

SYSTEM-DRIVEN PROCESS REDESIGN

A CASE STUDY

By Robert J. Jablonski

Background

In 1991, Community Psychiatric Centers, Inc. (CPC) had reached a crossroads. Their highly decentralized, highly profitable approach to managing the 44 psychiatric hospitals had resulted in steady growth in both revenue and earnings, but management information required by senior executives at the corporate level was either difficult to accumulate or lacking entirely. Moreover, there was no coordinated effort or infrastructure to support the introduction of information technology at corporate, regional or hospital levels. An automated billing and collections system was in use at the hospitals, but it provided no facility for aggregating data for management analysis by regional management or corporate accounting staff. All reporting was prepared manually by hospital business managers and either faxed or overnighted to corporate headquarters as part of the monthly accounting closing process. Few standards existed to define data elements used on reports or to guide business managers in gathering and reporting data. Moreover, few hospital business managers were conversant in the requirements for appropriate financial accounting function. Report formats and financial data were not uniform across facilities, requiring the fourteen accountants at corporate headquarters to spend the majority of their time restating various hospital reports in an effort to generate monthly financial statements and maintain CPC's financial records.

The newly-installed Chief Financial Officer realized that standardization of accounting information and policies and centralization of the reporting activity required a more robust information system than that which CPC was using. After soliciting proposals from several organizations, the alternatives were as follows:

1. CPC could acquire several software and hardware configurations to meet the needs of its various business functions, and hire a consultant as system integrator to link them together for reporting purposes. This would require a large investment in hardware, software and support staff.
2. CPC could select a single vendor to supply a "turnkey" solution, whereby the vendor would be responsible for hardware and software operation and maintenance, with CPC staff providing training and integration support, with the assistance of a consultant to redesign CPC's business operations to maximize the system's utilization and the flow of information to corporate executives.

The second alternative was chosen on the basis of its reduced technical complexity, the reduced investment in

hardware and technical and support staff, and its focus on improving CPC's operations at the hospital and corporate levels. This option called for the use of Shared Medical Systems' Invision software with the Remote Computing Option (RCO).

The RCO alternative is essentially a computer timesharing arrangement whereby the software resides on SMS hardware in its Malvern, PA data center and is operated at CPC sites via leased telephone lines. SMS is responsible for the operation and maintenance of the software and hardware, enabling CPC to forego the expense of hiring and training computer operators, system applications programmers, and systems analysts. This alternative also gives CPC hospitals the ability to utilize hospital management information technology that would normally be too expensive for facilities in their size range (50 to 200 beds).

Ernst & Young was selected as the consultant to assist CPC in adapting its operations to the use of the new information technology by applying its Focused Improvement Methodology and techniques to CPC's environment. Based in large measure on the work of H. James Harrington in his books, *Business Process Improvement* and *The Improvement Process*, the methodology stresses the introduction of a *process* focus, as opposed to a *functional* orientation. The basis of the Focused Improvement methodology is the identification of customer requirements or expectations, and the enhancement of these processes required to meet or exceed those needs and expectations by engineering or designing error-producing variables (or special causes) out of the process.

Ernst & Young and SMS were charged with the responsibility for matching the requirements and expectations of its internal and external customers with information technology that would enable CPC employees to meet the challenges of customer service and operational improvement.

Project Initiation

The development of an appropriate plan of work was the first order of business. This involved the identification of the objectives of the project, the sequence of tasks required to meet the objectives and the assignment of appropriate staff to perform the tasks.

Of CPC's 44 North American hospitals, one would serve as the alpha site for the system, and a second would serve as the beta site to field test the operational improvements as well as the implementation methodology. The remaining 42 facilities would be implemented in phases or "rollouts"

over the course of twelve months. The first twelve months of the project were dedicated to the process analyses and improvement recommendations, the development of the base system screens and pathways, and training regimens for both the implementation staffs and the hospital user staff.

Commencing in July 1992 through June 1993, CPC, SMS, and E&Y planned to develop an understanding of the basic components of the Invision system, the business processes utilized at CPC hospitals and regional and corporate offices. They would then build the required screens, pathways and processes to implement and sustain operational improvement and increase the volume and flow of information to executives at all levels of the organization.

The second twelve months of the project were to be dedicated to implementing both the information system and the operational changes in the 42 remaining hospitals in a series of four rollouts. The rollouts were structured to group the hospitals geographically, allowing the implementation team to travel easily among the sites during each rollout, and to minimize travel expenses from the corporate office.

The plan originally assumed the implementation of all applications across all facilities in a given rollout. The plan was later amended to a staged implementation, with general accounting applications implemented first, patient management and patient accounting applications thereafter, and to group the hospitals into two stages within a rollout (See Figure 1. – Rollout Schedule).

With a commitment of approximately 100,000 hours of professional time, a project planning and management tool was required to not only assist in developing the plan itself, but to facilitate the multiple permutations and “what-if” scenarios that were required to be considered in laying out the plan. Project Workbench was selected as the software tool to be used, and one professional was assigned full time during the planning stage and early in the life of the project to monitor performance to the plan, hours expended on separate tasks, and required hours to complete various stages of development.

Individuals were assigned to three broad application areas in the initial stages of the project: Patient Management, Patient Accounting, and General Accounting. Since there was to be no distinction between the Ernst & Young Process Improvement (PI) and Information Technology (IT) development staffs during the analysis and system building phase of the project, individuals from both specialties were assigned to each of the teams. The PI specialists were expected to gain an understanding of the current operations through process walk-throughs and interviews with CPC operating managers and staff. The IT specialists were to familiarize themselves with the basic structure and functionality of the SMS Invision product so as to understand the limits and capabilities of the software. CPC and

SMS professional staff were assigned to application teams based on their expertise and/or experience with the particular application. Approximately thirty individual team members were assigned either full or part time to develop the system.

Four project directors were assigned to lead the team: one executive each from CPC and SMS, and PI and IT specialists from E&Y. Team leaders were assigned to the application of teams, responsible for assigning tasks and supervision on a day-to-day basis. The professional assigned to provide project monitoring and reporting skills was also accorded team leader status. Professional staff assigned to the teams worked under supervision of the team leaders, regardless of their parent organization.

The critical issue in the formation of the project team during the early stages of the project was to create a unified team from three separate organizations with a seamless team structure and chain of command. It was imperative that the team operate as a single entity, since none of the three organizations alone possessed the requisite technical skills to accomplish the objectives of the project. It was also critical to establish the identity of the customers of the project early in the project. This facilitated a common focus for all team members during the development of the system, and clearly delineated the beneficiaries of the system.

Focused Improvement Methodology

The use of the Focused Improvement Methodology (or Process Improvement, to use Harrington's nomenclature) was selected based on the need for short-term, tactical change at the operating level of the organization. (See Figure 2. – the Improvement Matrix) While a case could be made that the type of change necessitated by CPC's situation was strategic in nature, affecting the organization's direction and mission, the overriding need was for operational improvement within a short time frame.

In order to apply the Focused Improvement methodology and techniques, a distinction between processes and functions needed to be made and understood by not only the end-user staff but by the team as well. Functions are typically understood as managed silos – a group of like tasks performed by the same individual or work group in (usually) close geographic proximity. Departments are organized around functions; hence, the accounting department handles the accounting function, the personnel department manages the personnel function, etc.

Processes, on the other hand, cross functional lines. The purchasing process work flow begins in a user department, involves tasks and activities within the purchasing, receiving and storeroom functions, and ends with transactions processed by the accounting department. Taking a process view of a work flow (a set of activities or tasks) involves understanding the end result of the activities as the delivery of a product or service to a customer. (See Figure 3. –

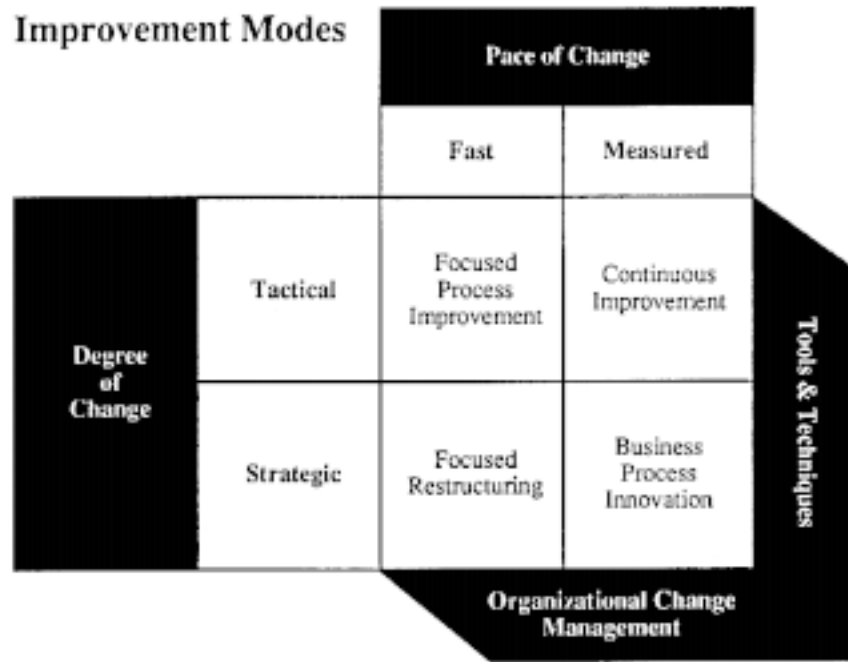


Figure 2

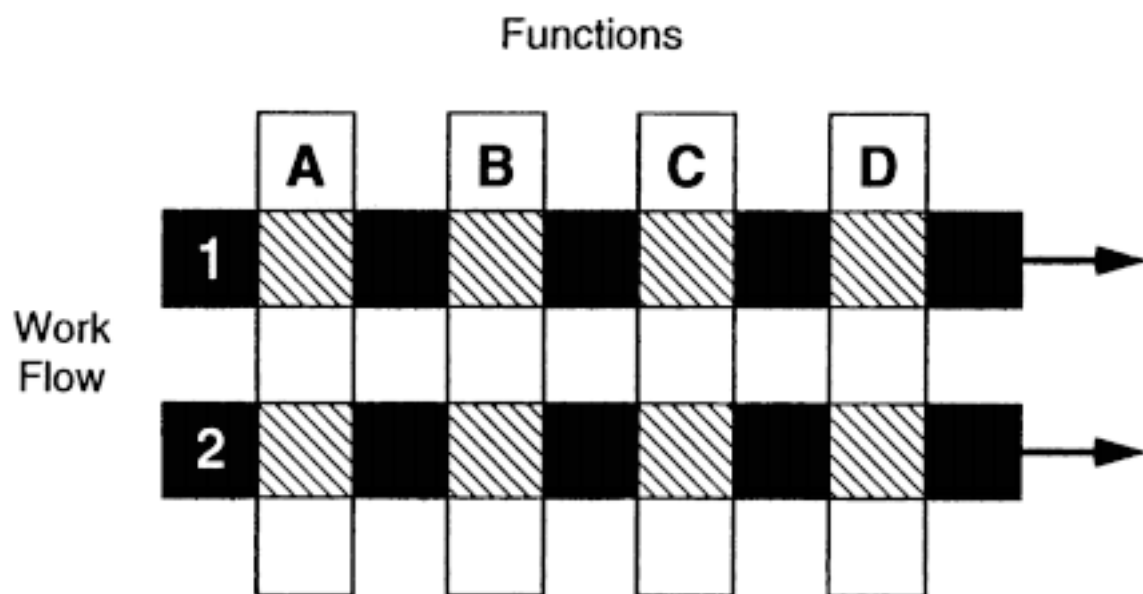


Figure 3

Process Workflow versus Functions) Meeting those needs and expectations is the primary purpose and rationale for the existence of the organization.

Departments or functions participate in processes to meet customer needs. Departments or functions cannot be improved – they can be modified by altering their scope of responsibility, and their access to resources can be expanded or restricted, but improvement can be made only to the process in which they participate, usually together with individuals from other departments.

In this case, the best example came in the Patient Management area. Four departments participated in the process of accepting patients into the facility: Intake, Admitting, the Psychiatric Assessment and Triage (PAT) Team and the Business Office. The degree and timing of their participation varied, but at some point each department bore responsibility for certain aspects of the patient acquisition process.

The Improvement Process

The introduction of the process approach was the initial step in applying the Focused Improvement methodology. The PI specialists developed the list of processes to be analyzed and trained team members on the methods to be used in the analysis phase of the project. Each process was analyzed at three levels: Process Improvement Team (PIT), PI, and IT specialist team and by the entire project team.

PIT Analysis

The analysis of each process included a number of tasks:

- A process walk-through was conducted that allowed the analysts to observe the process being performed and to interview the participants.
- Following the process walk-through, the analysts flowcharted the process as they understood it.
- The process inputs, outputs, customers and suppliers were documented by the analysts so that all components of the process were identified.
- The job title or classification of each staff member who participated in or performed the process was documented to establish skill level requirements for the process and to measure human resource utilization.
- An estimate was made of the volume of transactions, or the number of times the process was required to be performed.

The process of conducting the walk-throughs, producing the flowcharts and gathering the analytical data took several weeks. Each process walk-through was conducted at two sites to discover the extent to which processes varied between facilities, the differences in inputs and outputs, the staff who performed the tasks, etc. Once the

process documentation was completed, the PIT returned to each site and reviewed the documentation with the staff who participated in the walk-throughs and interviews. If errors were discovered in the flowcharts or data, they were corrected on-site and the documentation was approved by the participants.

PI and IT Specialist Analysis

Following completion of the process documentation, it was turned over to a team of ten Process Improvement and Information Technology executives for review and further analysis. All the executives had participated in the walk-throughs, and had a functional area of expertise. Each of the processes was discussed by this senior analytical team to highlight the key issues to be addressed by the application of both the Invision system and Focused Improvement techniques. To the extent possible, cycle time analysis, value analysis and root cause analysis was done for each process considered. The product of this review was the Process Improvement Opportunities List (See Figure 4. – Process Improvement Opportunities List).

This document detailed the key process-related problems, opportunities, issues, and requirements that were required to be resolved by the project. It contained the following components:

The ISSUE was described in terms of a problem or set of conditions that currently existed that the analysis had identified as the source of errors, inefficiencies or ineffectiveness. The problem was to be stated in terms of specific operations rather than generalities such as “Reports take too much time”. Details such as which functions were affected, what requirements were not being met and their consequences were to be clearly defined.

The IMPACT of the problem was described in terms of why this situation was bad – to what extent did the organization pay for it in dollars, increased process or cycle times, extra labor, rework or negative effects on downstream activities.

The OBJECTIVE was described in terms of ability to accomplish some task or activity, produce some output, utilize some input more efficiently or generate a desirable result.

The OPPORTUNITY was defined as the benefit that would accrue to the organization as a result of achieving the OBJECTIVE. The benefit could take the form of reduction of financial or legal risk, increased cash flow, reduced cost or higher quality output.

The RECOMMENDATION was a description of the specialist team's prescribed course of action to take advantage of the OPPORTUNITY and to achieve the OBJECTIVE. The RECOMMENDATION could be as simple as enforcing existing policies and procedures or as complex as establishing new organizational structures and applying additional technology.

CPC Process Improvement Opportunities List

ISSUE	IMPACT	OBJECTIVE	OPPORTUNITY	RECOMMENDATION	REQUIREMENT	DISPOSITION
Registrations						
1 Account numbers are not assigned in a uniform or consistent manner across facilities. Some hospitals use the medical record number as the account number. Some assign a new medical record number with each admission.	It's difficult or impossible to identify bad debt on admission, consolidate medical records, or post payments to appropriate accounts. Potential loss of revenue from unidentified bad debt.	Ability to uniquely identify each patient, and link multiple inpatient/outpatient episodes to that patient through the account and medical record numbers.	Improved patient record keeping and financial data flows.	Assign terminal digit number to each patient. Inmate will assign a unique account number to each episode of registration within appropriate range. Keep intake registration number	May be a conversion issue. Format decision. Policy/procedure on how to handle medical record number assignments on SMS system.	Terminal digit number is part of SMS system.
2 There are inconsistent cash collection procedures and practices across facilities, e.g. deposit calculations, patient liability after insurance and payment plan registration.	Increased bad debt, loss of cash flow, reduced net income.	Ability to correctly determine and collect the patient's portion of reimbursements.	Increase net revenue. Improve cash flow. Reduce financial risk.	Establish specific guidelines and criteria for determining cash deposits, payment plans and patient liability. Monitor cash collections.	Access to contract data. Uniform policies. Cash collection reporting.	Policies drafted and procedure being developed.
3 There are about 25 admitting forms requiring reading and/or signature by the patient during admission. This can take up to 30 minutes.	Patient frustration and delay in admission process. High forms inventory and expense.	Ability to get patient admitted and into a room as soon as possible with necessary regulatory sign-offs.	Reduction of admission time, simplification of processes, reduction of paper flow and filing.	Consolidate forms where possible. Eliminate unnecessary signatures. Review legality of forms to see if they can be signed in stages so not to hold up admitting process. Use "signature on file" for some forms.	Forms review program.	Simplify (and consolidate) admitting forms wherever possible, with primary input from the CPC Forma Committee. Done.

Figure 4

The REQUIREMENT was defined as the set of conditions that must be changed in order to implement the RECOMMENDATION. It was a prerequisite to operationalizing the changes described in the previous columns.

Later, a column was added to track the DISPOSITION of the item through the improvement process and the system design and build phases.

The process of developing this portfolio of improvement opportunities took one week. The specialist team acted as both a technical review panel as well as a senior design staff. PIT members were interviewed during this phase of the analysis to clarify points of contention or to validate data presented to specialist team. The discussions in these sessions were among the most lively conducted over the course of the project, because the composition of the specialist team was, by design, chosen to ensure that as many points of view as possible were brought into the process.

Following completion of the Process Improvement Opportunities List, the specialist team members broke into smaller groups to develop proposed process flowcharts that incorporated the Recommendations and Requirements. (See Figure 5. – Proposed Process Flowchart) The proposed flowcharts reflected the specialist team's understanding of the current environment, its knowledge of the Invision system's capabilities and the capacity of operational staff to assimilate the large degree of change that the Process Improvement Opportunities List required. The proposed process flowcharts highlighted the application and use of the Invision technology, the points at which manual operations would be assumed by the system, from the use of on-line terminal inquiry and system reports, and new paper and information flows.

Project Team Analysis

The Process Improvement opportunities List and the proposed process flowcharts were presented to the entire project team in a weeklong series of meetings. This was a no-holds-barred technical critique of the specialist team's work. The ten executives were questioned regarding the assumptions upon which their analyses and recommendations were based, the validity of their proposed work flows, the sources of information presented, etc. Proposed flowcharts were redesigned and redrawn, issues clarified, recommendations modified and changes made to the content of the analyses. The objective of the sessions was to ensure that the recommendations were technically sound, could be implemented by both the system development effort and the operations staffs at the hospitals, and would meet the needs of the organization as specified in the original Request for Proposal. The project team analysis also served to ensure that the specialist team did not "push the envelope" too far in any direction. While a considerable level of change was necessary and desirable, too

much could be counterproductive to the organization as a whole. The end result of the project team analysis was a conceptual framework from which the system design and operational improvement implementation plan could be developed.

Review and Approval

The final step in completing the conceptual design was to obtain the approval of the organization's senior operational and administrative executives. To provide the required oversight and approval of the design and development phases, CPC created two committees.

A Review Board was assembled to provide the primary review of design and development issues and resolutions. Its charter lists its responsibilities as follows:

- Provide departmental/regional input on decisions affecting policy and procedural changes caused by the system implementation.
- Assist in developing changed policies to be presented to the Steering Committee.
- Review and approve new system automated and manual workflows.
- Assist in resolving potential interdepartmental/regional conflicts caused by changes in policy and procedures.
- Provide a mechanism for evaluating user acceptance of the system.
- Assist in defining and monitoring benefits to be derived from the system implementation.

The Review Board included 22 managers and executives from CPC's corporate offices, regional administration and hospital operations, as well as the four project directors from the team. The functional areas represented included Clinical Management, Hospital Operations, Business Operations, Marketing, Medical Records, and Financial Management. It met periodically to review and assess progress on the system's development both as a group and via conference calls.

The Steering Committee comprised the senior executive management of the organization. Its responsibilities were as follows:

- To evaluate and make decisions as to policies and procedures that need to be resolved from an operational, financial and administrative level on company-wide basis caused by the system implementation.
- To recommend appropriate action to remedy inconsistencies with project goals and plans.
- To resolve interdepartmental/regional conflicts brought on by changes in policy and procedures attributed to system implementation.
- To monitor realization of defined benefits derived from

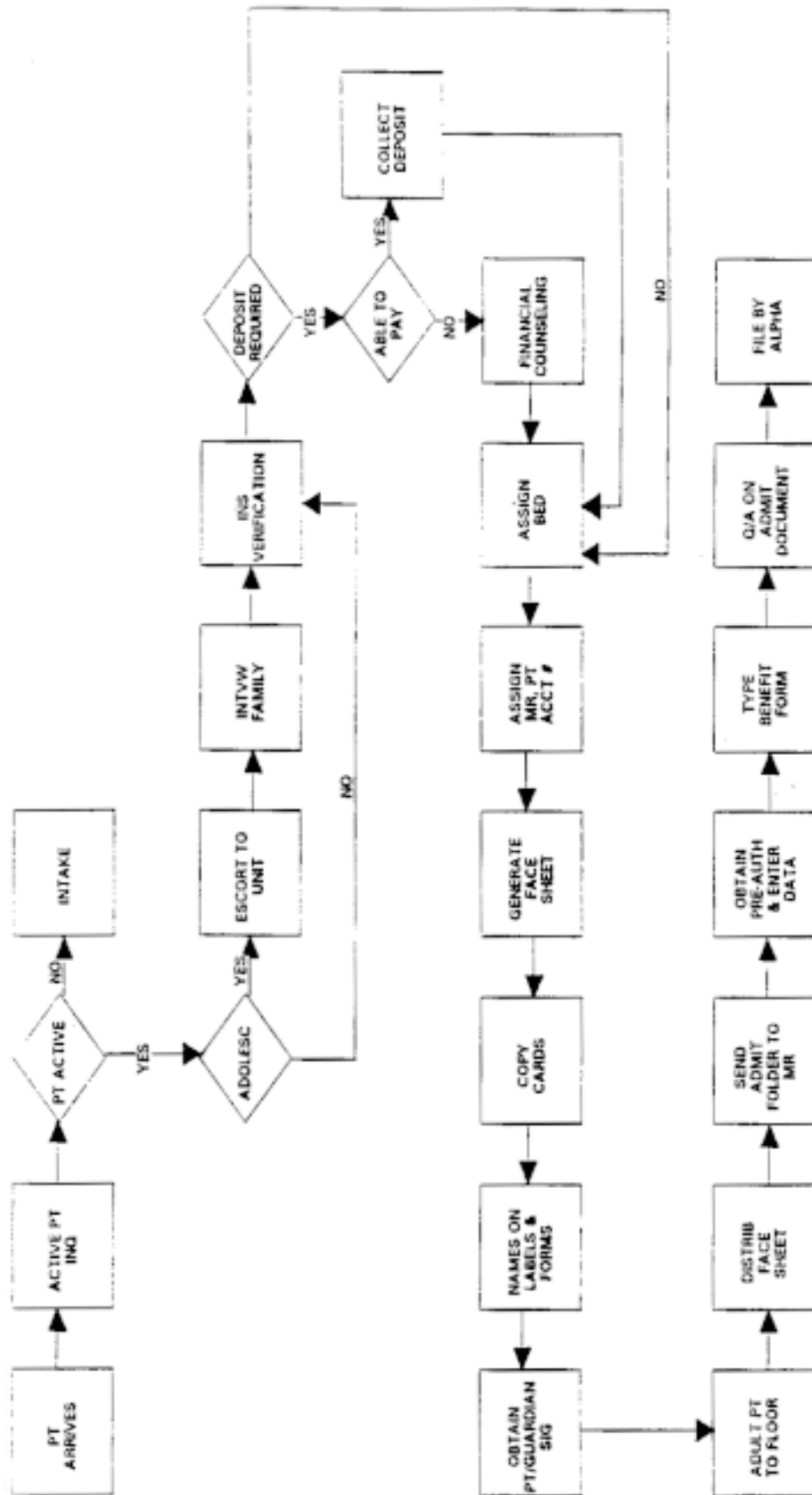


Figure 5

system implementation.

The Steering Committee included the following:

- Board Chairman/Chief Executive Officer
- President/Chief Operating Officer
- Senior Vice President/Chief Financial Officer
- Executive Vice President, Hospital Operations – West
- Executive Vice President, Hospital Operations –Southern California
- Vice President, Internal Audit
- Vice President, Business Office Operations – West

The full Review Board met and attended presentations of the Process Improvement Opportunities List. Their input and concurrence was solicited to finalize and prioritize the improvement opportunities. Later, the Review Board met in smaller groups and via conference call to discuss the proposed process flows and the conceptual design framework.

The Process Improvement Opportunities List was presented to the Steering Committee and several issues on which the Review board could not reach consensus were discussed. The Steering Committee made final decisions on these issues and approved the conceptual framework for further design and development.

System Build and Process Design

With the approvals of the Review Board and Steering Committee completed by October 1992, the team repositioned itself for the development tasks. This meant that the IT and PI specialists followed separate work plans. The systems specialists began the work of screen design, pathway development and data element construction within the context of the Invision software. The Process Improvement specialists began to rewrite operational policy statements and procedural documentation.

The time horizon called for system and operational changes to be implemented at the alpha site in March 1993 with beta site implementation in May 1993. Given the aggressive schedule for development and implementation, the major project management challenge was to ensure that, while following separate, but parallel development paths, the PI and IT teams would converge shortly before the alpha installation to integrate their products. These objectives were accomplished in February 1993.

Periodically during the development phase, subsets of the Review Board were convened via conference call to review screens, processing pathways and processes. This oversight and review mechanism was implemented to ensure that the team followed the conceptual design previously approved by both the Review Board and the Steering Committee. The team visited the alpha and beta sites to present the management and staff at each facility

with a “preview of coming attractions” and to solicit their suggestions for a smooth implementation. Staff at the beta site took the initiative in field-testing several of the proposed operational flows to assess their effectiveness, and communicated their findings to the progress team management.

Alpha Test

In March 1993, the software was loaded and installed at the alpha site. The system had been extensively tested in the development mode using data input specifically for test purposes, and had performed well. The next phase involved the conversion of existing data and training of hospital staff at the alpha site. The objectives of the alpha test were to:

- test the data loading and conversion programs and methodology using “live” data in a production environment,
- provide cross training to development team members who had previously concentrated in a specific application area,
- develop effective training regimens and materials for the rollout phase,
- submit the system to normal use in a production environment to validate its performance, and,
- assess the effectiveness of the process and the procedural improvements developed by the team.

The results of the system test were encouraging. The conversion methodology and programs produced a stable environment and new system balanced with the old within the expected time frame. The system operated well within expectations in terms of response times and access. The cross training and user training segments of the implementation revealed that more development of training materials and methods were required. Specifically, the timing of training sessions and the format of the training documentation were not conducive to effective training. Many of the users felt overwhelmed by the implementation and experienced difficulties in accommodating both their training sessions and their work schedules.

On the process side, many of the new procedures lacked sufficient detail to assist management and supervision in maximizing the use of the system. For example, several procedures specified the use of system inquiries and reports to meet operational needs, but were not linked into a daily routine of activities that would produce the desired result of producing bills or generating management reports. While the system produced census information in a variety of formats and sorted in several ways, it did not present the data in the same format that management had seen it presented for over ten years. This created the perception that the system could not produce an appropriate census report. Thus, several “improvements” were

either misinterpreted by the customers or rejected entirely.

The lessons of the alpha implementation were detailed and discussed by the entire team in a half-day session called to assess the effectiveness of the system, the implementation methodology and the process improvements. These lessons were incorporated in to the project plan and new approaches and solutions developed.

Beta Test

Using the experience of the alpha implementation, the team altered the implementation approach for the beta site and concentrated on the following objectives:

- To optimize the installation and conversion processes to the minimum time required; i.e., to determine how rapidly the system could be installed in a typical facility;
- To improve the training sessions and methods to maximize familiarity with the system in the least time requirement;
- To test improvements to key processes identified by the alpha implementation; specifically, the month-end closing process and daily census reporting.

The beta implementation was successful in a number of areas. The system was installed and data conversion completed in three weeks – less than half the time required at the alpha site. Training sessions were scheduled more efficiently and training was more effective, as evidenced by fewer requests for assistance in routine processing. While some procedural issues remained, the process improvements were well received and valuable insight was gained for further improvement to be made prior to rollout.

Current Status

The beta implementation was completed by the middle of June 1993. Since that time, ten facilities have implemented the Payroll, Accounts Payable and Fixed Assets applications, with the Patient Management and Patient Accounting implementations scheduled to commence in August 1993. Processes continue to be refined and improved based on feedback and results from the two pilot sites. Additional enhancements and improvements to the system are being developed by the team at both the corporate office and in the field.

Key Concepts

Based on the experience with this project, several valuable system development, process improvement and change management lessons have been acquired (some painfully) by the project team and its leadership:

1. *Plan your work and your plan* – there is no substitute for an adequate project plan. The old maxim, “If you fail to plan, you plan to fail”, holds true in projects of this nature. Subprojects undertaken by the team with the understanding that the task would “take a few hours” turned into endeavors that encompassed weeks of

effort. Initiate no new task without a written understanding of the objective, deliverable, due date, staff assigned and executive responsible for completion. With a good project plan in place, Murphy’s Law is in effect: without one, Murphy becomes your project director!

2. *Be flexible* – while it is necessary to have a plan, it is foolish to be married to it. It would be a rare set of circumstances that would allow a project planner to foresee all the myriad contingencies and quirks that befall a large (or small) project. Expect the unexpected!
3. *Select and adhere to a structured improvement methodology* – this is a corollary to number 1 above. Without a structured, rigorous approach to improvement, comparisons among alternatives become difficult. The improvement methodology of choice should utilize recognized quality improvement techniques, be easily explained by practitioners, and produce documentation that is easily understood by the end-users.
4. *Select performance metrics prior to analysis* – develop measurements of process efficiency and effectiveness prior to conducting the analysis. This helps establish baseline performance against which improvement can be measured following implementation.
5. *Establish documentation standards* – select a flowcharting method and software, formats for reports and analyses, and train the analysts in their use *prior to initiating a process analysis*. The quality of the analysis suffers and the cycle time of the analytical process is lengthened when on-the-job training is used.
6. *Develop a communication plan* – the project team, the project sponsors and the end-user community all have information needs regarding the process improvement, system development and implementation efforts. The stress levels will be high enough with an informed community; with an uninformed community, it increases geometrically. Consider a project newsletter or periodic announcements of progress and project successes.
7. *Develop an issues logging system* – problems, bugs, concerns and opportunities arise on a daily basis. Develop a method to document them, assign them to the appropriate resource, and monitor their status through completion or rejection. (See Figure 6. – Issues Worksheet) Without such a system, resources will be inefficiently applied, without supervision or management review of the appropriateness of the response or the quality of the result.
8. *Maintain a customer focus* – the objective of the improvement effort is the increase in benefit to the customer, whether the customer is inside the organization or external to it. *The system is the means, not the end!* Development and deployment of information technology are not objectives – solving problems, increasing quality and meeting customer needs are!

Acknowledgements

The author wishes to acknowledge and thank the many individuals whose efforts are described in this paper. While a full listing of all those who contributed to this effort and continue to support this project would be impractical, special thanks go to:

Community Psychiatric Centers, Inc.:

Steve Weis, Executive Vice President/CFO

Pam Huffman, Senior Director, Information systems

Rose Deignan, Vice President, Business Office Operations

Ernst & Young:

Jim Frkovich, Engagement Partner

Steve Giles, Project Director

Shared Medical Systems, Inc.:

Kathy Goodwin, Project Director

Rich Jordan, Account Executive