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Testimony

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TAX SYSTEMS  
MODERNIZATION

Actions Underway But  
Management and Technical  
Weaknesses Not Yet  
Corrected

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Mr. Chairman and Members of the Committee:

We are pleased to be here today to discuss the Internal Revenue Service's (IRS) efforts to modernize its tax processing system. In July 1995, we reported that pervasive management and technical weaknesses placed at serious risk the government's multibillion dollar Tax Systems Modernization (TSM) effort. To correct these weaknesses, we made more than a dozen recommendations to improve IRS' (1) electronic filing strategy, (2) strategic information management, (3) software development, (4) systems architecture, integration, and testing, and (5) accountability and control of systems modernization.<sup>1</sup>

In March 1996 testimony<sup>2</sup> before the Committee, we reiterated our concerns that IRS' effort to modernize tax processing was jeopardized by persistent and pervasive management and technical weaknesses and we advised the Committee that IRS' ongoing efforts did not include milestones or provide enough evidence to conclude that weaknesses will soon be corrected. We also noted that the development of IRS' Cyberfile electronic filing system exhibited many of the technical weaknesses that we identified with TSM. We recently completed a review for the Committee on Cyberfile contractual issues and issued a report which identifies severe acquisition and financial problems.<sup>3</sup>

In a May 1996 report required by the Treasury, Postal Service, and General Government Appropriations Act of 1996, the Department of the Treasury delineated, and we verified, that IRS has initiated a number of actions and is making some progress in addressing our July 1995 recommendations.<sup>4</sup> For example, IRS (1) is preparing a comprehensive strategy to maximize electronic filing, (2) has created an investment review board to select, control, and evaluate its information technology investments, (3) has updated its system engineering process, is updating its systems life cycle methodology, and is working across various IRS organizations to define disciplined processes for software requirements management, quality assurance, configuration management, and project planning and tracking,

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<sup>1</sup>Tax Systems Modernization: Management and Technical Weaknesses Must Be Corrected If Modernization Is To Succeed (GAO/AIMD-95-156, July 26, 1995).

<sup>2</sup>Tax Systems Modernization: Management and Technical Weaknesses Must Be Overcome To Achieve Success (GAO/T-AIMD-96-75, March 26, 1996).

<sup>3</sup>Tax Systems Modernization: Cyberfile Project Was Poorly Planned and Managed (GAO/AIMD-96-140, August 26, 1996).

<sup>4</sup>Report to House and Senate Appropriations Committees: Progress Report on IRS's Management and Implementation of Tax Systems Modernization (Department of the Treasury, May 6, 1996).

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and (4) has completed a descriptive overview of an integrated, three-tier, distributed systems architecture.

However, as we reported in June 1996,<sup>5</sup> many of these actions are still incomplete and do not respond fully to any of our recommendations. Examples include the following:

- The comprehensive business strategy for electronic filing is not scheduled for completion until October 1996.
- IRS does not yet have a repeatable process for selecting, controlling, and evaluating its technology investments; not all planned and ongoing systems have been reviewed in a single investment portfolio; and the basis for making investment decisions is still unclear.
- The procedures for requirements management, quality assurance, configuration management, and project planning and tracking are being developed but are still incomplete.
- IRS has completed neither its integrated systems architecture nor its security and data architectures and has not completed a schedule for doing so.

As a result, IRS has not made adequate progress in correcting its management and technical weaknesses, and none of our recommendations has been fully implemented. Until IRS' weaknesses are corrected, we believe the Congress should consider limiting TSM spending to only cost-effective modernization efforts that (1) support ongoing operations and maintenance, (2) correct IRS' pervasive management and technical weaknesses, (3) are small, represent low technical risk, and can be delivered in a relatively short time frame, and (4) involve deploying already developed systems only if these systems have been fully tested, are not premature given the lack of a completed architecture, and produce a proven, verifiable business value.

In its report, Treasury states that because IRS does not currently have the capability to develop and integrate TSM, it will obtain additional contractual help to accomplish these tasks. While effective use of additional contractors may, in the future, strengthen IRS' capability to modernize, IRS clearly does not now have the capability to manage all of its current contractors successfully. For example, Cyberfile, which is being built by contractors, has used many of the same undisciplined software development practices we had criticized at IRS and, as a result, could not

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<sup>5</sup>Tax Systems Modernization: Actions Underway But IRS Has Not Yet Corrected Management and Technical Weaknesses (GAO/AIMD-96-106, June 7, 1996).

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be piloted during the 1996 tax filing season as originally planned. Therefore, if IRS is to use additional contractors effectively in the future, it will have to first strengthen and improve its ability to manage software development contractors.

I will now discuss the results of our Cyberfile review, the TSM redirection efforts described in Treasury's report, IRS' progress in addressing each of the recommendations we made in July 1995, and actions that must be taken before IRS obtains additional contractual support to develop TSM.

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## Cyberfile Project Was Poorly Planned and Managed

We found that IRS' selection of the Department of the Commerce's National Technical Information Service (NTIS) to develop Cyberfile was not based on sound analysis. IRS did not adequately analyze requirements, consider alternatives, or assess NTIS' capabilities to develop and operate an electronic filing system, even though the need for these critical prerequisites was brought to management's attention as early as July 1995. Instead, IRS selected NTIS because it was expedient and because NTIS promised IRS, without any objective support, that it could develop Cyberfile in less than 6 months and have it operating by February 1996.

In an attempt to meet these self-imposed time constraints, the Cyberfile project was hastily initiated. Development and acquisition were undisciplined, and the project was poorly managed and overseen. As a result, it was not delivered on time, and after advancing \$17.1 million to NTIS, IRS has suspended Cyberfile's development and is reevaluating the project.

We also found that IRS and NTIS did not follow all applicable procurement laws and regulations in developing Cyberfile. IRS cited the Brooks ADP Act (40 U.S.C. 759) for its authority to procure Cyberfile. However, IRS did not perform requirements and alternatives analyses as required by the Federal Information Resources Management Regulation which implemented the Brooks ADP Act. NTIS also violated applicable procurement laws and regulations in developing Cyberfile. To obtain contractor services quickly, NTIS modified an existing sole source contract awarded through the Small Business Administration's (SBA) small and disadvantaged businesses program, referred to as the "Section 8(a)" program. The modification provided \$3.3 million for Cyberfile and increased the total contract value to \$4.3 million. NTIS did not submit this modification to SBA for review as required under the Section 8(a) program. Further, this modification circumvented SBA rules requiring that contracts over \$3.0 million be

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competed among eligible Section 8(a) firms rather than being issued on a sole source basis. In addition, at the time of modification, the contractor was not an eligible 8(a) firm under SBA regulations, and had NTIS submitted the modification to SBA as required, responsible officials at SBA said they would have rejected it.

Our review of Cyberfile obligations and costs found that they were not accounted for properly. IRS (1) significantly understated the obligations related to the project and (2) improperly accounted for the \$17.1 million advanced to NTIS. In addition, NTIS did not promptly and accurately account for Cyberfile obligations and costs. Specifically, significant financial transactions were not properly documented and obligations and costs were not recorded promptly and accurately.

Finally, we found that adequate financial and program management controls were not implemented to ensure that Cyberfile was acquired cost-effectively. As a result, excess costs were incurred. For example, the interagency agreement between IRS and NTIS was not structured to minimize costs, and Cyberfile costs continued to be incurred after the project was suspended. Specifically, the agreement allowed NTIS to assess a 10 percent management fee for (1) costs associated with NTIS' failure to follow preferred management practices, such as late payment penalties and (2) items which IRS could have readily obtained directly and provided to NTIS, such as computer equipment acquired under existing government contracts. In this regard, IRS incurred about \$89,000 in NTIS management fees for purchasing items costing over \$886,000 under an existing Department of the Treasury contract which is administered by IRS. If IRS had purchased these items directly and provided them to NTIS, it could have avoided NTIS' \$89,000 management fee.

In light of the severity of acquisition and financial problems identified during our review, we recommended, inter alia, that before resuming work on Cyberfile, IRS and the Department of Commerce each submit a report to the Committee detailing the (1) weaknesses in IRS' and NTIS' acquisition and financial management processes and controls that permitted Cyberfile mismanagement and (2) actions that have been taken to ensure that these weaknesses in processes and controls have been corrected and that resulting mismanagement does not recur.

In commenting on our Cyberfile report, Treasury agreed with our findings and recommendations. It stated that it shared our concerns regarding IRS' management of the Cyberfile project, and that the experience with the

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project underscores the importance of IRS implementing our recommendations. IRS did not disagree with any of our findings or recommendations. It said that Cyberfile was not successful and encountered problems and explained that it is conducting an internal review of Cyberfile to identify a full range of corrective action.

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## Treasury's TSM Report Acknowledges Weaknesses and Describes TSM Redirection Efforts

The Department of the Treasury, in its May 1996 report to the Senate and House Appropriations Committees, provides a candid assessment of TSM progress and future redirection, and a description of ongoing and planned actions intended to respond to our July 1995 recommendations to correct management and technical weaknesses. Treasury found that despite some qualified success, IRS has not made progress on TSM as planned because systems development efforts have taken longer than expected, cost more than originally estimated, and delivered less functionality than originally envisioned. It concluded that significant changes are needed in IRS' management approach and that it is beyond the scope of IRS' current ability to develop and integrate TSM without expanded use of external expertise.

The report notes that work has been done to rethink, scale back, and change the direction of TSM. Additional changes are still in progress with actions underway to restructure the management of TSM and expand the use of contractors. Agreeing that our July 1995 recommendations are valid, the report notes that more work has to be done to respond effectively to our recommendations. It states that progress in IRS' management and technical areas can only be achieved by institutionalizing improved practices and monitoring projects for conformance to mandated standards and practices.

However, the report does not address the basic problem of continuing to invest hundreds of millions of dollars in TSM before the requisite management and technical disciplines are in place. Nor does it address the risk inherent in shifting hundreds of millions of dollars to additional contractual efforts when the evidence, as demonstrated with IRS' Cyberfile project, is clear that IRS does not have the disciplined processes in place to manage all of its current contractual efforts effectively.

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## Fundamental Management and Technical Weaknesses Are Being Addressed, but None Have Been Corrected

IRS has initiated a number of actions to address management and technical weaknesses that continue to impede successful systems modernization. However, ongoing efforts do not correct the weaknesses and do not provide enough evidence to determine when they will be corrected and what steps if any are being taken in the interim to mitigate the risks associated with ongoing TSM spending.

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## IRS Does Not Yet Have a Comprehensive Strategy to Maximize Electronic Filings

IRS has identified increasing electronic filings as critical to achieving its modernization vision. In our July 1995 report, we said that IRS did not have a comprehensive business strategy to reach or exceed its goal of 80 million electronic filings by 2001. IRS' estimates and projections for individual and business returns suggested that by 2001, as few as 39 million returns may be submitted electronically, less than half of IRS' goal and only about 17 percent of all returns expected to be filed.

We reported that IRS' business strategy would not maximize electronic filings because it primarily targeted taxpayers who use a third party to prepare and/or transmit simple returns, are willing to pay a fee to file their returns electronically, and are expecting refunds. Focusing on this limited taxpaying population overlooked most taxpayers, including those who prepare their own tax returns using personal computers, have more complicated returns, owe tax balances, and/or are unwilling to pay a fee to a third party to file a return electronically.

We concluded that without a strategy that also targets these taxpayers, IRS would not meet its electronic filing goals. In addition, if, in the future, taxpayers file more paper returns than IRS expects, added stress will be placed on IRS' paper-based systems. Accordingly, we recommended that IRS

*refocus its electronic filing business strategy to target, through aggressive marketing and education, those sectors of the taxpaying population that can file electronically most cost-beneficially.*

*IRS agreed with this recommendation and said that it had convened a working group to develop a detailed, comprehensive strategy to broaden public access to electronic filing while also providing more incentives for practitioners and the public to file electronically. It said that the strategy would include approaches for taxpayers who are unwilling to pay for tax preparer and transmitter services, who owe IRS for balances due, and/or*



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who file complex tax returns. Further, IRS said that the strategy would address that segment of the taxpaying population that would prefer to file from home using personal computers.

To date, IRS has performed an electronic filing marketing analysis at local levels; developed a marketing plan to promote electronic filing; consolidated 21 electronic filing initiatives into its Electronic Filing Strategies portfolio; and initiated a re-engineering project with a goal to reduce paper tax return filings to 20 percent or less of the total volume by the year 2000. It plans to complete its electronic filing strategy in October 1996. These initiatives could result in future progress toward increasing electronic filings. However, our review found that these initiatives are not far enough along to determine whether they will culminate in a comprehensive strategy that identifies how IRS plans to target those sectors of the taxpaying population that can file electronically most cost-beneficially. It also is not clear how the reengineering project will impact the strategy or how these initiatives will impact TSM systems that are being developed.

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## IRS' Strategic Information Management Practices Remain Ineffective

In our July 1995 report, we said that IRS did not have strategic information management practices in place. We found, for example, that despite the billions of dollars at stake, information systems were not managed as investments. To overcome this, and provide the Congress with the insight needed to assess IRS' priorities and rationalization for TSM projects, we recommended that the IRS Commissioner

*take immediate action to implement a complete process for selecting, prioritizing, controlling, and evaluating the progress and performance of all major information systems investments, both new and ongoing, including explicit decision criteria, and*

*using these criteria, to review all planned and ongoing systems investments by June 30, 1995.*

In agreeing with these recommendations, IRS said it would take a number of actions to provide the underpinning it needs for strategic information management. IRS said, for example, that it was developing and implementing a process to select, prioritize, control, and evaluate information technology investments to achieve reengineered program missions.

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Our assessment found that IRS has taken steps towards putting into place a process for managing its extensive investments in information systems. The following are examples of these steps.

- IRS created an executive-level Investment Review Board, chaired by the Associate Commissioner for Modernization, for selecting, controlling and evaluating all of IRS' information technology investments.
- IRS developed initial and revised sets of decision criteria used in the summer and fall of 1995, as part of its Resource Allocation and Investment Review to make additional changes in information technology resource allocations for remaining fiscal year 1996 funds and planned 1997 spending. This review included only TSM projects under development. It did not address operational systems, infrastructure, or management and technical support activities.
- The Treasury Department created a Modernization Management Board to review and validate high-risk, high-cost TSM investments and to set policy and strategy for IRS modernization effort.
- IRS is considering the use of a "project readiness review" as an additional Investment Review Board control mechanism for gauging project readiness to proceed with spending.
- IRS developed a business case handbook that includes decision criteria on costs, benefits, and risks. It is reassessing the business cases, which were developed on the TSM projects, using the handbook. Results are planned to be used by the Investment Review Board to assist in making funding decisions for fiscal year 1997.
- IRS has developed an investment evaluation review handbook designed to assess projected costs and benefits against actual results. The handbook has been used on four TSM projects and five additional reviews are scheduled to be completed within the next year. The completed reviews contain explicit descriptions of problems encountered in developing these systems. The reviews make specific recommendations for management and technical process changes to improve future results. Specific recommendations pertain to strengthening project direction and decision-making. Many reflect concerns that we have raised in past reviews. The investment evaluation reviews were presented to the Investment Review Board and disseminated to other IRS managers. IRS is defining roles, responsibilities, and processes for incorporating Investment Evaluation Review recommendations at the project and process levels.

These are positive steps and indicate a willingness to address many of the weaknesses raised in our past reports and testimonies. But, as noted in Treasury's report on TSM, the investment process is not yet complete.

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According to Treasury, it is missing (1) specific operating procedures, (2) defined reporting relationships between different management boards and committees, and (3) updated business cases for major TSM technology investments.

These concerns coincide with two central criticisms we have repeatedly made about TSM. Because of the sheer size, scope, and complexity of TSM, it is imperative that IRS institutionalize a repeatable process for selecting, controlling, and evaluating its technology investments, and that it make informed investment decisions based on reliable qualitative and quantitative assessments of costs, benefits, and risks. Although IRS is planning and is in the initial stages of implementing parts of such a process, a complete, fully integrated process does not yet exist. Specifically, IRS has not provided us evidence to justify its claims that its decisions were supported by acceptable data on project costs, benefits, and risks. For example:

- Our review found no evidence to suggest that IRS established minimal data requirements for the decisions made as part of the TSM Resource Allocation and Investment Review or the rescope process in December 1995. For example, because IRS lacks the basic capabilities for disciplined software development, it cannot convincingly estimate systems development costs, schedule, or performance. Subsequent to its rescope analysis, IRS developed minimal data quality requirements for cost-benefit and risk studies, proposed return-on-investment calculations, and return-on-investment thresholds, or comparisons of expected performance improvements with results to date. However, to date few, if any, projects have met these criteria.
- In deciding whether to accelerate, delay, or cancel specific TSM projects, IRS did not use validated data on actual versus projected costs, benefits, or risks as set forth by the Office of Management and Budget (OMB).<sup>6</sup> Instead, IRS continues to make its decisions based on spending whatever budgeted funding ceiling amounts can be obtained through its annual budget and appropriations cycles. As a result, IRS cannot convincingly justify its TSM spending decisions.
- All projects (i.e., proposed projects, projects under development, operational systems, infrastructure, and management and technical support activities) were not included in a single systems investment portfolio. Instead, only TSM projects under development were ranked. As a result, there is no compelling rationale for determining how much to

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<sup>6</sup>Evaluating Information Technology Investments: A Practical Guide (Executive Office of the President, Office of Management and Budget, November 1995).

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invest in these projects compared to other projects, such as operational systems and infrastructure.

- There is no defined process with prescribed roles and responsibilities to ensure that the results of investment evaluation reviews are being used to (1) modify project direction and funding when appropriate and (2) assess and improve existing investment selection and control processes and procedures. As a result, there is no evidence that changes are occurring based on valuable lessons learned, as in the recently completed post-implementation review of the Service Center Recognition/Image Processing System. For example, IRS found that because system requirements were not adequately defined or documented, the system could not be quantifiably tested properly which adversely affected the implementation of the system. Moreover, with only four investment evaluation reviews completed to date and five planned for the upcoming year, this represents only a small fraction of the total IRS annual investment in TSM. More must be done to confirm actual results achieved from TSM expenditures.

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## Reengineering Efforts Not Linked to Modernization

We noted in our July 1995 report that IRS' reengineering efforts were not linked to its systems development efforts. As shown in our work with leading organizations, information system development projects that are not driven by a critical reexamination and redesign of business processes achieve only a fraction of their potential to improve performance, reduce costs, and enhance quality.

Since our July report, IRS' reengineering efforts have undergone a redirection. Three reengineering projects—processing returns, responding to taxpayers, and enforcement actions—were halted because IRS decided to focus instead on an enterprise-level view of reengineering.

Its new effort, entitled Tax Settlement Reengineering, was begun in March 1996 and involves a comprehensive review of all the major processes and activities that enable taxpayers to settle their tax obligations, from educational activities through final settlement of accounts. The reengineering project team, working with IRS' Executive Committee, has identified 16 major processes involved in tax settlement and is about to begin reengineering four of them. High-level designs of the new processes are scheduled to be defined by September 30, 1996, with work on detailed designs to start early in fiscal year 1997, if approved by the Executive Committee. Reengineering efforts on as many as eight other tax settlement processes could be underway by the end of fiscal year 1997.

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Although this effort could have substantial impact, IRS still faces the same problem we reported on a year ago. Reengineering lags well behind the development of TSM projects, whereas it should be ahead of it—defining and directing the technology investments needed to support new, more efficient business processes. Until the reengineering effort is mature enough to drive TSM projects, there is no assurance that ongoing systems development efforts will support IRS' future business needs and objectives.

The reengineering team believes that by September 30, 1996, they will have a general idea of how the first four tax settlement reengineering projects may impact current systems development efforts. If additional reengineering projects are started as planned in 1997, it could be another year or more before most of the information and systems requirements stemming from these projects are defined. Meanwhile, investment continues in many TSM projects that may not support the requirements resulting from these reengineering efforts.

IRS acknowledges that integration of reengineering and TSM must occur and has assigned responsibility for it to the Associate Commissioner for Modernization. However, it has not yet specified how or when the requisite integration will occur.

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## Software Development Activities Are Inconsistent and Poorly Controlled

In our July 1995 report, we said that unless IRS improves its software development capability, it is unlikely to build TSM timely or economically and systems are unlikely to perform as intended. To assess its software capability, in September 1993, IRS rated itself using the Software Engineering Institute's Capability Maturity Model (CMM). IRS placed its software development capability at the lowest level, described as ad hoc and sometimes chaotic and indicating significant weaknesses in its software development capability. Our review confirmed that IRS' software development capability was immature and weak in key process areas. For instance,

- a disciplined process to manage system requirements was not being applied to TSM systems,
- a software tool for planning and tracking development projects was not consistently used,
- software quality assurance functions were not well defined or consistently implemented,
- systems and acceptance testing were neither well defined nor required, and

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- software configuration management<sup>7</sup> was incomplete. To address IRS' software development weaknesses and upgrade IRS' software development capabilities, we recommended that the IRS Commissioner

*immediately require that all future contractors who develop software for the agency have a software development capability rating of at least CMM Level 2;<sup>8</sup> and*

*before December 31, 1995,*

*define, implement, and enforce a consistent set of requirements management procedures for all TSM projects that goes beyond IRS' current request for information services process, and for software quality assurance, software configuration management, and project planning and tracking; and*

*define and implement a set of software development metrics to measure software attributes related to business goals.*

IRS agreed with these recommendations and said that it was committed to developing consistent procedures addressing requirements management, software quality assurance, software configuration management, and project planning and tracking. It also said that it was developing a comprehensive measurement plan to link process outputs to external requirements, corporate goals, and recognized industry standards.

Specifically regarding the first recommendation, IRS has (1) developed standard wording for use in new and existing contracts that have a significant software development component, requiring that all software development be done by an organization that is at CMM Level 2, (2) developed a plan for achieving CMM Level 2 capability on all of its contracts, and (3) started to implement a plan to monitor contractors' capabilities, which may include the use of CMM-based software capability evaluations. The Department of the Treasury report also noted that a schedule for conducting software capability evaluations was developed. However, we found that IRS does not yet have the disciplined processes in

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<sup>7</sup>Configuration management involves selecting project baseline items (e.g., specifications), systematically controlling these items and changes to them, and recording their status and changes.

<sup>8</sup>The Software Engineering Institute at Carnegie Mellon University has developed a model, the Software Capability Maturity Model (CMM), to evaluate an organization's software development capability. CMM Level 2 denotes that basic project management processes are established to track cost, schedule, and functionality and that the necessary process discipline is in place to repeat earlier successes on similar projects.

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place to ensure that all contractors are performing at CMM Level 2. For example, contractors developing the Cyberfile electronic filing system were not using CMM Level 2 processes subsequent to our July 1995 recommendation. Further, no schedule for conducting software capability evaluations has yet been developed.

With respect to the second recommendation, IRS is updating its systems life cycle (SLC) methodology. The SLC is planned to have details for systems engineering and software development processes, including all CMM key process areas. IRS has updated its systems engineering process to include guidance for defining and analyzing systems requirements and for preparing work packages. Further, IRS has drafted handbooks providing guidance to audit and verify developmental processes. In addition, IRS has developed a configuration management plan template, updated its requirements management request for information services<sup>9</sup> documents, and developed and implemented a requirements management course. The Treasury Department also reported that IRS is testing the SLC on two TSM efforts, Integrated Case Processing (ICP) and Corporate Accounts Processing System (CAPS). IRS also has a CMM process improvement plan, and work is being done across various IRS organizations to define processes to meet CMM Level 2. Finally, IRS is assessing its capabilities to manage contractors using the CMM goals.

However, the procedures for requirements management, software quality assurance, software configuration management, and project planning and tracking are still not complete. A software development life cycle implementation project, which is to include these procedures, is not scheduled for completion until September 30, 1996. In addition, software quality assurance and configuration management plans for two ICP projects<sup>10</sup> were not being used, and the groups developing software for CAPS do not have a software configuration management plan or a schedule for its development. Further, ICP and CAPS development is continuing without the guidelines and procedures for other process areas (e.g., requirements management, project planning, and project tracking and oversight) required by CMM Level 2.

Regarding the third recommendation, IRS has a three-phase process to (1) identify data sources for metrics, (2) define metrics to be used, and (3) implement the metrics. A partial set of metrics was identified. Initial

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<sup>9</sup>A request for information services is a process to request changes to IRS' computer systems. This process provides a way to request, control, monitor, and track changes to IRS' computer systems.

<sup>10</sup>The two projects are the Case Processing System and the Case Inventory Management System.

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use of these metrics—populated with real data and in a preliminary format—began in June 1996. Data sources for these metrics have been identified and weaknesses (such as difficulties in retrieving the data and inconsistencies in the data) are being documented to provide feedback to various systems' owners.

However, this initial set of metrics is incomplete. It focuses on areas such as time reporting, project sizing, and defect tracing and analysis, but it does not include measures for determining customer satisfaction and cost estimation. Such measures are needed to adequately track the needed functionality with associated costs throughout systems development. Further, there is no schedule for completing the definition of metrics or for institutionalizing the processes needed to ensure their use. Finally, there is no mechanism in place to correct identified data and data collection weaknesses.

In summary, although IRS has begun to act on our recommendations, these actions are not yet complete or institutionalized and, as a result, systems are still being developed without the disciplined practices and metrics needed to give management assurance that they will perform as intended.

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## Systems Architectures, Integration, and Testing Are Incomplete

In our July 1995 report, we said that IRS' systems architectures,<sup>11</sup> integration planning, and system testing and test planning were incomplete.

To address IRS' technical infrastructure weaknesses, we recommended that the IRS Commissioner

*before December 31, 1995,*

*complete an integrated systems architecture, including security, telecommunications, network management, and data management;*

*institutionalize formal configuration management for all newly approved projects and upgrades and develop a plan to bring ongoing projects under formal configuration management;*

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<sup>11</sup>A systems architecture is an evolving description of an approach to achieving a desired mission. It describes (1) all functional activities to be performed to achieve the desired mission, (2) the system elements needed to perform the functions, (3) the designation of performance levels of those system elements, and (4) the technologies, interfaces, and location of functions.



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*develop security concept of operations, disaster recovery, and contingency plans for the modernization vision and ensure that these requirements are addressed when developing information system projects;*

*develop a testing and evaluation master plan for the modernization;*

*establish an integration testing and control facility; and*

*complete the modernization integration plan and ensure that projects are monitored for compliance with modernization architectures.*

IRS agreed with these recommendations and said that it was identifying the necessary actions to define and enforce systems development standards and architectures agencywide. IRS' current efforts in this area follow.

- In April 1996, IRS completed a descriptive overview of its integrated three-tier, distributed systems architecture to provide management with a high-level view of TSM's infrastructure and supporting systems. IRS has tasked the integration support contractor to develop the data and security architectures.
- IRS has adopted an accepted industry standard for configuration management. It developed and distributed its Configuration Management Plan template, which identifies the elements needed when constructing a configuration management plan. In April 1996, enterprisewide configuration management policies and procedures were established. IRS also plans to obtain contractor support to develop, implement, and maintain a vigorous configuration management program.
- IRS has prepared a security concept of operations and a disaster recovery and contingency plan.
- IRS has developed a test and evaluation master plan for TSM. IRS plans to develop implementation and enforcement policies for the plan.
- IRS has established an interim integration testing and control facility, which is currently being used to test new software releases. It is also planning a permanent integration testing and control facility, scheduled to be completed by December 1996.
- IRS has completed drafts of its TSM Release Definition Document, which is planned to provide definitions for new versions of TSM software from 1997 to 1999, and Modernization Integration Plan, which is planned to define IRS' process for integrating current and future TSM initiatives.

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These activities start to address our recommendations, but do not satisfy any of them. Specifically:

- IRS has not completed its integrated systems architecture (the “blueprints” of TSM) and has not committed to a completion date.

Its completed high-level overview was not intended to, and does not provide, the level of detail needed to provide effective guidance to design and build systems. For example, IRS’ concept of a three-tier, distributed architecture has not been delineated to the level needed to provide sufficient detail to understand the security requirements and implications. It does not, for instance, specify what security mechanisms are to be implemented between and among the three tiers to ensure that only properly authorized users are allowed to access tax processing application software and taxpayer data. IRS is using contractors to complete its security and data architectures, but has not committed to a completion date. Meanwhile, IRS is investing in building TSM systems without the “blueprints” that are needed.

- IRS has not yet brought its development, acceptance, and production environments under configuration management control. For example, there is no disciplined process for moving software from the test to the production environment. Additionally, although directives have been distributed to follow various TSM systems development standards, no enforcement mechanisms are in place.
- Our review of the security concept of operations found that the document does not identify selected security methods and techniques. For example, it discusses two methods for providing identification and authentication for controlling user access to various systems without specifying which method should be used. The security concept of operations is also sometimes inconsistent with the security mechanisms currently being implemented on systems now being developed and does not indicate how, when, or if these inconsistencies will be resolved. The specific methods and techniques are currently planned to be provided in different versions of a planned technical concept of operations. The first version is currently planned to be completed in January 1997.
- IRS’ disaster recovery and contingency plan is a high-level document for planning that presents basic tenets for information technology disaster recovery but not the detail needed to provide useful guidance in emergencies. For example, it does not explain the steps that computing

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centers need to take to absorb the workload of a center that suffers a disaster.

- The test and evaluation master plan provides the guidance needed to ensure sufficient developmental and operational testing of TSM. However, it does not describe what security testing should be performed, or how these tests should be conducted. Further, it does not specify the responsibilities and processes for documenting, monitoring, and correcting testing and integration errors.
- IRS is still working on plans for its integration testing and control facility. In the interim, it has established a temporary facility which is being used for limited testing. The permanent facility is not currently being planned to simulate the complete production environment and will not, for example, include mainframe computers. Instead, IRS plans to continue to test mainframe computer software and systems which interface with the mainframes in its production environment. To ensure that IRS does not put operations and service to the taxpayers at risk, IRS should prepare a thorough assessment of its solution, including an analysis of alternative testing approaches and their costs, benefits, and risks.
- IRS' draft TSM Release Definition Document and draft Modernization Integration Plan (1) do not reflect TSM rescoping and the information systems reorganization under the Associate Commissioner, (2) do not provide clear and concise links<sup>12</sup> to other key documents (e.g., its integrated systems architecture, business master plan, concept of operations, and budget), and (3) assume that IRS has critical processes in place that actually have not been implemented (e.g., effective quality assurance and disciplined configuration management).

In summary, although IRS has taken actions to prepare a systems architecture and improve its integration and system testing and test planning, these efforts are not yet complete or institutionalized, and, as a result, TSM systems continue to be developed without the detailed architectures and discipline needed to ensure success.

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## No Single IRS Entity Controls All Information Systems Efforts

In our July 1995 report, we said that IRS had not established an effective organizational structure to consistently manage and control systems modernization organizationwide. The accountability and responsibility for IRS' systems development was spread among IRS' Modernization Executive, Chief Information Officer, and research and development division. To help

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<sup>12</sup>For example, it is not clear how particular software releases are tied to business master plan goals and objectives and to the integrated transition plan and schedule's products and services. Without these links, the documents do not provide important information on how much will be done by each release, in what period of time, and at what cost.

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address this concern, in May 1995, the Modernization Executive was named Associate Commissioner for Modernization. The Associate Commissioner was to manage and control systems development efforts previously conducted by the Modernization Executive and the Chief Information Officer.

In September 1995, the Associate Commissioner assumed responsibility for the formulation, allocation, and management of all information systems resources for both TSM and non-TSM expenditures. In February 1996, IRS issued a Memorandum of Understanding providing guidance for initiating and conducting technology research and for transitioning technology research initiatives into system development projects.

It is important that IRS maintain an organizationwide focus to manage and control all new modernization systems and all upgrades and replacements of operational systems throughout IRS. To do so, we recommended that the IRS Commissioner

*give the Associate Commissioner management and control responsibility for all systems development activities, including those of IRS' research and development division.*

Steps are being taken by the Associate Commissioner to establish effective management and control of systems development activities throughout IRS. For example, its SLC methodology is required for information systems development, and information technology entities throughout the agency have been directed to submit documentation on all information technology projects for review. However, there is no defined and effective mechanism for enforcing the standards or ensuring that organizational entities cannot conduct systems development activities outside the control of the Associate Commissioner. Further, no time frames have been established for defining and implementing such control mechanisms. As a result, systems development conducted by the research and development division has now been redefined as technology research, keeping it from the control of the Associate Commissioner.

In summary, although IRS has made improvements in consolidating management control over systems development, the Associate Commissioner still does not yet have control over all IRS' systems development activities.

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## Plans Must Be Defined and Capabilities Strengthened Before Obtaining Additional Contractual Support

IRS plans to increase its reliance on the private sector by (1) preparing an acquisition plan and statement of work to conduct an expedited competitive selection for a “prime” development and integration contractor, (2) transferring responsibility for systems engineering, design, prototyping, and integration for core elements of TSM to its integration support contractor, and (3) making greater use of software development contractors, including those available under the Treasury Information Processing Support Services (TIPSS), to develop and deliver major elements of production TSM systems. By increasing its reliance on contractors, IRS expects to improve the accountability for and probability of TSM success.

IRS plans to increase the use of private-sector integration and development expertise by expanding the use of contractors to support TSM. It outlined a three-track approach for transitioning over a period of 2 years to the use of a “prime” contractor that would have, according to IRS, overall authority and responsibility for the development, delivery, and deployment of modernized information systems.

To facilitate this strategy, IRS reported it would consolidate the management of all TSM resources, including key TSM contractors, in its Government Program Management Office (GPMO). Under the direct control of the Chief Information Officer, the GPMO will be delegated authority for the management and control of the IRS staff and contractors that plan, design, develop, test, and implement TSM components. IRS plans to have the GPMO fully staffed and operational by October 1, 1996. IRS informed us that as of August 29, 1996, a director had been appointed and over 40 staff had been assigned to the office. IRS representatives also told us the agency was currently developing a detailed contract management plan and a statement of work for acquiring its “prime” contractor, and believed it could award a contract in about 2 years.

IRS’ approach to expanding the use of contractors to build TSM is still in the early planning stages. Because of this, IRS was unable to provide us with formal plans, charters, schedules or the definitions of shared responsibilities between the GPMO and the existing program and project management staff.

At this point, it is unclear what these IRS planned actions entail, or how they will work. For example, IRS has not specified how and when it plans to transfer its development activities to contractors, and to what extent contractors could be held responsible for existing problems in these government-initiated systems. This is particularly important because if IRS

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continues as planned, the principal TSM systems will be in development and/or deployed before IRS plans to select a “prime” contractor in about 2 years. Moreover, it is not clear how the “prime” contractor would direct potential competitors that are already under contract with IRS. Without further explanation of and a schedule for transitioning specific responsibilities from IRS to contractors, we cannot fully understand or assess IRS’ plans.

Further, plans to use additional contractors will succeed if, and only if, IRS has the in-house capabilities to manage these contractors effectively. In this regard, there is clear evidence that IRS’ capability to manage contractors has weaknesses. In August 1995, IRS acquired the services of NTIS to act as IRS’ “prime contractor” for Cyberfile, i.e., NTIS was given the overall responsibility for development, delivery, and deployment of the system. However, Cyberfile was not developed using disciplined management and technical practices. As a result, this project exhibited many of the same problems we have repeatedly identified in other TSM systems, and after providing \$17 million to NTIS, Cyberfile was not ready for planned testing during the 1996 tax filing season. Similarly, IRS contracted in 1994 to build the Document Processing System. After spending over a quarter of a billion dollars on the project, IRS has now suspended the effort and is reexamining some of its basic requirements, including which and how many forms should be processed, and which and how many data should be read from the documents.

It is clear that unless IRS has mature, disciplined processes for acquiring software systems through contractors, it will be no more successful in buying software than it has been in building software.

In conclusion, IRS still does not have (1) effective strategic information management practices needed to manage TSM as an investment, (2) mature and disciplined software development processes needed to assure that systems built will perform as intended, (3) a completed systems architecture that is detailed enough to guide and control systems development, and (4) a schedule for accomplishing any of the above. Accordingly, the Congress could consider limiting TSM spending to only cost-effective modernization efforts that (1) support ongoing operations and maintenance, (2) correct IRS’ pervasive management and technical weaknesses, (3) are small, represent a low technical risk, and can be delivered in a relatively short time frame, and (4) involve deploying already developed systems, only if these systems have been fully tested, are not premature—given the lack of a completed architecture—and

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produce a proven, verifiable business value. As the Congress gains confidence in IRS' ability to successfully develop these smaller, cheaper, quicker projects, it could consider approving larger, more complex, and more expensive projects in future years.

Further, IRS does not manage all of its current contractual efforts effectively, and its plans to use a "prime" contractor and transition much of its systems development to additional contractors are not well defined. Accordingly, the Congress could consider requiring that IRS institute disciplined systems acquisitions processes and develop detailed plans and schedules before permitting IRS to increase its reliance on contractors.

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Mr. Chairman, this concludes my statement. I will be glad to answer any questions.

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