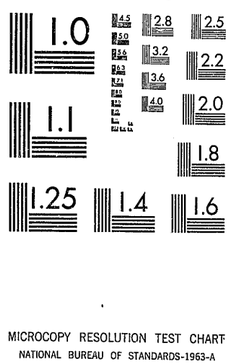
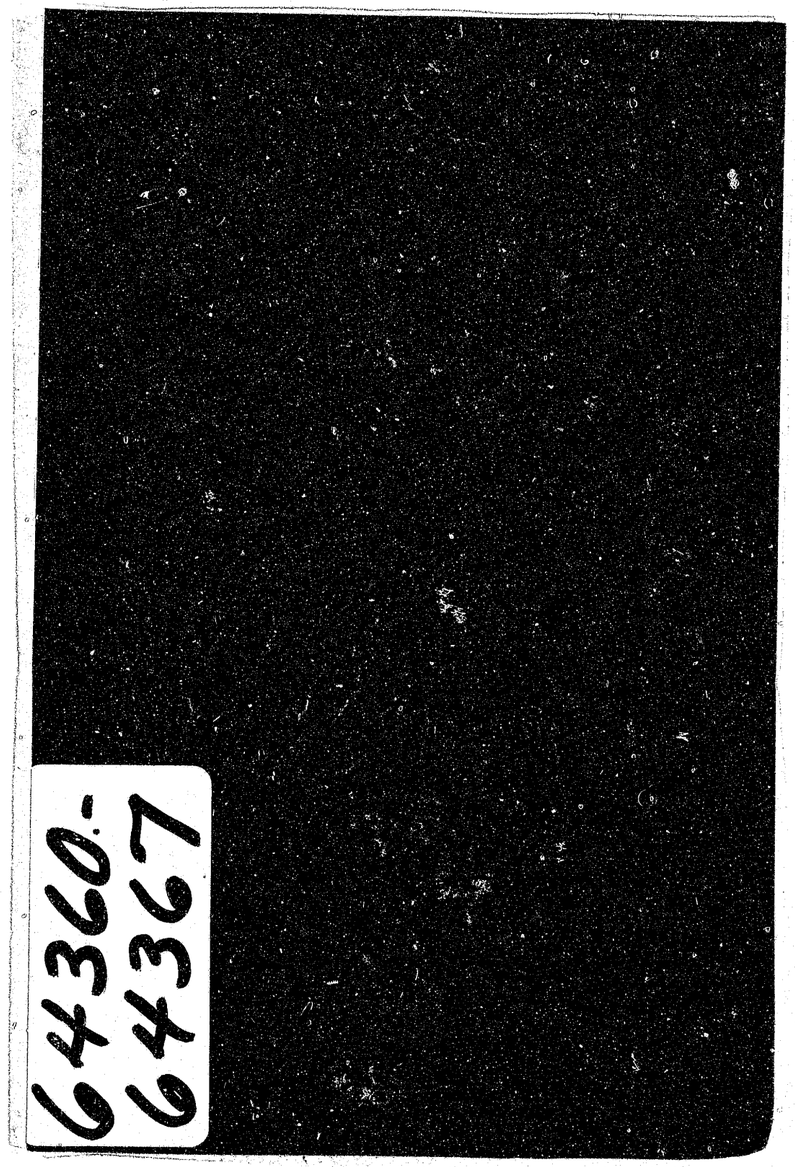


National Institute of Justice
United States Department of Justice
Washington, D.C. 20531

DATE FILMED

8/03/81



Management Information Systems in the Drug Field

Edited by

George M. Beschner, M.S.W.
Neil H. Sampson, M.P.A., M.P.H.
National Institute on Drug Abuse

and

Christopher D'Amanda, M.D.
Coordinating Office for Drug and Alcohol Abuse
City of Philadelphia

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Alcohol, Drug Abuse, and Mental Health Administration

Services Research Branch
Division of Resource Development
National Institute on Drug Abuse
5600 Fishers Lane
Rockville, Maryland 20857

The Services Research Reports and Monograph Series are issued by the Services Research Branch, Division of Resource Development, National Institute on Drug Abuse. Their primary purpose is to provide reports to the drug abuse treatment community on the service delivery and policy-oriented findings from Branch sponsored studies. These will include state of the art studies, innovative service delivery models for different client populations, innovative treatment management and financing techniques, and treatment outcome studies.

Chapter 2, State of the Art Review: Drug Abuse Management Information Systems in Single State Agencies was written under NIDA contract #271-76-5506.

All of the other chapters in this report were prepared under NIDA grant #5 H81 DA 01729-03 to the Coordinating Office for Drugs and Alcohol Abuse, City of Philadelphia.

DHEW Publication No. (ADM) 79-836
Printed 1979

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402
Stock Number 017-024-00938-5

CONTENTS

64362

2.
State-of-the-Art Review

Drug Abuse Management Information Systems in Single State Agencies

Paddy Cook, Barry Rosenthal, M.S., and Cheryl Davis, M.A.

Information systems within State governments specifically designed for the management of drug abuse treatment and prevention services are a recent phenomenon, not more than 5 years old, and currently entering a critical stage. Temporary funding incentives which were originally provided to the States by the National Institute on Drug Abuse, Division of Scientific and Program Information, (NIDA/DSPI) during 1974 to install a standardized Federal system have expired. The Single State Agencies (SSAs) for Drug Abuse have meanwhile been delegated more authority for management in keeping with the decentralization goals of revenue-sharing guidelines and have assimilated Federal data requirements into their own organizational and information management environments. A variety of drug abuse management information systems now exist in the States with different levels of technical complexity, selections of data elements, and patterns of report use. Continued development and utilization of these systems will involve new relationships between NIDA and the States.

Within the National Institute on Drug Abuse, the Division of Resource Development has also been involved in the development of information systems at the local program level. The Services Research Branch of that Division joined with the Division of Scientific and Program Information in February 1977 to sponsor a state-of-the-art review of drug abuse management information systems within the SSAs, the point at which Federal and local program interests converge. The purposes of this 5-month project were twofold:

- To survey the nature and extent of drug abuse information systems within the SSAs.
- To determine the areas of primary concern for future Federal technical assistance or collaboration among the States relative to MIS design, development, or revision.

HISTORICAL BACKGROUND

To appreciate the significance of the survey findings and the recommendations based on them, one must be aware of the brief but complicated history of drug abuse management information systems. Many aspects of the current national framework for the delivery of drug abuse treatment services were established by the Drug Abuse Office and Treatment Act of 1972. This bill established a Special Action Office for Drug Abuse Prevention (SAODAP) which was charged with the responsibility for determining the extent of the drug abuse problem, identifying treatment resources and methods, and developing a strategy for drug abuse prevention and treatment. The law also mandated the creation of Single State Agencies in the States to carry out the planning functions, manpower development, and implementation of appropriate prevention and treatment activities. The organizational framework in which these Single State Agencies were to be located was not specified and the subsequent variations in implementation affected the priorities afforded to drug abuse problems and the later development of their information systems.

SAODAP implemented the first drug abuse data-retrieval system called the Client Oriented Data Acquisition Process (CODAP) with the approval of six Federal agencies concerned with treatment and rehabilitation services. The original version of CODAP, which became a reporting requirement for all federally funded drug abuse treatment programs in 1973, provided demographic data and information on the drug-abusing behavior of clients admitted for treatment. Data were collected on individual admission forms, case sample progress reports, client census summaries, and funding information forms for all programs.

In 1974, CODAP underwent a major revision. CODAP II added a client discharge form and an expanded admissions form which were designed to enable measurement of changes in client behavior during treatment.

During the same year the functions of SAODAP, which had been formed as a temporary organization, were merged into the newly formed National Institute on Drug Abuse. The Division of Scientific and Program Information (DSPI) within NIDA was directed to implement an integrated and comprehensive drug abuse management information system that would satisfy the management needs of both the Federal and State governments. This new system was called the Integrated Drug Abuse Management Information System (IDAMIS) and was composed of three separate but coordinated systems:

- CODAP II--information on clients in treatment.
- Drug Abuse Program Reporting Unit (DAPRU) later known as the National Drug Abuse Treatment Utilization Survey (NDATUS)--data on all units providing drug abuse prevention and treatment services.

- Financial Management Information System (FMIS)--information for budgeting, cost finding, program monitoring, and financial control.

Original plans called for these subsystems to be transplanted intact (or with only slight modification) to the SSAs complete with fully workable software. Encouragement for State implementation of these modules was provided by DSPI in the form of 2-year contracts for establishing an Integrated Drug Abuse Reporting System (IDARP) in each Single State Agency. Sufficient resources for system installation and maintenance were offered in the form of (1) funds for staff, manpower training, and computer hardware (EDP equipment), and (2) technical assistance. The first IDARP contracts were negotiated in 1974 and all 50 States and 5 trusts and territories responded in less than a year.

The Single State Agencies have focused primarily on two of the three subsystems: CODAP and NDATUS. FMIS remains an optional component but CODAP data are required from all federally funded treatment programs and the annual facility resources survey (NDATUS) is conducted through the IDARP managers.

An intensive effort has been required to train staff and establish procedures for data collection and quality control. As these tasks have been completed, the emphasis of the SSAs has shifted from data collection to data utilization.

Although the IDARP contracts expired in June 1976, the States have continued to support the Federal drug abuse MIS with extensions of unexpended IDARP funds and/or State moneys. The decisionmaking and reporting responsibilities assigned to the SSAs by NIDA (e.g., monitoring of statewide services, contracts, production of State plans, program management reviews, and mandatory reporting of CODAP and NDATUS) require a continued State involvement with federally defined information systems. New arrangements for NIDA incentives for continued SSA participation may, therefore, be pending.

In January of 1977, CODAP was revised again. The changes in the data elements were primarily motivated by a desire for more precise measures of change in client behavior from time of admission to time of discharge.

Several modifications in the original plan for implementation of IDAMIS have discouraged the development of uniform management information systems within the States:

- The activity reports which were a part of the design of CODAP II provided aggregate data on clinic activities, client services, and clients' progress in treatment. These activity reports were soon dropped as requirements by NIDA, and States were then left with no uniform procedures for reporting client services or staff activities.

- NDATUS, which was originally designed to be collected on all drug abuse services on a semiannual basis, was restricted to an annual effort covering treatment units only. Therefore its reports on resource availability have been less timely and comprehensive than originally anticipated.

- FMIS is an optional subsystem which has been implemented in only a few States. Some modifications will need to be made in the software before it can be used to calculate unit costs, and it is not a billing system.

- Software for generation of routine reports using CODAP data was never provided to the States. Instead, IDARP personnel were trained in the use of commercial statistical software packages. These software packages have provided greater flexibility in data analysis, allowing MIS personnel to design reports around State informational needs.

Factors within the States have also contributed to the diversification of SSA-level MISs:

- Although NIDA produces reports based on CODAP data, the turnaround time is lengthy. Many Single State Agencies wanted to return timely clinical information to individual programs and, when there was a delay in the provision of CODAP software to the States, they either purchased software packages or developed proprietary software.

- In an increasing number of States, responsibilities for drug abuse and alcohol services have been merged into substance abuse agencies. These new organizations must meet the reporting requirements of both NIDA and the National Institute on Alcohol Abuse and Alcoholism (NIAAA). Attempts to handle these overlapping reporting requirements efficiently have resulted in many design innovations.

- The MISs in some SSAs have been affected by the larger organization of which they are a part. This is especially true of the SSAs which are located within Mental Health Departments since the National Institute of Mental Health (NIMH) was several years ahead of NIDA and NIAAA in the encouragement of MISs within the States. Again, design innovations have been required in order to avoid excessive paperwork.

SURVEY METHODOLOGY

In developing the methodology for the survey, one objective was to identify characteristics of State MISs that might be useful for further technical assistance efforts, or guidelines and manuals directed to the particular needs of groups of similar States. It was necessary, therefore, to discover general classification schemes applicable to drug abuse management information systems. It was

also necessary to structure the data-collection effort itself around defined content areas so that compatible descriptive information could be compiled and analyzed.

In order to find appropriate classification schemes and link the survey with other work in the MIS field, a brief review of the literature was conducted. Four potentially useful classification schemes emerged:

- Organizational location and purposes of the MIS (environment)
- Information contained in the system (design)
- Processing technology (mechanics)
- Management utilization of the information (decision-assistance)

One common classification of data banks divides them into statistical and intelligence systems depending on the regulatory purposes for which they are used (Westin 1971). Statistical systems aggregate data to study variations in group characteristics for planning and policy-setting purposes. Intelligence systems, by contrast, provide case dossiers on individuals for treatment, administrative, or punitive purposes. State drug abuse information systems and the CODAP files, operating under confidentiality regulations, restrict reports on clients to statistical aggregates; some States also produce internal clinically oriented individual client records of urine results, dosage schedules, or counseling sessions by client identification number. These individual case reports, however, are not interfaced with other systems such as health records, criminal activities, or welfare services.

This classification scheme is further amplified (Westin 1971) by grouping governmental information systems according to the organizational situations in which they are found as well as the purposes they serve. Although these particular classification categories have limited direct application to drug abuse information systems, the different organizational arrangements of the SSAs are of potential descriptive value. Questions focused on these organizational or environmental differences were therefore included in the survey.

A second potential classification scheme was suggested by differences in system design or data components used as input documents. Descriptions of information systems for the management of mental health clients, which are analogous in many ways to those concerned with drug abuse patients, frequently delineate subsystem components that can be combined in several ways to generate a variety of output reports (Elpers and Chapman 1973; Weinstein 1976). Some systems only contain data on services rendered to clients; others include measures of client improvement or unit costs, available resources, revenue and expenditures, etc. The number of instruments and the types of variables with common definitions that are included are a crude measure of system design complexity.

Another method of categorizing MISs was based on technological complexity or the historical availability of data-processing equipment (Withington 1974). The tasks actually performed by the processing equipment can be used to describe important differences among systems: transactions such as time posting and printing paychecks can be performed by simple data-processing systems; automatic subfile updates in systems with common data definitions can be made by integrated information systems; selection of specific data elements is possible in information retrieval systems with random access capabilities; and the meaning of data can be interpreted in management information systems which interface elements from different subsystems. These "real" information systems are designed to match scarce resources with areas of critical need (Davis and Freeman 1976).

A final classification scheme was derived from a systems analysis approach that differentiated types of management responsibilities and graded information systems by the management functions they support (Anthony 1965).

Systems designed around operational control functions usually consist of simple accounting transactions; more complex systems for management control monitor variances from established goals or standards; and systems for strategic planning assist with the deployment of resources and definition of new objectives. This approach can be used (Kennevan 1973) to differentiate automatic data-processing systems from more complex management information systems that supply information condensations and analyses useful for setting policies and standards, forecasting resource requirements, and controlling day-to-day operations.

The decisions made by managers can be classified according to a similar scheme as structured, in operations such as client billing; semistructured, in managerial situations such as evaluating staff performance levels; and unstructured or ad hoc, in strategic planning functions such as agency reorganizations or predicting new high-risk target groups. Different information is needed to make structured decisions than to suggest acceptable alternatives when decisions are less predictable (Gorry and Morton 1971). Fairly sophisticated computer applications such as simulation models or interfaces of data from a variety of sources in online manipulations are required for meaningful analyses of social data where the variables describing behavior are numerous, interactive, and seldom organized around a theoretical perspective (Pool, McIntosh, and Griffel 1968). Another decision-theory model cautions management against the organizational strains created by an overabundance of unorganized data (Ackoff 1967) and proposes distinctions between operations in which optimal solutions can be routinely identified and those management functions that require choices based on estimates and predictions.

One clear message which emerged from the literature was that the true management information systems were those used to support organizational decisionmaking. Therefore the original survey design included an attempt to differentiate data-retrieval systems from management information systems.

The state-of-the-art review of MISs existing in SSAs was conducted February 1 to May 31, 1977. All 50 States and 5 additional counties were contacted and either visited or interviewed by telephone.

Thirty field sites were selected based on such factors as systems complexity or the presence of innovative design features. An effort was made to visit States which used a variety of approaches in terms of data collection, utilization of CODAP, and scope of drug treatment and prevention services. In States which were not visited, documentation (input forms, manuals, or reports) was requested to supplement the information obtained by telephone interviews.

The data-collection phase of the project was organized in less than a month; the site visits and telephone contacts were completed during the following 5 weeks. The Single State Agencies were generally quite cooperative in scheduling visits and providing the information requested.

An Interviewer's Guide was the primary tool used for both the field visits and the telephone contacts. This handbook established the framework for the project, outlined procedures for arranging and conducting the site visits, and presented the general content areas for information collection. There was not enough time to devise and pilot test a standardized questionnaire nor to seek the necessary governmental clearance for such an instrument. Since it was not possible at that time to predict what information would be available in each SSA, how detailed that information would be, or which areas would be most fruitful for analysis, the format of the guide allowed for open-ended responses. States and counties were then described in a narrative report which reflected differing emphases and mixes of detail. This approach provided the flexibility needed to document widely varying organizational and technical developments at the State level but established a framework from which categories and classifications could emerge.

The four general classification schemes discovered in the literature were repeated in the Interviewer's Guide which outlined the basic procedures for observing and describing MISs in the States and counties. These general areas were:

- The impact of the SSA/county organization on the design and installation of a MIS.
- The instruments and procedures used for input into the system.
- The processing modes, technology, and personnel used in data transformations.
- The output records generated and distributed for management information and utilization.

Whenever possible two consultants visited each site and shared responsibilities for interviews. An organizational consultant described the functions and structure of the SSA, the scope of drug abuse services, the expectations and attitudes toward quantified information, other constraints or supports for an MIS, and the actual generation and utilization of reports from the system. The technical consultant analyzed the types of data collected, the quality control procedures in effect, the hardware and software used, and the flow of data through the system.

The major methodological problems encountered were related to the uneven quality of the information obtained. The data gathered reflected only questions that were probed; consultants differed in their perspectives and States did not always have sufficient information readily available. These difficulties were not unanticipated and were considered normal for a study of this nature attempting to obtain baseline data.

After all the narrative reports had been completed, a coding sheet was developed and the data contained in these reports transferred to the coded format for computer analysis. The code sheet contained the same four general content areas that had guided the interviews and narrative descriptions.

However, the objective of differentiating data retrieval systems from management information systems could not be accomplished. Limitations on time and the availability of information made it impossible to make valid assessments of the manner and degree to which different SSAs were using their information systems. The fact that many systems were in a state of flux with many SSAs in the planning or implementation stage of a new system meant that there was not proof yet of what the output of the new systems would be or how that output would be used. Where reports were being produced by established systems, the format and distribution of the reports could be described but frequently the degree to which the information contained in the reports was actually integrated into the decisionmaking process could not be determined.

FINDINGS

This section reports the major findings of the MIS survey in six areas:

- Level of MIS Implementation
- Decisionmaking Assistance Expected From MISs
- System Mechanics and Technologies
- MIS Typologies

- Most Frequent Problems
- State Summaries

LEVEL OF MIS IMPLEMENTATION

One major finding was that many drug abuse management information systems were in a state of flux with no consistent developmental direction. Some States were adding new data components and automating subsystems while other were cutting back to minimal requirements and decreasing budgets for processing. This made it difficult to describe and classify the systems (table 1).

TABLE 1.—Level of MIS implementation

Phase [1]	Number of States N=48	Percent of States
Minimal CODAP	14	29
Established systems	13	27
Developmental phase of new MIS	6	12
Piloting a new MIS	7	15
Major revisions in earlier MIS	8	17

[1]Missing States = 2.

Fourteen states (29 percent) utilized only CODAP and NDATUS information as the basis of their MIS and had not moved beyond the NIDA instruments to develop additional components or different systems. Thirteen States had established systems beyond CODAP and were not currently undergoing major changes. Overall, 56 percent of the States had apparently reached a momentary equilibrium in MIS development, although information concerning either their immediate or long-range plans was not always obtained. The remainder of the States were either planning for change, piloting new systems, or undergoing major system revisions.

The 13 States which were in a planning or piloting phase had not placed formal priorities on MIS development. The reasons for delayed development were not coded but included such barriers as lack of State support, staff limitations, or organizational changes. One State acquired a new SSA director who resolved the stalemate in information system development; another director reshuffled

internal MIS staff responsibilities; and still another had to await a bureaucratic reorganization before MIS plans could be approved. The grants awarded through the Council of State and Territorial Alcoholism Authorities (CSTAA) for MIS development were a decided stimulus to many of the States including several which were launching new systems at the time of the survey.

In the eight States undergoing major revision, anecdotal information indicated that three factors were apparently at work:

- Recent CODAP revisions and similar modification in the NIAAA reporting system.
- Mandates from State legislatures.
- Pressures from organized community interest groups and task forces.

Such changes in reporting requirements were often sudden, unpredictable, and extrinsic to the orderly and controlled development of the MIS as planned by the State Agency staff. In some cases the perspective for data-collection efforts changed completely. In one State, which had developed prompt evaluation methodologies based on treatment outcomes, a new policy on confidentiality curtailed the submission of any data on individual clients; the revised MIS concentrated on process measures instead. By contrast, another State which had recently installed a system to measure program efficiencies and report variances from targeted goals had just been required by its legislature to develop new measures of program effectiveness and to implement followup studies of clients after treatment.

The survey did not include enough questions about the maturity of systems to draw conclusions about developmental stages or cycles. However, two patterns of MIS evolution were observed. Some States moved slowly but directly from simple to more complex arrangements adding new information components gradually and incorporating them into the ongoing system.

Other States began with grandiose schemes calling for "total" systems designed to provide all the information that might ever be wanted. In trying simultaneously to meet the information needs of program administrators, clinicians, researchers, elected officials, and the general public, they swamped managers with what Russell Ackoff, in his classic "Management Misinformation Systems," described as "an overabundance of irrelevant information." Experience taught them that "facts" even when available were often less influential than other factors (such as political considerations) in real-life decisionmaking, and that computerized information supported some decisionmaking tasks better than others.

As a result some States were cutting back on the volume of data collected and focusing on using information for management purposes rather than simply acquiring and storing it. In one State whose MIS was undergoing modifications, the revised goal was to

produce the "minimum number of justifiable output reports." Several States were reducing the amount of extraneous research information collected routinely on clients but offered coded spaces on the data-collection instruments which could be used as needed for special studies. Still others were moving to adopt CODAP as their central module for client-related information in order to avoid unnecessary duplication of reporting, while adding other information to build a more comprehensive MIS. In general there was a growing awareness of the need for economy in information collection systems.

Decisionmaking Assistance Expected From MISs

One set of questions directed to SSA directors and their staff concerned expectations from an MIS: What types of information were needed to fulfill managerial responsibilities? Responses were categorized in the nine general areas depicted in table 2.

TABLE 2.—Decisionmaking assistance expected from an MIS

Area	SSAs indicating expectation	
	Number N=50	Percent
Program monitoring and evaluation:		
Outcome/impact/effectiveness	31	62
Process/utilization/efficiency	24	48
Program planning:		
Needs assessments	26	52
Resource inventories	14	28
Budgeting by unit costs	21	42
Meeting external reporting requirements/requests	11	22
Research	10	20
Clinical treatment needs	7	14
Standards development	6	12

By far the greatest emphasis was placed on assistance with program monitoring and evaluation. Sixty-two percent of the States expected to measure program effectiveness, and 48 percent expressed an interest in process or efficiency measures. This concern with monitoring and evaluating treatment programs was a natural correlate of SSAs being required to allocate and account for funds and services--usually through subcontracting mechanisms rather than direct administrative control.

Interest in measuring client "success" and relative program effectiveness was expressed more often than a desire for measurement of program efficiency. There was a general demand for outcome and impact studies to assess reductions in client drug problems, increases in client productivity, and social and financial benefits accruing to communities receiving treatment and prevention services. There was a desire to rank and compare programs so that allocations of funds, staff training, and technical assistance could be made on a rational basis. However, at the time of the study only a few States had actually implemented policies that tied review results directly to funding approvals. The expressed demand for effectiveness measures rather than efficiency rates may have been related to the type of data already in the system since CODAP-based systems already require client-oriented information while process measures such as staff activities or units of services must be added.

Second only to the interest in program monitoring and evaluation was an interest in using data for program planning and needs assessment. The desired information included external "indicators" from the community of drug use and abuse rates and incidence and prevalence studies with which to make projections of demand for treatment and prevention services. Fifty-two percent of SSAs expressed a desire to use MISs as support for needs assessments but only 26 percent were regularly collecting such indicator data. A few States had developed formulas for converting needs assessments to weighted indices by geographic area to be used as input in determining funding awards and facility locations. This represented a trend toward the utilization of available data for planning decisions.

Another type of information required for planning is an up-to-date inventory of resources in order to identify gaps in services. Only 28 percent of SSAs expressed this need--probably due to the availability of the NDATUS data base.

Another category of support desired from an MIS was unit-cost reporting to be used for budgeting, third-party reimbursements or rate negotiations, and measures of client costs. More than half the States expressed this need but only a few had made progress toward developing such a capability. Many States were planning to tie expenditure information to client service or modality of treatment in the very near future, or were piloting such a system.

The other four categories of anticipated MIS support received much less attention from the SSAs. Assistance in meeting outside reporting requirements or requests was mentioned by less than a quarter of the States. The lack of stress on this area may have been related to experiences with political realities. At least two States felt helpless in the face of community power groups using emotional arguments; however, several others cited cases in which studies and special reports based on MIS data had been influential in obtaining funding or reversing adverse policies.

Research needs were considered important for MIS assistance by 20 percent of the survey participants, and clinical treatment supports by 14 percent. It could be argued that these two categories are not usually the primary functions of SSAs and are, therefore, less frequently mentioned as areas requiring support from State-level management information systems. The aggregate information needs at the SSA level would generally not be the same as the individual client status reports desired by clinics for treatment planning and intervention. As mentioned previously, many States were interested in reducing the amount of information in their systems that was geared to research rather than management needs.

Only 12 percent of the States specifically mentioned a desire to use the MIS for developing standards or supporting policy decisions, a function strongly advocated by most designers of information systems who think of strategic intelligence as the primary role in which management should receive decision assistance from carefully selected information.

Overall the types of support expected from information systems in the States indicated a movement away from reports related to individual clients and an increased emphasis on those useful for management control and resource deployment. At this point, however, most States had not yet conceived of an MIS in strategic terms as useful for setting objectives, determining policies, or acquiring appropriate resources. There was some evidence, based on the interest in development of formulas for resource allocations, that progress was being made in this direction.

System Mechanics and Technologies

The survey included a number of questions about the mechanics of MIS operations which are reported in the four tables that follow:

- Instruments for data collection
- Control of data quality
- Technology for operations
- Reports for management decisions

The number of data-collection instruments in use among the systems varied widely between one form and an incredible 15 instruments (table 3). States using only the 3 basic CODAP reports had the highest single representation (15, or 32 percent). Two-thirds of the States used 5 instruments or less and a quarter of them reported between 6 and 10 forms, not all necessarily in the same programs and not all a part of the same system. These higher figures usually reflected the overlap of several systems such as CODAP, NIAAA, and a State MIS.

TABLE 3.—Instruments for data collection

Instruments used	Number of States	Percent of States
Number:[1]		
0-4	21	45
5	10	21
6-10	12	25
> 10	4	8
Type:[2]		
CODAP	42	84
Non-CODAP admission	16	32
Client services	11	22
External indicators	13	26
Non-CODAP discharge	11	22
Expenditures	10	20
Change in status	8	16
Aggregate client activity summary	9	18
NIAAA	10	20
Staff activities	7	14
Prevention/education services	8	16
Preintake contact	6	12
Aggregate client census summary	8	16
Addendum	6	12
Followup	7	14

[1] Unknown=3; N=47.

[2] N=50.

When the instruments were classified by type, CODAP forms were used in 42 (84 percent) of the States with 16 (32 percent) of the States preferring to use their own admission forms and 11 (22 percent) also using their own non-CODAP discharge questionnaire. The overlap can be accounted for by the duplicate reporting requirements in 70 percent of the States. A client services form (22 percent) and routine collection of drug-related "indicator" data (26 percent) were next in popularity. Only six States (12 percent) mentioned trailer sheets or addendum items of client-related data to supplement CODAP. Seven were undertaking client followup studies using instruments specifically designed for that purpose. Twenty percent of the SSAs required routine expenditure information from clinics and programs. Eight States (16 percent) had implemented at least a cursory attempt to aggregate information related to prevention and education services.

Numerous manuals were collected from States using their own instruments in addition to CODAP and the quality of these manuals varied widely. The best provided a full overview of the MIS in a

series of volumes including explanations of the data flow and examples, with interpretations, of output reports. The best manuals had clear definitions of all data elements, consistent instructions, and illustrations of all the forms. However some were so poorly printed that the words were illegible or so poorly written that the instructions were unclear. The most appealing manuals contained some humor to alleviate the tedium inherent in such documents. In a few States new forms had been designed and implemented without an updated manual of instructions; this practice was not conducive to the maintenance of a high-quality data base.

The data-collection instruments also showed variations in quality and design. One of the most imaginative forms combined admission, discharge, followup, and client-status-change reports on one-half sheet of paper. Separate coding instructions were available, and color codes on the instrument depicted the boxes to be completed at different points in the treatment process. Users were apparently quite satisfied with the form, which was not true of staff burdened with a six-page intake form in another State. In some States the instruments had coding instructions printed on the back but no separate instruction manuals. The effectiveness of this practice was not evaluated.

The procedures for control of data quality were usually critiqued in the narrative descriptions of the States (table 4). Forty percent of the States rated themselves as having good practices, 38 percent had adequate quality control, and 22 percent were described as having limited control procedures. The need for continued improvement in data quality in over half the States was borne out by frequent complaints from IDARP managers about the time required to edit incoming forms, resolve errors, and provide technical assistance to the worst offenders at the clinic levels.

Generally the States were aware of the great effort required to maintain quality control in a system even after completion of the initial training and implementation phase. This emphasis on the requirements for quality control may be at least partially attributed to the establishment of the IDARP function as a central control point in the SSA for CODAP monitoring. Several of the States had further decentralized this process to regional offices that were assigned the major responsibility for logging forms, batching the inputs, and resolving error reports.

When broken out separately, the specific procedures for quality control that reportedly received the most consistent attention were manual edits (91 percent of the States), staff training (79 percent), and the use of instruction manuals (65 percent). Machine edits, producing either error reports based on consistency checks or turnaround documents, were used in 59 percent of the States, frequently in tandem with another manual edit routine.

When questioned about the frequency of data submissions, most States (88 percent) reported a monthly schedule. Only 12 percent required weekly submissions; three States mentioned quarterly

TABLE 4.—Control of data quality

Quality control	Number of States	Percent of States
Degree of quality control exercised:[1]		
Limited	8	22
Adequate	14	38
Good	15	40
Specific procedures for quality control:[2]		
Manuals	22	65
Training	27	79
Manual edits	31	91
Machine edits	20	59
Reconciliations	21	62
Logging controls	19	56
Frequency of instrument submissions:[3]		
Weekly	5	12
Monthly	36	88
Quarterly	3	7
Annually	3	7

[1] Not reported=13; N=37.

[2] Undefined=16; N=34.

[3] Unknown=9; N=41.

collections. In States with varying submission dates for different forms, the most frequent submission requirement was coded.

Seventy-three percent of the States were operating an automated information system with another 17 percent pending automation (table 5). This represented a significant increase in automation; in the previous year only 54 percent of the States were automated and 13 percent pending automation. However, almost half of the States still performed some manual data processing, e.g., tabulations of figures from the client-flow summary. No clear relationship could be established between the level of sophistication of the data-processing technology used in each State and system output in terms of quantity or quality of reports. Analysis of the relationship between level of technology and level of output was made more difficult by the fact that some States operated concurrent manual and automated systems.

Most of the SSAs (77 percent) used State-operated computer facilities, usually available through a central department of administration in the State's capital city. Another 15 percent found

TABLE 5.—Technology for operations

Technology	Number of States	Percent of States
Processing mode:[1]		
Automated	35	73
Pending automation	8	17
Manual	22	46
Computer facility available:[2]		
State-owned	33	77
Private vendor	3	7
University	7	16
Special technical aids:[3]		
Remote job entry	7	14
Interactive terminals	5	10
Automated system in use:[4]		
File maintenance only	4	11
File maintenance and report generators	3	8
Commercial software packages/ NIDA tapes	17	46
State tapes and commercial packages	13	35
Number of MIS staff:[5]		
0-2	13	32
3-5	13	32
6 or more	14	35
Organization of MIS staff:[6]		
Within SSA	41	87
Outside SSA	6	13

[1]Unknown=2; N=48.

[2]Unknown/none=7; N=43.

[3]Unknown=1; N=49.

[4]Unknown/none=13; N-37.

[5]Unknown=10; N=40.

[6]Unknown=3; N=47.

TABLE 5. —Technology for operations—Continued

Technology	Number of States	Percent of States
Programer available on staff:[7]		
Yes	19	50
Use of CODAP tapes:[8]		
Received from NIDA and used	17	35
Produced for NIDA	3	6
Produces own tape for State use only	12	25
Not used/not received	16	33

[7]Unknown=12; N=38.

[8]Unknown=2; N=48.

universities to be cooperative, sometimes providing faster turnaround and more user assistance than the State facilities. Five States had developed an online capability using interactive terminals with display screens installed at the central MIS office or in other parts of the State. These offered immediate access to the data base and the ability to select individual records by client number or to provide cross-tabulations for different groups on a series of prepackaged table formats. It was not possible to determine whether sophisticated machinery served as an impressive gimmick or a useful management tool. Such machinery certainly increased the flexibility of the reports produced and eliminated problems associated with mountains of unused paper printouts.

Seventeen of the States were using commercial software packages and the tapes received from NIDA as their basic system; 3 States produced CODAP tapes for NIDA from their own instruments; and 13 States made their own tapes for use with commercial packages for analytical purposes.

States generally had small staffs to work in the management information system: almost two-thirds reported five or fewer available personnel. States with MIS staff located outside the immediate SSA (13 percent), often in a department of research and evaluation, usually had a strong commitment to the development of proprietary State systems beyond CODAP. Half the States had a programer available to them on their own MIS staff, most of these apparently being employed to write software for file building and maintenance rather than report generation. States with their own software for analyzing the CODAP II data were acutely aware of the expense and effort necessary to modify it and were amenable to using commercial software for routine analyses in the future.

The production of routine reports has begun only recently in many of the States that focused earlier efforts on data-collection procedures. At the time of the survey 67 percent of the States were producing regular reports; 53 percent of this group produced reports at least monthly (table 6). Almost half of the routine reports were reputedly available within 2 weeks after source documents were received. This figure was not validated but it did include manual as well as automated reports. According to the SSAs, 64 percent of clinics and programs did receive reports from the States, but some were cursory and consisted only of annual or quarterly analyses.

One of the chief complaints of MIS staffs was that the program- and clinic-level personnel were not skilled in interpreting output reports. Many IDARP managers reported that printouts were discarded by program personnel who provided no feedback on the information contained in the reports. The sample State MIS output reports collected during the survey were analyzed for format and 58 percent contained only printouts. The greatest number (79 percent), however, compiled figures onto tables with clear labels which were readable and not difficult to interpret. Sixty-four percent of the reports used narrative summaries and 33 percent presented graphics to assist interpretation indicating a desire on the part of MIS staff to make quantitative analysis understandable to the users of the reports. Many MIS staff members stated that they planned to train program and clinic staff in data interpretation in order to increase understanding and utilization of the MIS reports.

Output reports were also analyzed in terms of the categories or aggregations of the data. Most commonly cuts were made on a clinic or program basis (82 percent). Other usual aggregations were by planning area or some other geographic grouping (36 percent); by client demographics; by drug problem categories (36 percent); and by modality/environment of treatment (32 percent).

The most frequent types of reports found in our samples were descriptive client profiles (78 percent), census or utilization studies (60 percent), drug problems or trends (40 percent), and outcome comparisons (40 percent). Twenty-four percent of the States produced either client registers to assist the unique identification and tracking of client treatment status or lists of clients active in treatment for verification at the clinic level. These report categories again reflected the primary concerns of SSAs with outcome evaluations, efficiency measures, and needs assessment.

MIS Typologies

The analysis of the information collected during this survey of drug abuse management information systems was directed toward answering the following questions:

TABLE 6. —Reports for management decisions

Characteristic	Number of States	Percent of States
Production mode:[1]		
Ad hoc only	16	33
Regular reports	32	67
Frequency of reports:[2]		
Weekly	2	6
Monthly	17	47
Quarterly	18	50
Annually	18	50
Timeliness of reports (after instrument submissions):[3]		
7-10 days	1	3
10 days-2 weeks	14	48
2 weeks-3 months	5	17
> 3 months	9	31
Use of CODAP data:[4]		
Yes	35	70
Format of reports:[5]		
Printouts	19	58
Graphics	11	33
New tables	26	79
Narrative summaries	21	64
Cuts of the data:[6]		
Clinic/program	41	82
Planning area/geographic unit	18	36
Client group	18	36
Modality/environment	16	32
Categorical program	6	12
Funding source	3	6

[1]Unknown=2; N=48.

[2]Unknown=14; N=36.

[3]Unknown=21; N=29.

[4]N=50.

[5]Unknown=17; N=33.

[6]N=50.

TABLE 6.—Reports for management decisions—Continued

Characteristic	Number of States	Percent of States
Report types:[7]		
Descriptive client profiles	39	78
Census/utilization	30	60
Drug types/trends	20	40
Outcome studies	20	40
Special research studies	15	30
Client lists/registers	12	24
Services	11	22
Unit costs	8	16
Individual clients	4	8
Report distribution/use:[8]		
SSA staff	46	92
Clinics/programs	32	64
External requesters	27	54

[7] N=50.

[8] N=50.

- Are there distinct levels or types of management information systems which are identifiable and discrete?
- If so, what are their characteristics?
- What factors relate to the development of these characteristics?
- What common problems are experienced by MISs within each category?

The effort to develop a typology was motivated not only by a desire to provide a framework for the analysis of the survey data but also as a possible basis for examining the feasibility of developing a model MIS based upon the identified typologies.

As discussed earlier, the data relating to the type of MIS were not forced into discrete categories but were descriptive and open ended. It was anticipated that if descriptive categories did exist, they would emerge following data reduction and analysis. Interestingly the first descriptive category to emerge was not based upon technological sophistication or data utilization for decisionmaking; rather, the overall design complexity based upon the scope and characteristics of the data collected appeared to provide the most cohesive descriptive categories.

The categories which emerged from this preliminary analysis were provided with labels which although somewhat descriptive were neither precise nor mutually exclusive. These typological categories were:

- CODAP/IDARP: These systems processed only CODAP information. The degree of usage ranged from receipt of NIDA monthly tapes and use of commercial software packages for analysis to the development of State software which builds data files and produces output reports. The major distinguishing factor was clearly not technology but the scope of data-collection and analysis operations. Fourteen States were within this category.
- CODAP and Addendum: Four States collected and processed additional client-oriented information as an addendum to the CODAP report forms. The primary focus of these systems was CODAP, with addendum sheets including data such as number of arrests, income, occupation, or other SES and drug-related elements. One State included on their addendum sheet clinic-level data which consisted of an expanded activity report.
- State Drug Systems: These States had designed and developed their "own" integrated MIS using in-house data-collection forms and operational procedures. These comprehensive drug MISs went beyond CODAP in the range and scope of data collected and often included software capabilities such as file building, error recognition, automated editing, and report generation. Eleven States were within this category.
- Combined systems: Thirteen SSAs operated MISs which formed an integrated component of a larger State system combining information on drugs, alcohol, and often mental health. In these systems, the primary emphasis was not upon the collection and analysis of drug information. The drug-related data served as one component of the overall system.
- None: Eight States exhibited no MIS development and participated in the CODAP system only to the extent of submitting hard copy to NIDA. These States were excluded from subsequent analyses. The States classified as "None" differ from the CODAP/IDARP category in the extent of utilization of the information; the latter used the data to satisfy given information requirements.

The above categories (excluding "None") reflected a continuum of design complexity.

Based on the design characteristics it was suspected that there would be a related functional complexity in terms of software development and automation, with the States having more sophisticated design features also developing more sophisticated software and more often employing automated processing procedures. The

initial analysis did not show such a relationship. In fact the inverse was true: 79 percent of the CODAP/IDARP and 100 percent of the CODAP and Addendum employed automated procedures. This compared to 64 percent and 77 percent of the States operating a State Drug System or a Combined System using ADP procedures. Since the operation of many State systems required both automated and manual processing procedures, another coded question concerning the extent of manual processing indicated a greater rate of response among the latter two MIS types. Although the systems with the less sophisticated design complexity were more frequently utilizing automated procedures, the degree of expertise required to develop and maintain the systems was not measured. This may change the interpretation based on the knowledge that many of the CODAP/IDARP and CODAP and Addendum systems employ statistical software packages (e.g., SPSS) for most of their processing and analysis while those States using ADP procedures employ State-developed proprietary software.

Another confounding variable is the level of implementation. Since the State MISs which fall into the latter two categories are in a more rapid state of change, the present use of manual processing procedures may not accurately reflect the intended functional design.

A further refinement of our understanding of functional complexity was indicated by the number and type of available MIS staff. More than 50 percent of both the State Drug and Combined Systems groups, compared to only one State operating a CODAP and Addendum system and none of the States operating a CODAP/IDARP system, had more than six staff members. In fact, 55 percent of the CODAP/IDARP States had only one MIS staff person. Recognizing that there are differences in the quality and responsibilities within various States, it is nevertheless apparent that the development of a more complex systems design was related to the availability of a larger MIS staff. The direction of the relationship is not known but it is reasonable to assume that more staff are required to design and operate a more complex system. The type of staff available is also crucial. Only 22 percent of the first two groups had a programer on staff compared to 55 percent of the States operating a State Drug System and 73 percent of the States with Combined Systems.

The above indicators, although descriptive of staffing and automation patterns, are vague in that they do not provide any information about what each system actually does for the SSA in terms of satisfying various information requirements. The most technically sophisticated and glamorous MIS is of negligible value if the information is not relevant to the SSAs decisionmaking needs or useful to the spectrum of potential recipients at various levels within the State administrative and treatment network. Two data elements which were helpful in examining the system's utility were SSA emphasis (perceived information needs) and SSA reporting (actual systems output/need satisfaction).

Table 7 illustrates the perceived State informational needs for each MIS type. These patterns seemed surprisingly similar despite varying levels of design complexity. The information needs reported most frequently from all groups were: (1) outcome evaluation, (2) planning and needs assessment, (3) process monitoring, and (4) unit cost/budget information. There were some minor differences between groups, most of which were expected. For example those SSAs operating State Drug Systems were most interested in process monitoring and clinical activities, and those operating CODAP and Addendum systems were most interested in outcome evaluation and needs assessment--two areas which required additional data to complement that collected by CODAP.

We examined the extent to which the perceived informational needs were satisfied (actual data produced) in order to determine the relationship between design complexity and report production. It was assumed that the production of output reports is a necessary precursor to an indirect measure of data utilization.

Table 8 provides the percent of States within each category and indicates the extent of positive responses to the production of 11 categories of reports. In general it appeared that States operating more sophisticated MISs made greater use of the data than those States operating less complex systems. A comparison of the States' reporting capabilities was based upon the number of reports produced by more than 50 percent of the States in a given MIS category. Only one report, client profile, was produced by more than 50 percent of the CODAP/IDAPR States; three reports (client profiles, census utilization, and outcome studies) were produced by more than half of the CODAP and Addendum States; more than 50 percent of the States operating a State Drug System produced five reports (census utilization, client profiles, special research, drug types/trends, and "other"), while only three reports were produced by more than 50 percent of the combined Drug/Alcohol States. On the average (table 9), States operating a CODAP/IDARP system produced slightly less than three reports per SSA; the CODAP and Addendum States, about five reports per SSA; the State Drug Systems, almost five per SSA; and the combined systems slightly more than four per State. The largest differences were between those States operating a CODAP/IDARP system and those operating either a State system or an Addendum system. The reports most frequently produced by CODAP and CODAP and Addendum States were descriptive client profiles and outcome studies, while the reports most frequently produced by State drug systems and combined systems were client profiles and census utilization reports. There also was a greater emphasis upon activity and service reports in the comprehensive and combined systems--not an altogether profound finding since CODAP does not collect this information.

One possible explanation for differences seen in the reporting and utilization of different systems categories might be the level of system implementation. For example, if a given system were in a piloting stage or undergoing major revisions, the reports actually produced might not be indicative of the system's potential for satisfying management information requirements. As mentioned

TABLE 7.—Percent of States, by MIS type and Single State Agency (SSA) emphasis

SSA emphasis	MIS type I CODAP/ IDARP	II CODAP and addendum	III State drug system	IV Combined drug/alcohol
Outcome monitoring/evaluation	71	100	73	69
Process monitoring/evaluation	43	75	73	46
Planning/needs assessment	50	100	54	38
Resource inventory	28	25	27	46
Unit cost/budget	50	75	45	46
Standards development	7	25	27	7
Clinical activities	0	25	27	23
Research	14	25	27	31
External requests	21	25	9	39
Other	36	0	45	38
Total N	14	4	11	13

TABLE 8.—Percent of States, by MIS type and Single State Agency (SSA) standard reporting

Standard reports produced	MIS type I CODAP/ IDARP	II CODAP and addendum	III State drug system	IV Combined drug/alcohol
Census utilization	36	75	73	85
Client profiles	85	100	82	92
Individual client listings	29	25	27	23
Individual client reports	7	25	9	7
Special research	14	50	55	38
Service reports	14	50	18	38
Unit costs	7	25	36	15
Drug types/trends	29	50	55	54
Staff activities	0	25	9	23
Outcome studies	43	100	45	38
Other	21	25	63	23
Total N	14	4	11	13

TABLE 9.—Number of Single State Agency (SSA) standard reports produced, by MIS type

Standard reports produced	Total	MIS type I CODAP/IDARP	II CODAP and addendum	III State drug system	IV Combined drug/alcohol
Census utilization	27	5	3	8	11
Client profiles	31	12	4	3	12
Individual client listings	11	4	1	3	3
Individual client reports	4	1	1	1	1
Special research	15	2	2	6	5
Unit costs	8	1	1	4	2
Service reports	11	2	2	2	5
Drug types/trends	19	4	2	6	7
Staff activities	5	0	1	1	3
Outcome studies	20	6	4	5	5
Other	14	3	1	7	3
Total reports	165	40	22	46	57
Total N	42	14	4	11	13
Mean ($\bar{x}$)	3.9	2.8	5.25	4.2	4.4

previously, when examined by level of implementation (beyond simple CODAP reporting), it was found that both the State Drug Systems and the Combined Systems were in a more dynamic state of change. Hence the differences between their report generating capacities and those of the CODAP/IDARP and CODAP and Addendum States may have been even greater than that actually observed. In fact 69 percent of the combined systems and 53 percent of the State drug systems were either in a state of early development, pilot testing, or undergoing major revision. Eighty percent of the CODAP/IDARP and CODAP and Addendum States indicated that their systems were established and not undergoing any major changes.

In analyzing the differences between various types of drug abuse MISs, the effect of each of the following factors was examined: (1) The SSA functional responsibilities (i.e., drugs only or drug/alcohol), (2) client static capacity, (3) total State drug budget, and (4) the existence of organizational or operational obstacles.

In terms of SSA responsibility, 18 SSAs were responsible for only drugs, 31 for drugs and alcohol, and 1 for drugs/alcohol and mental health. There seemed to be only minimal conflict between MIS system responsibilities and administrative responsibilities (i.e., one State with drugs-only responsibility operated a combined system, and only three States with combined responsibilities operated a State drug system). The CODAP and CODAP and Addendum States showed no pattern based on administrative responsibilities, while the States operating more complex systems seemed to correlate more closely with the administrative responsibilities. However no causal relationship was established. For example, in more than one State an SSA with combined drug/alcohol responsibility operated a CODAP system simply because of the small number of CODAP clients in the State.

The supposition that a large client static capacity would dictate a more elaborate and complex management information system is partially borne out by the data. Table 10 shows a moderate relationship between type of MIS and the size of the client static capacity.

Although a clear linear relationship is not present, there appears to be a greater probability that a State with a large treatment population will develop its own MIS. The obvious exception appears to be the combined drug/alcohol systems, where the size of the drug population appears to be considerably less than that in other States. Hence, the impetus for system development is probably based on some other factor, i.e., size of alcohol or mental health population, State priorities, etc.

Another variable which might influence the type of MIS development is the size of the State drug abuse budget. Although data relating to the actual dollar expenditures for MIS development were not available, it was found that most States spend between 1 percent and 3 percent of the total State drug budget on MIS development and/or operation.

TABLE 10.—Percent of States, by client static capacity and MIS type

MIS type	Client static capacity	
	Less than 5,000	More than 5,000
CODAP/IDARP	79	21
CODAP and addendum	79	21
State drug system	45	55
Combined drug/alcohol	100	0

Table 11 compares the size of the total State drug budget for each category of MIS. The supposition that States with larger budgets would be more likely to develop a complex information system was confirmed by the data with the exception of the combined drug/alcohol systems.

TABLE 11.—Percent of States, by State drug budget and MIS type

MIS type	State drug budget	
	Less than $5,000,000	More than $5,000,000
CODAP/IDARP	65	35
CODAP and addendum	50	50
State drug system	36	64
Combined drug/alcohol	60	31

Whereas 35 percent of the CODAP/IDARP States and 50 percent of the CODAP and Addendum States had budgets in excess of $5 million, 64 percent of the States operating their own system were included in this category. In fact four States in this latter category had total drug budgets in excess of $20 million a year. Although funding and expenditure policies often differ based on State priorities, there appeared to be a fairly strong relationship between the amount of funding available and the development of a State system.

One additional explanatory variable examined was the percentage of total State drug abuse clients included in the CODAP system. Where CODAP is widely reported throughout the State and is "representative" of State treatment activities and clients, it was expected that there would be a greater reliance upon CODAP and less desire to operate an expanded system.

The data presented in table 12 indicate that the lower the amount of coverage in a State, the greater the likelihood that the State will implement a system which goes beyond the collection and analysis of CODAP data. The only exception to this finding was the group of States which collected addendum information. These data suggest the possibility that some State-level complaints about CODAP might be due less to the nature of CODAP data than to the percentage of clients on whom it is collected.

TABLE 12.—Percent of States, by CODAP coverage in State and MIS type

MIS type	Percent of CODAP coverage	
	Less than 75	75 or more
CODAP/IDARP	27	73
CODAP and addendum	25	75
State drug system	45	55
Combined drug/alcohol	58	42

In summary, it appears that States with limited CODAP coverage, large client capacities, and large drug budgets are more likely to develop a management information system which goes beyond the scope and characteristics of the CODAP system. While the data presented indicate that there were some discernible patterns within the identified categories based on the perceived system complexity, these differences, in terms of the variables considered, seem more a matter of degree rather than a clear-cut distinction. Additionally, a variety of important environmental and operational factors were either not included in the data collection or not apparent from preliminary analyses of the data gathered. For example, one variable not analyzed was the effect of the visibility of the SSA within the State. A second factor which was clearly important but that could not be examined quantitatively was the effect of the personalities of individual SSA staff members. The limited scope of this survey permitted only the impression that personal differences, in terms of professional competence and ability to generate State support for MIS goals, had a significant effect on MIS development in several States.

Analysis of MIS Problems Perceived by SSA Staff

It was not surprising to learn that SSAs were experiencing a number of problems related to the development and operation of management information systems. What was surprising was the similarity of problem areas across various types of MISs and within various levels of development. Table 13 depicts and categorizes the types of problem areas perceived by the SSAs. Overall, organizational problems (reported 43 times) predominated.

TABLE 13. —MIS problem areas

Area	Number	Area	Number
Organizational:		Technical:	
Staff limitations	20	Turnaround	12
Organizational obstacles	9	Lack of automation	7
Lack of funding	8	Inflexibility of software	7
Lack of State support	6		
Total	43	Total	26
Informational:		System design:	
Too little data utilization	14	Developing systems	3
Poor data quality	9	Poor forms design	3
Insufficient program evaluation followup data	3	Paperwork burden	2
Total	26	Total	8

Staff limitations in terms of number or expertise were reported more times (20) than any other problem. There were 9 reports of States encountering organizational obstacles and 14 reports of problems relating to funding and State support. Informational problems (reported 26 times) and technical problems (reported 26 times) were perceived by the States as other major areas of concern. Systems design problems were reported relatively infrequently (8 times).

Since it was anticipated that States might experience different types of problems at various stages of MIS development, the categories of problems reported were examined by level of MIS implementation. Those States which had no MIS or made only minimal use of CODAP data, reported that organizational problems were paramount. Table 14 depicts the number of positive responses to categorical problem areas by the level of systems implementation in the SSAs. Because the number within each level of implementation was different, a ratio based on the number of reported problems and the number of SSAs was developed to facilitate comparisons across groups. Those States which operated established systems reported the greatest number of organizational problems (excluding "None") with only minor differences between those making major revisions and those in a piloting phase. In terms of the problem-ratio indicator, States with established systems or in a piloting phase had the highest problem ratios.

The organizational obstacles reported often contributed to the next largest problem areas: unmet informational needs and technical problems. Fourteen States reported that the data were underutilized; 9 reported that the quality of the data was either questionable or poor (table 13), and others cited specific deficiencies in their systems such as a lack of data for followup and/or evaluation.

The States undergoing major revisions experienced the greatest rate of unmet informational needs. It was interesting to note that the States with no MIS development reported the lowest rate of unmet information needs. Perhaps these States were too busy dealing with their organizational problems to consider using management information. These data further suggest that the availability of a substance abuse MIS stimulates an awareness of the need for additional information as existing needs are met.

The largest number of technical problems related to turnaround time (12), lack of appropriate automated capabilities (7), and the development of software which was too inflexible to meet the changes required (7) (table 13). The greatest relative number of technical problems were reported by States with either established (R=0.85) MISs or ones undergoing major revisions (R=0.75). States in a phase of early development also report a considerable number of technical problems (R=0.50).

Overall the greatest relative number of problems were reported by States undergoing major revisions (R=2.0) followed by the "None" (R=2.5) and established systems (R=2.4). The low overall reporting

TABLE 14.—*Number and ratio of categorical problems, by level of implementation*

Level of implementation (N)	Categorical problems									
	Organizational		Informational		Technical		Design		Total	
	Number	Ratio	Number	Ratio	Number	Ratio	Number	Ratio	Number	Ratio
Early development (6)	2	0.3	3	0.50	3	0.50	0	—	8	1.3
Piloting (7)	6	0.86	4	0.57	1	0.17	1	0.14	12	1.7
Major revisions (8)	5	0.62	7	0.87	6	0.75	3	0.37	21	2.6
Established (13)	10	0.77	7	0.54	11	0.85	3	0.23	31	2.4
None/other (13)	20	1.6	5	0.38	5	0.38	3	0.23	33	2.5
Total N	43	—	26	—	26	—	10	—	105	—

of significant problems during the early stages of MIS development seems to reflect a pattern of initial optimism and confidence followed by disillusionment after MIS establishment and a fairly high level of dissatisfaction by the time it was decided that significant changes were needed.

Table 15 depicts reported problem areas by the design complexity of State management information systems. States with no MIS reported the greatest rate of organizational problems (R=1.9), followed closely by States operating their own system (R=0.91). The fewest organizational problems were reported by the States operating either combined drug/alcohol (R=0.54) or an addendum system (R=0.50). Although the States operating their own systems reported the greatest rate of organizational problems, they also reported the lowest rate of unmet information needs. Apparently they were successful in dealing with the organizational obstacles which arose.

The problem ratios closely paralleled the design complexity of each system with the most complex State system reporting the greatest number/rate of problems, followed by the less complex addendum system. The CODAP/IDARP systems, clearly the least complex of the three, also reported the lowest problem ratio (R=1.6).

It appears that the development and maintenance of a substance abuse management information system necessarily includes a number of related problems. A State's ability to overcome these problems and obstacles may be the single most important predictor of the eventual fruitfulness and utilization of a management information system.

Table 16 is the final summary table. The data therein compare State management information systems and the SSA environments served across selected variables discussed throughout this report. Certain caveats applicable both to the information in table 16 and the analysis in this report are reiterated:

- Much of these data represent the "best informed judgments" of the SSA agency staff and/or interviewer.
- Some data may appear conflicting or contradictory due to simultaneous and ongoing development in the SSAs.
- Subtle shifts in data interpretation may have developed between individuals responsible for the data collection and those performing subsequent analysis.
- The open-ended structure of the interview methodology left gaps in information from some sources.

Nevertheless this report (and the summary data in table 16) represent important baseline trends at a given point in time.

TABLE 15.—*Number and ratio of categorical problems, by MIS type*

MIS type (N)	Categorical problems									
	Organizational		Informational		Technical		Design		Total	
	Number	Ratio	Number	Ratio	Number	Ratio	Number	Ratio	Number	Ratio
CODAP/IDARP (14)	9	0.64	7	0.50	5	0.36	2	0.14	23	1.6
CODAP and addendum (4) . .	2	0.50	3	0.75	2	0.50	1	0.25	8	2.0
State drug systems (11)	10	0.91	5	0.45	10	0.91	2	0.18	27	2.5
Combined drug/alcohol (13) .	7	0.54	9	0.69	7	0.54	3	0.23	26	2.0
None (8)	15	1.9	2	0.25	2	0.25	2	0.25	21	1.4
Total N	43	–	26	–	26	–	10	–	105	–

TABLE 16.—*Comparisons of management information systems and Single State Agency (SSA) environments*

States	SSA responsibility			Client capacity		Drug budget		Type of MIS			Level of MIS implementation					Number of MIS staff			Processing mode			CODAP coverage		Use of CODAP tapes			
	Drugs only	Drugs and alcohol	Drugs, alcohol, mental health	≤3000	>3000	≤$5,000,000	>$5,000,000	None	CODAP only	CODAP/addendum	State system	Combined	CODAP only	Early development	Piloting	Established	Under revision	2 or less	3 to 5	6 or more	Automated	Pending automation	Manual	<75 percent	≥75 percent	Not used/not received	Uses NIDA tapes	Creates own files	Submits tape to NIDA
Alabama		X		X		X		X						X				. .	. .	. .		X	X		X	X			
Alaska	X			X		X					X					X		. .	. .	. .			X		X	X			
Arizona			X	X			X					X				X				X	X				X		X		
Arkansas	X			X		X			X				X					. .	. .	. .			X		X	X			
California		X			X		X			X					X					X	X			X			X		
Colorado		X		X		X					X						X			X	X		X	. .	. .				X
Connecticut	X				X	X				X						X			X		X				X			X	
Delaware		X		X		X						X			X			X				X	X		X	X			
Florida.	X				X		X		X				X					X			X				X		X		
Georgia		X			X	X						X					X			X	X			X					X

NOTE: Leaders on the table for a particular State indicate that information was not obtained.

TABLE 16.—*Comparisons of management information systems and Single State Agency (SSA) environments—Continued*

States	SSA responsibility			Client capacity		Drug budget		Type of MIS						Level of MIS implementation					Number of MIS staff			Processing mode			CODAP coverage		Use of CODAP tapes				
	Drugs only	Drugs and alcohol	Drugs, alcohol, mental health	≤3000	>3000	≤$5,000,000	>$5,000,000	None	CODAP only	CODAP/addendum	State system	Combined	CODAP only	Early development	Piloting	Established	Under revision	2 or less	3 to 5	6 or more	Automated	Pending automation	Manual	<75 percent	≥75 percent	Not used/not received	Uses NIDA tapes	Creates own files	Submits tape to NIDA
Hawaii		X		X		X		X					X							X	X			X		X			
Idaho		X		X		X			X					X				X				X	X	X		X			
Illinois	X				X		X				X						X				X		X	X		X			
Indiana		X		X			X		X				X						X		X		X	X			X		
Iowa	X			X		X					X			X				X			X		X	X		X			
Kansas		X		X			X	X						X										X		X			
Kentucky	X			X		X		X											X		X		X	X	X				
Louisiana		X		X			X		X				X					X			X					X			
Maine		X		X		X			X				X					X				X	X	X					
Maryland		X			X		X			X						X			X		X			X		X			

NOTE: Leaders on the table for a particular State indicate that information was not obtained.

TABLE 16.—*Comparisons of management information systems and Single State Agency (SSA) environments—Continued*

States	SSA responsibility			Client capacity		Drug budget		Type of MIS						Level of MIS implementation					Number of MIS Staff			Processing mode			CODAP coverage		Use of CODAP tapes				
	Drugs only	Drugs and alcohol	Drugs, alcohol, mental health	≤3000	>3000	≤$5,000,000	>$5,000,000	None	CODAP only	CODAP/addendum	State system	Combined	CODAP only	Early development	Piloting	Established	Under revision	2 or less	3 to 5	6 or more	Automated	Pending automation	Manual	<75 percent	≥75 percent	Not used/not received	Uses NIDA tapes	Creates own files	Submits tape to NIDA
Massachusetts	X				X		X				X					X				X			X	X		X			
Michigan		X			X		X				X					X				X	X		X	X		X			
Minnesota		X			X	X						X				X				X		X	X	X		X			
Mississippi		X		X		X			X					X						X							X		
Missouri		X		X		X						X			X			X				X	X	X		X			
Montana		X		X		X			X				X					X			X				X		X			
Nebraska	X			X		X				X						X			X		X			X		X			
Nevada		X		X		X			X				X					X			X				X		X			
New Hampshire	X			X		X		X					X									X			X	X				
New Jersey		X			X		X		X				X						X		X				X		X			

NOTE: Leaders on the table for a particular State indicate that information was not obtained.

TABLE 16.—*Comparisons of management information systems and Single State Agency (SSA) environments—Continued*

States	SSA responsibility			Client capacity		Drug budget		Type of MIS						Level of MIS implementation					Number of MIS staff			Processing mode			CODAP coverage		Use of CODAP tapes				
	Drugs only	Drugs and alcohol	Drugs, alcohol, mental health	⩽3000	>3000	⩽$5,000,000	>$5,000,000	None	CODAP only	CODAP/addendum	State system	Combined	CODAP only	Early development	Piloting	Established	Under revision	2 or less	3 to 5	6 or more	Automated	Pending automation	Manual	<75 percent	⩾75 percent	Not used/not received	Uses NIDA tapes	Creates own files	Submits tape to NIDA
New Mexico	X			X		X			X					X					X		X							X	
New York	X				X		X				X						X			X		X		X			X		
North Carolina	X			X			X					X					X			X	X		X				X		
North Dakota		X		X		X						X					X			X					X				
Ohio	X				X		X		X										X		X			X			X		
Oklahoma	X			X		X					X				X			X			X			X			X		
Oregon		X		X			X					X					X			X	X			X				X	
Pennsylvania		X			X		X				X					X				X	X				X				X
Rhode Island		X		X		X						X				X				X	X				X				
South Carolina		X				X						X				X				X	X				X			X	

NOTE: Leaders on the table for a particular State indicate that information was not obtained.

TABLE 16.—*Comparisons of management information systems and Single State Agency (SSA) environments—Continued*

States	SSA responsibility			Client capacity		Drug budget		Type of MIS						Level of MIS implementation					Number of MIS staff			Processing mode			CODAP coverage		Use of CODAP tapes				
	Drugs only	Drugs and alcohol	Drugs, alcohol, mental health	⩽3000	>3000	⩽$5,000,000	>$5,000,000	None	CODAP only	CODAP/addendum	State system	Combined	CODAP only	Early development	Piloting	Established	Under revision	2 or less	3 to 5	6 or more	Automated	Pending automation	Manual	<75 percent	⩾75 percent	Not used/not received	Uses NIDA tapes	Creates own files	Submits tape to NIDA
South Dakota		X		X		X						X				X				X	X			X	X				
Tennessee		X		X			X											X		X						X			
Texas	X				X		X				X					X			X		X			X			X		
Utah		X		X		X						X			X				X		X			X			X		
Vermont		X		X		X												X		X		X			X				
Virginia	X			X		X			X							X				X			X				X		
Washington	X			X			X				X				X			X		X			X				X		
West Virginia		X		X		X			X				X					X		X				X		X			
Wisconsin		X										X				X		X		X			X		X				
Wyoming	X			X		X		X					X					X				X	X		X				

NOTE: Leaders on the table for a particular State indicate that information was not obtained.

HIGHLIGHTS AND IMPLICATIONS

The project methodology was designed to illuminate patterns of State-level drug abuse management information systems in terms of their organizational frameworks, operational technologies, perceived information needs, and level of output reports produced. Preliminary analyses and tentative findings have been presented. Selected highlights and implications are presented below.

Highlights

- More than half of the States surveyed were planning or executing changes in their MISs. Some of these changes were the result of internal decisions to improve the systems or implement additional components. Others were imposed by outside forces such as new Federal or State Government requirements or pressure from community groups. In many cases the required changes conflicted with the original plans for the MIS.

- The SSAs expressed a strong desire to obtain information useful for program monitoring, evaluation, planning, and budgeting. Less emphasis was placed on the use of MISs to collect information relating to clinical activities or research needs.

- The CODAP system was heavily integrated into the State systems with 84 percent of the States using the Federal forms, 70 percent mentioning usage of the data, and 35 percent using NIDA tapes for automated processing.

- As MISs develop beyond CODAP, the sequence of new forms added begins with expanded admission and discharge instruments. Client services information, external indicator data, and expenditures tend to be added next. Progression of data collection reflects the type of information which SSAs desire to receive from MISs.

- Most States are now aware of quality-control procedures and consider them an important aspect of system implementation.

- Almost all States are involved to some extent in automated processing of their data and many now have programers on staff to assist the file-building, maintenance, and reporting procedures.

- Although output reports are now routinely generated by the majority of MISs, the amount of data collected still greatly exceeds the amount of data analyzed and distributed as output reports.

- In terms of system complexity, four major typological categories of State substance abuse management information systems were delineated: (1) States using only CODAP information, (2) those combining additional data with existing CODAP forms, (3) those with State drug abuse information systems, and (4) those with combined drug/alcohol systems.

- Only a limited number of discrete patterns were found to exist with each typological category when organizational structure, informational needs, level of reporting, and problem areas were considered--thus indicating that systems complexity might not be the best typological descriptor.

- Although the analyses conducted on the data collected did not precisely "explain" variations in State MISs, patterns related to levels of SSA responsibility, total State drug budget, client static capacity, and extent of CODAP coverage did emerge and were related to design complexity.

- The most overwhelming developmental problems experienced in the States were organizational obstacles and staff limitations.

Implications

- NIDA assistance to the States to enhance MIS development should be directed particularly toward the development of information for planning, monitoring, and evaluation since these were the needs most often expressed by the SSAs.

- The development of a modular model information system is not feasible at this time due to the wide variation in MIS development, operations and resources, and the lack of consistent developmental/operational patterns.

- Production and distribution of guidelines and recommendations for the development of MISs could be helpful to the SSAs but cannot be expected to solve the host of problems experienced by the drug abuse management information systems. New systems can, however, profit from the experiences of States with more developed systems, and a mechanism for continuous information exchange should be developed to facilitate this process.

- NIDA should assist States in achieving statewide client coverage with either CODAP or State-developed systems. This should be done in conjunction with the production of CODAP tapes at the State level for more timely turnaround.

- Systems should remain flexible due to the likelihood of continued mandated and internal requirements for change.

- It is imperative that MISs be based on a functional management approach with data collection, analysis, and report generation designed around the decisionmaking responsibilities of the SSAs.

- Continued efforts should be made to appraise developments in State-level MISs that are focused on this functional management approach rather than design complexity or technological sophistication.

RECOMMENDATIONS OF THE REVIEW PANEL

A draft of this chapter was presented to a panel of experts for review on June 1, 1977, at a seminar sponsored by the National Institute on Drug Abuse in Orlando, Fla. This panel included the directors of Single State Agencies, IDARP personnel, and people from the county, city, and clinic level.

The panel emphasized the conclusions of the report:

- The primary purpose of a management information system is to assist administrators in the deployment of organizational resources.
- In order for the informational needs of the Single-State Agencies to be met, client-oriented data need to be supplemented with information relating to external indicators, services provided, program evaluation and monitoring, and financial management.
- Data collection should be minimized, with all data elements reflecting careful consideration of informational needs. Data utilization should be maximized with an emphasis on providing timely analysis, presentation and distribution of reports (supplemented by training in the use of the reports when necessary).

The panel also suggested a plan for promoting the development of drug abuse management information systems through interstate cooperation and technical assistance from the Federal level. They recommended:

- Progress toward common operational definitions of such terms as "management information systems" and "evaluation" (possibly through circulating tentative definitions through the mail for review and feedback).
- Establishment of an interstate communication network to facilitate exchange of ideas and avoid duplication of effort through:
  1. Maintenance and dissemination of up-to-date information on drug abuse management information systems by the National Institute on Drug Abuse (or one of its contractors).
  2. Development of a "resource directory" listing the highlights of individual systems and cataloging the activities

of various systems within general categories (i.e., needs assessment and planning).

  3. Creation of task forces relating to common issues and problems.

- Strengthening of two-way communication between State/county personnel and the National Institute on Drug Abuse in such areas as:
  1. Federal funding policy (e.g., use of "slots" as a basis for reimbursement).
  2. Federal reporting requirements (since changes present difficulties with staff training, software revisions, and expense).

AUTHORS

PADDY COOK
BARRY J. ROSENTHAL, M.S.
CHERYL DAVIS, M.A.

Richard Katon and Associates, Inc.
Rockville, Maryland

REFERENCES

Ackoff, R. Management Misinformation Systems. Management Science, 14:147-156, 1967.

Anthony, R.N. Planning and Control Systems: A Framework for Analysis. Boston, Mass.: Harvard University Graduate School of Business Administration, 1965.

Davis, S., and Freeman, J. Hospital managers need management information systems. Health Care Management Review, 1:65-74, 1976.

Elpers, J.R., and Chapman, R.L. Management information for mental health services. Administration in Mental Health, 1973. pp. 12-25.

Gorry, G.A., and Morton, M.S.S. Framework for management information systems. Sloan Management Review, 13:55-70, 1971.

Kennevan, W.J. Structuring and managing a management information system. In: Kennevan and Joslin, eds. Management and Computer Systems. Arlington, Va.: College Readings, Inc., 1973. pp. 365-373.

Pool, I. de S.; McIntosh, S.; and Griffel, D. Information systems and social knowledge. In: Westin, A.F., ed. Information Techology in a Democracy. Cambridge, Mass.: Harvard University Press, 1971, pp. 241-249.

Weinstein, A.S. Evaluation through medical records and related information systems. In: Guttentag, M., and Struening, E., eds. Handbook of Evaluation Research. Vol II. New York: Maral Decker, 1976. pp. 397-477.

Westin, A.F. An introduction: Descriptions of the developing systems by their advocates. In: Westin, A.F., ed. Information Technology in a Democracy. Cambridge, Mass.: Harvard University Press, 1971. pp. 15-29.

Withington, F.G. Five generations of computers. Harvard Business Review, July-Aug. 1974. pp. 99-108.

END