

**The Implementation of Software Products to  
Manage and Control Computer Resources  
Needs Improvement**

**July 2003**

**Reference Number: 2003-20-151**

**This report has cleared the Treasury Inspector General for Tax Administration disclosure review process and information determined to be restricted from public release has been redacted from this document.**



DEPARTMENT OF THE TREASURY  
WASHINGTON, D.C. 20220

INSPECTOR GENERAL  
for TAX  
ADMINISTRATION

July 31, 2003

MEMORANDUM FOR CHIEF INFORMATION OFFICER

*Gordon C. Milbourn III*

FROM: Gordon C. Milbourn III  
Assistant Inspector General for Audit (Small Business and  
Corporate Programs)

SUBJECT: Final Audit Report - The Implementation of Software Products to  
Manage and Control Computer Resources Needs Improvement  
(Audit # 200220001)

This report presents the results of our review of the Internal Revenue Service's (IRS) implementation of Tivoli®,<sup>1</sup> a suite of software products for improving the management and control of its computer resources. The overall objective of this review was to determine whether the IRS is effectively and efficiently managing and using Tivoli®.

In summary, the IRS has developed and maintained high-level system life cycle documentation for the Enterprise Systems Management (ESM) project, which includes Tivoli®. This documentation generally follows the IRS' *Enterprise Life Cycle Lite*<sup>2</sup> methodology.

We also identified several weaknesses in the management control practices over Tivoli® that, if not corrected, could reduce the overall effectiveness and actual benefits of the Tivoli® implementation. The IRS uses the term "endpoint health" to gauge whether Tivoli® can "successfully" communicate with computing devices. On April 14, 2003, the IRS' overall endpoint health percentage was 60 percent (78,925 of 131,488 endpoints). Also, in September 2002, only 38 of 4,497 computers at the New Carrollton Federal Building successfully received a software update via Tivoli®.

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<sup>1</sup> Tivoli® is a registered trademark owned by IBM. The implementation of Tivoli® is part of the IRS' Enterprise Systems Management project encompassing help desk operations, network and systems management, software distribution, asset management, and performance measures analysis and reporting.

<sup>2</sup> The framework for project management in the Information Technology Services function that provides a flexible yet structured approach to the key planning and control elements needed for effective project management in this environment and the tools to do the job.

Endpoint health is not effectively managed and maintained at a higher rate because no policies and guidelines have been established to promote endpoint health, such as schedules when individuals should leave their networked computers turned on or when to have laptops connected to the IRS network. The low percentage of endpoint health, combined with staff not being assigned the responsibility to resolve endpoint health and software distribution problems, have resulted in unrealized efficiencies ranging from approximately \$5.5 million to \$7.6 million.

We also identified the following concerns:

- The IRS has stated that it has deployed more Tivoli® software licenses than were purchased; therefore, the IRS may be exposed to legal remedies (e.g., fines and penalties).
- The IRS obtained software licenses that were not used, which could result in wasted funds.
- A support services contractor for Tivoli® was working onsite without a current statement of work, which could result in the IRS being billed for services it did not intend to receive.
- Tivoli® was only partially compliant with the IRS' security requirements, thereby potentially increasing the IRS' exposure to security risks.
- Tivoli's® business continuity capability was never tested; therefore, the IRS may not be able to timely recover its enterprise-wide network management capability in the event of a disaster.

We recommended that the Chief Information Officer (CIO) ensure that appropriate policies, guidelines, and performance standards are developed to establish and monitor network connectivity to promote Tivoli® endpoint health; and that staff is assigned the responsibility for resolving problems associated with unhealthy endpoints and unsuccessful software distributions. The CIO should also ensure that a Contracting Officer's Technical Representative (COTR) is assigned to assist the Contracting Officer in monitoring the Tivoli® contracts; contractual agreements for the number of software licenses purchased and installed are monitored for compliance and appropriate contract modifications are prepared and approved; and an Information Systems Security Officer is assigned for the Tivoli® component of the ESM project to ensure that adequate security and business continuity capability for Tivoli® are provided and tested.

Management's Response: The CIO agreed with our evaluation of the implementation of Tivoli® and the recommendations. The End User Equipment and Services (EUES) organization has developed the appropriate policies and guidelines for the establishment of network connectivity to promote Tivoli® endpoint health, assigned the responsibility for resolving problems associated with unhealthy endpoints and unsuccessful software distributions for all IRS office locations, and assigned a COTR to assist the contracting officer in monitoring the Tivoli® contracts. The EUES organization monitors the contractual agreements for compliance with the number of software licenses that have been purchased and installed. A "true up" of deployed

software is done quarterly. If the contractual agreement changes, they modify the contract. In addition, the EUES organization will work with the Contracting Officer to include documentation of IRS' enrollment in the IBM Software Passport Program in contract documentation. Also, the EUES organization will appoint an Information Systems Security Officer by August 1, 2003. Management's complete response to the draft report is included as Appendix VII.

Copies of this report are also being sent to the IRS managers who are affected by the report recommendations. Please contact me at (202) 622-6510 if you have questions or Margaret E. Begg, Acting Assistant Inspector General for Audit (Information Systems Programs), at (202) 622-8510.

**The Implementation of Software Products to Manage and Control  
Computer Resources Needs Improvement**

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## The Implementation of Software Products to Manage and Control Computer Resources Needs Improvement

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### Background

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The Internal Revenue Service (IRS) has over 100,000 computers and associated software items supporting its 100,000 plus employee workforce. Consistently managing such a large number of computing devices and their associated software is a challenge. The IRS is implementing Tivoli®,<sup>1</sup> a suite of software products, to improve the management and control of its computer resources.<sup>2</sup> The Tivoli® software suite is modular in design, whereby specific functions can be obtained by adding the desired software module to the Tivoli® Management Framework<sup>3</sup> software package. For example, various modules can provide functions that include software distribution, inventory management, remote control over personal computers, security administration, user administration, and web services management, among other functions.

As of September 30, 2002, the IRS had deployed 13 different modules into production (see Appendix VI for a description and status of various Tivoli® modules). Expenditures for the Tivoli® software suite of products and associated costs for supporting hardware, software, and services totaled over \$49 million.

Responsibility for managing the implementation and support of the Tivoli® suite of software products resides in the Office of Enterprise Systems Management (OESM) within the End User Equipment and Services (EUES) organization of the Modernization, Information Technology and Security (MITS) Services organization. Operational support is provided by OESM personnel located at the IRS Campus<sup>4</sup> in Austin, Texas.

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<sup>1</sup> Tivoli® is a registered trademark owned by IBM.

<sup>2</sup> The implementation of Tivoli® is part of the IRS' Enterprise Systems Management project encompassing help desk operations, network and systems management, software distribution, asset management, and performance measures analysis and reporting.

<sup>3</sup> Tivoli's® Framework module provides the architectural foundation for other Tivoli® software modules to function properly.

<sup>4</sup> The campuses are the data processing arms of the IRS. The campuses process paper and electronic submissions, correct errors, and forward data to the computing centers for analysis and posting to taxpayer accounts.

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The audit was conducted in the EUES organization at the IRS National Headquarters in New Carrollton, Maryland, and the Information Technology Services' (ITS) Systems Management Center at the IRS Campus in Austin, Texas, from November 2002 to April 2003. The audit was conducted in accordance with *Government Auditing Standards*. Detailed information on our audit objective, scope, and methodology is presented in Appendix I. Major contributors to the report are listed in Appendix II.

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### Life Cycle Documentation Has Been Developed and Maintained

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The IRS' *Enterprise Life Cycle Lite* (ELC Lite) is the framework for project management in the ITS function that provides a flexible yet structured approach to the key planning and control elements needed for effective project management in IRS' environment and the tools to do the job. It combines policies, procedures, and guidelines with the plans and project control mechanisms needed for effective project planning, implementation, and management within ITS.

The IRS has developed and maintained high-level system life cycle documentation for the Enterprise Systems Management (ESM) project that includes the Tivoli® project. This documentation includes an ESM Baseline Business Case, Project Management Plan, Organization Transition Plan, Implementation/Deployment Plan, Systems Requirements Report, as well as the documentation necessary for Tivoli® system security certification and accreditation.<sup>5</sup> This documentation generally follows the IRS' ELC Lite methodology.

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<sup>5</sup> Security Certification is an independent technical evaluation for the purpose of accreditation; it uses security requirements as the criteria for the evaluation. Accreditation is the formal authorization by a management official for a system to operate and an explicit acceptance of risk in having that system operate.

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### **Tivoli® Program Administration Needs Improvement**

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The Clinger-Cohen Act (also called the Information Technology Management Reform Act)<sup>6</sup> requires Federal agencies to have processes in place to help ensure that information technology projects are being implemented at acceptable costs, within reasonable time periods, and are contributing to tangible, observable improvements in mission performance.

Tivoli's® ability to communicate with the computing devices in the network is a critical functionality that must be successfully performed for Tivoli® to be an effective tool for managing an enterprise-wide system. The IRS uses the term "endpoint health" to gauge whether Tivoli® can "successfully" communicate with computing devices. An endpoint, loosely defined, is a computing device that operates in a network, such as a server, desktop, or laptop. IRS officials have stated that endpoint health is directly related to the success of Tivoli®.

The IRS uses a web site to track endpoint health. Endpoint health is reported as an overall percentage for the IRS organization, and a summary percentage for 10 geographic areas (e.g., east region, southeast region, mid-states region, west region), as defined by Tivoli®, is also reported. Each geographic area contains various IRS offices and their endpoints (i.e., computing devices). On April 14, 2003, the IRS' overall endpoint health was 60 percent (78,925 of 131,488 endpoints), and endpoint health for each of the 10 geographic areas ranged from 32 percent to 97 percent. Based on the range of endpoint health percentages, some offices are clearly better at managing their systems for endpoint health than others. In addition, the IRS has not established an overall goal for the endpoint health percentage.

As a result of the low endpoint health percentage, the software distribution module is not realizing its full

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<sup>6</sup> Clinger-Cohen Act of 1996 (Title was added by Public Law 104-208, which amended Public Law 104-106 to entitle Division D (Federal Acquisition Reform Act of 1996) and Division E (Information Technology Management Reform Act of 1996), together, the Clinger-Cohen Act of 1996.).

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effectiveness. For example, the Tivoli® Software Distribution module provides an automated hands-off method of installing new software products, upgrades, or patches to the IRS' standardized suite of software programs that reside on Windows-based workstations throughout the IRS. As of April 14, 2003, the overall software installation success rate for these workstations was approximately 44 percent (180,567 of 410,537 software patches).<sup>7</sup> However, because the software distribution module is not able to communicate with all of the IRS workstations, the success rate for software installation for IRS workstations overall is actually less than the 44 percent.

Endpoint health is not effectively managed and maintained at a higher rate because no policies and guidelines have been established to promote endpoint health, such as schedules when individuals should leave their networked computers turned on or when to have laptops connected to the IRS network. IRS officials indicated that the current practice is to inform individuals prior to the distribution of software via e-mail notification.

Another issue with the management of endpoint health is that personnel are not assigned the responsibility for resolving endpoint health problems at specific IRS office locations. For example, when a Tivoli® endpoint health problem occurs, a trouble report is generated and logged to the System Management Center (SMC). The SMC then reports the problem to the respective IRS field office that is generally responsible for addressing endpoint health problems. If the local field office has not designated a Tivoli® System Administrator to address Tivoli® endpoint problems, the issue generally remains open until either SMC personnel can address it or someone at the field office does not have other competing priorities and, therefore, has the time to address it.

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<sup>7</sup> Software patches include those for the common suite of Windows based software programs known as the Common Operating Environment (COE). Out of the 410,537 software distributions, the COE software distribution's overall success rate was 39 percent (92,751 of 239,845).

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For example, at the New Carrollton Federal Building (NCFB), no one has been formally assigned the Tivoli® System Administrator responsibility to ensure endpoint health problems are resolved. In September 2002, only 38 out of 4,497 computers at the NCFB were reported as successful in obtaining a software update. We were informed that a possible cause of this low software installation rate was that many of the computers at the NCFB had unhealthy endpoints primarily due to computer naming conventions that were not compatible with Tivoli® requirements. Some unsuccessful software updates were caused by problems with the computer (e.g., not enough memory). Without the assignment of staff to resolve endpoint health and software distribution problems, Tivoli's® overall effectiveness and actual benefits could be reduced.

As of April 14, 2003, the IRS reported that approximately \$2.7 million was saved in reduced time to distribute the 180,567 software copies out of 410,537 attempts. With improved policies and guidelines and assigning staff the responsibility for addressing endpoint problems for IRS office locations, the IRS could reap additional efficiencies in reduced software distribution time and costs. IRS officials indicated that an 80 percent initial software distribution success rate at a specific time would be a realistic target, with a goal of 100 percent success over time. While a 100 percent software distribution success rate to all endpoints at any specific time is desirable, it is unrealistic due in part to the large number of laptop computers in use.

For example, had those software distribution attempts on April 14, 2003, been 80 percent successful, the IRS could have had additional efficiencies of approximately \$2.2 million. These additional efficiencies could have reached approximately \$3.5 million if those software distribution attempts had been 100 percent successful.

In addition, since the IRS' reported efficiencies for software distribution represents only 60 percent of all endpoints, an additional \$3.3 million to \$4.1 million (based on the success range of 80 to 100 percent) of potential efficiencies could have been obtained if the IRS had been able to distribute

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software to the 40 percent of the endpoints it could not reach (see Appendix IV). Subsequent software distributions would provide additional efficiencies in reduced time and costs.

### Recommendations

The Chief Information Officer should ensure that:

1. Appropriate policies, guidelines, and performance standards are developed to establish and monitor network connectivity to promote Tivoli® endpoint health.

Management's Response: The EUES organization has developed the appropriate policies and guidelines for the establishment of network connectivity to promote Tivoli® endpoint health.

2. Staff is assigned the responsibility for resolving problems associated with unhealthy endpoints and unsuccessful software distributions for all IRS office locations.

Management's Response: The EUES organization has assigned staff responsibility for resolving problems associated with unhealthy endpoints and unsuccessful software distributions for all IRS office locations.

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### Contract Administration Over Tivoli® Needs Improvement

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The Office of Management and Budget (OMB) Circular A-123, *Management Accountability and Control*, dated July 21, 1995, provides guidance to Federal managers on improving the accountability and effectiveness of Federal programs and operations by establishing, assessing, correcting, and reporting on management controls.

Treasury Directive 76-01, *Treasury Acquisition/Procurement Regulation*, provides that Contracting Officer's Technical Representatives (COTR) are responsible for providing technical direction, monitoring contract and contractor performance, maintaining an arm's-length relationship with the contractor, and facilitating communications with the Contracting Officer.

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However, a COTR has not been assigned to monitor the various Tivoli® contracts. OESM personnel indicated that the Contracting Officer located in Lanham, Maryland, would assume the duties of both the COTR and Contracting Officer. As a result of not assigning the duties of a COTR to a separate individual, the IRS has increased the risk of the Tivoli® contracts not being properly monitored, with consequences such as the following:

- Our review of an October 2002 modification to a Fiscal Year (FY) 2001 contract determined that the IRS purchased 61,250 licensed copies of the Tivoli® Software Distribution module and 61,250 licensed copies of the Tivoli® Inventory module. However, IRS project managers stated that they had implemented 106,054 copies of each of these software modules. Similarly, IRS project managers stated that they had implemented 106,054 copies of the Tivoli® Remote Control module but had purchased only 87,500 copies of the module (see Appendix V).
- The IRS implemented three Tivoli® modules (Tivoli® Enterprise Control, Tivoli® Decision Support, and Tivoli® Manager for Web Sphere Application Server) that were received from the vendor without contractual documentation supporting the purchase.
- The IRS obtained software licenses that were not used, which could result in wasted funds. For example, the IRS purchased 1,200 licenses for the Tivoli® Security module and 1,200 licenses for the Tivoli® User Administration module. However, while these modules were originally included for security purposes, they were not used in the final design.
- We identified a support services contractor for Tivoli® working at the IRS Campus in Austin,

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Texas, without a current Statement of Work.<sup>8</sup> The IRS Contracting Officer indicated that a modification to the FY 2001 contract was being prepared to add this individual to the contract.

Approximately \$45 million of the \$57 million awarded for Tivoli® support services remains available for option in FYs 2004 through 2006. Without adequate contract monitoring, the IRS will continue to be exposed to potential legal remedies (e.g., fines and penalties) for software licenses and could be billed for services that it did not intend to receive.

### Recommendations

The Chief Information Officer should ensure that:

3. A COTR is assigned to assist the Contracting Officer in monitoring the Tivoli® contracts.

Management's Response: The EUES organization has assigned a COTR to assist the contracting officer in monitoring the Tivoli® contracts.

4. Contractual agreements for the number of software licenses purchased and installed are monitored for compliance. If the contractual agreement has changed, a contract modification should be prepared and approved.

Management's Response: The EUES organization monitors the contractual agreements for compliance with the number of software licenses that have been purchased and installed. A "true up" of deployed software is done quarterly. If the contractual agreement changes, the contract is modified. In addition, IRS officials stated they will work with the Contracting Officer to include documentation of IRS' enrollment in the IBM Software Passport Program in contract documentation.

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<sup>8</sup> A Statement of Work describes the work to be performed or the services to be rendered, defines the respective responsibilities of the Federal Government and the contractor, and provides an objective measure so that both the Government and the contractor will know when the work is complete.

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### Security Responsibilities for Tivoli® Have Not Been Formally Assigned

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The OMB Circular A-130, *Management of Federal Information Resources*, dated November 30, 2000, addresses the requirement for adequate computer security for information systems. The Internal Revenue Manual (IRM) states that the Information Systems Security Officer (ISSO) is responsible for ensuring the system is certified and accredited. The IRM also states that business resumption plans shall be developed, tested, implemented, and maintained for all essential systems. It states that performance measures should be followed for the planning, implementation, testing, review, and maintenance of business continuity plans for all critical business functions. However, an ISSO has not been assigned to ensure that the IRS' security requirements were being complied with and that a business continuity capability for Tivoli® exists, thereby potentially increasing the IRS' exposure to risks in the areas of security and business continuity (i.e., not being able to restore functions in a timely manner).

For example, the IRS granted the Tivoli® system an Interim Authority to Operate (IAO) in July 2002. The IAO included various security requirements, such as the use of a software module to promote security (i.e., Policy Director Operating System). However, the software module was not enabled, and the IRS' networked devices are potentially exposed to increased security risks. IRS staff acknowledged that the Tivoli® system is only partially compliant with the security requirements.

The Tivoli® System Technical Contingency Planning Document<sup>9</sup> states that the Tivoli® recovery strategy is limited to plans to acquire new hardware to replace systems lost in a disaster and that these plans are inherently untestable estimates of the resources and time required to achieve a recovery. Therefore, the business continuity capability has not been tested. By not having an effective business continuity capability, the IRS may not be able to

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<sup>9</sup> Provides recovery strategies, essential resources, plans, and procedures necessary to recover the system in the event of a disaster.

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recover timely from a disaster. OESM personnel indicated that an ISSO has not been assigned because of a hiring freeze and reorganization within the MITS Services organization.

By not having an ISSO to ensure adequate security and an effective business continuity capability, the IRS is potentially increasing its security risk and limiting its ability to timely recover its enterprise-wide network management capability from a disaster.

### **Recommendation**

The Chief Information Officer should ensure that:

5. An ISSO is assigned for the Tivoli® component of the ESM project to ensure that adequate security and business continuity capability for Tivoli® is provided and tested.

Management's Response: The EUES organization will appoint an ISSO by August 1, 2003.

**Detailed Objective, Scope, and Methodology**

The overall objective of this audit was to determine whether the Internal Revenue Service (IRS) is effectively and efficiently managing and using Tivoli®,<sup>1</sup> an enterprise system software product. To accomplish the objective, we:

- I. Evaluated the effectiveness of selected system life cycle management controls over the Tivoli® project.
  - A. Determined and identified the appropriate system life cycle methodology.
  - B. Determined and documented the implementation status of the Tivoli® software product.
  
- II. Evaluated the effectiveness and efficiency of selected operational controls over the Tivoli® implementation for software distribution to personal computer (Tier III) systems. The IRS is in the process of refreshing and updating its 100,000 plus personal computer workstations with this software.
  - A. Documented at a high level Tivoli's® technical architecture (diagram) and the technical processes used to distribute software on computers located in remote locations.
  - B. Determined the method used to establish and document whether intended software could be distributed to the intended workstations.
  - C. Documented the administrative processes and controls used to distribute software.
  - D. Validated the method identified in step II.B by judgmentally selecting 10 workstations located at the IRS Campus<sup>2</sup> in Austin, Texas, and determined whether the software distribution being reported to Tivoli® as successful was actually installed on the workstations. Judgmental sampling was used because there was no intent of projecting across the population of approximately 5,000 endpoints at the campus.

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<sup>1</sup> Tivoli® is a registered trademark owned by IBM.

<sup>2</sup> The campuses are the data processing arms of the IRS. The campuses process paper and electronic submissions, correct errors, and forward data to the computing centers for analysis and posting to taxpayer accounts.

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**Appendix II**

**Major Contributors to This Report**

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**Appendix III**

**Report Distribution List**

Commissioner N:C  
Deputy Commissioner for Operations Support N:OS  
Chief, Information Technology Services OS:CIO:I  
Acting Chief, Security Services OS:MA  
Director, End User Equipment and Services OS:CIO:I:EU  
Acting Director, Portfolio Management OS:CIO:R:PM  
Manager, Enterprise Systems Management OS:CIO:I:EU:ESM  
Director, Legislative Affairs CL:LA  
Chief Counsel CC  
National Taxpayer Advocate TA  
Director, Legislative Affairs CL:LA  
Director, Office of Program Evaluation and Risk Analysis N:ADC:R:O  
Office of Management Controls N:CFO:AR:M  
Audit Liaisons:  
    Chief, Information Technology Services OS:CIO:I  
    Chief, Security Services OS:MA  
    Director, End User Equipment and Services OS:CIO:I:EU  
    Manager, Program Oversight and Coordination OS:CIO:R:PM:PO

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### Appendix IV

#### Outcome Measures

This appendix presents detailed information on the measurable impact that our recommended corrective actions will have on tax administration. These benefits will be incorporated into our Semiannual Report to the Congress.

##### Type and Value of Outcome Measure:

- Inefficient Use of Resources – Potential; \$2,217,945 to \$3,449,550 (see page 3).

##### Methodology Used to Measure the Reported Benefit:

*Assuming an 80 percent software distribution success rate:*

On April 14, 2003, the Internal Revenue Service (IRS) reported on its web site that there were 180,567 successful software distributions, out of a total of 410,537 attempts, and an overall endpoint health of 60 percent. The IRS estimates that each software distribution, when performed manually, takes 20 minutes per computer at a labor rate of \$45 per hour. This equates to \$15 per software distribution. Using the IRS' manual labor rates, the total number of software distributions, and an initial software distribution effectiveness rating of 80 percent, we derived an inefficiency measure totaling \$2,217,945.

$410,537 \text{ software distribution attempts} * 80 \text{ percent} = 328,430$

Total inefficiency measure:  $(328,430 \text{ potential} - 180,567 \text{ actual software distributions}) * \$15 \text{ per software distribution} = \$2,217,945.$

*Assuming a 100 percent software distribution success rate:*

On April 14, 2003, the IRS reported on its web site that there were 229,970 unsuccessful software distributions, out of a total of 410,537 attempts, and an overall endpoint health of 60 percent. The IRS estimates that each software distribution, when performed manually, takes 20 minutes per computer at a labor rate of \$45 per hour. This equates to \$15 per software distribution. Using the IRS' manual labor rates and the number of unsuccessful software distributions, we derived an inefficiency measure totaling \$3,449,550.

$229,970 \text{ unsuccessful software distributions} * \$15 \text{ per software distribution} = \$3,449,550.$

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### Type and Value of Outcome Measure:

- Inefficient Use of Resources – Potential; \$3,284,295 to \$4,105,365 (see page 3).

### Methodology Used to Measure the Reported Benefit:

#### *Assuming an 80 percent software distribution success rate:*

On April 14, 2003, the IRS reported on its web site an overall endpoint health rate of 60 percent and a summary total of software distributions to date of 410,537. Based on this relationship, the total estimated amount of software distributions that the IRS could have had with an 80 percent software distribution rate is 547,382. Forty percent of this amount (representing software distribution endpoints that Tivoli® could not reach) equates to 218,952 unrealized software distributions. The IRS estimates that each software distribution, when performed manually, takes 20 minutes per computer at a labor rate of \$45 per hour. This equates to \$15 per software distribution. Using the IRS' manual labor rates, the number of unrealized software distributions, and an initial effectiveness rating of 80 percent, we derived an inefficiency measure totaling \$3,284,295.

Total amount of software distributions: 410,537 software distributions / 60 percent = 684,228.

Total amount of software distributions with an 80 percent effectiveness rating: 684,228 \* 80 percent = 547,382.

Unrealized software distributions: 547,382 software distributions \* 40 percent of endpoints not reached = 218,953.

Potential software distribution inefficiency: 218,953 software distributions \* \$15 per software distribution = \$3,284,295.

#### *Assuming a 100 percent software distribution success rate:*

On April 14, 2003, the IRS reported on its web site an overall endpoint health rate of 60 percent and a summary total of software distributions to date of 410,537. Based on this relationship, the total estimated amount of software distributions that the IRS could have had with 100 percent software distribution and 100 percent healthy endpoints is 684,228. Forty percent of this amount (representing software distribution endpoints that Tivoli® could not reach) equates to 273,691 unrealized software distributions. The IRS estimates that each software distribution, when performed manually, takes 20 minutes per computer at a labor rate of \$45 per hour. This equates to \$15 per software distribution. Using the IRS' manual labor rates and the number of unrealized software distributions, we derived an inefficiency measure totaling \$4,105,365.

Total amount of software distributions: 410,537 software distributions / 60 percent = 684,228.

Unrealized software distributions: 684,228 \* 40 percent = 273,691.

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Potential software distribution efficiency savings: 273,691 software distributions \* \$15  
per software distribution = \$4,105,365.

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**Appendix V**

**Tivoli® Software Module Over-Deployments  
(as of September 30, 2002)**

<b>Product ID</b>	<b>Tivoli® Module</b>	<b>Number Purchased</b>	<b>Number Deployed</b>	<b>Number Over-deployed</b>
5698-SWD	Tivoli® Software Distribution <sup>1</sup>	61,250	106,054	44,804
5698-INV	Tivoli® Inventory <sup>2</sup>	61,250	106,054	44,804
5698-RCL	Tivoli® Remote Control <sup>3</sup>	87,500	106,054	18,554
5698-EMN	Tivoli® Distributed Monitoring	2,250	2,506	256
5698-EAS	Tivoli® Enterprise Control	0	17	17
5698-TDS	Tivoli® Decision Support <sup>4</sup>	0	14	14
5698-WAS	Tivoli® Manager for Web Sphere Application Server	0	6	6
<b>Total Number of Over-Deployed Software Modules</b>				<b>108,455</b>

*Sources: Internal Revenue Service (IRS) Contract No. 0-1-TR-DO-CA-A01 and IRS correspondence.*

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<sup>1</sup> The number of modules presented includes client and server modules. Client modules: Number Purchased 59,000; Number Deployed 103,550; Number Over-deployed 44,550. Server modules: Number Purchased 2,250; Number Deployed 2,504; Number Over-deployed 254.

<sup>2</sup> The number of modules presented includes client and server modules. Client modules: Number Purchased 59,000; Number Deployed 103,550; Number Over-deployed 44,550. Server modules: Number Purchased 2,250; Number Deployed 2,504; Number Over-deployed 254.

<sup>3</sup> The number of modules presented includes client and server modules. Client modules: Number Purchased 87,500; Number Deployed 103,550; Number Over-deployed 16,050. Server modules: Number Purchased 0; Number Deployed 2,504; Number Over-deployed 2,504.

<sup>4</sup> The number of modules presented includes client and server modules. Client modules: Number Purchased 0; Number Deployed 7; Number Over-deployed 7. Server modules: Number Purchased 0; Number Deployed 7; Number Over-deployed 7.

**The Implementation of Software Products to Manage and Control  
Computer Resources Needs Improvement**

**Appendix VI**

**Tivoli® Module Deployment Status  
(as of September 30, 2002)**

<b>Tivoli® Module/ - SubModule</b>	<b>Functional Description of Module</b>	<b>Deployment Status</b>
NetView	Provides a suite of network management tools for displaying network topologies, correlating and managing events, monitoring network availability, and gathering performance information.	Deployed
Management Framework	Provides the architectural foundation that other selected Tivoli® products use.	Deployed
- Application Performance Manager	<ul style="list-style-type: none"> <li>Helps achieve higher availability and optimized performance of specific applications.</li> </ul>	Planned
- Business System Manager - Distributed Edition	<ul style="list-style-type: none"> <li>Enables customers to graphically monitor and control interconnected business components and operating system resources from one single console.</li> </ul>	Not Deployed
- Data Protection for Oracle	<ul style="list-style-type: none"> <li>Is an add-in component to the Tivoli® Storage Manager (TSM); it applies the centralized, on-line, and back-up capabilities, as well as the automated storage management function of the TSM to Oracle databases using the Oracle Recovery Manager.</li> </ul>	Planned
- Decision Support	<ul style="list-style-type: none"> <li>Consolidates and presents enterprise management data in an easy-to-use view, which reveals patterns and relationships among the data.</li> </ul>	Deployed
- Disaster Recovery Manager	<ul style="list-style-type: none"> <li>Provides a flexible backup method for systems to help protect data and provide restore capabilities.</li> </ul>	Not Deployed
- Distributed Monitoring	<ul style="list-style-type: none"> <li>Monitors system resources and services, detects and corrects routine problems, detects and elevates nonroutine problems to appropriate personnel, and escalates critical situations/problems to the centralized console.</li> </ul>	In Development

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<b>Tivoli® Module/ - SubModule</b>	<b>Functional Description of Module</b>	<b>Deployment Status</b>
- Enterprise Console	<ul style="list-style-type: none"> <li>• Serves as a source of rules that elevate system or network problems to help desk personnel.</li> </ul>	In Development
- Inventory	<ul style="list-style-type: none"> <li>• Serves to automatically view and record hardware and software installed on networked systems. This information is then used to update the Information Technology Asset Management System on a weekly basis.</li> </ul>	Deployed
- Manager for Databases	<ul style="list-style-type: none"> <li>• Works with the TSM to protect a wide range of application data via the protection of the underlying database management systems holding that data.</li> </ul>	Deployed
- Manager for MQSeries	<ul style="list-style-type: none"> <li>• Provides an enterprise management solution for IBM's MQSeries commercial messaging software.</li> </ul>	Deployed
- Manager for Network Hardware	<ul style="list-style-type: none"> <li>• Helps the TSM and its other data protection modules to perform high-efficiency data backups and archives of applications while minimizing performance impact on database servers.</li> </ul>	Not Deployed
- Manager for Oracle	<ul style="list-style-type: none"> <li>• Incorporates Oracle management into the Tivoli® Framework and provides management, monitoring, and automated task execution.</li> </ul>	Deployed
- Manager for Web Sphere Application Server	<ul style="list-style-type: none"> <li>• Provides a single point of control to understand the health of the key elements of the Web Sphere Application Server environment.</li> </ul>	Deployed
- Policy Director	<ul style="list-style-type: none"> <li>• Provides a security auditing subsystem and a device-allocation mechanism that provides the required object-reuse characteristics for removable or assignable devices.</li> </ul>	In Development
- Remote Control	<ul style="list-style-type: none"> <li>• Allows an administrator to control the keyboard and mouse input and monitor the display output of a remote personal computer (PC). In addition, the administrator can use Remote Control to reboot a remote PC.</li> </ul>	Deployed

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<b>Tivoli® Module/ - SubModule</b>	<b>Functional Description of Module</b>	<b>Deployment Status</b>
- Server Performance Prediction Guide	<ul style="list-style-type: none"> <li>• Gathers server performance statistics including percentage of Central Processing Unit usage and percentage of disk usage.</li> </ul>	Deployed
- Software Distribution	<ul style="list-style-type: none"> <li>• Automates software distribution and installation from a central point.</li> </ul>	Deployed
- Space Manager	<ul style="list-style-type: none"> <li>• Automatically moves inactive data to less-expensive offline storage, freeing online disk space for more important active data.</li> </ul>	Not Deployed
- Storage Manager	<ul style="list-style-type: none"> <li>• Protects data from hardware failures and other errors by storing backup and archive copies of data on offline storage.</li> </ul>	Not Deployed
- Tivoli® Management Environment 10 (TME10) - Global Enterprise Manager	<ul style="list-style-type: none"> <li>• Unifies network computing management processes across mainframe data centers and distributed environments. This is no longer an active Tivoli® product and has been replaced by Tivoli® Business Systems Manager.</li> </ul>	Not Deployed
- TME10 - Security for Server	<ul style="list-style-type: none"> <li>• Provides centralized security management and the ability to define security policies and functions. Originally included for security purposes, this application was not used in the final design.</li> </ul>	Not Deployed
- TME10 - User Administration for Server	<ul style="list-style-type: none"> <li>• Provides system administrators with a single point of control and performs user, group, and host account management. Originally included for security purposes, this application was not used in the final design.</li> </ul>	Not Deployed

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<b>Tivoli® Module/ - SubModule</b>	<b>Functional Description of Module</b>	<b>Deployment Status</b>
- Web Services Analyzer	<ul style="list-style-type: none"> <li>• Consolidates globally distributed Web server log files into a single data warehouse and creates reports on Web server activity and visitor statistics.</li> </ul>	Deployed
- Web Services Manager	<ul style="list-style-type: none"> <li>• Ensures the availability and performance of the Web infrastructure.</li> </ul>	Deployed

*Sources: Interviews with Internal Revenue Service management and Enterprise Systems Management project documentation.*

# The Implementation of Software Products to Manage and Control Computer Resources Needs Improvement

Appendix VII

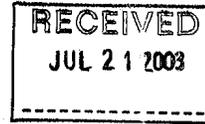
## Management's Response to the Draft Report



CHIEF INFORMATION OFFICER

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

July 21, 2003



MEMORANDUM FOR ACTING TREASURY INSPECTOR GENERAL FOR TAX  
ADMINISTRATION

FROM: W. Todd Grams *Julie A. Bushkin*  
Chief Information Officer *for*

SUBJECT: Management Response to Draft Audit Report – The  
Implementation of Software Products to Manage and  
Control Computer Resources Needs Improvement  
(Audit # 200220001)

The Internal Revenue Service (IRS) has invested in a very large enterprise systems management program. The Modernization, Information Technology and Security (MITS) Services is committed to efficiently managing computer resources at an enterprise level. We have implemented Tivoli®, our software products and services that provide enterprise management functionality (i.e., software distribution, remote control over personal computers, inventory management, security administration, etc.) to ensure adequate control of our computer resources. We continue to improve business processes to more efficiently support the IRS mission and to provide high-quality customer service. The Director, End User Equipment and Services (EUES):

- Established a staff to develop processes and procedures for maintenance of Tivoli® endpoints (i.e., computing devices that operate in a network, such as servers, desktops, or laptops). This staff also published documents on procedural endpoint health for production support personnel and conducted training classes to ensure understanding of the procedures. Endpoint health, the gauge of whether Tivoli® can “successfully” communicate with computing devices, is reported as an overall percentage for the IRS organization, and a summary percentage for 10 geographic areas, e.g., east, southeast, mid-states, and west regions.
- Established a staff to monitor and maintain the health of Tivoli® endpoints. Since this group has been established the overall endpoint health has improved from 60% to 88%. The Software Distribution staff is actively monitoring and resolving unsuccessful distributions. Within the last

## The Implementation of Software Products to Manage and Control Computer Resources Needs Improvement

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2

month, the percent of successful first distribution has increased from 40% to 60%.

- Appointed a Contracting Officer's Technical Representative (COTR) for the Tivoli® contract.
- Performed a quarterly reconciliation of licensed purchases versus product deployment (referred to as a "true up") with Tivoli® to ensure compliance with the contractual agreement. We will also include documentation of the IRS' participation in the IBM Software Passport Support Program in the contract documentation.

The Director, EUES, will also appoint an Information Systems Security Officer (ISSO) and ensure that disaster recovery plans are developed and tested.

We agree with your recommendation that provides a potential resource savings ranging from approximately \$5.5 million to \$7.5 million by improving Tivoli® program administration.

In addition, we are advising that none of the material in the draft report warrants protection under the Freedom of Information Act or other applicable laws.

We have included additional details on these actions in our attached management response. If you have questions, please call me at (202) 622-6800, or Thomas Mulcahy, Manager, Program Oversight Office, at (202) 283-6063.

Attachment

# The Implementation of Software Products to Manage and Control Computer Resources Needs Improvement

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ATTACHMENT

Management Response to Draft Audit Report – The Implementation of Software  
Products to Manage and Control Resources Needs Improvement  
(Audit # 200220001)

## IDENTITY OF RECOMMENDATION #1

The Chief Information Officer should ensure that appropriate policies and guidelines are developed to establish network connectivity to promote Tivoli® endpoint health.

## CORRECTIVE ACTION #1

The End User Equipment and Services organization has developed the appropriate policies and guidelines for the establishment of network connectivity to promote Tivoli® endpoint health.

## IMPLEMENTATION DATE:

COMPLETED 05/01/2003 PROPOSED \_\_\_\_\_

## RESPONSIBLE OFFICIAL(S)

Chief Information Officer  
Chief, Information Technology Services  
Director, End User Equipment and Services M:I:EU

## CORRECTIVE ACTION MONITORING PLAN #1

N/A

## The Implementation of Software Products to Manage and Control Computer Resources Needs Improvement

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ATTACHMENT

Management Response to Draft Audit Report – The Implementation of Software  
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### IDENTITY OF RECOMMENDATION #2

The Chief Information Officer should ensure that appropriate staff is assigned responsibility for resolving problems associated with unhealthy endpoints and unsuccessful software distributions for all IRS office locations.

### CORRECTIVE ACTION #2

The End User Equipment and Services organization has assigned staff responsibility for resolving problems associated with unhealthy endpoints and unsuccessful software distributions for all IRS office locations.

### IMPLEMENTATION DATE:

COMPLETED 05/01/2003 PROPOSED \_\_\_\_\_

### RESPONSIBLE OFFICIAL(S)

Chief Information Officer  
Chief, Information Technology Services  
Director, End User Equipment and Services M:I:EU

### CORRECTIVE ACTION MONITORING PLAN #2

N/A

## The Implementation of Software Products to Manage and Control Computer Resources Needs Improvement

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ATTACHMENT

Management Response to Draft Audit Report – The Implementation of Software  
Products to Manage and Control Resources Needs Improvement  
(Audit # 200220001)

### IDENTITY OF RECOMMENDATION #3

The Chief Information Officer should ensure that a COTR is assigned to assist the contracting officer in monitoring the Tivoli® contracts.

### CORRECTIVE ACTION #3

The End User Equipment and Services organization has assigned a Contracting Officer's Technical Representative (COTR) to assist the contracting officer in monitoring the Tivoli® contracts.

### IMPLEMENTATION DATE:

COMPLETED 05/01/2003 PROPOSED \_\_\_\_\_

### RESPONSIBLE OFFICIAL(S)

Chief Information Officer  
Chief, Information Technology Services  
Director, End User Equipment and Services M:I:EU

### CORRECTIVE ACTION MONITORING PLAN

N/A

## The Implementation of Software Products to Manage and Control Computer Resources Needs Improvement

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ATTACHMENT

Management Response to Draft Audit Report – The Implementation of Software  
Products to Manage and Control Resources Needs Improvement  
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### IDENTITY OF RECOMMENDATION #4

The Chief Information Officer should ensure that contractual agreements for the number of software licenses purchased and installed are monitored for compliance. If the contractual agreement changed, a contract modification should be prepared.

### CORRECTIVE ACTION #4

The End User Equipment and Services (EUES) organization monitors the contractual agreements for compliance with the number of software licenses that have been purchased and installed. A “true up” of deployed software is done quarterly. If the contractual agreement changes, we modify the contract. In addition, we will work with the Contracting Officer to include documentation of the IRS’ enrollment in the IBM Software Passport Program in contract documentation.

### IMPLEMENTATION DATE:

COMPLETED \_\_\_\_\_ PROPOSED 10/01/03

### RESPONSIBLE OFFICIAL(S)

Chief Information Officer  
Chief, Information Technology Services  
Director, End User Equipment and Services M:l:EU

### CORRECTIVE ACTION MONITORING PLAN #4

The Director, End User Equipment and Services will meet monthly with management, the COTR, and the ISSO to ensure the effectiveness of the Tivoli® endpoint health, software distributions, status of Tivoli® contracts (including submission of contract modifications), and security and business continuity of Tivoli®.

## The Implementation of Software Products to Manage and Control Computer Resources Needs Improvement

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ATTACHMENT

Management Response to Draft Audit Report – The Implementation of Software  
Products to Manage and Control Resources Needs Improvement  
(Audit # 200220001)

### IDENTITY OF RECOMMENDATION #5

The Chief Information Officer should ensure that an ISSO is assigned for the Tivoli® component of the ESM project to ensure that adequate security and business continuity capability for Tivoli® is provided and tested.

### CORRECTIVE ACTION #5

The End User Equipment and Services organization will appoint an Information Systems Security Officer (ISSO) by August 1, 2003.

### IMPLEMENTATION DATE:

COMPLETED \_\_\_\_\_ PROPOSED 08/01/2003

### RESPONSIBLE OFFICIAL(S)

Chief Information Officer  
Chief, Information Technology Services  
Director, End User Equipment and Services M:I:EU

### CORRECTIVE ACTION MONITORING PLAN FOR CORRECTIVE ACTION #5

The Director, End User Equipment and Services will meet monthly with management the COTR, and the ISSO to ensure the effectiveness of the Tivoli® endpoint health, software distributions, status of Tivoli® contracts (including submission of contract modifications), and security and business continuity of Tivoli®.