

3-1971

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Recommended Citation

Ameiss, Albert P. and Thompson, Warren A. (1971) "Cost Accounting -- Its Role in a Hospital Information System," *Management Adviser*. Vol. 8: No. 2, Article 5.

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Cost accounting—with its relatively bloodless connotations—would seem far removed from the hospital picture. This study of cost accounting in a state hospital system shows otherwise—

COST ACCOUNTING – ITS ROLE IN A HOSPITAL INFORMATION SYSTEM

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IF A superintendent of a state psychiatric hospital had seen this article fifteen years ago, he might have expressed sheer amazement for at least two reasons: (1) that a state legislature would appropriate adequate funds for such a frivolous thing in the mental health field as a computer, much less an automated information system; and (2) that anyone would consider cost data for control or pricing purposes important enough in this nonprofit environment to develop any kind of cost system, manual or otherwise.

But times have changed, and computer-based information systems became possible with the ap-

pearance of third generation computers in 1965. Computers installed earlier were used primarily to automate clerical operations, rather than to improve management decision making. The advent of management information systems signaled the beginning of the challenging task of bringing the power of the computer to provide information to both policy management and operating management.

The capability of storing and structuring information to serve levels of management with widely differing information requirements attracted the attention of management in many fields, including that of mental health.

A new kind of forward thinking has developed as a distinct departure from the not so “good old days” when state mental health institutions were little less than remote penitentiaries where human misery could be tolerated by society as long as the cost per patient day did not exceed \$1.00. In fact, this was about the extent of the cost information considered necessary at that time. But not so today!

A number of states have devoted substantial resources to the development of better instruments and techniques for treating the mentally ill, including the installation of sophisticated third generation

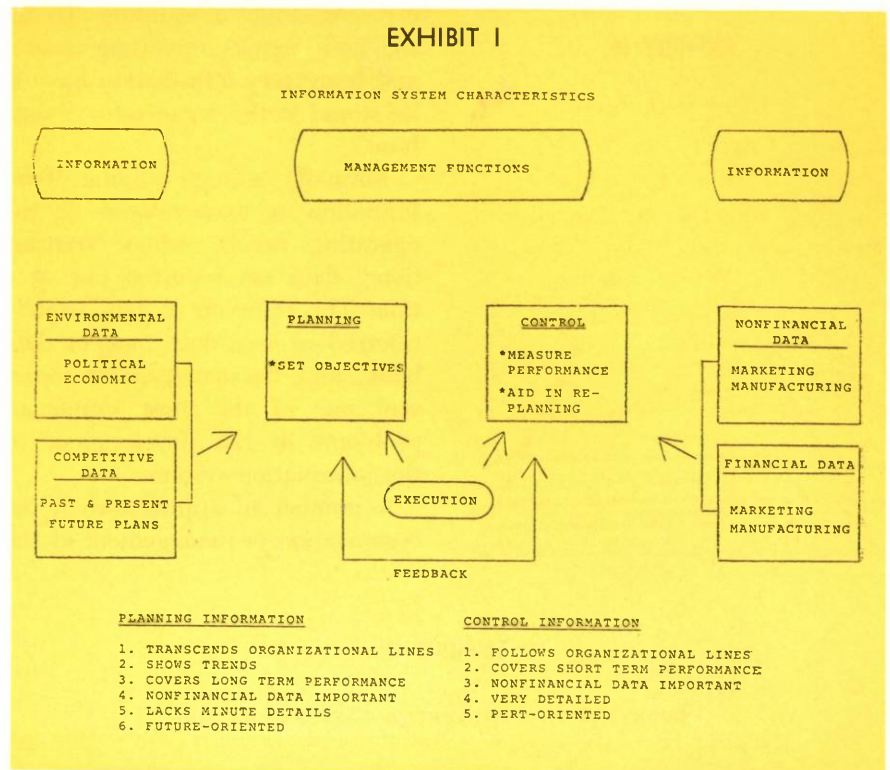
computers and computer-based information systems.

An example is found in Missouri, where by 1974 the Division of Mental Health plans to have operational a statewide electronic data processing system. Focused upon increasing the efficiency in *both* the care of patients and the administrative aspects of the Division's ten major institutions, an automated "Standard System of Psychiatry" is being introduced—one of only a few such projects throughout the world.¹ First priority is properly afforded this computerized comprehensive health care system. But administrative systems are also in the process of development and furnish the setting for this article, illustrating the role that cost accounting can play in an automated mental health information system.

In the paragraphs that follow, the definition and characteristics of such a system are introduced, followed by the application of such concepts in the form of the Division's financial information system. Particular attention is afforded the cost accounting and fund control applications, which are an integral part of the Division's information system.

A literature search provides many definitions for the term "information systems." One author may see such a system as a provision of service on a timely basis, articulating the information needs of management functions at various organization levels.²

Another prefers a "fundamental" information system, comprising all the procedures, methodologies, organization, software, and hardware elements needed to insert and retrieve selected data required for operating and managing the organization, and feels that there is no



real difference between such a "fundamental" information system and the so-called "management" information system.³ A third author sees an important difference and distinguishes the latter system as one marked by a definite orientation toward management and includes only such managerial information elements, structured into a data base to serve the requirements of both policy and operating management.⁴

These different viewpoints seem to be synthesized in a final definition, describing the information system as a whole or combination of systems components functioning within the organization. The basic objective stated is to process data and provide information and internal control to carry out the organization's responsibilities of stewardship over the assets, control over the operations, and concern, evi-

denced by long- and short-term planning, for the future.⁵

Many of these characteristics of information systems are illustrated in Exhibit I, above. Particular emphasis is placed on the managerial functions of planning, execution, and control. The need for both external and internal information for planning purposes is suggested. As indicated, the feedback through proper channels of corrective action taken by lower operating managerial levels assists top management in replanning. The result is that management's objectives can be achieved or reset, if necessary.

Vital functions which the information system has to support, suggested in Exhibit I, include planning, to set the course of managerial action; control, to execute the planned course of action; and review, for the comparison of actual and planned courses of action. Unfavorable variances are reported to facilitate corrective action at the lowest possible organizational level of the hospital under this version

¹ Discussed at greater length in "A Statewide Electronic Data Processing System," George A. Ulett, M.D., et al., *Hospital and Community Psychiatry*, pp. 26-29.

² Li, David, *Accounting, Computers, Management Information Systems*, McGraw-Hill, Inc., New York, 1968, p. 213.

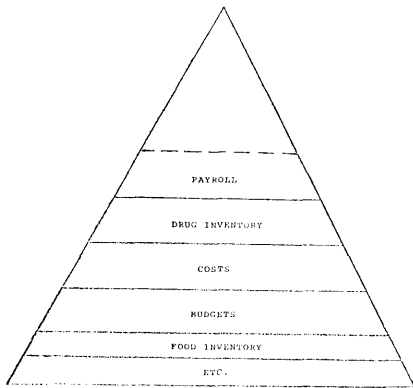
³ *Accounting and the Computer*, a selection of articles from *The Journal of Accountancy and Management Services*, American Institute of Certified Public Accountants, New York, 1966, p. 288.

⁴ Enger, Norman L., *Putting MIS to Work—Managing the Management Information System*, American Management Association, Inc., New York, 1969, p. 14.

⁵ Bower, Schlosser, and Zlatkovich, *Financial Information Systems—Theory and Practice*, Allyn and Bacon, Inc., Boston, 1969, pp. 8-9.

EXHIBIT II

THE INDIVIDUAL FILE DATA BASE



of responsibility accounting. To do so, both actual operating results and budgetary information have to be stored in the organization's data base.

Normally, a huge volume of information is accumulated at the operating levels, where transactional data are reported one at a time. This reservoir of data, usually referred to as a data base or data bank, and its management represent one of the most significant problems in the development of the information system.

A number of approaches to the organization or management of the

data base have been identified. These include the use of a separate data bank for each application, such as payroll, inventories, or cost and budgetary applications, as illustrated in Exhibit II on the left. One difficulty with this approach is the one-to-one relationship. If an institution computerized 20 applications, 20 different data bases or master files would probably be required. The requesting, mounting, dismounting, and returning of tapes containing such data files are time-consuming and unproductive activities.

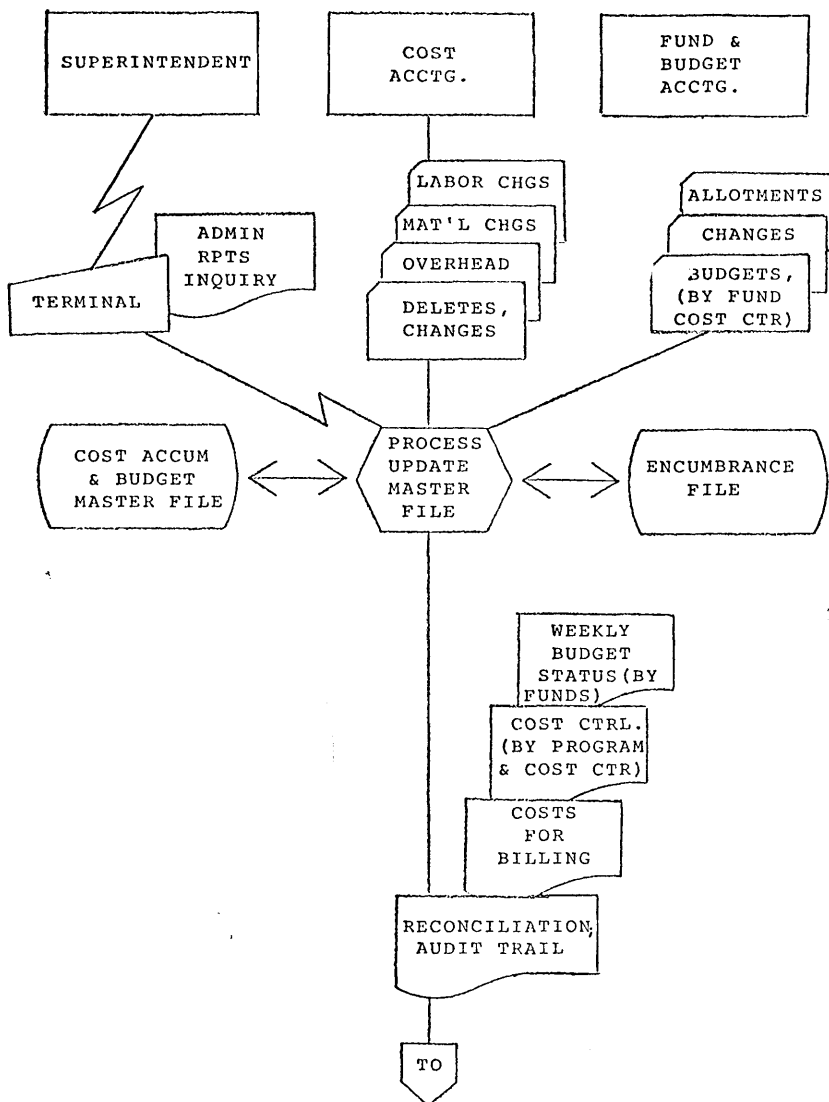
In addition, the maintenance of individual files necessitates batch processing, by which all transactions of the same kind are accumulated, sorted, and processed when the volume so warrants. Processing each piece of transactional information as it arises therefore must be ruled out as impractical.

Another approach to data base organization and management is called the integrated data base. A modification of this approach is being attempted in Missouri's Division of Mental Health. This approach is more difficult because a single, integrated reservoir of data is required which has to be accessible to all applications.

In a recent article entitled, "A Single Information Flow System for Hospital Data Processing," Belverd Needles stated that although many hospitals are experimenting with electronic data processing, none has yet developed a system based on the single information flow concept.⁶ His reference was to a single pool of data for all applications—one integrated file to meet all demands. Closely allied to the integrated data base is integrated data processing, whereby a single piece of information is entered into the data processing system only once in its history and from that time on is available to serve all requirements until

EXHIBIT III

OVERVIEW - BUDGETARY & COST REPORTING



DMH INSTITUTIONS

⁶ Needles, Belverd, Jr., "A Single Information Flow System for Hospital Data Processing," *Management Services*, September-October, 1969, pp. 27-37.

its usefulness has been exhausted.

The key to this kind of integrated file and processing system is a basic understanding of how the information is going to be used and the need to store it in such a way that the relevant data can be retrieved at the time and in the manner needed. Exhibit III on page 32, is an overview of the budgetary and cost accounting flow of information being developed in the state of Missouri. This flow of information is intended to satisfy the following requirements:

(1) *Budgetary Control*, defined as the comparison of expenditures on the cash basis against the budget or allotment of a given fund. This ensures that the hospital in question does not overspend or underspend its budget in any fund. Weekly reports are needed to satisfy this requirement in Missouri's Division of Mental Health.

This application of automated fund accounting in the Division is illustrated in Exhibit IV (right), "The Budget Status Report." A sort is made, controlling one fund, i.e., operations, additions, capital expenditures, and a comparison is

EXHIBIT IV

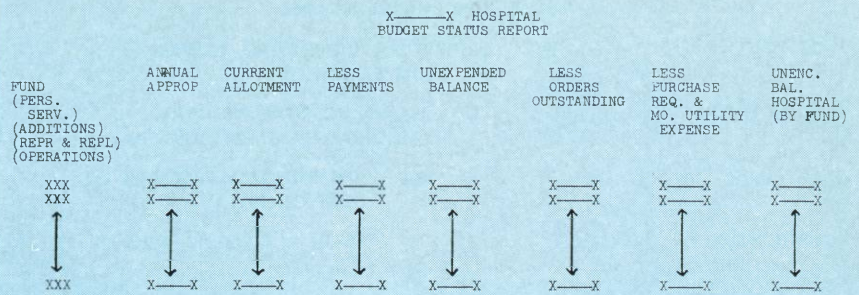


EXHIBIT V

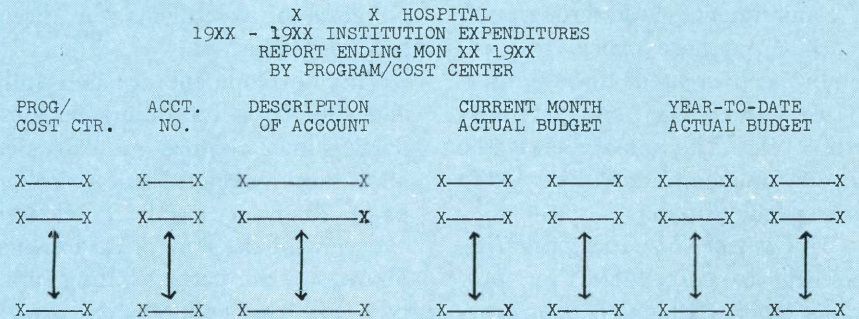
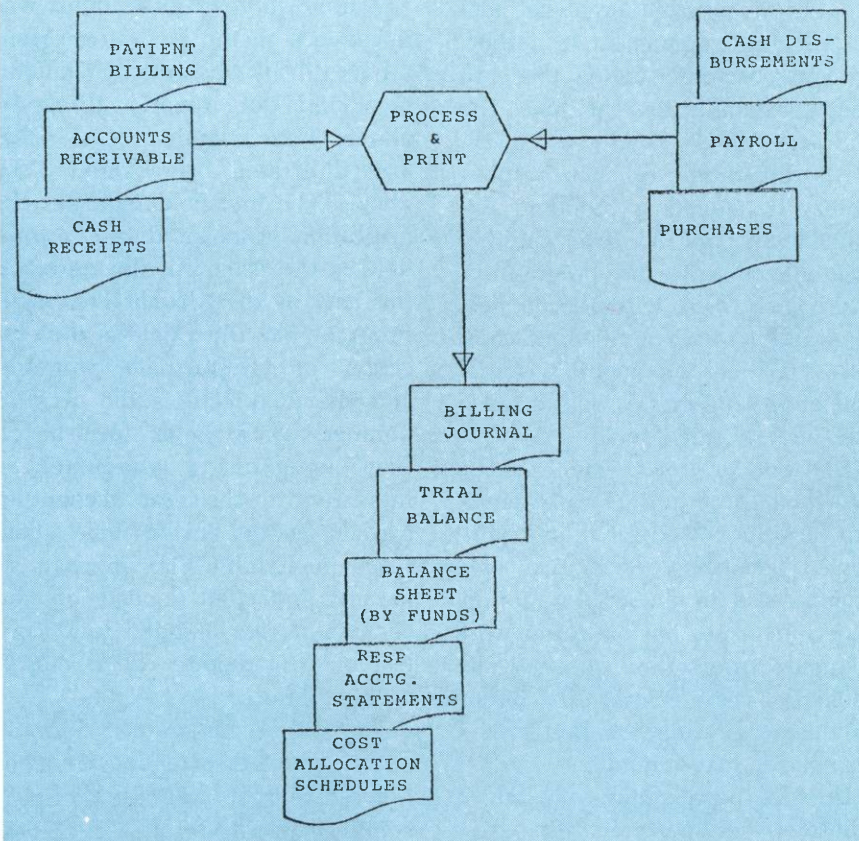


EXHIBIT VI

COST ACCUMULATION AND ALLOCATION SYSTEM



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was formerly a consultant in automated business applications with McDonnell Automation Company, St. Louis. He was named "Author of the Year" in November, 1970, by the St. Louis chapter of the National Association of Accountants. Dr. Ameiss received his B.S., M.S., and Ph.D. from St. Louis University.



WARREN A. THOMPSON is associate chairman of the department of psychiatry at the Missouri Institute of Psychiatry. He is a fellow and charter member of the Association of Mental Health Administrators and a board member of the

St. Louis Mental Health Association. Dr. Thompson has written many articles, several in collaboration with Dr. Ameiss. He received his B.S. from the University of Oklahoma, his M.B.A. from Oklahoma State University, and his Ph.D. from the University of Missouri.

EXHIBIT VII

EXAMPLE OF CHARGE NUMBER

FIRST FIELD	005.	INSTITUTION IDENTIFYING NUMBER (ST. LOUIS STATE HOSPITAL)
SECOND FIELD	15.	MAJOR HOSPITAL PROGRAM (ALCOHOL TREATMENT PROGRAM)
THIRD FIELD	400.	(INTERMEDIATE PROGRAM OR COST CENTER)
FOURTH FIELD	104.01	(ACCOUNT NUMBER)

made within each fund of the quarterly allotment with total payments from that fund. The unexpended balance is further reduced by commitments made through outstanding purchase orders and encumbrances created through purchase requisitions and monthly utility bills. The remainder is the free or unencumbered balance in that specific fund.

(2) *Control by Responsibility*, referring to cost centers or programs. This is a management function at each operational level, requiring the matching of actual expenditures of a controllable nature with the budget for that particular program. In this application of responsibility accounting, unfavorable variances are acted upon at the lowest possible organizational level having commensurate authority and corrective action taken to keep expenditures within the budget.

An illustration of such responsibility statements is found in Exhibit V on page 33. This monthly printout controls the program or cost center field within each hospital and account number and compares the current month's actual and budget figures as well as those for the year to date.

(3) *Full or Absorption Costing*, by which programs or treatments can be fully costed for billing purposes. Not only are direct costs accumulated in the cost center in which incurred, but allocation will be made from administrative and ancillary cost centers to direct cost centers, using the best statistical bases determinable.

In third party billing, no longer will the payer accept charges based

on a per diem basis. Hospitals today must be able to relate patient costs to patient charges. Costs must be allocated to patients based on costs of treatments for direct service groups.

The development of such fully allocated costs for billing to third parties may require an extensive allocation routine. Exhibit VI on page 33 is a highly condensed overview of the flow of documents. Shown are the patient billing function and the maintenance of accounts receivable; the accumulation and allocation of labor, material, and overhead costs; and the printout of journals, as well as audit trails, for use by public accountants or internal auditors in their periodic reviews.

A uniform chart of accounts was introduced in the Division of Mental Health of Missouri to facilitate the kinds of reports discussed above. Four major control fields are illustrated in Exhibit VII, above. The first field indicates the institution or hospital; the second field is the program, illustrated in this case by the Alcohol Treatment Program; the third field is the cost center or intermediate program; and the final field is the account number. These fields furnish the "key" in accessing information as indicated in the cost accounting and budgetary master file illustrated in Exhibit VIII on page 35. Records selected depend on the content of the intended fund control or cost reports called out in each program.

Still to be programmed for the Division is the reapportionment process so that full costing is accomplished. The result will be cost

allocation printouts, showing fully allocated costs of direct patient services. To accomplish this, facilities have been provided whereby cards may be punched at each hospital, read through the terminal IBM-2780 already installed at the major hospitals of the Division, and processed at the central computing facility on the IBM 360/50. Appropriate statistical bases will be used to allocate administrative and ancillary costs to direct care treatments to satisfy recently announced requirements of Medicare and other third party payers.

Exhibit IX, page 36, shows the hospital information system in capsule form. The role of cost accounting in the "Management Information System" is shown. Rather than a single information flow, both clinical and administrative information systems are shown. The result is a system which considers cost effectiveness with respect to treatments given and facilities used. Generated are the outputs for cost control and for billing purposes.

In the design of information systems, it is thought important that idealism be tempered by realism and technical capability. On line systems, however appealing, must be conditioned by economic realities. Perhaps the major difference between the information provided through a management information system and that provided manually is that the automated system is organized and articulated; this is not necessarily the case in informal systems.

While a computer is not essential to the development of a management information system, it is desirable because of the need to accumulate information, measured in various dimensions; to amplify information for control purposes at lower operating levels of management; and to reduce summarized data on a timely basis for top management's planning purposes.

But the automated management information system is only that—an information-provision service articulating information needs for

EXHIBIT VIII

COST ACCUMULATION BUDGET &
EXPENDITURE FILE MASTER

DIVISION OF MENTAL DISEASES
DATA PROCESSING DEPARTMENT
TAPE AND DISK LAYOUT

DELETE	HOSP	PROGRAM	COST	CENTER	ACCT. NO.	FACILITY NO.	ASSET	DESCRIPTION OF PROGRAM	DESCRIPTION OF ACCOUNT
1	2	3	4	5	6	7	8	9	0

MASTER FILE (cont.)

II

ASSET DESCRIPTION	EXPEN- DITURES 1965-66	EXPEN- DITURES 1966-67	A N N U A L			
			JUL	AUG	SEPT	OCT
1	2	3	4	5	6	7

EXPENDITURES YEAR (1967 - 1968) C U R R E N T

JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG
1	2	3	4	5	6	7	8

MASTER FILE (continued)

III

EXPENDITURES (1968 - 1969)							
NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE
1	2	3	4	5	6	7	8

APPROPRIA TION (1967-68)	APPROPRIA TION (1968-69)	BUDGET REQUEST AMT.	CURRENT YEAR'S ALLOTMENT				
			JULY	AUG	SEPT	OCT	NOV
1	2	3	4	5	6	7	8

EFF. DATE		UPDATE DATE	
M	D	M	D
1	2	3	4

various management functions at various levels. It cannot make decisions of any real nature other than those programed. It can pro-

vide more information for managers on which to make decisions in an organized and planned manner than they have ever had be-

fore. Hospitals in Missouri's Division of Mental Health will reap the benefits of such computer capabilities with respect to both clinical

and administrative decision making as described in this paper.

If the hospital superintendent of 15 years ago mentioned in the introduction to this article could return, he might not recognize the sophisticated clinical, cost account-

ing, and administrative features of the information system now under development in Missouri. But he couldn't help being thrilled by the interest being shown by Missourians in the field of mental health, by the substantial resources being

devoted to this cause, and by the professional efforts being made to use every modern technique, including the total capability of the computer, to achieve a major breakthrough in the treatment of the mentally ill.

EXHIBIT IX

MANAGEMENT INFORMATION SYSTEM

