TREASURY INSPECTOR GENERAL FOR TAX ADMINISTRATION

Legacy Systems Management Needs Improvement

August 19, 2020

Reference Number: 2020-20-044

TIGTACommunications@tigta.treas.gov | www.treasury.gov/tigta | 202-622-6500

HIGHLIGHTS: Legacy Systems Management Needs Improvement

Final Audit Report issued on August 19, 2020
Reference Number 2020-20-044

Why TIGTA Did This Audit

This audit was initiated to assess the IRS's efforts to identify and replace its legacy systems.

Impact on Taxpayers

Legacy systems are critical for many organizations because they support key mission functionalities. However, they can also carry significant risks, including increased cybersecurity threats and maintenance costs.

In Fiscal Year 2019, the IRS spent over $2.86 billion to operate its current information technology infrastructure, nearly $2.04 billion (71 percent) of which was on operations and maintenance. If current trends continue, spending is expected to increase to over $3 billion annually by Fiscal Year 2026.

The IRS reported that the cost of operating these systems is overtaking other important components of effective tax administration and limiting the capacity to deliver quality service to taxpayers. Modernization is necessary to curtail these rising costs.

What TIGTA Found

The IRS has not developed specific or long-term plans to address updating, replacing, or retiring most of its legacy systems. Through various initiatives, the IRS identified 45 systems for modernization or candidates for modernization and 34 systems for retirement.

While various business units and functions have differing definitions of a legacy system, the IRS does not have an enterprise-wide definition or a complete and accurate inventory of legacy systems. By applying the Information Technology organization's definition of a legacy system to the As-Built Architecture (ABA) as of April 29, 2020, TIGTA determined that 288 (43 percent) of the 669 systems in the IRS's production environment had missing information that prevented TIGTA from determining whether the systems should be considered legacy. Of the remaining 381 systems, TIGTA determined that 231 systems were legacy and 150 were not legacy. When comparing our list to the IRS's lists of legacy systems, TIGTA identified 46 systems as legacy that the IRS had not and one system that the IRS incorrectly identified as legacy. Further analysis determined that an additional 49 systems will become legacy within the next 10 calendar years.

Furthermore, the IRS generally does not capture operations and maintenance costs at the system or subsystem levels, only at the investment level. As a result, the IRS does not have sufficient and detailed cost data that can be used in its decisionmaking processes to prioritize its legacy system modernization efforts.

What TIGTA Recommended

TIGTA made five recommendations including that the Chief Information Officer coordinate with other business units and functions, as needed, to: establish, implement, and uniformly apply an IRS enterprise-wide definition of a legacy system; implement *Portfolio Rationalization* or a similar program IRS enterprise-wide to identify, prioritize, and execute the updating, replacing, or retiring of current and future legacy systems; ensure that all systems are included in the ABA with complete and accurate information; implement a policy requiring system owners to provide and periodically update system information to the ABA; and capture operations and maintenance costs for the current information technology infrastructure at the subsystem level.

The IRS agreed with three recommendations. The IRS plans to ensure the implementation and uniform application of an enterprise-wide legacy system definition and continue to update system information as well as implement an enterprise-wide policy requiring systems owners to regularly provide system information to the ABA. In addition, the IRS partially agreed with two recommendations. The IRS plans to implement the *Portfolio Rationalization* or similar strategy to include Information Technology organization–managed and business–managed systems for an enterprise-wide strategic approach and continue to track operations and maintenance costs at the project/program level.

TREASURY INSPECTOR GENERAL
FOR TAX ADMINISTRATION

U.S. DEPARTMENT OF THE TREASURY

WASHINGTON, D.C. 20220

August 19, 2020

MEMORANDUM FOR: COMMISSIONER OF INTERNAL REVENUE

FROM: Michael E. McKenney
Deputy Inspector General for Audit

SUBJECT: Final Audit Report – Legacy Systems Management Needs Improvement (Audit # 202020004)

This report presents the results of our review to assess the Internal Revenue Service's (IRS) efforts to identify and replace its legacy systems. This review is part of our Fiscal Year 2020 Annual Audit Plan and addresses the major management and performance challenge of *Modernizing IRS Operations*.

Management's complete response to the draft report is included as Appendix V.

Copies of this report are also being sent to the IRS managers affected by the report recommendations. If you have any questions, please contact me or Danny R. Verneuille, Assistant Inspector General for Audit (Security and Information Technology Services).

Table of Contents

Appendices

Background

Legacy systems[1] are critical for many organizations because they support key mission functionalities, but they can also carry significant risks. In today's rapidly changing information technology environment, a system that may not be considered legacy today might become legacy tomorrow due to the fast pace of emerging technologies as well as changing business priorities or customer needs.

The Department of the Treasury defines a legacy system as:

> *...an information system that may be based on outdated technologies but is critical to day-to-day operations. A legacy system, in the context of computing, refers to outdated computer systems, programming languages, or application software that are used instead of more modern alternatives. A legacy system may be problematic, due to compatibility issues, obsolescence, or the lack of support. What is key is that a legacy system has been identified as strategic, but in need of replacement.*

The Internal Revenue Service's (IRS) legacy computing infrastructure reflects a complex set of demands: ongoing changes to tax rules and regulations and processing more than 160 million individual and business tax returns and refunds during each filing season as well as implementing measures to protect and securely maintain taxpayer data. Modernizing its legacy computer systems has been a persistent challenge for many years and will likely remain a challenge for the foreseeable future. According to the *Enterprise Technology Blueprint*,[2] the IRS reported that modernization of its computing infrastructure will be difficult due to the complexity of existing legacy systems, a gap in employee skill sets, and the demands of new legislation.

Modernizing IRS legacy computer systems will continue to be a challenge.

The IRS uses an enterprise architecture framework as the foundation model for its enterprise architecture artifacts supporting investment planning, operations modernization, and taxpayer experience through secure digital innovation. Information systems are managed by individual business units or functions, which includes the Information Technology (IT) organization. The IRS's information technology enterprise direction and strategy are generally guided by the following six main documents as well as the Taxpayer First Act.[3]

- ***Enterprise Technology Blueprint*** provides the envisioned long-range technology environment and how technology will be leveraged and employed in support of the IRS's strategic business direction. It also provides a visualization of the interrelationships between the envisioned business capabilities, data, applications, and systems as well as technologies and infrastructure.
- **IRS Publication 3744,** ***IRS Strategic Plan, Fiscal Years 2018–2022***,[4] provides a comprehensive enterprise strategic framework detailing the IRS mission, vision, goals, objectives, supporting activities, and key measures. Each target enterprise architecture

[1] See Appendix VI for a glossary of terms.
[2] Release 1.1, dated March 31, 2020.
[3] Pub. L. No. 116-25.
[4] Revised April 2018.

capability is aligned and prioritized based on strategic plan objectives to support the strategic plan execution.

- *IT Vision 2.0*[5] provides the IRS direction on how information technology will enhance support for its customers and improve its internal business operations over the next three to five years. The target enterprise architecture aligns the target state services, solutions, and technologies to ensure that information technology and business missions are met.
- *Legacy Code Reduction Strategy*[6] provides a plan that will leverage data analysis of the legacy portfolio to reduce the IRS legacy code footprint. According to IT organization management, this strategy will be executed through the *Portfolio Rationalization* program.
- *Portfolio Rationalization*[7] is a program to reduce the system footprint through iterative activities to retire, reduce, reuse, or replace system code. It provides support for the evaluation and reporting of IT organization initiatives, including keeping the infrastructure current and reducing legacy applications.
- *Target Enterprise Architecture*[8] provides a holistic five-year enterprise vision of future IRS operations and describes the baseline architecture as well as a transition plan to achieve the target architecture. It also highlights six business[9] and four technical[10] strategic areas. The strategic business areas collectively encompass the major business functions of the IRS. The technical strategic areas encompass the foundational information technology environment on which IRS business operations are executed.
- **Section 2101 of the Taxpayer First Act** requires the Chief Information Officer to develop and implement a multiyear strategic plan for the information technology needs of the IRS. The plan will include: 1) performance measures for information technology and strategic plan implementation, 2) a plan for an information technology integrated enterprise architecture, and 3) the resources needed to accomplish the strategic plan. The plan will also account for planned major information technology acquisitions and align itself with the *IRS Strategic Plan*. The Chief Information Officer will update the plan annually, taking into account the development of any new information technology and the needs of the IRS.

The IRS has also developed the *IRS Integrated Modernization Business Plan*[11] specifically to address its modernization challenge. This plan provides a six-year road map for achieving necessary modernization of IRS systems and taxpayer services in two three-year phases that started in Fiscal Year 2019. The IRS organized the plan around four *"Modernization Pillars"* that are critical to its mission and future development: 1) *Taxpayer Experience,* 2) *Core Taxpayer Services and Enforcement*, 3) *Modernized IRS Operations,* and 4) *Cybersecurity and Data Protection*. The IRS anticipated spending $600 million between Fiscal Years 2019 and 2020 on

[5] Dated January 2018.
[6] Dated December 13, 2019.
[7] Dated March 17, 2020.
[8] Release 2020, dated September 18, 2019.
[9] The six business areas include: 1) Account Management, 2) Case Management, 3) Compliance, 4) Customer Service, 5) Intake, and 6) Internal Operations.
[10] The four technical areas include: 1) Applications and Services, 2) Data, 3) Infrastructure, and 4) Security.
[11] Dated April 2019.

these efforts and estimates that total costs will be approximately $2.3 billion to $2.7 billion over six years to fully implement this plan. Although Congress appropriated $150 million to the IRS for its Business Systems Modernization efforts in Fiscal Year 2019 and an additional $180 million in Fiscal Year 2020, the IRS did not receive its total two-year funding request of $400 million for its modernization efforts. The IRS reported that the success of its modernization efforts is dependent upon ensuring that funding is available for multiple fiscal years at predictable intervals.

According to the *IRS Integrated Modernization Business Plan*, the IRS identified three investments and three programs[12] to support the *Modernization Pillars* of *Core Taxpayer Services and Enforcement* and *Modernized IRS Operations*. Two investments and one program are part of Phase I that started in Fiscal Year 2019 and will continue onto Phase II, which is scheduled to begin in Fiscal Year 2022.[13] The remaining investment and two programs will begin in Phase II. The three investments and three programs include the following.

Phase I

- **Customer Account Data Engine 2 Transition State 2** – This investment will help modernize and develop an integrated, near real-time processing environment to support tax returns, information returns, payments, and other transactions. A key project supporting Customer Account Data Engine 2 Transition State 2 is the Individual Tax Processing Engine, which will convert approximately 200,000 lines of legacy Assembler Language Code to the modern Java software language. Strategy and Planning function management stated that this code conversion supports only a portion of the legacy Individual Master File functionality and that functionality outside this scope needs to be accounted for to fully retire the system.
- **Enterprise Case Management** – This investment will provide an enterprise-wide approach for streamlining case and workload management processes. It will also provide new capabilities through digitizing case information, automating work selection, and improving resource alignment. When completed, this will enable the IRS to decommission approximately 60 case management systems, *e.g.*, Integrated Collection System, Report Generation Software, Reporting Compliance Case Management System, *etc*. As of April 2020, management from the Enterprise Case Management Program Management Office stated that a solution has been identified and selected.
- **Next Generation Infrastructure** – This program provides a series of initiatives to support a more efficient, scalable, and flexible architecture implemented through advanced information technology infrastructure tools and technologies, such as an enterprise storage solution. These initiatives encompass compute, network, and storage activities as well as Development and Operations (referred to as DevOps) to automate software delivery and infrastructure changes. The IRS anticipates that these initiatives will help to reach its goal of converting 75 percent of its legacy code to modern languages.

[12] The IRS reported that these are all programs. For clarity later in the report, we distinguished those that are also considered investments.

[13] The Return Review Program was initially part of the *IRS Integrated Modernization Business Plan*. However, IT organization management stated that in Fiscal Year 2020 the Return Review Program transitioned to operations and maintenance and was no longer considered a part of their modernization efforts.

Phase II

- **Customer Account Data Engine 2 Target State** – This investment will allow capabilities for direct visibility and access to taxpayer account details on a near real-time basis. This will facilitate voluntary compliance and improve traceability of financial data from core accounting systems to IRS financial statements.
- **Information Returns Systems Processing** – This program consists of a modern intake database and systems that will allow for enhanced document matching to improve information return intake consistency.
- **Real-Time Tax Processing** – This program will deliver independent and near real-time data processing, allowing the IRS to move away from batch processing, view returns dynamically, and understand the status of a return as it is processed. Currently, batch processing prevents taxpayers from easily adjusting their individual returns. Within certain parameters, this program will allow amendments to be processed directly.

Results of Review

Specific or Long-Term Plans Have Not Been Developed to Address Updating, Replacing, or Retiring Most Legacy Systems

Reliance on legacy systems poses significant risks, including cybersecurity threats.

The reliance on legacy systems, aged hardware and software, and use of outdated programming languages poses significant risks, including increased cybersecurity threats and maintenance costs. In addition, the IRS cannot effectively manage its legacy systems[14] if it does not have an enterprise-wide strategy, an enterprise-wide definition, and a complete and accurate inventory to address updating, replacing, or retiring most of its legacy systems.

When we asked for specific plans to identify, manage, or modernize the IRS's legacy systems, IT organization and other business unit and function management stated that, generally, there were no individual plans for all systems at the IRS. IT organization management stated that, for systems managed by the Applications Development function, modernizing systems is based on business needs and the system capabilities or processes to deliver them, which may or may not include updating, replacing, or retiring legacy systems. However, IT organization management referenced the seven various direction and strategy documents that generally guide the IRS's information technology enterprise. Our review of five of the documents determined that the IRS has initiatives identifying 21 systems for modernization or potential candidates for modernization and 25 systems for retirement.[15] Figure 1 provides the number of systems specifically identified for modernization or retirement by direction and strategy document.

[14] For the purpose of this report, we will use the term legacy systems to also include legacy applications.

[15] Some investments, programs, and systems identified for modernization or retirement may affect associated subsystems. Subsystems were included in our total only if they were specifically identified in the information technology enterprise direction and strategy documents.

Figure 1: Number of Systems Specifically Identified in Initiatives for Modernization or Retirement[16]

Direction and Strategy Document	Systems Identified in Initiatives for Modernization	Systems Identified in Initiatives for Retirement
Enterprise Technology Blueprint	**2**	**16**
Legacy Code Reduction Strategy [17]	**6**	**3**[18]
Target Enterprise Architecture	**7**	**5**
Portfolio Rationalization [19]	**1**	**0**
IRS Integrated Modernization Business Plan	**5**	**1**
Total	**21**	**25**

Source: Treasury Inspector General for Tax Administration's analysis of IRS initiatives specifically identifying systems for modernization or retirement.

Our review of the remaining two documents *(IRS Strategic Plan* and *IT Vision 2.0)* determined that the IRS did not identify any additional systems for modernization or retirement. According to IT organization management, these two documents, which provide the strategy and direction of information technology in support of tax administration, were not meant to identify specific systems for modernization or retirement. In addition, IT organization management stated that, moving forward, *Portfolio Rationalization* will be their primary modernization program for the systems they manage.[20] They further stated that the collective initiatives focus on incrementally modernizing IRS capabilities and systems in batches; together with *Portfolio Rationalization*, these initiatives are expected to eventually provide and develop specific plans. However, for the majority of legacy systems, no efforts have been made to identify time frames, activities to be performed, and functions to be replaced or enhanced.

Aside from the systems specifically identified in the *Portfolio Rationalization* document, the *Portfolio Rationalization* team also maintains a "backlog" of initiatives, identifying an additional 24 systems for potential modernization and nine systems for retirement if resources and funding become available. However, other than the systems we identified in the five information technology enterprise direction and strategy documents in Figure 1 and as part of the *Portfolio Rationalization* program "backlog" of initiatives, the IRS does not currently have any specific or long-term plans to either update, replace, or retire its remaining legacy systems in operations.

[16] Duplicate systems identified from the *IRS Integrated Modernization Business Plan* for modernization or retirement are not included in the count for the remaining four information technology enterprise direction and strategy documents.

[17] The Individual Master File is included in the number of systems identified for modernization, but it is identified for retirement in other direction and strategy documents. The IRS plans to convert its programming language from Assembler Language Code to Java.

[18] These systems have since been retired and include the Automated Cycle Proof Listing Tier 2, Employee Protection System, and Wage and Investment Compliance Reports – Automated Cycle Proof Listing.

[19] Because the same systems are identified in the *Legacy Code Reduction Strategy*, they are not included in the count for the *Portfolio Rationalization* program.

[20] The *Portfolio Rationalization* program does not include systems managed by other IT organization functions or other business units and functions.

The Government Accountability Office (GAO) has reported similar findings. In Fiscal Year 2016, the GAO reported[21] that Federal agencies need to address aging legacy systems. For two of its systems reviewed, the IRS did not have specific, defined plans for modernization or replacement. The GAO recommended that the Secretary of the Treasury direct the IRS's Chief Information Officer to identify and plan for modernization or replacement of legacy systems as needed, including time frames, activities to be performed, and functions to be replaced or enhanced. In Fiscal Year 2019, the GAO also reported[22] that, for one of the IRS's critical systems reviewed, it had a documented modernization plan, which included work necessary to modernize the system. However, the plan did not include steps for the disposition of the legacy system or all necessary milestone dates to complete the modernization effort.

The GAO has issued guidance on managing legacy systems[23] and provides that agencies should periodically identify, evaluate, and prioritize their systems that are at, near, or exceeding their planned life cycles or that are based on technology which is obsolete to determine whether these systems should be updated, replaced, or retired. This process will allow agencies to identify and address high-cost or low-value systems in need of modernization.

Management Action: After the completion of our audit work, IT organization management provided documents to support that *Portfolio Rationalization* was implemented as the IT organization's program for modernizing legacy systems. In addition, management provided five examples[24] of long-term plans for modernizing legacy systems that were developed as a result of the *Portfolio Rationalization* program's efforts.

The IRS lacks an enterprise-wide definition that can be uniformly applied to identify its inventory of legacy systems

After much discussion and a request for how the Treasury Inspector General for Tax Administration defines a legacy system, IT organization personnel provided the Department of the Treasury's definition. They subsequently clarified and further defined a legacy system to include application age equal to or older than 25 years, programming languages that are considered obsolete (*e.g.*, Assembler Language Code and Common Business-Oriented Language), and systems meeting other factors such as a lack of vendor support, training, or resources. Applying this definition, IT organization personnel provided a list of legacy systems that they managed as of September 5, 2019.

IT organization personnel stated that their definition of a legacy system only applied to their organization and that other business units and functions may have different definitions. Consequently, we contacted five business units and 15 functions on November 26, 2019, and requested that they provide their definition of a legacy system as well as a current list of systems under their control that met their definition. Two business units and eight functions responded that they do not manage any systems. The remaining three business units and seven

[21] GAO, GAO-16-468, *INFORMATION TECHNOLOGY: Federal Agencies Need to Address Aging Legacy Systems* (May 2016).
[22] GAO, GAO-19-471, *INFORMATION TECHNOLOGY: Agencies Need to Develop Modernization Plans for Critical Legacy Systems* (June 2019).
[23] GAO, GAO-04-394G, *INFORMATION TECHNOLOGY INVESTMENT MANAGEMENT: A Framework for Assessing and Improving Process Maturity* (Mar. 2004).
[24] These included the Audit Information Management System Related Reports, Combined FedState, Miscellaneous Computations, Reimbursable Accounts Systems, and Remittance Processing System.

functions provided one or more responses in the following categories along with a list of legacy systems, based on their definition, which they manage:[25]

- One business unit and three functions do not have a definition of a legacy system.
- One business unit and four functions have their own definition of a legacy system, *e.g.*, a system that is in operations and maintenance, a system with software that is older than the prior version of the software currently available from the vendor, and development of a system that is older than five calendar years.
- One business unit partially used the IT organization's definition of a legacy system, *i.e.*, older than 25 years.
- Two business units asked for the Treasury Inspector General for Tax Administration's definition of a legacy system.

Given the number and different IRS definitions of a legacy system, we met with the Chief Information Officer and other senior IT organization executives. They agreed that the IT organization's definition should be considered the IRS's enterprise-wide definition and used for the purpose of our review. Based upon this information, we applied the IT organization's definition of a legacy system to the IRS's As-Built Architecture (ABA)[26] to identify all current systems that should be considered legacy. As of November 22, 2019, the ABA contained 644 systems in the production environment. However, we determined that 270 (42 percent) of these systems were missing basic and essential information,[27] *i.e.*, application age and programming language,[28] which prevented us from determining whether the systems should be considered legacy. Enterprise Services function management stated that there are no requirements for system owners to provide such information in the ABA. Of the remaining 374 systems, we determined that, based on the IT organization's definition, 230 systems were legacy and 144 were not legacy.

When we met with Applications Development and Strategy and Planning function management on April 27, 2020, they stated that the IRS has made strides in updating system information in the ABA. Specifically, they mentioned that the IT organization's *Portfolio Rationalization* program effort aligns the IRS's systems data with the ABA data, which includes resolving system and data discrepancies, *e.g.*, systems in the production environment not listed in the ABA or duplicate systems with different data attributes. On April 29, 2020, we obtained an updated list from the ABA that showed that there are now 669 systems in the production environment. Our review found that 288 (43 percent) systems were still missing the same basic and essential

[25] The 10 business units and functions that responded include: 1) Appeals; 2) Chief Privacy Officer; 3) Criminal Investigation; 4) Facilities Management and Security Services; 5) Human Capital Officer; 6) Large Business and International Division; 7) National Taxpayer Advocate; 8) Research, Applied Analytics, and Statistics; 9) Whistleblower Office; 10) Tax Exempt and Government Entities Division.

[26] According to IT organization management, the ABA is the authoritative source for the IRS's systems architecture.

[27] Three hundred and eight systems that were missing information on the application age, the programming language, or both includes 216 systems that did not have information on both the application age and programming language as well as 23 systems that did not have the application age and 69 systems that did not have the programming language.

[28] We did not apply other factors, such as lack of vendor support, training, and resources, when defining a legacy system due to variables in subjectivity.

information as in our original analysis,[29] which prevented us from determining whether the system should be considered legacy. Of the remaining 381 systems, we determined that 231 systems were legacy and 150 were not legacy. Figure 2 provides a summary of the legacy and non-legacy systems by managing organization.

Figure 2: Number of Legacy and Non-Legacy Systems by Managing Organization[30]

Organization Responsible for Managing Systems	Systems Identified As Legacy	Systems Identified As Non-Legacy	Systems Missing Information	Total
IT Organization	**204**	**116**	**97**	**417**
Business Units and Functions	**6**	**2**	**73**	**81**
Business Unit or Function Not Identified by the IRS	**21**	**32**	**118**	**171**
Total	**231**	**150**	**288**	**669**

Source: Treasury Inspector General for Tax Administration's analysis of the April 29, 2020, ABA list.

The IRS also does not have a complete and accurate inventory of legacy systems. When we compared our list to the lists of legacy systems from the IT organization and other business units and functions, we identified 46 systems as legacy that the IRS had not. Appendix III provides a list of legacy systems incorrectly identified as current by the IRS.

The IRS does not have a complete and accurate inventory of legacy systems.

IT organization management provided the following causes for why these 46 systems were not identified as legacy.

- 3 systems are being modernized and are no longer considered legacy systems.
- 5 systems were not listed in the ABA either in error or were considered to be created by subsystems and thus were not entered.
- 17 systems were identified as legacy at the system level but not at the subsystem level.
- 21 systems' information, *i.e.*, application age and programming language, changed since the list of systems identified as legacy was provided by the IT organization.

We disagreed with two of the IT organization management's responses. Systems not updated, replaced, or retired and still in operation should continue to be considered legacy because increasing costs continue to be spent on operations and maintenance and consistent funding for modernization efforts is not guaranteed. In addition, the ABA does not always provide the main and sublevel relationships of the various systems. This information would be essential for

[29] The 336 systems that were missing information on the application age, the programming language, or both include 236 systems that did not have information on both the application age and programming language as well as 37 systems that did not have the application age and 63 systems that did not have the programming language.
[30] Due to a conflicting understanding of which organization has managing responsibilities for some systems, our analysis was limited to information provided from the ABA.

the IRS to identify all systems that are legacy, particularly those systems managed directly by a business unit or function and not the IT organization.

Conversely, the IRS incorrectly identified the Telephone Routing Interactive System–Integrated Data Retrieval System as legacy that we did not consider legacy based on the IT organization's definition of a legacy system. IT organization personnel stated that this system was identified in error and has been removed from their list of legacy systems.

Potential growth of the legacy systems inventory

To provide additional perspective and the scope of legacy systems in future operations, we further analyzed the systems identified for modernization or retirement in the five information technology enterprise direction and strategy documents reviewed as well as in the *Portfolio Rationalization* program's "backlog" of initiatives. We determined that, from the IRS's current population of 231 legacy systems, only 27 of the 45 systems identified for modernization and 13 of the 34 systems identified for retirement in these documents and initiatives are considered legacy.[31]

In addition, we further analyzed the data from the ABA to determine the number of systems that will become legacy over the next 10 calendar years. Our analysis determined that an additional 49 systems[32] will become legacy due to meeting or exceeding each system's application age.[33] Thirteen of the 30 systems currently not considered legacy[34] identified for modernization or retirement in the information technology enterprise direction and strategy documents and the *Portfolio Rationalization* program's "backlog" of initiatives are part of the 49 systems that will become legacy. This will potentially increase the total number of legacy systems to 280 systems if current modernization plans are not fully implemented. In addition, if further action is not taken to address the growing number of and reliance on legacy systems, the IRS faces the risk of increasing cybersecurity threats and maintenance costs as more of its systems become legacy. Appendix IV provides a list of current systems that will become legacy within the next 10 calendar years.

The Chief Information Officer should coordinate with the other business units and functions, as needed, to:

Recommendation 1: Establish, implement, and uniformly apply an IRS enterprise-wide definition of a legacy system.

> **Management's Response:** The IRS agreed with this recommendation and will ensure implementation and uniform application of an enterprise-wide definition of a legacy system that conforms with established Department of the Treasury and Federal guidelines.

[31] Of the 79 systems identified for modernization or retirement, we were unable to make a legacy determination for six systems due to missing information in the ABA, and we did not make a legacy determination for three additional systems because the IRS had already retired them.

[32] The IT organization manages 46 of these systems, the Wage and Investment Division manages one of these systems, and the IRS did not identify the business unit(s) or function(s) managing the remaining two systems.

[33] The ABA does not always provide a specific application age but rather provides an age range, *e.g.*, 20–25 years old.

[34] This is calculated as follows: 45 (21+24) systems identified for modernization or potential modernization [plus] 34 (25+9) systems identified for retirement [minus] 40 (27+13) systems identified as legacy [minus] 9 (6+3) systems missing information in the ABA or already retired [equals] 30 systems.

Recommendation 2: Implement *Portfolio Rationalization* or a similar program IRS enterprise-wide to identify, prioritize, and execute the updating, replacing, or retiring of current and future legacy systems. This should include consideration of the system as well as the subsystem levels.

> **Management's Response:** The IRS partially agreed with this recommendation. The IRS will implement *Portfolio Rationalization* or a similar strategy to include the current scope of IT organization–managed and business–managed systems for an enterprise-wide strategic approach to identify, prioritize, and recommend the update, replacement, or retirement of current and future legacy systems.
>
> > **Office of Audit Comment:** Although the IRS only partially agreed with our recommendation, we believe management's response meets the intent of our recommendation.

Recommendation 3: Ensure that all systems are included in the ABA with complete and accurate information, including the managing organization(s), application age, and programming language.

> **Management's Response:** The IRS agreed with this recommendation and will continue to update the ABA with the appropriate information on a regular basis, including the managing organization(s), application age, and programming language.

Recommendation 4: Implement a policy requiring system owners to provide and periodically update system information in the ABA.

> **Management's Response:** The IRS agreed with this recommendation and will continue to ensure that an enterprise-wide policy is implemented requiring system owners to regularly provide and update system information to the ABA.

System-Level Cost Data Are Insufficient to Support Legacy Modernization Decisions

IRS spending on its information technology infrastructure is expected to increase to over $3 billion by Fiscal Year 2026.

According to the *IRS Integrated Modernization Business Plan,* the IRS reported that the costs of maintaining its current technology continues to grow every year at an unsustainable rate. In Fiscal Year 2019, the IRS spent over $2.86 billion to operate its current information technology infrastructure, nearly $2.04 billion (71 percent) of which was on operations and maintenance. If current trends continue, spending is expected to increase to over $3 billion annually by Fiscal Year 2026. The IRS also reported that the cost of operating these systems is overtaking other important components of effective tax administration and limiting its capacity to deliver quality service to taxpayers. Modernization is necessary to curtail these rising costs.

Office of Management and Budget Circular A-11, *Preparation, Submission, and Execution of the Budget*,[35] established processes to analyze, track, and evaluate the risks and results of

[35] Dated December 2019.

investments in information systems made by Federal agencies as well as report the net program performance benefits achieved as a result of these investments. The Office of Management and Budget uses several data collection mechanisms to oversee Federal information technology spending during the annual budget formulation process. This includes identifying operations and maintenance costs, which are required to operate and maintain an information technology asset in a production environment.[36]

To determine the operations and maintenance costs associated with each legacy system, we obtained Fiscal Year 2019 cost data from the Integrated Financial System for 127 information technology investments. The operations and maintenance costs are further categorized by up to 18 different types of expenses, *e.g.*, contractor, labor, and operational travel.[37] For example, in Fiscal Year 2019, the IRS spent approximately $5.2 million on contractors and $9.1 million on labor for operations and maintenance of the Individual Master File legacy system. However, we found that while some information technology investments can also be systems like in our example, the IRS generally does not capture operations and maintenance costs at the system level. Information technology investment operations and maintenance costs are also not captured at the subsystem level. As a result, the IRS does not have enough detailed cost data that can be used in its decisionmaking processes to prioritize the modernization of its legacy systems and subsystems.

Of the nearly $2.04 billion spent on operations and maintenance during Fiscal Year 2019, the IRS spent nearly half, $950 million, on three general information technology investments.

- End User Systems and Support ($176 million) – Provides desktops, laptops, mobile devices, asset (hardware and software) management program oversight, and incident management services to all IRS end users.
- Mainframes and Servers Service Support ($493 million) – Provides design, development, and deployment of server, middleware, and large systems and enterprise storage infrastructures, including databases, operating systems, and software for these platforms. This information technology investment category includes operations and maintenance funding for legacy systems.
- Telecommunication System Support ($281 million) – Provides data network infrastructure, engineering, voice, and video services throughout the IRS.

These costs are not allocated specifically to the information technology investment or system level. These costs are considered fixed costs spent on the operation of the IRS's information technology infrastructure. However, from these funds, we were able to determine that the IRS spent approximately $142 million on operations and maintenance costs for 52 of the 231 systems we identified as legacy. For the remaining 179 systems, we were unable to determine the amount spent on their operations and maintenance based upon the limited cost data available.

The *President's Management Agenda*[38] provides that "Effective stewardship of taxpayer funds is a crucial responsibility of [the Federal] Government, from preventing fraud to maximizing

[36] The Office of Management and Budget also collects data on development, modernization, and enhancement costs of projects and activities that lead to new, or to change or modify existing, information technology assets to substantively improve capability or performance.
[37] The IRS also captures the same types of expenses, as applicable, for development, modernization, and enhancement costs for each information technology investment.
[38] Dated March 20, 2018.

impact." It further provides that data, accountability, and transparency must provide the tools to deliver better results while improving accountability to taxpayers for sound fiscal stewardship and mission results. It goes on to state that "Congress and taxpayers have pressed for better information about how Federal IT dollars are spent and the return on that investment.... This lack of granularity makes it difficult to baseline Federal investments and show the public whether [the Federal] Government is spending taxpayer dollars effectively." However, the IRS did not consider capturing system-level operations and maintenance costs because it was only required by the Office of Management and Budget to capture the costs necessary to calculate the net program performance benefits achieved from its information technology investments. We believe that this lack of sufficiently detailed cost information hinders the IRS's ability to make informed decisions and prioritize its legacy system modernization efforts.

Recommendation 5: The Chief Information Officer should capture operations and maintenance costs for its current information technology infrastructure at the subsystem level.

Management's Response: The IRS partially agreed with this recommendation. The IRS will continue to track operations and maintenance costs in the Integrated Financial System using the internal order codes. The internal order codes capture cost at the project/program level.

Office of Audit Comment: IRS management states that they will continue to capture operations and maintenance costs at the project/program level. However, we do not believe that the operations and maintenance costs for all systems and subsystems will be captured with this approach. As a result, the IRS will not have sufficiently detailed cost information that can be used in its decisionmaking processes to prioritize the modernization of its legacy systems and subsystems.

Appendix I

Detailed Objective, Scope, and Methodology

The overall objective of this review was to assess the IRS's efforts to identify and replace its legacy systems. To accomplish our objective, we:

- Reviewed the IRS's information technology enterprise direction and strategy documents as well as interviewed IT organization and other business unit and function personnel to determine the IRS's modernization efforts and to identify legacy systems that the IRS plans to update, replace, or retire.
- Assessed the IRS's efforts to identify all legacy systems currently in operations by obtaining and applying the IT organization's definition of a legacy system to system information maintained in the ABA.

  Obtained two data extracts of systems in the production environment from the ABA. Compared the lists of legacy systems from the IT organization and other business units and functions to the list of systems we identified as legacy from the ABA and met with respective management personnel to obtain concurrence as well as to document the reasons for the differences.
- Determined the operations and maintenance costs of the IRS's legacy systems by reviewing available financial data. We also interviewed IT organization personnel to determine what, when, and how expenses are captured.

Performance of This Review

This review was performed with information obtained from the IT organization and other business units and functions during the period October 2019 through May 2020. We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective.

Major contributors to the report were Danny R. Verneuille, Assistant Inspector General for Audit (Security and Information Technology Services); Bryce Kisler, Director; Louis Lee, Audit Manager; Jason Rosenberg, Lead Auditor; and Charlene Elliston, Senior Auditor.

Validity and Reliability of Data From Computer-Based Systems

We performed limited evaluation of the reliability of the ABA data extracts to help ensure that the data were reasonably complete and accurate. We verified the criteria used to create the ABA extracts, verified that all fields requested were received, reviewed the output file to detect obvious errors and unexpected missing data, and verified that the record counts equaled to

what was expected. We determined that the data were sufficiently reliable for the purposes of this report.

Internal Controls Methodology

Internal controls relate to management's plans, methods, and procedures used to meet their mission, goals, and objectives. Internal controls include the processes and procedures for planning, organizing, directing, and controlling program operations. They include the systems for measuring, reporting, and monitoring program performance. We determined that the following internal controls were relevant to our audit objective: Office of Management and Budget directions, issued GAO reports, and guidance on legacy systems as well as IRS information technology policy and guidance documents. We evaluated these controls by interviewing IT organization and other business unit and function management and personnel, reviewing reports and IRS policy and guidance as well as information technology enterprise direction and strategy documents for managing legacy systems, and applying the IT organization's definition of legacy to the ABA to identify legacy systems.

Appendix II

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 Congress.

Type and Value of Outcome Measure:

- Reliability of Information – Potential; 47 systems that were not identified or were incorrectly identified as legacy (see Recommendation 1).

Methodology Used to Measure the Reported Benefit:

Using the list of 669 systems in the production environment from the ABA as of April 29, 2020, we applied the IT organization's definition of a legacy system to 381 systems with sufficient system information, *i.e.*, application age and programming language, to make a determination on whether the system should be considered legacy. We compared the lists of legacy systems from the IT organization and other business units and functions to the list of systems we identified as legacy from the ABA. We identified 46 systems that the IRS did not identify as legacy and one system that the IRS incorrectly identified as legacy.

Type and Value of Outcome Measure:

- Reliability of Information – Potential; 336 systems that had missing system information in the ABA (see Recommendation 3).

Methodology Used to Measure the Reported Benefit:

Our analysis determined that 336 systems did not have information or had inaccurate information in the ABA on the application age, program language, or both. This number includes 236 systems that did not have information on both the application age and programming language as well as 37 systems that did not have the application age and 63 systems that did not have the programming language.

Appendix III

Legacy Systems Incorrectly Identified As Current

(System should be identified as legacy based on the IT organization definition)

System	Abbreviation	System Name	Reason (Application Age, Outdated Programming Language, or Both)
1	AH	Address Hygiene	Outdated Programming Language
2	AIMS Extract	Audit Information Management System Extract Open/Closed Letters (LF396)	Outdated Programming Language
3	AIMSR	Audit Information Management System Reference	Both
4	AIS	Automated Insolvency System	Application Age
5	ARP	Audit Information Management System Reports Processing	Both
6	AUR	Automated Underreporter	Application Age
7	BBTS	Batch Block Tracking System	Application Age
8	BMF 701 EXEC	Executive Control Program for Business Master File Extract	Application Age
9	BMF 94X-XML	Business Master File Electronic Filing 94X-XML [Extensible Markup Language]	Application Age
10	BMF ANALYSIS	Business Master File Posting and Analysis	Application Age
11	BMF NOTICE COMP	Business Master File Notice Composition	Application Age
12	BMF NOTICE ID	Business Master File Notice Identification	Application Age
13	BMF PRE-POSTING	Business Master File Pre-Posting	Application Age
14	BMF Wage	Business Master File Wage Data for the Social Security Administration	Application Age
15	BRTF 701 EXEC	Executive Control Program for Business Return Transaction File Extract	Application Age
16	CAWR	Combined Annual Wage Reporting	Application Age

System	Abbreviation	System Name	Reason (Application Age, Outdated Programming Language, or Both)
17	CCACheck	Chief Counsel Advice Check	Outdated Programming Language
18	DED	Data Edit Validation	Both
19	ERCS	Examination Returns Control System	Application Age
20	GAS	Gas Oil Update and Report System	Application Age
21	ICS Mainframe	Integrated Collection System Mainframe	Outdated Programming Language
22	IIP	Insolvency Interface Program	Outdated Programming Language
23	IMF 701 EXEC	Executive Control Program for Individual Master File Extract	Application Age
24	IMF ANALYSIS	Individual Master File Posting and Analysis	Application Age
25	IMF NOTICE COMP	Individual Master File Notice Composition	Application Age
26	IMF NOTICE ID	Individual Master File Notice Identification	Both
27	IMF OUTPUTS	Individual Master File Outputs	Application Age
28	IMF PRE-POSTING	Individual Master File Pre-Posting	Application Age
29	IMS-FITS	Issue Management System – Fraud Information Tracking System	Outdated Programming Language
30	IRP NF	Information Returns Processing Nonfiler	Application Age
31	IRTF	Individual Return Transaction File	Application Age
32	ISRP	Integrated Submission and Remittance Processing	Outdated Programming Language
33	MIS RPTS	Management Information System Reports	Outdated Programming Language
34	ML	Mail Labels	Outdated Programming Language
35	NFTRAC	Nonfiler Tracking	Application Age
36	NRPS BMF	Notice Review Processing System – Business Master File	Application Age

System	Abbreviation	System Name	Reason (Application Age, Outdated Programming Language, or Both)
37	NRPS BMF IAP	Notice Review Processing System – Business Master File Integrated Collection System/Automated Collection System/Print	Application Age
38	NRPS IMF	Notice Review Processing System – Individual Master File	Application Age
39	NRPS IMF IAP	Notice Review Processing System – Individual Master File Integrated Collection System/Automated Collection System/Print	Application Age
40	OLNR	On-Line Notice Review	Outdated Programming Language
41	QDAR	Questionable Refund Program Individual Master File Criminal Investigation Division Duplicate Address Refund	Outdated Programming Language
42	RGS	Report Generation Software	Both
43	SCRIPS	Service Center Recognition Image Processing System	Application Age
44	SS	Shared Secret	Outdated Programming Language
45	TMSSN	Temporary Social Security Number	Outdated Programming Language
46	U.S. CERT	United States Residency Certification	Outdated Programming Language

Appendix IV

Current Systems Becoming Legacy Within the Next 10 Calendar Years[1]

System	Abbreviation	System Name	When System Will Become Legacy (Calendar Years)
1	527PAC	527 Political Action Committee	Within 10 Years
2	A6020(b)	Automated 6020(b)	Within 5 Years
3	ACDS	Appeals Centralized Database System	Within 5 Years
4	ALERTS	Automated Labor and Employee Relations Tracking System	Within 5 Years
5	AMA	Automated Manual Assessments	Within 10 Years
6	ANMF	Automated Non–Master File	Within 5 Years
7	AOIC	Automated Offers In Compromise	Within 5 Years
8	ATFR	Automated Trust Fund Recovery Program	Within 10 Years
9	BMF CCNIP	Business Master File Case Creation Nonfiler Identification Process Database	Within 10 Years
10	BMF DIF INV	Business Master File Discriminant Index Function Inventory	Within 5 Years
11	BMF OUTPUTS	Business Master File Outputs	Within 5 Years
12	BPMS	Business Performance Management System	Within 5 Years
13	CARE TIER1	Computer Assisted Review of Error Resolution System – Tier 1	Within 10 Years
14	CASTS	Custodial Audit Support Tracking System	Within 5 Years
15	CTRS	Collection Time Reporting System	Within 5 Years
16	DCS-2	Data Capture System	Within 5 Years
17	EC	Employee Connection	Within 5 Years
18	EDAS XRDB	Enterprise Data Access Strategy Extensible Markup Language Relational Database	Within 10 Years
19	EFPPS	Electronic Federal Payment Posting System	Within 5 Years
20	EQRS-Campus	Embedded Quality Review System – Campus	Within 10 Years
21	EQRS-Field	Embedded Quality Review System – Field	Within 10 Years

[1] As of April 29, 2020.

System	Abbreviation	System Name	When System Will Become Legacy (Calendar Years)
22	ExFIRS	Excise Files Information Retrieval System	Within 10 Years
23	Finalist	Zoning Improvement Processing – Location Code Processing	Within 10 Years
24	ICCE IP	Integrated Customer Communications Environment Interactive Processor	Within 5 Years
25	ICCE MIS	Integrated Customer Communications Environment Management Information System	Within 10 Years
26	ICCE Monitor	Integrated Customer Communications Environment Monitor	Within 10 Years
27	ICCE REF	Integrated Customer Communications Environment Refund Inquiry	Within 5 Years
28	ICCE Telephone Apps	Integrated Customer Communications Environment Telephone Applications	Within 5 Years
29	ICCE Web Apps	Integrated Customer Communications Environment Web Applications	Within 10 Years
30	IFS	Integrated Financial System	Within 10 Years
31	IRFOF	Internet Refund – Fact of Filing	Within 10 Years
32	MeF	Modernized Electronic Filing	Within 10 Years
33	NDS	Notice Delivery System	Within 10 Years
34	NOTICES	Notices	Within 5 Years
35	Passport Input	Passport Input	Within 10 Years
36	PHOREF	Photocopy Refunds Program	Within 10 Years
37	PRINT	Print Automation	Within 5 Years
38	RCA	Reasonable Cause Assistant	Within 10 Years
39	Registration	Registration Services	Within 10 Years
40	RICS	Returns Inventory and Classification System	Within 10 Years
41	RRP LC	Return Review Program Legacy Components	Within 10 Years
42	RTR	Remittance Transaction Research System	Within 10 Years
43	SCOP	Standard Corporate Files On-Line Overnight Processing	Within 5 Years
44	SERP	Servicewide Electronic Research Program	Within 5 Years
45	SOR	Secure Object Repository	Within 10 Years

System	Abbreviation	System Name	When System Will Become Legacy (Calendar Years)
46	STRAWS	Suite of Tools for Review and Creation of Automated Workplans and Schedules	Within 10 Years
47	TAMIS	Taxpayer Advocate Management Information System	Within 10 Years
48	TPC	Third-Party Contact	Within 10 Years
49	WHCSDB	Withholding Compliance System Database	Within 10 Years

Appendix V

Management's Response to the Draft Report

CHIEF INFORMATION OFFICER

DEPARTMENT OF THE TREASURY
INTERNAL REVENUE SERVICE
WASHINGTON, DC 20224

August 7, 2020

MEMORANDUM FOR DEPUTY INSPECTOR GENERAL FOR AUDIT

FROM: Nancy A. Sieger
Acting, Chief Information Officer

Nancy A. Sieger
Digitally signed by Nancy A. Sieger
Date: 2020.08.07 16:18:27 -04'00'

SUBJECT: Response to Draft Audit Report – Mitigating the Risks of Legacy Systems Management (audit #202020004)

Thank you for the opportunity to review your draft audit report and address the report observations with the audit team. As acknowledged by TIGTA in the report, the Internal Revenue Service (IRS) legacy computing ecosystem comprises hundreds of systems that enable the IRS mission and support our successful delivery on a complex set of requirements. Each year, this includes making ongoing system changes to account for changing tax laws and regulations; securely processing more than 253 million tax returns and other forms; collecting $3.26 trillion in taxes, representing almost 96 percent of the funding that supports the Federal Government's operations; and implementing legislation such as the CARES Act, which has provided over 162 million Economic Impact Payments totaling more than $271 billion.

The IRS is committed to modernizing targeted legacy systems to the extent possible based on resources and agency priorities. This commitment is visible in the IRS Integrated Modernization Business Plan, the IRS Strategic Plan, the IRS Technology Roadmap and the new Portfolio Rationalization program. These documents reflect the IRS incremental modernization strategy. We continue to make significant progress in delivering incremental modernization, including past and in-progress CADE2 deliverables and the work in-progress for the initial release of the Enterprise Case Management system. Beyond the major programs included in the IRS Integrated Modernization Business Plan, the Portfolio Rationalization program also identifies and executes other modernization opportunities based on benefits and available resources.

We agree with TIGTA's three recommendations and partially agree with two recommendations, which will make constructive improvements in our journey to modernize our legacy portfolio. Our corrective action plan for the recommendations identified in the report is attached. The IRS is committed to implementing an enterprise-wide strategy to identify, prioritize, and execute the update, replacement, or retirement of legacy systems in a well-planned and strategic effort.

The IRS values your continued support and the assistance your organization provides. If you have any questions, please contact me at (202) 317-5000 or a member of your staff may contact Steve Lambourne, Director, Applications Development, Technical Integration Office, at (972) 825-6236.

Attachment

Draft Audit Report – Mitigating the Risks of Legacy systems Management
(audit #202020004) (e-trak # 2020-24538)

RECOMMENDATION #1: Establish, implement, and uniformly apply an IRS enterprise-wide definition of a legacy system.

CORRECTIVE ACTION #1:The IRS agrees with this recommendation and will ensure implementation and uniform application of an enterprise-wide definition of a legacy system that conforms with established Treasury and Federal guidelines.

IMPLEMENTATION DATE: December 15, 2020

RESPONSIBLE OFFICIALS: Associate Chief Information Officer, Enterprise Services

CORRECTIVE ACTION MONITORING PLAN: We enter accepted Corrective Actions into the Joint Audit Management Enterprise System (JAMES) and monitor them on a monthly basis until completion.

RECOMMENDATION #2: Implement Portfolio Rationalization or a similar program IRS enterprise-wide to identify, prioritize, and execute the updating, replacing, or retiring of current and future legacy systems. This should include consideration of the system as well as the sub-system levels.

CORRECTIVE ACTION #2: The IRS partially agrees with this recommendation. IRS will implement Portfolio Rationalization or similar strategy to include the current scope of IT-managed systems and business-managed systems for an enterprise-wide strategic approach to identify, prioritize, and recommend the update, replacement, or retirement of current and future legacy systems

IMPLEMENTATION DATE: September 15, 2021

RESPONSIBLE OFFICIALS: Associate Chief Information Officer, Applications Development

CORRECTIVE ACTION MONITORING PLAN: We enter accepted Corrective Actions into the Joint Audit Management Enterprise System (JAMES) and monitor them on a monthly basis until completion.

RECOMMENDATION #3: Ensure all systems are included in the ABA with complete and accurate information, including the managing organization(s), application age, and programming language.

CORRECTIVE ACTION #3: The IRS agrees with this recommendation and will continue to update the ABA with the appropriate information on a regular basis, including the managing organization(s), application age, and programming language.

IMPLEMENTATION DATE: September 15, 2021

RESPONSIBLE OFFICIALS: Associate Chief Information Officer, Enterprise Services

Attachment

Draft Audit Report – Mitigating the Risks of Legacy systems Management
(audit #202020004) (e-trak # 2020-24538)

CORRECTIVE ACTION MONITORING PLAN: We enter accepted Corrective Actions into the Joint Audit Management Enterprise System (JAMES) and monitor them on a monthly basis until completion.

RECOMMENDATION #4: Implement a policy requiring system owners to provide and periodically update system information to the ABA.

CORRECTIVE ACTION #4: IRS agrees with this recommendation and will continue to ensure that an enterprise-wide policy is implemented requiring system owners to regularly provide and update system information to the ABA.

IMPLEMENTATION DATE: January 15, 2021

RESPONSIBLE OFFICIALS: Associate Chief Information Officer, Enterprise Services

CORRECTIVE ACTION MONITORING PLAN: We enter accepted Corrective Actions into the Joint Audit Management Enterprise System (JAMES) and monitor them on a monthly basis until completion.

RECOMMENDATION #5: The Chief Information Officer should capture operations and maintenance costs for its current information technology infrastructure at the sub-system level.

CORRECTIVE ACTION #5: IRS Partially agrees with this recommendation. IRS will continue to track operations and maintenance costs in the Integrated Financial System using the internal order codes. The internal order codes capture cost at the project/program level.

IMPLEMENTATION DATE: June 15, 2022

RESPONSIBLE OFFICIALS: Associate Chief Information Officer, Strategy & Planning

CORRECTIVE ACTION MONITORING PLAN: We enter accepted Corrective Actions into the Joint Audit Management Enterprise System (JAMES) and monitor them on a monthly basis until completion.

Appendix VI

Glossary of Terms

Term	Definition
Application	A component of a system that utilizes information technology resources to store, process, retrieve, or transmit data or information using information technology hardware and software.
Artifact	The tangible result (output) of an activity or task performed by a project.
As-Built Architecture	The authoritative source of the IRS's information technology and business environments. It documents the production environment of IRS systems, infrastructure, technology platforms, *etc.*
Assembler Language Code	A low-level programming language for microprocessors and other programmable devices. It generally lacks high-level conveniences, *e.g.*, variables and functions, and is not portable between various families of processors. It is useful for programmers when speed is necessary or when there is a need to carry out an operation not possible in high-level languages.
Asset Management Program	Maintains and develops standards, policies, processes, measurements, and systems that enable an organization to properly manage its information technology assets with respect to risk, control, governance, costs, and business compliance as well as the performance objectives that have been set by the organization.
Batch Processing	The execution of a series of programs or jobs on a computer with minimal human interaction.
Business Unit	A title for major IRS organizations, such as Appeals, the Wage and Investment Division, and the IT organization.
Calendar Year	The 12-consecutive-month period ending on December 31.
Common Business-Oriented Language	A business-based programming language created in 1959, designed for exclusive use in mainframe computers for business applications.
Database	A collection of information that is organized so that it can easily be accessed, managed, and updated.
Development and Operations (DevOps)	A change in information technology culture, focusing on rapid information technology service delivery through the adoption of Agile, lean practices in the context of a system-oriented approach. DevOps emphasizes people (and culture) and seeks to improve collaboration between operations and development teams.
Enterprise Architecture	A strategic information asset base which defines the mission, the information and technologies necessary to perform the mission, and the transitional processes for implementing new technologies in response to the changing needs of the mission.

Term	Definition
Enterprise Services Function	A part of the IT organization that provides crosscutting services and support functions that help bring coordination and assistance to programs and projects within the IRS.
Fiscal Year	Any yearly accounting period, regardless of its relationship to a calendar year. The Federal Government's fiscal year begins on October 1 and ends on September 30.
Government Accountability Office	An independent, nonpartisan agency that reports to Congress on how well Government programs and policies are meeting their objectives. It also advises Congress and the heads of executive agencies about ways to make the Government more efficient, effective, ethical, equitable, and responsive.
Incident Management	The process for managing incidents with the goal of restoring service as quickly as possible and minimizing the adverse impact on the customer.
Individual Master File	The IRS database that maintains transactions or records of individual taxpayer accounts.
Information Technology Organization	The IRS organization responsible for delivering information technology services and solutions that drive effective tax administration to ensure public confidence.
Infrastructure	The hardware, software, and network resources and services required for the existence, operation, and management of an enterprise information technology environment. It allows an organization to deliver information technology solutions and services to its employees, partners, and customers.
Integrated Collection System	Provides workload management, case assignment and tracking, inventory control, case analysis tools, and management information system capabilities to support the Small Business/Self-Employed Division's Collection Field function.
Integrated Financial System	An administrative accounting system used by the IRS.
Investment	The development and sustainment resources needed in support of information technology or related initiatives. These resources include, but are not limited to: research, development, test, and evaluation appropriations; procurement appropriations; and operations and maintenance appropriations.
Java	A set of several computer software products and specifications that together provide a system for developing application software and deploying it in a cross-platform computing environment.
Legacy System	An information system that may be based on outdated technologies but is critical to day-to-day operations. In the context of computing, it refers to outdated computer systems, programming languages, or application software that are used instead of more modern alternatives.
Mainframe	A powerful, multiuser computer capable of supporting many hundreds of thousands of users simultaneously.

Term	Definition
Middleware	Software that functions at an intermediate layer between applications and the operating system and database management system or between the client and server.
Modernization	The process of updating, improving, and bringing in line with modern standards.
Office of Management and Budget	The largest component of the Executive Office of the President. It oversees and coordinates Federal procurement policy, performance and personnel management, information technology, and financial management. In this capacity, it oversees agency management of programs and resources to achieve legislative goals and administration policy.
Operating System	The software that serves as the user interface and communicates with computer hardware to allocate memory, process tasks, and access disks and peripherals.
Programming Language	A computer language engineered to create a standard form of commands.
Report Generation Software	An audit tool for tax compliance officers, revenue agents, and tax examiners that automates the examination process from case creation and assignment through assessment to closing and archiving.
Reporting Compliance Case Management System	Provides the capabilities to perform operating division–wide inventory control, compliance testing, quality measurement, tax computing, and education and outreach as well as team examination monitoring.
Return Review Program	Integrates taxpayer data from multiple sources and provides taxpayer data and systemic anomaly detection results enterprise-wide for fraud and civil noncompliance using a service-oriented approach and modern user interface technologies. This system replaced various components of the Electronic Fraud Detection System.
Server	A computer that carries out specific functions, *e.g.*, a file server stores files, a print server manages printers, and a network server stores and manages network traffic.
Software	A general term that consists of lines of code written by computer programmers that have been compiled into a computer program.
Subsystem	A component of an application or system.
System	A discrete set of information resources organized for the collection, processing, maintenance, use, sharing, dissemination, or disposition of information. A system normally includes hardware, software, information, data, applications, communications, and people.

Appendix VII

Abbreviations

ABA	As-Built Architecture
GAO	Government Accountability Office
IRS	Internal Revenue Service
IT	Information Technology