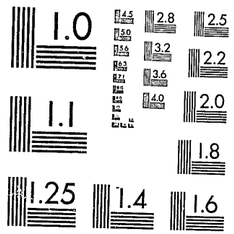

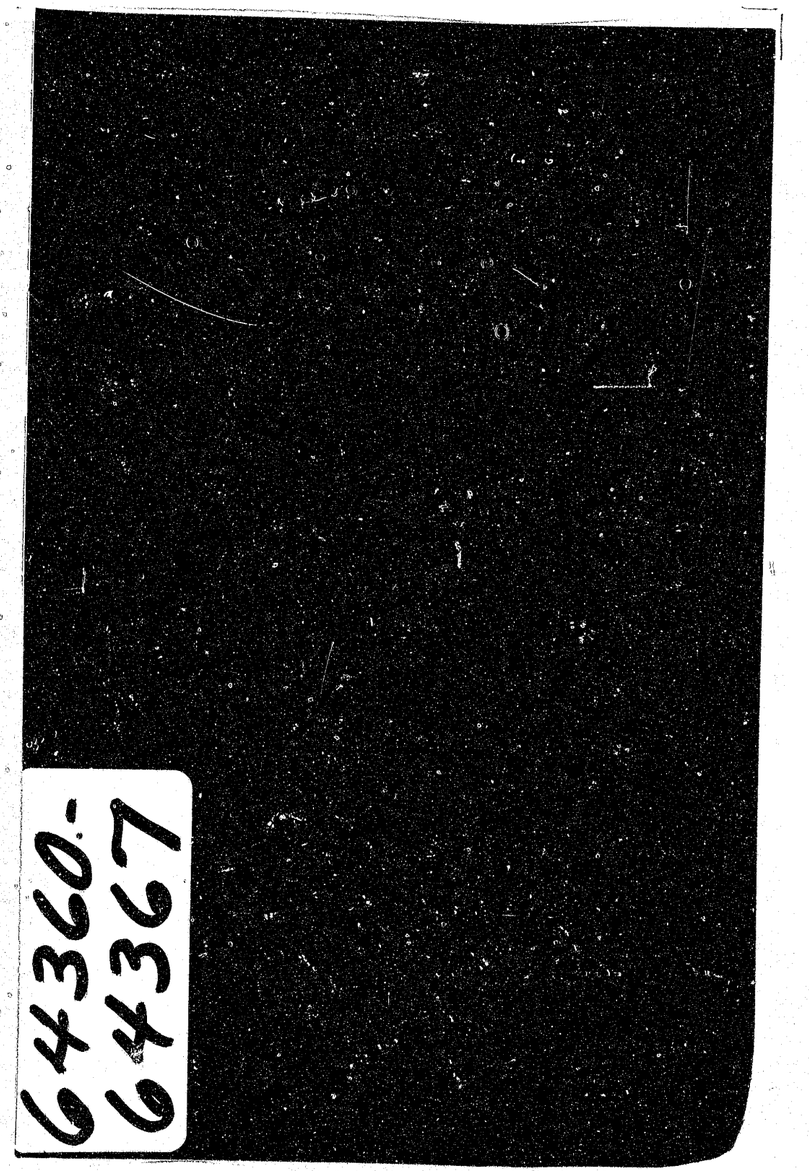

Management Information Systems in the Drug Field

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CONTENTS

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6.
Automation Alternatives in the Drug Abuse Treatment Setting

Herbert M. Birch, Jr. and Kerry G. Treasure

More and more drug abuse treatment managers are turning to computers to assist them in operating management information systems and to direct their programs. Yet many managers are uninformed about the advantages (and disadvantages) of automation and often do not know how to go about selecting an appropriate system to meet their particular needs. This article is intended to shed a ray of light on automation at the treatment center level. It provides a basic definition of data processing, a set of evaluative criteria for assessing automation alternatives, the major data-processing options, and a straightforward strategy for selecting and implementing an MIS.

WHAT IS DATA PROCESSING AND HOW DOES IT RELATE TO DRUG ABUSE PROGRAM TREATMENT MIS?

Regardless of the type of organization (e.g., drug treatment program, meatpacking plant, carwash), its data-processing function is made up of five separate interrelated steps (Awad 1970):

- Origination of data
- Input of data into the system
- Manipulation of the data
- Output of the reports
- Storage of information for future use

Figure 1 presents an overview of these five data-processing steps. It shows the process of admitting a new client into the program; the same steps would be followed for a billing transaction, for preparing a payroll, or for a client encounter. Each of these

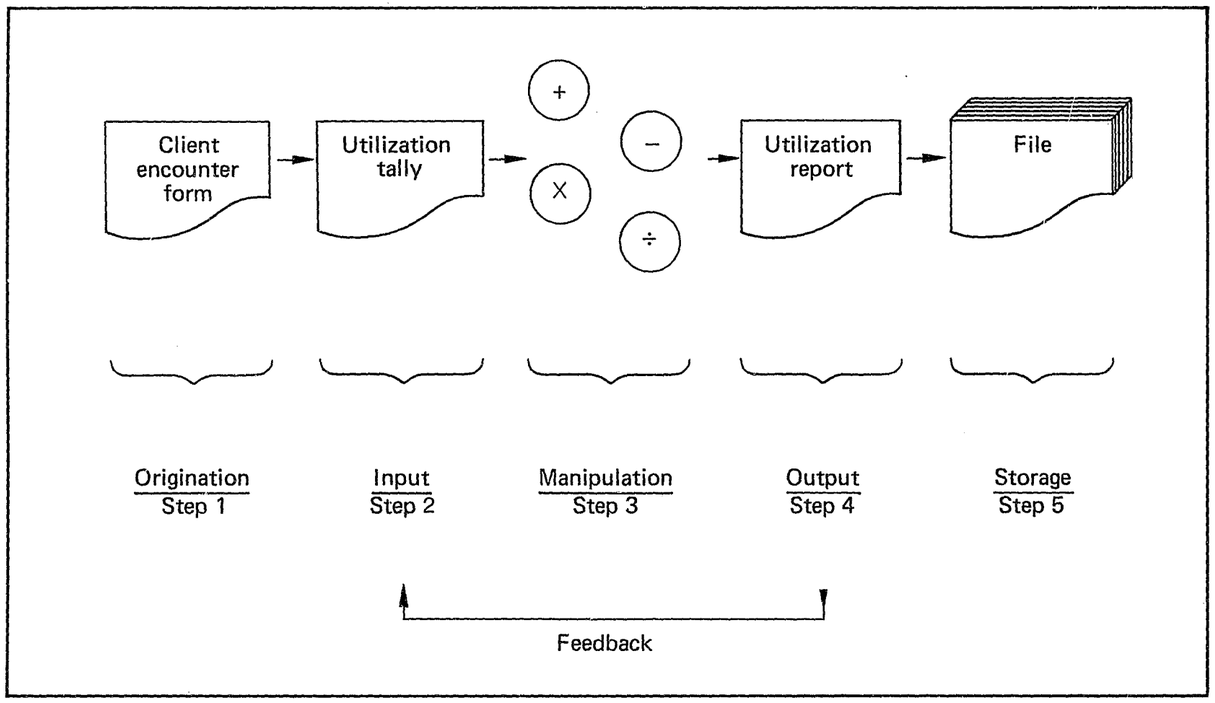

FIGURE 1.—*The data processing cycle*

steps may be accomplished through a variety of methods. In any case the objective is to complete each step in the quickest, most accurate, and most cost-effective manner. Depending upon the nature of the organization, the most appropriate method might be manual, semiautomated, or fully automated processing. The remainder of section 1 elaborates on each of these steps. Section 2 describes the various processing alternatives and their relative applicability to the drug treatment setting.

Origination of Data

The first step in the processing cycle requires capturing data about an event on a source document. This step is rarely affected by the medium used to process the data (i.e., manual or automated). That is--and this point should be stressed--there is no way to avoid having the provider, the counselor, or some other individual employee record the transaction or activity on a source document. However, the amount of information recorded for each event may be affected by the processing medium. For example, a fully automated system may encourage the tendency to collect as much data as possible at the point of occurrence since the automated system can accommodate more efficiently large data bases at steps 3, 4, and 5 (discussed below). Figure 2 portrays several types of source documents upon which drug abuse treatment programs usually rely.

Input of Data into the System

Input simply means that the data recorded on source documents are entered into the MIS. This input step can be accomplished by manual, partially automated, or fully automated means.[1] To illustrate, consider two methods available for inputting data; each of these examples represents an extreme on the continuum of complexity:

- Manual Input: Input into a manual system is accomplished simply by people, paper, and pencils. The input data are derived from the source documents. The input device used to record the transactions is an ordinary pencil. Figure 3 illustrates the relationship between the input and the input device. Once data are input into the system (e.g., the expense ledger) they are available for processing during steps 3, 4, and 5.

- Fully Automated Input: At the opposite extreme the fully automated system may employ a terminal as the input device. Again, the data contained on the source documents are the

[1] In a highly complex automated system, steps 1 and 2 may be combined if, for example, source materials are entered directly into the terminal of a computer rather than being recorded first as hard copy.

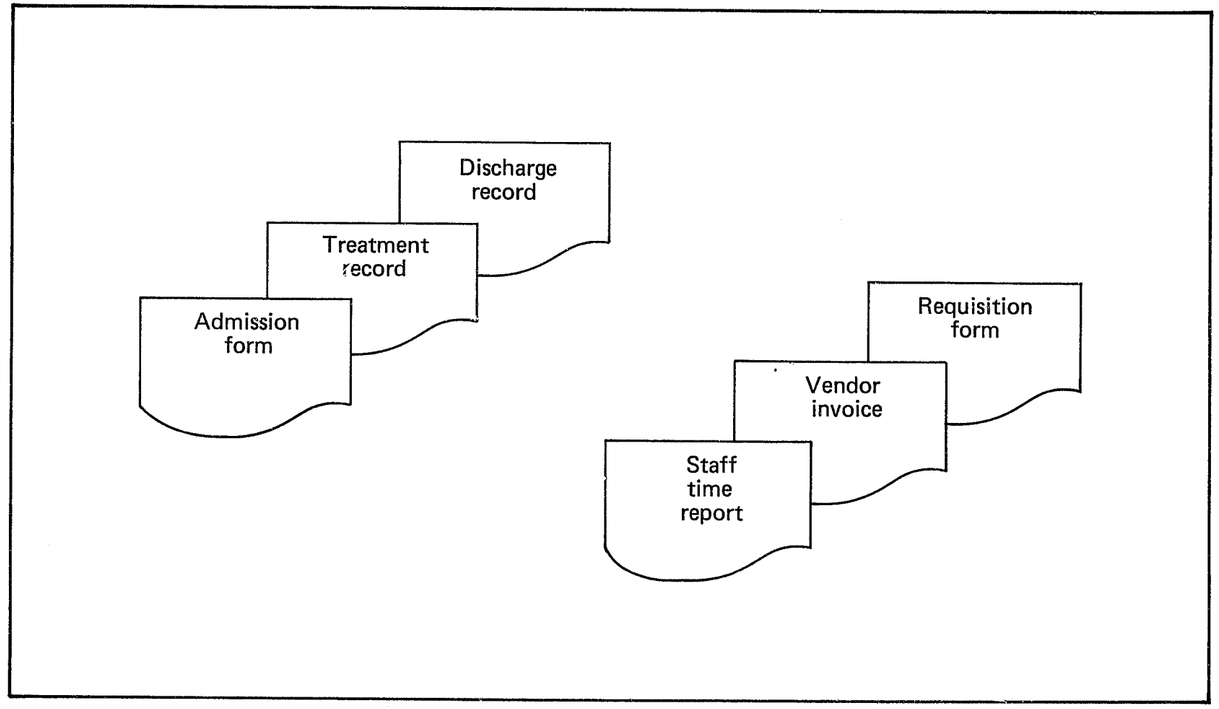

FIGURE 2.—*Examples of source documents*

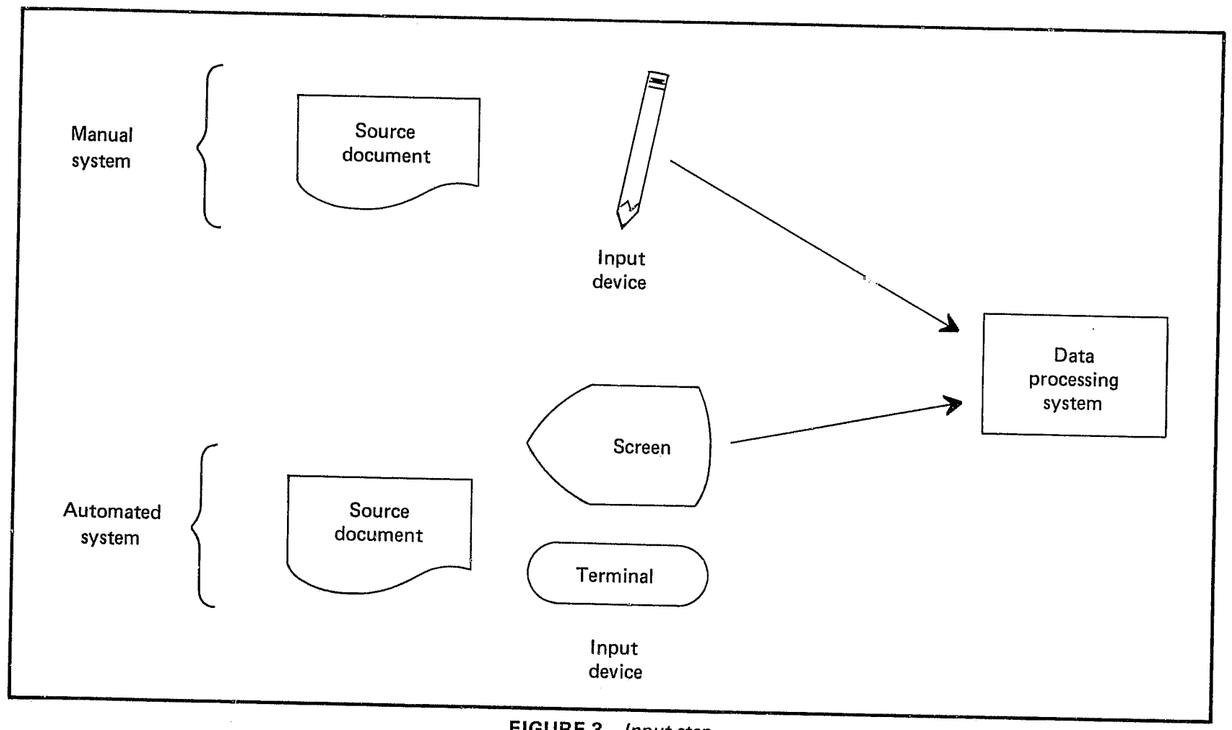

FIGURE 3.—*Input step*

source of input data. The data are then displayed on the screen, edited, and stored in the system for processing during steps 3, 4, and 5. This approach, becoming more cost-effective as the cost of terminals decreases, provides an excellent method of insuring accurate data input. Since data processing can be no more accurate than the input of source data, this is a critical feature.

Manipulation of Data

Manipulation is the process by which data are converted into meaningful information. There are five basic subfunctions (Awad 1970) of the manipulation step: classifying, sorting, calculating, recording, and summarizing. An example from the drug abuse treatment setting will illustrate each of these subfunctions; the means (automation or manual processing) by which these subfunctions are accomplished will be discussed later.

- Classifying: Grouping source documents into a logical order so that the data can be easily retrieved throughout the processing steps. In drug abuse treatment settings, this usually requires that the source data be arranged alphabetically or numerically. When data are filed this way, it is easy for staff to quickly locate treatment, admission, discharge or financial data about a particular client simply by knowing the client's name or assigned number.

- Sorting: Depending upon the purpose of the manipulation step, the source data are further categorized into meaningful subclassifications. For example:

  1. If the purpose of the manipulation is to produce patient and third-party bills, then the source documents would be sorted by type of third-party payer.

  2. If the purpose of the manipulation is to compare utilization and client characteristics by modality, then the source documents would be sorted into subclasses that distinguish among the modalities.

  3. If the purpose of the manipulation is to compare trends in utilization over time, then the client data would be sorted into chronological subclassifications.

- Calculating: This is the process in which data are added, subtracted, multiplied, divided, or in which more complex mathematical procedures are performed. Calculations result in such "quantities" as percentages, totals, ratios, costs, statistical measures (Chi-square), and so on. For example, calculations performed on client financial records will generate information concerning the account balance of that individual. Calculations in which the client utilization levels are compared to the planned utilization levels will result in ratios of planned to actual utilization. And calculations performed on an

employee's timesheet will result in an amount of gross pay for the period.

- Recording: Sometimes the calculations (performed above) do not lead to a complete answer but only provide intermediate information that will in turn be used to produce the desired end product. When this occurs the results of the calculations are recorded or stored so that they may be used later. Two examples are helpful:

  1. The accounts receivable card for each individual is updated daily through a series of calculations. The new subtotal for the day is recorded on the accounts receivable card from which a total is drawn and a bill prepared at the end of the month. It is the intermediate recording of daily subtotals that enables the billing clerk to compute the monthly balance due.

  2. The treatment center that wishes to develop unit cost information must perform three separate calculations, record the answers from each calculation, and then combine the recorded results to reach the unit cost. Specifically the treatment center must compute information regarding:

     a. The direct labor costs associated with the service unit.

     b. The other direct costs associated with the service unit.

     c. The overhead and administrative costs associated with the service unit.

     As each piece of information is computed, it is recorded for eventual addition to the other pieces of information.

- Summarizing is the task of setting out the results of the manipulation step in a clear, concise manner. The precise format of the summary will depend on the audience to whom the report is addressed. For example the unit costs may be summarized:

  1. By modality (with the three cost categories combined) if the report is being used to evaluate relative costs among the various modalities.

  2. By type of cost category (direct labor, other direct and overhead) if the NIDA project officer is concerned about the ratio of overhead costs to direct costs.

  3. By unit of service if the report is to be used to prepare bills.

Figure 4 illustrates the various ways in which the information about unit costs might be summarized.

It is easy to see that although each of these subfunctions can be conducted manually, a computer can be very helpful in the more tedious data-processing steps. More quickly and accurately than the human hand, the computer can classify, sort, manipulate, report on, and summarize large volumes of data. Hence there is enormous value to the automated approach to data processing.

Output of the Reports

This step is to a large extent human-based and requires that the reports and summaries produced thus far be communicated to the appropriate individuals, be used to make decisions, and create feedback into the system when additional information is required. Although the computer can assist in getting the reports to the appropriate individuals (i.e., by address labels or instructive headings), it cannot affect the use of the information per se and, once again, the human element controls the data-processing sphere.

Storage of Information for Future Use

Data and information processed through the system thus far can be stored in manual or automated files for future use. Whether manual or automated the files should make provision for easy access (e.g., with indices) and for periodic purging (i.e., eliminating information that has no further use).

With this understanding of the nature of the data-processing task, the manager is now ready to assess the data-processing requirements of his/her own treatment program and review these against the advantages of the various data-processing alternatives: in-house computers, service bureaus, and manual systems. Each of these options is discussed in the following section.

WHAT ARE THE ALTERNATIVES FOR DATA PROCESSING?

The drug treatment program has a range of data-processing alternatives available to it. Unfortunately there is no "pat" approach that will meet the needs of all programs equally well and each treatment center must review all alternatives and select for itself the method most appropriate to its needs. This section will assist the manager by providing:

- A general distinction between hardware and software.
- An analytic framework of criteria that should be considered in evaluating any data processing alternative.

Cost factor analysis

Service and total cost	Direct laboratory		Other direct		Overhead	
	Dollars	Percent	Dollars	Percent	Dollars	Percent
Admission $23.15	16.00	69	3.00	13	4.15	18
Counseling $36.98	25.50	69	5.25	14	6.23	17

Modality cost report

Service	Outpatient	Residential	Methadone
Admission	$18.50	$23.18	$17.24
Counseling	26.00	35.17	21.78
Urinalysis	5.00	7.21	3.79

Fee scale

Service	Fee
Counseling	$36.98
Admission	23.15
Urinalysis	6.42
Meals	1.25

FIGURE 4.—*Illustrative output formats*

- A discussion of the relative characteristics of three major data-processing approaches: in-house computers, service bureaus, and manual systems.

Hardware and Software: A Clarification of Terms

A decision to procure an automated data-processing system requires that the program obtain both hardware and software. The distinction between these two wares can be illustrated by analogy to a player piano:

- The piano itself is equivalent to the hardware--the computer. It is simply a machine that without some instruction sits mute.

- The punched tape which drives the piano corresponds to the computer software. It tells the hardware which keys to activate and which pedals to depress. Without the piano the music tape (like the computer program or software) is incapable of making music.

The hardware and software are mutually dependent.

To carry the analogy further, if the bar in which the piano is to be installed stresses a modern tempo, the piano must be driven to play contemporary songs. However, if the proprietor of the bar is only able to find music tapes from the 1930s, the piano will be of little value in entertaining the clientele. Or if the piano can accommodate tapes 14 inches wide and contemporary songs are produced on tapes 12 inches wide, the proprietor of the bar faces an equally difficult situation. In the same way, the computer hardware and software must be compatible.

A Framework for Evaluation: Twelve Systems Evaluation Criteria

As the treatment center begins to explore data-processing alternatives, it should be concerned with 12 critical characteristics of each option.

- The system must be <u>available</u> as needed: Can the system be available when and as often as needed? Is there a waiting time to purchase the system or to obtain assistance in implementing the system? Is the system still in the developmental stages and, if so, is a reasonable deadline likely to be met? If the system is to be shared by more than one organization, will the drug treatment organization be able to exercise priority on use of the system? Are the foreseeable timelags tolerable given the data-processing needs of the treatment center?

- The system must be <u>reliable</u> at all times: Is the processing system reliable? (For example, if equipment is used, does it

function smoothly? If manual processing is employed, are the individuals dependable?) Is there a backup process that can handle the work if the equipment or individuals are out of commission? Are the facilities for repair competent, responsive, and timely?

- The system must stress <u>security</u> of information: Given the confidential nature of drug treatment records, are the processing procedures designed to safeguard sensitive information? Do the processing procedures comply with the Federal confidentiality regulations? What routine precautions are taken to protect information from damage due to fire, flood, blackouts or other disasters?

- The system must be able to <u>turn around</u> information in a <u>reasonable time</u>: Turnaround time is the length of time between step 2 of the data-processing cycle (data entry into the system) and step 4 (output). Does the system produce routine reports within a reasonable turnaround time? Does the system have the capacity to turn around nonroutine reports on an as-needed basis with little delay?

- The <u>prepackaged software</u> should be thoroughly suited to the treatment center needs: Many treatment programs will find that prepackaged software systems (the piano music tapes) are well suited to some of their needs. Does the treatment program really understand <u>its</u> needs? Does the prepackaged software meet these needs? Are mismatches between program needs and software capabilities tolerable considering the expense of building a software package from the ground up? Can the software be tailored in any way to make it more suitable? Can the treatment center obtain proprietary rights to the software (i.e., buy the software rather than lease or rent it) so that changes can be made in it or so that the treatment program will be protected if the software company goes out of business?

- The automated system should be accompanied by considerable <u>programing consultation</u> services: If the treatment center entertains the thought of purchasing hardware, what assistance does the hardware vendor offer in writing programs (software) for the computer? What is the cost of these services? What type of staff resources will the treatment center require to develop and maintain its own software? What type of assistance can be expected after the initial startup period for such services as modifying or adding programing capabilities?

- The system should be <u>expandable</u> enough to grow with the treatment program over coming years: What is the maximum volume of transactions that can be handled by the system? How is the cost of additional transactions accrued? What additional hardware costs will be incurred to support expanded capacity?

- The system should be flexible enough to accommodate changing requirements: Can the software be easily modified to produce special reports? Does it have report-generator capacity? Will the system accommodate changes in billing formats, Federal and State reporting requirements, and planning issues? Can the system address idiosyncratic evaluation issues?

- The system should be relatively easy to install: If the system is to be installed on the premises of the drug treatment center, what renovations and physical accommodations will have to be made to the environment? How much space will be required and what functions will be displaced in allocating space to the new computer facility?

- The system should be fairly easy to implement: What time schedules can be predicted for the various implementation phases? What level and type of staff resources are required to implement the system? What types of training will be necessary to get staff "on board" the system? What types of forms will have to be designed for data origination and input?

- The system should be simple to operate: What type and how many trained staff will be required to operate the system on a daily basis? What type of staff will be required to upgrade or modify the system over time?

- The system should be cost-effective: Although these last questions are more difficult to answer, one must at least ask what are the true costs of the system: hardware, software (initial procurement or development), processing costs, staff salaries and training, installation and startup costs? Are there any "hidden" costs? What are the guarantees that the costs will not increase rapidly? How do the costs of the alternative systems compare with the costs of the data-processing (probably manual) system currently in place and are any increases in cost justified?

In short, this list gives the treatment center manager a point of departure. By asking the questions, the treatment program can begin to get an idea about the relative attributes of the alternative systems.

As a primer on the various alternatives, the following sections discuss--in broad brush strokes--the merits of four data-processing alternatives. It must be kept in mind however that within these broad categories the particular characteristics of each system may vary considerably. Nothing can substitute for a penetrating analysis by the treatment center prior to committing substantial sums of money to a data-processing alternative.

In-House Small-Business Computers: The Wave of the Future

The evolution of computer technology has been rapid, and computers have grown in the direction of wider applications and user orientation. Until recently, however, computers remained sufficiently complex and costly that their utility in small businesses was severely limited. In the early 1970s, the industry branched in a radical direction applying advanced technology to a line of computers appropriate for small-business use.[2] For the first time the possibility of a drug abuse treatment center buying or leasing its own computer has become reasonable.

What is a small-business computer? In the most gross sense, a computer has five important components:

- Input mechanisms: Recall that step 2 in the data-processing cycle requires that original data be entered into the system. Thus the first important part of the computer is the input mechanism. There are two major types:

  1. A keypunch machine which is not physically attached to the computer and which produces batches of punched cards that are fed to the computer at a later time.

  2. The more typical input mechanism for small-business computers is the input terminal which resembles a typewriter. This mechanism is attached to the computer, either occupying the same room or being connected by telephone or wires from a location. This is known as online data entry.

- Central processing unit (CPU): This is the "guts" of the computer where the classifying, sorting, calculating, reporting, and summarizing take place.

- The instructions (software): This part of the computer corresponds to the music tape for the player piano and can take one of three forms: tape, disk, and diskette. The latter is most commonly used by small computers and resembles a phonograph record.

- Storage units: Data files, like instructions, can be maintained on disks, diskettes, or tapes.

- Printer: This part of the computer translates machine language into "hard copy" reports and documents. In addition the computer can project images on a cathode ray tube (CRT) which resembles a television screen.

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[2]Small business is usually defined in the computer science literature as being between 50 to 150 employees and having not more than $5 million in annual revenues. Clearly most drug abuse treatment programs fall within this definition.

Figures 5 and 6 illustrate several popular small-business computers demonstrating the compactness of the five components described above. There are many other types of hardware available from other vendors; these examples were selected randomly.

Small-business computers can be used for a variety of purposes in drug abuse treatment settings. Some of the applications can be supported by prepackaged software programs; others require special programing efforts:

- Financial management applications: Prepackaged programs include payroll, accounts payable, cash disbursements, accounts receivable and billing, general ledger, and cost accounting. Special programs can be developed to determine unit costs and for financial planning.

- Client management applications: Fewer prepackaged software programs exist to support client management in drug abuse treatment programs. However, software can at least theoretically be developed to perform scheduling, medication monitoring, client demographic characteristics analysis, utilization analysis, productivity and outcome studies, Federal and State reporting, and so on. Such developments must usually wait on clear definitions of these terms--not a problem with the more generally understood terminology of accounting.

Obviously, all small-business computers do not have identical capabilities. Some companies (e.g., Basic Four, Datapoint, and Digital Equipment Corp.) specialize in small-business computers. Larger companies (e.g., IBM, Honeywell, Burroughs, Singer, and NCR) have a diversified product line of which small-business computers comprise a relatively small part. Despite this diversity, it is possible to make a general assessment of the characteristics of small-business computers in terms of the 12 criteria introduced earlier.

- Availability: Because the treatment program has its own machine and does not compete with other organizations for its use, availability is rarely a problem and is in fact one of the most compelling reasons for obtaining one's own computer.

- Reliability: These machines have proved to be generally reliable. Because periodic failures of input or output components are to be expected, the treatment program should assess vendor responsiveness to (and charges for!) making necessary repairs. The treatment center should also try to identify comparable equipment in the area that might be "borrowed" during protracted "down" periods.

- Confidentiality and Security: Because the data never leave the premises, confidentiality of client records is assured. As with any information system, however, data can be abused internally and so the treatment program should develop a written plan to restrict circulation of data and prohibit unauthorized access.

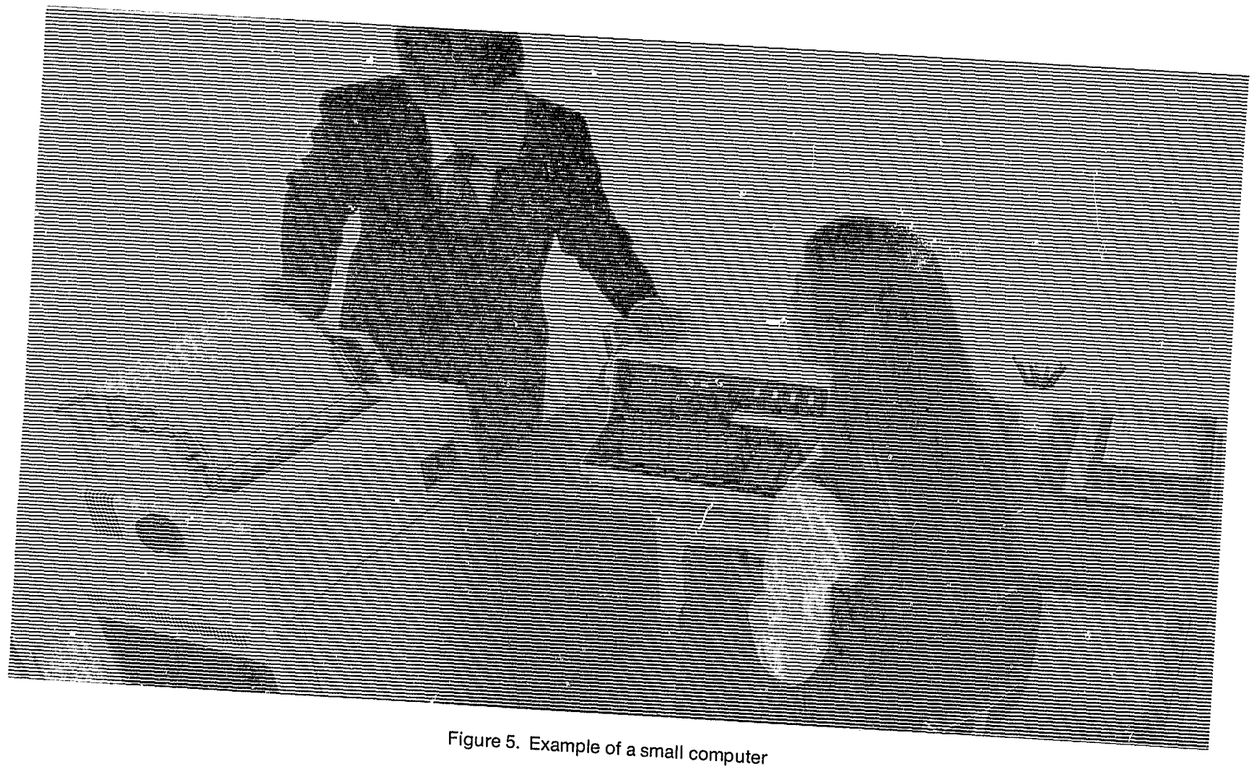

Figure 5. Example of a small computer

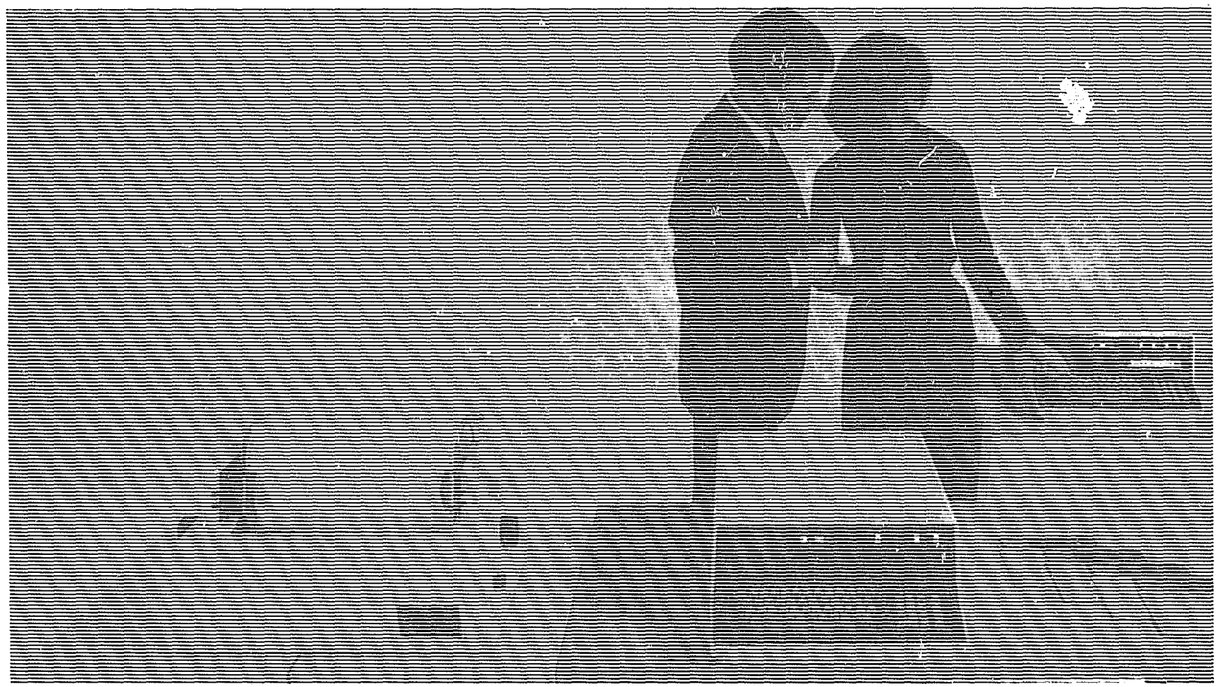

Figure 6. Example of a small computer

- Turnaround time: Turnaround time is not usually a problem with an in-house computer if the treatment center has formalized processing priorities and if the computer has adequate capacity to meet routine programing needs. Turnaround time can also be affected by the data input mode: both batch input and online input are common to small-business computers; the latter method, although more expensive and technologically complex, results in speedier response times and can accomplish tasks that a batch processing system cannot. For example:

  1. Immediate status determination: A registration clerk can query the computer files via a terminal to determine if the client is enrolled in the program, is scheduled for an appointment that day, or is eligible for a particular payment plan.

  2. Medication monitoring: The computer files can provide immediate feedback (via the terminal) regarding the appropriate dosage for medication, the approaching expiration date of the prescription, delinquent urinalysis, or contraindications for medication.

- Packaged software programs: Prepackaged software programs for small-business computers are generally limited to standard procedures such as payroll, accounts payable, and general ledger. It is unusual to find more precisely tailored packages that support client management activities. In "shopping around," the treatment center may find a package that appears to meet many of its needs. Caution must be exercised to assure compatibility between the software package and the hardware of choice. Additional programing is very expensive.

- Programing service and technical support: Most of the small-business computer vendors offer "turnkey" systems. These imply vendor responsibility for smooth operation of both hardware and software. Because of the competition among vendors, the consumer can usually insist that the system operate satisfactorily as a condition of contract acceptance. However, industry surveys indicate that post-installation services leave much to be desired. Therefore as part of the contract the treatment center should specify the amount and type of ongoing technical support to be provided and, if possible, identify particular individuals who will perform these ongoing services. It is considered desirable even to draw up two contracts--one covering hardware and the other software.

- Expandable: Most small-business computers can be expanded considerably by adding storage capacity or a faster printer. If the treatment center plans to grow and expand the computer function, it should consider (1) the cost of the original equipment and (2) the cost of expansion equipment. It may be that Computer A is less costly in the short run but that Computer B (with the larger initial capacity) is more cost-effective over the period of growth.

- Physical installation: By definition these small-business computers are compact and relatively easy to install. However they are likely to require physical plant modifications such as air-conditioning, circuit breakers, fire extinguishers, and electrical system upgrading. The costs of these modifications must be part of the evaluation of the alternatives.

- Ease of implementation: For turnkey systems implementation is relatively straightforward if the vendor provides adequate operator and user training. For unique programing applications, implementation is far more difficult and will require commensurate investment of time and staff resources to design program specifications, test and debug the system, and implement it entirely.

- Ease of operation: Most small-business computers have been designed for operation by clerical-level staff. This is a significant attraction of these computers. However, if the system needs to be modified, the treatment center will need continuing access to a programer.

- Cost-effectiveness: Small-business computers (hardware alone) range from $5,000 to $100,000; software development costs may run up to three times the hardware costs and increase proportionately with the level of programing effort. The fixed costs of an in-house computer are relatively high and include the monthly purchase or lease payment, salaries, and space. Variable costs, on the other hand, are generally low being limited to punch cards, printer forms, disk packs, utilities, and miscellaneous supplies. Cost-effectiveness, then, depends upon whether the system capacity is used fully enough to justify the high fixed costs.

Computer Service Bureaus

A service bureau is an organization that owns a computer and that (1) leases or rents time on the computer, or (2) uses its computer power to perform specific tasks for clients. In contrast to the small-business computers described above, these companies usually employ the largest and most sophisticated equipment available as shown in figure 7. Service bureaus are sponsored variously by:

- Proprietary companies: The majority of service bureaus are for-profit companies. Some offer a wide array of services and others are highly specialized, offering only a single service (e.g., patient billing).

- Drug abuse coordinating agencies: Although not usually considered as service bureaus, single-State and single-county agencies often own or have ready access to computers which can perform data-processing tasks for drug treatment centers. Insofar as considerable data are already submitted to these

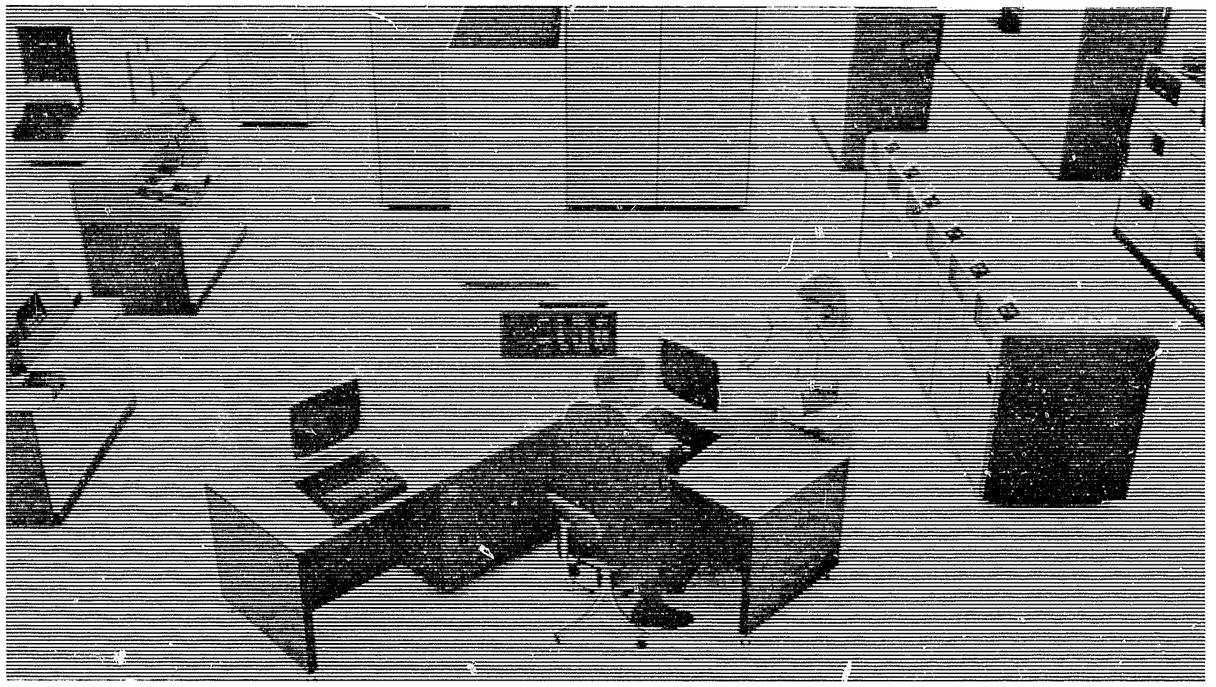

Figure 7. Example of a service bureau

agencies,[3] it makes sense to explore the possibility of completing the data-processing cycle through this mechanism.

Service bureaus have two major modes of operation (in fact many service bureaus offer both modes as options):

- Online processing: This mode requires that the drug treatment center have a terminal on its premises that links the center directly to the computer. Data are entered into the service bureau computer via this terminal and, similarly, data can be retrieved by issuing a request through the terminal. This mode greatly enhances the responsiveness of the service bureau but is a rather costly feature and should be carefully justified before the expense is incurred.

- Batch processing: With this mode the treatment center forwards (by mail or hand delivery) batches (packages) of input documents to the service bureau according to a regular schedule (e.g., monthly). This requires that the treatment center collect its source documents (step 1 in the data-processing cycle) in a standard acceptable format that can be easily processed by the computer.

Service bureaus like any service industry vary considerably in the quality and cost of their product. Nonetheless the following generalizations can be made about them:

- Availability: With the larger service bureaus availability is usually not a problem. However if the service bureau has one or two large clients (and the treatment center is not one of them!) the center may experience difficulty gaining access to the facility.

- Reliability: Because service bureaus tend to use modern equipment and to have adequate backup computing power to cover periods of machine failure, reliability is generally good.

- Confidentiality and security: Although security leaks are more apt to occur whenever data leave the treatment center, service bureaus are usually contractually obligated as well as being dedicated just from a good business point of view to maintaining a reputation for security and, thus, can be expected to comply with any reasonable safeguard plans. Treatment centers should review the Federal, State, and accrediting agency (if applicable) confidentiality regulations with the service bureau to determine how compliance is to be assured.

- Turnaround time: With the proprietary service bureaus, treatment centers can usually negotiate any length of turn-

[3]FMIS and CODAP for example.

around required. In contrast, service bureaus based in coordinating agencies are notorious for their lengthy turnaround times. Overall, turnaround time with a service bureau is dependent upon:

1. The data entry mode, e.g., online or batch processing.

2. The relative priority of the treatment center in the hierarchy of service bureau clients.

3. The capacity of the service bureau computer to handle all of its clients.

4. The quality of the input data provided by the treatment center. Incorrect data (rejected by the system through a series of edits) will have to be corrected by phone or mail thus increasing the turnaround time.

- Packaged software programs: Packaged software support is one of the most important criteria in selecting a service bureau and in this respect service bureaus vary most widely. It is in the interest of the service bureau to assist the treatment center in locating software packages that meet treatment center needs and that are compatible with service bureau hardware. (The problem of hardware and software incompatibility is not as great a problem in this environment--in contrast to the in-house computer--because software packages are made to run on the kinds of computers typically found in service bureaus.) Although the number of packages available for operation in the service bureau setting is large, the treatment center will find that these prepackaged systems relate primarily to financial management needs and do not address the largely statistically oriented client management requirements.

- Programing services and technical support: Most service bureaus offer programing services and technical support to encourage new clients. These services can be used to modify existing programs, develop new software, train staff, draft input forms, and so on. The treatment center should negotiate a fixed-price contract for specific assistance. Moreover if the treatment program pays to develop a new software package, it should obtain ownership rights so that a shift to an in-house computer or other service bureau will not require redevelopment of the software.

- Expandable: The expansion capability of a service bureau is almost unlimited. However, the costs of the service bureau's services expand in almost direct proportion to the transaction volume. Hence a treatment center should monitor its costs closely to determine when the fixed costs of an in-house computer are justified by large volumes.

- Ease of installation: Ease of physical installation is a major advantage of the service bureau approach. At the most,

terminal(s) will be installed and this is as simple a process as installing a telephone.

- Ease of implementation: Although the need for training staff in data collection and interpretation remains necessary, the treatment center that selects the service bureau approach will not need to train its staff in computer operations. However during the early system design stages, implementation can be difficult depending chiefly on the originality of the software package.

- Ease of operation: The ease of operation is another strong point of the service bureau approach. The service bureau usually develops data input records in machine readable form, processes all data, and prepares all finished reports. This approach obviates the need for computer operators at the treatment center.

- Cost-effectiveness: The fixed costs of a service bureau are usually nominal being limited to a small monthly hookup fee. (Conversely, the installment fee can be charged at the beginning of the contract in a lump sum.) Service bureaus will usually require a contract for a minimum period of 1 year to cover the variable costs associated with one or more of the following:

  1. Number of cards punched
  2. Amount of data entered into the system
  3. Number of transactions processed
  4. Number of documents produced

  Because service bureaus compute charges in a large variety of ways, the treatment center should obtain very detailed estimates for all types of charges possible lest it be saddled with unanticipated "hidden" costs.

Manual and Machine-Assisted Systems: Traditional but Reliable

At the simplest end of the data-processing continuum lie manual systems. Manual data-processing systems--like their automated counterparts--must complete the five steps in the data-processing cycle: data origination, data entry, data manipulation, data output, and data storage. Certain of these steps can be assisted by simple business machines or techniques that greatly enhance the efficiency of manual systems at a reasonable cost:

- Data Entry: There are two ways to economize in the data entry step. The first involves a manual one-write system; the second is an automatic one-write system. These methods record data in different records simultaneously, with a single

entry. Usually, one-write systems (both manual and automated) are associated with accounting functions, but they can be used with equal effectiveness for client recordkeeping applications.

- Data Manipulation: Data manipulation in a manual system can be aided by calculators, accounting machines, and special filing systems that speed retrieval and sorting activities.

- Data Storage: Manual files can be organized in a number of ways that increase access and retrievability, such as color coding, tickler files, cross-files, mail-sort files, and others.

As the advent of computer-supported data-processing systems in small organizations becomes more likely, these organizations tend to overlook the substantial advantages of manual or machine-assisted information systems. Manual systems are as available as are competent clerks; they are as reliable as those clerks are competent. They are extremely easy to operate (if somewhat tedious) insofar as they generally require only clerical skills. And most important, manual systems are cost-effective for a great majority of small service organizations: Treatment centers can harness nonscheduled time of onboard staff members to run the system; they need make little if any capital investments; and they will incur only nominal variable expenses.

Despite these compelling advantages, there are significant shortcomings to manual systems. Turnaround time is notoriously sluggish. Although very flexible during initial periods of growth, manual systems can not be expanded appreciably without becoming inaccurate, inefficient, and generally overwhelming. Also users of manual systems (more so than users of automated systems) tend to overlook the need for documentation--an oversight that penalizes the treatment program (1) during audits and fiscal reviews, (2) when stafff turnover creates the need for retraining, and (3) if it hopes to conduct longitudinal analysis of the data generated by the system.

WHAT TASKS ARE REQUIRED TO SELECT A DATA-PROCESSING ALTERNATIVES?

- "The computer firm didn't give us what we wanted!"

- "The staff simply wasn't prepared to take over where the computer firm left off. We are going to have to hire a programer instead of a desperately needed additional counselor."

- "The machine was obsolete by the end of the first year."

- "The data are so riddled with errors that I still have to rely on intuition to make management decisions."

These common complaints are not only the cry of drug treatment agencies but of every type of organization that leaps into data processing without a careful analysis of its own information needs and the many alternatives available for satisfying those needs. This final section of the chapter lays out a logical plan by which treatment centers can launch a data-processing project. Figure 8 presents the sequence of these tasks. It should be noted above all that nothing can substitute for deliberate cautious planning and analysis by the treatment center manager.

Conduct an Informal Survey of Experiences and Alternatives

The drug treatment center should not begin its investigation of data processing alone or at ground zero. Many similar service organizations have gone down the data-processing road and there are eager vendor "guides" to assist the treatment program in its journey. The treatment center manager should take advantage of the free advice available from a number of sources.

- Other service organizations: Organizations with successful data-processing histories are usually generous with the details of that success. And the victims of data-processing "horror stories" can be counted on to recount the events that gave them trouble.

- Vendors: Vendors offer a range of presale services and gimmicks from which the objective treatment center manager can profit. Being careful not to make a premature commitment, the manager can participate in seminars, receive instructive literature, obtain free cost estimates, and get assistance in conducting an information needs assessment.

- Trade associations, Single State Agencies, parent organizations, and funding agencies: These organizations all have a vested interest in the fiscal and administrative integrity of the treatment program and so frequently offer technical assistance, information system guidelines, model systems, workshops, and other services that may assist the treatment center in its preliminary search for a data-processing alternative.

- Public accountants: Almost every treatment center engages an accountant (at least on a part-time basis); this resource--who is intimately familiar with the accounting information needs of the treatment program and well versed in several alternative accounting system approaches--can usually provide a valuable source of guidance to the treatment center.

- Objective consultants: Occasionally the treatment center may wish to employ the services of an information system consultant. Managers who seek such assistance should be certain that

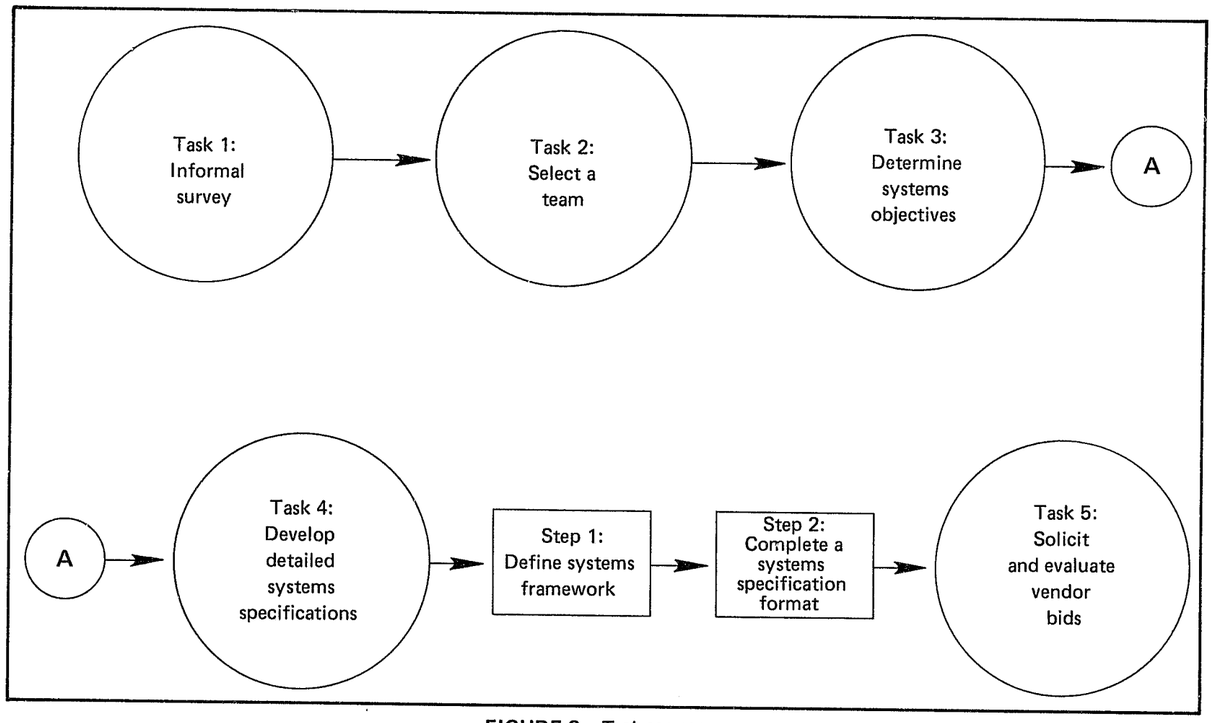

FIGURE 8.—*Task sequence*

the consultant is familiar with the drug abuse environment and try to make sure that s/he has no vested interest in one particular data-processing alternative or system.

Select a Data-Processing Team

One of the most important initial planning steps is to select the data-processing team. The word "team" is used deliberately: the project will probably span several years, create numerous political and technical hurdles, and influence every functional area of the treatment center. Thus the project team should be comprised of carefully selected individuals. The team leader should be an individual with a systems orientation, a broad familiarity with the management requirements of the treatment center, the authority to complete the assignment, and have the full backing of top center management. Team members should be drawn from every department or discipline within the treatment center to assure a multidimensional focus of the developing system and to help "sell" the system throughout the treatment center.

Determine System Objectives

Once a firm commitment to the data-processing system project has been made, the treatment center must develop specific objectives and priorities for the project:

- Objectives state clearly what the treatment center intends to accomplish by implementing the system. Wherever possible, the objectives should be stated in measurable terms so that (1) there can be no disagreement about the "meaning" of the objective, and (2) so that progress toward the objective can be monitored.

- Priorities acknowledge that there are limited resources available to implement the objectives and that ultimately some objectives are more important than others. Ranking or clustering the objectives according to their importance, although difficult to achieve in practice, will further communicate the overall intent of the data-processing project.

The best approach to developing the systems objectives is the "question and answer" technique. During a meeting of the project team, one should attempt to reach agreement on answers to questions such as:

- What can the system do for us?

  1. How will it support the service delivery process?

  2. How does it provide information for evaluating that process?

  3. How will it facilitate billing third party payers and clients?

  4. How can it help us improve counselor productivity and reduce wasted time?

  5. How can it guide the resource allocation process?

- How much can we spend for the system?

  1. What percentage of the total budget can be committed to the project?

  2. How many additional specialized people can we afford?

  3. What investment can be made of management time?

  4. What will be the ongoing costs?

  5. What will be the cost savings?

- What are the key considerations in evaluating alternative systems? What is the priority among these considerations?

  1. Reliability

  2. Availability

  3. Confidentiality

  4. Turnaround time

This meeting should produce a list of systems objectives that will form the basis for systems development and communication among all players. These objectives are not the final word: they will be refined or changed during the remaining tasks.

Develop Detailed System Specifications

The previous section stressed the importance of evaluating data-processing alternatives as they relate to treatment center needs. To do this the treatment center manager must understand the nature of the evaluative task. For example, assume that the program is faced with three alternatives: Systems A, B, and C. The first impulse is to compare A to B, B to C, and A to C to determine the "best" system. But this approach misses an important point: The evaluation should be made not between the alternative systems per se--but between X (the treatment center's own definition of system requirements) and A, X and B, and X and C. In other words, the evaluator must have a clear understanding of his/her own needs. S/he must have information about the alternative systems and must <u>also</u> have a firm and comprehensive understanding of the treatment center's information needs. These needs should be documented in a format that facilitates

communication between the treatment center and the system vendor. The process by which the information needs are cataloged is called system specification.[4] A system specification ("spec") is defined as follows:

> The activities to be supported by the MIS, the outputs required to support those activities, and the processes necessary to produce those outputs.

In short the system specifications define the treatment center's needs at each step in the data-processing cycle. They are the cornerstone of the MIS and must be very detailed and comprehensive.

A METHODOLOGY FOR DETERMINING INFORMATION NEEDS AND FORMULATING SPECIFICATIONS

Broadly Define the System Framework

It may seem axiomatic but the first step is to define the management information system. There are as many definitions for MIS as there are users of MIS. Consequently, major problems often arise from basic disagreements concerning the parameters and ingredients of the MIS. Does client management and quality assurance impact on the MIS? Is accounting part of the MIS? Will the MIS perform evaluation functions? These and other basic questions must be answered explicitly prior to selecting a processing alternative.

One way of defining the MIS involves the concept of system "modules" introduced in chapter 7. Each system module is a self-contained minisystem or subsystem. Like building blocks, the modules combine to form a larger system. In applying the module concept to drug abuse treatment centers, one approach is to develop modules around the major management decisionmaking areas: planning and budgeting; client treatment; financial management and accounting; and evaluation. Each treatment center can define the MIS to include, exclude, or reorganize these functional modules. As an illustration of the amount of detail required in an MIS definition, the following functions may be included:

The Planning and Budgeting Module

The planning and budgeting module provides forms for and describes how a program can:

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[4]System specification as used here is not to be confused with software program specifications that are utilized by computer analysts.

- Identify appropriate goals and objectives and formulate a program plan.
- Use the program plan and historical data from the other MIS modules to develop a quarterly or monthly revenue/expense budget.
- Use this budget to meet external reporting requirements (e.g., to NIDA).
- Use the budget throughout the year to monitor the financial status of the treatment center.
- Identify unit costs for each type of service provided by the program.

The module stresses that detailed planning and budgeting be done once a year but that the plan and the budget themselves become important tools for program management throughout the year.

The Financial Management and Accounting Module

As the funds available for drug abuse treatment become more limited, a premium will be placed on programs that can demonstrate tight internal control and efficiency with monies. The financial management and accounting module is comprised of four functions:

- Accounts receivable management
- Billing
- Payroll
- Voucher processing (i.e., paying bills)

These four functions are carried out in a way that facilitates cost accounting or cost allocation and allows management to identify costs and revenues according to the type of activity with which they are associated.

The Client-Treatment Module

The client-treatment module is comprised primarily of a set of input forms in the client record. These forms relate to the four submodules of the client-treatment cycle:

- Admission
- Treatment planning
- Service delivery and progress evaluation

- Discharge

This is the most critical module in the MIS because the information collected throughout the client-treatment cycle is used throughout the MIS for such purposes as staffing, billing, reporting to NIDA, planning and budgeting, and evaluation.

The Report and Evaluation Module

The evaluation/monitoring module does not involve the collection of any additional data but, rather, tabulation and analysis of data collected by the other three modules. Three types of analysis are performed by this module:

- Evaluation of individual client progress;
- Financial analysis, e.g., comparison of actual to planned expenditures and ratio analysis;
- Program analysis of two types:

  Assessment of the success in meeting program goals and objectives;

  Review of routine program indicators, such as staff-to-client ratio, turnover of client population, and percentage of successful discharges.

The evaluation/monitoring module discusses how information collected by the other modules can be summarized, tabulated, and displayed to be of most valuable assistance in the decisionmaking processes.

Figure 9 shows the relationships among the four MIS modules outlined above.

Complete System Specification Worksheet for Each Module

> A system doesn't do what you want . . . it does what you tell it.

So goes the cliche. Figure 10 illustrates a practical and concise format for telling the system what to do. This format will enable the treatment center manager to specify MIS requirements by module in an organized manner. The elements in the worksheet relate directly to the steps in the data-processing cycle.

For example, the specification sheet for the client treatment module would be approached by first defining the functions that the module is to support: admission, treatment planning, service scheduling and delivery, progress evaluation, and discharge. The output for the system (i.e., the information required to

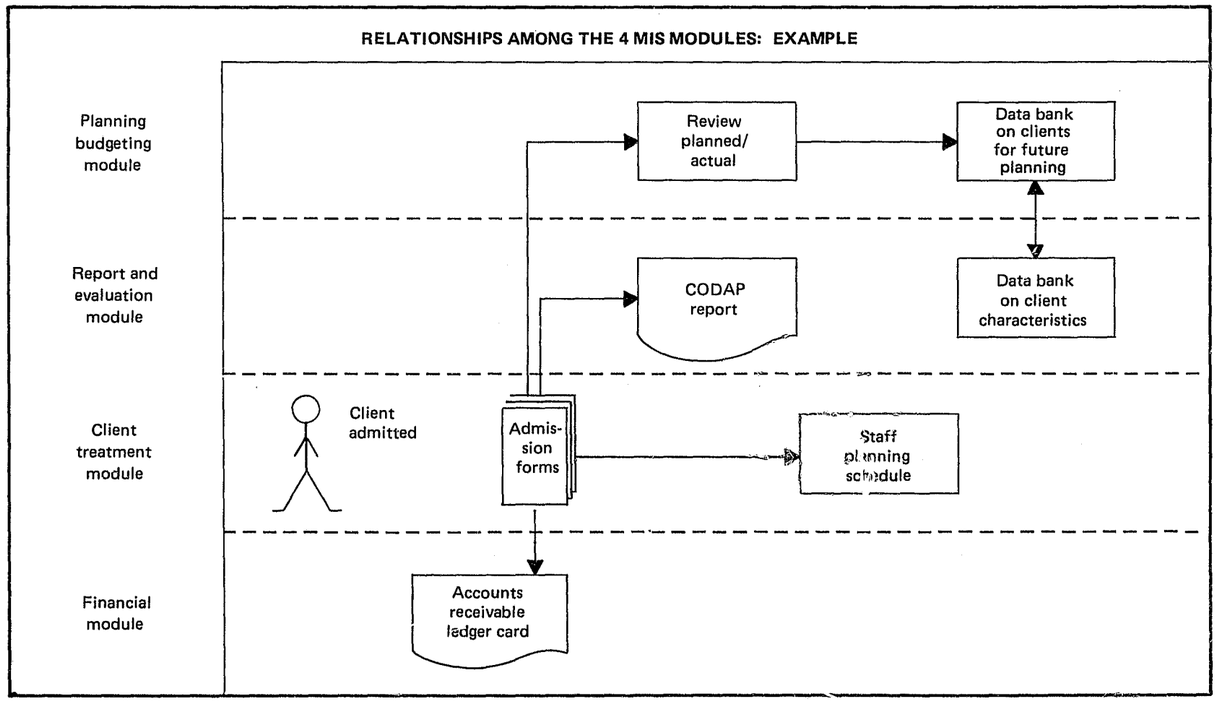
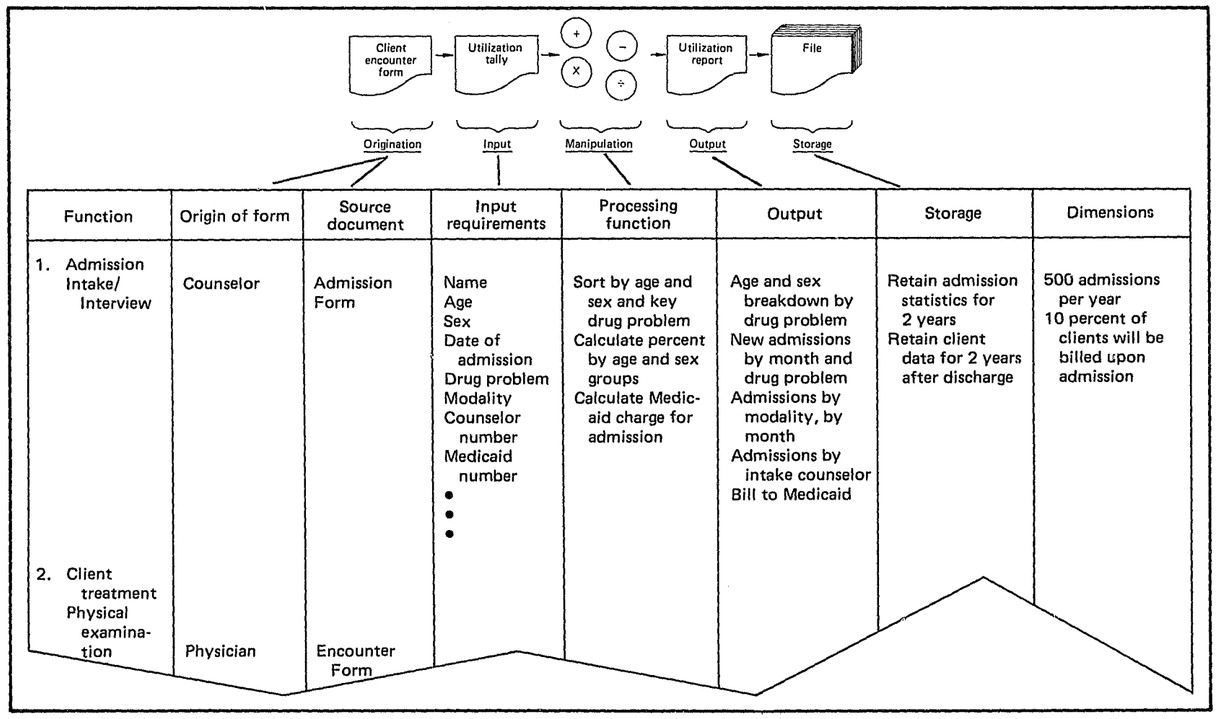


FIGURE 9.—*Functions of the 4 MIS modules*



Function	Origin of form	Source document	Input requirements	Processing function	Output	Storage	Dimensions
1. Admission Intake/ Interview	Counselor	Admission Form	Name Age Sex Date of admission Drug problem Modality Counselor number Medicaid number • • •	Sort by age and sex and key drug problem Calculate percent by age and sex groups Calculate Medicaid charge for admission	Age and sex breakdown by drug problem New admissions by month and drug problem Admissions by modality, by month Admissions by intake counselor Bill to Medicaid	Retain admission statistics for 2 years Retain client data for 2 years after discharge	500 admissions per year 10 percent of clients will be billed upon admission
2. Client treatment Physical examination	Physician	Encounter Form					

FIGURE 10.—*Specification worksheet—client treatment module*

perform the decisionmaking tasks of each function) correspond to the information requirements as developed in chapter 7. From there the manager (and the project team) can fill out the rest of the form. This is basically a trial-and-error, advise-and-consent process. Throughout many items will be entered and then discarded (and possibly reentered!) as the treatment center staff struggle to define their management processes. But the struggle will pay off. There is no substitute for careful system planning and this set of specifications provides a good foundation for the entire project.

Solicit and Evaluate Vendor Bids

"Let the buyer beware" is not a particularly comforting credo for drug abuse treatment centers in the new world of automated MIS but it is a necessary one. Because treatment centers can, we believe, profit from a dose of old-fashioned competition in evaluating and selecting among the data-processing alternatives, a well-structured specific Request for Proposal (RFP) which includes the systems objectives and specification worksheets can assist the treatment center to communicate its systems needs to prospective firms. It can also provide those firms with a helpful framework within which to describe their systems.

In summary, this chapter has provided a look into the world of data processing from the point of view of the drug treatment program manager. We hope that he or she will now be able to analyze additional information on his/her own. Because the field is so technical, the potential for costly mistakes is great. Hence we have stressed planning and obtaining objective expert help. To us the advantages of automation are so compelling that we feel planned risk is clearly justified.

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