REPORT TO THE CONGRESS

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

A Proposed Automated Tax Administration System For Internal Revenue Service-- An Evaluation Of Costs And Benefits

Although a valid need exists to upgrade existing automated data processing capabilities at the Internal Revenue Service, its cost-benefit analysis should be revised to correct weaknesses, such as

--overoptimism regarding savings attributed to the proposed system and

--possible understatement of software development and other costs.

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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To the President of the Senate and the
Speaker of the House of Representatives

This report evaluates the reasonableness of a cost-benefit study the Internal Revenue Service made in support of a new computer system for tax administration. We made this review because of the extensive congressional interest in receiving more information on the cost and benefits associated with developing new automated data processing systems and because of congressional concern for protection of individual privacy. A companion report is being prepared on the privacy features associated with the new system.

We made our review pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53) and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

We are sending copies of this report to the Director, Office of Management and Budget; the Secretary of the Treasury; the Commissioner, Internal Revenue Service; and the Administrator of General Services.

Comptroller General
of the United States

Contents

ABBREVIATIONS

DDES	Direct Data Entry System
GAO	General Accounting Office
IDRS	Integrated Data Retrieval System
IRS	Internal Revenue Service
OMB	Office of Management and Budget
TAS	Tax Administration System

COMPTROLLER GENERAL'S REPORT TO THE CONGRESS

A PROPOSED AUTOMATED TAX ADMINISTRATION SYSTEM FOR INTERNAL REVENUE SERVICE--AN EVALUATION OF COSTS AND BENEFITS

D I G E S T

In September 1975 the Office of Management and Budget approved an Internal Revenue Service (IRS) program for designing and acquiring a new data processing system for tax administration. The proposed system, called the Tax Administration System, is to increase IRS data processing capacity and capabilities for the 1980s and beyond. (See pp. 3 and 7.)

IRS made a cost-benefit analysis supporting its decision to develop the proposed system. Its analysis shows that the system will be more beneficial over a 10-year period than the present system with some enhancements. According to the analysis, the proposed system will cost about $649 million or $154 million more than the present system enhanced, but could achieve gross benefits of about $2.1 billion.

Estimated benefits are in personnel savings of about $328 million and in increased revenue of about $1.8 billion. Increased revenue is to be generated by improving the productivity of revenue-producing personnel. More tax returns will be audited and more revenue will be collected. (See p. 8.)

GAO's review shows that the cost-benefit analysis supports the proposed system, although the ratio between costs and benefits is not as great as IRS estimated. GAO found that the proposed system's benefits were overestimated by more than $606 million and that the costs for the proposed system and the present system enhanced were understated by $62 million and $1 million, respectively.

In addition, each alternative did not include approximately $553 million of operating personnel costs directly related to the automatic

data processing function. Although the $553 million for each alternative has no effect on incremental or net system costs, such operating costs should be included to show full life cycle costs. (See p. 8.)

Two major uncertainties could adversely affect the proposed system's costs and benefits.

--A savings of $458.3 million attributed to rapid retrieval of tax account information that cannot be validated.

--The possible understatement of software development costs.

Should these or other shortfalls occur, they could materially reduce estimated benefits. (See pp. 17 and 23.)

GAO is concerned about potential software problems because data base management software needed for the proposed system is not commercially available. The computer equipment vendors will need to customize off-the-shelf software or develop new software to fit the data base requirements.

In either case, more time will be required than IRS is providing in its procurement plan. Consequently, any data base management software acquired under the plan probably will be underdeveloped and will require substantial modifications or redesign before it is operationally acceptable. That remedial effort could delay the development of the proposed system or jeopardize its successful completion. Similar problems have jeopardized other Government system development projects. (See p. 32.)

The risk of software problems and the probability of IRS becoming enmeshed in a prolonged and costly development effort can be minimized if IRS adheres to its evaluation criteria for computer systems acquisition and prototyping. This could also limit the Government's losses to design and development costs if the prototype operation is unsuccessful. (See p. 35.)

GAO's review of the cost-benefit analysis shows that the proposed system could be beneficial despite the various adjustments GAO made to the IRS estimates. Those benefits indicate that developing the proposed system would be more desirable economically than improving the present system for the long term. The development of the proposed system, if successful, will allow IRS to replace outdated data processing equipment and techniques with modern computers and technology. This should help IRS to handle its increasing workload and to process tax returns more effectively and efficiently. (See pp. 8 and 36.)

Under the proposed system, taxpayers could receive refunds more rapidly and have their inquiries resolved faster. As a result, an issue that should be considered in developing the proposed system is imputed interest that the Government would incur if accelerated refunds are made.

The Department of the Treasury would have to increase borrowing by $249 to $332 million in 1985. Since the Congress must decide whether it wants to incur the additional interest cost, GAO did not consider as a proposed system cost imputed interests or the economic impact of getting the refunds back into the economy sooner. (See p. 29.)

GAO confirms that a valid need exists to upgrade the IRS data processing system, but GAO's analysis was limited to the two alternatives IRS postulated. The IRS analysis did not compare the relative costs and benefits of each alternative.

By eliminating those benefits that can be achieved under both alternatives, IRS understated the proposed system's benefits and did not attribute any benefits to the present system alternative, although an improved present system could also generate benefits.

GAO does not believe that a complete comparson would result in a different conclusion, since the proposed system's benefits would

also be increased by those that were offset. (See p. 37.)

The House and Senate Appropriations Committees reported in May and June of 1976 on IRS's fiscal year 1977 budget hearings. These committees deferred any approval of the proposed system until further study can be made and the Administration is in a position to provide the Congress with more assurance of its advisability. Consequently, IRS was directed to provide a revised cost-benefit analysis and new procurement, development, and implementation plans before taking any action toward procuring the proposed system. (See p. 37.)

If the proposed system is eventually approved by the Congress, GAO recommends that the Commissioner of Internal Revenue take the following actions to insure that the program will be prudently managed and that the development of the proposed system will be successful.

--Revise the cost-benefit analysis to show all proposed system costs and benefits and provide for its update during development.

--Reevaluate estimated costs for system development so that any need for additional funding can be anticipated to preclude development delays and adjust the analysis accordingly.

--Adopt the cost-benefit analysis as a management tool to monitor costs and benefits during implementation.

--Provide the vendors with sufficient time to produce the needed data base management software by extending the deadline for proposals.

--Insure that benchmarking 1/ and computer system acceptance testing criteria are followed and that prototyping is successfully completed before acquiring additional computer systems.

1/Benchmark is a vendor's live test demonstration that his equipment and software can meet contract performance specifications.

--Provide for a reevaluation of the proposed system to include a new cost-benefit study in the event that functional requirements are compromised or degraded by computer equipment or software performance.

--Consider obtaining a technical coordinator to oversee benchmarking, select equipment, and assist in subsystem integrating.

GAO also recommends that the Secretary of the Treasury keep the Congress fully informed on the impact that imputed interest has on borrowing so that public policy on the acceleration of taxpayer refunds can be formulated in conjunction with its deliberations on national budgets. (See p. 38.)

The Commissioner of Internal Revenue generally concurred with GAO's recommendations regarding the IRS cost-benefit study. He welcomed GAO's periodic briefings and open discussion and indicated that because of this exchange of information, IRS is already in the process of implementing most of the recommendations contained in the report. (See p. 38 and app. I.)

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CHAPTER 1

INTRODUCTION

The Internal Revenue Service (IRS) made a cost-benefit analysis that supported a proposed data processing system called the Tax Administration System (TAS). IRS postulated a 10-year economic life for this system ending September 30, 1985, although it plans to use it through the 1990s. It estimated that TAS will cost about $649 million or $154 million more than the present system enhanced over its specified economic life. TAS will probably be the largest automated data processing system of its kind and will have an impact on the entire IRS organizational structure. In addition to the cost of developing and implementing TAS, IRS also addressed the issue of protecting individual privacy.

Our work was conducted in two segments: addressing the privacy features of TAS and addressing the reasonableness of the cost-benefit analysis. This report deals specifically with the IRS study of costs to be incurred for designing, developing, and implementing TAS and the benefits to be realized once it is operating. We also identify and describe potential problems that could be encountered in the TAS development. (See ch. 6.) A separate report will be issued on the privacy features of TAS.

SCOPE OF REVIEW

We reviewed pertinent Office of Management and Budget (OMB), General Services Administration, and IRS documents regarding how a cost-benefit analysis should be made; the design, development, implementation, and operation of automated data processing systems; and the acquisition of automated data processing and related equipment. We concentrated on IRS policies, regulations, and procedures regarding the design of TAS.

High-level officials and supervisory and staff personnel having responsibilities in areas affected by the cost-benefit analysis were interviewed. Representatives from four major computer manufacturing companies were also interviewed.

We conducted the interviews, examined computer facilities, and observed data processing operations at IRS' (1) National Office in Washington, D.C., (2) National Computer Center in Martinsburg, West Virginia, (3) Baltimore District Office, and (4) service centers in Covington, Kentucky; Brookhaven, New York; and Chamblee, Georgia.

Our study was limited to evaluating the alternatives IRS considered.

ORGANIZATION OF IRS

IRS is part of the Department of the Treasury; its mission is to collect most Federal tax revenues. To accomplish this mission, IRS employs more than 80,000 people to administer and enforce all internal revenue laws with the exception of those regarding alchohol, tobacco, firearms, and explosives. Responsibility for administering these laws was assigned to the Bureau of Alcohol, Tobacco, and Firearms, Department of the Treasury, on July 1, 1972.

The IRS organizational structure is divided into a headquarters organization known as the National Office and a field organization which includes regional offices, district offices, service centers, and local offices.

Headquarters organization

The National Office, located in Washington, D.C., develops nationwide policies and programs for administering the internal revenue laws and provides overall direction to the field organization. The National Computer Center, Martinsburg, West Virginia, and the IRS Data Center, Detroit, Michigan, are also part of the National Office.

Field organization

There are 7 regions, each headed by a Regional Commissioner, which supervise and evaluate the operations of 58 district offices and 10 service centers. In addition, about 900 local offices in the districts function as satellites. The number and location may vary depending on taxpayer and IRS needs.

BACKGROUND ON DATA PROCESSING ACTIVITIES

IRS converted to automated data processing in the late 1950s because statistics showed that the IRS workload was increasing beyond the capacity of conventional manual and accounting machine capabilities. The Commissioner of Internal Revenue in February 1959 proposed an automated data processing system to the Congress and received House and Senate budget approval in June 1959. That system was implemented during the 1960s. Although it has been changed and adapted over the years to meet frequent legislative changes, workload growth, and increasing program demands, basically, the same system is in use today.

CHAPTER 2

NEED FOR A NEW AUTOMATED DATA PROCESSING SYSTEM FOR TAX ADMINISTRATION

The Internal Revenue Service has determined that the present automated data processing system used for tax administration needs to be redesigned to provide the data processing capabilities necessary for tax administration in the 1980s and beyond. The present system includes computer systems from four different manufacturers--General Electric Company; Honeywell Information Systems, Inc.; International Business Machines Corporation; and Control Data Corporation. According to IRS officials, this system will not meet future needs because:

--The computer systems are not compatible. Transfering data between them requires intermediate computer operations to convert data formats and structures to those acceptable to the recipient system.

--The technological limitations of the computer systems preclude full satisfaction of user requirements.

--Some equipment is old and replacement component parts will become increasingly difficult to obtain.

--Future workload demands will surpass the capabilities of the existing computer system and limit the ability of IRS to fulfill its legislative mandates in an effective and efficient manner.

DESCRIPTION OF PRESENT SYSTEM

The present system was designed as a batch-oriented system in the early 1960s. It is centralized at the National Computer Center where the master records of all taxpayers are processed and maintained. The center interacts with 10 service centers strategically located to serve taxpayers residing in specific geographic areas.

In this system a taxpayer files his return directly with the service center within his geographic area. The center numbers that return for document control purposes, verifies the taxpayer's identification, and transcribes the tax data onto magnetic tape containing data from many taxpayers. The data is then processed through the computer to verify the accuracy of the taxpayers' calculations. The output data is

transcribed onto magnetic tape which is then shipped, along with other tapes on a weekly basis via commercial air transportation, to the National Computer Center.

At the National Computer Center, the data on the tapes are sorted and merged by account number sequence--employer identification number for business returns and social security numbers for individual returns. Each account or master record is then updated and analyzed weekly by the computer. Tapes containing taxpayer information are then sent back to the service centers for further processing. Processing tax returns through this system requires 5 to 6 weeks from the time a return is filed at a service center to the issuance of a refund check or a notice of tax due.

In an attempt to keep pace with technological improvements for record handling and data processing, IRS made two major additions to the original system.

1. The Direct Data Entry System (DDES) was installed in some centers in 1964 and was extended to all centers by 1969. It eliminated the use of keypunch cards and allowed operators to transcribe tax data directly from tax return and related documents to magnetic tape.

2. The Integrated Data Retrieval System (IDRS) was installed and implemented in all service centers by 1974. The system, through the use of computer terminals, provides immediate access to current information from about 10 percent of the taxpayer's master records. Its coverage is based on the probability of taxpayer inquiry and IRS need and duplicates some of the master file information maintained by the National Computer Center.

According to IRS officials, even though IRS has taken advantage of some technological advances, such as DDES and IDRS, the original system was primarily based on the computer technology of the early 1960s. Since the existing system was implemented, piecemeal system augmentations and expansions were made to expand processing capabilities and to overcome operating deficiencies. They believe that these incremental improvements demonstrate the system's lack of flexibility and the need for redesign.

CURRENT TAS DESIGN CONCEPT

In 1969 IRS contracted with the MITRE Corporation to conduct a system concepts formulation study for developing a new data processing system to overcome the operating

deficiencies. In 1971 a report was submitted to IRS outlining three concepts for meeting future IRS data processing needs. They dealt with varying degrees of automated data processing capabilities ranging from expanding the functions of DDES and IDRS to a completely new online data processing system.

An IRS analysis group evaluated the MITRE concepts and developed the current Tax Administration System concept discussed in the IRS cost-benefit study. The concept envisions a batch and real-time transaction oriented computer network employing a decentralized data base. The network will consist of over 8,000 terminals, 10 service centers, and 1 communications center as shown in figure I. The system will use batch processing to update its data base and will provide the users with online inquiry capability to access the data base at a maximum rate of 100,000 transactions an hour with a 5-second response time for 95 percent of the inquires.

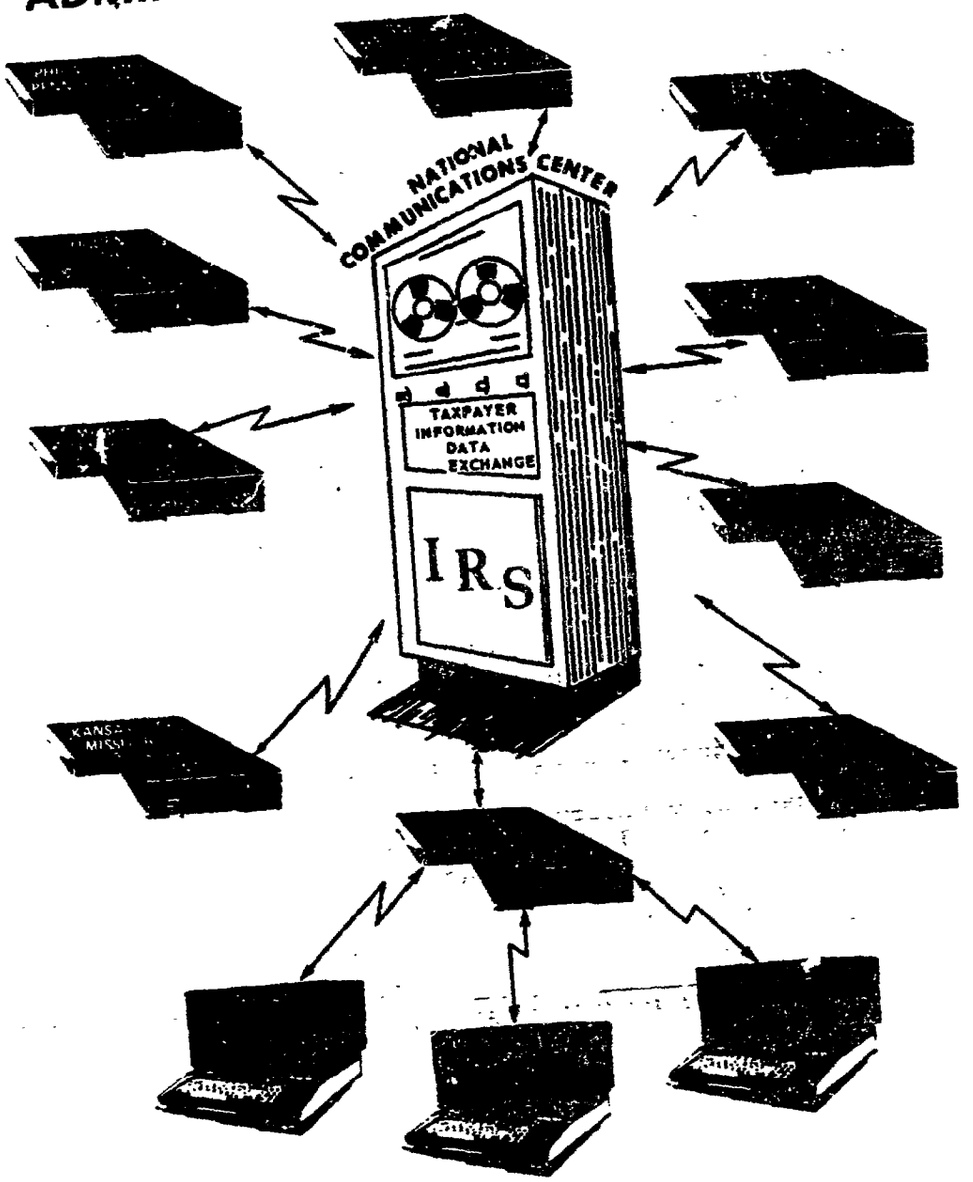
The National Communications Center will be established at Martinsburg, West Virginia, to function primarily as a switching center through which taxpayer master records and other taxpayer information can be transferred between service centers. It will also maintain a master index of all taxpayers and backup to the master files. The center will replace the National Computer Center whose functions will be eliminated by the decentralized data processing systems.

Each service center will maintain in its data base only that information pertaining to taxpayers with a primary address within the center's geographic area of responsibility. High volume input to the data base will be accomplished through DDES. Information from tax returns and taxpayer payments and refunds will be entered through specified data entry terminals to update the master records in the data base.

Mathematically verifying tax return data, validity checks, balancing, and work control processes will occur during recording operations. The accounting functions will be done as the transactions are processed and the master files are updated. Over 45 types of tax returns and more than 300 different transactions categories are included in this extremely complex operation. IRS estimates that by 1985 each service center will be processing about 692,000 transactions a day.

FIGURE 1

OVERVIEW OF THE PROPOSED TAX ADMINISTRATION SYSTEM NETWORK



OFFICE OF MANAGEMENT AND BUDGET APPROVES TAS DEVELOPMENT

On September 19, 1975, OMB's Associate Director for Economics and Government said he would grant programmatic approval for TAS after some modifications. These modifications involve reducing the online processing requirements at the service centers, encoding communications between the service centers and the National Communications Center, and reducing the amount of facility construction required for the new system. These modifications, according to OMB, would reduce TAS's overall cost by $130 million.

The Assistant Secretary (Administration), Department of the Treasury, on September 25, 1975, told OMB that the Treasury and IRS agreed to the modified system design. He stated that the modified design was close enough to the TAS design to be acceptable and that the facility construction issue should be deferred because it is not germane to the basic system design. Also, he cautioned that the acceptance of the OMB modified design did not indicate that the Treasury or IRS agreed with OMB's projected cost reductions. He pointed out that the competitive bid process would be the determining factor of actual cost.

The cost-benefit analysis we reviewed is based on the TAS design IRS proposed. We have not evaluated the impact of OMB's modifications on TAS cost and benefits because our analysis had been essentially completed when the modifications were agreed to. Also, IRS had not adjusted its analysis to show the changes. IRS should accomplish this as the TAS program progresses.

CHAPTER 3

IMPROVED PRODUCTIVITY AND REDUCED PERSONNEL COSTS SUPPORT THE TAS ALTERNATIVE

The Internal Revenue Service cost-benefit analysis generally supports the decision to implement the Tax Administration System and shows that TAS will be more beneficial over its 10-year economic life than the present system with some enhancements.

The analysis shows that TAS will cost about $649 million or $154 million more than the present system enhanced, but could achieve about $2.1 billion in benefits. These benefits consist of personnel savings of about $328 million and increased revenue, resulting from improved productivity, of about $1.8 billion.

Although the cost-benefit analysis generally supports TAS, we found that IRS has overestimated TAS benefits by more than $606 million, underestimated TAS cost by about $62 million, and underestimated present system enhanced cost by about $1 million. In addition, each alternative did not include approximately $553 million of operating personnel costs directly related to the automatic data processing function. We believe that full life cycle costs should be shown for each alternative, and we have included the personnel costs in our adjustments, even though they have no effect on the net TAS cost. A summary of the IRS cost-benefit analysis and our adjustments follows.

		IRS amount		Our adjustment (note a)		Adjusted amount
				(millions)		
Gross TAS benefits		$2,145.7		$606.9		$1,538.8
Less net TAS cost:						
TAS cost	$649.2		615.1		1,264.3	
Present system cost	-495.5		-553.9		-1,049.4	
Net cost		153.7		61.2		214.9
Net TAS benefits		[b] $1,992.0		$668.1		[b] $1,323.9

[a] See pages 13, 22, and 30.

[b] In accordance with OMB Circular A-94, IRS discounted net TAS benefits to $1,051.0 million. Using the same method of discounting, the adjusted net benefits as we determined them would be $660 million.

COST-BENEFIT METHODS

The general approach used by IRS in making its cost-benefit analysis is consistent with the policies and procedures of Federal Management Circular 74-5 established for agencies to document their needs for acquiring automatic data processing equipment and OMB Circular A-94 relating to evaluating time distributed costs and benefits. IRS considered all costs over the stated life of the alternative systems, residual value of equipment, and various methods for acquiring equipment and used present value discounting as required by the circular. IRS did not consider the inflationary impact of future costs and benefits because OMB Circular A-94 prohibits forecasting any change in general price levels during the planning period.

IRS considered two alternatives--the proposed TAS and the present system enhanced[1/]--for meeting its tax administration data processing needs from July 1, 1975 to September 30, 1985.

Costing of alternatives

The proposed TAS cost included such things as new computers and associated peripheral equipment, communications lines and equipment, software development, expanded facilities at each of the 10 service centers, and the National Communications Center to house the computer and communications operations.

The present system enhanced includes costs to:

--Install additional International Business Machine model 370 computer systems at the National Computer Center during fiscal years 1979 and 1983.

--Upgrade Honeywell H-2050 computer systems in the 10 service centers by adding tape and disk drives, expanding computer memory, and improving the computer processing time.

--Expand Integrated Data Retrieval System in fiscal year 1981 so that each service center would have dual Control Data Corporation model 3500 computer systems to

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[1/] IRS refers to this alternative as the Present System Maintained; however, it includes various enhancements as discussed in this report.

handle normal workload growth and new projects, including the Audit Information Management System, Employer Identification Number Research and Assignment System, and an automated case control system for the intelligence function.

The enhancements to the present system would enable IRS to handle projected workload growth through, but not beyond, 1985.

Estimating TAS benefits

IRS evaluated the impact that TAS would have on the functions of tax administration at the service centers; the National Computer Center; the Data Center in Detroit, Michigan; the National Office in Washington, D.C.; and the numerous regional, district, and field offices. IRS used two methods to calculate estimated benefits.

In the first method IRS claimed as benefits employee cost savings, including salary, fringe benefits, and overhead costs, of all employees who would no longer be needed for tax administration and those who would not have to be hired incrementally as workloads increased. Personnel requirements would be reduced by automating certain clerical functions and increasing employee productivity.

The second method includes cost savings due to reduction of clerical positions at IRS service centers, data center, and field offices. However, it recognizes the contributions of technical personnel, such as revenue agents, revenue officers, and special agents. These personnel would be retained and their increased productivity would allow for more audit coverage and better revenue collection capabilities. IRS is pursuing the benefits calculated under this method as the TAS objective.

Our review indicated that the latter method is the most appropriate since it includes and attempts to quantify, in terms of increased revenues, the improved productivity of technical personnel. Accordingly, our analysis was limited to those benefits calculated by this method.

Benefits of present system enhanced not presented

IRS did not present the benefits that could be achieved by enhancing the present system. But it considered those benefits that could be achieved either through TPS or by enhancing the present system as offsets and did not, in most

cases, claim them as TAS benefits. Consequently, the TAS benefits are net benefits or benefits beyond those that could be achieved by enhancing the present system.

CHAPTER 4

TAS BENEFITS ARE OVERESTIMATED

The Internal Revenue Service estimated that gross benefits valued at about $2.1 billion could be achieved during the 10-year economic life of the Tax Administration System as follows:

Functional area	Amount of benefits
	(000 omitted)
Tax return audit	$1,305,641
Intelligence	387,884
Tax return processing	229,780
Collection	156,015
Taxpayer service	46,454
Data center	10,739
Statistics	4,520
Internal audit	4,032
Technical (tax rulings)	440
General litigation	170
Total	$2,145,675

We reviewed about 90 percent of the total benefit amounts. This included the functional areas of tax return processing, auditing, and intelligence and we found that they are overestimated by more than $606 million.

While benefits are overestimated, it should be noted that, if TAS is implemented as now proposed, IRS can replace and modernize its equipment and still achieve considerable benefits. These benefits are estimated to approach $300 million annually (after our adjustments) in 1985, and IRS has stated that it intends to retain the system for the balance of the twentieth century. The following schedule shows our benefit adjustments:

Schedule of Our Adjustments to
IRS Cost-Benefit Analysis Based on
Personnel Savings Plus Additional Revenue Method
(millions)

Gross TAS benefits per analysis		$2,145.7
Less our adjustments:		
Audit (note a)		
Revenue source allocation	$ 73.8	
Automating technical time report	335.0	
Automating selection and examination report	-59.6	
	349.2	
Intelligence (note b)		
Method of assessing revenue	158.8	
Automating tax fraud case control	35.7	
Clerical cost factors	-1.8	
	192.7	
Returns processing (note c)		
National Communications Center staffing	30.0	
Service center employee cost factors	7.0	
DDES enhancement	28.0	
	65.0	
		606.9
Adjusted gross benefits		[d] $1,538.8

[a] See pp. 13 to 17.

[b] See pp. 17 and 18.

[c] See pp. 18 to 20.

[d] Includes $458.3 million in claimed benefits for rapid retrieval of tax information that can not be fully substantiated by IRS or verified by us, as discussed on page 16.

AUDITING BENEFITS

IRS expects increased revenues of about $1.288 billion and clerical savings of about $17.5 million by improving the automation of certain tax return audit functions.

Tax return audits help insure the highest degree of voluntary compliance with tax laws. A primary method of selecting tax returns for audit is a computer program that uses a mathematical formula to measure the probability of tax error in each return. Presently, tax returns identified as having

the highest probability of error are manually reviewed and classified by experienced tax examiners or auditors. An audit package is created for each of those tax returns which includes the original tax return, associated schedules, any other documentation accompanying the return when filed and a control card indicating the results of prior audits (dollar amount only). The control card is also used as the source document for adjustments. Those returns confirmed as having the highest error potential are selected for audit.

IRS believes that selecting tax returns for audit will be greatly improved under TAS because more information, such as detailed audit history, will be available with every tax return reviewed. There will also be linkages between related tax returns, such as partners in a partnership, and indicators of tax year carryover reporting requirements, such as installment sales of real property. The improvements will enable the classifiers to select returns for auditing that have the most additional revenue potential.

TAS will also enable the tax examiners to speedup the processing of claims of overassessments by about 2 weeks through access to the online data base. This will result in interest savings.

At the National Office and the Baltimore District Office, we reviewed the rationale for determining the increases of auditing productivity that can be achieved with TAS and evaluated the estimates of increased revenues and clerical personnel savings. We found that IRS overestimated audit benefits by $349.2 million.

Increased revenues should be based on source of revenue

IRS overstated increased revenues for the auditing function by $73.8 million because of inaccurate proration c revenues for TAS's first 3 years of implementation.

TAS is scheduled to be implemented in phases over a 3-year period, beginning in fiscal year 1978. To prorate the increased revenues that could be achieved as each phase is implemented, IRS developed a formula using fiscal year 1981 as the base year. The formula produced a percentage of TAS implementation in all service centers for each of the 3 years. IRS applied the percentages to its estimated increased revenues for the base year to estimate the increased revenues for the TAS phase-in period. This produced a $163.2 million estimate.

We found that the formula did not accurately prorate the increased revenues because it did not allocate revenues according to the type of tax return audited.

This occurred because the percentages of implementation are based on the total number of tax account records to be converted to TAS at each service center. These records are categorized as the individual, business, and residual master files, and they contain 77, 20, and 3 percent of the records, respectively. Consequently, the application of the percentages of implementation is not proportionate to the sources of the increased revenues.

IRS should have weighted the percentages of implementation according to the sources of auditing revenues. On the basis of IRS statistics for fiscal years 1973 and 1974, we determined that 63 percent of additional revenue is generated by auditing business returns, 22 percent by auditing individual returns, and 15 percent by auditing residual accounts.

Using these weights, we estimated that increased revenue should be $89.4 million, or $73.8 million less than the IRS estimate.

Benefits of automating technical time are overstated

According to IRS officials, TAS will automatically generate monthly technical time reports that are presently prepared manually by revenue agents and tax auditors to record direct examination time expended in auditing tax returns. The time saved by automation is to be used to increase the number of audits and could amount to increased revenues of $458.3 million.

In estimating additional manpower potential, IRS used an increased productivity factor of about 2 percent. Our examination disclosed that the 2 percent factor could not be supported by quantitative analysis. For example, we were informed by National and District Office officials that monthly technical time reporting requires about 45 minutes for a revenue agent and 15 minutes for a tax auditor. Annualized, this amounts to 9 hours for a revenue agent and 3 hours for a tax auditor. This time savings applied to additional audit coverage for all revenue agents/tax auditors over the economic life of TAS yields about $123.3 million in additional revenue or an overstatement of the above estimate of $335 million.

Increased revenues from rapid information retrieval not substantiated by IRS

IRS estimated that TAS would provide revenue agents and tax auditors with the ability to rapidly retrieve tax account information via the TAS terminals. Tax examiners would be able to quickly obtain additional information concerning a particular return or related returns, whereas under the present system, it takes 3 weeks or longer. Accordingly, estimated benefits of $458.3 million in additional revenue could be realized.

Our examination of the benefits attributable to rapid retrieval of information by tax auditors disclosed that IRS again used an increased productivity factor of about 2 percent. This is equivalent to about 10 minutes per auditor per day that could be applied to the audit of additional tax returns. However, the factor used was not supported by a quantitative analysis of the impact that rapid retrieval of information will have on the examination or auditing of tax returns. Available information did not permit us to quantify the effects of rapid retrieval of tax information and instead of this type of verification, we evaluated the IRS rationale used in making the estimate.

We discussed rapid retrieval with officials from the IRS National Office Audit Division and the audit division of the IRS Baltimore District Office. We were told that information over that provided in the audit package is very seldom needed to complete an audit. If more information is required, the tax examiner works on another case while the request for additional information is being fulfilled. Also, we were told that the total time required for the audit would not be reduced, although the rapid retrieval of information might help expedite completion of the audit.

We further discussed rapid retrieval of information at the National Office with IRS officials responsible for preparing the TAS cost-benefit analysis. Those officials believed that it would be beneficial despite the position of the Audit Division officials interviewed. To support their position, they provided the following additional rationale:

--Rapid and easy access to the TAS data base encourages tax examiners to check out more issues concerning related taxpayers and transactions.

--Tax examiners will avoid spending time to refresh their memories and reorienting themselves regarding

a case that had been set aside awaiting additional information.

--When quick resolution of an issue closes an audit case, the tax examiner avoids the review of that case by his supervisor and the expenditure of time to explain why the case is unresolved.

--Quick resolution of audit cases also eliminates additional contact with the taxpayer and reduces the chances of audit cases being reassigned to another tax examiner.

Although we recognize that some benefit may be attributable to the rapid retrieval of tax account information, no information was available that would quantitatively substantiate what range of benefits would be reasonable. (See footnote, p. 13.)

Revenues from improved selection and examination report automation should be increased

IRS underestimated by $59.6 million the additional revenue that could be generated by improving the process of selecting tax returns to be audited and by automating certain audit examination reports. The underestimate was caused because a lower annual revenue yield per tax examiner of $141,000 was used instead of the higher amount of $176,000 as IRS determined.

INTELLIGENCE DIVISION BENEFITS

The primary function of the Intelligence Division is to increase taxpayer voluntary compliance by seeking out cases of tax fraud. In this function TAS will save technical time by automating the selection of possible tax fraud cases and by generating management reports. IRS has estimated these improvements will increase revenue by about $376.3 million and achieve personnel savings of about $11.6 million. We found that IRS overestimated the increased revenue by about $194.5 million and underestimated personnel savings by about $1.8 million.

Additional revenue based on recommended assessments

IRS estimated that TAS will save the Intelligence Division the equivalent of 3,620 staff-years of effort and assumed that the savings could be used to increase the number

of tax fraud cases special agents could handle. It determined that the improved productivity could increase revenues by $376.3 million.

In analyzing this computation, we found that the staff-years saving was reasonable but IRS used the 1973 average recommended assessments of $103,750 per special agent rather than the average assessments actually imposed on the taxpayers. IRS acknowledged that an average of actual assessments should have been used. On the basis of statistics for fiscal years 1972 through 1975, we computed an average of actual assessments per special agent of $60,084 and determined that the increased revenues were overstated by $158.8 million.

Increased revenue from automating control of tax fraud cases also related to present system

The TAS alternative includes automating control of tax fraud cases in process within the Intelligence Division. This automation is expected to increase the productivity of the special agents with a corresponding increase in revenue of about $35.7 million.

We found that the increased productivity or revenue is not a valid TAS benefit because the automation is also included in the present system alternative and will be accomplished by IRS in fiscal year 1977 through expansion of Integrated Data Retrieval System capabilities. Since this automation will be achieved independently of TAS, the increased revenue of $35.7 million should not have been claimed for TAS.

Intelligence Division clerical savings should be increased

IRS estimated that the automation of certain clerical functions within the Intelligence Division would result in personnel savings of $11.6 million. In making this estimate, division analysts used an employee cost factor of $13,000 rather than the $14,649 cost factor developed for costing clerical positions. Using the lower factor resulted in the understatement of clerical savings of $1.8 million.

RETURNS PROCESSING BENEFITS

IRS projected personnel savings associated with the processing of returns in the service centers and National Computer Center of $229.8 million. It expects to achieve these

savings by increasing employee productivity through automation and changing or eliminating some job functions.

We selected 10 service center functions for detailed review that account for 75 percent of returns processing benefits. At two service centers and the National Office, we evaluated the adequacy of the rationale used in estimating the savings for each of those functions, the reasonableness of the projected productivity increases, and verified the mathematical calculations used to quantify benefits. We found that IRS overestimated these savings by about $65 million.

Cost of staffing National Communications Center

IRS estimated that eliminating the National Computer Center from the tax return processing cycle would result in personnel savings of about $30 million. But, in making the estimate, IRS did not consider the cost of staffing the National Communications Center.

When TAS is in operation, the National Computer Center will be replaced by the National Communications Center, which will function as a switching center for data transmission between service centers. It will also be responsible for maintaining a centralized taxpayer directory and a backup master file for the service centers. IRS estimates that the staffing required to carryout the new functions will be about the same as that required to staff the National Computer Center. Consequently, no personnel savings will be achieved by eliminating the National Computer Center.

Incorrect adjustments overstate personnel savings

IRS used composite employee cost factors in calculating personnel savings that could be achieved within the various functions of the service centers. These factors included average salary, related fringe benefits, and indirect costs, such as training, supervisory salaries, office furniture, equipment, and maintenance. In reviewing these factors, IRS found that some facility costs were duplicated and required adjustments. In making the adjustments to eliminate the duplication, IRS made some incorrect calculations that overstated personnel savings by $7 million.

Direct Data Entry System enhancement is not solely a TAS benefit

IRS projected that productivity increases could be achieved by enhancing DDES at each service center. The enhancement consists of adding an online file containing the abbreviated name and address data of all taxpayers within the geographical area the service center serves. This will allow the data transcriber to compare the address on the return of a taxpayer who does not use the preprinted address labels IRS supplies to the address on file. In those cases where the address is verified, the transcriber will not have to transcribe the address. This address verification process will save about 60 keystrokes now required to transcribe the address part of a tax return. In addition, the number of errors relating to taxpayer identification are expected to be reduced.

Under the present system alternative, DDES would be as is, although the same enhancements considered in the TAS alternative could be made within the present system. According to the IRS ground rules for identifying TAS benefits, those that could also be achieved within the present system are not claimed. (See p. 10.) In this case, IRS did not follow its guidelines and inappropriately claimed benefits of $28 million.

OTHER BENEFITS THAT MAY BE ACHIEVED BY TAS

Two benefits that TAS could achieve have not been included in the IRS estimate: interest savings by faster processing of tax returns and quicker response to taxpayer inquiries.

The Internal Revenue Code requires IRS to pay interest on refunds not issued within 45 days from the due date of the return (usually April 15th) or the return's receipt date if filed after the due date. Much of the interest is paid because of delays in processing tax returns containing errors. The resolution of errors and the later processing of the returns in many cases extends beyond the 45-day limit. Under TAS the processing of such returns will be quicker because much taxpayer information needed to resolve errors will be readily available through the TAS terminals and later processing will be reduced from 5 to 6 weeks to 2 to 3 weeks. This faster processing will enable IRS to process more returns of this type within the 45-day limit and thus preclude paying interest. We have not estimated the amount of interest that will be saved because statistics needed to compute the savings

for the 10-year life of TAS were not readily available. However, IRS estimated that savings could be as much as $17 million in 1985. The IRS estimate is based on a 6-percent rate of interest. The rate was increased to 9 percent effective July 1, 1975, and is subject to periodic adjustment. At the 9-percent interest rate, the savings would be $25.5 million.

With regard to responding more quickly to taxpayer inquiries, in the present system such inquiries are answered either through the IDRS terminals, which can assess about 10 percent of the taxpayer records, or through researching of microfilm. The IDRS data base contains taxpayer information only for the current tax year and that information is not available until after the 5- to 6- week processing cycle is completed. Information on microfilm is not available until about 8 weeks after the return is filed.

Through TAS terminals, 3 years of tax information on all taxpayers will be accessible to taxpayer service representatives for answering taxpayer inquiries. The data base will be updated immediately after returns are received, and there will be minimum microfilm researching, enabling the service representatives to readily answer taxpayer inquiries.

CHAPTER 5

SYSTEMS ALTERNATIVE COSTS ARE UNDERESTIMATED

TAS COSTS ARE UNDERSTATED

The Internal Revenue Service estimated that the Tax Administration System will cost about $649.2 million to develop, operate, and maintain during its 10-year economic life that was used as a basis for the cost-benefit analysis. The cost is categorized as development cost (software), capital investment, leasing and other costs, equipment maintenance, and software maintenance. We analyzed various cost elements in those categories and, in our opinion, the cost is understated by at least $615.1 million. The understatement includes $552.5 million of personnel costs associated with computer and communications operations that IRS omitted from its estimates for both the existing and proposed systems. (See p. 8.) The following schedule shows the IRS estimate and our adjustments.

Category	IRS/TAS estimate	Our adjustment	Adjusted estimate
		(millions)	
Development cost	$ 75.2	$ 31.8	$ 107.0
Capital investment	249.9	10.6	260.5
Lease and other costs	84.5	-	84.5
Equipment maintenance	133.2	4.7	137.9
Software maintenance	106.2	15.7	121.9
Operating personnel	-	552.5	552.5
Typographical error	.2	-.2	-
Total	$649.2	$615.1	$1,264.3

Development costs

IRS defines TAS development or software costs as personnel costs to be incurred for system design, programming, testing, installing, and training necessary to familiarize employees with TAS operation. It estimated that those personnel costs to be about $75.2 million.

IRS divided the TAS program into projects, such as mass data input, case input, and tax account project and assigned teams to develop cost estimates for each project. The teams, composed of system analysts, programmers, and user representatives, multiplied user estimates of staff-year requirements for the above categories by cost factors applicable to the various types of personnel needed.

The manner in which IRS estimated the TAS development or software cost is a common approach used both in industry and Government. The weakness of this method of estimating development costs is that the results are often understated and cost overruns occur that strain management's ability to support system development.

The reasonableness of the $75.2 million was evaluated by reviewing industry cost trends and the experiences of other Government agencies. When making these evaluations we were particularly concerned with the cost relationships between software and equipment and how those relationships compared to the IRS estimate.

Recent computer industry studies and the experiences of other Government agencies indicate that the cost to develop software exceeds the cost of computer equipment. One study shows that equipment costs represent less than 25 percent of the total costs incurred to design, develop, and operate a new system. Another study by the Rand Corporation indicates that by 1985, equipment cost will represent less than 5 percent of the total system development costs. In addition, the General Services Administration's Automatic Data Processing Strategy Study--completed in March 1975 by Decisions and Designs Incorporated--indicates that developing application software has become the largest cost item of automated data processing and that if trends continue, software is expected to account for 90 percent of all costs by 1980 or 10 times the cost of equipment.

Further, a 1974 study of all data processing costs in the Department of Defense by the Institute for Defense Analysis indicates an average software/equipment cost ratio of 1.7 : 1. The results of these studies are borne out by our experience with other Federal agencies. The experience of some other

Federal agencies shows that the ratio of software costs to equipment costs ranges from 1.7 : 1 to 3.5 : 1 whereas the IRS estimate is slightly more than 0.5 : 1, based on estimated TAS equipment cost of $141.3 million.a/

We recognize that the circumstances of the TAS development may differ from the above generalized experience ratios. However, our experience and the experience of others suggests that the 0.5 : 1 ratio indicated by IRS may be substantially understated.

No thoroughly tested methods exist for estimating system development costs. However, some prominent data processing professionals assert that a good method--often referred to as the programming code method--is to estimate and cost the number of lines of programming code required to develop the application software and to use that cost to extrapolate the remaining costs. One study which supports this method shows that one-sixth of development cost is for programming, one-third is for planning, one-fourth is for component program testing, and one-fourth is for system testing.

Because the number of coding lines TAS required had not been estimated, we were not able to use the method discussed above to test the reasonableness of the IRS estimate. However, we believe that the programming method can yield more reliable estimates primarily because it is based on programming code data which IRS could develop and reasonably measure in terms of programmer productivity and cost.

Although we recognize that the TAS development cost may be substantially understated, we did not adjust it as a result of this analysis because any adjustment would be subjective on our part. It would be prudent, however, for IRS to test its estimate by using the programming method so that they could anticipate any need for additional funding or program stretchout.

Interim development cost not included in estimate

The estimated development cost discussed above should also include $31.8 million of interim development costs that must be spent to improve the present system as TAS is being developed and implemented.

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a/ This figure does not include equipment purchases for Direct Data Entry System and the Audit Time Sharing System or Honeywell model H2050A computers for the Service Centers.

IRS plans to make a number of improvements to the present system during the first 3 years of the 10-year economic life of TAS. These improvements include developing new data systems, such as the Audit Information Management System and the Audit Time-Sharing System, and the automation of the tax fraud case workload control. It also includes system changes required to comply with new legislation pertaining to employee pension plans, privacy, tax reform, and other tax matters.

The cost of these improvements was properly included in the present system alternative costs but was omitted from the TAS alternative. Since these improvements are not options, but rather improvements that will be made regardless of the alternative selected, their costs should also be included as part of the TAS alternative.

Capital investment

IRS estimated that TAS will require a capital investment of about $273.3 million to purchase the equipment and to expand the facilities that will house the computer systems. The investment is for the following items:

	(millions)
Computer equipment	$103.2
Terminal/printer equipment	49.9
Communications equipment	16.2
Facilities and special installation	[a/] 104.0
Capital investment	273.3
Less residual value of equipment	-23.4
Total	$249.9

[a/] We did not analyze this estimate because the construction program was deferred. (See p. 7.)

Computer equipment

The IRS estimate for computer equipment is reasonable. The equipment requirements were initially estimated by the Federal Computer Performance Evaluation and Simulation Center[1/] on the basis of workload projections through 1985. IRS later reduced the computer equipment requirements upon reevaluation of user needs. Examples of equipment reductions are the

[1/] An organization established by General Services Administration to provide computer system design services to agencies of the Federal Government. The Federal Simulation Center is operated by the Air Force.

elimination of a backup computer at each service center and the retention of the DDES equipment.

After estimating the equipment requirements, IRS, with the aid of three computer manufacturers and a consulting firm, developed equipment configurations to represent each manufacturer's equipment that is capable of satisfying the requirements. Each configuration was then priced at the respective manufacturer's 1975 list price and an average price for the three configurations was computed. A 40-percent discount was then applied to the average price to estimate computer equipment cost. A 40-percent discount is supported by other large-scale computer systems contracts awarded by the Federal Government. We have concluded that this method was adequate for estimating those costs.

Terminal/printer equipment

The IRS estimate for terminal and printer equipment includes $19 million to purchase the existing data entry terminals of DDES, $6.7 million to purchase terminals for the Audit Time-Sharing System, and $24.2 million to purchase the user terminals and printers for TAS. We found that the cost of the DDES terminals is based on contract prices and therefore is accurate. With regard to the TAS terminals and printers, we believe that the cost of the terminals is understated by about $9.9 million.

IRS estimated the purchase price of the TAS terminals on the basis of a market survey of 162 types of display terminals available from 65 suppliers. The survey, which was made by a computer information services company in April 1974, showed that prices for nonprogrammable display terminals ranged from about $1,200 to nearly $10,000. From this price range IRS estimated that the TAS terminals would each cost $2,500. IRS selected a price at the lower end of the price range to allow for substantial discounts that it believed would be available due to the large number of terminals to be acquired. We are not aware of any other terminal procurement as large as the one the IRS proposes.

However, the terminal requirements are fairly stringent and include a detachable customized keyboard, special function keys, and an operator badge reader for security purposes. We reviewed the market survey and found 10 terminals that could possibly fulfill all or most of the IRS requirements. The terminals ranged in price from about $3,360 to $6,100 with an average price of $4,547. In addition, we reviewed General Services Administration price lists for terminal and printer equipment to determine a reasonable discount based on quantity and/or dollar amount. We computed an

18-percent discount and applied that discount to the average terminal price of $4,457 to arrive at a discounted price of $3,728. The difference between our estimate and the IRS estimate amounts to about $9.9 million.

Communications equipment

Communications equipment includes small computers needed to interface communications with the computer systems, and related equipment needed to use the communications lines. We found that the IRS understated the cost of the related equipment by about $0.7 million because it did not correctly price modem equipment. That equipment makes business machine signals compatible with communications facilities.

IRS estimated modem prices based on a representative manufacturer's list price. However, we found that the manufacturer's list price is nearly $8,000 rather than the $4,000 price IRS used. We computed an average discounted price of $7,700 for each modem needed on the basis of Federal Supply Schedule price lists. The difference between our estimate and the IRS estimate, extended over the total number of modems needed, amounts to about $0.7 million.

Lease and other costs

IRS estimated that it will cost about $84.5 million during the implementation of TAS to continue leasing the present computer equipment, the terminals of DDES and Integrated Data Retrieval System, and the communication lines, and microfilm. Our analysis of that estimate did not disclose any material discrepancies.

Equipment maintenance

IRS estimated that the cost to maintain the computer equipment, terminals, printers, and communications equipment would be about $133.2 million. We believe that this estimate is understated by $4.7 million.

IRS estimated that the annual maintenance cost for the computer equipment, terminals, and printers is equal to 4 percent of the equipment's list purchase prices. It applied the rate, which is based on the weighted average of maintenance charges contained in the Federal Supply Schedules, to the list prices and extended the annual costs over the life of TAS to arrive at its estimate.

We reviewed maintenance charges contained in the Federal Supply Schedules and one negotiated Government contract. The 4-percent rate is reasonable for computer, terminal, and printer equipment located in the service centers, but is low for terminals and printers located in field offices. The maintenance charges are higher in the field because of the time required for vendor maintenance personnel to travel to the field locations. The disparity between field office and service center maintenance costs resulted in an $8.7 million underestimate.

But the understatement is offset by an overstatement of about $4 million that IRS made in estimating the cost to maintain communications equipment. IRS used a "rule of thumb" to estimate maintenance costs. It assumed that annual maintenance costs for a single shift is 12 percent of the equipment's purchase price and that three-shift maintenance for 1 year is 24 percent of the equipments' purchase price. We found that these rates are reasonable for most communications equipment but are too high for modems. The rate for low-speed modems should be about 7 percent and for high-speed modems about 13 percent. Because of this lower rate IRS overstated communications equipment maintenance costs by $4 million.

Software maintenance

IRS estimated that it will cost about $106.2 million to maintain, improve, and update the application programs during the economic life of TAS. This cost, which represents National Office personnel cost for system analysis, programming, testing, and system documentation, includes $33.1 million for maintaining the application programs of the present system on an interim basis. We found that $15.7 million should be added to that estimate.

When costing the TAS alternative, IRS estimated that maintenance of the present system programs during fiscal years 1977 through 1980 would cost about $33.1 million. However, in costing the present system alternative for the same period, IRS estimated that maintenance for those same programs would cost about $48.8 million. These costs should be identical because the same amount of software maintenance will be needed under either alternative. Therefore, IRS underestimated these costs by about $15.7 million.

Operating personnel costs

IRS did not include personnel costs of about $552.5 million in costing either the TAS alternative or the present

system. This cost includes $127.6 million for personnel needed at the service centers to operate the computer systems and to maintain the applications programs, and $394.9 million for personnel to operate the data entry terminals of DDES. It also includes $30 million for personnel needed to staff the National Communications Center. (See p. 19.)

Personnel costs are a major element in operating automated data processing systems and should be included as a cost of each alternative being analyzed in such a way that if the proposal were adopted the costs would be trackable during implementation of the alternative. Further, any differences in personnel costs of the alternatives should be considered as cost reductions that could contribute to one alternative being the least costly.

IRS evaluated the impact that TAS will have on operating personnel to ascertain whether any personnel costs reductions could be achieved, rather than to ascertain the personnel cost of the TAS alternative. It determined that the operating personnel requirements of the service centers will be about the same under either alternative and concluded that there will be no personnel savings. IRS did not give further consideration to the personnel costs in completing the cost-benefit analysis.

THE COST OF INCREASED EFFICIENCY

Once TAS is implemented, the returns processing cycle will be reduced by about one-half of what it is today. This will make available more current tax account information and enable IRS to expedite taxpayer refunds by 3 to 4 weeks. However, expediting refunds would increase the need for additional Government borrowing or decrease the prospect of reducing the public debt temporarily, depending on the fiscal conditions of the time. In either case, to expedite the processing of $83 billion in refunds projected for 1985, the Treasury would incur $249 million to $332 million of imputed interest or additional interest cost.

The additional interest is the cost to borrow funds to replace the use of those taxpayer funds held in escrow that would be refunded to the taxpayers 3 to 4 weeks sooner under TAS. Conversely, processing of billable returns and deficiencies will be expedited by 3 to 4 weeks, accelerating the cash flow into the Treasury by an estimated $9.2 billion in 1985.

The additional interest cost would be offset by $27.6 million to $36.8 million because interest on Government borrowing will be reduced by the accelerated cash flow. The

interest amounts were computed based on the July 29, 1976, yield of short-term Treasury bills. Furthermore, the additional interest cost should be offset by the economic impact of getting the money back into the hands of the taxpayer sooner.

We did not include the imputed interest as a TAS cost because any decision to incur increased interest costs to accelerate refunds to the taxpayers is a matter of public policy rather than a question of the costs of the respective data processing systems.

PRESENT SYSTEM COSTS ARE UNDERSTATED

IRS estimated that it would cost about $495.5 million to enhance and operate the present system for the 10-year period on which the cost-benefit analysis was made. The enhancements were assumed to be sufficient to handle the increasing workload that IRS expects during that period of time.

The major categories of cost for the present system alternative are the same as the TAS cost categories. We analyzed various cost elements in those categories and found no material discrepancies in the IRS estimates for development costs, leasing and other costs, and software maintenance. However, we did find that capital investment is understated by about $0.8 million, equipment maintenance is understated by $0.9 million, and IRS omitted personnel operating costs of $552.5 million as discussed on page 29. Because of these items the present systems cost is understated by about $554 million. The following schedule shows the IRS estimate and our adjustments.

Category	IRS estimate	Our adjustments	Adjusted estimate
	(millions)		
Development cost	$ 31.8	$ -	$ 31.8
Capital investment	a/181.4	a/ .5	a/181.9
Lease and other costs	49.2	-	49.2
Equipment maintenance	105.9	.9	106.8
Software maintenance	127.2	-	127.2
Operating personnel	-	552.5	552.5
Total	$495.5	$553.9	$1,049.4

a/The total capital investment cost is reduced by estimated equipment residual value of $12.6 million on IRS estimate, $0.3 million on our adjustment, and $12.9 million on the adjusted estimate.

Capital investment/equipment maintenance

In estimating capital investments IRS did not include about $3.1 million needed to enhance DDES and about $0.9 million to maintain that equipment. It also overstated the cost of a computer system by about $2.3 million.

IRS plans to improve DDES as phase 1 of the TAS program. It estimated that adding an address key to the DDES terminal keyboards and an online file containing taxpayer addresses will cost about $3.1 million plus an additional $0.9 million for equipment maintenance. We determined that the enhancement can also be achieved within the present system since it is not dependent upon the TAS development. (See p. 20.) Therefore, the cost of $4 million should also be included as a present system alternative cost.

Regarding the overstatement of $2.3 million, IRS estimated that a computer system that would be installed at the National Computer Center in fiscal year 1983 would cost about $5.7 million. In calculating this amount it used the list prices of the system's equipment without discounting them. Since the computer system--called the IBM 370--may be outdated by 1983, its purchase price should be substantially lower than the $5.7 million. This is indicated by its predecessor system--the IBM 360--which is available today from third party vendors at prices as low as 33 percent of its original list price.

We believe that IRS should have used the 40-percent discount rate that it used in estimating the cost of the TAS equipment. Applying this rate to the list price of $5.7 million produces a more reasonable cost estimate of $3.4 million for the IBM 370. Accordingly, the IRS estimate for capital investments should be reduced by $2.3 million. This adjustment, combined with the DDES, reduced by the residual value of the equipment of $0.3 million (see footnote to schedule on p.30) results in a net understatement of capital investment and equipment maintenance amounting to $1.4 million.

CHAPTER 6

POTENTIAL PROBLEMS IN DEVELOPING TAS

It appears that the Tax Administration System is desirable from an economic point of view because its implementation, as it is now conceived, would produce economic benefits exceeding its cost while replacing older computer systems with current generation computers. However, potential software problems exist that may delay and possibly jeopardize the successful development of TAS.

POTENTIAL SOFTWARE PROBLEMS

IRS can expect to encounter software problems because the data base management software needed for TAS is not commercially available. The computer equipment vendors will need to customize off-the-shelf software or develop new software to fit the data base requirements. This will require substantially more time than the IRS request for proposal is providing. Consequently, a possibility exists that any data base management software IRS acquires under that plan would be underdeveloped and require substantial modifications or redesign before becoming operationally acceptable. That remedial effort could delay the development of TAS or jeopardize its successful completion.

Software problems similar to those that IRS can encounter have occurred in other large-scale Government system development projects. Such problems contributed to canceling the Air Force Logistics Command's Advanced Logistics System after that agency spent more than $175 million for software development. Other projects in which software problems caused costly delays include the United States Army's Combat Service Support System, the Department of Defense's World Wide Military Command and Control System, and the Federal Aviation Agency's Manpower and Personnel Information Systems.

Software is key to TAS development

Successful development of TAS is dependent on IRS acquisition of sophisticated data base management software. This software must be capable of managing, at each service center, a data base of about 64-billion characters. It will be stored on discs and mass storage devices readily accessable by a user within 5 seconds at a rate of about 100,000 transactions an hour. Also, it must handle complex data interrelationships and interface with a data communications system containing about 800 terminals per service

center. Without this sophisticated software to manage the data, the development of TAS, as planned by IRS, is not possible.

Software is not commercially available

Vendors familiar with the TAS requirements have told us that off-the-shelf or standard software would have to be customized, at substantial cost, to meet TAS requirements. They indicated that a thorough analysis of data base requirements would have to be made to identify needed software design changes. The complexity of those changes would be magnified by the large data base involved, the voluminous real time workload, the 5-second response time, and interfacing the software with other parts of the system, such as the data communications system. One vendor representative was of the opinion that it would take about 4 months just to study the requirements while another indicated that at least 6 months may be needed to customize the software after the requirements were fully understood.

Vendors also expressed concern over the large investment that each would have to make to compete for the TAS procurements. The investment, estimated to be as much as $2 million, will be needed to customize the data base management software and qualify it during the benchmarking phase of the procurement.

Software requires extensive development

Software development, including data base management software, is costly. Historically, it has required an extraordinary amount of time to design, test repeatedly and modify before it becomes operationally acceptable. For example, recent software implementation by a computer hardware company indicates that as much as 5 years could be required to design and develop operational software.

One software project similar to the IRS requirements is indicative of the time needed to customize data base management software. In this case, a Government agency selected a standard data base management package and spent about 27 months customizing it to fit the agency's data base requirements, determining design and the impact of design changes on the software as a whole, and establishing the system architecture. Another 9 months was needed for programming and component testing and an additional 9 months for operational testing.

Considering the sophistication of data base management software and particularly the time required for testing, it is our opinion that at least 12 months could be required to customize the software needed for TAS. If new software is needed, this time would be extended considerably.

Joint effort to customize software

IRS is aware that custom data base management software is needed for TAS and considered, including the requirement, in its request for proposals. It intended to acquire one part of the software through the competitive procurement, including benchmarking, and to develop the other part jointly with the winning vendor after contract award. This approach was considered because the competitive procurement of the total software package would require all vendors to incur software development costs to prepare for benchmarking. Also, the need for an extraordinary amount of detail about the complex taxpayer account record and file structure would be needed for the vendors to customize their data base management software. IRS wanted to limit software development costs to the winning vendor.

IRS, in considering the two-phased approach to acquiring the data base management software, recognized that the software would be developmental. The approach would have permitted IRS and the winning vendor to complete the development within an environment in which both would know the nature and complexity of the effort and the time required to complete it. But IRS abandoned this approach after the vendors indicated a desire to bid on the basis of functional system requirements rather than technical performance specifications. In this regard, functional system requirements are statements of the user's needs as seen by the user. This approach enables the vendor to bid software that it believes best meets the user's needs. On the other hand, technical automatic data processing specifications restrict the vendor to supply software that specifically meets technical criteria and which may or may not be responsive to user needs.

Software to be delivered fully developed

The IRS request for proposals provides for each vendor to determine, on the basis of functional requirements, the type of data base management software required for TAS and benchmark fully developed software within 7 months after the request is issued. To accomplish this, vendors, before benchmarking, will need to (1) analyze the data base requirements, (2) determine the extent their software will have to be modified, (3) make and test necessary technical changes and their

impact on the software as a whole, and (4) debug the software after the customization is completed. This is in addition to analyzing benchmark problems and configuring the operating software/equipment that will be proposed to IRS.

We believe that 7-month period is insufficient for vendors to customize their software and prepare it to meet IRS requirements. Further, if IRS acquires any software that is customized within the 7-month period, that software could be suspect as being underdeveloped or immature. Consequently, substantial modifications could be required to make this software operationally acceptable. This effort, after contract award, could delay the development of TAS and jeopardize its completion.

PROCUREMENT PLAN REDUCES RISKS

If the program proceeds (see p.37), the probability of IRS becoming engrossed in a prolonged and costly development effort can be reduced if IRS follows its procurement plan for acquiring the TAS computer systems. As distinguished from the request for proposal described above, this plan provides several decision points for IRS to determine whether the TAS program should proceed. These include the benchmark phase during which IRS must determine whether competing vendor's equipment and software satisfy TAS specifications and computer system acceptance testing where IRS determines if the selected computer system meets performance standards. By adhering to the evaluation criteria established for each phase, without compromises, IRS can minimize the risk of acquiring software that will not work.

The IRS plan also includes a provision for acquiring follow-on computer systems only after the prototype operation at the Covington Service Center is successfully completed. Strict adherence to this provision can limit the Government's investment in TAS to the design and development cost in the event that prototype operation is not successful.

CHAPTER 7

CONCLUSIONS, RECOMMENDATIONS, AGENCY COMMENTS, AND OUR EVALUATION

CONCLUSIONS

The present data processing system needs to be either redesigned or improved to provide the Internal Revenue Service with sufficient capacity and capability to process the increasing number of tax returns. Of the two alternatives, IRS has elected to redesign the system as the Tax Administration System and has prepared a cost-benefit analysis to support its decision.

Our review of the cost-benefit analysis shows that TAS could achieve substantial benefits attributable to enhanced productivity and reduced personnel costs despite the various adjustments that we made to the IRS estimates. Our analysis indicates that developing TAS is more desirable from an economic point of view than improving the present system for the long term. Further, the development of TAS, if successful, will allow IRS to replace outdated data processing equipment and techniques with more modern computers and technology. This should allow IRS to handle its increasing workload of processing tax returns more effectively and efficiently.

However, some factors should be considered in connection with developing TAS. One is the issue of imputed interest resulting from accelerated refunds. We did not include this as a TAS cost because any decision to incur increased interest costs to accelerate refunds to the taxpayer is a matter of public policy rather than a question of the costs of respective data processing systems. However, we believe the Department of the Treasury should keep the Congress fully informed about the imputed interest issue so that it can consider this question in connection with its deliberations on national budgets.

Another important factor is the risk involved in developing TAS, particularly since the processing of tax returns will be dependent upon the reliability of the software TAS uses.

The major risk is with the large data base and the software that is needed to manage the data. Unless carefully managed, the customizing of off-the-shelf data base management software or the developing of new software could jeopardize the successful development of TAS.

We believe that it will be necessary for IRS to exercise prudent management if TAS is to be successfully developed. Specifically IRS should insure that the benchmarking of the software and the computer system acceptance testing are accomplished and evaluated within the established criteria. It also should insure that the prototyping of the first computer system installed at the pilot service center is successful before committing the Government to the acquisition of the additional systems. Further, IRS should provide for a reevaluation of TAS to include a new cost-benefit study, in the event that the functional requirements are comprised or degraded during the development of TAS because of computer equipment or software performance.

A valid need exists to upgrade the present data processing system if IRS is expected to improve tax administration and to continue processing tax returns effectively and with increasing efficiency.

The manner in which IRS made its analysis does not provide a comparison of all of the relative costs and benefits of each alternative. By not disclosing benefits that can be achieved under either alternative, IRS understated TAS benefits and did not attribute any benefits to the present system alternative although an improved system could generate benefits. Nevertheless, we do not believe that a complete comparison would result in a different conclusion, since TAS benefits also would be increased by those that were offset.

The House and Senate Appropriations Committees reported in May and June 1976 on the IRS fiscal year 1977 budget hearings. These Committees deferred any approval of the TAS program until further study can be made, and the Administration is in a position to provide the Congress with more assurance of its advisability. Consequently, IRS was directed to provide a revised cost-benefit analysis and new procurement, development, and implementation plans before taking any action toward procurement of TAS.

RECOMMENDATIONS

If the TAS program is eventually approved by the Congress, we recommend that the Commissioner, IRS, take the following actions to insure that the program will be prudently managed and to minimize development risks.

- --Revise the cost-benefit analysis to show all TAS costs and benefits and provide for its update as TAS is developed.
- --Reevaluate estimated costs for system development or software so that any need for additional funding can

be anticipated to preclude development delays and adjust the analysis accordingly.

--Adopt the TAS cost-benefit analysis as a management tool to monitor costs and benefits as TAS is implemented.

--Provide the computer equipment vendors with a reasonable amount of time to produce the needed data base management software.

--Insure that benchmarking and computer system acceptance testing criteria are followed and that prototyping is successfully completed before acquiring additional computer systems.

--Provide for a reevaluation of TAS, to include a new cost-benefit study in the event that functional requirements are compromised or degraded by computer equipment and software performance.

--Consider obtaining a technical coordinator to oversee benchmarking, select TAS equipment, and assist in integrating TAS subsystems.

With regard to the issue of imputed interest we recommend that the Secretary of the Treasury keep the Congress fully informed on the impact that imputed interest has on borrowing so that public policy on accelerating taxpayer refunds can be formulated, in conjunction with its deliberations on national budgets.

AGENCY COMMENTS AND OUR EVALUATION

The Commissioner of Internal Revenue, by a letter dated July 23, 1976, generally concurred with the recommendations contained in our report. He also concurred with our adjustments to the IRS cost-benefit study with the exception of (1) eliminating all benefits for automating technical time reports and (2) adding identical personnel operating costs to both alternatives.

According to the Commissioner, IRS at one time anticipated that the new Audit Information Management System would include automated technical time reports. However, questions were subsequently raised about the capability of the Integrated Data Retrieval System files and equipment (which contain the Audit Information Management System and other time-sensitive systems) to handle any additional large volume of activity without seriously degrading the IDRS response time. Consequently, full development of the automated t hnical time reporting system and achievement of the estimated benefits before TAS is unlikely.

In this regard, IRS officials provided documentation to support the Commissioner's statement, and we have adjusted that section of the report (p.16) to reflect the benefits we determined are attributable to TAS based on our analysis of this part of audit benefits.

The Commissioner stated that, in reference to his second point, IRS eliminated as irrelevant those costs which were identical under either alternative. However, all operating costs were treated in the IRS analysis and shown separately. Further, he stated that the inclusion of identical operating costs in comparing alternatives could be misleading. As an example, he cited the schedule of adjustments to the Present System Costs on page 30 of the report and pointed out that the operating cost adjustment more than doubles the total figure, although the remaining two adjustments are less than 0.3 percent.

Operating costs were discussed, as indicated by the Commissioner, in the IRS cost-benefit study, but not in a manner which we believe readily identifies automatic data processing operating costs. As stated in the report, automatic data processing personnel operating costs are a major cost element in automated data processing systems, and we believe they should be included and analyzed in such a way that they would be trackable during the implementation of the selected alternative. The inclusion of personnel operating costs had no effect on the incremental or net TAS costs as shown by IRS in the cost-benefit study. However, this manner of disclosure makes all interested parties aware of the true life cycle costs, that is best estimates of costs for both systems.

The Commissioner stated that our recommendations to revise the cost-benefit analysis, adopt it as a monitoring tool, and reevaluate the TAS requirements are very important ones. He said that IRS was in the process of developing a comprehensive tracking system to account for all relevant costs; they are reviewing and updating user requirements and exploring means to accurately report benefits. Their plans include monitoring TAS at critical checkpoints and making reassessments whenever a major unscheduled event occurs.

In reference to our recommendation concerning a reevaluation of system development costs so that additional funding can be anticipated and the analysis adjusted, the Commissioner stated that such a reassessment was being made.

Also, IRS is extending the deadline for vendor proposals and allowing additional time for benchmarking and acceptance

testing pursuant to our recommendations covering these points.

The Commissioner stated that our concluding recommendation to employ a technical coordinator to oversee benchmarking, equipment selection, and subsystem integration had been carefully considered. He believes that the objective of this suggestion will be best achieved by IRS's own well qualified and experienced TAS staff. However, to insure that system's requirements are fully met, IRS has retained a competent outside firm to independently review TAS benchmark plans. He believes that their analysis will provide further confirmation that vendors which successfully meet the benchmark can produce the required hardware and software.

In our opinion, the use of a third party system coordinator or systems engineer can be of considerable value in the development of TAS. This function can be provided internally by IRS analysts or externally by a systems engineering organization. We believe the preferred course of action is to competitively select an outside organization which already has a demonstrated record of achievement and available technical staff. This approach will reduce the risk of system failure, particularly in integration of the complex subsystems, such as data processing and data communications. Moreover, the system engineering organization can provide impartial technical assistance in evaluating responses to the TAS request for proposals and later benchmark and acceptance tests. The approach we have recommended has been used successfully by other Federal agencies in the development of large complex systems.

Department of the Treasury / **Internal Revenue Service** / Washington, D.C. 20224

Commissioner

JUL 23 1976

Mr. Victor L. Lowe
Director, General Government Division
United States General Accounting Office
Washington, D.C. 20548

Dear Mr. Lowe:

We appreciate the comprehensive evaluation made by your staff of the costs and benefits of the proposed Tax Administration System (TAS). The periodic briefings and open discussions which you arranged throughout the audit were particularly helpful.

We are pleased with your overall conclusion that the cost/benefit analysis supports TAS, and that the substantial benefits from TAS indicate it is a more desirable option than improving the present system for the long term.

In general, we concur in the recommendations listed on pages 59 and 60 in the draft report, "A Proposed Automated Tax Administration System for Internal Revenue Service - An Evaluation of Costs and Benefits." We also concur in your proposed adjustments, with the exception of two: (1) the elimination of all benefits for automating technical time reports and (2) the addition of certain identical operating costs to both alternatives.

Apparently there was a misunderstanding about whether technical time reporting would be automated prior to TAS. At one time, we anticipated the new Audit Information Management System (AIMS) would include this important project; however, questions were subsequently raised about the capability of the Integrated Data Retrieval System (IDRS) files and equipment (which contain the AIMS and other time - sensitive systems) to handle any additional large volume of activity without seriously degrading IDRS response time.

This problem and alternative solutions are now under study. Nevertheless, full development of the automated technical time reporting system and achievement of the estimated benefits prior to TAS implementation is unlikely.

APPENDIX I

Mr. Lowe

With regard to the treatment of operating costs, we eliminated as irrelevant those costs which were identical under either alternative. However, all operating costs were treated in our analysis and these are shown in Figures 10 and 11 of our study.

We believe the inclusion of identical operating costs in comparing alternatives could be misleading. For example, the table on page 49 of the draft report shows an adjustment for operating costs which more than doubles the total figure, although the remaining two adjustments are less than three-tenths of one percent (0.3%).

We believe your recommendations to revise the cost/benefit analysis, adopt it as a monitoring tool, and reevaluate the TAS as requirements change are very important ones. Thus, we are in the process of developing a comprehensive tracking system to account for all relevant costs, reviewing and updating user requirements, and exploring means to accurately report benefits. Our plans include monitoring TAS at critical checkpoints and making reassessments whenever a major, unscheduled event occurs.

You also recommended that we reevaluate system development costs so that additional funding can be anticipated and the analysis adjusted, if necessary. Such a reassessment is taking place, including consideration of your suggestion to adjust development and software maintenance costs to include estimated interim costs. For comparison purposes, we are also analyzing the software/hardware cost ratio in development of the IDRS (which has decentralized data bases and on-line terminal capabilities like TAS).

We are also carrying out your recommendation to provide the computer equipment vendors with an extended deadline for proposals. The revised schedule will provide several additional months for vendors to respond to the solicitation document. Additional time for benchmarking and acceptance testing will also be allotted in line with your advice to take steps which will assure successful prototyping.

The concluding recommendation to employ a technical coordinator to oversee benchmarking, equipment selection and subsystems integration has been carefully considered. We believe the objective of this suggestion will best be achieved by the Service's own well qualified and experienced TAS staff. In order to assure that systems' requirements are fully met, however, we have retained a competent outside firm to independently review TAS benchmark plans. Their analysis will provide further confirmation that vendors who successfully meet the benchmark can produce the required hardware and software.

Mr. Lowe

[See GAO note 2 below.]

Once again, we commend your staff for a comprehensive and penetrating review of the TAS proposal's costs and benefits. GAO's confirmation of TAS overall cost-effectiveness and the Service's need to upgrade the present ADP system is appreciated.

With kind regards,

Sincerely,

Commissioner

GAO notes: 1. Page references in this appendix may not correspond to pages of this report.

2. Material no longer related to this report has been deleted.

PRINCIPAL OFFICIALS RESPONSIBLE FOR ADMINISTERING ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
SECRETARY OF THE TREASURY:		
William E. Simon	Apr. 1974	Present
George P. Shultz	June 1972	Apr. 1974
COMMISSIONER OF INTERNAL REVENUE:		
Donald C. Alexander	May 1973	Present
ASSISTANT COMMISSIONER, ACCOUNTS COLLECTION, AND TAXPAYER SERVICE (note a):		
James I. Owens (acting)	Aug. 1976	Present
Robert H. Terry	Aug. 1973	July 1976
ASSISTANT COMMISSIONER, PLANNING AND RESEARCH:		
Anita F. Alpern	Jan. 1975	Present
Dean J. Barron	Aug. 1973	Dec. 1974
DIRECTOR, TAX SYSTEM REDESIGN DIVISION:		
Patrick J. Ruttle	Dec. 1975	Mar. 1976
Donald G. Elsberry	Nov. 1973	Dec. 1975
DIRECTOR, TAX ADMINISTRATION SYSTEM DIVISION:		
Patrick J. Ruttle	Mar. 1976	Present

[a] In March 1976 the responsibility for TAS was transferred from the Office of the Assistant Commissioner (Planning and Research) to the Assistant Commissioner (Accounts, Collection, and Taxpayer Service). With the transfer, the Tax System Redesign Division was abolished and the Tax Administration System Division established.