Implementing the Model Medicaid Management Information System

JOHN C. ANDERSON, PhD, and PAUL FARSETH, BA

THE MODEL MEDICAID Management Information System (MMIS) has been subjected to much recent criticism and concern from government administrators, legislators, and providers of health services. Some critics suggest that it is not fulfilling its intended objectives in States where it has been installed, that it is not processing information correctly and on time. Others suggest that although the system may process information correctly, the reports it produces have not been integrated productively into the management of State Medicaid programs (title XIX of the Social Security Act). We believe that careful review of State experience with the MMIS will show the model system to be a sound design for administering Medicaid. The problems which have clustered around the MMIS are real, but they are the consequences of the particular processes that States have used in implementing the design and integrating the system with their administrative operations.

It is not surprising that the MMIS has been difficult to implement and integrate. Researchers and managers, both public and private, have been increasingly concerned in recent years with the problem of how to implement management information systems. In all parts of society examples can be found of failed information system projects, expensive products of hard effort which produced unused in-

☐ *Dr. Anderson is assistant professor of management sciences, Graduate School of Business Administration, and member of the Management Information Systems Research Center of the University of Minnesota. Mr. Farseth is supervisor, Catastrophic Health Benefits Program, Minnesota Department of Public Welfare, and was formerly principal management analyst in the department's Medicaid Development Section. Tearsheet requests to Dr. John C. Anderson, Graduate School of Business Administration, 751 Business Administration Tower, University of Minnesota, Minneapolis, Minn. 55455.*

formation or information that is inadequate to the managerial needs it was designed to satisfy.

An almost unanimous conclusion of recent research into the problem of implementing information systems is that implementation must be viewed as an ongoing process rather than the last phase of a project effort. Success is won or lost all through the analysis, design, and developmental phases and by the care and flexibility with which the early phases' plans are refined during the final installation of computer programs and administrative procedures. A related conclusion is that information systems, when in place, become dynamic parts of their organizations. Implementation must continue, with the system evolving with the organization.

This paper draws on our observation of the process of implementing the MMIS in Minnesota. We offer some normative conclusions and recommendations to guide other States' MMIS efforts and other efforts in building large-scale information systems, particularly in the public sector.

Background: MMIS and the Minnesota Project

Since its inception in 1966, the federally subsidized Medicaid program of medical assistance for the poor and disadvantaged has encountered an unexpected spiraling of its costs, which now exceed $14 billion per year in State and Federal expenditures. Administered by State and Territorial Governments and their local subdivisions under the general supervision of the Department of Health, Education, and Welfare's Social and Rehabilitation Service, the program has varied greatly in the effectiveness of its management. Controls on excessive and duplicate payments, investigation of fraudulent claims, and controls on substandard quality of services have often been lacking. Complicated standards of eligibility have led to errors in who may have access to the program's benefits. Lacking the substantial coinsurance involvements of recipients' pocketbooks found in the Medicare program, Medicaid recipients have not objected to large amounts of overservice and to overcharging, which Medicare recipients would find intolerable.

To correct these deficiencies, the Social and Rehabilitation Service developed a model Medicaid Management Information System to guide States in computerizing and upgrading their claims payment operations, fraud investigations, and utilization control efforts.

This model was first published in August 1971, and pilot implementation in Ohio was begun in 1972. In the Social Security Amendments of 1972, Congress provided fiscal incentives to States to set up information systems patterned after the model (Federal assumption of 90 percent of development costs and 75 percent of operating costs of qualifying systems). Those amendments also required States to generate statistical profiles of providers' patterns of service and of recipients' patterns of service utilization. Group profiles were to provide norms against which individuals' profiles could be compared. Such profiling requires computerized information handling on a scale similar to that envisioned in the MMIS. Requiring it provided further incentive to States to install the MMIS.

The Minnesota Department of Public Welfare responded to the new incentives quickly, beginning work in January 1973 on a centralized Medicaid payments and information system that would meet the MMIS design criteria and would replace the manual processing of claims previously carried on by 87 county welfare departments. Centralized payments for nursing home services were begun in January 1974, and by May 1975 all regular providers of health services were paid through the new system. Computer programs that generate management reports and surveillance profiles were completed by August 1975, and Minnesota was certified for 75 percent Federal participation in MMIS-related operating costs, effective the first of that month.

Since then, the system has been significantly refined, particularly in its benefits recovery capacity and in the tracking of persons eligible for Early Periodic Screening, Diagnosis, and Treatment (EPSDT). During fiscal year 1976, the system processed approximately 220,000 claims and adjustments per month, paying out about $320 million in benefits by the year's end. Administrative costs for the year came to roughly $4.5 million. These costs include expenses for provider enrollment and training, claims processing, production of management reports, surveillance and utilization review, medical policy supervision, mailing of explanations of Medicaid benefits (EOMBs) monthly to recipients of services, plus teleprocessing and maintenance of the case information (eligibility) file. The $4.5 million does not include the cost of audit staff and general overhead costs for the welfare department's executives and support services. Also excluded are the counties' costs—costs of administering the recipient eligibility intake and review process, assistance to clients needing EPSDT services, review of the appropriateness of nursing home patients' level of care, and local review of certain monitored claims for medical supplies. After the exclusions, the adminis-

trative cost per claim amounted to about $1.70, a sum which compares favorably with Medicare experience. Caution is needed in such comparisons, however, as definitions vary as to what constitutes a claim or what expenses are to be included in administrative costs.

In establishing its MMIS payment system, Minnesota transferred an important group of computer programs from the Oklahoma welfare information system to provide the basic structure of its case information system. Most of the other computer programs needed to implement the MMIS model were transferred from the Ohio Department of Public Welfare, the pilot project site. Administrative procedures and the concept of using optical character recognition (OCR) scanning devices instead of keypunching to convert data to computer form were borrowed from the Michigan Department of Social Services. A system for processing nursing home claims was developed locally. All transferred computer programs were substantially rewritten to meet local requirements and to improve their computer efficiency.

Management of the Minnesota project was led by staff from a small consulting firm, assisted by staff from the Minnesota Department of Public Welfare and the information systems division of the State's administration department.

Minnesota's experience with the MMIS was neither smooth nor disastrous. The information system which resulted is not the ultimate version of the MMIS, but it is more than adequate, and it is evolving to meet new needs in the administration of the Medicaid program. Drawing on our experiences in the Minnesota project, we offer here a conceptual discussion of six areas where problems may arise during an MMIS effort, six areas in which key tasks must be addressed:

Defining program and operations policies
Organization planning and defining of roles
Managing and controlling the project
Defining data and output requirements
Provider relations and training
Coping with technological change

Defining Program and Operations Policies

To be worth its development and operating costs, a Medicaid information system must support and execute the program's key policies. Therefore the policies must be known. In addition, they must be fair, defensible, and capable of enforcement. (In Minnesota, program policies often proved to be unclear at the start, owing to the previously loose-knit administration of the program by many local agencies.)

If policies are ill-defined, they must be clarified. If they are out of date, unfair, or unenforceable, they need to be revised. A management information system as big as the model MMIS has too much inertial mass to risk setting any part of it in motion on a wrong track. The costs of backtracking and fixing errors can be huge—both in dollars and in injustices to providers and recipients of medical care.

Clearly, not all policies can be defined and analyzed in advance of the technical phases of such a project. Indeed, one of the strengths of the Minnesota project was its continuing reconsideration of objectives, policies, and priorities as the political, legal, and administrative constraints on the project became more clear. But it is important to achieve the greatest possible clarity about the program's and the system's goals before beginning.

To make sure that policy is defined, revised, and correctly programed into a mechanized system of claims payments, staff must be assigned to refine policies, to analyze the impact of new or proposed Federal laws and regulations, and to interpret the policies definitively to systems analysts, health care providers, provider trainers, and claims processing supervisors. Opportunities must be provided for adversarial evaluations of particular policies, lest they be based on inadequate information or set without regard for external consequences.

Organizations going through rapid change or growth are often tempted to limit criticisms from staff and to discourage meddling across organizational lines. This fosters accountability and suppresses fruitless squabbling, but the mediation of policy criticisms (or technical disagreements over methods and procedures) through a few members of a managerial elite may stifle and dry up information sources needed to keep an organization's processes of change on target. Forbidding communications between work groups (as some supervisors did during the Minnesota project), particularly if they are working on different aspects of the same problem or function, delays information flows and distorts and filters information which needs to be communicated.

The Minnesota MMIS project overcame initial unclarity about program objectives, policy constraints, and limits on what could be required of outsiders such as health care providers, county welfare offices, and Medicare fiscal agents, by applying techniques discussed in the next two sections of this paper. When the techniques failed or were not ap-

plied, the costs were significant. Before discussing those techniques, however, two other aspects of policy definition need comment.

Besides internal policy definition and revision, the leaders of an MMIS project effort must acquire legislative support for statutory revisions of policy. In Minnesota it became necessary, midway in the project, to seek legislation giving the Medicaid program a right of subrogation to recipients' health and casualty insurance benefits (to the extent of the program's expenditures for any given recipient). In other States, legislation has been needed to modernize legal requirements for approval of vendor claims or for keeping records or issuing checks. In addition, existing laws may not give enough authority to a Medicaid program to require standard invoice forms.

Finally, there is the issue of legislative support for developing a new Medicaid management information system. Indeed, this is the first issue encountered, as the State's share of development costs must often be appropriated after much debate over whether "inept State bureaucracies" or "self-serving outsiders" can better be trusted to do a good job at a reasonable cost.

This problem of legislative support was short-circuited in Minnesota by the intervention of the Governor's statewide Loaned Executive Assistance Program (LEAP) during 1972. Eying projections of low development costs from an earlier consultant study of centralizing Medicaid claims processing in-house and the screening portability of the Oklahoma State welfare information system, the LEAP teams assigned to the welfare department forced an early commitment to developing a State-operated MMIS.

Other States may not find such decisions so easy to resolve, nor should they. If the Medicaid agency lacks internal managerial expertise, if the State civil service system is intractable, or if computer and systems support are lacking or outdated, the possibility of buying an established fiscal agent's expertise deserves evaluation.

If a contractor is to operate a system after building it, however, several new concerns arise: What incentives does the contractor have to control program expenditures? Is there some risk that the contractor may control program expenditures by denying benefits in an arbitrary way, often after service has been rendered? Does the contracting fiscal agent have any incentive to control its operating costs if it is paid on a "cost-plus" formula? Are its costs and overhead expense required to be reasonable and open to audit? Will the State be able to do an effective audit, probing deeply and carefully enough to challenge the fiscal agent's cost statements?

If a fiscal agent is to be reimbursed on a flat rate per claim, do the performance criteria in the contract insure that any underbid by the agent will not be recovered improperly through slow or inaccurate claims processing? Is there any fine-print provision for formula increases in rates which pass the agent's first year underbid losses back to the State in subsequent years?

And if a fiscal agent is selected that later proves too expensive or unacceptable in some other way, how is the State agency to handle claims processing until another agent can be selected and installed? It appears that at least one State has been forced to renew a fiscal agent's contract at unfavorable terms because no other agent could be installed quickly enough. Such misfortunes can be forestalled by careful contract writing, with clear definitions of short-term renewal options to cover periods of renegotiation or changes in contractors.

Organization Planning and Defining of Roles

Along with the practical work of project management and control, discussed subsequently, State agencies beginning an MMIS development face a need to review their internal organization for decision and control and the quality of their supervision of local welfare agencies or offices. At the same time, they need also to review their relationships with outside agencies to clarify roles, powers, goals, functions, and the distribution of political influence. Such outside agencies include State health departments, hospital and nursing home rate-setting authorities, professional standards review organizations (PSROs), and health professions' licensing boards.

A Medicaid agency's administrators need to look at the commitment of time available from their top managers and from the directors of local offices. Minnesota's ability to bring its MMIS project to fruition required continuing detailed attention and support from the Commissioner and her deputy. Their involvement was crucial to acquiring and supervising the project's consultant firm, to shaping the project's authorizing and housekeeping legislation, and to forcing decisions from other departments (particularly the administration department, which was responsible for the State computer center, and the personnel department, through which emergency staff appointments and timely acquisition of professional staff had to be channeled). Since the welfare department was at first short of experienced and aggressive staff in the Medicaid policy section,

the almost daily participation of the director of the income maintenance division in the project was essential.

In allocating responsibilities, each person's managerial ability needs to be looked at. In every organization there are managers who are comfortable with the status quo, settled in their ways and lacking in the curiosity and assertiveness needed to guide drastic new developments. This may be a special risk in government, where tenure can protect the weak and political pressures may housebreak the innovative. If such persons hold key positions, they need clear guidance on what is expected in the new effort. In an MMIS development, everyone works double. Letting those who may turn out to be indecisive, unmotivated, or incompetent know about the extraordinary demands with which they will be faced may make it simpler to relocate them to less stressful positions or to justify their later replacement.

Outside the central Medicaid agency, control of local welfare offices is critical, for these must manage the determination and review of recipients' eligibility, transmit timely and accurate eligibility information to the central office, deal with recipients' practical problems, and maintain other local relationships for the State. A State department is likely to find that the size and sophistication of such local offices or agencies vary. Such variations, the degree of local autonomy (be it legal or habitual), past responsibilities, and past performance should all be considered in deciding what functions to delegate beyond eligibility intake and review and arranging for EPSDT services. Should local agencies answer service providers' inquiries about Medicaid recipients' eligibility dates and ID numbers? Should they have a role in reviewing nursing home patients' levels of care? Should they make decisions on renting or buying durable medical equipment? Each State will find different answers. The answers may be misguided, however, if the past and expected capabilities of the local offices are not reviewed, giving close attention to possible causes of past performance failures. Some causes of failure can be remedied. Confusing central office directives on policies and procedures can be clarified. But local autonomy and unwillingness to cooperate are more difficult to change. If county welfare boards refuse to hire sufficient staff at the expense of local property taxpayers, the Medicaid agency may need some means to compel cooperation or to subsidize the counties' costs with State and Federal funds.

Regarding relations with other agencies, the following observations may be helpful.

Medicare fiscal agents. It is desirable to arrange with Medicare carriers and intermediaries for automated exchange of data on payments made for Medicaid recipients. Such acquisition of data on computer tape should be provided for early in an MMIS project. It eliminates the need to make health care providers bill both Medicare and Medicaid. It improves the accuracy of payments for crossover claims and removes opportunities for provider fraud. It provides more complete data for surveillance and utilization review of services to Medicare beneficiaries. And it costs less (to both the Medicaid and Medicare organizations) than shipping explanations of Medicare benefits on paper from the fiscal agents into the Medicaid shop for manual review, annotation, and keypunching. Liaison is also desirable with Medicare fiscal agents regarding such matters as their relations with hospital utilization review committees and PSROs, sharing of practitioner fee schedules, and coordination of audits of hospitals' statements of operating costs.

State health departments. The Medicaid agency needs timely verification from State health departments of the eligibility of hospitals and nursing homes to participate in the title XIX program. It needs to facilitate health departments' mandatory medical or professional reviews of care given to nursing home patients. It can profit from acquisition of computer files of the social security numbers of persons who have died (in order to purge Medicaid eligibility files). It may need health department assistance in meeting its obligation to provide early periodic screening, diagnosis, and treatment for children. It may want to contribute to institutional rate review activities carried on by health departments. And it may be able to provide useful epidemiologic and health services utilization data to health department researchers.

Professional standards review organizations. Good relationships with PSROs are important to State Medicaid programs because of the contribution the PSROs can make to cost containment and quality assurance. PSRO relationships affect MMIS efforts because PSROs may depend on Medicaid agencies to collect the uniform hospital discharge data abstract for PSRO review. Or, being physician controlled and jealous of their autonomy, they may make it difficult for a Medicaid program to collect sufficient information for claims review, budget planning, and utilization review. In any event, if data are to be collected for PSRO use or in parallel with PSRO collection, agreement on uniform data coding

schemes is important, lest hospitals face impossible reporting burdens.

Other compensation systems. Finally, we emphasize the importance to State Medicaid programs of investing more staff, expertise, and systems capability in the recovery of health care benefits to which recipients are entitled. This effort requires close liaison with the health and auto insurance industries and with the Workers' Compensation system. Analysis of Minnesota data suggests that a well operated and aggressive system of claiming recipients' benefits on a national scale could recover more than $500 million per year in health and casualty insurance, workers' compensation, and dependents' health benefits from employed absent fathers. Minnesota has computerized much of the benefits recovery process, but accomplishing this has required cooperation with the insurance industry and training of local welfare agency staff to insure that good information on recipient coverage is effectively reported.

Managing and Controlling the Project

Project managers must plan to communicate with and actively involve all persons affected by an MMIS project if an effective information system is to be implemented. Having addressed the make-or-buy decisions mentioned earlier and having settled on some combination of consultant (or fiscal agent) and State effort, management must develop routines, procedures, and an organization to carry out the project's tasks. In this regard, we offer several comments.

First, the level of involvement of a consultant organization must be controlled if a State or some other agent is to operate the new information system when it is completed. Minnesota's Medicaid agency assured its ability to operate, maintain, and refine the system by limiting the role played by its consulting firm and by distributing the firm's personnel throughout the project's work groups. As a consequence, almost no components came into the system without State personnel having participated in their detailed design and computer programing. If this had not been done, State operating staff would have been dependent on the consulting firm's system documentation and unclear about the placement of the system's components and the reasoning behind their particular form.

Next, use of a project-management protocol is desirable, so that all tasks are done in an effective, ordered, and timely manner. Minnesota, following the practice of the State computer center, used a packaged set of procedures (PRIDE, M. Bryce & Associates) for systems analysis and documentation, cost analysis, and job scheduling. The particular package of procedures that a State chooses is not critical, but use of documentation standards, standard task lists for organizing and phasing work, and standardized procedures for reviewing progress provides important protection against oversights, ineffective assignments of staff, and failures to keep technical documentation complete and up to date.

Using components of a system transferred from another State should not substitute for analysis of internal requirements, nor should it tempt the project's managers toward unrealistic expectations of how quickly systems development can be accomplished. Minnesota encountered policy differences, technical deficiencies, differences in medical service and diagnosis codes, and other problems embodied in the computer programs it transferred. All these had to be worked out before the programs could be run reliably. When they were not considered, as happened with the surveillance and utilization review programs, which received only minor patches to computer code, the computer outputs contained data of questionable value.

On the other hand, the value of the experience and completed debugging of computer programs inherent in a transferred system cannot be underrated. The imported system's documentation, coupled with queries to its management and support personnel, are valuable tools for training and orienting project staff. The "not invented here" syndrome should not blind a State to this opportunity to avoid errors other States have worked through.

Finally, to insure that decisions are made on an informed basis, the project's decision makers should have the benefit of regular structured information exchanges and technical orientation briefings. Briefings on data processing concepts for policy staff may forestall unrealistic demands on the technical staff for impossible time schedules or impractical computer processing logic. Briefing systems and procedures analysts regularly on the program's objectives, policies, and regulations will help them to draw out the policy staff with good questions about the system's requirements and will make the analysts more sensitive to the sequential dependency of each successive computer subsystem.

The Minnesota MMIS project suffered initially from the data processing naivete of policy staff and from systems analysts' inability to define or elicit the necessary decisions from the policy staff. Two factors compensated for these findings. First, during the early stages of development, many of the deci-

sions taken were strategic rather than technical; they were choices of which design components of the system to import from other States. Melding technical and policy expertise did not become a problem until the retailoring of the imports to local requirements began. Second, once detailed design of reports and processing logic got under way, two major committees facilitated information exchange and discussion of policies and methods.

Formed early in the project, a welfare systems advisory committee (WISAC) drew together State policy and systems staff with representatives of county welfare departments. Meeting monthly, and sometimes more often, the WISAC committee drew from the staffs of the local agencies information about what data they could provide for the Medicaid public assistance case information system and what outputs the local agencies needed for internal use and for control of data integrity. The discussions of this group had major impacts on the data set finally installed in the case information system, on the methods of local agency reporting to the system, on the design of the system's reports, and on the establishment of the central eligibility files used for the turnover of adult cash assistance cases to the Federal Supplemental Security Income (SSI) Program.

Beginning work in the spring of 1974, approximately 1 year into the project, a second, even more important committee came into being. The Tuesday morning group was a tactical consortium of about 20 policy staff, systems analysts, and data project managers, chaired by the project coordinator; it included the income maintenance director, acting with the authority of an assistant commissioner. The Tuesday morning group reviewed progress on all key issues, discussed alternative technical design strategies, wrestled repeatedly over how to define or revise unworkable program and operations policies, and reached consensus on priorities and assignments of staff resources. These sessions, often stormy, were crucial to the project's success. During these meetings, the interdependence of the work groups and project actors became clear. Gaps in policy, impossible burdens proposed to be laid on medical care providers, new Federal regulations, and the consequences of programer misunderstandings were identified and analyzed. Worth noting is that all participants could address any work group's progress, methods, designs, or interpretation of the regulatory environment. This tapping of all participating policy and systems staff persons as information resources consistently led to advance warnings of oversights and impending problems (both technical and political), which could then be addressed before they achieved fatal momentum.

The Tuesday morning group assured coordination of efforts. Because it functioned in a structured but open and nonauthoritarian way, it improved the information base for decisions. Because it operated, for the most part, by consensus (the group felt strong discomfort if any knowledgeable member could not agree), it elicited an uncommon and powerful esprit from its members. Finally, because the higher levels of management participated in the group, it was able to define its outputs without a continuing risk of reversal from above.

Defining Data and Output Requirements

All analyses of management information systems aim at some array of outcomes, typically information outputs on which operational controls, disbursements, audit trails, budgeting, and strategic management decisions can be based. Defining the content and form of outputs to meet management's and the organization's needs is critical to the success of the project.

The availability of the data requirements and reporting structures identified in the published "MMIS General Systems Design" should not lead a State to assume that this analysis is complete or sufficient for all State requirements. The managers of the Minnesota project found considerable further analysis was required.

We have already said much about the need to clarify, continuously, the program objectives to be accomplished by information management. We stress that the sufficiency, acquirability, reliability, and consistency of data must be assured, and the form in which they are presented must enable the user to find the information needed to make decisions.

Sufficiency. Computer files and the input documents, such as invoices, must contain the data elements needed for automated decisions, computations, and edits. There is a temptation to build tough and lean systems based on minimal data sets. States planning to develop an MMIS will do well to recognize that more data elements will be needed to drive the MMIS than are recommended in the model system distributed by the Department of Health, Education, and Welfare through National Technical Information Service. Data sets smaller than those in the model system may endanger the system's certifiability for increased Federal participation in operating costs.

Acquirability. Data elements to be reported by medical vendors or county welfare agencies must be sufficiently well defined and well organized to make the cost of reporting them reasonable. Procedure and diagnosis codes (for example, the International Classification of Diseases, Adapted, Eighth Revision —the ICDA-8—and the major variant published by the Commission on Professional and Hospital Activities—the H-ICDA-2) should reflect a consensus of local providers' practice. It is madness to require physicians to code invoices with the procedure codes of the National Association of Blue Shield Plans if the dominant local insurance carriers are demanding use of codes from the third edition of Current Procedure Terminology (the CPT-3). (Local Medicare coding choices are less critical if the carriers are doing their own coding, although codes received on crossover claims passed on by title XVIII carriers should be translatable for utilization profiling purposes.)

If data are not reported, redundant sources should be supplied, with system defaults for nonfatal data gaps. For example, Minnesota found that recipients' birthdates on invoices were more accurate than the dates in the eligibility file, but more likely to be missing. Both sources of data are entered in the system, so that discrepancies can be flagged to assure accurate computing of recipients' ages.

Reliability. Besides editing data for plausible values and correct formats, a well built MMIS should have data collection forms designed to prevent errors in filling them out or in keying (or scanning) them into computer processing. Standard invoices prevent reporting errors, but nonstandard conventions for filling them out may create more errors than use of invoices designed specifically for Medicaid. Data reported should be relatively raw. Providers should not have to do complex computations to arrive at net billed charges. The computer can do the computing better, though it may need more operands (data reported) to get started.

Identifiers should contain self-checking digits (computer check digits) where possible. However, if a numeric series of identifier codes has many gaps and few transposition problems, as perhaps in the CPT, the need for check digits is less critical. In Minnesota, the State medical association's re-issue of the CPT contains check digits used by Medicaid but not by Blue Shield. Each feels that it gets payoffs from its approach to the codes. On the other hand, Minnesota's failure to put check digits in recipient identification numbers has been a source of grief.

Codes to be captured should be of workable size. Minnesota's 16-digit recipient identification number invites errors each time it is copied, keyed, or scanned, even when it is broken into small blocks.

Finally, data schemes should be designed for easy editing on data entry equipment (particularly key-disks and optical scanners), because correction or rejection of defective data by manual operation is most efficient when no major computer processing has been done and when no marrying of errors lists to original documents is needed.

Consistency. Data coding schemes must be consistent over time. If significant changes in schema are undertaken (for example, from ICDA-8 to H-ICDA-2), providers of data must be notified of the changed requirements and given training, computer history records must be translated, and providers should, preferably, be required to enter a flag mark on submissions of new data to indicate use of the new codes. Similarly, when old fields are redefined in computer records, previous data in the computer history files must be purged before the new application begins.

If MMIS components are transferred from other States, the compatibility of code structures is especially important, because edits and decision trees may be hard coded in COBOL on the basis of code meanings not applicable in the new location. Minnesota was forced to do major overhauls of the Ohio surveillance and utilization review computer programs after it initiated use of the 1964 California Relative Value Studies procedure codes as permissible alternatives to the CPT. All procedure maps had to be double tabled to the second code scheme, and the isomorphic American Dental Association codes had to be filtered out.

Output clarity. Reports should present information needed for making decisions at the level of the intended users. Reports should be organized to flag or focus attention on the exceptional items which require action and to assist retrieval of data on the persons or classes of cases of interest to the user. Following are several pitfalls worth noting:

- Reports which summarize transaction data to a trivial level of generality.
- Reports which display so much detail that summaries and comparisons are physically impractical to extract.
- Reports lacking data needed to interpret detail, such as abstracts of a recipient's history with no diagnosis data or with drug codes but no drug names.
- Reports in awkward sort orders which disperse

data desired to be accessed simultaneously (for example, claims adjustments for a provider which cannot be examined adjacent to regular claims in a provider history).

• Reports which display comparison data in sort orders different from the reports or files with which they are to be compared.

Finally, we stress again that the contents of reports must be tailored to management's actual needs in decision making, as these are understood in each State. Early in the analysis of the Minnesota's system's requirements, it became evident that a large number of statistical reports not defined in the model MMIS or the Ohio system would be desired. Other new reports had to be developed to service Minnesota's system of charging counties for part of the non-Federal share of expenditures. Hospital cost settlement reports had to be repeatedly redone and redefined. Analysis of the distribution of reasons for pended claims was needed.

Rethinking and augmenting the report structures of information system packages are normal tasks in transferring computer systems. The process should not be glossed over, as it can make or break a transfer effort. The new system must generate enough usable information to make it controllable by its managers in its new form and changed environment.

New report structures should not simply recapitulate material in existing reports. The old reports may have been unreliable, incomplete, misleading, unintelligible, or simply unused. It is essential to assure that reports can be generated to support all important operating, planning, and control decisions. Information systems can be decision systems only when their reporting structures support and are compatible with management's decision processes.

Provider Relations and Training

In developing a Medicaid MIS, provider relations and training have at least four major facets: marketing, tapping the information resource, training, and troubleshooting.

Marketing. Installation of the MMIS causes changes in processing requirements and procedures for handling medical claims. New data elements must be reported by vendors of health services. New invoices and forms come into use. Standards for payment of claims tighten. Explanations of payments change. Delays and foulups in payments occur. All of these events mean that the Medicaid agency has a marketing problem with its vendors. It must sell vendors on the value to them of putting up with the new requirements and the expected inconveniences that occur during the debugging of a new system.

Marketing requires direct communication, face-to-face if possible, with affected vendors, to alert them early to impending changes, to persuade them of the good will and honest intentions of the Medicaid agency's staff, to convince them of the social utility of the proposed changes, and to clarify the benefits they may expect to receive (such as improved cash flow). Such communications should be candid and timely but not dogmatic and premature, and the agency staff should guard against making commitments and uninformed promises that later may not be kept.

In addition, good marketing requires liaison with professional associations and influential representatives of provider groups to assure their assent and support for the project. Their support will often be less than generous, since the MMIS lays new burdens on providers, may reduce fees, and promises new forms of provider surveillance. But failure to discuss the new requirements and benefits with provider group leaders will result in resentment, organized resistance to the new requirements, and political problems over misunderstood requirements.

Tapping the information resource. Providers of care know what information they can report, what bookkeeping procedures they use, and their business office costs. They may not know these facts precisely, but they have better information than the Medicaid agency has. The Minnesota agency discovered, to its chagrin, that it is cheaper and politically easier to try early to tailor billing procedures to what is within reach of providers' business offices than to invest in requirements which cannot or will not be met. A State will find it useful to work through its information reporting requirements with providers, business office personnel, and service bureaus early in the development process. This interchange does not require yielding on disputes over capture of data absolutely required in the system, but it does mean keeping open to the possibility that some proposed requirements may be trivial or needlessly clumsy when a simpler or different approach may be more acceptable.

In addition, providers of care believe that they have something to contribute to the definition of fair policies on what services should be covered, subject to which checks and reviews. They do, both individually and through their professional associations and delegates to Medicaid advisory committees. Unless a State's Medicaid and MMIS project staffs

are exceptionally large and experienced, provider inputs to redefinitions of policy are invaluable in filling in the State agency's gaps in knowledge and expertise.

Training. Changes in billing and bookkeeping require retraining of providers and, most important, their billing clerks and service bureaus. Training materials must be complete and adequately indexed, with clear examples. Training seminars must be held for billing office personnel, not just for professionals or hospital administrators. Training should be timely, not the week before procedures change. Trainers must know billing and claims processing conventions intimately and have open lines of communication with Medicaid systems and policy staff to obtain quick answers to questions and difficulties which may arise. In addition, trainers should be instructed to identify and communicate back to the agency newly discovered problems and policy confusions, so that they may be corrected.

Because procedures will continue to change as an MMIS is refined, channels of communication with providers should be continuous. Minnesota found that information could be distributed quickly via messages on fortnightly remittance advice billings. Provider bulletins that can be produced and mailed on short notice are often necessary, but these should go through a clearance procedure to control unauthorized "emergency" changes in procedures and policies. Provider handbooks should be indexed so that changes and additions are simple to insert. Minnesota discovered that numbering inserts by section and topic was no substitute for page numbers.

Finally, individual providers will invent unique ways of fouling up both the system and their cash flow. Staff who train provider personnel should be prepared to work with individual providers to locate the cause of their problems. The claims processing system should be capable of referring providers with persistent problems regularly to the training unit, using such tools as provider inquiries and provider-specific computer analyses of error-code frequencies in pended claims. In Minnesota's experience, one-to-one communication with providers having consistent processing difficulties has been an expensive but cost-effective method of resolving provider problems.

Troubleshooting. During and after the MMIS' installation, individual providers and the system will have problems. A mechanism is needed for providers' inquiries about unpaid, mispaid, and rejected claims. The organizational location is not critical, but this office must have access to the claims and document control (tracing) indexes and to remittance advices and warrant logs. Its staff need access to policy and medical professional staff, to systems analysts and programer support, and to provider handbooks and systems documentation. Staff who handle provider inquiries must be alert to common problems which may be resolved through provider training, information bulletins, and handbook revisions, or by reprograming computer edits and billing conventions. In Minnesota, this function, along with processing of requests for adjustments, is handled by the staff of experienced medical claims analysts responsible for reviewing excepted claims.

Coping with Technological Change

The model MMIS is a design for a large and complex computerized information system. Building it makes demands on computer facilities and their personnel. Replacing clerical operations with computer processing drastically changes established document handling and decision making routines. Establishing new management functions dependent on computer outputs changes managers' modes of access to decision data, as well as the sorts of data available. Coping with such changes is, in large measure, a problem of managing people, of helping them to organize and adjust to a new work and information environment.

The adjustment can be eased by giving care to the technological changes which impact the work environment or complicate the computer system. We discuss some common sources of technological difficulty in this section.

Need for new computer and terminal hardware. Bringing up a system in a computer center without sufficient disk file, tape drive, or line printer capacity may necessitate major rewriting of transferred computer programs or cause losses in computer efficiency. Conflicting demands for central processing unit time or computer core may delay production programs and occasionally force skipping the production of some management reports. Outdated telecommunication systems may compromise the timeliness of eligibility files or increase the production and distribution load of paper and microfiche reports.

Minnesota's experience establishes that a separate stand-alone computer controlled by the Medicaid agency is not mandatory for MMIS processing. However, it does illustrate the need for active facility

planning and organizing, and careful scheduling with a State's information system department.

Borrowed programs in nonstandard computer languages. Transferred MMIS system components may require conversion of hardware-specific shortcuts taken in what is ostensibly American National Standards Institute COBOL. Transferred components may be tied to proprietary data base software, which must be purchased if new file interfaces are not to be developed.

Borrowed computer programs which do not match their documentation. Program people and systems analysts should be alert during the implementation of a transferred system that the computer code for edits, file organizations, and decision trees may no longer match the narrative documentation.

Optically scanned vendor invoices. If optical scanning of invoices is used for data entry, providers of health services need to know how they must type and handle their invoices. (They will also need an explanation of how their claims will be paid more quickly through use of OCR technology.) A multifont OCR device itself will need fine tuning of its character screens to assure that it can read all common typewriter and line printer fonts used on the invoices.

Data display media. Users of computer outputs should receive data in intelligible formats in a medium suitable to their use. Random lookups in large, frequently updated data sets are easiest to do using on-line video terminal inquiry or face indexed COM (computer output to microform) microfiche. Proof lists, management data, and error resolution forms should be on paper so that notes and computations can be written on them. Reports of an audit trail character or of other possible historical interest should be reduced to microfilm or microfiche for permanent storage, regardless of how the prime user's copies were produced.

Provider and service bureau computer limitations. If providers rely on their own or service bureaus' computer systems for billing or accounting services, the computer systems create a need for additional lead time for providers to respond to new State requirements.

Conclusions

This discussion of Minnesota's experiences has highlighted a number of concerns for other States planning to implement the model Medicaid Management Information System. Some infortuitous decisions and problems have been touched on which Minnesota could have avoided with the hindsight of today. On the whole, however, we believe that the Minnesota project was effective. The final product has proved acceptable and is well on its way to becoming a true management information system for Minnesota's Medicaid program.

Attempting to consolidate our recollections regarding critical issues was difficult. Attempting to summarize them further is perhaps a disservice, because the preceding discussion is but the tip of the iceberg; many underlying observations and empirical facts could usefully be explored. Nonetheless, at the risk of oversimplification, some general conclusions and recommendations are in order.

States beginning an MMIS project should actively seek available knowledge and expertise in the MMIS area. States beginning today have an advantage in that Federal guidelines for system design are now available, and their interpretation is clearer than during Minnesota's project. Federal staff who have worked on State site audits have clarified their interpretations of the design requirements and are available for advice. Other States have been through the development experience and can provide insight, some of which has been documented in this paper.

It should be recognized that the MMIS (or at least some of the subsystems) may lend itself to a system transfer effort, noting on the one hand the benefits of available structure and savings of time and money inherent in such transfers, and on the other hand, the risks of policy, code structure, and hardware incompatibility, the dependencies on other organizations, and the behavioral complications of such projects. Transfer processes themselves must be carefully structured to insure successful implementation. Cost differences should be explored thoroughly.

An evolutionary development of the system should be planned. The target should be clear before beginning, but an attempt to proceed intractably down a prescribed path to the final product will compromise the results. The business of project management is to firm up requirements' analyses and systems' designs to the best possible state at any given time, leaving appropriate ffexibility and logical hooks for enhancement where necessitated by organizational needs. The development of information systems is a learning process—for managers in defining their goals, for both management and systems analysts in deciding the kinds of information needed to support management decision making and

operational control, and for systems designers and programers in learning how best to capture and manipulate data with accuracy, flexibility, and economy.

Structured participation of key individuals and organizations at strategic points in the development process is imperative; unstructured participation can be more of a hindrance than a help. Participants must be carefully selected and they should include persons who are knowledgeable about operational needs and who can understand policies and procedures within affected organizations.

Early and adequate communications with providers, other agencies, and other organizational units within the parent organization are critical. What participants feel must be noted as well as what they can document, since inarticulate feelings are often clues to information needed for successful implementation.

One of the strengths of the Minnesota project was structured participation. One of its shortcomings was that it did not push structured participation further than it did.

In an MMIS project, the organization itself must evolve. Information flows, informal communication and authority structures, formal responsibilities, and basic functioning of the organization will be affected by the development and the ongoing new operations. The process of organizational change must effect an orderly, informed transition. When organizational growth is necessary, skill requirements and staff resources to meet those requirements must be carefully examined. Staffing by the "good person" approach without due consideration of the skills required can cause delay, error, and loss of organizational rapport, and it can bring about other problems associated with replacement of poor choices of personnel.

The design process must be policy driven. Policies should not be decided by bouncing them off the design, nor should they be locked up in advance of the design. Rather the definition and documentation of policies, as well as assessments of their flexibility, must be a continuous part of the design process. Legislation must be planned for, and the time lags associated with the legislation must be anticipated.

While organizational and behavioral changes are prominent issues in MMIS implementation, technological change must also be managed. Changes in technology are easier to plan and assess than organizational changes, but failures of equipment and software to meet expectations may cause delays, increased costs, and organizational problems.

Additional Information on the Medicaid Management Information System

Several publications useful to Medicaid project managers are available from the National Technical Information Service (NTIS), Springfield, Va. 22151. Request by NTIS numbers.

- *Social and Rehabilitation Service, U.S. Department of Health, Education, and Welfare: Medicaid management information system. General systems design for title XIX. Ed. 2, Washington, D.C., December 1973, 5 volumes. PB 236–550, $37.*
- *Social and Rehabilitation Service, U.S. Department of Health, Education, and Welfare: Medicaid management information system. General installation guide for title XIX. Washington, D.C., June 1972. PB 210–742, $4.25.*
- *Social and Rehabilitation Service, U.S. Department of Health, Education, and Welfare: Model training program for implementing the Medicaid management information system. Washington, D.C., March 1973. PB 217–222, $5.75.*
- *Social and Rehabilitation Service, U.S. Department of Health, Education, and Welfare: S/UR operational techniques. Washington, D.C., February 1973. PB 216–158, $8.50.*
- *Social and Rehabilitation Service, U.S. Department of Health, Education, and Welfare: MARS operational techniques. Washington, D.C., spring 1974. PB 216–159, $7.25.*