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Report to the Chairman, Committee on
Governmental Affairs, U.S. Senate

GAO

June 1991

TAX SYSTEM MODERNIZATION

Further Testing of IRS' Automated Taxpayer Service Systems Is Needed



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United States
General Accounting Office
Washington, D.C. 20548

Information Management and
Technology Division

B-243619

June 20, 1991

The Honorable John Glenn
Chairman, Committee on
Governmental Affairs
United States Senate

Dear Mr. Chairman:

This report responds to your request for the results of our review of the Internal Revenue Service's (IRS) Taxpayer Service Integrated System (TSIS).

Too often, taxpayers who call IRS' toll-free numbers for information get a wrong answer. To remedy this, IRS developed TSIS—a project to automate its taxpayer inquiry program. IRS plans to spend \$250 million to develop, install, and operate TSIS through fiscal year 1998. We reviewed this project because of continuing congressional interest in the taxpayer inquiry program and because IRS requested significant funding to automate all of its 32 call sites beginning in fiscal year 1992.

IRS intended that employees, using TSIS, could find the correct answers to taxpayer questions, electronically order requested forms, set up an automated process to research taxpayer questions and call them back later, and access other systems containing information on taxpayers for research purposes.

Our objective was to determine whether tests to measure TSIS' effectiveness provided the information necessary to justify installing TSIS at all call sites. Details of our objectives, scope, and methodology appear in appendix I.

Results in Brief

IRS does not have the basic information it needs to decide whether to install TSIS at all 32 call sites. Tests to determine whether TSIS will improve service to taxpayers have been inconclusive; this includes tests IRS ran this filing season, which were too limited or otherwise flawed. Even if TSIS can improve service, IRS also might be able to realize improvements of equal magnitude through management changes.

In December 1990 the Office of Management and Budget (OMB) denied IRS' 1992 TSIS budget request for \$41 million. Because of this and our concerns, IRS has changed its plans for TSIS. It now intends to continue

testing TSIS rather than begin installing the system during fiscal year 1992, as originally planned. We agree with this approach, and recommend that such tests be constructed to measure the benefits of TSIS. IRS should also evaluate what management initiatives could be used along with TSIS to improve the accuracy and productivity of toll-free call sites.

Background

For more than 20 years IRS has operated a toll-free telephone program to help taxpayers understand complicated tax law and prepare their tax returns. Each year, several thousand IRS "assistors" at 32 call sites handle taxpayer calls. During the 1990 tax filing season, they answered about 17.4 million such calls. There are two groups of assistors—frontline and backup. Frontline assistors take a call and, if they can't answer the questions, refer the call to more experienced backup assistors. In supplying answers to taxpayer questions, assistors use labor-intensive, manual procedures and rely on paper reference materials.

The inaccuracy of answers that taxpayers often receive has been a concern for several years. For example, in a hearing on the 1990 tax filing season, the Chairman of the Subcommittee on Oversight of the House Committee on Ways and Means stated that he had been troubled by the low accuracy rate of IRS' telephone assistance program, noting that during the 1989 filing season only 63 percent of the answers IRS gave taxpayers were correct. Since then, the accuracy improved to about 84 percent for the 1991 filing season, due largely to management improvements. IRS is also concerned about the cost of this service. According to its data, the costs of providing taxpayer service rose from \$140 million in fiscal year 1984 to \$318 million in fiscal year 1990—an increase of 127 percent. During this same period the number of taxpayers taking advantage of the program increased by only 31 percent, from 54 million to 71 million.

In the mid-1980s IRS started three separate automation projects to improve taxpayer service. Two of them, the Automated Taxpayer Service System (ATSS) and the Taxpayer Service Expert Assistant System, focused on developing advanced workstations for assistors. The third project was to develop an information system for taxpayer service managers. This project has been delayed until IRS is better able to evaluate the managers' needs.

IRS' Taxpayer Services Division began developing ATSS in the mid-1980s to improve accuracy and productivity. The ATSS concept called for replacing paper reference materials with a computerized data base of IRS

publications and forms that could be rapidly researched to answer taxpayers' questions. ATSS also was designed to (1) allow forms requested by taxpayers to be electronically ordered, (2) set up an automated process for researching taxpayer questions and calling back later, and (3) eventually link up with other IRS systems so that taxpayer information could be retrieved for research purposes.

At the same time that ATSS was being developed, IRS' Research Division was developing the Expert System to improve the accuracy of responses. With this system the assistor enters a key word or phrase—such as capital gains—relating to the taxpayer's question. The computer then displays questions to be asked of the taxpayer. As the questions are asked and answered new displays appear; in this way both parties are guided to the right answer to the original question.

The systems were tested during the 1989 and 1990 tax filing seasons at call sites in Boston (Expert System) and Dallas (ATSS). In January 1990 IRS decided to combine the efforts, and in March established the TSIS office to manage the combined project. Since then IRS has placed priority on further refining and testing the Expert System and on combining Expert System capabilities with the ATSS concept to form TSIS. During the 1991 tax filing season, the Expert System was tested at the Boston and Philadelphia call sites, and on a very limited basis in Los Angeles. TSIS was tested on a limited basis in Dallas. IRS planned to use the data developed in Boston, Philadelphia, and Dallas to decide whether to begin a phased installation of TSIS at all 32 call sites nationwide between 1992 and 1994.

ATSS and Expert System Tests Were Inconclusive

Tests of the Expert System and ATSS during the 1989 and 1990 tax filing seasons did not conclusively demonstrate whether the automated systems could improve accuracy and productivity.

Expert System

The Boston call site tested a prototype of the Expert System during the 1989 filing season to see if it was feasible. IRS concluded that the Boston test results looked promising, so a larger-scale prototype of the system was developed and tested during the 1990 filing season; the test involved personnel at approximately 140 workstations. This prototype was supposed to significantly improve accuracy without reducing the number of calls answered. For the test all frontline assistors had to use

the system without referring to paper copies of forms and publications. Further, they had to refer all questions not on the system (whether or not they knew the answer) to a backup assistor.

While test results showed the system's potential, they also identified problems. When the system contained information to answer taxpayers' questions and was used correctly, the answers received by taxpayers were correct 100 percent of the time. However, the system could not answer about 62 percent of the questions taxpayers asked because it lacked adequate information. Further, assistors often used the system incorrectly or did not use it when they could have. When this happened the assistors' accuracy rate was only 43 percent. In addition, productivity of assistors—as measured in calls answered per hour—decreased from 15.1 in 1989 to 11.7 in 1990—a decline of 23 percent. According to the test evaluation report, it took more time to answer simple questions using the system than it took to do so manually; IRS personnel found that after they gained experience in answering questions using the system, it was not particularly helpful in answering simple questions. Assistors also found that training on the system needed to be improved.

Another problem with the test methodology was that IRS was testing an evolving system—the system and guidelines for using it were changing constantly, obviously increasing the difficulty of those trying to learn to use it. According to the TSIS project manager, other shortcomings included workplace procedures being altered to accommodate the testing and education level of the assistors being higher than average, conditions leading to distorted test results. Project management officials, deciding that the test was inconclusive, slated further testing for the 1991 filing season.

In spite of these problems, IRS officials strongly believed in the system's ability to significantly improve the accuracy of responses, and cited a 21-percentage-point gain in accuracy at the Boston call site between the 1989 and 1990 filing seasons, as measured using the Integrated Test Call Survey System (ITCSS)—IRS' official mechanism for measuring the accuracy of responses. However, the IRS official in charge of evaluating the 1990 test told us that ITCSS had shortcomings in evaluating the Expert System because ITCSS measurements did not consider whether assistors used the Expert System properly, or at all, in responding to taxpayers.

ATSS

After several years of development, IRS began testing ATSS during the 1989 filing season. At Dallas, IRS tested the ATSS component that allows

assistors to look up answers to taxpayers' questions using a computerized data base of IRS publications and other reference materials. However, because those participating in the test were only using it to answer at most 25 percent of the questions asked, IRS decided that the test was inconclusive. Further impediments to IRS' assessment were that the most important references were not on the system, some material was inaccurate, and the computers were slow.

For 1990 more publications were added to the data base, inaccuracies in the material were corrected, and faster hardware and software were installed. Another Dallas test, which IRS called a proof of concept test, was performed using two groups of 30 assistors each. One group was given computers and training in ATSS; the second group, the control group, answered taxpayer questions using paper reference materials.

Like the Expert System test, the 1990 ATSS test produced inconclusive results. For example, using a measurement specifically constructed for the test, IRS found that assistors using ATSS correctly answered almost 94 percent of taxpayers' questions; those not using ATSS answered questions correctly about 90 percent of the time. But when results were measured using ITCSS, those who used ATSS were found to have answered questions correctly only 76 percent of the time, while those not using ATSS gave correct answers over 86 percent of the time, according to ITCSS. The ATSS evaluation team believed that the specially developed measurement was better than ITCSS because it included a larger sample of phone calls, and used actual rather than test calls. We believe that ITCSS provides more accurate test results, however. On the basis of our previous work, we know that the test questions were well-developed, the correct answers reviewed carefully, and the test administered reliably.¹ The test results also showed that less experienced personnel had higher rates of productivity when they used the system, but more experienced ones' productivity suffered. The ATSS evaluation team believed that this was probably because more experienced assistors were interested in exploring the larger number of information sources available in ATSS, but there was no analysis to support this assertion. The TSIS project manager said that the result was also inconclusive because the test did not use the hardware and software that would be in place in the operational system.

¹See, for example, Tax Administration: Monitoring the Accuracy and Administration of IRS' 1989 Test Call Survey (GAO/GGD-90-37, Jan. 4, 1990), and Tax Administration: IRS' 1990 Filing Season Performance Continued Recent Positive Trends (GAO/GGD-91-23, Dec. 27, 1990).

IRS Sought to Install Expert System Despite Inconclusive Test Results

Because IRS wanted to quickly improve accuracy, it decided in June 1990 to install the pilot Expert System at four more locations for the 1991 filing season, even though the 1990 test results were inconclusive. Treasury granted IRS approval to begin installing the system on the basis of a partially developed requirements analysis. This analysis did not contain a cost/benefit study; state specific, measurable objectives for the system; or discuss non-automation alternatives—all of which are required by Treasury directives. According to Treasury and IRS officials, approval to begin installing the system was granted with the understanding that the system would be evaluated further during the 1991 filing season and that a complete requirements analysis would then be submitted.

The plan to install the Expert System at four more sites was not carried out because of a delay in awarding the contract to supply the needed workstations. However, IRS was able to purchase enough workstations through the Air Force Standard Multiuser Small Computer Requirements Contract² to install the system at one additional site, Philadelphia, and to expand the number of workstations at Boston.

IRS Will Not Be Able to Make Installation Decision After This Year's Tests

During this year's filing season, IRS tested the Expert System portion of TSIS at Boston and Philadelphia and the full TSIS on a limited basis in Dallas. IRS planned to use these test results to decide whether to install the system at five more sites for the 1992 filing season and at all 32 call sites by the 1994 filing season.³ Therefore, the Philadelphia, Boston, and Dallas tests are important in helping IRS to make the right decision.

In our opinion, after this year's test results are evaluated IRS still will not have the information it needs to decide whether it should begin installing the system at more call sites. This is because (1) operational changes were made at Philadelphia at the same time that the system was installed, (2) IRS has not fully evaluated non-automation alternatives, and (3) TSIS testing was too limited for results to be projectable.

²All Department of Defense branches and agencies and all federal civilian agencies can make purchases from this contract. The contract includes multiuser computer systems, communications/networking features, software, training, maintenance, and technical support.

³IRS planned a phased approach to TSIS installation. That is, the five sites receiving the Expert System portion of TSIS for 1992 would be upgraded to the fully integrated system in 1993. Additional sites would receive the Expert System in 1993, and would be upgraded to the full system in 1994, along with all remaining sites.

Operational Changes at Philadelphia Interfere With Conclusive Results

The objectives of the Philadelphia test were to assess the impact of the Expert System on call site operations and to improve the quality of assistance provided by IRS at the Philadelphia call site. However, because changes were made for the 1991 filing season in how Philadelphia operates at the same time the Expert System was introduced, IRS won't be able to distinguish between the effects of operational changes and automation on performance. For example, unlike in previous years, frontline assistors were limited to answering simple questions about procedures and tax law while the backup assistors were divided into specialty areas such as income, deductions, and capital gains and losses, only answering questions concerning their specialty. Many of these calls would have been handled by the frontline assistors in previous years.

Unlike Boston's, Philadelphia's system was newly installed for 1991. This Philadelphia test was, then, the only opportunity this year to compare a call site's accuracy and productivity using the Expert System, with the accuracy and productivity results from the previously used manual system. This opportunity appears to have been lost, though, since the operational changes at Philadelphia have skewed the results. Reliably comparing call site performance from one year to the next would have entailed, to the extent practical, holding operating procedures from the previous year constant during the test period.

Non-Automation Alternatives Need to Be Explored

Changes other than automation may also improve accuracy and service at the call sites. Treasury directives require that, before purchasing automated systems, non-automated alternatives be considered as a way to satisfy the need. However, IRS' requirements analysis did not discuss non-automation alternatives.

Adequate consideration of non-automation alternatives is an important issue because many call sites that were not automated nevertheless significantly improved in accuracy between 1989 and 1990. While Boston's accuracy improved by 21 percentage points, three other sites that did not have the Expert System had comparable accuracy gains, and 24 sites improved accuracy by 10 percentage points or more. Overall accuracy for all call sites rose from 63 percent in 1989 to 77 percent in 1990; it was nearly 84 percent in 1991. IRS officials have not specifically studied why accuracy has improved but, as we reported in December 1990,⁴ they believe several factors contributed: (1) increased managerial

⁴GAO/GGD-91-23, Dec. 27, 1990.

emphasis, (2) a more stable and experienced work force, and (3) development of guides to help employees probe for all the facts needed about a taxpayer's situation before attempting to answer a question. Officials at the three call sites whose accuracy gains were comparable to Boston's said that in addition to these reasons, incentives were given to employees with high rates of accuracy. In addition, they said, they were better able than in previous years to pinpoint employees who needed more training.

Test of Fully Integrated System Is Limited

IRS originally planned to test the integration of the Expert System and ATSS functions using all Dallas assistors this year. However, because of the contract delay mentioned earlier, IRS could not purchase the equipment it needed on time. Therefore, the 1991 Dallas test used the equipment left over from the 1990 ATSS test, which limits the test to 55 employees instead of the more than 300 at the site. The acting project manager said that the 1991 test would not test the new system hardware and software, and would not test the local area network that will eventually be used with the system. Because of these limitations, IRS plans to retest the system in 1992 using all personnel and new equipment at the Dallas site.

Concerns About Testing and Costs Have Caused IRS' Plans to Change

On December 17, 1990, we met with IRS officials to discuss the results of our work on TSIS. At that meeting we said that IRS still needed to identify specific objectives for the project and should explore non-automation alternatives more thoroughly. We also expressed our concerns about the shortcomings in the 1991 tests.

OMB has also had concerns about TSIS, and in December 1990 denied IRS' fiscal year 1992 budget request for \$41 million to expand it. OMB denied the request because the system was not shown to be cost-effective, a conclusion based on the results of the test of the Expert System in Boston, and TSIS' high life-cycle cost.

At IRS' request, we met again on February 22, 1991. At this meeting IRS officials agreed with our concerns, and said that plans for TSIS changed significantly in February 1991. Specifically, rather than installing the Expert System at additional sites for 1992, IRS now plans to continue testing the Expert System in Boston and Philadelphia, and will expand the test of TSIS to all taxpayer assistors in Dallas. Officials also said they realized that the benefits of TSIS had not been demonstrated. The emphasis for the 1992 filing season will be to design a test that will

yield valid and defensible results, more thoroughly test TSIS, and refine the Expert System.

In addition, IRS now plans to extend the development and installation of TSIS through fiscal year 1997, rather than fiscal year 1994 as had been planned. In fiscal year 1993 IRS plans to test TSIS at two more sites, then make a decision on whether to install the system nationwide. Assuming the additional tests support a decision to go ahead with the system, IRS plans to install TSIS at seven sites each year in fiscal years 1994, 1995, 1996, and 1997. Because of the changes to the program, IRS' expenditure for TSIS is expected to be \$14 million in fiscal year 1991, down from \$23 million. Using Tax Systems Modernization carryover funds,⁵ IRS also plans to spend \$14 million in fiscal year 1992, instead of the \$41 million originally requested. IRS estimates that it will cost \$250 million to develop, install, and operate TSIS through fiscal year 1998.

Previous IRS Systems Development Problems

We have previously reported on instances in which IRS, in an effort to respond quickly to a problem, has tried to proceed with projects before they were ready. For example, our May 1989 report on IRS' Electronic Filing System noted that IRS planned to expand the system nationwide, but had not clearly defined system requirements or evaluated the costs, benefits, and technical feasibility of other approaches.⁶ As a result, the agency was not in a position to know if this was the best approach for expanding the system.

Similarly, our July 1990 report on IRS' Automated Underreporter System pointed out that IRS officials' haste to complete the system led them to use incomplete systems designs and shortcut important systems development steps. These problems, compounded by a lack of adequate technical expertise and experience, delayed the scheduled start of the system by about 2 years.⁷

⁵IRS designated TSIS as a Tax Systems Modernization project in May 1990. Funds appropriated for Tax System Modernization are available until spent; therefore they can be carried over from one year to the next.

⁶ADP Modernization: IRS Needs to Assess Design Alternatives for Its Electronic Filing System (GAO/IMTEC-89-33, May 5, 1989).

⁷Tax System Modernization: Management Mistakes Caused Delays in Automated Underreporter System (GAO/IMTEC-90-51, July 10, 1990).

Conclusions

Faced with too many wrong answers being given to taxpayers in its toll-free telephone assistance programs, IRS believed it had to act quickly and introduced an automated solution to the problem. As a result, it decided to begin installing parts of TSIS before the benefits of the system were demonstrated. We found, as did OMB, that 2 years of testing to determine whether TSIS will improve service to taxpayers have been inconclusive. We also found that IRS has not determined, as required by Treasury directives, the improvements that resulted from other operational changes.

IRS has now adopted a slower pace to TSIS development. Further testing of TSIS obviously is needed during the 1992 filing season, and if properly constructed and carried out, should yield the information IRS needs to decide whether to install TSIS at additional call sites.

Recommendations to the Commissioner of Internal Revenue


To ensure that TSIS is not installed nationwide until its benefits have been clearly demonstrated, we recommend that the Commissioner of Internal Revenue make sure that IRS develops a test methodology that will allow it to conclusively determine the impact of TSIS on call site operations. This methodology should (1) identify specific, measurable benefits of TSIS, and (2) distinguish to what extent benefits are due to automation and to what extent they are due to other operational changes. Finally, if IRS decides to install TSIS nationwide, it should consider how TSIS can be most effectively combined with ongoing management improvement initiatives to enhance the accuracy and productivity of taxpayer service call sites.

In its June 4, 1991, comments on our report, IRS agreed with the report recommendation that the benefits of TSIS be clearly demonstrated before nationwide installation. The letter stated that IRS will be conducting additional tests during the 1992 filing season to more precisely determine the benefits of such a system. Detailed IRS comments are contained in appendix II.

As arranged with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution of it until June 25, 1991. At that time, we will send copies to the Secretary of the Treasury; the Commissioner of Internal Revenue; the Director, Office of Management and Budget; and to other congressional committees interested in the matters discussed above. The report will also be made available to others upon request. This report was prepared under the direction of

Howard G. Rhile, Director, General Government Information Systems, who can be reached at (202) 275-3455. Major contributors to this report are listed in appendix III.

Sincerely yours,

A handwritten signature in black ink that reads "Ralph V. Carlone". The signature is written in a cursive style with a large initial 'R' and a long, sweeping underline.

Ralph V. Carlone
Assistant Comptroller General

Contents

| | |
|--|----|
| Letter | 1 |
| Appendix I Objectives, Scope, and Methodology | 14 |
| Appendix II Agency Comments | 15 |
| Appendix III Major Contributors to This Report | 17 |

Abbreviations

| | |
|-------|--|
| ATSS | Automated Taxpayer Service System |
| GAO | General Accounting Office |
| IMTEC | Information Management and Technology Division |
| IRS | Internal Revenue Service |
| ITCSS | Integrated Test Call Survey System |
| OMB | Office of Management and Budget |
| TSIS | Taxpayer Service Integrated System |

Objectives, Scope, and Methodology

We reviewed the Taxpayer Service Integrated System (TSIS) project to determine whether tests to measure TSIS' effectiveness provided IRS the information necessary to justify installing the system at all of its telephone call sites. We performed the review because of continuing congressional interest in the quality of service that IRS provides to taxpayers, and because IRS requested significant funding to automate all of its 32 taxpayer service call sites beginning in fiscal year 1992.

We conducted our audit work between June 1990 and April 1991, primarily in Washington, D.C. We also visited call sites in IRS' Boston and Dallas districts, where IRS has been testing automated taxpayer service systems. To acquire background information on IRS' actions to automate taxpayer service, determine their status, and learn about IRS' plans for these automation projects, we interviewed IRS officials responsible for designing and developing automated systems, and the project managers and staff for the Taxpayer Service Integrated System (TSIS). We also reviewed IRS' systems development policies and regulations, as well as various documents related to TSIS, such as planning and budget documents, status reports, test reports, and requirements analyses.

We performed our review in accordance with generally accepted government auditing standards.

Agency Comments



COMMISSIONER

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

JUN - 4 1991

Mr. Howard G. Rhile
Director, General Government
Information Systems
United States General Accounting Office
Washington, DC 20548

Dear Mr. Rhile:

We have reviewed your recent draft report entitled, "Tax System Modernization: Further Testing of IRS' Automated Taxpayer Service Systems is Needed".

We agree with the recommendation that the benefits of the Taxpayer Service Integrated System be clearly demonstrated before nationwide installation. We will be conducting additional tests next filing season to more precisely determine the benefits of such a system.

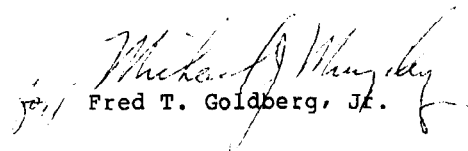
During the past several years, the Internal Revenue Service has made great strides in improving the accuracy of our responses to taxpayer inquiries. Although we are pleased by our progress, we can and should do better. Coupled with our ongoing management improvement initiatives, we believe that the Taxpayer Service Integrated System holds great promise for improving the assistance we provide to taxpayers. Further testing is needed, however, before we know how to make the best use of this technology. Detailed measurement plans are being developed for the next year's test with executive oversight being provided by an Information Systems Control Group.

Review and oversight by GAO provide useful information to ensure that Tax Systems Modernization meets the needs of the taxpayers and the government. We look forward to continuing our cooperative relationship as we proceed with this important endeavor.

Our detailed comments on the specific report recommendations are enclosed.

Best regards.

Sincerely,


Fred T. Goldberg, Jr.

Enclosure

IRS COMMENTS ON RECOMMENDATIONS
CONTAINED IN GAO DRAFT REPORT ENTITLED
"TAX SYSTEM MODERNIZATION: FURTHER TESTING OF IRS'
AUTOMATED TAXPAYER SERVICE SYSTEM IS NEEDED"

Recommendation:

To insure that TSIS is not installed nationwide until its benefits have been clearly demonstrated, we recommend that you make sure that IRS develops a test methodology that will allow it to conclusively determine the impact of TSIS on call site operations. This methodology should (1) identify specific, measurable benefits of TSIS, and (2) distinguish to what extent benefits are due to automation and to what extent any benefit is due to other operational changes. Finally, if IRS decides to install TSIS nationwide, it should consider how TSIS can be most effectively combined with ongoing management improvement initiatives to enhance the accuracy and productivity of taxpayer service call sites.

Comment:

We agree with the recommendation that the benefits of TSIS be clearly demonstrated before nationwide installation. The project is following an action plan including an extensive economic analysis of a fully automated site after completion of the fiscal year 1992 filing period. The analysis will be available in June of that year. The methodology being used will identify specific, measurable benefits of the system. The analysis compares the benefits of a particular alternative or course of action to the costs associated with that alternative. It incorporates a time value analysis, comparing the current worth of an alternative to the current worth of a second or third alternative. In addition, Information System Control Groups (ISCGs), which provide executive oversight, have been dealing with these issues during the last 12-18 months. As a result, risks attendant to business decisions are being mitigated. In addition, the project office, in cooperation with their partner, Taxpayer Service Division, has established formal Quality Measures which will be considered as part of the economic analysis. These Quality Measures are important management tools in the Service's Tax Systems Modernization effort. It is our plan to integrate Tax Systems Modernization initiatives with the ongoing management improvement initiatives to enhance the accuracy and productivity of the Taxpayer Service call sites.

We recognize the concerns that GAO has identified with the Electronic Filing System. However, the quality measurement system, the Information Systems Policy Board, and the Information System Control Group process will minimize the risks of TSIS implementation.

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