Effective planning for and justification of the extension of data processing in hospitals

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Starting with the basic premise that: There is a significant role for data processing as a viable tool to assist in patient care and administrative management of hospitals, then we can dispense with the assumption that it should no longer be necessary to convince administrators of the need for computerization in hospitals. This premise seems to be substantiated by the significant increase in the application of computer technology over the last several years as documented by a 1972 American Hospital Association Survey that indicated that of 552 hospitals sampled, 81 percent had one or more in-house computers and an additional 5 percent used out-of-house computer services.

By virtue of today's socio-economic environment and continuing advancements in medicine it is a given fact that hospitals are becoming more complex and are offering more services. The management of a more complex and diverse institution offering a broader range of services becomes much more difficult. To compound the complexity problem, there continues to be a shortage of qualified professional personnel and those qualified professionals now in the field are being used heavily in clerical tasks. All of these trends make the hospital a very difficult institution to manage.

In addition to the pressures on the industry caused by complexity, there have also been a number of clearly visible trends related to attempts to solve this problem through the use of data processing technology. Within the last year there have been many clearly recognizable trends.

- A greater number of vendors with installed systems.
- A number of new vendors entering the field.
- A number of established vendors leaving the field.
- Heightened interest and understanding of integrated clinical data processing concepts by administrators.
- Pressures for internal cost reduction and quality of care justifications caused by Phase III, Phase IV, C.O.L.C., P.S.R.O.'s, etc.
- The need for new management information to insure C.O.L.C. "guideline" compliance.
- Continued growth of professional societies in the Health Care Data Processing area, i.e., HISSG (Hospital Information Systems Sharing Group), Society for Computer Medicine, HMSS (Hospital Management Systems Society).
- AHA Interest: Advisory Panels
  Numerous Institutes
- The recognition by administrators that Data Processing is an expensive resource that must be managed as such.
- The growing recognition of the need to justify programs of computerization before investments are made with the corresponding subsequent requirement of "tracking" the performance of that investment once made.
- The recognition by administrators that the use of Data Processing in hospitals has been costly with marginal return, if any, from the computer investment.

Currently, computers in most hospitals are employed in financial applications, such as patient billing, payroll and accounts receivable. The pressures of increased workloads and insurance company and other agency reporting requirements make the automation of these functions often necessary and certainly useful. However, this rarely yields an appropriate return on a data processing investment, except occasionally in terms of improved cash flow through the more efficient control and more rapid collection of accounts receivable.

The real benefit of automation lies in its use in the handling of information in the clinical departments. The large quantity of information pertaining to the care of the patient which is processed in these areas provides excellent justification for properly executed programs of extended automation. Certain clinical departments lend themselves more readily to automation because of their high volume of data and their high cost of operation, typically represented by personnel costs, i.e., Laboratory, Radiology, Central Supply, Pharmacy, Dietary. Nursing, representing approximately 40 percent-50 percent of a hospital's budget, becomes an excellent source for systems improvement opportunities through the reduction of clerically intensive tasks performed as a result of a physician's order for a clinical service.

A relatively small number of hospitals have proceeded with programs of extended automation beyond the Business Office. These systems typically have involved one or more
of the following features:

- The collection of the doctor’s order at the source (the nursing unit).
- The transmission of that order to the interested service department (Lab, X-Ray, Pharmacy, etc.).
- The processing of the information (patient charge posting, Pharmacy inventory update, Lab test result).
- The retrieval of the information (transmission and display at the source for use in the care of the patient).
- The ultimate storage of the information as a component of the patient’s medical record.

The experience of hospitals in the past, which have ventured beyond the Business Office, has indicated that many seemingly viable automation programs have not produced the results at the costs anticipated for them. Difficulties have been encountered in these programs primarily for the following reasons:

- The selected approach to automation has required large front-end investments in anticipation of future benefits (cost reduction, better quality of care, etc.). This high risk approach, accompanied by the failure to achieve the desired benefits, has resulted in a waste of resources and tremendous dissatisfaction on the part of the hospitals involved.
- The selected approach to automation did not fit the hospital’s or the vendor’s ability to achieve. When programs were undertaken, well thought out plans for implementation were not developed, and activities were not carefully monitored—as a result, the benefits were not realized.

Although benefits, as a rule have not been achieved, a well planned program can indeed:

- Reduce Costs
- Increase Revenue
- Enhance Quality of Care (Through Better Accuracy and Timeliness)
- Free Professional Personnel from Clerical Tasks
- Reduce Systems Complexity and Opportunities for Error

This may appear as an impossible set of goals but when the complexity of information processing within a hospital is better understood, the goal is more achievable.

Illustrative of this point is the ordering of a lower G.I. series procedure. This is a common procedure which typically affects a number of areas in the hospital. At one hospital which we have examined in depth, we found that the manual system they were using to communicate information required 82 steps, 32 separate documents and resulted in the filing of 19 documents (Figure 1). The Nursing Unit was involved in both sides of the procedure, Radiology, of course, took the pictures, Dietary was involved in a special diet for the patient, Transportation was involved to bring the patient to Radiology and back to the Nursing Unit, Pharmacy was involved in providing certain preparatory drugs, the Business Office, of course, was involved in the billing. Through a proposed automation technique at this particular hospital, the steps involved were reduced from 82 to 23, the documents involved from 32 to 5 and the documents filed from 19 to 2.

![Diagram of lower G.I. series process](image-url)
(Figure 2). By decreasing the number of steps, cost reduction could be obtained and the quality of care of that particular hospital could be enhanced.

One of the major factors impacting “quality” of care is “opportunity” for error (Figure 3). It follows that the more tasks that must take place, the more opportunity for error. By reducing the tasks that take place manually, the opportunity for error is correspondingly reduced. It has been our experience that those innovations which reduce costs in a hospital are the same things that enhance the quality of care.

As a result of internal and external pressures and obvious opportunities for improving hospital operations, many hospitals have approved large programs for the extended use of the computer. Most hospitals have not, however, achieved the expected benefits intuitively projected for these programs. In actuality, automation has increased costs, had little affect on patient care, increased the complexity of managing the hospital and increased the management burden. Why is this true? The prime causes of lack of complete success in computer effort results from a number of factors:

There has been an oversimplification of the problem coupled with a general lack of recognition that you can’t change overnight. You must change in a pre-planned careful fashion and the “Management of Change” requires skills above and beyond those that might be currently available within the Hospital Organization. Too frequently, hospitals have acted intuitively in this matter. They feel that the computer will be beneficial but they do not define the benefits and the plan to realize those benefits. Instead they typically move ahead without clear justification or clear computer program objectives. When the computer program does not achieve what administration expected, they are, of course, unhappy. This might be characterized as a function of inadequate planning.

Hospital computer programs being considered today typically require large front-end investments and thus automatically become high risk programs particularly when measured in terms of achieved benefits. The large commitment necessary at the front end will lock a hospital into a program from which there is no turning back. Thus with inadequate planning, the program becomes a very high risk affair.

Another factor is the over excessive influence by vendors and suppliers in the decision making process. Vendors, by their nature, tend to oversell and encourage large commitments. Unless the hospital grabs hold of the problem and adequately defines its needs in a preplanned way, it risks too much vendor control and influence of the program.

The proliferation of vendors in the field causes still another difficulty. Each vendor has his own approach, plan and product and makes a number of claims which are appealing while attempting to establish his difference. Because of the large number of vendors, it is extremely difficult to evaluate capabilities and make an intelligent choice of a program.

In examining some of the general characteristics of hospitals considering extending data processing into so called “HIS/MIS” programs, we find that they are typically larger and therefore more complicated hospitals who can potentially gain a greater benefit from computerization and have certain characteristics in common:

- These hospitals almost universally are concerned about the problem of using the computer more extensively and rank the computer problem high amongst those that need to be solved in the next several years.
- They are very acutely aware of previous failures and are very concerned about making a major commitment in light of the less than successful results of the industry.
- They are presently spending a lot of money on computers.
- These hospitals are generally spending between two and four dollars per patient day currently, and are using the computer primarily in the Business Office, with varying degrees of effectiveness.

The thing that they all have in common is that they recognize the need for even further expenditures and are presently trying to decide upon their next step while considering questions like:

- Should we use the computer outside the Business Office or shouldn’t we?
- Should we consider a shared service vendor instead of our in-house computer?
- Should we make a full-fledged commitment to a “total” HIS/MIS?
- Should we buy a package?
- Should we develop our own?
- What application first? Why?
- How much will each application cost? Why?
- How estimated?
- What are the varying costs, benefits and risks of the different next steps?
- What effect do regulatory and community agencies have?

The problem is very complicated. There are a number of conflicting pressures which have resulted in an ambivalent attitude and a lack of decisiveness toward the extended use of computers in hospitals. On the one hand, the administrator knows that he will have to use the computer more extensively but on the other hand, he is unhappy at the prospect of greater expenditures in an area whose performance
has been mixed, at best. The problem is more of what to do rather than what not to do.

In addition to the difficulty caused by these factors there is a general lack of recognition of the requirements necessary for managing an automation effort. There is a tendency to use inadequate control methods and to inaccurately define the goals of the program. This has led to underestimates of costs, and overestimates of benefits. If there is anything that makes management unhappy, it's underestimates of costs and overestimates of benefits. This has been followed by a communication gap between management and computer technologists. There has generally been too much emphasis on technology and too little emphasis on establishing:

- Proper program management
- Proper program objectives
- Proper program planning
- Proper system design
- Proper project control and tracking

It is in this area that hospital management falls down.

The technology required to make "hospital information systems" work has been available for several years and has been appropriately used in a number of industries. The complexity of the hospital, however, makes it more difficult to use computers in that environment than in most other environments. This is not a technical problem. This is a management problem and should be treated from that perspective.

In approaching this problem there are a number of questions which must be asked and answered before a satisfactory solution can be achieved.

- What should be done first?
- What should be done second?
- What should be done third?
- Which applications are feasible?
- Which applications are justifiable?
- In what order should you prioritize your program?
- How much should be spent? Over what period of time?
- How will such expenditures be justified?
- Who should I expend with?
- Over what length of time can the ultimate system be reasonably installed? Is it six months, one year, ten years, fifteen years?
- How can I be reasonably certain of the accuracy of my plan?
- What are the checkpoints which tell me I'm succeeding—and should proceed—or failing—and should stop and re-evaluate?

All of these questions must be carefully addressed before undertaking implementation of a program. A proper approach to the extended use of computers in hospitals must include the use of sound business justification and planning techniques preliminary to the start of implementation of the program.

Compucare, through its experience with many hospital automation projects, has developed techniques which support hospitals in these difficult decisions and which tend to greatly reduce the risk of their actions. Utilizing the minimum criteria of:

- Reduction to cost
- Increase to revenue and
- Enhancement to patient care

as key indicators against which to proceed. The approach we have developed and apply generally follows this guideline:

1. Assess the present computer program to determine the effectiveness and benefits of the current Data Processing budget.
2. As a result of the assessment a plan of action should be developed to improve the existing program in the short range considering:
   - Computer capacity—over/under
   - Projects to "kill"
   - Staff and development techniques
   - Available budget dollars
3. The definition of the benefits of automation by system in terms of the potential for:
   - Reduced costs
   - Increased revenue
   - Improved patient care
4. An assessment of the risks of automation including:
   - Development and operating costs
   - Vendor performance capability
   - Change to hospital policies and procedures
5. The ranking and prioritizing of identified projects of value
6. A determination of an affordable level of expenditure considering:
   - Available dollars
   - Contention for resources
   - Regulatory pressures
   - Value of the opportunities/benefits to be achieved
7. The screening of the commercial availability of system packages to meet the hospital's opportunities/benefits and to:
   - Develop requests for proposal as required
   - Firm up cost data
   - Integrate projects
8. Selection of the most appropriate approach based on the criteria of:
   - Early return on investment
   - Funding future development costs through the achievement of cost savings, as quickly as possible
   - Low risk
9. The definition of the techniques by which progress can be measured to help assure the achievement of
the benefits by:

- Setting measurement benchmarks for each approved project
- Establishing benefit realization plans
- Establishing a project reporting system

The result of strict adherence to the described approach should be the development of plans that would keep costs and benefits of new systems in parallel as much as possible, while additionally insuring early return on investment and the opportunity to modify the plan without losing the economies identified. It is this kind of sound business analysis that identifies the attendant risks while clearly measuring achievement that is going to make certain hospitals successful in their data processing programs.