents indicated that they employ a CMIO (HIMSS 2012a, Figure 14). In a small system, such as a single hospital or medical center, the CMIO function might still exist, but often the organizational chart looks like the one shown in Exhibit 4.6. In this scenario, the information systems operations manager—along with the directors of management engineering, telecommunications, and health information management—reports to the CIO. In large healthcare organizations and systems, these division directors often have substantial staffs, whereas in midsize organizations, a single person might occupy two or three of these functional positions as well as fill other job responsibilities. In small facilities, one staffer might be responsible for all of these functions. No matter who fulfills the position, the CIO and related functions do exist.

EXHIBIT 4.5
Organizational
Chart of an HIT
Department
in a Large
Organization

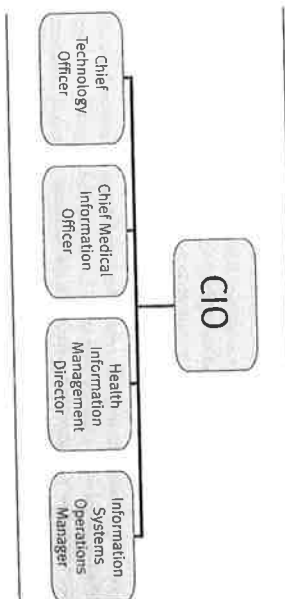
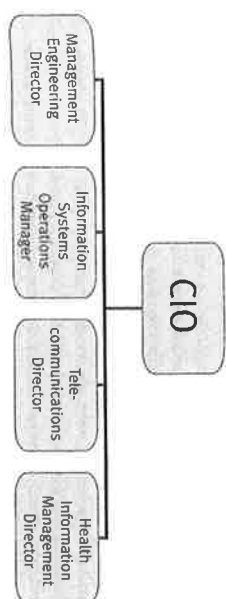
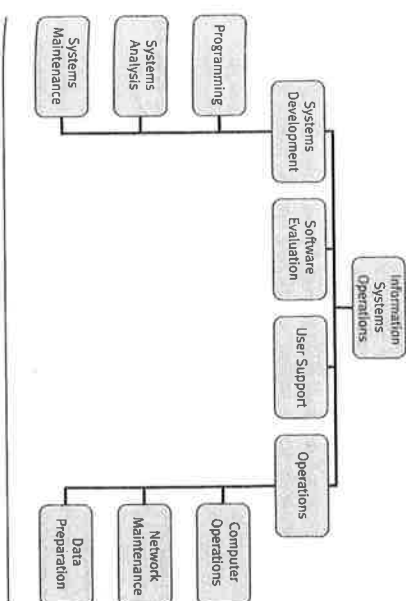


EXHIBIT 4.6
Organizational
Chart of an HIT
Department
in a Small
Organization



Looking further into the organizational structure of the HIT department reveals that, beyond the first level of reporting relations, it has even more layers. Exhibit 4.7 depicts the chart of an information systems operations division. Such a division typically consists of four major components: systems development, software evaluation, user support, and operations. Professional staff members in systems development are responsible for system design and implementation, and the systems development unit is itself organized into three main sections: programming, systems analysis, and systems maintenance. The software evaluation group is responsible for evaluating

EXHIBIT 4.7
Organizational
Chart of the
Information
Systems Operations
Division



software systems in the health applications area, for reviewing and approving all hardware and software acquisitions proposed by user departments, and for providing technical support on software utilization. The user support unit operates a help desk that users can contact for hardware and software assistance. Finally, the operations division is in charge of computer operations, network maintenance, and data preparation.

The general organization of HIT departments may vary, but data are available that support the specific structure presented here. The Scottsdale Institute and HIMSS Analytics (2005, Figure 7), publication, for example, indicated that 71 percent of HIT departments had telecommunications, 18 percent had health information management, and 9 percent had biomedical engineering staffs. These numbers grew by 2012: HIMSS survey respondents reported that 80 percent of HIT department have telecommunications, 28 percent have health information management, and 22 percent have biomedical engineering (HIMSS 2012a, figure 29).

Aside from this typical organizational structure, two other characteristics are important to note, according to Scottsdale Institute and HIMSS Analytics (2005):

1. Most organizations (85 percent) reported having an HIT steering committee. The role of this committee is to provide strategic direction for information systems decisions. Specifically, it tends to provide strategic approval (89 percent) for HIT decisions, be involved in budgetary decisions (65 percent), and play a role in vendor selection (30 percent). The committee is generally viewed as something that improves HIT operational and strategic effectiveness and that links the HIT department to potential and actual end users; small organizations are less likely to have this linkage function.
2. In many organizations, some HIT staff report to directors of other departments (outside of HIT) and not directly to the CIO. For example, in the Scottsdale Institute and HIMSS Analytics report, 40 percent of survey respondents indicated that none of their staff reported outside of the HIT department, 40 percent had staff reporting to laboratory departments, 35 percent had staff reporting to the radiology department, and 25 percent had staff reporting to the pharmacy department. This complexity necessitates a leadership and governance model that promotes coordination, standards, and efficiency.

Staffing of the HIT Department

Given the organizational structure and responsibilities of the HIT department, each section must be staffed. Selecting the individuals with the necessary skills and expertise is the next task of the CIO. Even the best structure

cannot be successful without optimal staffing. Naturally, from the CIO's perspective, matching the skills and expertise of direct reports to their areas of responsibility is most important, but staff selection and assignment as well as other staffing decisions should be based on the design of the HIT unit. Generally, the directors or managers reporting to the CIO should have more technical and operational knowledge, experience, and expertise in their assigned areas than the CIO. Leadership must be able to count on these individuals to plan, design, and implement the best technology solutions for their area. For example, the health information management division should be headed by an experienced and certified registered health information administrator with broad knowledge of information flow and electronic health record (EHR) systems.

As a rule, three levels of personnel must be recruited to staff an HIT department: professional, technical, and clerical. Professional-level staff includes systems analysts and computer programmers. Although finding talented persons who can fill both roles is possible, care must be exercised in not conflating the two positions. Systems analysis requires broad-based skills that computer programmers often do not possess. It is a highly creative process best performed by someone with both technical prowess and organizational insight. Because most systems are complex and involve substantial human-machine interaction, the systems analyst must be able to deal effectively with people and understand how the organization carries out its mission. On the other hand, programmers typically have a narrower orientation and are skilled in the technical tasks of software development and maintenance. Programming requirements are changing. As healthcare organizations move toward the implementation of client/server architecture, network programmers are largely replacing those who used to write and maintain large programs for mainframe computers.

Technical-level personnel operate the computers and maintain the communications network. An experienced technical manager, reporting to the CIO, should head the information systems operations divisions. The manager must have up-to-date knowledge of the technical aspects of systems analysis, computer programming, hardware and software, networks, and systems maintenance, just to name a few responsibilities (see Exhibit 4.7). The manager must be willing to spend the time and effort necessary to stay abreast of the latest trends and upgrades in a rapidly changing field. In addition, the manager must be an experienced financial manager and must be skilled in interpersonal relations. Skilled network managers are highly trained and are often in short supply. The information systems operations supervisor must be both a skilled technician and an effective manager. Similarly, equipment maintenance is handled by technical-level staff. These technicians are typically employed by the vendor and supply periodic preventive maintenance

and emergency repairs on call (see the section on outsourcing later in this chapter).

Clerical-level staff members are those who provide administrative support throughout the HIT department. Two primary factors have driven the need for well-trained HIT clerical staff, as is true for most other parts of the organization. First, the monitoring, control, and reporting requirements for HIT have expanded as privacy, security, and other regulatory requirements have become more stringent. Second, HIT leadership and technical staff are now becoming integrated into the broader healthcare system, so clerical staff have had to help these professionals plan, schedule, and support internal and external meetings and initiatives.

The approach to organizing and staffing the HIT department depends on the complexity of the organization. For example, an integrated delivery system composed of multiple facilities is much more complex than a single facility, requiring a larger and more intricate HIT function. Further, as a matter of culture, some systems are highly centralized, with all software development carried out by a corporate information technology staff. In other, less complex systems, more responsibility may be delegated to operational units. Whatever the approach, the organizational structure must facilitate electronic information exchange across the enterprise (DeFord and Porter 2005).

Staffing for HIT has grown rapidly in recent years, a trend that appears will continue in the foreseeable future. Most respondents (61 percent) to the HIMSS (2012a) CIO survey indicated their staffing would grow in the next 12 months. Of the types of staff most in demand, clinical application support was cited by 43 percent of respondents to have the greatest need, followed by network and architecture support (22 percent). Other growth areas include clinical informatics (20 percent), system integration (17 percent), IT security (14 percent), and clinical transformation (13 percent). In total, 32 percent of respondents indicated no change in their HIT staffing in the coming year, and only 5 percent indicated a likely decrease in staffing.

Budgeting the HIT Department

Budgets for HIT are increasing, but they remain low both in absolute terms and relative to similar spending in other industries (Salkever 2004). In a 2006 HIMSS survey, 54 percent of respondents indicated that their organization spent 2.5 percent or less of their operating budget on HIT, and 14 percent indicated that they spent more than 3.5 percent on HIT. In the same survey, more than 70 percent of CIOs indicated that their HIT spending would increase in the coming year (HIMSS 2006a); this corresponded closely with responses in the HIMSS surveys from previous years. In the 2012 survey, 56 percent of respondents indicated that their operating budgets would *definitely* increase and 19 percent forecasted that their operating budgets would

probably increase (HIMSS 2012a, Figure 30). The four top reasons for budget growth were overall IT systems growth (68 percent), additional staffing needs (57 percent), overall budget increases (43 percent), and compliance with regulatory changes (43 percent) (HIMSS 2012a, Figure 31). These are in contrast to reasons given by survey respondents in the past—namely, growth in the number of systems and technologies (80 percent), alignment between the long-term HIT and organizational strategic plans (48 percent), and an overall budget increase (41 percent) (HIMSS 2006a).

The budget increases for HIT are likely to continue as workforce shortages drive labor costs up and as technology advancements lead to more opportunities for expanded and enhanced services. Despite the emphasis on hardware and software, however, labor costs continue to be the key driver of HIT costs. Exhibit 4.8 presents the average and median salaries for CIOs overall, for CIOs in various work settings, for CIOs with different educational training, and for CIOs working in different regions of the country. As

Category	Average Salary, 2012	EXHIBIT 4.8 Salary for CIO by Type of Organization, Education, and Region, 2012
Overall	\$208,417	
Type of Organization		
CIO—Multihospital/IDN	\$254,054	
CIO—Standalone hospital	\$178,786	
CIO—Academic health center	\$243,229	
CIO—Hospital/clinic	\$187,440	
CIO—Critical access hospital	\$125,573	
Education/Degree		
MD	\$306,000	
PhD	\$230,714	
Master's degree	\$213,705	
Bachelor's degree	\$194,473	
Associate's degree	\$175,250	
High school diploma	\$140,675	
Region		
Pacific	\$232,181	
New England	\$217,533	
East South Central	\$213,341	
East North Central	\$212,118	
Middle Atlantic	\$211,939	
West North Central	\$209,412	
Mountain	\$191,076	
South Atlantic	\$186,802	
West South Central	\$186,429	

SOURCE: Data from CHIME (2013).

shown in the exhibit, the “average” CIO in all settings made about \$208,000 in 2012—up from \$151,000 in 2006 (CHIME 2013; HIMSS 2006b). The size and complexity of the organization influenced CIO salary in 2012: CIOs in multihospital systems made more than \$254,000, CIOs in standalone hospitals made \$179,000, and CIOs in critical access hospitals made \$126,000. Similarly, education and geographic location had an effect on a CIO’s average salary. A CIO with an MD made \$306,000 on average, while one with a high school diploma earned \$141,000. CIOs living and working in the Pacific region (Washington, Oregon, California, Alaska, and Hawaii) were paid an average of \$232,000 per year, while those located in the West South Central Region (Texas, Oklahoma, Arkansas, and Louisiana) received a \$186,000 annual salary.

Outsourcing and Multisourcing HIT Functions

Many healthcare organizations are considering outsourcing portions of their HIT functions as an alternative to in-house staffing. The decision to outsource entails purchasing (or *buy*) the services from an external vendor or a contractor rather than hiring the staff and producing (or *make*) the service in-house. This make–buy decision must be seriously considered as the complexity of HIT increases. Traditionally, the term *outsourcing* has been associated with a contract for facilities management. More recently, however, the term is used in a broader context to denote contracting with the best-qualified company to meet a specific information systems objective. This may involve *multisourcing* to a number of different vendors as well as outsourcing to a single vendor.

Some of the major potential benefits of outsourcing include the following:

1. Reduction of in-house staffing requirements
2. Smaller investment in capital equipment
3. More flexibility in meeting changing requirements and adopting new technology
4. Reduction in the time required to implement new applications
5. More predictable cost structure, particularly if fixed-price contracting is employed

Outsourcing is not without potential dangers and risks to the organization and to the CIO leading the outsourcing initiatives; they include the following:

1. Heavy dependence on vendors, with the possibility that a critical contractor might go bankrupt or change business direction
2. High costs associated with vendor fees and profit structure
3. Employment of contractors who do not understand the operation and culture of healthcare organizations

Hensley (1997) describes some of the principles to follow in outsourcing. He emphasizes the importance of weighing the cultural fit with the vendor; suggests that outsourcing be part of a long-term strategy (not just a quick fix); and recommends good reference checking, looking for staying power among vendors being considered. Further, Hensley states that healthcare organizations should not outsource the things they do best, should not become obsessed with short-term savings, and should not negotiate such favorable terms in a contract that a business partner is put out of business.

Waymack (2000) offers the following four suggestions for selecting outsourcing firms:

1. Seek long-term commitments, because the costs of switching vendors can be substantial.
2. Require relevant experience with the specific service to be outsourced.
3. Develop performance measures for selection on the basis of the services to be outsourced.
4. Do not base evaluation solely on the lowest bid.

From the broader business perspective, many back-office functions are commonly outsourced. For example, Hall (2007) reports that more than two of three firms engage in some form of business process outsourcing. His study examined accounts receivable specifically and found five key arguments for outsourcing:

1. *Borrow time.* Contrary to the general expectation, outsourcing does not reduce costs but may generate increased recoveries. This is the primary reason to outsource accounts receivable.
2. *Expertise.* Because an outsourcing firm’s core business is the function for which it is hired/contracted to do, its staff members have great expertise in that specific function and the organization that hires the firm is likely to achieve excellence.
3. *Technology.* Similarly, the outsourcing firm employs the most current technology, which often leads to better outcomes. Because this technology typically requires substantial investment, the firm has technology-based cost advantages.

4. *Consistency.* A dedicated staff in the outsourcing firm follows up on invoices in a timely and professional manner.
5. *Core business focus.* By outsourcing an important but noncore business or process, the organization is free to concentrate on its core business.

Similarly, Menachemi and colleagues (2005) report systematically on the nature and extent of outsourcing by urban or rural status, ownership (not-for-profit or for-profit), organization size, system affiliation, CIO reporting relationship, and information technology strategy value. They also report outsourcing rates for a number of specific HIT functions in six broad categories. These categories, along with examples of function and reported outsourcing rates, are as follows:

1. Development/integration: applications development, 11.3 percent
2. Staffing: CIO, 14.4 percent
3. Operations/management: personal computer support, 15.5 percent
4. Employee support and training: help desk, 6.2 percent
5. Applications and services: transcriptions, 51.5 percent
6. Web-related: e-business, 4.1 percent

A survey by Waller, Rubenstunk, and Hallenbeck (2010) reveals the top three reasons for outsourcing HIT services, according to survey respondents:

1. Expertise of vendor (90 percent)
2. Cost savings (65 percent)
3. New service (9 percent)

In addition, between 27 percent and 34 percent of respondents indicated that they outsource EMR, patient surveys, and the help desk function. *Modern Healthcare* magazine conducts an outsourcing survey as well. The top outsourcing firms, based on size of the client base, reported a 13 percent gain in the number of clients in 2011 (Kauscher 2012). However, information technology ranked seventh in terms of money spent by organizations on outsourcing.

Many examples of outsourcing can be found, all with direct application to a particular type of information technology. Specific examples of successful outsourcing experiences are numerous, but they generally come from the testimonials posted on vendor websites. However, one organization that received recognition was Mercy Hospital in Chicago. Mercy outsourced

an array of information systems to a vendor, leading HIMSS to recognize the hospital's efforts to modernize its medical information systems (Mercy Hospital 2009). Similarly, Jefferson Regional Medical Center in Pittsburgh worked with Siemens Medical Solutions to fulfill its strategic goal of bringing "medical excellence closer to home" (Siemens Medical Solutions 2005, 1). For Jefferson, this goal meant reducing costs and enhancing its quality reputation. Information technology was targeted as the vehicle to implement the goal, and the decision to outsource HIT was integral to achieving it. Jefferson employed a CIO to manage the Siemens outsourcing relationship. Their joint vision was that HIT should always deliver appropriate technology and resources to meet the hospital's strategic goals.

This outsourcing collaboration yielded many positive results, some of which are as follows:

- The decision support and managed care recovery unit recovered \$1 million in revenue in 16 months through the use of Siemens Contract Management System.
- This unit recovered an additional \$400,000 in charges in 16 months by correcting clinical documentation issues concerning comorbidity conditions prior to patient discharge.
- Jefferson's accounting department worked with HIT to automate employee time reporting and management to reduce payroll department staff by half while improving manager online reporting capacity.

This successful outsourcing experience led to plans for other joint efforts, including providing personal digital assistants (PDAs) for physicians that would allow physicians to access patient information from their PDAs throughout the hospital.

Results of the CIO portion of the *Seventeenth Annual HIMSS Leadership Survey* indicated that 38 percent of the organizations responding to the survey outsourced the development and maintenance of their websites, 33 percent outsourced dictation and transcription services, 19 percent outsourced applications development, 19 percent outsourced project management, 18 percent outsourced both the help desk function and database management, and 17 percent outsourced telecommunications (HIMSS 2006a). Interestingly, these numbers were similar to those in previous years, except that outsourcing personal computer support, network operations support, and technical support did not make the 2006 list, and dictation and transcription was new to the outsourcing list in 2006. Twenty-nine percent of respondents indicated that they did not outsource any HIT functions.

Evolving Role of the Senior HIT Executive

Looking into the future of HIT and the role of the HIT executive is an exercise filled with uncertainty. A number of analysts have carefully considered the role that advancements in HIT are likely to have on the organization of health delivery entities. Brynjolfsson and Hitt (2000) and Oliner and Siechel (2000), among others, examine the relationship of technology and productivity growth. They find that organizational change is needed to capture the potential to which computers and other technology offer support. Without fundamental changes in the ability of managers to "invent new processes, procedures and organizational structures that leverage this capability" (Brynjolfsson and Hitt 2000, 24), the gains from increased HIT spending may not be realized. The CIO is at the center of the changing role of HIT and its potential impact on healthcare delivery.

In the 2005 HIMSS *Annual Report of the US Hospital IT Market*, the following key challenges emerged:

- Underinvestment in HIT
- Need to replace technologies and applications
- Interoperability of applications and systems
- Integration of ambulatory systems
- HIT financial accountability

By 2012, participants in the *23rd Annual HIMSS Leadership Survey* listed a more future-oriented set of priorities (HIMSS 2012a):

- *Achieving meaningful use.* In 2012, 38 percent of respondents identified that achieving meaningful use for their institution is their principal priority. This percentage is somewhat lower than that for 2011, but it indicates that this challenge continues to be a major concern for HIT leaders. Twenty-six percent of respondents reported having accomplished Stage 1 of meaningful use, and almost half expect to complete attestation during 2012; another 17 percent have plans in place for 2013.
- *Developing clinical systems.* These systems refer to EHR, e-prescribing, and computerized physician order entry (CPOE). In total, 15 percent of respondents indicated that development of these systems is a priority.
- *Leveraging information.* Cited by 13 percent of respondents, the effective use of clinical and administrative data for decision making is the third priority. Together, data mining, evidenced-based medicine, and

clinical decision support techniques have increased in importance for HIT leadership.

- *Optimizing current systems.* Making the best use of as well as effectively operating the systems currently installed is a concern for 12 percent of respondents. The proliferation of applications in particular raises questions about how to get these features and functions to work in an optimal fashion as intended and to deliver the best results.
- *Preparing for ICD-10.* This priority was cited by 11 percent of respondents. It communicates the need to complete the preparation for the conversion to the ICD-10 clinical coding system.

Specific business issues faced by senior executives in healthcare HIT have remained essentially the same from year to year in recent years. In 2006, the HIMSS survey indicated that customer satisfaction, Medicare cutbacks, reducing medical errors, and cost pressures were the four top business priorities of information technology executives; all of these priorities were also at or near the top in the 2005 survey. New to the 2006 survey was a fifth concern: interoperability. By 2012, 40 percent of the HIMSS survey respondents cited healthcare reform as the top priority, and 23 percent named policy mandates (often related to reform). The next two concerns were financial considerations (cited by 14 percent) and health information exchange (cited by 5 percent) (HIMSS 2012a, Figure 11).

The Expanded CIO Role

In discussing the changing role of healthcare CIOs, Wood (2000, 81) states, "In the past, chief information officers were responsible for nothing else but assuring a constant flow of information. Today, they are being asked to do a great deal more. From E-business to E-health strategy, the chief information officer is the focal point of an organization's ability to leverage new technology." The CIO role has expanded since Wood made this statement, with the explosion of concern about healthcare quality, cost pressure, efficiency concerns due to labor shortages, and other constraints. CIOs have emphasized their strategic role rather than their technical management role (Morrissey 1996). The complicating and often unmentioned point is that the CIO position is usually not the first job that a person holds out of college. Most CIOs started their career in intermediate-level positions and, if successful, rose to the CIO position. The initial jobs can be in the information systems/information technology areas or can be outside of this domain entirely. CIOs may come from medicine, nursing, or other clinical/administrative areas. The prior jobs, especially in information systems/information technology, laid by a candidate for a CIO role do require the individual to have technical or data management skills to be successful. In other words, a CIO does not need the

technical skills to perform the CIO job but may be required to have those skills and experiences to get that executive position.

Realize that today's CIO no longer just manages one of many operating units within a healthcare organization. The person also must look beyond HIT and engage in significant strategic thinking on behalf of the unit as well as the entire organization. The broad classifications of CIO activities serve or are accountable to the following three distinct interest groups:

1. *Uprward.* The CEO and/or the board rely on the CIO to assist in strategic and operational planning for the organization as a whole by supporting enterprisewide planning. This is a future-looking role, which is, by nature, strategic. However, they also require the CIO to effectively manage data quality, security, privacy, and integrity to comply with a growing array of government regulations, such as the *Sarbanes-Oxley Act of 2002*, *Health Insurance Portability and Accountability Act of 1996* as modified by the *Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009*, and the *Patient Protection and Affordable Care Act of 2010*.
2. *Horizontally.* Executive leaders throughout the hospital—such as the CEO, CMO, and chief nursing officer—also rely on and work closely with the CIO to improve their respective department's data collection, storage, analysis, and reporting.
3. *Internally.* The CIO must be able to effectively manage the information technology business unit.

The Scottsdale Institute and HIMSS Analytics (2005) report suggested that less than half of respondents to a survey indicated that the CIO was facilitating HIT-related discussions with the board. More often, the report stated, the CEO or another senior executive had responsibility for board discussions related to information technology. This trend is not consistent or incongruent with the growing role and responsibility of the CIO today, and it (partly) contributes to the uncertainty of the future of the CIO. For example, the *Sarbanes-Oxley Act* reporting requirements may have shifted the responsibility of data integrity away from the CIO and back to the CFO. With that responsibility, CFOs may want to control the data warehousing and data management functions more closely. Furthermore, Schwartz (2005) suggested that the CIO as a title will disappear; in the future, functions under the CIO's domain may report to the CFO.

In addition, greater board involvement in information technology is likely. In 2005, 56 percent of healthcare organization boards approved budgets, and only 39 percent approved specific systems projects (Scottsdale Institute and HIMSS Analytics 2005). Given the central role of HIT systems

in influencing healthcare quality and organizational competitiveness, boards will likely be more involved in HIT decisions in the future.

Today, the future remains uncertain; thus, the CIO and other HIT leaders must maintain vigilance to ensure continued success. Many key issues must be considered, and HIMSS Analytics (2012a) and other publications offer a guide to regularly monitoring a few of the current priorities:

- *Revenue cycle management.* A number of features on the horizon will affect this vital organizational function. Examples of those that pose significant demands on HIT include recovery audit contractor requirements for key audit data, bundled payment and value-based purchasing, patient eligibility and authorization transactions for accountable care organizations, and ICD-10 encoding upgrades.
- *Healthcare information exchanges (HIEs).* These are a buzzword now, although their existence seems to not have a strong business case. They require coordination for smooth transfer to and from unrelated organizations that pose major threats. In 2012, 55 percent of surveyed leaders indicated that they participate in an HIE (HIMSS 2012a, Figure 18).
- *Patient Protection and Affordable Care Act.* This legislation poses a host of challenges, the most important of which is great uncertainty. The US Supreme Court helped move it forward to some extent, by ruling that the act is fundamentally constitutional because the most contentious portion of the law—the individual mandate—is a tax. After all, the federal government has the authority to tax. However, the Supreme Court ruled that the federal government cannot force states to expand Medicaid coverage to 133 percent of the poverty level as the legislation proposed. This ruling enables individual states to opt out of Medicaid expansion if they so chose. As such, state participation in this aspect of the act varies.
- *Interoperability.* Discussed later in the chapter, interoperability is still a dream because of the lack of standards. The implications are that standards are likely to add demands on HIT leadership.

Priorities for Application Development

Reduction of medical errors and enhancement of patient safety will continue to be “hot issues” among government agencies and private consumer organizations. To that end, the Leapfrog Group (2007), a consortium of major purchasers of healthcare, expanded its efforts to reduce preventable medical mistakes. Chapter 9 addresses computerized physician order entry as

a technique to reduce medication errors in hospitals. Emphasis on the development of computer-based records will continue and will likely be placed on information systems that can support evidence-based medicine and disease management programs.

Communications between patients and providers, facilitated by the Internet, will expand in the next ten years. Armed with information obtained online, patients will participate more fully in decisions about their care. Home-based monitoring systems will become more common and will help to reduce the need for repeated outpatient visits and to delay or defer the need for inpatient care.

Recemphas on the use of HIT for strategic decision support is likely in the next few years as well. This topic received considerable attention in the early 1990s but was sidetracked by data-conversion concerns in anticipation of the year 2000 (Y2K hype) and then further put off as components of the Health Insurance Portability and Accountability Act were implemented.

System Communications and Interfaces

Developing efficient communications among and between computer applications on an enterprise-wide basis continues to be problematic for many healthcare organizations. As mentioned earlier in this chapter, management audits conducted by senior managers in ten major healthcare organizations revealed that "most organizations reported concern about this issue [system integration] and stated that they were working toward a solution" (Austin, Hornberger, and Shmerling 2000, 235).

Some organizations continue to have problems in obtaining meaningful data from transaction-processing systems to use in decision support and management studies. More emphasis on process reengineering during systems analysis and selection could help to improve the situation. This ongoing problem has now been clearly identified and labeled as *interoperability*. As seen in Chapter 1, to improve, care delivery systems must work together within and across organizations. HIMSS Analytics (2005) adopted a definition of interoperability as the ability of HIT to work together within and across organizational boundaries to advance the effective delivery of health care for individuals and communities. Naturally, this is complex in concept and application. The National Alliance for Health Information Technology (2007) endorsed four levels of interoperability with different technical specifications and containing varied organizational implications, as defined by Walker and colleagues (2005):

1. *Nonelectronic data*. Sharing information does not include any use of information technology and thus relies on conventional phone service.

2. *Machine-transmittable data*. Sharing information uses generally available information technology, but that information has not necessarily been standardized and thus cannot be manipulated. This transmission relies on fax transmission or sharing of portable document format (or PDF) files only.

3. *Machine-organizable data*. Sharing information uses electronic information technology, but the messages are generally not fully standardized. Data received must be modified by programs (interfaces) that help the receiver understand the data's meaning. This transmission might consist of sharing of files stored in incompatible formats.

4. *Machine-interpretable data*. Sharing information uses electronic information technology, but the information has been fully standardized in terms of format and vocabulary. This transmission might include coded information from a lab to the receiver's EMR.

Because of this interest, investigators are looking to assess the value of information exchange, which depends on interoperability. The Center for Information Technology Leadership assessed the expected net value of electronic data transactions using the New York State HIE model. It concentrated on measuring the value from clinical encounters among hospitals, medical group practices, and other providers and among major payers, laboratories, pharmacies, and other key stakeholders. The model assumes a full transition to computer-linked data exchange of standardized information, and the measurement was conducted over a ten-year implementation period. The center estimated a net value of electronic data transactions of 3.3 percent of total health expenditures in the state in 2003—or about \$4.54 billion (Hook et al. 2006).

At this point, the challenge of interoperability—at least for hospitals—appears to have declined. Only 4 percent of respondents to the HIMSS 2012 survey reported that interoperability is a barrier to implementing systems (HIMSS 2012a, Figure 12), making interoperability the ninth item on a list of barriers for HIT leaders.

Advances in Technology

Technology will continue to improve and will offer new opportunities for healthcare organizations during the next ten years. The most frequently identified technologies cited by respondents to a HIMSS Analytics (2005) survey were sign-on/identity management technology, barcoding technology, speech recognition, and PDAs. By the 2012 HIMSS survey, a question about advances in technology was not even addressed. The HITTECH Act has changed the landscape of CIO priorities, making adoption of EHR and implementation of systems to meet meaningful use requirements the central

focus. The 2012 survey included specific issues related to the HITTECH Act, such as meaningful use, HIE, and information privacy and security. Although the emerging technologies mentioned in the 2005 survey have not gone away, they are deemed less pressing by HIT leaders who are dedicating their efforts to current demands. For the CIO and other HIT leaders, the prospect of mastering existing technologies—much less forecasting the next innovation—remains overwhelming. Successful leaders will need to maintain a high level of awareness, be flexible to adapt and adopt, and become continuous learners.

Other Challenges

The evolving role of the CIO will face myriad challenges in the near future. In addition to those discussed above, survey information suggests the following key priorities to consider (HIMSS 2012a):

- **Security concerns.** Internal breaches of security continue to be the primary security concern, with 13 percent of HIT leadership experiencing a security breach in the last six months and 22 percent in the previous year.
- **Remote access to online patient information.** HIT leadership reported that 97 percent of physicians, 60 percent of nurses, 59 percent of other clinical professionals, and 67 percent of nonclinical staff have access to patient information online. In addition, 23 percent reported that patients in their organization have this access.
- **Meaningful use.** Few (26 percent) CIOs claimed they have already attested to Stage 1 meaningful use, and by the end of 2012, another 49 percent expected to attest.

Summary

This chapter discusses the leadership, human resources, and management expertise required to make effective use of HIT infrastructure in healthcare organizations. The organizational position of the CIO has evolved over the years and is now a separate, executive-level role. This elevation is due to the growing importance of clinical systems, regulatory reporting requirements, and the use of information in strategic planning and decision support.

Today, the CIO generally reports directly to the CEO, primarily assists the senior leadership team in using information effectively, and provides management of information processing and telecommunications in the organization. The required skills of the CIO include enterprise-wide planning,

leadership, management oversight, human resource management, and financial management.

The HIT department's organization has also evolved over the years. Generally, managers in management engineering, information systems operations, communications, and health information management report directly to the CIO. However, this department varies widely by size and complexity of the organization. In large, complex organizations, the chief technology officer and chief medical information officer roles may exist. Most HIT departments have a steering committee to assist in providing strategic direction. One added complexity of the CIO role is that many organizations have information systems staff members who report to operational units outside of the HIT department.

The evolving role of HIT will force the CIO to work upward with the CEO and board, horizontally with other hospital leaders, and internally to manage the HIT business unit. The functions and roles outlined for HIT leadership exist even in small organizations that do not have individuals with those assigned tasks. The functions must be managed in small institutions as in large organizations, but individuals with other non-HIT roles often assume the responsibilities for these functions.

Key priorities for application development in the coming years include systems communications and interfaces, advances in technology, security concerns, and website use.

Web Resources

A number of organizations (through their websites) provide more information on the topics discussed in this chapter:

- American College of Healthcare Information Administrators (ACHIA; www.aachia.org/Collages/ACHIA/healthcareinformation.html). A subunit of the American Academy of Medical Administrators, ACHIA is a personal membership organization for information managers with special focus on continuing education and research in healthcare information administration.
- American Health Information Management Association (AHIMA; www.ahima.org). AHIMA is a personal membership organization of information professionals who specialize in the utilization and management of clinical information.
- American Medical Informatics Association (AMIA; www.amia.org). The term *medical informatics* is used to describe the science of

storage, retrieval, and optimal use of biomedical information for problem solving and medical decision making. **AMIA** is a personal membership organization of professionals interested in computer applications in biomedicine.

- **Applied Health Informatics Learning and Assessment** (www.nhi.ca/hi/). This comprehensive website details the competencies necessary for CIOs and other HIT leadership. Here, you can view the challenge faced by the CIO or other leader, a detail of the micro roles necessary to meet that challenge, an assessment of the importance of this challenge/role, and even suggestions for how to gain the experience necessary for the role. See www.nhi.ca/hi/ahimicroroles.php?id=1&MenuID=5.

- **College of Healthcare Information Management Executives (CHIME; www.cio-chime.org)**. CHIME is a personal membership organization of CIOs in the healthcare field. CHIME provides professional development and networking opportunities for its members.
- **Healthcare Information and Management Systems Society (HIMSS; www.himss.org)**. HIMSS is a personal membership organization representing professionals in clinical systems, information systems, management engineering, and telecommunications. HIMSS provides professional development opportunities to its members through publications and educational programs.
- **Health Information Technology and Quality Improvement, Health Resources and Services Administration, US Department of Health and Human Services** (www.hrsa.gov/healthit/index.html). This is a rich website for information, fundamental data, research studies, and manpower assessments related to HIT.

Discussion Questions

1. Why is healthcare/clinical experience more important for healthcare CIOs today than in past years?
2. What factors can increase the size and complexity of the HIT organizational structure?
3. An HIT steering committee is used in most healthcare organizations to make strategic and budgetary decisions. Do you consider the steering committee to be a good design? Why or why not?
4. Why is demand increasing for HIT staffing?

5. Compare the roles/functions and the average salary of a CIO with that of other HIT personnel. Are the roles complementary or substitutes? Can you justify the salary differences?
6. Do the benefits of outsourcing outweigh the risks? Order the highly ranked outsourced services from riskiest to least risky, and explain your rationale for the decision.
7. Based on the changing roles of CIOs, do you agree or disagree with Schwartz (2005) that the role of CIO will disappear?
8. Why is system integration such an important topic in HIT?
9. Several priorities for application development are listed in the chapter. Can HIT assist in any other important priorities?