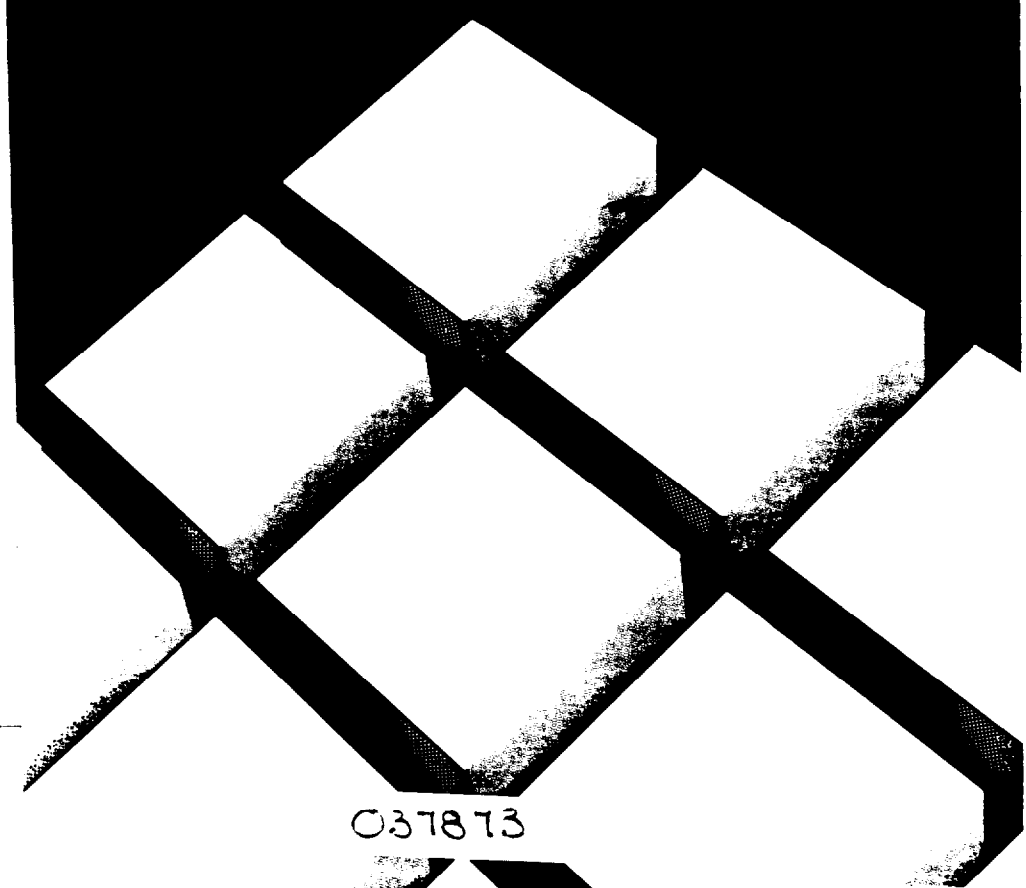


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Critical Factors in
Developing
Automated
Accounting and
Financial
Management Systems



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PREFACE

The General Accounting Office (GAO) has long believed that the federal government urgently needs to improve the financial information on which it bases many important decisions. To run our complex government effectively, both the Congress and the executive branch need sound automated accounting and financial management systems. Major upgrading of antiquated systems is required to achieve this, and resources will need to be committed to the task. We are publishing this brief booklet to describe in plain English some critical aspects of accounting and financial management systems development in order to inform the Congress and others with a stake in improving government management. This booklet is based on our experience in reviewing systems development projects. We gratefully acknowledge also the suggestions and contributions of many federal and private-sector professionals with expertise in developing these systems.



Comptroller General
of the United States

CONTENTS

| | |
|--------------------------|----|
| Preface | i |
| Introduction | 1 |
| The Overall Plan | 3 |
| Management Commitment | 4 |
| Contracting Process | 5 |
| Basic Features | 6 |
| Systems Methodology | 7 |
| Target Dates | 9 |
| Functional Requirements | 10 |
| Documentation | 11 |
| Up-to-Date Technology | 12 |
| Equipment Acquisition | 12 |
| Training | 13 |
| Independent Testing | 13 |
| System Operation | 14 |
| Quality Assurance Review | 15 |

INTRODUCTION

Many federal accounting and financial management systems must be redesigned to give the executive branch and the Congress the financial information they need to make effective decisions in the complex environment of the 1980's and 1990's. Many federal systems also require modernization to take advantage of today's communication and data processing technology.

Automated accounting and financial management systems must meet management needs as well as a variety of agency standards. GAO issues standards for accounting and financial reporting as well as for internal controls. The Office of Management and Budget (OMB) has issued guidance on financial management systems and internal controls, while both OMB and the General Services Administration have published directives on managing information resources. Treasury also has requirements that significantly affect systems development. In addition, federal systems are subject to the National Bureau of Standards' information processing technical standards.

A decision to undertake a major systems redesign, acquisition, or improvement project cannot be taken lightly. Beyond its developmental cost, a systems project will disrupt normal activities with a host of attendant problems. While many difficulties can be anticipated, no systems project proceeds exactly as originally planned, nor will it be free of unexpected problems. Managing any major project requires shrewd planning and thorough consideration of technical matters. It also demands an ability to deal with the unexpected and a mechanism to solve problems.

What follows is a straightforward discussion of 14 major factors that are often critical to the success of major systems projects. This booklet speaks to a general audience, describing major elements of these projects in plain English. It is not a technical document, nor can it replace the formal systems methodologies that project managers and systems professionals must use.

Overall Plan

Individual systems projects must be planned and carried out with an agency's overall systems plan in mind. Such a plan ensures that an agency's systems can efficiently meet management's current needs for sound financial information yet provide for future expansion. It can also ensure compatibility between equipment and systems, prevent duplication by different systems in collecting and producing information, and clearly define the rationale and scope of individual projects. The plan can help resolve difficult choices such as whether to develop customized software or to adapt "off-the-shelf" products. It establishes target deadlines for projects and their major phases, identifies the necessary resources, and designates someone who will be responsible for each part of the plan.

A successful overall plan must win top management support and receive consistent direction. One effective way to accomplish this is by establishing an Automated Data Processing (ADP) steering committee composed of top managers who know the agency's information needs. The chief ADP official often serves as an advisor, while the committee oversees plan development and approves the final version as well as prioritizing individual projects within the overall plan. Regular meetings help the committee monitor progress against the plan and provide occasions to reevaluate and update the plan as needed.

Management Commitment

Management must agree that a project is needed and accept its goals. Management must also be willing to apply the skills of the agency's top managerial and technical people, plus other resources as needed, for a project's successful completion. This commitment includes ensuring participation by all staff members who will use the system or whose work will be affected by the project. Assigning a strong project manager with the skills necessary to carry out the project is important to the credibility of management's commitment.

Strong management support, including adequate resources, is vital. For accountability and timely completion, management needs to maintain continuity among the people assigned to manage and help with a project. People who are knowledgeable about requirements must be accessible as the project moves along.

When a contractor is used, management too often believes that, once the contract is let, everything is under control. In reality, a complex system requires major effort from internal staff. Financial managers, users, and others must spend considerable time away from their normal duties to communicate their detailed operating requirements to the contractor. Internal staff members must forgo other projects to monitor and review the contractor's work, and management must prepare for this.

Contracting Process

Agencies often contract with private-sector consulting firms for systems acquisition and development services. Such contracting is a highly technical, complex process with many possible pitfalls. A wide variety of laws, regulations, and legal decisions must be well-known to the people involved in contracting. They must also determine the most appropriate type of contract for the situation (for example, fixed price or cost-plus-fixed-fee), ensure that contract specifications are sufficiently detailed to adequately describe the work, and exercise careful judgement in evaluating bids. In-depth examination of these considerations is beyond the scope of this booklet. The importance of having skilled, competent people carry out the contracting function, however, is abundantly clear. Many agencies, especially the smaller ones, do not have the necessary expertise in-house. The General Services Administration has staff specialists who can help in these situations.

Basic Features

Accounting and financial management officials should ensure that planned automated systems include such essential features as:

- a comprehensive set of automated internal controls to ensure the accuracy and reliability of information in files and reports, and to prevent or discourage fraud;
- controls to guarantee the security of equipment, programs, and files as well as the privacy of records on individuals;
- audit trails allowing transactions to be traced from reports to their originators;
- automated general ledger and reporting modules, where relevant, to aid in producing basic financial reports;
- appropriate sets of automated subsidiary ledgers, such as an accounts payable ledger and an accounts receivable ledger;
- flexible inquiry capability to aid in meeting nonrecurring needs for information;
- one-time-only recording of transactions;
- automated matching of related transactions (for example, matching disbursements with related payables); and
- adequate manual procedures, since not all transactions will be automatically entered and almost all will require some manual work. In other words, not everything will or should be computerized—some things will be done by people. A good systems project must deal with manual as well as automated processes.

Systems Methodology

A proven systems methodology is a major tool in developing high-quality individual systems. A systems methodology is a formal, structured approach to systems development that outlines and describes sequentially and in substantial technical depth all phases, tasks, and considerations that systems developers believe are necessary for a successful project. A methodology constructs a framework for ensuring that each development phase is carefully planned, controlled, and approved; that it complies with standards; that it is adequately documented; and that it is staffed by competent people. Most consulting firms, as well as several major federal departments and agencies, have developed or adopted a systems methodology for their projects. GAO believes that a systems methodology, to be fully effective, should take into account all critical factors in this booklet.

Often a new system is thought of as ready to plug in and operate immediately—like a new typewriter or telephone. In reality, complex systems rarely operate on a “turn-key” basis. It is true that use or adaption of ADP programs successfully developed and used by other agencies, programs in the public domain, and “off-the-shelf” programs increasingly can streamline and reduce the cost of systems development and acquisition. Even where such programs are used, however, intensive in-house knowledge and involvement are required. Installing the system is only part of what is involved. Many other aspects must be planned, budgeted, or acquired. These include the organization and skills mix needed to operate and maintain the system, adequate space and facilities for the staff and equipment, facility security, employee recruitment and training, and

conversion to the new system. An effective systems methodology helps determine these needs and how to meet them.

An effective methodology will ensure that massive and complex projects are carried out segment by segment. This is done by developing successively—rather than concurrently—each defined segment of the total system. Each completed segment is fully tested, operating satisfactorily, and integrated with earlier segments before the project proceeds to another segment. While the successive approach is ideal, for a variety of practical reasons it may be necessary to overlap some segments' development. The steering committee must then be especially careful that the overall effort is effectively managed and coordinated and that overlapping segments are well integrated.

Target Dates

Target dates for completing projects or phases are difficult to estimate accurately for complex systems projects. The projects typically require frustrating and almost interminable backtracking, fixing, adjusting, testing, and retesting to get things to work as they should. Schedules tend to be optimistic, sometimes because workers may tell top management what they think it wants to hear. Regular written progress reports should be required. Target dates set at the beginning of a project should be as realistic as possible; variances from early projections will still occur. As the project proceeds and a greater understanding of its scope and complexity evolves, target dates should become more precise and reliable. Management can then take firmer control.

When target dates are changed within reason, everyone from top management down must be patient. The key point is that target dates should be established and variances analyzed, while management acts firmly but fairly to deal with slippage and delays.

Functional Requirements

The functional requirements document serves as the blueprint for later phases of a systems project. It describes the accounting and financial management jobs the system is to perform, the agency's information requirements, the operating environment, and a plan for developing the necessary computer programs. It is very important that this document be sufficiently detailed to prevent misunderstandings about aims and expectations, for expensive changes may otherwise follow. The document must be carefully developed, reviewed, and approved before starting the detailed design.

The functional requirements document serves as a bridge between management's information needs and the system's technical design. An inadequate document can, in the end, produce a poor system.

The study of functional requirements is often the most difficult part of a project. It asks that specialists in three disciplines—management, accounting, and systems analysis—communicate effectively with each other. Managers, accountants, and users at all levels, who have detailed understanding of the agency's accounting processes and reporting needs, must be available on a priority basis to work along with the systems analysts to establish systems requirements and prepare the functional requirements document. Users' requirements must be communicated fully and effectively to the analysts.

Design cannot proceed until the requirements document is reviewed and approved by the organization's top management.

Documentation

Systems designs must be adequately documented. No matter how well and carefully a system is designed, it is of little value if inadequately documented. Users cannot be expected to know and remember everything they might possibly need to know to use, operate, and maintain a complex system. Users and operators must often refer to the documentation, which describes in detail how information passes into and through a system, as well as the system's products. When revising a system, analysts and programmers also have to rely on comprehensive technical information about the programs and their interrelationships. Full documentation helps in training new staff members, too. An adequate set of documentation includes:

- user manuals for those who use the system's products or enter transactions, as well as for auditors and others who check operations for correctness;
- an operations manual for computer operators; and
- system, subsystem, and program technical specifications and program listings for the staff who must make needed changes.

Up-to-Date Technology

Systems development and improvement projects should make optimal use of proven technology—not just in hardware but in software engineering and development. Senior management and financial officials cannot be expected to be technological experts, but they should try to gain some awareness of recent innovations that might improve their systems. This does not mean applying state-of-the-art technology as an end in itself, but using this technology wherever it can improve accounting and financial management cost-effectively.

A well-articulated overall plan, wisely monitored by the ADP steering committee, can prevent a major problem GAO has noticed in recent years: overoptimism about present technology. Often projects promise all things to all people by attempting to produce one data base that includes “everything you ever wanted to know” about an agency or an activity, available at the press of a button. Overly ambitious projects invariably encounter serious management and technical problems that cannot be resolved. The successful project of colossal scope has been a rare exception.

Equipment Acquisition

Equipment should not be acquired before system requirements are clearly specified, for this has often led to waste and systems failure. Sometimes systems are designed to operate on existing equipment. This is appropriate if management's information needs are not compromised to accommodate the equipment. Any successful system, including its equipment, is driven by management's information needs and the overall costs and benefits involved.

Training

The importance of training cannot be overstated. Three primary groups need it: the system's information users, accountants, and system operators. Besides being necessary for operating and using the system, effective training can greatly reduce the tension often associated with major changes in the workplace. Some people's jobs will be changed, and sometimes it is impossible to know in advance whose and to what extent. Training, counseling, and familiarity with the system can greatly smooth the transition and minimize resistance to change.

Training is also important to ensure that system outputs are properly used and to avoid the natural tendency of people to keep their old systems rather than to rely on the new.

Independent Testing

The purpose of acceptance testing is to make certain before accepting and placing the system in operation that it performs as designed. It is important that acceptance testing be planned and performed by a group independent of the developer.

For complex systems, acceptance testing is a very formal process. A test plan identifies the documentation, equipment, and software needed for the tests. It also describes test methodology, test controls, and tests to be performed. Problems are noted in a formal test analysis report, and retesting continues until all problems have been satisfactorily resolved.

System Operation

An agency should not try to place any new system in operation until all significant problems identified by testing have been corrected. Otherwise, day-to-day operations will encounter major problems. In such cases, transactions must be continually reentered, reports will be late or unusable, staff members may revert to manual processes or old systems, and deep mistrust of the new system can develop.

Commonly, systems are implemented too hastily in an attempt to meet inflexible or unrealistic target dates. On the other hand, trying to eliminate all potential implementation problems is equally unrealistic. Some unanticipated problems will always occur, and provision needs to be made for resolving these problems as they arise.

Sometimes, in converting from one system to another, agencies operate both old and new systems concurrently until the new system operates satisfactorily. This approach, known as parallel conversion, is not always necessary and, in fact, has drawbacks; the decision to run parallel is important. Parallel conversion may sometimes be appropriate for high-risk systems where costly problems will be created if the new system fails. Disadvantages of parallel conversion include additional costs as well as disruption of everyday activities. It also burdens the operational people who must enter records into two systems, then review and compare two sets of output reports.

Quality Assurance Review

Finally, in long-term projects, objectivity often gives way in the face of day-to-day pressures to get the job done. A fresh look by someone who has technical knowledge but is not close to the project can be helpful in spotting problem areas, omissions, or even better ways of accomplishing the system's tasks. The independent reviewer should use a checklist to consider and document all relevant points. Typically, the reviewer should be equal to or higher in rank than the project manager and must be able to exercise independent judgment, similar to that of an inspector general. The reviewer should try to make constructive recommendations for resolving any problem he or she finds.

Large-scale financial management systems development projects, besides costing a great deal, place tremendous demands on agency management and staff. Many factors such as the 14 we have discussed can, if not properly addressed, prove major roadblocks to a project's success. GAO believes, however, that competent, alert, and informed agency management can effectively anticipate these factors. We are confident that the cost and human demands of modernizing our accounting and financial management systems will be repaid many times over by progress in managing our federal government's financial affairs.

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