AUTOMATED HOSPITAL INFORMATION SYSTEMS: A Benefits Optimization Program

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ABSTRACT

In 1982, the Center for Health Management Research, Lutheran Hospital Society of Southern California published Evaluating Automated Hospital Information Systems, an instruction manual designed to help hospitals measure and compare the outcomes of automated hospital information system (AHIS) implementation. (Strum et al., 1982) The Center has now published a companion volume, Benefits Optimization for Automated Hospital Information Systems (Strum et al., 1983). Whereas the evaluation manual aims at a broadly based, system-wide comparison of projected versus realized AHIS outcomes, the optimization manual is designed to help hospitals formulate and implement highly focused, remedial and adaptive management interventions in the AHIS environment. The end of such interventions is to operationally optimize the hospital specific mix and level of AHIS-related benefits.

INTRODUCTION

Benefits Optimization is a management program by means of which a health care facility can realize the labor savings and cost avoidance potentials of an automated hospital information system (AHIS) as well as enhance its level of service benefits. The program is designed to be cost-effective. This means first of all that the value of the economic benefits to be realized must outweigh the cost of realizing them and the value of service benefits must be at least worth the cost of realizing them. It further means that a hospital must have some means of calculating the costs and measuring the benefits in advance. In addition, the program helps a hospital to identify its own optimal mix and appropriate level of benefits. Optimization thus frames the realization of AHIS benefits in terms of each organization’s particular needs, resources, and capabilities rather than in terms of a fixed level of realizable benefits calculated in terms of hardware and software characteristics.

AHIS BENEFITS

In their seminal analysis of AHIS benefits, John Gall and his colleagues at El Camino Hospital theorized that AHIS benefits are of three broad types: fall out benefits (those which occur more or less automatically as the outcome of a successful implementation); spin off benefits; and realizable benefits (those which remain potential after implementation and will not be available except as the result of a direct management intervention designed specifically to realize them). (Gall et al., 1975, 1977).

Gall’s separation of AHIS benefits into categories defined in terms of how the benefits are affected has been generally accepted. More important than the categories themselves, however, are the implications of Gall’s analysis. It is his conviction that the most important economic benefits fall into the third category; that is, they will not result automatically from a successful system implementation and, in fact, will be available only to those hospitals which actively intervene to effect them. AHIS benefits are, in this view, fully as much a function of hospital management as they are of inherent system characteristic.

The nominal or generic benefits of an AHIS are generally agreed upon: high speed communications and transactions; a large storage capacity supported by retrievability across a wide variety of query types; and error free processing. It is more difficult to define the specific benefits of a given system type. In part, this is because whereas generic benefits may be thought of as characteristics inherent in the hardware and software, specific benefits are in reality specific not to the AHIS but to the users or the user organization. For example, while the ability to support English language retrieval from disease or procedure files is a generic system benefit, it is likely to be of specific benefit only to a research hospital because such capabilities are very expensive they could as easily be a disservice to a
hospital which did not need and would seldom use
them.

Another illustration of the relative quality of
some AHIS benefits is provided by the assumption
that a decrease in test turn around time and a
reduction in lost test results will move a
patient more quickly into the regime of care and
thus result in a decrease in the hospital's
average length of stay. The economic benefits
to a hospital of reducing its average length of
stay may vary greatly depending upon such
variables as its occupancy rate or its prevail-
ing methods of reimbursement. Such variability
suggests that the concept of an AHIS benefit is
largely meaningless apart from a particular user
or user organization who is the recipient of the
benefit.

In addition, a consensus seems to be emerging
that rejects a rigorous global classification of
AHIS benefits as either principally economic or
principally service oriented and sees, instead,
a range of benefits which must be measured and
evaluated in a variety of ways: some by means of
cost-benefit analysis; some in terms of a
trade-off between costs and benefits which are
only in part economic; and some in terms of a
trade-off between costs and benefits which have
no immediately evident economic dimensions. Two
important qualifications of this view are that an
application which could fairly easily be cost
justified in one hospital setting might not be
so in another; and that justification criteria
need not in every case include evidence of a
positive economic benefit (so long as no claims
are made to cost effectiveness).

AHIS benefits can, then, be seen from several
perspectives. First, benefits do not exist in
the abstract; an AHIS system characteristic only
provides a true benefit if there is a user
present to whom that characteristic is desir-
able. Second, while some generally desirable
system characteristics will automatically result in perceived benefits, others will not; a poten-
tial AHIS benefit will sometimes be realized
only if there exist users or managers who are
able actively to effect that benefit. Finally, it
is possible to look at AHIS benefits in terms
of either of quantitative or qualitative outcomes;
some AHIS impacts are beneficial because they
contribute to increased revenues or decreased
operating costs; others are perceived as benefi-
cial because of their impact on service to
patients or on the working conditions of hospi-
tal personnel. However, while a large number of
AHIS benefits may be primarily either economic
or service, few are likely to be exclusively one
or the other. Most AHIS benefits will have both
economic and service related dimensions.

CENTRALIZING TECHNOLOGY IN A
DECENTRALIZED ORGANIZATION

A particular problem in AHIS management arises
from the interface between an AHIS and tradi-
tional hospital organization. A hospital is a
complex, highly professionalized and highly
departmentalized organization. (Georgopoulos
and Mann, 1962). It is thus perhaps almost impos-
sion essentially decentralized: "a loosely cou-
pled organization of specialized service depart-
ments that have certain internally divergent
priorities and considerable day to day ambiguity
of direction." (Lincoln, 1982). Although integra-
tion of system technology, on the other hand, encourages
centralization of organizations, tending in its
impact on organizational structure toward (among
other effects) a decline in the number of
levels, an integration and consolidation of pre-
nviously separated decision areas, a shift upward
in the location of decision making within the
organization, the introduction of increased
rigidity of decision making, and an increase in
centralization of control. (Whisler, 1970). The
need for a single, authoritative source of
data definition and the increasingly widespread
application of data base technology to hospital
information systems are but two examples of the
centralizing tendencies of AHIS technology.

It does not follow from this that hospitals must
become highly centralized organizations in order to
reap the benefits of computerization; what
does follow is that a technological tool which
transcends traditional organizational boundaries
is liable to function poorly if it is managed in a
traditional way. If a wholly centralized
approach to AHIS Management is at odds with hos-
pital organization, a wholly decentralized
approach is equally at odds with AHIS technol-
ogy. Effective use of an AHIS is subject to the
ability of the hospital as an organization to adapt
to computer technology. It implies a degree of both horizontally and
vertically integrated decision making.

PRECONDITIONS FOR BENEFITS OPTIMIZATION

Successful implementation is one precondition of
successful optimization. Although planning for
optimization may begin early, no formal optimi-
ization activities should be undertaken until the
system has been brought up, shepherded through
its shake-down period, and achieved steady state
operation. Implementing an AHIS is a demanding
task. Premature attempts at optimization could
well impede a successful implementation.
Ideally, optimization should begin as soon as
possible after steady state operation has been
reached -- after hospital personnel have learned
to use the system and have adjusted to it, but
before patterns of use have solidified and a
mind set has come into being which equates cur-
rent procedures with proper use of the system.

Adequate planning and resource allocation is a
second precondition. It is one of the under-
lying assumptions of the program that planning
and resource allocation for benefits optimiza-
tion have generally been inadequate and that
optimization efforts have frequently failed for
exactly that reason. Great attention is there-
fore paid to the planning and resource allocation stages.
A third precondition is active participation by both top and middle management. Top hospital management must be willing to commit sufficient resources to sustain meaningful optimization efforts and must in addition be perceived throughout the organization as firmly behind the goals and objectives of optimization. Equally important is that middle management actively share with top management in setting those goals and objectives. One of the critical success factors for benefits optimization will be the commitment of hospital administration to optimization goals and objectives which managers perceive as overall organizational goals and objectives. Unless objectives for benefits optimization are clear, well understood, and generally accepted by the managers who will be responsible for achieving them, the program has little chance for success.

THE BENEFITS OPTIMIZATION PROGRAM

Benefits Optimization for Automated Hospital Information Systems comprises nine chapters aggregated under three main headings: Part One: Strategic Planning for Benefits Optimization; Part Two: Objective Setting for Benefits Optimization; and Part Three: Implementing A Benefits Optimization Program.

Cost effectiveness is an inherent aspect of the program. Benefits optimization is cost effective whenever an acceptable trade-off is established between the costs expended in realizing non-economic benefits and their value to the organization, or an acceptable rate of return is established on the costs invested in realizing economic benefits. There must be from the beginning a reasonable expectation that the benefits to be derived from the undertaking will be worth the costs incurred. Moreover, a staged process is desirable by means of which as progressive steps requiring greater resource commitment are reached, a decision to commit those resources can be supported by objective analysis.

A control system is built into the methodology whereby at two major decision points, information is provided as to the opportunities, probable costs and potential benefits of proceeding further. Because this information is based upon analysis of hospital data, data is collected and analyzed prior to each of these decision points.

Part One turns on a decision point designed to be low cost/low commitment. The data required are of two kinds. Readily available statistical data provide for a broad, inexpensive overview of organization productivity. A direct survey of hospital personnel provides information on their expectations, experiences, and conceptions of the systems' positive and/or negative impacts on the hospital environment.

In Part Two, areas in which the opportunities for realizing benefits appear to be greatest are examined in fuller detail. In addition to analysis of statistical data of the sort used in support of decisions reached in Part One, PART ONE: STRATEGIC PLANNING FOR BENEFITS OPTIMIZATION

1. Planning for the Benefits Optimization Program
2. Identifying Departments with a Potential for Benefits Optimization

PART TWO: OBJECTIVE SETTING FOR BENEFITS OPTIMIZATION

3. Collecting Departmental Performance Data
4. Analyzing Performance and Recommending Objectives
5. Selecting and Establishing Management Objectives

PART THREE: IMPLEMENTING A BENEFITS OPTIMIZATION PROGRAM

6. Orienting Hospital Staff to the Benefits Optimization Process
7. Department Start Up and Data Collection
8. Data Analysis and Recommendations for Change
9. Implementing Plans for Change

THE BENEFITS OPTIMIZATION MODEL

Figure 1.

direct observation of department activities and further input from users are important sources of information at this stage. Information is sought here in greater depth and narrower focus in order to isolate specific and well defined areas which can be expected to be amenable to successful benefits optimization. Identification of these areas leads to the second major decision point.

Part Three requires data collection which is more detailed and resource intensive. Information gathered in the first two parts is designed primarily to enable the organization to answer the questions "Is this a cost effective endeavor?" and "Where should its principal thrust be directed?" By the end of Part Two, the questions whether and where have been answered; Part Three addresses the questions of what and how.

Finally, the process as conceived is iterative. At the conclusion of Part Three, a return to Part Two provides for post-implementation audit and for analysis of the existing potential for continued optimization activities. Decision
points within Parts One and Two provide for continuation, exit, or a return to the beginning to re-examine goals and identify new opportunities. (Implementation of a new application should, for example, suggest a return to Part One.) As a practical matter, a 24-month optimization program is proposed here: an initial 4-month planning period; a first cycle comprising eight months; and a second and third cycle comprising approximately six months each. In theory -- and perhaps ideally -- optimization is an ongoing activity.

OPTIMIZATION AND EVALUATION

While optimization focuses on management rather than evaluation it is closely linked to evaluation and is properly seen as an integral part of the overall evaluation process. AHIS evaluation can be broken down into four distinct parts, each addressing a particular question. The questions are: 1) Does the hospital need an AHIS? 2) Which AHIS should it select? 3) What are the outcomes of a successful system implementation? and 4) What can be done to make better use of an AHIS as a management tool? The corresponding evaluation techniques are: 1) systems analysis; 2) AHIS selection evaluation; 3) AHIS impact evaluation; and 4) AHIS benefits optimization.

Benefits Optimization for Automated Hospital Information Systems presents an optimization methodology which can function in either of two modes: as a stand alone methodology for those hospitals which have implemented an AHIS but have not conducted an evaluation program; and as a modular methodology for those hospitals which have been engaged in ongoing AHIS evaluation.

Successful optimization requires good information about the current state of affairs, about reasonable expectations for change, and about the probable costs. Chapters 1-5 of the Optimization Manual provide a detailed, step-by-step process for developing this information. But the formal structure of the process is such that available alternatives can often be used in place of a specific step. For example, even though the Optimization Manual is designed so that it can be used independently of the Evaluation Manual, the two can also be used in conjunction with one another. A hospital conducting an impact evaluation study will find that the outcomes of their impact study can often be used as inputs to supply information needed to complete Parts One and Two of the optimization program (Chapters 1-5) and move on to Part Three (Chapters 6-9).

A hospital just beginning evaluation is likely to have little of this information. One that is in the midst of evaluation, on the other hand, will already have much of the information, and needs direction in applying rather than developing it. Chapters 1-5 of the Optimization Manual provide simultaneously a detailed methodology for developing new information and a set of guidelines for drawing upon extant information developed as a part of an ongoing AHIS evaluation program.

CONCLUSION

The concept of AHIS benefits is not a simple one. The benefits themselves arise from a complex interaction between computer hardware and software on the one hand and organizational needs and capabilities on the other. Hence the focus of benefits optimization on optimizing benefits rather than simply upon realizing them. Each hospital should be able to identify the mix of AHIS benefits which provides the best fit with its organizational goals. Optimization activities can then be directed toward operationalizing that fit.

REFERENCES


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