United States General Accounting Office

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Report to the Chairman, Subcommittee on Oversight, Committee on Ways and Means, House of Representatives

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TAX ADMINISTRATION

Replacement of Service Center Computers Provides Lessons for the Future

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GAO

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The Honorable J. J. Pickle
Chairman, Subcommittee on Oversight
Committee on Ways and Means
House of Representatives

Dear Mr. Chairman:

This report is in response to your request that the General Accounting Office evaluate the Internal Revenue Service's (IRS) acquisition of the Service Center Replacement System (SCRS) and identify any unresolved problems. Our work identified two factors that we believe contributed significantly to the problems IRS encountered with SCRS. The first factor involved inadequate quality controls, particularly when it came to testing rewritten computer programs before putting them into production. The second factor related to an absence of sufficient organizational oversight during critical phases of SCRS.

At the time we completed our audit work, IRS had taken or was taking several steps to deal with the problems caused by SCRS and to avoid similar problems in the future. Those steps included a revision of quality assurance procedures and the use of steering committees and project managers to enhance management oversight and control. In future assessments of IRS' ADP-related activities, we will be alert as to whether these changes have been effective. For example, as part of our ongoing assessment of IRS' implementation of the Tax Reform Act of 1986, we will be evaluating the reasonableness of IRS' process for testing programs that have been or are being revised in preparation for the 1988 filing season, which include changes as a result of the act.

As agreed with your office, we are providing copies of this document to IRS. Unless you publicly announce its contents earlier, we plan no further distribution until 10 days from the date of the report. At that time, we will send copies to interested parties and make copies available to others upon request.

Sincerely yours,

Jennie S. Stathis

Jennie S. Stathis
Associate Director

Executive Summary

Purpose

During 1985, the Internal Revenue Service's (IRS) 10 service centers had difficulty processing tax returns. As a result (1) more refunds were delayed in 1985 than in the past, and the government's interest payments on late refunds increased substantially; (2) IRS issued many erroneous notices to taxpayers; and (3) service center workloads, including correspondence inventories, swelled. Problems associated with the acquisition and implementation of a newly-installed service center computer system, called the Service Center Replacement System, were major contributors to those processing difficulties.

At the request of the Subcommittee on Oversight of the House Committee on Ways and Means, the General Accounting Office assessed IRS' management of the hardware acquisition and software conversion associated with that new system and identified steps IRS has taken since then to help avoid problems with future system acquisitions.

Background

In July 1979, an in-house feasibility study recommended that IRS competitively replace two existing service center computer systems with one system. Consistent with guidance from the House Committee on Government Operations and the Office of Management and Budget (OMB), the study called for a rollover system, which meant that existing applications were not to be enhanced and that new functions, applications, or data files were not to be added. IRS issued a Request for Proposals in February 1980; tested the systems offered by respondents to that Request; and, in June 1981, awarded a 4-year lease/ownership contract, at a cost of $102 million, to Sperry Univac, Incorporated. That contract called for two central processing units to be installed at each of the 10 service centers and at IRS' National Computer Center in West Virginia. IRS expected that those computers, which were installed between March 1982 and April 1983, would meet service center processing requirements into 1987. (See pp. 10, 11, 19, and 20.)

Besides the procurement of new hardware, the Service Center Replacement System involved the rewriting of about 1,500 computer programs from one language to another. That software conversion was accomplished by IRS staff between 1980 and 1985 at a cost of about $29 million. (See pp. 29 to 31.)

Results in Brief

Upon implementation, in 1985, the new computer system failed to adequately meet the service centers' processing requirements, and IRS had to procure additional central processing units for each location that

were not contemplated when the contract was awarded and rewrite several computer programs. That situation occurred because (1) IRS did not have sufficient controls in place during critical phases of the project to provide the kind of oversight needed to insure timely and informed decisionmaking and (2) management did not emphasize quality during the software conversion phase of the project.

Since the Service Center Replacement System, IRS has taken steps to help ensure that the kinds of problems encountered during that system's acquisition and implementation do not recur in future automated data processing (ADP) projects.

Principal Findings

Problems Encountered During Replacement of Service Center Computers

The Service Center Replacement System project involved two major phases—the acquisition of new equipment from Sperry and the rewriting of computer programs by IRS staff. IRS encountered problems during each of those phases that led to insufficient capacity upon implementation of the new computer system.

During the equipment acquisition phase, for example, IRS took actions that were inconsistent with congressional and OMB guidance and with its own system sizing assumptions. Those actions served to limit the amount of available capacity on the new computers. During the software conversion phase, IRS rewrote programs without taking full advantage of available quality assurance tools and put rewritten programs into production before they were fully tested. As a result, some programs ran inefficiently, which contributed to the capacity problem, while other programs failed to meet users' needs. (See pp. 14 to 38.)

In GAO's opinion, IRS' management environment during both phases of the project did not facilitate informed decisionmaking. There was no steering committee, for example, to help insure that all affected parties were represented in the decisionmaking process, and the project office that had overseen development of the project plan was not involved in implementing that plan. (See pp. 41 to 46.)

IRS Has Taken Steps to Improve Its Management of Future ADP Projects

Since acquisition of the Service Center Replacement System, IRS has implemented certain organizational controls that should provide better ADP project oversight and thus enhance decisionmaking. Specifically, it has established procedures for assigning steering committees to major projects, has assigned responsibility for major project decisions to those committees, and has adopted procedures that extend a project manager's responsibilities beyond the planning phase of a project. (See pp. 41 to 46.)

IRS has also taken and is taking steps directed at enhancing the quality of future software-related projects. A private contractor was hired, for example, to study IRS' software development activities, and quality assurance procedures are being revised. (See pp. 38 to 40.)

Because the most significant quality assurance-related problem identified during the review involved inadequate testing, GAO plans to evaluate IRS' current testing procedures to determine whether they have been sufficiently improved since implementation of the Service Center Replacement System.

Recommendations

Because the steps IRS has taken in response to the problems encountered on this project should help ensure better project management in the future, GAO is making no recommendations.

Agency and Contractor Comments

IRS generally agreed with GAO's "historical overview and findings." IRS pointed out that the Service Center Replacement System hardware and software are now working well and that organizational changes have been implemented to "prevent similar problems with computer systems installations in the future." (See p. 12.) GAO also obtained oral comments on portions of this report from Sperry (now known as UNISYS). Although they generally agreed with the facts in those excerpts, UNISYS officials had several comments about the way those facts were cast. This report has been revised to reflect those comments, which are fully described on pages 18 and 19.

Contents

Tables

Abbreviations

ADP	automated data processing
AICG	Automation Implementation Control Group
AIMS	Audit Information Management System
ASCII	American Standard Code for Information Interchange
COBOL	Common Business Oriented Language
CPE	Computer Performance Evaluation
CPU	central processing unit
GAO	General Accounting Office
IDRS	Integrated Data Retrieval System
IRS	Internal Revenue Service
NCC	National Computer Center
OMB	Office of Management and Budget
SAT	Systems Acceptability Testing
SCRS	Service Center Replacement System
SCUMPS	Service Center Upgrade of Mainframe Processing System
SDO	Systems Development Office

Introduction

The Internal Revenue Service (IRS) encountered numerous problems during 1985 that disrupted returns processing activities and strained taxpayer relations. IRS' 10 service centers had difficulty processing tax returns in a timely manner, controlling the flow of tax returns and tax data through the processing system, and keeping case inventories at manageable levels. As a result, IRS' operational costs increased as productivity declined, the government's interest payments to taxpayers increased as refunds were delayed, and IRS' image waned as the public became increasingly frustrated.

We have discussed those problems in detail during congressional hearings and in various documents. Appendix I contains a listing of those testimonies and documents.

Most of the problems IRS experienced in 1985 were related in one way or another to the introduction of a new service center computer system known as the Service Center Replacement System (SCRS). SCRS replaced the mainframe computer systems used to process over 180 million tax returns and related documents annually and to provide IRS offices with the capability to research taxpayer accounts. In addition to replacing aging equipment, SCRS involved restructuring data files, using standard vendor system software, redesigning application software[1] to be more effective, and converting application software from assembly languages[2] to Common Business Oriented Language (COBOL).

On May 23, 1985, the Subcommittee on Oversight, House Committee On Ways and Means, requested that we assist it in evaluating IRS operations and procedures. As part of that request, the Subcommittee asked that we evaluate how well IRS managed the acquisition and implementation of SCRS and that we identify problems encountered with the SCRS procurement, problems that remain unresolved, and steps that IRS can take to minimize those problems during future system acquisitions.

Chapter 2 of this report discusses the equipment acquisition phase of SCRS and the capacity problems associated with that equipment. Chapter

[1]System software runs the computer system internally. It enables the computer to perform its basic functions, such as storing and retrieving data. Application software makes the computer do specific things with the data being entered into it. An application itself is an automated function or processing requirement that may involve many computer programs.

[2]An assembly language is a machine oriented, or low-level language, which requires the programmer to write detailed instructions to control all processing steps. An assembly language is usually dependent on a particular brand of computer. COBOL, on the other hand, is a procedure oriented, or high-level language. Such a language is less rigid than a low-level language and is usually independent of a particular brand of computer.

3 describes the software conversion phase of SCRS and the problems IRS encountered with the converted software. Chapter 4 discusses certain organizational controls IRS has implemented since SCRS in an attempt to better manage automated data processing (ADP) projects.

Overview of Tax Processing System

Each year, IRS' 10 service centers and its National Computer Center (NCC) in Martinsburg, West Virginia, process millions of tax returns and related documents and update millions of taxpayer accounts. Collectively, these 10 centers and NCC comprise the tax processing system—a system that is heavily supported by computers.

The tax processing system is generally described in terms of pipeline and nonpipeline processing. Pipeline processing is comprised of a master file at NCC, which contains an account for each individual and business taxpayer, and a computer-based processing system in each service center, which receives tax returns, transcribes information from those returns, and subjects that information to math, validity, and accounting checks before transmitting it to NCC for posting to the taxpayers' accounts. The service center phase of pipeline processing involves the mainframe computers that were replaced through SCRS; various input systems, such as the Distributed Input System;[3] and communications processors, through which on-line inquiries via computer terminals must pass to get access to data bases on the mainframe computers.[4]

Nonpipeline processing involves computer-based support systems that contain selected account information for use by various service center functions in carrying out and managing tax administration requirements, such as controlling and accounting for tax receipts and issuing bills and notices to taxpayers. The primary support system is a realtime system called the Integrated Data Retrieval System (IDRS). As a realtime system, IDRS provides an on-line capability that enables users to instantaneously access taxpayer accounts and change those accounts to reflect up-to-date information such as a payment.

[3]This system, which became operational in 1985, is used to enter payment and tax return data into the mainframe computers. Problems associated with this system's implementation contributed to the returns processing difficulties IRS experienced in 1985. Those problems are discussed in the reports and fact sheet cited in appendix I.

[4]These processors are discussed in our October 14, 1986, report entitled Data Communications: Thorough Testing and Workload Analyses Needed for IRS Processors (GAO/IMTEC-87-3BR).

SCRS Acquisition Process

As IRS' work load increased, the tax processing system was expanded through new computer programs and new equipment. The computer programs that were added were usually written on an ad hoc basis as IRS began to collect more and more data and use this data for more and more purposes. The result was an assortment of programs that, although they worked, were cumbersome to use, maintain, and add to when necessary. In addition, computer capacity was wasted by performing too many processing steps.

IRS' efforts to upgrade the tax processing system eventually led to a feasibility study in 1979. The study report recommended that IRS competitively replace both the Control Data Corporation 3500 and Honeywell 2050A computer systems, which were used for nonpipeline (IDRS) and pipeline processing, respectively, with one system via a single procurement. The study stipulated, however, that pipeline processing would remain a batch processing operation while those nonpipeline functions performed on IDRS would remain on-line. Consequently, the new system, which came to be known as SCRS, would have to have both capabilities.

In February 1980, IRS issued a Request For Proposals for SCRS. Three companies responded. One of those respondents, Honeywell, Incorporated, subsequently decided not to compete. The remaining two respondents were Sperry Univac, Incorporated (hereinafter referred to as Sperry), which proposed its 1100/82 system, and Vion Corporation, which proposed an Hitachi AS/9000 series system.

Award of the SCRS contract was based on the results of IRS' cost and technical evaluation of each system. The cost/technical evaluations were weighted on the basis of 80/20. That is: the least costly system that met requirements was given up to 80 points, while up to 20 points could be given to a proposed system based on IRS' evaluation of its technical capabilities. The Hitachi system received the most points for its technical capabilities, but the contract was awarded to Sperry because its cost estimate was significantly lower than Vion Corporation's.

The contract, awarded in June 1981, called for 11 Sperry 1100/82 computer systems—one for each of the 10 service centers and one to be used at NCC for developing and testing programs. Introduced in November 1976, the 1100/80 series was, at that time, the largest and most powerful computer offered by Sperry. The computers were acquired under a 4-year lease/ownership contract for $102 million. The price included hardware, vendor-supplied software for the operating system,

and maintenance for 8 years. The 1100/82 systems were installed at the 10 service centers and NCC between March 1982 and April 1983.

SCRS Management Responsibilities

When the SCRS project was initiated, the ADP Policy/Resource Board was the governing ADP policy and decisionmaking body at IRS. In 1983, that Board was replaced by an Automation Policy Board, to be chaired by IRS' Deputy Commissioner and to include IRS' three Associate Commissioners, the Deputy Chief Counsel, and two Regional Commissioners. The Automation Policy Board is responsible for (1) formulating ADP policy; (2) establishing long-term ADP goals; (3) approving IRS' overall ADP plan; (4) setting priorities among ADP projects and initiatives; (5) altering plans and priorities to meet changing needs and conditions; and (6) establishing standards and procedures for acquiring, using, expanding, and discontinuing ADP equipment.

Overall management responsibility for the SCRS project was initially assigned to the Office of the Assistant Commissioner for Data Services. A Systems Development Office (SDO) was established to plan for, support, and initiate the project. SDO reported to the Assistant Commissioner for Data Services. As part of its responsibilities, SDO completed project feasibility studies, conversion studies, and transition plans. The SCRS transition plan was the basic management tool for providing an orderly move from old systems to new; identifying milestones; and assigning responsibility for equipment procurement, applications software development and testing, and personnel training.

SDO was relieved of responsibility for SCRS in December 1981 and was subsequently abolished in 1982, soon after IRS underwent a major reorganization. The reorganization created three associate commissioners, each overseeing a number of assistant commissioners. The Associate Commissioner for Data Processing became the principal advisor to the IRS Commissioner on policy matters affecting data processing. Among those reporting to the Associate Commissioner was an Assistant Commissioner for Computer Services who assumed management responsibilities similar to those assigned to the former Assistant Commissioner for Data Services, including responsibility for acquisition and implementation of SCRS.

Objectives, Scope, and Methodology

Consistent with the Oversight Subcommittee's request, our objectives were to (1) evaluate IRS' management of SCRS' acquisition and implementation and (2) identify the changes IRS has made to its system for managing ADP projects since SCRS. We did not attempt, as part of this review, to assess the propriety of IRS' contract award or IRS' post-award administration of that contract. Rather, our intent was to provide an historical assessment of SCRS and to identify steps IRS has taken since SCRS to avoid problems on future system acquisitions. In that regard, appendix II lists IRS information systems that are proposed or under development that will require major ADP acquisitions in fiscal year 1987 and beyond.

This report is based on information that was obtained from IRS' National Office and from each of IRS' 10 service centers either as part of this review or as part of prior GAO assessments of SCRS-related problems at IRS' service centers (see app. I).

To evaluate IRS' management of SCRS, we (1) interviewed IRS officials and analyzed pertinent documents and statistical information relating to the acquisition and implementation of SCRS; (2) talked to representatives from the Office of the Assistant Commissioner for Computer Services about the use of quality assurance techniques, including acceptability testing, during the software conversion phase of SCRS and reviewed relevant documentation and studies; and (3) reviewed analyses of the converted software by IRS' Computer Performance Evaluation Staff and talked to IRS officials about actions taken in response to those analyses.

To assess the changes IRS has made to its system for managing ADP projects since SCRS was implemented, we (1) reviewed reports issued in December 1985 and May 1986 by an IRS contractor on the results of a study of IRS' software development activities, (2) analyzed IRS' current ADP management procedures as described in the Internal Revenue Manual and other documents received from IRS, and (3) interviewed officials at IRS' National Office.

We conducted our review from August 1984 through November 1986 in accordance with generally accepted government auditing standards.

Comments From IRS

In commenting on a draft of this report (see app. IV), the Commissioner of Internal Revenue agreed with our "historical overview and findings" and noted that the report generally consolidates and reinforces the findings and recommendations of reviews conducted within IRS and by contractors. The Commissioner noted that "despite the serious problems

experienced during the final implementation phase of . . . [SCRS], the conversion is now complete and both hardware and software are working well." He noted also that IRS has implemented organizational changes necessary to "prevent similar problems with computer systems installations in the future." Some of these organizational changes are discussed in chapter 4.

We also obtained oral comments from Sperry (now known as UNISYS) on portions of this report. Those comments are discussed on page 18.

IRS' Acquisition of SCRS Was Hampered by Problems With the System Sizing Test and Unplanned Additions to System Work Load

IRS had originally contracted with Sperry to purchase 22 central processing units (CPU)[1] —2 at each service center and at NCC—to support processing requirements into 1987. Between the time the contract was awarded and November 1985, however, IRS had to install an additional 52 CPUs with peripheral equipment and software, bringing the total procurement to 74 processors and increasing equipment and maintenance costs from $102 million to about $170 million. Although some of those additional CPUs can probably be attributed to the fact that IRS had to estimate its needs several years before SCRS was actually implemented, others were needed because IRS had taken steps to increase the SCRS work load that were inconsistent with its system sizing assumptions.

IRS also encountered problems during the system sizing test that surfaced after the contract with Sperry had been awarded. Those problems, which called into question whether the system would meet IRS' needs, were resolved about 15 months after contract award.

SCRS Processing Work Load

To understand the SCRS capacity problem, the major segments of a service center's work load need to be recognized. In its February 1983 SCRS usage study, IRS' ADP Computer Performance Evaluation staff categorized service center processing on SCRS into IDRS processing, nightly batch processing, and weekend batch processing.

IDRS is a realtime tax account data retrieval and update system that supports nonpipeline processing activities including those of Collection, Taxpayer Service, Criminal Investigation, and Examination. Before SCRS, IDRS processing generally started at 6:00 a.m. and ended at 6:00 p.m. every Monday through Friday. However, for 1985, when SCRS was expected to be fully implemented, IRS planned to increase available IDRS processing time from 12 hours a day to 16.

Nightly batch processing is initiated after IDRS processing is completed each Monday through Friday and, except on Friday, is to be completed before IDRS processing starts the following morning. This batch processing consists primarily of processing tax return data and updating IDRS files. The processing of tax return data involves subjecting that data to

[1]A CPU is the heart of a computer system. It controls and directs all input and output devices, called peripheral equipment, performs arithmetic and data manipulation functions, and tests for various conditions during processing. Sperry 1100/80 series computer systems can have one to four CPUs.

various math and validity checks. IDRS files are updated with transactions made during the day by Collection, Examination, Taxpayer Service, and other users.

Weekend batch processing involves updating the IDRS accounts and files in preparation for the following week's activity. Weekend batch processing starts after Friday's nightly batch processing is finished and must be completed before IDRS processing starts on Monday morning. To provide service center and district office users with complete, timely, and accurate data for researching tax accounts and responding to taxpayer inquiries, the updated files and notices produced from weekend processing must be available on Monday morning.

Problems With the System Sizing Test Surfaced After Contract Award

Federal agency data processing managers are responsible for validating performance and cost before buying a computer system or service. One of the tools used for system validation is a benchmark, which involves testing a proposed system with computer programs and associated data tailored to represent a particular data processing work load. The benchmark allows an agency to model its current and projected data processing work load with some accuracy and helps vendors to determine the appropriate size computer system to propose.

IRS conducted a pre-contract award benchmark and relied on the results in determining that the Sperry system would meet its processing requirements. Certain facts came to IRS' attention after contract award, however, which indicated that the pre-award benchmark was unreliable. Those facts involved Sperry's use of a system software code that it later decided to discontinue supporting and its use of nonstandard system software. After Sperry revised the system to resolve those issues, IRS reran the benchmark and the system passed.

Benchmark Work Load Criteria Developed

To establish a work load for the SCRS benchmark, IRS technicians selected what they believed to be representative realtime and batch applications and converted them to COBOL. This process took about 9 months and cost about $2.1 million. IRS developed the simulated work load as follows:

- A baseline work load was developed using the average number of transactions for the three highest volume service centers (Fresno, Austin, and Ogden).
- Transaction volumes were projected to grow linearly at 8 percent a year.
- Realtime availability was projected to be 12 hours a day.

The Request for Proposals required that the benchmark work load, including application programs and data files, was to be processed within specified time constraints using a standard version of system software the competing vendors proposed. This process was to allow IRS to evaluate how well each proposed system would meet its processing requirements when using the same ground rules and work load.

Contract Awarded to Sperry After Benchmark

In March 1981, benchmarks were conducted at facilities of the two companies competing for the SCRS contract—Sperry and Vion Corporation. The tests were carried out by vendor personnel and observed by IRS representatives. After the systems being offered by Sperry and Vion passed the benchmarks, IRS evaluated the cost and technical merits of each system. In June 1981, on the basis of that evaluation, IRS awarded a contract for 11 Sperry 1100/82 systems[2] containing a total of 22 CPUs.

Problems Surfaced After Contract Award

After the first benchmark was completed and IRS had awarded the contract to Sperry, IRS learned from other Sperry customers that Sperry had decided to discontinue support of the system software code, called FIELDATA, that it had used to represent data within the computer during the SCRS benchmark. Sperry planned, instead, to begin using American Standard Code for Information Interchange (ASCII) for representing data within the computer. Sperry officials told us that Sperry was trying to comply with federal information processing standards and that standards were being worked on at the time that anticipated the use of ASCII.

IRS was concerned about the use of ASCII because any data representation method other than FIELDATA would essentially invalidate the results of the pre-award benchmark. In July 1981, IRS' Internal Audit Division estimated that using ASCII, which requires more system capacity than FIELDATA to process the same work load, might require a third more hardware at a cost of about $54 million—an estimate that Sperry officials told us was significantly overstated.

According to documentation obtained from IRS, Sperry's position was that by not converting from FIELDATA to ASCII, SCRS would not benefit from software upgrades and technology changes unless IRS paid for

[2]The last digit in the numeric system model designation represents the number of CPUs contained in the system configuration. For example, an 1100/82 contains two CPUs and an 1100/83 contains three.

them after 1983—when Sperry planned to change its system support to ASCII. After discussing the issue with Sperry's project manager, Internal Audit concluded that Sperry's interpretation of software maintenance requirements and responsibilities under the SCRS contract differed from IRS'. According to Internal Audit, Sperry believed that the contract required it to provide problem-solving support for the system software, which did not include upgrades and new technology changes, while IRS' position was that the contract required Sperry to provide all system upgrades and changes in systems software technology at no cost.

To resolve the contractual dispute, IRS and Sperry entered into a Memorandum of Understanding on January 27, 1982. The Memorandum clarified IRS' contractual rights to receive state-of-the-art software improvements and associated support. IRS agreed to implement SCRS using ASCII; Sperry agreed to rerun the benchmark by the end of June 1982 using ASCII and, if required as a result of the benchmark, to provide additional hardware at no cost to IRS.

Before rerunning the benchmark, IRS discovered Sperry had used nonstandard system software during the initial benchmark, which, according to IRS documentation ". . . had not been identified to the IRS and had not been proposed for the contract." According to IRS, the nonstandard software was "tailor-made to fit the specific set of data" supplied by IRS for the benchmark and would have been impossible to use in a production environment. IRS subsequently notified Sperry that it would not accept Sperry's nonstandard software.

While the benchmark was being rerun between June 21 and July 1, 1982, IRS discovered additional nonstandard software which had not been identified by Sperry. IRS informed Sperry that the nonstandard software would not be allowed, but that the benchmark could be continued for demonstrations that were not affected by the nonstandard software.

According to an analysis made by IRS hardware and software technicians, the Sperry 1100/82 system failed the benchmark. On July 1, 1982, IRS notified Sperry that all contract deliveries were being discontinued. According to IRS' notification letter, the discontinuance, which IRS later referred to as a moratorium, would remain in effect until all contract deficiencies were resolved.

As a result of the difficulties with the June 1982 benchmark, Sperry agreed to conduct another benchmark using standard software. According to IRS officials involved in this benchmark, which was conducted in August 1982, the Sperry 1100/82 system passed the test with some modifications to the software. However, in order to satisfy several unresolved contractual issues, Sperry agreed to make additional modifications to the system software and to accelerate installation of a third CPU in each service center. Also, in accordance with the January 1982 Memorandum of Understanding, Sperry agreed to provide IRS additional ADP equipment, valued at $10 to $12 million, at no additional cost to the government. According to IRS, all contractual problems were eventually resolved and the moratorium was lifted in September 1982.

In March 1983, IRS had a third CPU installed at the Cincinnati Service Center. Another benchmark was then conducted to ensure that the projected work load for 1987 could be run on the upgraded system. Sperry passed that benchmark.

According to IRS officials we interviewed who were involved in resolution of the benchmarking problems and correspondence between the Commissioner of Internal Revenue and the Secretary of the Treasury, IRS considered terminating the contract for default. However, IRS believed that it needed to move ahead with its modernization plans, particularly the software conversion. Terminating the contract would have caused a significant delay in IRS' plans because a recompetition of SCRS would have had to take place. Rather than terminate the contract, IRS chose to resolve the problems with the Sperry system.

Comments From Sperry

We sent excerpts from a draft of this report to Sperry (now known as UNISYS) on May 22, 1987. The excerpts were those parts of chapters 1 and 2 that discussed Sperry's involvement with SCRS, specifically the benchmarking process. UNISYS officials provided oral comments at a meeting on July 10, 1987. Although they generally agreed with the facts in those excerpts, the officials had several comments directed at the way those facts were cast. Changes have been made to this report to reflect those comments.

In making their comments, the UNISYS officials emphasized two points:

- Whatever problems arose during the benchmarking process were resolved, and Sperry, in furtherance of that end, implemented IRS' recommended approach to resolution.

- The benchmarking process had nothing to do with the processing problems IRS experienced in 1985. Those problems, as discussed later in this report, were due to such factors as unplanned increases to the SCRS work load and computer programs that were written inefficiently by IRS staff.

Unplanned Additions to the SCRS Work Load After Acquisition Began

After the SCRS feasibility study was completed and the acquisition was underway, IRS initiated actions that were inconsistent with the sizing assumptions in that study. Virtually every functional area in IRS was provided additional support in the form of unplanned system enhancements and new applications.

As early as July 1981, IRS officials responsible for initial SCRS planning anticipated problems meeting service center processing requirements. Various IRS studies of service center processing needs consistently warned of a shortage of capacity on the new computers. In each case, unplanned additions to the SCRS work load were cited as major reasons for that shortage. Those concerns were realized in 1985 when service center returns processing was adversely affected by insufficient computer capacity.

SCRS Was Intended to Be a Replacement System

Among others, the House Committee on Government Operations, the Office of Management and Budget (OMB), and the Department of the Treasury were involved in discussions that preceded the decision to acquire SCRS. Documentation of those discussions shows an intent to upgrade the service center computer systems while ensuring that work load increases did not outpace available computer capacity. In a May 2, 1978, letter to Treasury, for example, the Chairman of the House Committee on Government Operations noted that "care must be taken to avoid incorporating into such system new tasks and processes which have not been reviewed and authorized by Congress."

In a June 9, 1978, letter to Treasury, OMB enclosed a Memorandum of Understanding between OMB and IRS on IRS' Long Range Computer Modernization Plan, which was to address IRS' ADP needs through the end of the century. The Memorandum stipulated that IRS, in its annual budget presentation to OMB, would identify any "substantive new computer applications it plans to add in the coming year." Substantive applications were defined as any ADP-related item that was submitted to IRS' ADP Policy/Resource Board for approval. The Memorandum went on to note that "...the final decision on new applications will continue to rest with the Commissioner of Internal Revenue" but that OMB reserved the option

"not to recommend funding for these new applications, or the additional computer capacity which these applications may require."

Consistent with the above, IRS' 1979 SCRS feasibility study provided that SCRS would be a "rollover" system with an allowance for an annual 2 to 3 percent growth in the volume of returns filed plus an annual 5 to 6 percent growth for unforeseen mandated new functions or functions that proved to be cost beneficial. The feasibility study made reference to the following assumptions that were used in developing the SCRS plan:

1. IRS would continue to provide, at a minimum, the same level of service to users and taxpayers that currently existed.

2. SCRS would have a life of at least 15 years with the equipment vendor providing upwardly compatible equipment/systems software for the system's life.

3. All applications software on SCRS would be written in a high-level language.

4. The replacement system would be a rollover of the existing system. That is:

- No new functions, applications, or data files would be added.
- No new data elements would be added to existing files.
- Existing files could be consolidated, eliminated, or reformatted.
- Existing applications could be redesigned, but not from a batch system to a realtime system.

Finally, the expectation that SCRS was to be a replacement system was communicated to all assistant commissioners and regional commissioners in an August 1980 memorandum from IRS' Assistant Commissioner for Data Services. The memorandum noted:

"While securing Treasury Department and OMB approvals, the Service was mandated and the Service agreed, to proceed with an equipment replacement program only, and not an enhancement to our current systems."

New Applications and Enhancements Added to SCRS

Although SCRS was intended to be a replacement system, IRS added several new applications and enhancements to the system before the 1985 returns filing season (see app. III). Collectively, the additions and enhancements affected all aspects of service center processing. For example:

- Nightly batch processing was affected by a redesign of the various applications that had supported pipeline processing. The new application that resulted from the redesign became one of the largest in IRS—processing hundreds of thousands of transactions per day during peak processing periods.
- Daily IDRS processing was affected, among other things, by a new application that provided an on-line system for correcting errors made by taxpayers on their returns and made by IRS while processing the returns.

According to IRS records, many of the new applications and enhancements were approved after the start of the benchmarking process. Several of those applications and enhancements were approved by the ADP Policy/Resource Board while others were approved by the Deputy Commissioner, the Assistant Commissioner for Data Processing, and the Director of the Software Division.[3] IRS documentation, including an August 1984 report on the SCRS capacity problem, noted that many enhancements were added to SCRS in consideration of the Administration's strong emphasis on cost beneficial automation. We asked IRS whether these changes to the SCRS workload had been reviewed and authorized by Congress as had been suggested by the Chairman of the House Committee on Government Operations. IRS officials indicated that Congress' oversight needs had been met by information IRS had provided in response to questions raised during Senate appropriations hearings in March 1983—after the new applications and enhancements had been added.

During the 1983 Senate appropriations hearings, the Commissioner noted that the decision to make the subject changes was made "on the basis that the conversion [to SCRS] would not be adversely affected by them." However, the additions and enhancements were being approved at a time when things were happening during the benchmarking process that called into question the sufficiency of SCRS' capacity to handle existing work load. As an indication of the potential impact on SCRS capacity from the changes to that work load, one IRS projection noted

[3]In March 1986, the Division's name was changed from the Software Division to the Tax Processing Systems Division. We will be referring to it as the Software Division throughout this report.

that the new applications and enhancements would probably require at least 150 percent more CPU power than planned and that the new error correction system, in and of itself, would require an additional CPU.

Extension of Realtime Availability

Another step IRS took after SCRS was sized was to extend IDRS processing from 12 hours a day to 16. As noted by the Commissioner of Internal Revenue in response to a question raised during Senate appropriations hearings:

"The commitment to 16 hour daily real time processing was made after SCRS sizing and has had a net negative effect on batch processing."

That effect was discussed in a July 1981 memorandum from the SDO Director to the Assistant Commissioner for Data Services.

"All system sizing and Transition Plan documentation has used a 12-hour IDRS real time period as a basic assumption since the sizing process was started in 1979. A commitment to 16 hour availability is in conflict with this assumption. . . . In short, we believe that such a change in the basic SCRS assumptions will have serious consequences on our ability to timely process IDRS batch work on the system we bought and to use important protection mechanisms built into the SCRS contract."

Impact of Capacity Problems Realized in 1985

In July 1982, as new applications were being developed for SCRS, the Director of the Software Division expressed concern regarding the capacity of the Sperry Univac 1100/82 systems to process the SCRS work load. The Director of the Hardware Division agreed with this concern, and the ADP Computer Performance Evaluation (CPE) staff within that Division initiated a study to determine whether adequate computer equipment would be in place to support nightly batch processing applications when SCRS became operational. According to its February 1983 study report, the staff decided to review nightly batch processing because it felt that part of the SCRS workload would "determine the maximum CPU resources required" for the total system.

In its study report, the CPE staff projected that processing of the peak nightly batch work load would require 90 percent of available CPU time provided by a Sperry 1100/82 system or, in practical terms, the system would be saturated by April 1984. According to the CPE study, when SCRS became fully operational in January 1985, the work load at all service centers would require "twice the available CPU capacity provided by a four-processor system." Among other things, the study attributed

the projected capacity problem to the introduction of new, unplanned applications and to a decrease in the number of hours available to process the nightly batch work load as a result of the decision to increase IDRS processing time from 12 to 16 hours.

In an August 1984 analysis of SCRS capacity, IRS projected that, beginning in October 1984, none of the service centers would be able to complete weekend batch processing in 2 days and that work load increases in January 1985 would further aggravate the situation. IRS estimated that the highest volume service centers would need 3 to 4 days to perform batch processing scheduled for weekends.

IRS' analysis attributed the SCRS capacity problem to the following factors:

- SCRS was tightly sized and left virtually no margin for additions, significant changes, or errors.
- Enhancements, additions, and redesigns compromised the initial work load projections and sizing requirements.[4]
- The transition to COBOL and a new data base management system[5] generated unforeseen operating inefficiencies.

In late 1984, IRS began to encounter the kinds of problems that had been predicted. Because we have already discussed those problems in other reports and testimonies, the following discussion is intended only as a summary.

After the IDRS applications were implemented in October 1984, the first weekend update at the Fresno Service Center was not completed until Thursday of the following week. Other service centers experienced a similar problem, although not as severe. When weekend processing extended into the work week, IDRS users were idled and nightly batch processing could not be accomplished. As a result, tax accounts involving correspondence with taxpayers and requiring adjustments could not be researched or resolved and inventories began to increase. Although

[4]In commenting on a draft of this report, representatives from the Office of IRS' Assistant Commissioner for Computer Services contended, contrary to the February 1983 study report and August 1984 analysis, that new applications and enhancements were not a major contributor to capacity problems. As they explained, ". . . the impact on weekend processing was computed to be approximately 7% additional CPU. Since weekend CPU sized the system, the impact can be categorized as minor."

[5]A data base management system is software that handles the organizing, cataloging, locating, storing, retrieving, and maintaining of data in a data base.

the situation improved before the 1985 filing season began, weekend updates, which were supposed to be completed by 6:00 Monday morning, continued to be untimely during the first 5 months of 1985, as shown in table 2.1.

Table 2.1: Weekend Update Completion Times During First 21 Weeks of 1985

	Number of Weeks Weekend Update Completed			
Service Center	By 6:00 a.m. Monday	Between 6:00 a.m. & 12 noon Monday	Between 12 noon & 4:00 p.m. Monday	After 4:00 p.m. Monday
Andover	18	2	1	0
Atlanta	5	6	2	8
Austin	8	5	1	7
Brookhaven	4	5	0	12
Cincinnati	20	0	0	1
Fresno	1	2	0	18
Kansas City	8	2	2	9
Memphis	11	5	2	3
Ogden	5	5	4	7
Philadelphia	6	5	0	10

As noted earlier, IRS' goal was to make IDRS available to users for 16 hours a day during 1985. From mid-February through May 1985, however, most service centers provided less than 12 hours of daily IDRS availability. Mondays were particularly difficult. For example, on Mondays during this period, the Fresno Service Center averaged less than 2 hours of IDRS availability. After the returns filing season ended, IDRS availability improved, with the 10 service centers averaging about 15 hours a day of IDRS processing from June through August 1985.

Extended processing times and the unavailability of IDRS to its users contributed to inventory levels that IRS considered unmanageable. By the end of August 1985, for example, the 10 service centers had about 1.5 million cases in their adjustments/correspondence inventories compared to about 0.9 million cases at that time in 1984.

Delays in processing tax returns in 1985 resulted in extra interest payments to taxpayers. By early November 1985, IRS had issued taxpayers about 48 percent more refunds with interest than had been issued at the same time in 1984, even though the total number of refunds for these periods was about the same. The increase in the number of refunds with

interest was accompanied by a 56-percent increase in interest payments, from $27.3 million in 1984 to $42.8 million in 1985.

In discussing increased interest payments that result from later refund payments, it is important to recognize that earlier refund payments also cost the government money because the Department of the Treasury must either borrow funds earlier to cover the payment or withdraw funds earlier from an interest-bearing account. We do not know what amount of additional costs the government would have incurred if the 1985 refunds had been paid earlier but we have reported in the past that:

"Although it incurs costs when paying refunds earlier, the government still achieves a net savings [because] interest rates earned or paid by the federal government to acquire funds are normally lower than the rate that is paid to taxpayers."[6]

IRS Bought Additional Computer Equipment to Meet Its Capacity Needs

IRS took various steps to deal with the capacity problems experienced in 1985. As we will be discussing in chapter 3, some of those steps were directed at improving the software that had been rewritten as part of the SCRS project. Other steps, as discussed below, involved the procurement of additional Sperry 1100/80 CPUs.

Additional CPUs Procured Under SCRS Contract

Under the original terms of the SCRS contract, 22 Sperry CPUs, along with tape and disk subsystems, were installed between March 1982 and March 1983 at NCC and the 10 service centers. IRS initially expected these systems to support service center processing requirements for several years. The contract also included, as an option, the installation of a third CPU at each location—an option that IRS originally did not expect to exercise until 1987, if at all. As discussed earlier, however, IRS and Sperry decided, during the benchmarking process, to accelerate installation of those CPUs. As a result, a third CPU was installed at each of the 10 centers and at NCC from March 1983 through June 1984.

From June 1984 to January 1985, IRS procured and installed a fourth CPU at each service center and at NCC to provide the capacity needed to get through 1985. That upgrade was not contemplated in the original contract; it was provided through a contract modification. Finally, again through modifications to the SCRS contract, IRS procured and installed a

[6]Tax Policy: Options for Speeding Tax Refunds and Reducing IRS' Interest Costs (GAO/GGD-86-72, July 28, 1986).

fifth and sixth CPU at NCC and at each of its four highest volume service centers—Fresno, Austin, Ogden, and Atlanta—between November 1984 and February 1985 and at the Brookhaven Service Center in July 1985.

More CPUs Procured as Part of the Service Center Upgrade of Mainframe Processing Systems (SCUMPS) Project

In August 1984, IRS began planning to replace all of the Sperry 1100/80 systems through a project known as the Service Center Upgrade of Mainframe Processing Systems (SCUMPS). According to IRS' August 1984 analysis of SCRS capacity, a critical problem could be expected in 1987 for which "... the only solution is a replacement of SCRS equipment." As a result, IRS initiated SCUMPS, which was initially planned to be a $223 million three-phase program.

In its January 1985 request for ADP equipment or services related to SCUMPS, IRS proposed

- a sole source procurement of Sperry 1100/92 systems for 1986 and 1987 to replace the Sperry 1100/80 systems,
- a competitive acquisition of needed disk and tape subsystems, and
- a competitive procurement to upgrade the Sperry 1100/92 systems and support fiscal years 1988-1991 processing.

To meet 1987 processing needs, a Sperry 1100/92 system for IRS programmers to use for testing had to be acquired and installed at NCC by August 1985 and operational systems had to be installed at all service centers by December 1986. On April 1, 1985, IRS requested that Sperry provide a proposal for delivering, installing, and maintaining hardware components and software to replace the present Sperry 1100/80 systems with 1100/92 systems. At that time, IRS believed the Sperry 1100/92 system, the latest addition to Sperry's computer line, was technically superior to the Sperry 1100/80 systems and would provide IRS more processing capacity. Subsequently, in an April 25, 1985, letter to Sperry, IRS cancelled its solicitation request to ensure that both Sperry and IRS had "... a clear understanding of each other's needs from both a technical and a contractual standpoint." However, IRS advised Sperry that a complete solicitation package including all "boiler-plate" language would be released in the near future.

Because we interpreted IRS' April 25, 1985, letter to mean that IRS intended to proceed with SCUMPS, we met with the Associate Commissioner for Data Processing and other IRS officials on May 13, 1985, to discuss our concerns that

- the SCUMPS requirements analysis appeared to be based on faulty assumptions,
- implementation milestones appeared to be unattainable,
- technical issues about the capabilities of the new equipment and its system software had not been resolved,
- alternative solutions had not been adequately developed and considered, and
- the overall program might be highly vulnerable to future bid protest actions.

The Associate Commissioner told us that IRS had decided to discontinue the acquisition and would notify Sperry of this action.

Instead of the original SCUMPS project, IRS initiated a revised SCUMPS project in May 1985. Under the revised project, IRS procured 18 additional Sperry 1100/80 CPUs that were planned to meet its work load needs through 1988. The additional 1100/80 CPUs were procured on the basis that they were the only systems available that could be installed and ready for use by the 1986 filing season without some software conversion. The 18 CPUs were installed by November 1985.

Under the SCRS and SCUMPS contracts, IRS procured a total of 74 Sperry CPUs at a total estimated equipment and maintenance cost of $170.2 million. Table 2.2 shows the number of CPUs at each service center and NCC as IRS began the 1986 returns filing season.

Table 2.2: Number of Sperry 1100/80 Computer Processors Installed by Date and Location

Service Centers and NCC	Basic SCRS contract	SCRS contract option	SCRS contract modifications			SCUMPS contract	Total Processors
	March 1982 through March 1983	March 1983 through June 1984	June 1984 through January 1985	November 1984 through February 1985	July 1985	September 1985 through November 1985	
Andover	2	1	1	•	•	2	**6**
Atlanta	2	1	1	2	•	1	**7**
Austin	2	1	1	2	•	2	**8**
Brookhaven	2	1	1	•	2	1	**7**
Cincinnati	2	1	1	•	•	2	**6**
Fresno	2	1	1	2	•	2	**8**
Kansas City	2	1	1	•	•	2	**6**
Memphis	2	1	1	•	•	2	**6**
Ogden	2	1	1	2	•	2	**8**
Philadelphia	2	1	1	•	•	2	**6**
NCC	2	1	1	2	•	•	**6**
Total Processors	**22**	**11**	**11**	**10**	**2**	**18**	**74**

Problems With SCRS Software Could Have Been Avoided With Better Quality Assurance

The SCRS project entailed two major phases. The first, as discussed in chapter 2, involved acquisition of new equipment through a contract with Sperry. The second, as discussed in this chapter, involved an in-house conversion or rewriting of computer programs from assembly languages to COBOL. The conversion involved about 1,500 computer programs that supported about 50 major applications. Although these applications were "rolled over" from the old service center computer systems to the Sperry 1100/80 systems, some of the applications were enhanced or redesigned. IRS also developed new applications to operate on the Sperry systems. The conversion, including enhancements and new developments, was planned and carried out by IRS staff between 1980 and 1985 at a cost of about $29 million.

IRS completed the software conversion by January 1985, as planned. However, some of the converted programs were inefficient, which contributed to the SCRS capacity problem discussed in chapter 2. Other converted programs did not satisfy processing requirements, which adversely affected IRS' ability to do its job. Those problems could have been avoided, in our opinion, if IRS had exercised better quality assurance during the conversion process.

IRS has modified some of the computer programs developed during SCRS to increase their operating efficiency and help free up computer capacity. Also, steps have been and are being taken to enhance the quality of future software-related projects. For example, IRS hired a private contractor to study its software development activities and is revising its quality assurance procedures.

One important form of quality assurance involves the testing of programs before they are put into operation. Because the most significant quality assurance-related problem we identified during our review involved inadequate testing, we plan to initiate a separate review of IRS' testing procedures to determine whether IRS has sufficiently tightened those procedures since SCRS.

Besides working to improve its quality controls, IRS has taken steps to improve its organizational controls so as to provide better management of and accountability for an ADP project. Because those improvements affect all phases of an ADP project, not just software development, they are discussed separately in chapter 4.

Planning and Implementation of Software Conversion

Software conversion involves transforming computer programs or data, without changing their functions, to permit their use on a replacement or modified ADP system.[1] Conversion can be complicated, requiring careful planning and implementation. Planning includes inventorying existing software, assigning responsibilities and establishing milestones for the conversion process, selecting tools to automate the process, and defining standards for the converted programs and files. Data files and transactions also need to be prepared and validated for testing the accuracy and reliability of the converted programs.

SDO played a key role in the initial planning for the SCRS software conversion. Before the conversion began, for example, SDO completed two studies of computer languages. In June 1978, SDO completed a study that compared assembly language to PL/1 language, a language developed for IBM computers. The primary purpose of the study was to determine the ramifications of converting to a high-level language at NCC. In January 1980, SDO completed another study comparing assembly language to COBOL. From that study, IRS decided to adopt COBOL as SCRS' programming language.

The conversion objectives were to (1) adopt a standard programming language that was easier to maintain and could be more easily transported to another computer system and (2) streamline aspects of IRS' computer processing. These objectives were intended to help IRS retain and hire programmers by using a more widely accepted programming language and to provide for more competition in future ADP acquisitions. Because COBOL would not be dependent on a particular manufacturer's computer hardware, an incumbent vendor's competitive advantage would be minimized.

SDO also prepared an SCRS transition plan in February 1980, which identified, explained, and assigned responsibilities for the various planning tasks. Among other things, the transition plan contained a timetable of events, which included dates for (1) training programmers; (2) analyzing, designing, and writing programs; (3) testing programs before they were fully implemented; and (4) implementing the programs. The plan originally established October 1984 as the date for completing the conversion and moving all processing to SCRS. The completion date was later revised to January 1985.

[1]Conversion of Federal ADP Systems: A Tutorial, August 1980, National Bureau of Standards, U.S. Department of Commerce.

SCRS software was converted in four phases starting in 1980. The phases were completed in August 1983, January 1984, October 1984, and January 1985 respectively. The software was converted by IRS' Software Division, which continued to support and maintain the assembly language programs while it carried out the conversion. Besides SDO, several other Computer Service organizations—the ADP Standards Branch, the CPE staff, and the Systems Testing Branch—played a role in the conversion. The ADP Standards Branch established and provided standards and guidelines for software conversion, including quality assurance practices for efficient and effective software development. The CPE staff evaluated SCRS capacity requirements and analyzed software efficiency. The Systems Testing Branch tested the converted computer programs to ensure that they satisfied processing requirements.

Software Inefficiencies Contributed to SCRS Capacity Problem

Before software conversion began, IRS knew the move to COBOL would require more computer capacity than was required using assembly languages. The language study completed by SDO in January 1980 estimated the ratio of COBOL to assembly language processing time to be 3.7 to 1. In addition, file sizes were expected to increase by about 60 percent. Because processing times and file sizes affect computer capacity, IRS concluded that the COBOL programs would need nearly four times as much capacity as the assembly language programs to process the same work load.

Some computer programs did not operate efficiently after they were converted to COBOL, however, and thus required even more capacity than expected. Those operating inefficiencies affected two major segments of SCRS work load—nightly batch processing and weekend processing—and contributed to the SCRS capacity problem.

Nightly Batch Processing

An August 1983 study of a major nightly batch processing application, conducted by members of the Software Division and the CPE staff, concluded that computer resources required by the COBOL programs associated with that application turned out to be much higher than expected. According to Software Division officials who participated in the study, some programs required 5 to 10 times more processing time in COBOL than in assembly language. The study group concluded that capacity requirements had been underestimated because

- certain aspects of the application were unusually inefficient on the Sperry 1100/80 systems; and

- computer programs were being modified as they were converted to COBOL, which introduced some processing inefficiencies into the programs.

Another factor affecting the efficiency of nightly batch processing was the fact that some programs were designed without a checkpoint/restart capability. A checkpoint/restart capability allows a program to restart from the point where it stopped instead of having to rerun the program from the beginning. This capability is important in large programs that are subject to problems that may stop processing. Absent such a capability, lengthy reruns are required, which use up computer capacity that would otherwise be available to process other applications.

Weekend Processing

Weekend processing capacity requirements were also adversely affected by inefficient computer programs. Weekend processing involves updating the IDRS data base with transactions from master file processing that occurred during the week. The critical aspect of Phase III of the conversion involved moving IDRS processing onto SCRS. This included 38 computer programs used to update and analyze the data base files which support IDRS. The updated files provide users with accurate taxpayer account information when their work week begins on Monday morning.

Before Phase III was completed, IRS anticipated a weekend capacity problem. Using processing times from Phase III programs that had been converted by early 1984, the CPE staff predicted IRS service centers would not be able to accomplish weekend processing requirements when Phase III was fully implemented. In January 1984, IRS formed a task force to address the problem. The task force identified computer programs that required the most processing time and modified the way the programs were written to reduce their processing times or capacity requirements. When the modification effort began, the largest program required almost 24 percent of the total weekend processing time. As of July 1984, the task force had modified the program and reduced its processing time by about 70 percent. The second largest program was also modified and required about 50 percent less processing time. By the end of 1984, the task force had reduced weekend processing time by 68 percent. This effort to reduce processing times provided IRS with additional computer capacity during 1985.

Insufficient Quality Assurance During the Conversion Process Contributed to Software Inefficiencies

Our review identified quality assurance-related problems that contributed to the inefficiencies in converted SCRS software. Tools available to software development personnel to help promote quality were not used, and programs were put into production before they were adequately tested.

According to several IRS officials, one reason for the insufficient attention to quality assurance was an emphasis on meeting milestones. One Computer Services branch chief told us, for example, that

"... as long as people think there is a hardware solution to a system problem, people will not get overly concerned about developing efficient programs."

Another Computer Services branch chief said that as long as meeting deadlines is the basis for measuring and rating managers' performance, quality assurance techniques will not be emphasized. Our review identified several reasons for IRS' emphasis on milestones. First, users wanted the project completed as quickly as possible so that work could begin on a large backlog of requests for new developments and modifications that had been held up due to saturation on IRS' older computer systems. Second, IRS managers wanted to minimize the period of time during which software personnel would have to divide their time between maintaining the assembly language programs and converting those programs to COBOL. Finally, IRS had committed to removing the Control Data Corporation 3500 computer system that supported IDRS by the end of October 1984, when the maintenance contract expired.

Quality Assurance Tools Not Used

As noted in the Internal Revenue Manual, studies indicate that it is substantially less expensive to correct errors early in the analysis and design phases of software development projects than it is to correct them after a system is operational. Various quality assurance tools are available to help software development personnel identify errors so that they can be corrected in a timely manner.

One available tool is the walkthrough—a group of experienced people reviewing design and program code[2] at various stages in the conversion. Walkthroughs help avoid wasted time and lost productivity by uncovering design and coding errors early.

[2]Program code is used to write computer programs. It consists of statements or instructions that tell a computer what functions to perform.

According to IRS, walkthroughs are an important educational tool for less experienced personnel. This would seem especially relevant to the SCRS software conversion because the use of COBOL was new to many of IRS' programmers. Nevertheless, in mid-1984, officials assigned to the Standards Branch and to a Software Division branch responsible for converting IDRS applications told us that walkthroughs were not being conducted during the design and programming phases of the conversion process because they took additional time and made meeting deadlines more difficult.

In February 1985, IRS emphasized the value of walkthroughs, as well as other forms of quality assurance, through issuance of a Quality Assurance Activities Handbook. That handbook noted, in part, that

> ". . . the walkthrough ensures adherence to established standards and provides the less experienced personnel with the opportunity to learn first-hand from the more experienced. But most significantly, it is consistently the most effective way known to improve the quality of computer software."

Quality can also be promoted through the use of computer programs that automate some of the tasks involved in writing and testing computer programs. Among the automated tools available are a

- COBOL Instrumentation Package, which provides statistics on CPU usage by the program and can be used to identify bottlenecks within a program and improve its efficiency;
- Structured Code Analyzer, which analyzes COBOL programs to detect occurrences of unstructured or nonstandard code; and
- Federal Information Processing Standards Flagger, which identifies aspects of computer programs that do not adhere to Federal Standard COBOL.

IRS made limited use of these automated tools during the SCRS conversion. Software Division officials responsible for converting Phase III and IV applications said that automated tools were not used. One branch manager said that he was not aware that tools were available to help produce efficient software. Another official noted that there was not enough time to use automated tools, and another official told us he was under the impression that it would take a software expert to use these tools.

In May 1985, after the SCRS software had been converted and put into operation, IRS issued a Testing Guidelines Handbook. That handbook is

". . . intended to provide software development personnel with techniques and procedures necessary to deliver a quality product" and includes information on certain automated tools.

Programs Implemented Before Testing

Ideally, computer programs are tested, and problems resolved, before they are put into production. The purpose of that testing, known as Systems Acceptability Testing (SAT), is to ensure that a program satisfies processing requirements. Many converted SCRS programs were put into operation, however, before IRS' Systems Testing Branch had completed testing them and before problems that had already been identified by testing had been resolved. Our review of the SCRS transition plan and SAT plans for various phases of SCRS indicated that IRS planned to fully test programs before implementation. A review of numerous SAT status reports showed, however, that testing fell behind schedule for various reasons, such as problems with the programs themselves, delays in receiving programs and/or program updates or corrections, and unavailability of computer time and/or testing personnel due to hardware problems and the need to divert resources to higher priority service center work.

As early as May 1983 and throughout 1984, SAT managers and system users voiced their concerns to Software Division managers about the lack of testing. However, the Assistant Commissioner for Computer Services, with the advice of Software Division managers, decided to put numerous computer programs into operation before they were tested to meet the implementation schedule. According to Software and Hardware Division managers, placing programs into production regardless of testing status was not a written policy but an accepted practice within IRS.

Inadequate testing led to operational problems with numerous computer programs that support major IRS functions, such as auditing and processing returns. It also precluded the timely identification and correction of program design weaknesses, such as the absence of checkpoint/restart capabilities, that adversely affected computer capacity.

Testing Problems Associated With Phase II of the Software Conversion

A major aspect of Phase II involved the conversion of programs that support various management information systems, chief among which is the Audit Information Management System (AIMS). IRS relies on AIMS in managing and monitoring its examination work load and in measuring and reporting progress against the annual examination plan.

Through periodic briefings of IRS management at the Assistant Commissioner level from May 1983 through January 1984, Examination representatives voiced their concerns about the testing associated with conversion of the AIMS programs. In a June 16, 1983, briefing, for example, Examination representatives stated that:

"The Systems Acceptability Testing (SAT) is not proceeding as scheduled. A number of AIMS batch programs have not been transmitted to SAT for testing. Many of the AIMS realtime and AIMS batch programs that have been transmitted have errors that result in incorrect and/or incomplete output. Testing of the AIMS reports programs has not begun because, until this week, the output from an AIMS batch program used as input into the reports program could not be generated. According to SAT, the testing of monthly and other periodic processing will not be completed timely. SAT has also stated that their quality of work is eroding because they will probably be forced to test with less than all their prepared input and the anticipated results for the reports will be unusable.

"Using the information we have received from SAT, it is highly probable that a number of programs scheduled for October implementation will be transmitted for production without being thoroughly tested by SAT.

"Based on our past experience with Data Services, we find that programs that are transmitted to the field for production without being completely tested by SAT produce numerous errors and incomplete or inaccurate reports."

In a December 1983 briefing paper, Examination representatives noted that:

"The SCRS Phase II SAT testing effort was discontinued on December 23, 1983. Continuation of SAT testing is no longer effective because program changes have been directly transmitted to Fresno rather than SAT . . .

"SAT estimates that the current completion of testing is as follows:

Realtime 90%
AIMS Daily Processing 50%
Weekly Processing 40%
Weekly Reports Processing 80%
Monthly Reports Processing 50%"

Despite the testing status and concerns raised by Examination, IRS proceeded to implement AIMS in January 1984. Problems began upon implementation and continued during 1985. Among the more significant problems:

- AIMS management reports were not reliable and could not be used to monitor work-in-progress and accomplishments.
- Closed cases were reappearing as open cases.
- Service centers had to manually review cases monthly to effectively monitor cases involving the statute of limitations.
- Duplicate cases were appearing in AIMS files at different service centers.
- IRS' master files at NCC and AIMS files in the service center did not agree.

A task force convened in June 1984 at the direction of the Deputy Commissioner identified 16 major problem areas with Phase II computer programs. Task force representatives told us, however, that Computer Services began implementing Phase III and assigned a low priority to resolving Phase II problems, with the exception of the Inventory Validation Listing project. This project attempted to improve the reliability of AIMS case files by matching the NCC master files with all AIMS inventory cases in the service centers. The matching project identified about 460,000 accounts with data mismatches.

After IRS fully implemented SCRS in January 1985, Examination was still experiencing problems with AIMS. For example, Central Region and Cincinnati District officials said they were still experiencing problems with command codes used to access cases and establish or close cases on the AIMS data base. In addition, AIMS management reports were not always accurate. One IRS official stated that only AIMS data for May and June 1985 was accurate; cumulative data was inaccurate.

Phase III and IV Programs Not Fully Tested

Unlike Phase II computer programs, which primarily support in-house functions such as AIMS, Phase III and IV programs produce products that more directly affect the public. Phase III programs, for example, automatically issue notices (such as delinquency notices), change taxpayer account information, and credit payments to taxpayers' accounts on IDRS. Phase IV programs support tax return processing.

Phase III programs were not fully tested before being put in operation. An SAT report stated, for example, that:

"A meeting with the Software Division representatives took place on July 13 [1984] to discuss the schedule to begin the phase III pilot. We expressed our opinion that there is a significant short-fall in the SAT due to missing data and unverified corrections. In addition, compatibility with the NCC master file runs needs more testing . . . Nevertheless, all members of the involved . . . branches were unanimous in the decision to start the pilot in [the Memphis Service Center] at the end of July."

IRS proceeded with the Phase III pilot test and fully implemented Phase III in October 1984.

IRS also began the 1985 filing season without fully testing Phase IV computer programs. For example, February 1985 SAT status reports stated that several nightly batch processing programs had not been tested. The untested programs included ones that were designed without critical checkpoint/restart capabilities. Adequate testing might have identified this problem.

Contractor Study Identified Need for Improved Quality Assurance in IRS' Software Development Process

In 1985, IRS contracted for a study of IRS' software development activities. The scope of the study included a review of IRS' programmer training; software standards, guidelines, and procedures; software development procedures, including SAT; and quality assurance activities. The results of the study were based primarily on interviews with managers and staff throughout Computer Services.

The December 1985 study report noted that there was little enforcement of IRS' ADP software standards and guidelines and that software testing was not thorough. The report concluded that software development was "time driven rather than quality assurance driven."

In addition, the report noted that IRS' organizational environment did not foster product quality and that the day-to-day "crisis management" atmosphere created a high level of inefficiency. Specifically the report pointed out that:

> "The fragmentation of Standards, SAT, and Quality Assurance into separate powerless units rather than a cohesive organization with enforcement responsibility has only added to the problems."

The contractor recommended that quality be assured throughout the software development process by

- reviewing, enforcing, and supporting standards and procedures within the branches;
- conducting peer reviews consisting of walkthroughs after the design, coding, and testing stages of development; and
- verifying that testing has been performed prior to putting the computer programs into operation.

The contractor also recommended that IRS acquire additional automated tools to help improve software development.

On May 8, 1986, the contractor issued a final report, which provided an in-depth review of one area discussed in the interim report—quality assurance. Among other things, the contractor reiterated that IRS' organizational structure does not promote or support a strong quality assurance function. The contractor noted also that most computer programs are released without having been SAT tested and that the Systems Testing Branch has no authority to prevent that from happening.

The contractor recommended a "hierarchy of quality assurance responsibilities with the ultimate authority for quality assurance resting at division level." Within that hierarchy, the contractor recommended such things as establishing quality circles, enlarging the Systems Testing Branch and giving it more responsibility and authority, and making the quality assurance group within the Standards Branch responsible for assuring that software is developed following IRS' internal standards.

The contractor noted also that all functional units responsible for quality assurance should be within a single division and that oversight of the quality assurance activity "should be within an independent area rather than in a division with its own specific, potentially conflicting mission."

The Assistant Commissioner for Computer Services convened a task force to review the contractor's final report. After evaluating the contractor's recommendations and reviewing Computer Services' current quality assurance program and relevant division-level procedures, the task force documented its results in an October 24, 1986, memorandum to the Assistant Commissioner. That memorandum contained several recommendations for strengthening the quality assurance program, including

- an expansion of the role of the Systems Testing Branch, to be accommodated by a transfer of staff years to that Branch from other IRS functions who use the Branch's services; and
- an expansion of the role of the ADP Standards Branch to educate and train managers in standards and quality assurance activities.

The task force concluded that its recommendations, in contrast to the contractor's, would not require a large expenditure of dollars nor require an increase in staffing ceilings.

Because the contractor's results indicate that many of the quality assurance issues that affected SCRS are still in need of attention, we talked to the Assistant Commissioner for Computer Services and members of his staff in November 1986 about those results and the task force's follow-on report. They told us that the task force recommendations were being considered by a quality council in Computer Services. They also referred us to various other steps that IRS was taking in an attempt to enhance the quality of its software projects, including revisions to its software standards and guidelines and to its quality assurance procedures.

Conclusions

The SCRS software conversion was a long and difficult task that was well planned. Studies were made to select a programming language and assess its potential impact on computer capacity. Conversion tasks were identified, responsibilities were assigned, and milestones were established.

Significant problems occurred during the conversion, however, which adversely affected the successful implementation of SCRS. Some computer programs were not written efficiently, which contributed to the SCRS capacity problem, and other programs failed to meet user needs. Those problems could have been minimized had IRS adequately tested programs before implementing them and used other available quality assurance tools.

We did not, as part of our review, assess IRS' current quality assurance activities and thus are in no position to formulate specific recommendations as to controls IRS would need to implement to help insure that future software development projects are less troublesome than SCRS. An IRS contractor recently completed a review of those activities, however, and the contractor's reports indicate that many of the issues that affected SCRS are still in need of management attention. According to IRS, that attention is being provided.

One important aspect of quality assurance needing attention, based on what happened during SCRS and the contractor's reports, is the testing of computer programs. We plan to evaluate IRS' current testing practices and procedures to determine whether they have been sufficiently improved since SCRS.

IRS Has Enhanced Its Organizational Controls Over ADP Projects Since SCRS

We recognize that large ADP projects, like SCRS, may encounter problems, especially when it is necessary to anticipate system needs and develop plans several years before the system will be implemented. We recognize that such projects may also involve trade-offs. Our analysis of the SCRS management environment, however, showed that IRS did not have adequate controls in place during critical phases of the project to provide the kind of oversight needed to ensure timely and informed decisionmaking in dealing with those problems and trade-offs. IRS has since implemented certain organizational controls, in the form of steering committees and project managers, in an attempt to provide better ADP project oversight and thus enhance decisionmaking.

IRS Now Uses Steering Committees on Major ADP Projects

In 1983, after SCRS was well underway, IRS started using steering committees to coordinate development of major ADP projects. Use of such committees is an important step toward improving IRS management of ADP projects—a step that might have helped avoid some of the problems associated with SCRS.

In 1979, we reported on an evaluation of IRS' management of computer resources[1] and noted that IRS lacked system development procedures to ensure that ADP projects were carefully monitored and controlled throughout their design, development, and implementation. We pointed out that system development procedures—detailing what is to be done and by whom at various steps from project proposal through system implementation—could provide top management and users with a means of reviewing progress throughout the acquisition cycle and could assure that systems are acquired and developed consistently and that key activities are properly completed. Our report recommended that IRS establish formal and standard system development procedures.

About the same time, IRS' Internal Audit Division issued a report that evaluated ADP acquisitions and recommended that IRS adopt a formalized, planned approach of orderly independent phases with management control points in each phase of the acquisition. About 3 years later, the Commissioner's Task Force on ADP acquisition also identified problems in management's control of system acquisitions. One of the recommendations in its April 1982 report led to establishment of steering committees, called Automation Implementation Control Groups (AICG), to coordinate development of major projects approved by the Automation Policy Board. IRS' records indicate that structured AICG meetings began

[1] IRS Can Better Plan For And Control Its ADP Resources (GGD-79-48, June 18, 1979).

in July 1983. Procedures in place as of September 1986 called for an AICG to be composed of IRS' three Associate Commissioners and the Director of Chief Counsel's General Legal Services Division as permanent members, and the assistant commissioners of major user functions, project managers, and appropriate field officials as ad hoc members.

IRS' procedures call for an AICG to monitor and provide guidance for all major ADP projects. In general, IRS categorizes ADP projects as major if their life cycle costs are $10 million or more and they fulfill a mission need. Life cycle costs include a project's or system's cost of design, development, implementation, and maintenance over its projected life.

Most major ADP projects that were initiated after 1982, such as the Automated Collection System and the Automated Examination System, have been guided by an AICG. Because it was well under way before IRS started using steering committees, SCRS was not guided by an AICG. Consequently, there was no focal point to represent top management and users on a consistent basis during critical phases of SCRS acquisition and implementation. The presence of such a focal point would have better insured that issues discussed earlier in this report relating to benchmarking, unplanned enhancements to SCRS, and implementation of untested computer programs had received appropriate management attention.

According to the Internal Revenue Manual, an AICG's primary role is to ensure that all organizations with either a primary or support role in a proposed system are involved with its acquisition from the outset. The manual describes an AICG as being responsible for (1) overseeing development of detailed implementation plans for major projects approved by the Automation Policy Board; (2) monitoring progress throughout the acquisition cycle; (3) making major decisions on projects during the implementation phase; and (4) providing periodic progress reports to the Automation Policy Board and other federal agencies, including the Treasury Department, as appropriate. At a meeting in October 1986, the Automation Policy Board reaffirmed the AICGs' role as an extension of the Board. According to officials we talked to in November 1986, the Board is actively reassessing IRS' overall management of ADP projects, including the make-up and responsibilities of AICGs, with the expectation that those responsibilities will be expanded rather than diminished.

Role of Project Managers Has Been Expanded Since SCRS

In our opinion, a number of SCRS problems were caused, or at least exacerbated, by the absence of a project manager during critical acquisition and implementation phases of the project. A project management office that contributed significantly to the planning for SCRS was eliminated before implementation. Accordingly, critical project management functions, such as ensuring that system sizing assumptions were adhered to, milestone dates were reasonable, and computer programs were adequately tested before they were implemented, were not effectively carried out.

In 1984, IRS instituted a procedure for identifying projects that should be headed by a project manager. According to IRS officials and documentation, project managers now, unlike during SCRS, are responsible for a project through implementation.

Need for Project Managers on Major ADP Projects Is Well Recognized

OMB Circular A-109, issued in April 1976, established policies for executive agencies to follow during major system acquisitions. Among other things, the Circular requires agencies to designate, for each major acquisition, a program manager who is to be given budget guidance and a written charter of his or her authority, responsibility, and accountability for accomplishing program objectives.

We discussed IRS' use of project managers in our June 1979 report. We pointed out that although IRS often used project managers, it did not have procedures specifically requiring their use, and we noted that several major systems had been implemented without a project manager having been designated. As discussed in that report, we view the use of project managers as a sound management practice that improves project control and accountability.

As noted in our 1979 report, a project manager should provide day-to-day direction, coordination, and control and should have full authority to make decisions on allocating resources; establishing plans, schedules, and budgets; and conducting most technical activities. He or she should also provide leadership for the project team and, as stated in our report, be the

> "key person in negotiating tradeoffs during the course of a project and arranging meetings with the [Automation Policy] Board to keep them informed of project status, obtain required approvals, and refer problems outside his authority. Such matters usually relate to conflicting priorities, resource requirements not being met, schedule slippages, or events requiring a major change in project direction."

In response to our report, IRS agreed that project managers were needed for major acquisitions and noted that it had started using them on several projects. One such project was SCRS, for which IRS established a project office called SDO.

SDO Involved in Planning but Not Implementing SCRS

SDO played a major role in SCRS planning. It completed a feasibility study, in July 1979, that contained problem statements, work load analyses, and work load projections for IRS' service center computer systems. The study also included key assumptions for sizing SCRS—a critical assumption being that consistent with OMB and congressional guidance, SCRS would not include enhancements or new applications. SDO also conducted studies of computer program languages to assess their processing efficiency and flexibility. Later, in February 1980, SDO issued a transition plan, which established milestones and assigned tasks for installing the new computer hardware, conducting programmer training, and converting the assembly language applications to COBOL.

SDO was instrumental in laying the groundwork for an effective SCRS acquisition. The need for SDO's involvement in SCRS beyond initial planning was discussed in a 1980 report entitled Review of Tax Processing System Planning for the Internal Revenue Service prepared for IRS by a committee of the National Research Council.

The National Research Council's report expressed, in terms specific to SCRS, our recommendation that major acquisitions use project managers. The report stated:

"A comprehensive program of such magnitude clearly demands an organization to manage and control it. . . . Therefore, to maintain control and visibility, we strongly recommend that the Systems Development Office have sufficient staff and be organized so as to review the decisions and tradeoffs made at all management levels on the project."

The report went on to say that SCRS would require constant attention to detail and that SDO would have to possess strong project-office-like authority and be in close contact with all IRS units involved in the project.

In 1981, acquisition issues involving such things as unreliable benchmarking results and deviations from sizing assumptions began to surface. Because of its involvement with SCRS up until then, SDO was in the best position to deal with those issues.

In December 1981, however, the Acting Assistant Commissioner for Data Services redefined the functions and responsibilities of SDO. According to a memorandum signed by the Acting Assistant Commissioner, recent events and delays in system acquisition projects being managed by SDO required a change in SDO's function so that new and replacement systems could be implemented on schedule. We were unable to clarify what was meant by "recent events and delays." As part of the change in its functions, SDO was to no longer be involved with SCRS. Implementation of SCRS became the responsibility of the various IRS organizations that had received assignments under the SCRS transition plan. From then on, SCRS was not managed by a project office.

Current Use of Project Managers in IRS

IRS' major ongoing ADP projects, such as the Automated Examination System and Integrated Collection System, are being headed by project managers. When we asked for information on the role and responsibilities of project managers, the Office of the Assistant Commissioner for Computer Services provided, as an example, a copy of the project manager's charter used on the Automated Collection System project. That paperwork indicates that the responsibilities of current project managers, unlike SDO, extend to a project's implementation phase.

As for lines of authority, the Automated Collection System charter, as originally approved in September 1981, called for the project manager to report to a control group consisting of IRS' Assistant Commissioners for Compliance, Data Services, and Resources Management and one regional commissioner—something akin to the present-day AICG. That reporting line was revised, however, by a memorandum of understanding concurred in by the Deputy Commissioner on February 20, 1982. The memorandum stated, in part, that the Automated Collection System project team "will become the responsibility of Data Services and will report to a designated official in the Data Services organization," and that other proposed major system acquisitions would be managed in the same manner. In other words, project managers would no longer report to a control group.

That shift in lines of authority is also evidenced by IRS' general project management guidance. In 1982, IRS had drafted a Guide for Project Managers that provided, among other things, that project managers would report to an AICG. That Guide was never published, however. Instead, in March 1984, IRS issued a revised section of the Internal Revenue Manual, titled "Management of Automatic Data Processing (ADP) Resources."

That manual section authorizes the Automation Policy Board to determine if ADP projects are to be designated as major and thus headed by a project manager. It also provides that project managers be assigned to and receive continuing supervision from the functional assistant commissioner. IRS officials we talked to in November 1986 told us that a Project Manager's Handbook was being developed and that the current reporting lines would be retained.

Conclusions

IRS' management environment during SCRS did not facilitate informed decisionmaking. There was no steering committee, for example, to insure that all affected parties were represented in the decisionmaking process and the project office that had overseen development of the project plan was not involved in implementing that plan. IRS has since taken steps to enhance the management environment surrounding more recent ADP projects. It has established procedures for assigning steering committees to major projects, has assigned responsibility for major project decisions to those committees, and has adopted procedures requiring the use of project managers.

Listing of GAO Reports and Testimonies Dealing With 1985 Data Processing Problems at IRS

1. Information on IRS Service Centers in Austin, Texas and Fresno, California (GAO/GGD-85-89, September 30, 1985). This report discusses operational problems experienced by the Austin and Fresno Service Centers in 1985.

2. Tax Administration: Information on IRS' Philadelphia Service Center (GAO/GGD-86-25FS, November 1985). This fact sheet discusses controls over tax returns; inventory backlogs; incidents involving documents that were, or were alleged to have been, improperly discarded or destroyed; and allegations that refund checks were backdated and did not include appropriate interest.

3. Testimony of the Senior Associate Director, General Government Division, before the Subcommittee on Oversight, House Committee on Ways and Means, on operational problems experienced by IRS' service centers during 1985 (December 16, 1985).

4. Testimony of the Senior Associate Director, General Government Division, before the Subcommittee on Oversight, House Committee on Ways and Means, on the status of the 1986 tax return filing season and service centers' tax return processing activities (March 4, 1986).

5. Tax Administration: How IRS' Philadelphia Service Center is Addressing Processing Problems (GAO/GGD-86-60BR, March 14, 1986). This briefing report discussed problems experienced by the Philadelphia Service Center in 1985, identified actions taken to prevent their recurrence in 1986, and commented on the status of service center operations during the first few weeks of the 1986 processing season.

IRS Information Systems That Are Proposed or Being Developed That Will Require Major ADP Acquisitions in Fiscal Year 1987 and Beyond[1]

Automated Litigation Support System
Optical Character Recognition Systems Replacement
Replacement of Remittance Processing System
Integrated Management System
Taxpayer Service Advanced Workstation
Modernization of NCC's Magnetic Media
Form 1040 Optical Character Recognition
Tax System Redesign
Integrated Collection System
Automation of Criminal Investigation
Automated Underreporter System
Information Returns Program Management Information System
Automated Examination System
Automated Financial System
Centralized Inventory and Distribution System
Files Archival Image Storage and Retrieval

[1]We compiled this list based on an analysis of IRS' Information Systems Plan for fiscal years 1988 through 1992. As such, it may not include all major acquisitions (defined by IRS as those expected to have a systems life cost of over $10 million).

Unplanned Additions and Enhancements to SCRS by Function

I. Multiple Users

- Microfilm Replacement System - IRS met 1990 volume estimates within first year. Volumes going up.
- Paper Forms 1099 processed by optical character recognition equipment - this means some documents going through the Sperry Univac 1100/80 computer processors.
- Additional Terminals - Puts more demand on Sperry Univac 1100/80 computer processors by generating more update transactions.

II. Examination

- Incorporated over 50 requests for changes to the Control Data Corporation system that were not approved previously.
- Audit assessments are now input through IDRS as opposed to the paper pipeline process.
- Local Exam programs incorporated into SCRS.
  - Combined Case Control System
  - Centralized Filer and Scheduling System
- Tax Equity and Fiscal Responsibility Act changes to partnership returns added to the system - this substantially modified the Combined Case Control System.

III. Returns Processing and Accounting

- Generalized Mainline Framework - redesign of the returns processing pipeline function.
- Centralized Authorization File - automation of the manual power-of-attorney file.
- On-line Error Resolution System for Forms 941 and 1040.
- On-line unpostable file.
- Major enhancements to the Work Planning & Control System.

IV. Collection

- Incorporated over 35 requests for changes to the Control Data Corporation system that were not approved previously.
- Realtime Processing of Non-Master File Accounts - establishing Taxpayer Delinquency Account/Taxpayer Delinquency Investigation on IDRS via realtime instead of the paper Direct Data Entry System method.
- Automated Collection System.

V. Criminal Investigation

- Incorporated many changes to the Centralized Evaluation and Processing of Information Items System.

VI. Disclosure

- Automated the disclosure of tax information to states.

VII. Employee Plans/Exempt Organizations

- Incorporated many changes to the Employee Plans/Exempt Organization Application Control System. Numerous legislative changes have been made also.

Comments From the Internal Revenue Service

The enclosure is not included in this appendix.

COMMISSIONER

DEPARTMENT OF THE TREASURY
INTERNAL REVENUE SERVICE
WASHINGTON, D.C. 20224

Mr. William J. Anderson
Assistant Comptroller General
General Accounting Office
Washington, DC 20548

Dear Mr. Anderson:

We have reviewed your recent draft report entitled "Replacement of Service Center Computers Provides Lessons for the Future".

In general we agree with the report's historical overview and findings. Where we were not in complete agreement on technical matters, we have forwarded our comments directly to GAO personnel as suggested. The report, for the most part, consolidates and reinforces the findings and recommendations of reviews conducted internally and by contractors. As noted in the report, much of this material has been covered previously in both IRS and GAO testimony before Congress.

Despite the serious problems experienced during the final implementation phase of the Service Center Replacement System, the conversion is now complete and both hardware and software are working well. The 1986 and 1987 filing seasons were successful and the new system is processing record numbers of returns. IRS has also implemented organizational changes necessary to prevent similar problems with computer systems installations in the future. The Automation Policy Board and Automation Implementation Control Groups provide increased management oversight and control as well as guidance on all major ADP projects. The roles of these groups and the responsibilities of project managers as well as pertinent organizational policies and changes are described in the enclosed introductory material from IRS' Information Systems Plan for Fiscal Years 1989-1993. In addition, important changes have been made within our Computer Services organization to improve capacity management, systems planning, and problem resolution.

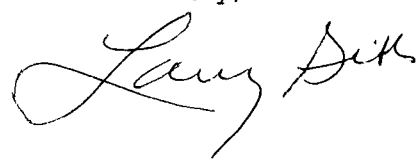
Mr. William J. Anderson

These organizational and procedural changes contributed to the success of the 1986 and 1987 filing seasons and the accomplishment of various ADP initiatives. We are committed to these new policies and will continue to monitor our performance in this area in order to promote quality throughout our operations.

We hope these comments are useful in preparing your final report.

With best regards,

Sincerely,



Enclosure