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Developing an Emergency Department Information System

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It was the summer of 1997 when executive leadership and managers from the emergency department (ED) and the informatics center first teamed up to contemplate implementing an information system to support clinical processes and administrative functions in the ED. Three years later, the same group, with a few new members, by then called the emergency department information system (EDIS) team, abandoned its efforts to purchase an off-the-shelf solution and commissioned the development of a set of custom interfaces to the institution's multitude of existing applications. After two more years, the most central and publicly visible of these components, the electronic whiteboard (eWB), successfully passed its first uninterrupted overnight usability test. After more than 5 years of effort, the passage of this milestone marked a long overdue win for the EDIS team.

Although the project achieved its stated objectives, why had it taken so long? What, if anything, could have been done differently to speed up the process? More importantly, what could be learned from this experience to facilitate other healthcare informatics projects in the future? To answer these questions, we examined the history of the development and implementation of the EDIS from its inception to the implementation of the eWB in September 2002. (See Table 7.1 for the EDIS project timeline.) Through interviews with key project participants, analysis of project documents, and discussions with other relevant stakeholders, it appears that the project was complicated and prolonged initially by the team's inability to find a suitable solution in the vendor marketplace and subsequently by delays associated with designing and rapid-prototyping a custom information system. In retrospect, it is also apparent that the project is best described not as one activity but two that occurred as separate phases marked by distinct differences in scope, approach, goal setting, leadership, and outcomes. This chapter presents the relevant history of each phase and traces the major distinctions between them that we believe show the lessons to be learned from the experience.

Early History of the EDIS Project

By the spring of 1997, service levels in the ED required serious attention. Foremost, wait times were well above industry benchmarks and patient satisfaction was low. Additionally, referring primary care providers consistently complained about poor notification while their patients were in the ED, and few were satisfied with the summary reports provided after discharge. Finally, according to an internal study, 76 percent of

TABLE 7.1. EDIS project timeline.

• July 1997—EDIS steering committee decides to investigate technology solutions to transform emergency department (ED) operations. • November and December 1997—External consultants conduct ED operational review.	1997	Phase I
• January 1998—ED considers piloting an application to replace transcription. • July 1998—Computerization work group produces request for information entitled "Functional Requirements for Patient Tracking System" for circulation to vendors. • July 1998—EDIS team begins investigating vendors of off-the-shelf patient tracking system solutions.	1998	
• EDIS team continues investigating vendors of off-the-shelf patient tracking system solutions.	1999	
• March 2000—EDIS team holds kickoff meeting to discuss purpose, priorities, and issues related to implementing an information system in the ED. • September 2000—EDIS team decides to build an ED patient tracking system that integrates with existing information systems and identifies key functional requirements, proposed data flow, and action steps.	2000	
• January 2001—EDIS team presents data flow diagram for ED processes. • March 2001—Hospital administration approves budget to update network and install hardware in the adult and pediatric emergency departments for EDIS. • Spring 2001: 1. EDIS team gets new project manager with Informatics and ED experience. 2. EDIS team begins meeting with the ED staff weekly. 3. EDIS team presents prototype of an ED information system. • June 2001—EDIS team introduces Web cam to broadcast the dry-erase board to the registration area. • July 2001—EDIS team receives approval to hire a programmer/developer. • September 2001—EDIS team redesigns adult ED registration process by focusing on speed (rapid registration). • October 2001—EDIS team implements rapid registration process in the adult and pediatric EDs (including completing the installation of a wireless network). • Fall 2001: 1. EDIS team hires a programmer/developer to work on the Web-based EDIS as first priority. 2. EDIS team demonstrates early ED whiteboard prototype.	2001	Phase I
• March 2002—EDIS team completes early manual for ED whiteboard application and begins developing user training materials, including Web-based training tools. • April–May 2002: 1. EDIS team presents electronic whiteboard (eWb) Overview presentation to the ED and suggests a plan for a staged go-live, first using existing systems in tandem use, then without original marker board; includes documented contents to maintain and role-based responsibilities. 2. ED nurse educator, assistant managers, and managers conduct user training on the job. • September 19, 2002—eWB application completes first overnight operational usability test. • December 11, 2002—EDIS project manager produces first new reports on ED operational statistics for September, October, and November using EDIS.	2002	

the ED faculty and 58 percent of the ED nursing staff were dissatisfied with the existing technology resources that were in place to facilitate the clinical and administrative functions of the department.

In reaction to these issues, the EDIS steering committee convened a team of informatics and ED staff members (Table 7.2) on July 14, 1997, to discuss how information technology might be applied to ease the operational problems in the ED. The team,

TABLE 7.2. EDIS Team.

Emergency department (ED) representatives	Informatics department representatives
• Chair of the Department of Emergency Medicine[a] • ED administrative director[a] • Director of adult ED[a] • Director of pediatric ED • Manager of adult ED • Assistant manager of adult ED • Manager of pediatric ED • Assistant manager of pediatric ED • Director of admitting • Director of ED finances • ED nurse educator • Director of ED registration (added in 2001)	• Director of informatics center[a] • Members of the order entry application team • Members of the information systems support team • Chief technology officer • Chief information officer • Information services consultants (to serve as project managers until Spring 2001) • EDIS lead programmer/developer (since Fall 2001 • EDIS project manager** (informatics faculty; since Spring 2001)

[a] Member of the EDIS steering committee.

composed of representatives and executives from a broad number of hospital functions, immediately targeted what it identified as two separate problems. First, they brainstormed a preliminary list of features the department would require in a system to manage its information needs; and, second, the group hired a team of external consultants to conduct an operational review of the ED and recommend key changes to improve satisfaction and performance.

Over the course of November and December of 1997, external consultants interviewed a number of patients and staff and examined most of the department's core processes. In a February 1998 report, they highlighted five key factors that were negatively affecting the service environment in the ED. Specifically, they noted ambiguity among staff roles and a general lack of concern for patient or referring physician satisfaction. They also reported that staffing levels were not well matched to patient volumes, managers could not monitor occupancy levels efficiently in real time, and administration of the cross-function paper-based processes was highly cumbersome. They recommended that the department would benefit from service-oriented team-building exercises, focused discussions around job duties with respect to departmental responsibilities, and, as examined below, implementation of a suitable information system to measure and coordinate its activities.

Regarding the department's need for an information system, the consultants specifically noted that volatility in daily and sometimes hourly demand for emergency services often resulted in gaps between the number of patients waiting to be seen and the number of providers available to care for them. It was primarily these gaps that caused excessive wait times and, consequently, drove down patient satisfaction. However, gaps were compounded by the fact that department managers could not efficiently monitor and adapt to changes in occupancy. Rather, they could only rely on retrospective and time-consuming analysis of historical throughput metrics (admissions, discharges, etc.) for ex post facto guidance in staffing model planning. The right information management system, it was expected, would enable dynamic monitoring of waiting and care delivery areas. Monitoring data collected by the system, combined with rules-based condition triggers embedded in the software, could alert managers to react when something unusual happened, e.g., if, on a hypothetical Friday, demand peaked in the morning rush hour rather than as usual in the afternoon or early evening because of an accident on the nearby interstate.

In addition to the lack of real-time activity monitoring and staffing-level planning capabilities, the consultants observed that data collection for care delivery and administration required an unmanageable and often unorganized volume of paperwork. In fact, they observed, paper-based processes in the ED were so cumbersome that they were a major cause of dissatisfaction to all parties involved and a primary obstacle to preparing documents for referring physicians. Perhaps worse, some paperwork was the limiting factor in the speed of care delivery sequences. For example, in patient registration, lengthy forms had to be completed before triage could be performed—a major source of patient dissatisfaction. In addition, discharge summaries were challenging to create because information was stored in collections of charts and shadow charts throughout the care delivery process. An appropriate information system, it was thought, could reduce the paperwork onus by separating information collection activities from care delivery sequences. Such a resource would centralize information management and enable report production on demand.

With these findings in mind, the EDIS team began discussing possible information technology solutions. Because the institution had considerable experience with building its own clinical applications, the debate quickly centered around evaluating the classic "build-vs.-buy" decision. In many ways, however, these conversations were premature because the question of what to buy or build had never been completely clarified. Some favored implementing a patient tracking system and advocated scouring the marketplace for vendor solutions. Others with a broader interest began defining the feature set of a tool to meet a variety of the department's operational needs. As one might have expected, there were also a few who resisted the effort entirely, expecting that the ED physicians would never adopt such a system.

Eventually, because of the substantial patient satisfaction and care delivery issues associated with the department's long wait and throughput times, the team focused on acquiring a system for real-time activity monitoring and resource management. In what ultimately was a fateful choice, solving the paper-based process challenges became a secondary priority. Instead, the dominant vision became that of a patient tracking system that could be used to capture time-and-motion statistics that would help managers identify those situations when waiting areas grew full or process bottlenecks that needed to be addressed. They planned that ED nurses and staff would keep the system current by recording the time of each patient's check-in, triage, encounter, discharge, etc., and thereby the task of tracking patients through departmental areas would be accomplished. With this in mind, team members finalized their desired functional requirements for a tracking system by early July 1998 (Table 7.3) and began evaluating vendor solutions in late summer.

Despite a rather confident start, success did not come quickly. To the contrary, the group corresponded with almost a dozen vendors for the next 18 months and held numerous meetings to no avail. There were, in fact, major issues with the team's approach that complicated the project. Foremost, it proved impossible to find a system that could be cost-effectively integrated with the array of internally developed and continuously evolving applications already in use throughout the medical center. Although legacy system issues were common to similar information technology projects, they were particularly limiting in this circumstance because the environment was changing at a rapid pace of two or three major clinical application additions each year. Furthermore, the team eventually concluded that vendor dependency would reduce the organization's flexibility to implement software design changes in future versions. Because flexibility was particularly important in the context of such a dynamic

TABLE 7.3. EDIS design process results, July 1998.

Planned features	Expected benefits	Desired tracking statistics
• Computer-generated medical record automatically interfaced with hospital information system • Integrated hospital registration with insurance verification • Computer-generated triage note • Computer-maintained tracking board with automatic warning prompts • Computerized order entry • Computerized nursing notes • Automatic retrieval of laboratory and radiology results • Full electrocardiograph (ECG) recorded in record (not just interpretation) • Automatic coding of diagnosis • Support for continuous quality Improvement (CQI) initiatives • Built-in time out if user walks away from terminal • PIN identification for quick access • Prompts and flags based on preset parameters	• Increased revenue from lost charges • Reduction of emergency department (ED) paper-/form costs • Increased quality of medical information available to primary care providers • Reduced risk due to illegible or incomplete clinical or billing information • Improved use of nurse time • More efficient tracking of patients • Reduced length of stay (LOS) • Reduced patient elopement • Improved ability to retain staff • Improved relations with other hospitals • Increased availability of management reports with increased facility of reporting • Increased documentation of supplies utilized in care delivery for better reimbursement • Security and confidentiality protection to meet JCAHO requirements	• Time of arrival • Time of triage • Time to bed • Time of initial nurse assessment • Time of initial physician contact • Time of disposition decision (admit to hospital or treat and release) • Time of ED departure (discharged from ED or admitted to hospital

Source: Internal memoranda.

system environment, the team was reluctant to make any commitment to an external party.

Perhaps even worse, the market for ED information systems was in its infancy at the time. As such, the risk of losing flexibility for customization was not as significant as the risk of the chosen vendor not being able to maintain its customer service levels or even going out of business in the middle of the implementation. Although this default risk could have been managed through software contract provisions specifying source code escrow arrangements, the possibility of the project collapsing for reasons beyond the control of the team made it difficult to settle on a single vendor. Finally, in addition to the technical and business issues mentioned, more challenging perhaps was the vagueness of the notion of a patient tracking system and how it would integrate with emergency medicine operations. In the planned scenario, nurses and staff were expected to maintain the system in addition to their normal activities. Some feared that this model of patient tracking, with its additional administrative layer, would overtax an already burdened team and reduce satisfaction even further. As a result, documents show that in September 2000 the EDIS team abandoned its efforts to pursue an off-the-shelf solution and began planning to design and build its own system, an effort that would extend the project into the following spring when new leadership would arrive to carry it in a new direction.

Designing the EDIS

From a historical perspective, the spring of 2001 marked a new and second phase in the EDIS project timeline (Table 7.1). At the beginning of this period, the team restructured itself from a collaborative "system selection" team into a project manager–led "system design and development" work group. To mesh the design process with the department's operational realities, the team named a physician informaticist with previous experience in emergency medicine as the project manager and partnered this individual with the director of the adult ED (a practicing attending physician).

The project management duo began by making a number of strategic changes to the project's objective and scope, and they entirely reorganized the team's approach. Foremost, they focused the project on improving overall ED performance—addressing the operational issues identified in 1998—through process analysis and information needs assessment across all ED functions. This was a marked difference from the earlier goal of implementing an off-the-shelf patient tracking system. In fact, this new objective meant reevaluating a number of long-standing processes, many of which had been previously considered unalterable, to identify opportunities where information technology might help to increase efficiency. In addition to advocating process analysis, the pair asserted that an integrated approach to using technology within functions should dictate process redesign efforts. Specifically, the idea of tracking patients by implementing a supplementary departmental system was inappropriate. Instead, the pair argued that tracking data could be collected in the background of any activity if an appropriately designed information system could be integrated with the process. For example, if supported by the right series of screens and dialog boxes, a nurse could use a custom module of the EDIS to record triage information while the system was automatically collecting timing statistics based on specific button clicks. Under this integrated approach, data from triage could be combined with data collected in a similar fashion from other process functions, e.g., discharge, to form the foundation data set for analyzing throughput metrics and identifying improvement opportunities. This model of process-integrated and function-specific components was drastically different from the layered tracking system approach first contemplated by the EDIS team. Implementing this strategy required weekly meetings and rapid prototyping of the process-related software components, but it produced results almost immediately.

The EDIS team had noteworthy success in adopting this new strategy, and no redesign was more dramatic than that of the patient registration function. In fact, the operational analysis from 1998 had indicated that the 20 to 25 minutes required to register a patient caused unnecessary delays and negatively affected patient satisfaction. However, after careful review, the team concluded that registration could be completed in *less than 2 minutes* if the focus could be shifted away from "completing the administrative (nonclinical) data collection" to instead emphasize "getting the patient into the system for treatment" as soon as possible. With this in mind, the team implemented a rapid registration procedure that simplified the registration process from a series of ten computer screens to a single computer screen with only six basic data elements. To complete gathering of the required data, the team implemented a new process by which nurses would use wireless laptops at the bedside only after triage and urgent care needs had been addressed. By letting patients receive the care that they were seeking as fast as possible, this redesign eventually made better use of waiting time and significantly improved satisfaction. Redesign efforts for triage, assessment, order entry, and discharge processes had similar results.

In parallel with its process redesign efforts, the team began to design the EDIS as a suite of integrated software components. To prioritize the development of these function-specific tools, the project managers developed prototypes and encouraged the team to evaluate each one along three dimensions: ED priority, EDIS team priority, and implementation difficulty (Table 7.4). After this analysis, the project managers readily identified the two components that represented their greatest opportunity for dramatic success: the eWB and its notification interfaces. However, to achieve success and have a dramatic impact on the department, they knew they had to carefully manage the associated risks. With this in mind, the new project leadership segmented their design approach to address interfaces separately from system components and focused their efforts on the highest-priority items.

The two highest-priority interfaces that the design team had to incorporate into the EDIS were links to the hospital's longitudinal patient record and its provider order entry system. Because both these major applications were still evolving and because both were being implemented on independent timetables beyond the control of the EDIS team, creating interfaces to them was particularly risky. To manage this risk, however, the EDIS project managers strategically decoupled the success of the interfaces from the project's overall success by stratifying the level of integration required and staging the availability of difficult-to-create features. For example, because the longitudinal patient record had been implemented on workstations in the ED, clinicians could already use its basic functionality to access patient records. However, the EDIS project managers deferred promising the ability to notify ED staff when a new lab report or radiology impression was available in the electronic record until they knew it was technically possible. In a similar fashion, the EDIS project managers carefully planned an interface to the hospital's provider order entry system. However, because order entry had not been implemented in the ED by the time planning for the EDIS began, the team designed an interface that could be activated at a later date but was not a required component of the core EDIS. This strategic separation proved fortunate because, as it turned out, the plan to implement order entry software in the ED was postponed, but EDIS development proceeded without interruption.

The highest-priority noninterface component of the EDIS was to be an electronic version of the department's whiteboard. In fact, the prominent dry-erase board that

TABLE 7.4. Assessment of proposed EDIS Components.[a]

Proposed EDIS component	ED priority	EDIS team priority	Implementation difficulty
Electronic whiteboard	1	1	1
Real-time notification through interfaces to laboratory, order entry, radiology, and electrocardiograph systems	1	1	1
Rapid sign-on mechanism	1	1	2
Rapid registration	1	1	3
Discharge documentation	1	2	4
Electronic triage documentation	2	2	3
Demographic information access	2	3	3
Management reporting	2	3	3
On-call management	2	3	5
Staff scheduling	4	4	3
Nurse charting	5	4	2

[a] Proposed components were assessed across three dimensions: emergency room (ED) priority, EDIS team priority, and implementation difficulty. Score ranges: 1 (highest) to 5 (lowest). Scores of one (1) indicate highest priority or most difficult to implement.

the proposed eWB would replace was the department's most central and vital tool for managing its operations at a glance. It was a central place to look for information on patient status and flow, occupancy levels and waiting room queues, operational statistics and emergency telephone numbers, etc. With the right information on the board, providers, staff, and operations managers could use it to make decisions about the service they were providing and the activities they were monitoring. Unfortunately, manual processes associated with the maintenance of time-sensitive information on the whiteboard were problematic. Keeping it up-to-the-minute took nurses away from their direct patient care responsibilities, and physicians wasted time looking for patients, checking for lab results, or occasionally ordering redundant tests when the information was not current. Cleaning staff wasted time unnecessarily searching for rooms to clean instead of knowing exactly which rooms required attention, and receptionists often had to physically check a room's status when they needed to admit a patient because the information on the board could not be seen from the reception area. In sum, the manual whiteboard did not enable the vital status monitoring functions that it was intended to support. It was these shortcomings that made the creation of an eWB a top priority for the EDIS team in the Fall of 2001.

The focus that the team placed on developing and prototyping the eWB resulted in total replacement of the manual system in a period of 9 months. One of the first prototypes demonstrated how a network could distribute information to multiple areas of the ED, and it was immediately beneficial. Specifically, the team installed an inexpensive network camera in the clinical area of the department, focused it on the manual whiteboard, and posted its images to an intranet site. Receptionists were then able to view the whiteboard from their desks through a Web browser, eliminating the need for them to run to the back in the middle of an admission. This interim solution based on simple technology brought early relief to the user group most negatively affected by the manual system. At the same time, feedback from the department facilitated the team's rapid prototyping efforts to design and build a Web-based, database-driven software application for a touch-sensitive plasma monitor that would eventually hang on the same wall where the original marker board had been for years. Figure 7.1 shows the transformation from the manual whiteboard to the electronic version.

Today, the eWB is not only different from the original whiteboard in appearance but is also radically different in the way it is populated with information and in the way it makes information available. For example, because of the redesigned rapid registration process, patient names and chief complaints are automatically added to a central database and therefore become visible and editable instantaneously to authorized individuals throughout the department. Patient tracking happens automatically in real time, and special tools to highlight extended waits have increased staff awareness of potential service issues. Notification engines are implemented to keep the eWB information about room status, clinical alerts, and test results updated continuously. The system also automatically tracks the length of stay for individual patients and computes aggregate operational statistics for the department (occupancy rate, waiting room count, average length of stay) that can be queried and presented in performance analysis reports. Furthermore, clinicians, managers, and executive leadership can use the tool's Web interface to conduct off-site monitoring of events in the ED if necessary. On a larger scale, the monitoring capabilities have even been extended to facilitate the department's participation in a countywide biosurveillance program, a capability that was never anticipated. In sum, the eWB has met and exceeded the expectations that surrounded its initial development. These phase II project successes are summarized in Table 7.5.

The marker board-based traditional whiteboard

The Web-based and database-driven electronic whiteboard

FIGURE 7.1. The traditional whiteboard and the electronic whiteboard (eWB). (Reprinted with permission.)

TABLE 7.5. EDIS project goals and outcomes.

Goals		Outcomes
Decrease physician time looking for patients and checking status of lab results.	→	Physicians see room status at a glance on the whiteboard and can quickly locate patients or receive alerts that test results are available.
Increase staff knowledge of each patient's emergency department (ED) service history.	→	Physicians no longer enter exam rooms, or poll patients in the waiting area, to check if radiology or other auxiliary services have been performed
Decrease inefficient use of time by nurses.	→	Nurses use computer terminals to update the information system from workstations throughout the ED.
Increase staff awareness of patient service time (how long patients have been at the ED)	→	Staff can change priorities to focus on patients based on eWB's up-to-the-minute waiting time
Decrease janitorial time spent roaming for rooms to clean.	→	Janitors now use the board as a task list.
Decrease reception time spent checking rooms for availability.	→	Receptionists now admit patients to the ED and assign rooms without having to leave their desks to check the board.
Enable alerts for emergency operational or clinical situations.	→	eWB automatically reports occupancy level, extended wait times, and uses a color schema to convey its message.
Make operational statistics available to help managers improve performance.	→	The EDIS enables standard and ad hoc reporting for management decision making.

Conclusion

Despite its ultimately successful outcome, considering the total EDIS project duration, extending from its conception in 1997 to the first full run of the eWB in late 2002, a reader might wonder how to evaluate and justify a project with such a long history. As has been described, however, development of the EDIS was a two-phase project with distinct differences between its phases (Table 7.6). In retrospect, we conclude that the success realized after the second phase was fundamentally dependent on the failure of efforts to identify an off-the-shelf solution. Specifically, although one might be disappointed with the first phase of the project because no tracking system or measurable performance improvement tool was implemented to address the department's operational issues, exploration of functionality options and research of the vendor marketplace produced the valuable decision that it was worthwhile to develop a custom solution internally. In fact, it was only with this conclusion from the research that the second phase of the project was commenced. Although it might seem that the due diligence phase of the build-vs.-buy decision was perhaps excessively extensive in this case, it appears that such scrutiny and deliberation were required to assure all stakeholders that investing in the development of another custom application was the best approach.

From a historical perspective, however, it is worth commenting that the "due diligence" phase, phase I, might have been hastened, albeit to the same outcome, if specific changes had been made to the project's goals and organizational structure in the beginning rather than at the conclusion of the first phase. Specifically, the shift in the team's goals from phase I to phase II transformed the project from a generic effort to implement a patient tracking system into a focused initiative to improve the depart-

ment's operational performance by applying information technology to support redesigned processes. Had this focus on outcomes been present in the first phase, less attention might have been placed on finding a "silver bullet" system solution, and the team might have realized the opportunity to improve certain processes (e.g., registration) much sooner.

Also, the second phase of the project benefited significantly from a change in the project's leadership structure (Figure 7.2). In the project's first phase, the organization's strategic elite played a key role in developing the ideas behind what a patient track-

TABLE 7.6. Evaluation of key project criteria for phases I and II.

Comparison	Phase I	Phase II
Needs assessment	Needs assessment was based on an understanding of operational problems in the department and team member evaluation of commercial products.	Needs assessment was based on an analysis of the tools and processes used in performing functions in the emergency department (ED).
Project leadership	The EDIS steering committee led the project and invited ED and informatics staff to participate.	After the decision to build a system was announced, two physicians, one each from the ED and informatics, under the sanction of the EDIS steering committee, stepped up to lead the EDIS project to completion.
Coalition building	The steering committee made efforts to include people in the process of forming ideas for the system selection *but* alienated people from the process by having endless, fruitless meetings.	The physician-led eWB development team rebuilt support in the EDIS project through focused attention on process revision, prototypes, and demonstrating progress in a timely manner.
Objective and scope definition	The EDIS team had a vision to use information technology to help track patients through the ED. Exactly what technology would be used, how it would be deployed, and who would be responsible were questions left for research and debate.	Two informatics physicians would lead the EDIS team to replace the functionality of the ED whiteboard through process analysis and using software already in place in the institution. Additional functionality would be added over time.
Schedule planning and project organization	There was no schedule for delivering a revised EDIS. Research and possible options were considered for 4 years.	The project leaders planned to implement functionality in order of importance and ease of implementation over 18–24 months.
Political sponsorship	The EDIS steering committee was divided over key questions of what could be done and how it would be accomplished.	The project leaders communicated with ED staff and the steering committee to build consensus and support for the project plan and its implementation.
Project process organization	The process of researching off-the-shelf solutions led to unending cycles of discovery and evaluation.	The software development processes followed a rapid application development (RAD) model.
Obstacle-targeting	When proposed solutions were unsatisfactory, more research was conducted.	The RAD model supported building functionality incrementally so that issues could be resolved quickly.
Institutionalization of progress	No solution was identified or implemented.	Process revisions were made to incorporate technology solutions.

Source: Adapted from Hyer N, Wemmerlöv U. A short note on change management: managing the transition to cells. In *Reorganizing the Factory: Competing Through Cellular Manufacturing*. Portland, OR: Productivity, 2002. (Reprinted with permission.)

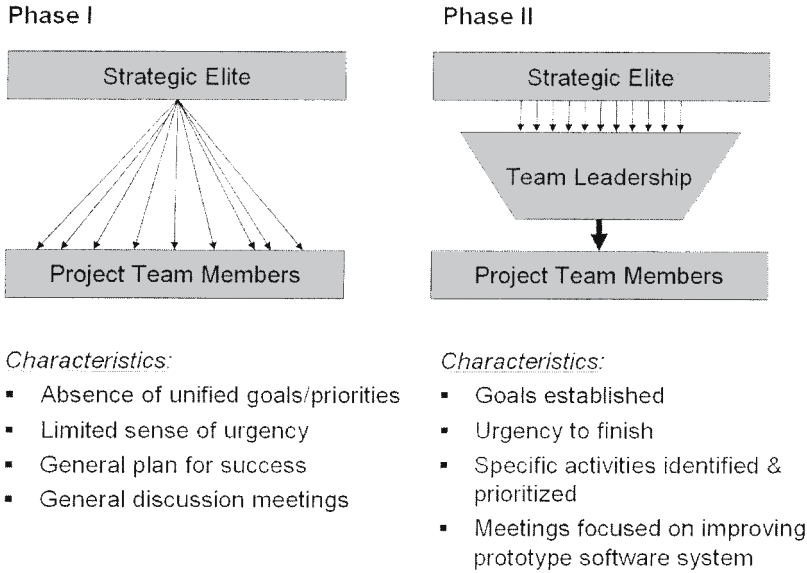

FIGURE 7.2. Changing EDIS project organization structure over time.

ing system might require, and they wisely solicited the feedback of key individuals. However, during this period, no individual or set of individuals played a role in translating the vision of the strategic elite into specific tasks for the team to accomplish. In contrast, during the project's second phase, the director of the adult ED and the project leader from informatics together formed the necessary managerial layer with the delegated authority to perform key functions like clarifying goals, prioritizing activities, and managing risks. As a result of their efforts, meetings were efficient, and energy was focused on the outcomes-oriented activities of process redesign and rapid software prototyping. In retrospect, it appears that the presence of this translation layer was a primary catalyst for the ultimate completion of the EDIS project. Although we can only speculate in hindsight, a similar project management model for phase I might have helped the EDIS team reach the pivotal conclusion to develop a custom solution much sooner.

Questions

1. What problem is the eWB intended to address?
2. Was the project a success? Why or why not?
3. Initially, the EDIS team chose to focus on selecting a patient tracking system. Later, the scope of the project was broadened to include a substantial component of process analysis and redesign. What were the reasons for this change in scope? What are the implications for the project?
4. The EDIS team used a variety of processes and criteria to prioritize their work, ultimately settling on an eWB as the top initial priority. Critique the prioritization process and decisions.