DESIGNING & IMPLEMENTING FINANCIAL INFORMATION SYSTEMS WITH RECOMMENDED METHODS FOR ANALYZING/USING INFORMATION FOR MANAGEMENT DECISION MAKING

A "How-To" Manual for Health Care Organizations in the Ukraine

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Preface

Financial pressures on the health care system in the Ukraine have resulted in a major emphasis to improve the financial management of health care providers. This has caused many managers within hospitals to seek efficient and effective ways to adopt new management tools and techniques with the use of computers. Many of these new financial tools such as improved budgeting models, cost accounting tools, internal control systems, and more, can be readily computerized allowing key managers an opportunity not only to improve the quality of selected managerial processes, but at the same time to do so quicker, more accurately, and with greater decision-making insight than ever before. In short, managers are attempting to do more, with less, and do it better with the assistance of computers. This is a traditional role of computerization and yet, can be an illusive benefit if approached incorrectly.

The rapid evolution and increasing availability of the micro-computers in the Ukraine has brought puzzling challenges to many of those individuals and organizations trying to capitalize on the value of computerization. In the Ukraine, where resources are particularly tight, there is a recognized need to implement such tools in a prioritized fashion so as to obtain the most out of the effort. An investment in a micro-computer is an important step and many issues arise as to how, when, and where such technology is best applied.

The intended purpose of this manual is to communicate how hospitals might design and implement selected financial information systems with recommended methods for analyzing and using this information for management decision making. The method in which this is illustrated is through the documentation of the essential steps and processes of a few selected hospitals with supporting comments as to how the information is actually being used. A summary of the key roles and design framework is presented, and notes and numerous examples are provided to allow the user of this manual an opportunity to obtain maximum benefit from the experience of others. Finally, case studies are provided which focus on decision-based automation and transaction based automation. All cases illustrate the role of the manager in using and analyzing the automated information for the benefit of improving the financial efficiency and effectiveness of the organization.

It should be noted, the automation effort in some of these facilities was the very first time a micro-computer had been employed as a financial management tool. As a result, there was significant learning curve not only in understanding the automation processes involved with financial systems, but of the basic principles of operating a computer itself. This situation demonstrates the primary challenge of this manual: Aligning the appropriate degree of detail with varying degrees of skill and knowledge of the readers. It is hoped a proper balance was achieved.

> ***Municipal Hospital Eyes Automation***
> *In referring to the role of automation, the Chief of Inpatient Services at the Municipal Hospital #10 in Odessa indicated, "We are already walking with computers. We need to learn how to run".*

I. Scope of Manual

A. Purpose

This manual is intended to accomplish two purposes. First, to communicate how hospitals go about the design and implementation of financial information systems. Sharing experiences and outlining the steps and processes documented through their effort is seen as a valuable method for accelerating the learning curve of others involved in similar efforts.

Second, to communicate the applications and roles for analyzing and using this information for management decision making within a Ukrainian health care institution. This manual takes the approach that it is of marginal value to automate a financial management process or activity unless there is material benefit to the organization. As such, the manual offers examples of automation efforts and, once automated, how the information is used to facilitate the management of key financial concerns.

B. Intended Audience

The concepts and steps provided are meant to apply to:

- Key hospital and polyclinic mangers
- Economists
- Accountants
- Information system specialists and system planners
- Software developers
- Hardware and software suppliers
- Management consultants
- Other interested parties of the Ukraine.

This manual will help these readers:

- Begin to understand the relationship between the cost and value of collecting and automating underlying transaction systems with the automation of higher level management processes. The manual promotes an understanding of how these two issues are intertwined.

- Make improved decisions regarding where, when, and how to initiate, and implement inaugural computerization efforts within their institution given minimum experience and expertise with computer tools and technology.

- Understand the essential steps involved and approximate time commitments to accomplish various levels of automation.

- Define the roles and responsibilities of various key players in the automation process.

- Define and encourage the establishment of selected benchmarks of success for monitoring the progress of an automation effort in the finance area.

C. Methodology

The methodology of this manual is rooted in five documentative activities including:

1. Making the steps clear to others
2. Focusing on key processes & principles
3. Demonstrating through example pragmatic approaches that proved successful
4. Identifying common pitfalls and rules of thumb
5. Sharing progress to date with other facilities

Finally, this manual is not a programmers guide to the development or selection of software and hardware.[1] All of the software used in this manual was obtained "off-the shelf" allowing each facility maximum flexibility to build/design/adopt the software to fit their unique needs and yet remain flexible as needs and expertise within an institution develops over time. The skills and techniques provided in this manual require marginal computer skills that can be learned through relatively short periods of training and hands-on experimentation.[2]

[1]However, hardware requirements are generally not determined or mandated by the application so much as by the size, performance, connectivity and other requirements of the user. For the most part, it is envisioned the systems will be a micro-computer based client-server application, utilizing any number of server hardware and operating system configurations.

[2]An example of a course agenda for software computer training is shown in the Appendix of this document.

II. Objectives of Designing and Implementing Financial Management Information Systems

A. Objectives

The central objective of designing and implementing financial management information systems is to support the strategic priorities of a health care organization. Typically such automation efforts are targeted to establish systems that facilitate key strategic and operational objectives, minimize the duplication and inaccuracy of information being manually maintained, and advance the collection, reconciliation, storage, and access to such data by decision makers.

> ***A Family Health Center in Odessa Creates a Financial Management Information System (FMIS)***
>
> *The purpose of the FMIS at the Family Health Center (FHC) was to automate the capture, centralization, and management of vital data so as to enhance management decision making and supportive analysis. Transaction data within the FHC had routinely been collected but was not processed in an efficient manner so that management could apply the information for day-to-day and strategic financial decision making. By automating the collection and processing of patient and financial information the FHC sought improved efficiency in the tabulation and recording of various Types of data. Additionally, once the automation of the collection of data was accomplished, the management of FHC sought to enhance decision-making regarding how this data was analyzed and used to guide the organization into the future.*

More specifically, the design and implementation of financial management information systems seek to foster:

- Operational Efficiency
- Managerial Effectiveness
- Organizational Survivability
- Strategic Flexibility
- Improved Decision-Making

B. System Capabilities

Minimally, such systems should be capable of collecting, tabulating, and/or facilitating the decision-making process. Such systems enable the decision-maker to accomplish some or all of the following:

- *Better Identify problems.*
- *Provide for measures of costs and benefits.*
- *Promote the identification of alternatives*
- *Provide for an evaluation framework of those alternatives.*
- *Better monitor and evaluate results.*

It is not the intent of software systems to support every management decision. Managerial judgment will always be required because an infinite number of decisions are made within an organization. It should be recognized that some non-objective information used to support many decisions is not likely to be provided by informational

systems at all. It should also be recognized there is a multiplicity of goals and decision-making criteria involved in the decision-making process.

C. Types of Automation

There are generally thought to be two types of automation efforts within the financial purview: Transaction based and decision based. Transaction based means an automation of selected transactions involving resources, patients, physicians, employees, and other data collection processes including accounting transactions, patient registration, inventory management, payroll, etc. Decision-based automaton is typically referred to as the automation of selected management processes and activities that require a degree of evaluative judgment such as budgeting, cost management, performance evaluations, strategic planning, etc. Where transaction automation seeks efficiency in the tabulation and recording of various types of data, decision-based automation seeks to improve the strategic effectiveness of the management team. Both automation efforts hold significant value and importance to health care organizations and it is not uncommon to find an element of each type of automation mixed with another. This manual will discuss both types of automation. The following chart illustrate these differences:

Transaction-Based	**Decision-Based**
Automated recording of patients	Analysis of patients for determining resource requirements
Automated tabulation of financial transactions	Financial Budgeting, Forecasting, and Cost Accounting
Automated recording of inventories.	Resource comparisons among physicians or various patient Types
Automated recording of key statistics	Analysis and the identification of trends or "out of tolerance" variances to normal operating conditions

In all cases the automation effort should be accomplished within a budgeted timeframe and a technological where-with-all consistent with the skill levels found within the organization. As such, automation is not as easy as first appears and demands the cooperative attention of a number of individuals within the organization. The roles and responsibilities of these individuals are discussed in the next section.

III. Key Roles in the Design and Implementation Process

Financial information systems typically have several different types of users. These users have different backgrounds, educational levels, expected frequency of system use patterns and other attributes. This section will characterize the roles and responsibility of those involved in the design and implementation process.

A. The Management or Design Team

It is of critical importance that the design process be ultimately led and supported by a strong management team which understands the strategic issues within an organization and can effectively prioritize these issues in relation to the automation effort. In this way, automation efforts are designed and later implemented in a fashion that is consistent with the relative priorities of the organization. This "coordination" of the automation design effort with the needs of the organization promotes rapid and tangible vale to the automation and precludes long and drawn out design and implementation processes. Thus, the establishment of a strong - top management team who can best balance the pace, scope, and direction of the automation effort with the needs of the organization is essential. Such a team would typically include:

- The Head Doctor
- Selected Deputies and/or Department Heads
- Key Accounting and Economic Personnel
- An Experienced Computer Programmer

It is the responsibility of this design team to:

- Insure the automation effort is consistent with needs of the organization;
- Make decisions and compromises when necessary that balance the cost of the automation effort with its relative value to the organization;
- Define the goals of the automation effort;
- Define the scope and schedule of the automation effort;
- Establish and monitor key milestones for the design and implementation process.

Oblast Clinical Hospital in Odessa defined and then aligned strategic priorities with the automation process of selected financial management systems: Technology working to support strategic priorities.

Senior managers of the Odessa Clinical Hospital identified and prioritized the most important strategic issues facing the organization. There was useful and vigorous discussion of each strategic issue as mangers evaluated the financial, clinical, and operational aspects of different issues. Clearly, clinical priorities impacted financial strategies. Financial information influenced clinical decision making. In spite of the complexity of these issues, a cooperative consensus was found among the management team. Armed with the relative priority of a host of important strategic issues, the automation of a financial management system designed to provide meaningful performance management information regarding these top priorities was ordered. By aligning key strategies with information system automation, these senior managers are appropriately applying computer technology to the most important organizational issues. Senior management recognized computerization as an important aspect of the need to become more efficient and effective at making quality decisions. Hospital managers see the application of such technology in conjunction with organizational goals as key to improved decision making. As the Chief Doctor indicated, "We cannot afford to make a mistake. We must apply these tools where it will do the most good".

B. The Accountant(s) and Economist(s) Role

The Accountant and the Economist can play a vital role in the design and implementation of a financial information system.

Decentralized budgeting software in Kodyma and is being used to support strategic initiative to re-organize the structure and delivery of health care services. The Head Doctor is using financial management tools to support the ongoing monitoring of this operational reorganization in order to financially survive.

Rural hospitals can be quite different than urban facilities. As such, strategic issues and their relative priority are expected to be somewhat different. This is the case in Kodyma. Due to a severe resource constraint, managers want to implement a significant re-organization so as to streamline operations, reduce operating costs and enhance clinical delivery. In addition, managers wanted to devote more attention on operational matters and less on administrative concerns. So, a capability to produce department budgets and component cost accounting information was developed. This facilitated the departmental reorganization through improved decision-making. In addition, external reporting requirements which burden the accounting and economic departments are being automated. For example, a quarterly report for State Authorities requires 10 people approximately 15 days to produce. A win-win solution is in work to automate much of the internal and external reporting functions while calculating key departmental information. This will:

- *Immediately enhance the financial decision-making capabilities regarding a current strategic imperative*
- *Reduce the time it takes to produce reports and provide analysis*
- *Improve reporting accuracy and consistency*
- *Re-direct the saved time to more meaningful management analysis of key operational concerns*
- *Improve internal reporting capabilities for enhanced decision making*
- *Build a basis for a high level performance management model for the facility*

Because such systems will often touch on the core financial processes and activities of the organization, and, because such systems guide decision-makers into the future, the role and responsibility of these individuals are recommended to be involved in the following:

- Insuring the system will properly collect, track, and report financial data in an accurate, timely and secure manner; (Is the system collecting and calculating the data correctly ?)
- Insuring the automation is of cost-benefit to the organization and reporting those benefits to the Management Team; (Is the system making us more efficient and if so, by how much?)
- Insuring the design and implementation process does not interrupt the normal flow of financial activity within the organization; (Is the design and implementation process keeping the organization from meeting its current financial reporting requirements?)
- Evaluating and proposing methods for the automated data to be presented in such a way so as to help managers assess the implication of historical financial data on the future; (How can the automation be designed to provide managers with improved insight into operations?)

- Insure the system is positioned to monitor and measure performance so as to point out areas where corrective action might be necessary; (Does their system promote improved performance management?)
- Insure the system can report/provide information to the respective users of that information in a relatively easy fashion; (Can the system report the information in a meaningful and useful manner?)
- Insuring the system has the necessary financial controls and reconciliation checks to insure system security and ongoing accuracy? (Is the data safe and are there key control totals which will provide insight into the ongoing monitoring of the system's accuracy in maintaining and tabulating the data?)

C. Computer Programmer and Other Information System Specialists

Software design and the implementation of computerized systems are often a "black-box" for those who are not familiar with the terminology and techniques involved in such a process. As such, one of the primary roles of a Computer Programmer or Information System Specialist is to help educate the Management Team in an efficient fashion, and explain how automation can add value and how it can most efficiently be employed. For example, often, the programmer will see design opportunities or obstacles that can materially effect the schedule of the design and implementation process. By bringing these issues to the attention of the Management Team, compromises in the design and implementation process can be made which best serve the organization as a whole. Specifically, the Computer Programmer or Information System Specialist is responsible for:

- Identifying opportunities, obstacles and solutions to the automation effort from a technical perspective;
- Collecting, understanding, and educating the top Management Team as to the role, use, and appropriate application of various new and older technologies to the organization;
- Selecting, designing and coordinating the plans for the hardware and software platforms with the data base and communication design structures;
- Developing the system including a design structure that enables ongoing improvements or revisions to be made in an efficient fashion;

Field Activity of One Computer Programmer

A local programmer used by the Odessa ZRP office has been hired to develop a basic software system which will aid in the decentralizing of budgets. The programmer designed the software with standard "off-the-shelf" tools (Microsoft Access™ and Excel™), and in Russian. The value of such a tool was multi-fold including:

- *Expediting the breakdown of the budgets*
- *Improving the accuracy of the calculations*
- *Allowing for iterative attempts under changing assumptions*
- *Providing for ongoing budget breakdowns as significant changes in funded amounts occur*
- *Calculating department costs under different global budget scenarios.*

The "program" is very straight forward, intended to be easily modified by the user as they desire to customize the application to their specific needs, and capable of being used as a facilitating tool to show "how-to" automate selected financial functions that will have a high return on the users time and resource investment. The program has been operating and includes a multiple step-down departmental overhead allocation capability and departmental costing capabilities. The total time for development was approximately 6 weeks.

- Promoting systems which do not duplicate data or processing activities and insure reasonable data security.[3]

D. Other Users of the System

The primary users of transaction based financial systems are clerical, data entry operators or operational accounting or inventory technicians. The primary users of decision-based financial systems are typically economists, financial analysts, and key managers who review the data and information for the purpose of making decisions and solving problems. Because of the interdependency of these two groups of users, it is the responsibility of the design team to solicit the input of potential users. This facilitates the design of information systems, adds value to the system when done, and helps to insure ongoing benefits to a wide spectrum of users.

The variety of users presents unique requirements for the selection and design of software systems. For example, transaction based financial systems are often "repetitive" in nature causing the design of computer screens to be simplified for rapid data entry or computer tabulation. Likewise, the design of the input screen are often best served when they parallel the actual operational process occurring within a department or organization. On the other hand, decision-based financial systems can often involve an complex analysis making the use of graphics, statistical analysis, and sophisticated reporting tools. The ability for systems to be designed to do both is not always easy. Fortunately, many of the newer technology products offer a very reasonable mix of software design capabilities at increasingly reasonable prices. The efforts defined in this manual relied heavily on state-of-the-art off-the-shelf software tools such as those produced by Microsoft™ which offered acceptable system capabilities relative to the cost. [4]

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[3]Health care software systems typically maintain a number of functional security features. These include:

- The ability to restrict access to all, part or selected groupings of users;
- The ability to restrict access to selected data fields. For example, the ability of the system to report patient clinical information but not list the patient name if so desired.
- The ability to update, change or otherwise modify security codes and access passwords in a rapid and periodic fashion
- The ability to compute checksums for critical quantities
- The ability to allow for or "self-assess" for computer viruses
- The ability to monitor, track and identify users entering the system from communication lines.
- The ability to easily backup the system in a periodic or perpetual manner.

[4] It should be noted there are a number of equally acceptable vendors offering a wide variety of features and functionality. Readers are encouraged to explore and research all available alternatives.

IV. The Design and Implementation Process of Financial Information Systems

The designing and developing of financial information systems presented in this document is shown in steps. The steps are:

A. The identification and prioritization of key financial strategic issues in need of automation;
B. The definition of the specific requirements of the system;
C. The design and development of the system;
D. The implementation of the system;
E. Avoiding common pitfalls and following rules of thumb.

A. The identification and prioritization of key financial strategic issues in need of automation.

The central objective of designing and implementing financial management information systems is to support the strategic priorities of a health care organization. Typically such automation efforts are targeted to establish systems that facilitate key strategic and operational objectives, minimize the duplication and inaccuracy of information being manually maintained, and advance the collection, reconciliation, storage, and access to such data by decision makers. This implies the design team must have a keen sense for what those strategic issues are and their relative priority. Based on strategic priorities set by the management team, the organization can seek to automate those underlying processes or activities that will effect the most important strategic decisions related to those priorities.

In order to produce useful software systems for decision-makers, the design team should focus on insuring:

Oblast Clinical Hospital automates selected aspects of its performance management function. Automation to incorporate key performance indicators for senior and departmental managers.

Based on strategic priorities set by the facility, the Oblast Clinical Hospital is automating key data that supports the most important strategic decisions. The intent is to institutionalize the ongoing process of performance management at multiple levels of the organization. In order to produce a meaningful performance management model for departments within the hospital, senior management:

- *Clarified key strategic objectives*
- *Targeted/focused on key operational processes*
- *Targeted/focused on critical factors related to those processes*
- *Wants to use these performance indicators to predict where performance is headed*
- *Wants to identify which performance measures need management attention*
- *Use all of this as a (partial) basis for motivating and leading fellow managers*

- Key strategic objectives are identified and prioritized;
- The automation emphasis is focused on key operational processes;
- The automation effort is targets critical data elements or performance indicators related to those processes.

If this is done, the automation process will then tend to add greater value to the organization.

There are a number of methods for identifying and prioritizing strategic objectives. Likewise, there are a number of ways a design team can evaluate and assess those priorities in light of available automation technology. A case study at the end of this document provides a useful example of such a situation in the Ukraine. The following is also provided.

Each automation project that is selected typically is evaluated based on operational and technological criteria. By providing a relative weight to each criteria and having members of the design team assign their relative "score" to the project, a total project score can be assigned.[5] Inevitably, one or two strategic issues can best be facilitated through automation.

Operational Criteria *(Relative to other automation projects)*	**Weight** *(1 to 5)*	**Score** *(1 to 5)*	**Total**
Economic impact	5	5	25
Strategic benefit to the organization	5	4	20
Service improvement	3	1	3
Information value to management decision-makers	2	5	10
Organizational and/or financial risk	4	3	12
Technological Criteria *(Relative to other automation projects)*			
Technological Adaptability - Ability to link this project to future automation projects	3	3	9
Technical ability and skill/knowledge to deliver the project	5	3	15
Technological fit - Ability to link this project to current automation efforts	2	4	8
		TOTAL	**102**

B. The definition of the specific requirements of the system.

Once the identification and prioritization of key financial strategic issues in need of automation has been accomplished, the design team then defines the specific requirements of the system. This can be done by referring to four questions. These questions help provide the design team with a clear understanding of the specific requirements of what they are trying to design/automate. They are:

1. What are the functional requirements of the system, including any formula or mathematical processes (algorithms) that may be required within the design?

[5]Weights are usually determined by a consensus of opinion of the Management Team. Scores are determined based on the executive opinion of the participating decision-makers.

2. What are the underlying business processes that will be involved in the automation effort?
3. What are the specific data elements that will be automated and therefore in need of collection?
4. What other areas or opportunities where the automation effort might add material value to the business process?

These four questions are explained in greater detail below.

1. *What are the functional requirements for the new system?* This question seeks to define what the design team wants the system to do, and, if any calculations are needed, what are the formulas and methods to be employed. Usually, there are two phases for defining functional requirements. The first is *general* stating the "big-picture" of what the design team intends to do. The second is more specific, stating particular features or functions of the system[6]. Where mathematical formulas will

Example of General Functional Requirements of a Budget Management System

- *Ability to produce alternative budget forecasts and support evaluation*
- *Ability to flexibly report budget information*
- *Creation and storage of modeled staffing scenarios*
- *Comparison of funding and staffing scenarios*
- *Observation and determination of adverse and positive funding trends*

Example of Specific Functional Requirements of a Budget Management System

The Budgeting System shall provide an accurate and timely analytic tool with the capability to forecast financial performance and measure that performance against ongoing results. This supports the strategic goal of effective fiscal management. A functional requirements is the ability to identify early warning signs of oncoming financial threats and opportunities. The system must be capable of using past performance as a learning guide and present the information in an understandable format promoting consensus and support of periodic budget cycles.

Specifically, the system shall:

- *Maintain an excess of four years of historical data and be capable of using a minimum of three years of such data to base prospective forecasts.*
- *Be capable of budgeting a minimum of four years into the future.*
- *Be capable of fixed, flexible and product line budgeting methodologies.*
- *Budget labor costs by labor and/or staff classes. The system is encouraged to have a capability of budgeting labor costs by employee on a shift basis.*
- *Provide multiple methods of forecasting such as "moving averages", "seasonally" or "smoothing" approaches.*
- *Possess a diverse and flexible variance and monitoring, reporting and analysis scheme that will promote ongoing budget management.*
- *Maintain a capability for mid-year re-budgeting cycles which would utilize current year-to-date information as a (partial) source for the updating the year's remaining forecast.*
- *Promote the assembly, preparation and documentation of budget proposals by providing extensive detail and summary budget reporting such as expected income statements, staffing and volume levels.*

[6]The purpose of a software functional specification is to describe in an easily understood manner the requirements of a system. The document is intended to capture and record what the users wish to obtain. It can be used as a resource for subsequent phases of product selection and/or design as well as a tool to facilitate

be used, such formulas should be defined in this phase. For example, forecasting next years volume of patient visits based on the previous two years of historical data could be done in a number of ways. It could be a simple average of the previous two years, or, it could be a weighted average where the previous year takes a higher weight or influence on the forecast calculations. By defining mathematical formulas early on in the design process, the programmer can better design the system to accomplish the objective.

2. *Exactly, what are the underlying processes or operational activities of a particular strategic priority that are in need of automation?* After identifying and prioritizing key strategic issues, inevitably one issue is deemed of highest priority. Within this issue, there is usually a single business process that is in need of improvement. For example, assume it is a strategic priority to collect and analyze patient data within a clinic. Automating the underlying processes of the Patient Registration Desk would be a useful target of the automation effort. In this case, understanding the steps and flow of the patient registration process, including the data elements being currently (manually) collected would be useful.

The Patient Registration Process at an Odessa Clinic. [7]

Step 1
Patient makes appointment at registration where information on doctors' schedules is available.

Step 2
Patient sees doctor and receives treatment. Doctor or nurse fills out a patient registration coupon. Each doctor or nurse has a small stack of blank coupons which they pick up from registration throughout the day.

Step 3
Patient takes coupon to registration. If user fee is involved, patient and pays cashier for treatment. Cashier places payment in cash register and gives receipt to the patient. Receipt contains sum, date and patient's last name. Cashier keeps ledger of patient's names and turns in with register tape to accountant at the end of the day. Money from register goes to accountant once a day. Cashier collects coupons and periodically takes to accountant. Accountant enters coupons into FMIS.

Step 4
Patient takes receipt back to doctor who collects and compiles. Receipts are given to Accountant at the end of the month and are checked against coupons.

Step 5
If tests are needed, patient goes for tests and gets new coupon from doctor/ nurse. Repeat steps 3 and 4. When patient returns receipt to doctor, lab results released to registration.

Step 6
Patient may receive test results from registration.

Another example in the Ukraine is the found in the need to allocate limited resources among departments in a more efficient manner. [8] Because there is not enough resources to go around, the question arises as to how best to allocate, monitor, and measure resource allocation decisions in an ongoing manner. This is

software purchases, design and implementation(s). The functional specification also serves as a communication tool that firmly establishes the expectations of users.

[7] Provided by Kelley Volak, Peace Corps Volunteer - Odessa, Ukraine.

[8] A case study of this entire process is shown at the end of this manual.

seen as a key financial process in need of automation. In order to accomplish this, an automated ability to decentralize the global budget of a facility to the department level under a variety of different scenarios is useful. Here, two key processes are involved:

- The (accounting) decentralization of the global budget among departments, and
- The resulting performance measurement and monitoring of departmental resource use.

1. *What are the data elements that need to be collected and automated to meet the needs of the activity?* Each business process or activity within a health care organization contains certain data elements and steps. For example, in order to automate the registration process of a patient it is necessary to know the *patient's name, the patient's address, the patient's age, the patient's medical symptoms*, etc. Similarly, to produce cost accounting information at the department level, it is necessary to know the *department name, a definition of cost objects within the department, the amount of resources currently being consumed, the quantity of the cost objects be produced or delivered to patients,* etc. These data elements form the "data-foundation" for automating the process. By listing the data elements that will be required in the automation process, the design team can identify the relative ease/difficulty it would take to collect the data and therefore automate the process. Most likely, the data is already being collected or is readily available. In some cases, the data may need to be produced or collected. The design team should always weigh the cost of obtaining the data versus the value it will provide the ultimate decision-makers.

Data Elements for Automating the Patient Registration Process

- *Patient Name*
- *Patient Address*
- *Patient Sex*
- *Patient Address*
- *Patient Symptom*
- *Referred Doctor*

Designing the Input Screens to Parallel Operations in Odessa

"Designing the system so that the automation efforts paralleled current operations of the facility helped.. This immediately enhanced the users understanding of the role of the "new" system and provided tangible and visible value to the staff of the facility. Finally, the input screen for the information was set up to resemble the Patient Registration document. This was a deliberate attempt parallel the process of delivering care and to reducing the length of time required to input the data into the system."

Another material benefit of identifying the data elements involved in a given process under automation is the design of the screens on the computer that will allow a user to easily enter the information. Often, it is best to make the input screen appear similar to the actual document commonly used by the organization.

2. *What other data elements or additional information would make the automation process even more useful to the users of the information?* It is not unusual for the design team to observe new opportunities for analysis or data collection as they design a software system. In fact, there is an tendency to have original software designs grow well beyond the original set of expectations. Each "expansion" of the project should be carefully evaluated and prioritized. It is often useful to first complete the original design before additional functions or features are added. In this way, short term value is more rapidly achieved and time for studying or evaluating additional "expansions" is made available.[9]

> ***Geometric Complexity Observed in Odessa***
>
> *An Odessa software designer sighed as the Management Team requested additional data elements and functionality to be built into a system. These requests went beyond the original specification and had not been considered in the early design and planning effort. As a result, each new data element that was o be added, required the programmer to define within the computer software, the relationship of this new data element to all of the ones already in the system. As more and more data elements were added, the time required to make the changes increased. As one manager stated, "These changes are becoming geometric in terms of the resulting complexity to create within the system".*

C. The design and development of the system: Translating business processes into computer systems.

While this manual is not a programmers guide to the development of software, it is within the scope of this document to overview the essential steps of how a programmer links the strategic priority being automated with the appropriate computer technology that will accomplish it. To do this, the programmer usually:

1. Reviews or maps-out the process and data elements that were identified during the definition of requirements;
2. Determines how critical processes within the automation effort are inter-related;
3. Coordinate and obtain the input from those users who are involved in the processes. This would include examining current forms documents and discussing the automation process with the staff who are most involved in the process;
4. Designing the database structure and relationship including any "interfaces"[10];
5. Select the appropriate software tool to fulfill the design specifications and functional requirements.

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[9] Please refer to Section V-E, "Pitfalls and Rules of Thumb".

[10] There are generally three types of interfaces a programmer will become involved with. Human interfaces (screens) need to be user-friendly, clear to operate and within the operational capability of "occasional" (not constant) access. Tools such as graphics, automated reporting formats and flexible data viewing alternatives are useful. Hardware Interfaces include the ability to interface one or more automated transaction systems and other functional subsets of the system. Placing the computer system on a network would be an example of this. Software Interfaces provide for the automated ability to input data from other systems. This includes the ability to interface with manual systems. Selected user output interfaces are often useful including an ability to interface(importing and exporting) with popular off-the-shelf spreadsheets, word processing programs, graphic packages and database programs.

The first three steps above have been discussed in some detail already.[11] The 4th step, designing the database structure and relationship, is a difficult one.[12] A key outcome of this step is the definition of the database structure and the underlying relationships among the data elements. When properly designed, the database structure will lend itself to changes over time and greatly facilitate the creation of the original design. It should be emphasized that it is the responsibility of a trained programmer to produce a database design structure. For the benefit of all members of the design team, however, an example of mapping out the automation process showing the critical operational processes targeted for automation is shown on the following page. Note how the mapping illustrates the inter-relationship of key data tables and identifies how selected data elements within each process interact. The example shown is the registration process of patients at an outpatient clinic. A number of data tables are shown as well as the relationship among the tables. The example is very simplified. Actual program examples go beyond the scope of this manual but can be seen in most any programmers manual.

D. The implementation of the system

Because of the cost, time, and other resource commitments involved in the implementation of information systems, there has been a great deal of research accomplished in determining the factors that lead to the successful implementation of information systems.[13] Learning from this research[14] and applying this experience is seen as the best "teacher" as to how to go about planning and organizing the implementation of an information system. There are commonly thought to be a number of key ingredients for a successful implementation. They are:

1. User involvement in the design and implementation process;
2. User training;
3. Ongoing management support and commitment to the project;
4. The source of the information, and,
5. Implementation times that are not too long.

User involvement in the design process has been emphasized throughout this manual. In part, because when it is time to implement the system, these same individuals will be asked to help bring the system "on-line". If they have not been involved in the design process, nor properly trained to operate the system, they will not be prepared to

[11] It is important to know when the role of the Management Team ends, and the programmer's technical knowledge begins. Steps 1 ro 3 actively involve the Management Team. Steps 4 and 5 are generally the programmers exclusive domain.

[12] Fortunately, many of the newer software development tools include features that assist the programmer in this effort.

[13] In part ,this is because there have been a number of failures during the implementation process.

[14] One such study is titled, *"Determinants of Decision Support Success: An Integrated Model,* Volume 23, Journal of Decision Sciences, 1992.

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INSERT PROGRAMMER'S DATABASE DESIGN EXAMPLE.

spot implementation or processing problems which may arise.[15] This could impair the accuracy of the data, delay the implementation, or even jeopardize the project.

Ongoing management support and commitment to the project is essential and without it, is a frequent reason for implementation delays and other project management problems. Unless the senior management of an institution will allow for the necessary time and resources that are required to accomplish the implementation, the software design, development, and implementation process will be at risk. It is for this reason senior management was encouraged to be involved in defining and prioritizing the value of the project early-on.[16]

> ***Implementation Means More than Installing Software - Lessons learned in Odessa***
>
> *Implementing a software system means more than installing it on a computer and training users how to operate it. Implementation also means applying the system for organizational benefit. The greatest challenge of implementing a new system is establishing measurable value to the organization. The challenge in this, as explained by the Head Doctor of the Oblast Clinical Hospital, is getting people to use the tool to make better decisions and work more efficiently. In this regard, the software tool acts as an agent of change, rather than the change itself.*

The source of the data being entered into the system must be accurate and reliable. The computer adage, *"garbage-in : garbage-out"* is indicative of the problem of poor or inaccurate data being fed into a system causing poor or inaccurate decisions being made from the data. Implementation teams should take special care at insuring the data is reliable and accurate.

Finally, implementations should not be too long or drawn out. Projects that take too long expose themselves to other risks such as conflicting priorities, and generally more expensive implementation costs. It should be noted, a common characteristic of an implementation process that is in trouble is one that is taking too long to accomplish. Senior managers are encouraged to monitor and track implementation schedules.

E. Pitfalls and Rules of Thumb in Building Computer Systems

While the best teacher is often one's own experience, there are many lessons to be learned from others when designing and developing information systems. The following is a short list of some common pitfalls and rules of thumb to keep in mind when involved in information system design, development, and implementation.

- *Transaction oriented systems are usually much less complex then decision-based systems.* Design teams should be aware and expect that the design of decision-based automation systems generally will be more complex and sophisticated then the design of transaction based systems. In part this is due to the way each group of users works. Transaction based users usually fill out forms, collect information, or enter transaction data such as accounting information. These activities more easily

[15] A basic computer training syllabus is provided in the Appendix of this document. This syllabus was used in Odessa and Kodyma, Ukraine, to bring new users of computer technology to a sufficient level of skill to properly use a newly designed computer system.

[16] See Section II and III and Step 1 of Section IV.

lend themselves to automation efforts because the methods and forms used by these users can be easily observed and duplicated in a computer.

Decision-based automation efforts, however, are inherently more complicated because the automation effort is directed at the human decision-making process. It should be recognized that non-objective information is used to support many decisions and it is not likely to be provided by informational systems at all. Further, it should be recognized there is a multiplicity of goals and decision-making criteria involved in any decision-making process. All of this makes the design of decision-based systems more complicated, and generally, more costly.

- *There is an inclination on the part of system planners to use available data rather than collect the needed or required for the best decision-solution.*Simply because the information is there, does not mean it has value or needs to be automated. During the initial stages of automation this inclination to collect available data will most likely serve the decision-makers well. It is difficult enough to build an information system based on available data, let alone based on data which does not yet exist. However, as the systems become more complex, and as the reliance and expectations of the decision-makers becomes greater, system planners should be willing to identify and collect, if necessary, new information that will best serve the decision-maker.

- *Increased levels of detail generally causes the decision-making ability of the system to be lowered.* Unfortunately, it seems the more detail and data that is entered into a system, the greater the difficulty it is to design the system to facilitate decisions. While greater levels of detail might provide more accurate or intricate reporting capabilities, the required design and database architecture structures become increasingly more complex. Because of this, it is generally recommended initial efforts to automate do not attempt to build the "ultimate" or most comprehensive of information systems. Starting with focused modules, and gaining experience over time, the resources and technological skill required to sustain automation efforts can be better developed and maintained.

- *Excessive historical data is of marginal use to many manages, particularly during periods of rapid economic change.* Simply because a computer can readily hold two, three of even ten years of historical data does not mean it should. In fact, many mangers find little use of such information to base current decisions upon. It seems the role of historical data is not, in fact, as valuable as one might think, especially during times of rapid economic change. While it is often of personal interest to observe historical data, more and more mangers find they do not use such data to make decisions. Rather, they rely more on short term trends, and the resulting analysis of recent operating indicators.

- *The integrity and accuracy of the information is more important than how it is portrayed on a computer screen.* Accurate and reliable data is more important than developing a fancy screen to show the results of the calculation. New software tools make the design of user interface screens rich in features and functionality. For example, graphs can be easily made and screens can be colorized.

Unfortunately, there is a tendency to spend too much time during the design process on these issues of form and not enough time on determining or automating various aspects of the integrity of the system such as data accuracy, data reconciliation, or efficient calculation processes. Design tams are encouraged to first focus on insuring the proper functioning of the system before spending to much time on building clever user interface screens.

- *Align the cost of technology with the value of the decisions or labor savings that will result from automation.* Do not automate for the sake of automation. By defining value to the automation, and aligning the costs of the automation effort with such value, technology can add continuing value to an organization.

- *The innovative nature and the resulting enthusiasm of new systems often can quickly disappear: Expect this.* For those institutions involved in initial automation efforts (and therefore less experienced in this regard) new information systems are initially greeted with great enthusiasm. Expect, however, this "enthusiasm to quickly dissipate as the users become more and more competent at using the system and their expectations of such systems grows. Often managers translate the lack of enthusiasm as a measure of the systems diminishing value. This will not be the case if the design team spent the necessary time and effort determining the strategic importance of the automation effort during the initial design stages. This should not, however, prevent users from seeking to update of upgrade their automation technologies on a regular basis.

- *Computers usually do not replace analysts. Information still needs to be interpreted.* Do not expect financial information systems to answer all the questions of senior management. Rather, the systems are generally more useful for efficiently collecting, presenting, or calculating information so that analysts can be positioned to better identify problems and suggest an increased number of possible solutions.

IV. Analyzing and Using Financial Information[17]

When discussing the analysis and use of information for decision-making, the focus is more on decision-based automation systems.[18]

A. Objectives and Methods of Analysis

Unlike transaction systems, decision based systems are driven by larger organizational and policy objectives. These objectives are not specified "once and for all" but are constantly being refined. As such, the analyst's overall challenge is to support changing

[17] A 250 page manual is available detailing hundreds of examples of selecting methodologies for analysis, developing, using, and applying the resulting financial information for improved decision making. The manual, titled, *"Implementing Management Accounting and Control Reforms in the NIS: A Manual for Health Care Organizations",* by B. Else and A. Wouters, April 1996.

[18] As indicated earlier, where transaction automation seeks efficiency in the tabulation and recording of various types of data, decision-based automation seeks to improve the strategic effectiveness of the management team. Both automation efforts hold significant value and importance to health care organizations and are often inter-dependent.

organizational and policy objectives.[19] Decision-based financial information systems seek to enable the decision-maker to help accomplish this for a number of analytical objectives.

The objectives and resulting methods for analysis can be summarized as follows.

- *Better Identify problems.* The objective is to seek the right solutions to the right problems rather than the involved solutions for the wrong problems.
- *Provide for measures of costs and benefits* The objective is to provide for a financial cost analysis as well as a scheme for evaluation of efficiency and effectiveness (e.g. benefits).
- *Promote the identification of alternatives* The objective is to offer alternative ways of achieving the decision-makers objective(s). This would include the specifying of a range of alternatives compared to the current situation.
- *Provide for an evaluation framework of those alternatives* The objective is to support an understanding of the predictive consequences of an alternative decision and compare those alternatives.
- *Better monitor and evaluate results.* The objective is to monitor and assess the impact of the decision.

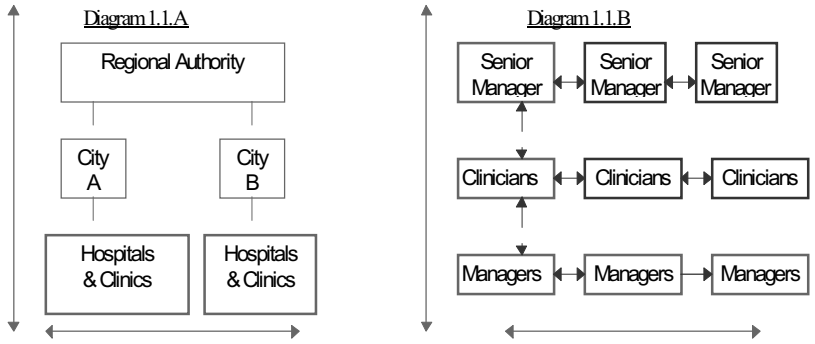
B. Role of Analyst

A financial analyst participates in the provision of a certain set of information commonly used by senior managers. Applications of information typically include budgeting, cost accounting, case mix management, basic productivity analysis and more. These applications of financial information are often interactive and interdependent, providing greater value when coordinated in an integrated decision-making environment. Typically, one or more analysts are involved in the process. In the Ukraine, these individuals are usually the Hospital Economist, Accountant, Senior Deputies, and/or Head Doctor.

The primary role of the analyst is to help to insure accurate and reliable data and analytical methods are being employed in the analysis. In this regard, the role of an analyst supports both vertical and horizontal support for decision-making. Vertical support can be characterized as offering decision-support to a region or state health authority. (see diagrams 1.1.A below) Vertical support also means the ability to provide decision-support within an entity such as between senior and junior management. (see diagram 1.1.B)

Horizontal support can be characterized as functional-based, where individual departments, clinicians, or functional areas are compared across the institution.

[19] The Analyst is usually the Economist, or equivalent senior manager.



C. Common Subject Areas and Uses of Information

The following sections outline some common health care management subject areas where applications of financial information typically occur. Each subject presents the role of the analyst in using financial information.[20]

Funding Analysis

The analysis of actual costs versus available funding is an important step in understanding the optimum use of limited funds. As such, financial information in concert with statistical data can provide sufficient information to facilitate resource allocation decisions. While the terms and timing of funding can often be diverse and complex, the role of the economist is to support the modeling and analysis of various funding scenarios. This holds significant planning and resource management value to decision-makers. Methods for such analysis might include:

> ***Other Funding Questions***
>
> • *To what extent should staff share in the funding they generate?*
> • *What departments have the greatest potential for generating non-public funds?*
> •*What is the desired mix of different types of funding sources?*
> •*Are funds accurately identified with the departments that "earn" them?*

- Creation potential funding scenarios
- Comparison of funding scenarios
- Observation and determination of adverse and positive funding trends given the expenditure of costs
- Determination of actual and prospective cost-reimbursement with resulting variance reporting

Budgeting

[20] This section has been adapted from themanual, titled, *"Implementing Management Accounting and Control Reforms in the NIS: A Manual for Health Care Organizations"*, A. Wouters and B. Else, April 1996.

Financial information can facilitate forecasts of financial performance and provide measures of that performance against ongoing results. This supports effective fiscal management. Here, financial information helps to identify financial threats and opportunities that are on the near horizon. Using past performance as a learning guide, analysts typically present historical information to support proposed and periodic budget cycles. In this regard, it is not uncommon to have numerous iterations of possible budgetary alternatives, as well as a need to analyze those alternatives under different perspectives. As such, an economist commonly:

Key Questions for Senior Managers for Reviewing Budgets

- *Are resources allocated fairly among the various responsibility centers?*
- *Are the strategic objectives incorporated into the budget?*
- *Are the technical assumptions and methods valid and correct?*

- Reviews historical data and is capable of applying this historical information to better define likely prospective budget forecasts.
- Frequently provides these forecasts in a number of different formats such as fixed, flexible and product line budgets.
- Focuses on certain types of accounting costs such as labor which typically consumes a great deal of total financial resources
- Encourages diverse and flexible variance reporting and analysis schemes that promote ongoing budget management.

Financial information also supports the preparation of and analysis of capital budgets. Here, acquisition and divestment of buildings and equipment as well as funds for renovation are organized, modeled and maintained. The capital budgeting function identifies the timing, depreciation, cash-flow, residual values and on-hand capital listings of needed assets to the typical health care organization. Without these assets, there would be minimal capacity to deliver health care. Thus, the role of the analyst in optimizing this functional area of management is key.

Productivity Management & Cost Control

Financial information can support the analysis, evaluation, modeling and reporting of the ratio and relationship between the goods and services produced (outputs) and the factors (inputs) that have contributed to production. Usually these factors of performance are expressed in terms of outputs such as hours per patient, minutes per treatment, meals per hour, tests per shift, and so on.

A fundamental objective of the productivity function is to identify changes, whether desired or retrospective performance evaluations, that should- or need- or did occur over time. By identifying, reporting, and evaluating other variables that impact on productivity performance in utilizing resources, financial information can play an important role in optimizing productivity. For example, assessing the effect of emergency room admissions on the department of surgery productivity levels. Common uses of financial information would include:

- The calculation of productivity performance indicators
- The measurement and reporting of productivity measures
- The recognition or identification of a variable's(s) effect upon output measures
- The production of usable, clear, and concise reports for use by operational personnel in their effort to manage productivity
- The tracking and monitoring of trends of productivity measures including any changes (upward or downward) of inputs or other intervening variables.

Table 2.10 Example of Flexible Cost Budget Analysis in an Ancillary Service Department

The following data is available for the ancillary department:

Cost	Actual Quantity	Planned Quantity	Actual Unit Cost	Planned Unit Cost	Actual Total Cost	Planned Total
Syringes	1,000	2,000	$0.50	$0.50	$500	$1000
Gauze pads	2,000	2,000	$0.05	$0.05	$100	$100
IV sets	1,000	1,000	$2.00	$2.10	$2,000	$2,100
TOTAL					$2,600	$3,200

Question: What is the volume variance for syringes? What is the unit cost variance for IV's? What is the total variance?

Solutions:

Volume variance for syringes:

(Budgeted Volume - Actual Volume) X Budgeted unit cost = Volume Variance
(2,000 syringes -1,000 syringes) X $0.50 per syringe = $500 favorable
(fewer syringes used than planned)

Unit cost variance for IVS:

(Budgeted unit cost - Actual unit cost) X Actual Volume = Unit Cost Variance
($2.10 -$2.00) X 1,000 sets = $100 favorable
(unit cost less than planned)

Total Variance = Volume Variance + Unit Cost Variance
$600 (favorable) = $500 (favorable) + $100 (favorable)

Strategic Planning

Strategic planning is the accomplishment of examining alternative ways of achieving an objective and providing an estimate of the resources required to accomplish that objective. Additionally, strategic planning provides a reference for measuring how much has been done to accomplish the objective. (monitoring performance)

Forecasting and strategic planning are not equivalent. Forecasting is the prediction of future events (budgeting) while strategic planning is the determination of actions or events that can be decided now or in the near future. Thus, the ability of forecasting to support strategic planning is a frequent challenge for analysts. Analyst support is commonly accomplished within the budgeting . For example, the decision to accept or

reject a funding source is strategic in nature but would most likely require a forecast of predicted financial and operational outcomes.

Examples of typical applications of information in a strategic decision-making environment would include the determination and evaluation of investment decisions including capital, operational, service, affiliation, consolidation, and other decisions. Likewise, a range of divestment decisions are common including closing facilities and selling or disposing of obsolete equipment, closing operational segments, reducing services or redefining the scope of health activities.

Urban Hospital Creates Strategic Plan

A hospital in Lviv, Ukraine has created a summary level strategic plan designed to position the organization so as to better adapt to the changing funding, service, and clinical needs of the local population. The plan acts as a guide for senior management in deciding and evaluating alternative courses of action. Financial information, tools and techniques were fundamental in creating the plan and providing ongoing methods for its implementation

Community Health Management

An important aspect for most health care organizations is the to support community health management including the analysis, management and operations of such activities as preventive medicine, public health education programs and an integrated analysis of inter- and intra-organization referrals. In addition, community health management includes the ability to review key health population concerns for the improved management structures. Here, the role of economist along with the required clinical personnel is indispensable in finding more optimum scenarios for managing limited resources.

Case Management

Three levels of case management can be defined.

"*Generic case management*" is defined as a multi-disciplinary team typically composed of a doctor(s), resident(s), nurse manager, social worker, and other ancillary team members (physical therapist, dietary consultant) who hold "rounds". The focus of these rounds is the efficacious determination and expeditious delivery of patient care, treatment, and testing. Expected length of stays, planned protocols of care, and anticipated impediments are routinely discussed and reviewed. Financial information can add insight into the costs, available budgets, and the operational impact for selecting alternative courses and protocols of care. By no means does the financial information seek to replace or criticize clinical decision-making.

"*Utilization review/utilization management (UR/UM) case management"* employs the management staff in the role of case "expediters". Here, nurse managers, social workers and clinicians acting as planners work in close cooperation with the UM/UR staff in a team approach to case management. Key functions of this team involve the identification of the appropriateness of hospital admission, the monitoring of hospital-specific clinical guidelines, the following of state guidelines as well as hospital/provider specific resource use guidelines. Examples of resource monitoring would be the identification of treatment delays that may impact length of stay. Typically UR/UM case management involves concurrent and retrospective reviews

involving reviews of up to 100% of a given patient type. Financial and operational information when supplemented with clinical information can add great value to this decision-making area through:

- Identification of the operational and cost impact of selected admission types
- The retrospective monitoring of hospital specific guidelines and other protocols of care to determine cost efficiency and consistency of care given variations in the treatment patterns
- The monitoring of key funding and reimbursement guidelines or plans
- The monitoring of hospital resource utilization and consumption

"*Clinical case management*" is diagnosis based case management designed to coordinate, expedite and advocate care, especially care of complex illness across settings including beyond acute care environments. Attributes of clinical case management focus on the attainment of measurable clinical or pathologic outcomes. As such, the role of financial data is normally rather limited in this area.

A Treatment Protocol and Costs for a Selected Case Management ('000s of KPS)

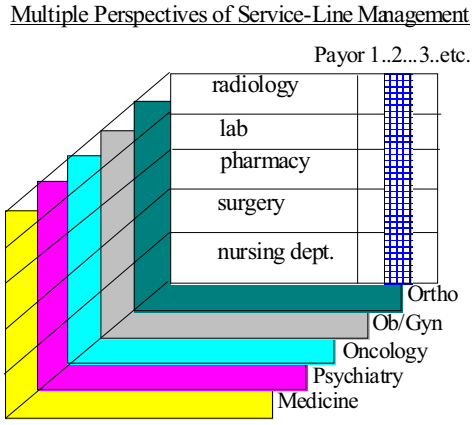
Department Cost Center	*Quantity*	*Variable cost per unit*	*Fixed cost per unit*	*Total Cost per unit*	*Total Variable Cost*	*Total Fixed Cost*	*Total Cost*
Registration	1 hour	Kps48.00	Kps52.00	Kps100.00	Kps48.00	Kps52.00	Kps100.00
Patient care	7 days	Kps110.00	Kps45.00	Kps155.00	Kps770.00	Kps45.00	Kps815.00
Pharmacy		Kps38.00	Kps19.00	Kps57.00	Kps38.00	Kps19.00	Kps57.00
Chest x-ray	1 RVU	Kps12.00	Kps8.00	Kps20.00	Kps12.00	Kps8.00	Kps20.00
Lab Blood test	1 RVU	Kps4.00	Kps3.50	Kps7.50	Kps4.00	Kps3.50	Kps7.50
Other tests		Kps85.00	Kps55.00	Kps140.00	Kps85.00	Kps55.00	Kps140.00
Patient meals	21	Kps1.30	Kps1.20	Kps2.50	Kps27.30	Kps1.20	Kps28.50
Linen	7 sets	Kps0.60	Kps0.50	Kps1.10	Kps4.2	Kps0.50	Kps4.70
Room Cleaning	1 team	Kps7.00	Kps3.00	Kps10.00	Kps7.00	Kps3.00	Kps10.00
TOTAL							Kps1,182.70

Service Line Management

The management of service lines is a typical application of financial information for those institutions organized around groups of services such as gynecological services, orthopedic services, etc. A service line management capability allows a facility to view the organization from multiple management perspectives. Assessment of quality, financial performance, operations, resource utilization and other measures are key functional aspects of service line management.

Analyzing alternative resource consumption profiles within service lines is a typical use of financial information. This analysis frequently occurs across departmental perspectives.

The diagram below illustrates service line management. In the diagram, Orthopedics, OB/Gynecology represent clinical service lines on one axis of the cube. Radiology, the laboratory, the pharmacy, etc., represent the departments that supports these service lines. Payor 1,2,3, etc. represents the funding sources. These could be Municipal Authorities, Oblast Authorities, Aid, etc.



The diagram illustrates the role in which financial information plays in providing useful information evaluating service lines. As an example, the utilization of resources by the orthopedic service lines among the departments can vary compared to the Ob/Gynecology area. By understanding these variations, increases or decreases in selected services levels can be evaluated for their cost impact on operations. The financial and operational impact of expanding the OB/Gyn area as opposed to the expansion of the Orthopedic area can be better evaluated.

Appendix

Case Study #1 - *Aligning Strategic Priorities with the Design of an Automation Effort for Producing a Departmental Performance Management System*

Case Study #2 - *Implementing a Financial Management Information*

Case Study #3 - *Computer System Training*

Case Study # 1

Aligning Strategic Priorities with the Design of an Automation Effort for Producing a Departmental Performance Management System

I. Background

The Odessa Clinical Hospital is a 1130 beds regional health care facility located on the outskirts of the City of Odessa. Acting as a referral hospital for the more critically ill or injured, the hospital employs approximately 2500 people and offers a complete range of health care services.

In addition, The Odessa Clinical Hospital serves as a training center for medical and nursing students. The facility also acts as a data collection point for a variety of Oblast level activities such as infectious disease tabulation.

II. Aligning Strategic Priorities with the Design of an Automation Effort

The definition and prioritization of the automation priorities considered a number of factors. First, the hospital was relatively new to automation efforts. Second, there were a wide variety of pressing issues facing senior management. The complexity of these issues and the resulting need to direct management's attention to the most important of issues was paramount. As a result, the Head Doctor formed a team of senior managers. The team composed of:

- The Head Doctor
- The Head of the Polyclinic
- The Head of Inpatient Services
- The Head of the Department of Surgery
- The Chief Accountant
- The Head Economist
- An external health care consultant experienced in the design, development, and implementation of information systems

The task of the Management Team was to identify and help prioritize a number of areas that were deemed to be of foremost strategic importance. The issues were grouped into two categories: Financial and Administrative Management, and Clinical Management. This categorization was in recognition that any automation effort needed to be balanced and weighed against all operational priorities. The categories were:

Financial and Administrative Management	**Clinical Management**
Funding Management	*Utilization Analysis*
Cost Management	*Patient Focused Care*
Employee Management	*Episode of Care Analysis*
Key Operational Indicators	*Clinical Benchmarking*
Scheduling	*Severity management*
General Financial Management	*Clinical Quality and Care Process Improvement*
Budget	*Population Health Management*
Performance Management	*Physician Profiling*

Each category was initially discussed and defined among team members. Then, a relative score of importance was assigned to each category by each team member. The score was on a scale of importance from 1 to 5. For example, Funding Management by one team member was given a 5 while Employee Management was given a weight of 3 by the same individual. This gave the category Employee Management slightly less importance than Funding Management. The scores provided by each member of the senior management team were then tabulated.

The results of the effort were discussed among team members and a quick consensus was found as to the relative priority of the issues. The results are shown on the next page followed by a definition of automation objectives from the resulting consensus.

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Insert Oblast Clinical Hospital Strategic Priorities chart.

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III. Objectives of Designing and Implementing a Performance Management System

The purpose of the information system was to automate the decentralization of the global hospital budget among the operational departments so as to produce departmental cost accounting calculations, and monthly departmental performance indicators. It was the ultimate objective of the senior management to measure, monitor, and report departmental performance on a more consistent and repetitive basis.

Automation efforts are targeted to establish systems that facilitate key strategic and operational objectives, minimize the duplication and inaccuracy of information being manually maintained, and advance the collection, reconciliation, storage, and access to such data by decision makers.

Given shrinking funding levels, the Head Doctor waned to insure departments were performing at optimum levels. This required an increase level of accounting and economic information to be produced on a regular basis. On previous occasions, such information would take 45 to 60 man-days to produce. Then, there were often questions as to the relative accuracy and the maintainability of the data on the part of the economic and accounting departments. Given the strategic importance of the objective, and the limiting funds to hire additional personnel to accomplish the task manually in an ongoing manner, the management team elected to automate these key processes.

The information that needed to be produced included:

- Departmental budgets shown by article
- Departmental costs by service
- Departmental statistics
- Key performance indicators shown by department

By automating this information, the facility would be better positioned to maintain performance reports and hold departmental managers more accountable for results.

Performance indicators within the Oblast Clinical Hospital's performance management system are meant to be responsive to various levels of hospital management. This includes department managers responsible for key operational processes and activities and administrative managers responsible for essential reporting and leadership functions. No single "foreign" performance management system seemed fit the needs of the Odessa Clinical Hospital. However, a common framework was applied to The Odessa Clinical Hospital that enhanced the opportunity to obtain a meaningful measurement system for each department The responsibility for creating a performance management system ultimately rested with senior management and their supporting staff. These individuals acted as facilitators in the design and implementation of an automated system of performance management. Key to their effort, was:

- Alignment between organizational objectives with the supporting performance measures necessary to monitor progress.
- The identification of the benefits of implementing a performance management system.
- The definition of steps and phases to implement such a model.
- Definition of the roles and responsibilities of key players in the process.
- Willingness to clarify and remove the operational challenges of implementing such an effort.
- Desire to identify where performance indicators were headed
- A need to identify which performance measures required management attention and which ones did not

III. Key Roles

The Management Team formed by the Head Doctor was instrumental in defining and setting the pace of the design and development of an automated performance management system. In addition to forming the team, the Head Doctor performed a number of functions in the definition of the performance management model. These included:

- Helping to identify old and develop new performance indicators
- Helping to train staff members on the role and value of such indicators
- Participating n the designing and implementation of the performance management model
- Forecasting the impact of new indicators on the staff and operational processes
- Following-up on the organizational value and impact of the performance management model

Weekly meetings were occurred among members of the design team. While the economist and accountant collected and insured the accuracy of the necessary data to make the system operate, the external consultant facilitated the necessary design and development plans. The entire project took about 8 weeks.

IV Framework for the Design of the Performance Management Indicators

The performance indicators that were established had five basic orientations. They were:

1. Output - *Measures as to what is being quantitatively accomplished within the department. Here, the number of patient days, patient visits, etc. are key indicators.*
2. Input - *Measures as to what is being quantitatively being provided to the department. Here, the number of doctors, nurses, aides, materials, medicines, etc. are key indicators.*
3. Process - *Measures as to the internal activities of the department. Here, the average length of stay or the direct time spent per patient were of interest.*
4. Quality - *Measures as to the qualitative nature of the department. Here, mortality rates, infection rates, re-admission rates, etc. were of interest.*
5. Efficiency- *Measures as to cost management and control within the department. Here, the unit and component cost per service are key indicators.*

V. Implementing the System

The implementation plan and schedule of this performance management system was too aggressive. Implementation occurred over a three week period and this was barely enough time to allow users to adjust and incorporate the nuances of the system. In part this aggressive time schedule was due to a number of external events which occurred including:

- Another reduction by the Authorities in the global budget resulting in the need for senior management to direct the immediate attention to other matters
- The limited availability the external consultant
- The need to provide computer training to selected individuals within the organization and the difficulty in arranging training schedules to meet their periods of availability.

In spite of these issues, the system was implemented.

Implementation training sessions and weekly meetings regularly occurred which was critical to the progress. Items discussed typically included:

- Adherence to the schedule
- System programming issues
- Training needs
- Data Problems
- Next Steps

An interesting aspect of the implementation system was the creation of a management by exception reporting capability. After the user enters into the system acceptable parameters for performance, the system reports when a given department is outside of the parameter. It is the intention of the senior management team to set these parameters after the system has been operating for a few months. This will allow for more accurate and appropriate benchmarks of performance among departments. An example of the performance management system is shown below:

VI. Conclusions

The establishment of the performance management system is still ongoing. In fact, management views the creation of the automated system as only a start in a long process to redefine how managers manage. It is expected that all of the performance indicators will eventually be refined. Because this was expected, the system was designed to accommodate changes in performance indicators with minimal programming effort. Finally, after the implementation of the system was complete, the Head Doctor is following up with a post-implementation period whereby the system will be examined for its usefulness and value. This is not an attempt to question the value of the automation so much as an attempt to fine tune the value and learn from the experience of automation.

Case Study # 2

Implementing a Financial Management Information System (FMIS) in Odessa

I. Background

The International Medical Research Family Health Center (FHC) was established in 1988 as an application of self-financed health services in the Soviet Union. FHC is a scientific, diagnostic, and therapeutic facility concerned with the treatment of female reproductive organs and urologic pathologies. FHC's mission is to provide high quality medical services at prices which are affordable to all.

FHC is one of the few health facilities in the former Soviet Union which attempts to be fully self-financing. Other health facilities employ user payments but many also rely on the State budget for financial support. Because efficient and effective financial management is a primary concern of FHC, the need to enhance decisions involving financing is an important strategic priority for the management team.

II. Objectives of Designing and Implementing Financial Management Information Systems (FMIS)

The purpose of the FMIS was to automate the capture, centralization, and management of vital data so as to enhance management decision making and supportive analysis. Transaction data within the FHC had routinely been collected but was not processed in an efficient manner so that management could apply the information for day-to-day and strategic financial decision making. By automating the collection and processing of patient and financial information the FHC sought improved efficiency in the tabulation and recording of various Types of data. Additionally, once the automation of the collection of data was accomplished, the management of FHC sought to enhance decision-making regarding how this data was analyzed and used to guide the organization into the future. This was seen as an opportunity to improve the strategic effectiveness of the management team and enhance operational efficiency. Both automation of the data collection as well as the automation and facilitation of the analysis held significant strategic value to the survivability of the FHC.

The central objective of designing and implementing financial management information systems is to support the strategic priorities of a health care organization. Typically such automation efforts are targeted to establish systems that facilitate key strategic and operational objectives, minimize the duplication and inaccuracy of information being manually maintained, and advance the collection, reconciliation, storage, and access to such data by decision makers.

The transaction data that was automated included:

Patient Identification number	Doctor identification number
Coupon control number	Nurse identification number
Date of service	Procedure number
Diagnosis Code	Department number
Amount paid	Method of payment(kvb, exempt, OMA, enterprise)

By automating this information, the facility would be better positioned to generate statistics and performance reports on a wide variety of topics. Some of these performance management topics included:

- Quantity of procedures by department
- Amount of revenue/funding by department
- Percent of total revenue/funding by department
- Revenue/funding by payment method
- Total number of procedures by payment method
- Percent of total revenue/funding by payment method
- Quantity of each procedure
- Total revenue of each procedure
- Average revenue by procedure

- Percent of total revenue by procedure
- Number of procedures by day
- Average number of procedures per week
- Total number of procedures by Doctor
- Amount of revenue by Doctor
- Average revenue per procedure by Doctor
- Percent of total revenue by Doctor
- Number of individual procedures by Doctor
- Total number of procedures by nurse
- Amount of revenue by nurse
- Average revenue per procedure by nurse
- Percent of total revenue by nurse
- Number of individual procedures by nurse

Once automated, this information could be viewed and/or printed for any period of time.

III. Key Roles, Users, and Their Time Commitment

The Director of the facility acted as the development team leader. In the early stages of the system's development, all ideas and questions were reviewed with her to get a feel for the strategic needs of the facility and the short and long term value to the organization of the approach being explored. Assisting the Director was the Chief Economist, who represented the accounting/financial side of the development team. Other department heads of the facility also were participants in designing and implementing the FMIS. Several meetings and discussions were held to explain the program, seek department input, prioritize features and functionality, and, of course, to answer any questions. The total development time was about 4 months, requiring the periodic attention of 2 to 3 hours per week by all team members. By involving a number of key members of management, the design of the system better matched the needs, priorities, and internal processes of the organization.

Automation of Data Collection Improves Management Decision-Making

The primary beneficiaries of automating transaction data were clerical, statisticians and operational accounting personnel. The primary users of decision-based automation were economists, financial analysts, and key managers who reviewed the data and information for the purpose of making decisions and solving problems. The variety of users presented unique requirements for the selection and design of the software system. For example, the automation of transaction based data was "repetitive" in nature causing the design of screens to be simplified for rapid data entry and computer tabulation. On the other hand, decision-based automation needed to include the use of graphics, statistical analysis, and reporting tools. The ability for the system to be designed to do both was facilitated by clearly identifying the strategic goal of the software system and understanding in advance the limitations and comparative advantages of the software.

IV. Framework for the Design of the Financial Management Information System

A key to the successful design and rapid development of this FMIS was insuring the desired specifications of the desired features and functionality remained narrow in scope and aligned with the strategic priorities of the organization. Designing the FMIS so that the automation efforts paralleled the current operations of the facility helped in this regard. This immediately enhanced the users understanding of the role of the "new" system and provided tangible and visible value to the staff of the facility.

Specifically, the transaction data that needed to be collected/automated had previously been gathered in a variety of ways. By consolidating all of the essential data into a single patient "coupon" which followed (and in fact streamlined) the flow of the patient, the collection, input, and resulting

automation was greatly facilitated. In this case, the coupon was issued by the Cashiers to the patient, filled in by the Doctor, and then entered into the system by the Accounting Department. Thus, the collection of data matched the process of delivering care. (An example of the coupon is attached.) Specifically, the patient would enter the facility and register at the front desk. The front desk would set up an appointment with a specific Doctor or direct the patient to wait in line for the next available Doctor. After the patient was seen by the Doctor, the Doctor would complete the coupon indicating what services were performed as well as make notes in his own clinical records. The coupon would then be forwarded to the Accounting department for entry into the FMIS. Once the data was entered into the FMIS, automated reporting and analysis was immediately available to managers.

The initial information system was written and evaluated in a Microsoft Excel ™ spreadsheet. The data was collected and reports were devised in Excel ™ for several months. This step gave the development team valuable experience and solidified their approach and workplan.

The next step was to hire a professional database programmer and duplicate the information in Excel™ into a more user friendly system. Microsoft Access ™ was selected as the program of choice for a number of reasons. First, the cost of the program was rather small. Second, the system and supportive training was available in Russian from local vendors. Third, the system is very easy to change and update as revisions/changes/improvements to the program were sought.

One of the first steps was to establish number codes for all relevant data being collected. As an example of this, the information required on the coupon included a patient identification number. At first is was suggested that the computer select a random, unique number for each patient. This idea was dropped after computers were not available for all Doctors or at the central registration area. The use of a unique patient identification number was implemented by the Doctors which included:

- the first three initials of the patient's last name
- the first initial of the first name
- the first initial of the middle name
- the birth date(day, month, year)

An example would be, Irina Vokova Shimkin born March 17, 1955. Her patient identification number would be: **SHUIV170355**. In addition, Departments, Doctors, Nurses and Procedures were given 3 digit codes. This implied that the system would not go beyond 999 codes for each category.

Finally, the input screen for the information was set up to resemble the coupon. This was a deliberate attempt parallel the process of delivering care and to reducing the length of time required to input the data into the FMIS.

V. Implementing and Using Financial Information Systems

Implementation of the system was initially discussed and coordinated with the committed support of the management of the facility. All those involved had a chance to raise their concerns and bring up specific issues related to them or to their department. A good deal of the substance of these discussions related to building consensus as to the strategic priorities of the implementation process. In addition, essential planning, organizing and the identification of responsibilities occurred.

A calendar of events was circulated to show the importance of the development cycle of the new system and identify key milestones for the implementation schedule. If something did not happen at the intended time, it became clear this could jeopardize the timing of the entire project. This encouraged timely participation of all development team members.

Implementation meetings were established in advance to create, review and discuss the implementation workplan. For example, at the beginning of the project, a brief meeting was held each morning. Items discussed typically included:

- Achievements from the previous day
- Opportunities with solutions from the previous day
- Adherence to the workplan calendar
- New Control procedures that should be established to maintain the integrity of the system
- A general sense as to the acceptability of the system by the Patients & Staff

Preparing to use the information system for decision making purposes was an exciting aspect of the project. Information gathered the previous day and combined with earlier history was rapidly applied to the decision-making and day to day management process. Examples included:

- Highlighting increases or decreases in key performance indicators, such as the number of patients observed and the number of procedures performed;
- Calculating the payroll for the Doctors and Nurses. In the case of the FHC, caregivers are paid, in part, a specific amount for each procedure performed;
- The establishment and monitoring of appropriate staffing requirements according to current business levels;
- The determination of which procedures contributed the majority of the revenues and costs, so financial estimations could be calculated and constantly updated;
- The identification of specific populations such as age groups and other demographic groups of patients;
- The identification and monitoring of the number of visits for (any)specific patient;
- The forecasting of future costs and receipts;
- And more...

VI. Other Considerations

Having a representative with internal control knowledge and accounting experience on the development team was a particular advantage. For example, the management team at FHC sought to enhance the internal control environment and key control processes by reconciling on a daily basis reconciling the total cash for the cash register receipts with the total cash represented in the FMIS system. By identifying, designing, and testing this reconciliation process early on in the development cycle, internal control was proactively developed. This resulted in a number of additional improvements which included the creation of control numbers of the coupons being maintained in a log so that the number of coupons issued versus collected could be reconciled. Ultimately this improved the integrity of the data in the FMIS and enhanced the reliability of the system as a source for decision-making.

VII. Conclusions

Thanks to the FMIS, the management of the FHC has a better understanding of their operations. Examples include:

- If the number of patients decreases, managers notice the decline in a matter of days. The management team can immediately attack the shortfall, thus reducing the number of slow business days.
- Management can expect a certain volume of business on a particular day of the week. Thus improved staffing guidelines have reduced the payroll expense or have spent the money in more value adding and efficient manner.
- Doctor and Nurse paychecks are reconciled with the number of procedures that the facility received money for. Because pay is based on performance, this is an important strategic issue to the staff and management.
- If management inquires about certain business activities, all of the information is immediately available. Proformas and “what-if” scenarios can be reviewed using the up-to-date data.

These are just a few examples of how the FMIS has improved how operations have benefited through automation.

Case Study # 3 [21]

Basic Computer Training: A Course Agenda

[21] Case study developed by Vera Yurova - Odessa Ukraine.

I. Objectives of Training

The objective of the training was to prepare students for using the micro-computer for the purposes of strengthening the financial management capabilities within hospitals. It was decided early on in the definition of the training agenda that the students did not need to know everything about computer systems. Rather, it was seen as useful to know enough about computer system operations to add immediate value to their institutions. Specifically, it was deemed important that the students learn the use of essential spreadsheet, database, and word processing capabilities. In this case, Microsft Office™ was used including Excel™, Access™, and Word™.

II. Course Methodology and Overview

The training occurred over a two week period of time. Training was normally held from 1PM to 5PM five days per week. In order to teach specific applications such as spreadsheets, or database use, it was first necessary to teach the basics of computer operations and computing environments. All course work was completed with a computer so as to maximize the exposure of users to the hardware. This initially included hands-on course work covering:

- The component parts of a personal computer;
- An overview of Windows™;
- File management and maintenance;
- "Help" in complicated situations;
- Computer Viruses;
- Backing-up files;
- Saving files, including naming protocols;
- Overview of the most common types of programs.

Certain subjects were excluded. For example, customizing Windows™ such as creating an icon or program group, or changing the color of a window was not covered. Likewise, teaching any of the Windows™ utilities such as Write, Calendar, Paintbrush, Notepad, Clock or Calculator was avoided. These programs are fun, but were seen as adding marginal value to the ultimate purpose of the training: Strengthening financial management.

Finally, it should be noted students were exposed the basic principles of organizing files including:

- Not mixing user created files (documents) and program files within the same directory
- Setting-up personal directories for easy back-up, etc.

After teaching the basics of computer operation and Windows™, an overview of the most common types of computer applications was provided. These included word

processing, spreadsheet, database, utilities, games, etc.. this was followed by a discussion of the main functions and values of each application type.

Finally, specific training on applications occurred. The training commenced with a spreadsheet program, Microsft Excel™. Students created a manual spreadsheet first so they could better visualize what a spreadsheet was before they turned on the computer and automated the task. The students learned the general principles of organizing spreadsheets, calculating with formulas and functions, working with files within Excel™, and creating charts and graphics.

Because of the wide variety of formulas and functions found within modern spreadsheets, not all of these functions were covered. rather, students were taught the basic functions and directed how to investigate the use of other ones, as required. Specifically, *the Add, Sum, Subtract, Multiply, Divide, and Average* functions were taught, as well as saving, renaming, formatting and the printing of spreadsheet files.

Training then occurred using Access™, a database program. Topics included:

- The basics of database use including what is a database, how to start and exit the program, how to save and create database file, etc.
- The structure of database files (tables, forms, queries, reports)
- The entering, editing, sorting and finding of data.

To better learn the process of treating a functioning database, students actually created a simple database file with supporting tables, forms, queries and reports. Then students were allowed to use their database, access files, and build reports..

The last application program taught was a word processing program. In this case, Microsoft Word™ was taught. Again, students were not asked to learn every feature and function of the program. rather, they learned a sufficient amount to obtain immediate value to their daily duties. More specifically, this included:

- How to work with text in the document
- How to format part or the whole of a document
- How to open, save, create documents, etc.
- Typical mistakes and the common problems when working in Word™.

Finally, all students were allowed ample time and access to the systems to practice their skills.

III. Computer Training Outline

Insert 2 pages of Microsft Excel [tm] Filename: ***Vera.xls***