



Audit Report



OIG-19-040

DATA Act: Treasury's Efforts to Increase Transparency Into Federal Spending Continue, But Further Refinement is Needed
July 30, 2019

Office of
Inspector General

Department of the Treasury

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OFFICE OF
INSPECTOR GENERAL

DEPARTMENT OF THE TREASURY
WASHINGTON, D.C. 20220

July 30, 2019

MEMORANDUM FOR DAVID A. LEBRYK
FISCAL ASSISTANT SECRETARY

FROM: Andrea D. Smith /s/
Director, Fiscal Service Audit

SUBJECT: *DATA Act: Treasury's Efforts to Increase Transparency Into
Federal Spending Continue, But Further Refinement is
Needed*

I am pleased to transmit the attached audit report, *DATA Act: Treasury's Efforts to Increase Transparency Into Federal Spending Continue, But Further Refinement is Needed* (OIG-19-040; dated July 30, 2019). Under a contract monitored by our office, The Center for Organizational Excellence, Inc. (COE) and CohnReznick LLP (CohnReznick), a certified independent public accounting firm, performed an audit of internal controls that Treasury's Bureau of the Fiscal Service (Fiscal Service) DATA Act Program Management Office (PMO) designed, implemented, and placed into operation to help ensure the security, processing integrity, and quality of the data extracted from the DATA Act Broker (Broker) for display on USASpending.gov.

In its audit report, COE and CohnReznick noted that the DATA Act PMO has made great progress toward achieving the DATA Act's objectives and found the implementation and deployment of the DATA Act Information Model Schema (DAIMS), Broker, and USASpending.gov consistent with requirements of the DATA Act. However, they identified risks that, if not mitigated, threaten Treasury's leadership of and hinder its efforts to increase transparency into Federal spending. Specifically, COE and CohnReznick noted issues with the DATA Act PMO's process and resource planning documentation and insufficient documentation of validation rules. COE and CohnReznick also noted that DAIMS specifications do not fully align with validation rules and full disclosures of known data limitations are not present on USASpending.gov. In addition, data elements from external sources are not fully documented through DAIMS specifications and the completeness of Treasury's cloud computing environment security features has not been evaluated.

Accordingly, COE and CohnReznick recommended that Treasury's Fiscal Assistant

Secretary (1) enhance and complete existing standard operating procedures (SOPs); (2) develop an internal reference document for the DATA Act PMO development team that explains validation rules; (3) test and document validation rules and develop procedures to ensure changes to rules implemented during coding are subsequently captured in official DAIMS documentation; (4) enhance generic disclaimers on USAspending.gov and expand the use of limitation statements; (5) expand current documentation or create a complementary document that includes all elements used for validation, derivation, and display purposes; and (6) incorporate a review of available complementary security controls into the existing review process for its cloud computing environment. Treasury management accepted the findings and recommendations.

Our contract required that the audit be performed in accordance with generally accepted government auditing standards. In connection with the contract, we reviewed COE and CohnReznick's report and related documentation and inquired of its representatives. Our review, as differentiated from an audit performed in accordance with generally accepted government auditing standards, was not intended to enable us to conclude on the effectiveness of internal controls implemented and deployed by the DATA Act PMO to ensure the integrity and quality of data extracted from the DATA Act Broker. COE and CohnReznick are responsible for the attached auditor's report and the conclusions expressed therein. Our review found no instances in which COE and CohnReznick did not comply in all material respects, with generally accepted government auditing standards.

We appreciate the courtesies and cooperation provided to COE, CohnReznick, and our staff during the audit. If you have any questions or require further information, please contact me at (202) 927-8757.

Attachment



DATA Act: Treasury's Efforts to Increase Transparency Into Federal Spending Continue, But Further Refinement is Needed

Audit Report

Independently Conducted for:

Office of Inspector General
Department of the Treasury

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AUDIT REPORT

July 30, 2019

Richard K. Delmar
Acting Inspector General
United States Department of the Treasury
Office of Inspector General
1500 Pennsylvania Avenue, N.W.
Washington, D.C. 20220

Dear Mr. Delmar:

Enclosed please find our report presenting the results of the Department of the Treasury's (Treasury) efforts to meet its responsibilities under the Digital Accountability and Transparency Act of 2014 (DATA Act).¹ Our audit objective was to assess the effectiveness of internal controls that Treasury's Bureau of the Fiscal Service (Fiscal Service) DATA Act Program Management Office (PMO) designed, implemented, and placed into operation to help ensure the security, processing integrity and quality of the data extracted from the DATA Act Broker² (Broker) for display on USAspending.gov.³

To accomplish our objective, we examined the internal control environment that the DATA Act PMO implemented to support continuous development of the DATA Act Information Model Schema (DAIMS),⁴ the Broker, and USAspending.gov. This included an examination of the software development methodology and supporting tools that the DATA Act PMO utilizes to implement updates to its program. We conducted our fieldwork from January 2018 through August 2018. Appendix I contains a detailed description of our objective, scope, and methodology.

While the DATA Act PMO has made great progress toward achieving the DATA Act's objectives, our audit identified areas of concern with the controls in place. The findings and recommendations detailed in this report are designed to assist the DATA Act PMO with further strengthening these processes and controls. 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 objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

This report is for the purpose of concluding on the audit objectives described above. Accordingly, this report is not suitable for any other purpose. We greatly appreciate the assistance from the Treasury Office of Inspector General (OIG) and DATA Act PMO personnel throughout this audit.

¹ Public Law 113-101 (May 9, 2014)

² The Broker is an information system that collects, maps, extracts, transforms, validates, and loads data in a format consistent with Treasury's Government-wide DATA Act guidance documentation.

³ USAspending.gov is the official online source for U.S. Government spending data.

⁴ The DAIMS is the comprehensive set of resources Treasury developed to support the standardization of Federal spending data and presentation to drive transparent, consistent, reliable, and accurate data for public use. The DAIMS defines data elements and their relationships, and provides guidance and tools to agencies.

Sincerely,

The Center for Organizational Excellence, Inc.

CohnReznick LLP

The Center for Organizational Excellence, Inc & CohnReznick LLP

Results in Brief

As of May 4, 2018⁵, Treasury's DATA Act PMO continues to make progress in its effort to comply with transparency requirements as defined by the DATA Act. The DATA Act PMO has successfully developed the DAIMS, implemented the Broker, and updated USAspending.gov. Additionally, the DATA Act PMO has deployed an Agile⁶ project methodology for developing, monitoring, and maintaining the DAIMS, Broker, and USAspending.gov.

The objective for this audit was to assess the effectiveness of internal controls that Treasury's DATA Act PMO has designed, implemented, and placed into operation to help ensure the security, processing integrity, and quality of the data extracted from the Broker and used for display on USAspending.gov. As part of this effort, we evaluated the effectiveness of internal controls in the Broker environment⁷ to ensure that data made available to the public on USAspending.gov is complete, valid, accurate, and of high quality.⁸ While the DATA Act PMO has made great progress toward achieving the DATA Act's objectives, we identified areas of concern with the controls in place. The findings and associated recommendations stemming from the audit results should be viewed as potential iterative improvements to a software development environment that is operating effectively.

We defined completeness as the extent to which required data was present and available for download on USAspending.gov.⁹ We assessed completeness in two ways: (1) whether all agency validated data available in source files is provided by the Broker to USAspending.gov; and (2) whether all data provided to the website is displayed accordingly and available for download with appropriate limitations associated with data display and availability noted.

We defined validity as the extent to which data displayed on USAspending.gov underwent and passed a rigorous validation process. We assessed validity in two ways: (1) whether the Broker validation rules effectively flagged anomalies in data that were manipulated for testing purposes; and (2) whether warning and error reports generated by the Broker provided appropriate output to users.

We defined accuracy as the extent to which data displayed and downloaded from USAspending.gov and the Broker were consistent with source files and DAIMS standards. Accuracy was assessed in two ways: (1) whether files produced by the Broker match the data from source files; and (2) whether data manipulated through website filters remains consistent.

We defined quality as a combination of utility, objectivity, and integrity.¹⁰ Utility refers to the usefulness of the information to the intended users. Objectivity refers to whether the disseminated information is being presented in an accurate, clear, complete, and unbiased manner. Integrity refers to the protection of information from unauthorized access or revision. We assessed quality in three ways: (1) the proper

⁵ Although the audit scope period ended May 4, 2018, we continued to receive documentation related to the procedures performed through August 2018.

⁶ Agile is a software development approach that allows for changing requirements, continuous development, daily collaboration between the customer and developers, and frequent delivery of working software (weeks as opposed to months).

⁷ Treasury provided access to a Broker staging environment that mimics the functionality of the Broker that loads production ready data for display on USAspending.gov.

⁸ Definitions for completeness, accuracy and validity were adapted from GAO-09-680G, *Assessing the Reliability of Computer-Processed Data* (July 2009). GAO-09-680G (p. 5) defines completeness as the extent that relevant records are present and the fields in each record are populated appropriately. GAO-09-680G (p.5) defines validity as ensuring the data represents what is intended to be measured. GAO-09-680G (p. 5) defines accuracy as the extent that recorded data reflect the actual underlying information. See footnote 10 for the source of the definition of quality.

⁹ Submission files for all agencies are hosted on an Amazon Web Services (AWS) portal accessible through USAspending.gov.

¹⁰ The Office of Management and Budget's Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies (February 22, 2002).

functionality of data display tools on USAspending.gov; (2) the appropriateness of limitation statements and disclaimers when data or displays were inconsistent or deviated from standards; and (3) the presence of repeatable processes for documenting and testing software features to support data validation and display.

While we generally view the implementation and deployment of the DAIMS, Broker, and USAspending.gov as consistent with requirements of the DATA Act, the results identified in this report still pose risks that, if not mitigated, threaten Treasury's leadership of and hinder its efforts to increase transparency into Federal spending. We noted the following issues that need to be addressed:

1. The DATA Act PMO's process and resource planning documentation puts consistency and continuity of system development at risk.
2. Documentation of validation rules is insufficient to ensure data quality.
3. DAIMS specifications do not fully align with validation rules as implemented in the Broker and as displayed in validation output files.
4. Full disclosures of known data limitations are not present on USAspending.gov.
5. Data elements from external sources are not fully documented through DAIMS specifications.
6. The Treasury DATA Act Operating Infrastructure (DAOI) Team has not evaluated the completeness of Amazon Web Services (AWS)¹¹ security features.

We understand and commend the tremendous effort required for the DATA Act PMO's implementation of such a complex project, with aggressive deadlines, involving multiple reporting agencies and numerous linked systems, as well as the development of new data-handling methodologies. Nonetheless, we recommend that Treasury's Fiscal Assistant Secretary:

1. Enhance and complete existing standard operating procedures (SOPs) to align with the steps of the DATA Act PMO's Agile development cycle, and update the DATA Act PMO's resource documentation to give prompt attention to staffing and succession planning for DATA Act implementation efforts to mitigate against resource gaps.
2. Develop an internal reference document for the DATA Act PMO development team that explains why a designation of warning versus fatal error was assigned to each rule; incorporate sub-rules that already appear in the Broker output and an explanation of potential formatting violations into the DAIMS validation rules documents; and either develop an instruction guide to interpret Broker output or incorporate mechanisms in the output itself to aid user interpretation when multiple fields are impacted by the same rule.
3. Perform testing and provide documentation assuring that the limited validation rules identified as having inconsistencies operate as intended in the Broker with accurately displayed output, and develop procedures to ensure changes to rules implemented during coding are subsequently captured in official DAIMS documentation.
4. Enhance generic disclaimers on USAspending.gov and expand the use of limitation statements on pages with known and potential display issues so that the public has a clear understanding of known limitations when using the data as displayed and available for download.
5. Expand the Interface Definition Document (IDD)¹² or create a complementary document that includes all elements used for validation, derivation, and display purposes from external tables

¹¹ With AWS, Treasury deploys its Broker and USAspending.gov solutions on a cloud computing environment that provides computing power, storage, and other application services over the Internet.

¹² A listing of the data elements, with supporting metadata to understand what data will be pulled from external award reporting systems.

that interface with the Broker and USAspending.gov. Documentation should include the cadence on which the tables are pulled or referenced by the Broker.

6. Incorporate a review of available complementary security controls into the existing review process for AWS, perform independent assessments to verify whether controls outside the standard package of controls offered by the service provider could be adopted to mitigate risk that security violations will occur, and develop and implement a process to obtain and review notifications of changes to the control environment, including new controls available.

In a written response, which is included in its entirety in Appendix II, Treasury management accepted the recommendations. However, Treasury was unable to replicate the audit findings in the Broker production environment¹³ as early as August of 2018 when the audit findings were initially received. This may be, in part, because the audit testing did not account for the hierarchical application of validation rules, as this report acknowledges. It may also be due to the audit testing having been performed in the staging environment (which is used to model system changes) as opposed to the production environment. Nonetheless, Treasury embraces the opportunity to improve and will implement the recommendations associated with the findings. Accordingly, Treasury management should record target dates for planned corrective actions in the Joint Audit Management Enterprise System (JAMES), Treasury's audit recommendation tracking system.

Background

Signed into law May 9, 2014, the DATA Act has several purposes:

1. Expand the Federal Funding Accountability and Transparency Act of 2006 (FFATA)¹⁴ by disclosing direct Federal agency expenditures and linking Federal contract, loan, and grant spending information to programs of Federal agencies to enable taxpayers and policymakers to track Federal spending more effectively;
2. Establish Government-wide data standards for financial data and provide consistent, reliable, and searchable Government-wide spending data that is displayed accurately for taxpayers and policymakers on USAspending.gov;
3. Simplify reporting for entities receiving Federal funds by streamlining reporting requirements and reducing compliance costs while improving transparency;
4. Improve the quality of data submitted to USAspending.gov by holding Federal agencies accountable for the completeness and accuracy of the data submitted; and
5. Apply approaches developed by the Recovery Accountability and Transparency Board to spending across the Federal Government.

To fulfill these purposes, the DATA Act imposes requirements on the Director of the Office of Management and Budget (OMB), the Secretary of the Treasury, the Inspector General of each Federal agency, and the Comptroller General of the United States. Specifically, the DATA Act requires Treasury and OMB:

1. Establish, by May 2015, Government-wide financial data standards for Federal funds made available to or expended by Federal agencies and entities receiving Federal funds;
2. Ensure such financial data is accurately posted and displayed on USAspending.gov by May 2017; and

¹³ The Broker production environment is the environment used by agencies for DATA Act submissions.

¹⁴ Public Law 109-282 (September 26, 2006).

3. Ensure the data standards established are applied to the data made available on USAspending.gov by May 2018.

From May through August 2015, the DATA Act PMO and OMB released 57 Government-wide financial data standards.¹⁵ The DATA Act PMO finalized these standards and published them via the DAIMS v1.0 in April 2016. In May 2017, Federal agencies completed their first DATA Act submissions for display on USAspending.gov. For the first DATA Act submission in 2017, a beta version¹⁶ of USAspending.gov began to display agency obligations¹⁷ and linked relevant agency spending data with awards distributed by the government. We note the scope of this audit focused on internal controls and did not specifically include whether the data standards established in 2015 were applied to the data made available on the website by May 2018. We assessed the controls in place to ensure data submissions complied with standards and whether data was available for display, consistent with certified submission files.

Implementation of the DATA Act is governed by an Executive Steering Committee (ESC) comprised of Treasury's Fiscal Assistant Secretary and OMB's Controller. The ESC oversees policies and implementation progress related to Federal spending transparency efforts. The ESC seeks input from Government-wide committees and reviews feedback from various sources on issues related to the DATA Act and Federal spending transparency. The DATA Act PMO is responsible for leading implementation efforts in conjunction with OMB's Office of Federal Financial Management.

The DATA Act Information Model Schema (DAIMS)

In April 2016, the DATA Act PMO and OMB released the DAIMS v1.0, which describes data elements, as well as data reporting validation requirements necessary for Federal agencies to transmit financial and award data for publication on USAspending.gov. In August 2016, the DATA Act PMO published an Errata,¹⁸ consisting of changes to conform with new policies, which was incorporated into DAIMS v1.1. This audit focused on DAIMS v1.1. Subsequent to the end of the audit scope period, the DATA Act PMO implemented DAIMS v1.2. The DATA Act PMO implemented DAIMS v1.3 in late fiscal year (FY) 2018. The DATA Act PMO provides DAIMS-related tools and guidance on Max.gov,¹⁹ GitHub,²⁰ and Fiscal Service's webpage.²¹

The DAIMS v1.1 includes the following artifacts:

- Information flow diagram – an overview of the reporting timeframes and sources of the data included in the DAIMS across the Federal enterprise, shown in Exhibit 1 on page 7;

¹⁵ See Appendix III for a listing of the Government-wide data standards established through the DATA Act. Including sub-elements, the actual count of reported data fields numbers much higher than 57. Prior to the DATA Act, government agencies had been complying with FFATA. Accordingly, agencies had already been responsible for reporting hundreds of procurement and financial assistance data elements to USAspending.gov. The DATA Act did not negate this requirement. The elements standardized in response to the DATA Act were drawn in part from elements already being reported. Accordingly, the DAIMS incorporates hundreds of additional FFATA elements that were not officially standardized as a part of DATA Act implementation.

¹⁶ A beta version of a website is a release with a goal of finding and correcting issues before the final release.

¹⁷ See Appendix III for the official definition of obligation.

¹⁸ The Errata was a list of amendments made to the DAIMS v1.0.

¹⁹ Max.gov is a Government-wide advanced collaboration, information sharing, data collection, publishing, and analytical portal for Federal agencies and partners.

²⁰ GitHub is a web-based, open-source collaboration tool based on the Git version control software, which allows users to make and track changes for software development projects. Treasury and OMB's Federal Spending Transparency GitHub site is located at <https://fedspendingtransparency.github.io>

²¹ <https://fiscal.treasury.gov/fsservices/gov/data-trans/dt-daims.htm>

- Reporting Submission Specification (RSS) – a listing of the data elements with metadata²² and specific instructions for Federal agencies to submit content in the appropriate format quarterly;
- IDD – a listing of the data elements, with supporting metadata to understand what data will be pulled from external award reporting systems;²³
- Sample file formats to ensure Federal agencies submit information consistently;
- Online data dictionary – a comprehensive list of data elements with definitions;
- eXtensible Business Reporting Language (XBRL)²⁴ schema files - the machine-readable²⁵ version of the data standard that includes accounting-related and award-related content;
- Validation rules specified in *DAIMS Validation Rules v1.1.2*²⁶ and *Financial Assistance Broker Submission (FABS)*²⁷ *Validation Checklist v1.1* – designed to verify data elements based on their values, metadata, and relationship to other data elements. There are two designations associated with the validation rules: fatal errors and warnings. A fatal error prevents submission of the data. A warning, allowable in data submissions, indicates a potential data quality issue;
- *DAIMS Practices and Procedures for DATA Act Broker Submissions v1.1 (Practices and Procedures)* – provides additional instructions for creating and understanding DATA Act reporting and validation rules;
- Domain values – the set of allowed values for certain data elements identified in the RSS and IDD;
- DAIMS diagrams – visual representations of how the data elements from the RSS and IDD align; and
- A crosswalk of acceptable short version labels, referred to as ‘terse labels,’ for formatted DATA Act submissions.

The Broker

The Broker is the technology tool established to support the implementation of the DAIMS. The Broker: (1) validates data submissions in accordance with the DAIMS validation rules and formatting specifications; (2) converts data from source files and agency submission files to a format for display on USAspending.gov; and (3) provides agencies feedback on compliance with validation rules. In September 2016, the DATA Act PMO released the Broker with all the functionality agencies needed to test the data validation and submission process. The Broker began accepting DATA Act submissions in quarter 2 of FY 2017.

Exhibit 1 on the following page shows the DATA Act flow of information from agency internal financial systems and external award reporting systems through the Broker for publication on USAspending.gov.

The following is a description of the flow of information depicted in Exhibit 1:

- Agency financial data is reported from internal financial systems to the Broker for publication on USAspending.gov quarterly. Procurement information from agency award systems is reported to the Broker through the Federal Procurement Data System-Next Generation (FPDS-NG)²⁸ daily. Financial

²² Metadata is a set of information that provides context and description of other data. Treasury maintains a metadata repository that serves as a master list of information about all data elements.

²³ Treasury maintains a DAIMS metadata repository that contains comprehensive information on data standards. This repository is then able to generate new RSS and IDD documentation when elements are modified.

²⁴ XBRL is a computer reporting language standard for linking business and financial reports to increase the transparency and accessibility of business information by using a uniform format.

²⁵ Machine-readable files allow developers easily to integrate DAIMS specifications into other technology applications.

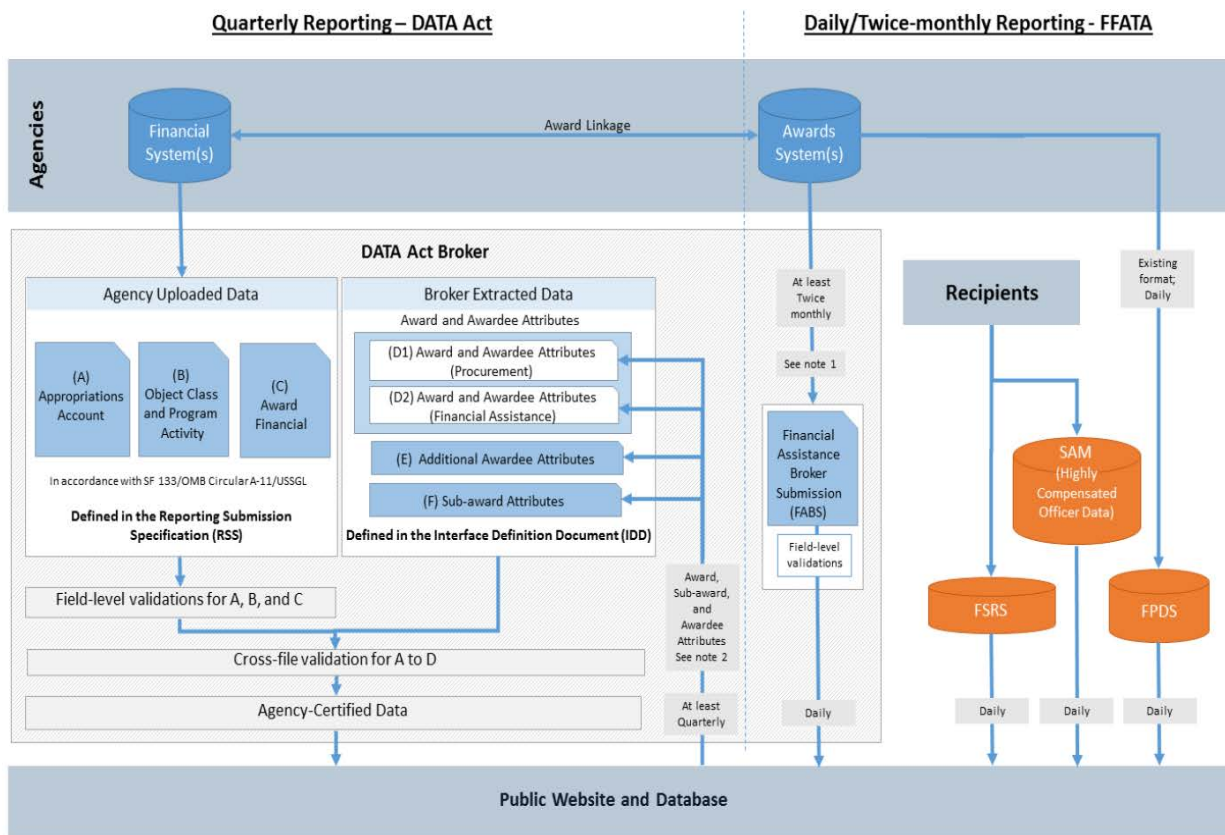
²⁶ Validation Rules v1.1 was released in June 2017 and v1.1.2 was released in September 2017.

²⁷ FABS is a portal in the Broker used by agencies to submit financial assistance data.

²⁸ FPDS-NG is used by Federal agencies to report all contract actions, including modifications, using appropriated funds for contracts whose total value exceeds a micro-purchase threshold. FPDS-NG is administered by the U.S. General Services Administration (GSA).

assistance data from agency award systems is reported to the Broker at least bi-monthly through FABS.

Exhibit 1. DAIMS v1.1 Information Flow Diagram



Note 1: The Financial Assistance Broker Submission (FABS) replaces the Award Submission Portal (ASP).
 Note 2: D1 and D2 pull in all award data associated with the submitting agency and agency-specified action dates. E pulls in highly-compensated officer information for DUNS numbers that appear in an agency's D1 and D2.
 F pulls in all sub-award data associated with the awards that appear in an agency's D1 and D2.

Information Flow Diagram v1.1 - June 30, 2017

Source: DAIMS v1.1

- Agency financial data is compared to information reported to Treasury via the Government-wide Treasury Account Symbol Adjusted Trial Balance System (GTAS).²⁹ Files A through C are generated by an agency quarterly and contain the reporting agency's budgetary information from its systems:
 - File A includes appropriation summary-level data that is also reported in the Standard Form-133, *Report on Budget Execution and Budgetary Resources* (SF-133),³⁰ which aligns with GTAS.

²⁹ GTAS is a system for monthly financial reporting. In order for Treasury to meet OMB requirements, and timely and accurately compile the Financial Report of the U.S. Government, monthly GTAS reporting is required of Federal agencies.

³⁰ The SF-133 Report on Budget Execution and Budgetary Resources provides a consistent presentation of data across programs within each agency. An agency-wide SF-133 should generally agree with an agency's Statement of Budgetary Resources (SBR). The SBR and related disclosures provide information about budgetary resources made available to an agency and the status of those resources at the end of the fiscal year.

- File B includes obligation and outlay information at the program activity³¹ and object class³² level.
- File C includes obligations reported at the award (procurement and financial assistance) and object class level.
- Once Files A through C are submitted, the Broker performs a series of validation checks of Files A through C, ensuring the data is consistent with the DAIMS.
- The Broker then generates award, awardee, and sub-award attributes found in data extracted from external award reporting systems in four additional datasets, Files D1, D2, E, and F.
 - File D1 contains award and awardee details associated with procurement awards found in File C, and it is extracted from data provided from FPDS-NG daily.³³ File D1 is generated by the Broker quarterly upon submission of Files A through C.
 - File D2 contains award and awardee details associated with financial assistance awards in File C and is extracted from data submitted through FABS. Agencies are required to submit this data at least bi-monthly. File D2 is generated by the Broker quarterly upon submission of Files A through C.
 - File E includes highly compensated officer data associated with awardee/recipient unique identifiers³⁴ present in Files D1 and D2. Data is extracted from SAM³⁵ daily but is consolidated by the Broker into a formal File E at the time of quarterly submission.
 - File F includes all sub-award data associated with the awards that appear in Files D1 and D2. Sub-award data is extracted from the FFATA Subaward Reporting System (FSRS)³⁶ daily. It is consolidated by the Broker into a formal File F at the time of quarterly submission.
- In DAIMS v1.1, Files A through C submission formats are defined in the RSS, and formats for Files D1 through F are defined in the IDD.
- The Broker performs an intra-file validation check of data in Files A, B, and C, and a cross-file validation of linkages across Files A through D2.
 - Validation includes identification of warnings and/or errors for Files A through D2. The DATA Act PMO has configured validation checks so that a warning or fatal error message will display in output files if the data submitted is not consistent with the DAIMS and supporting artifacts.
 - Files A and B both report data using a Treasury Account Symbol (TAS).³⁷ File B represents a more granular level of data, with each row of data being presented according to its OMB-assigned program activity and object class code. Accordingly, File B data will match File A data when summed to the TAS level. File A and B spending data are presented as year-to-date values.

³¹ The DATA Act definition of program activity is provided in Appendix III.

³² The DATA Act definition of object class is provided in Appendix III.

³³ Procurement data is submitted directly to FPDS-NG from agency award systems, and some data is sourced through direct entry by agency Contracting Officers. All vendor information in FPDS-NG comes from the System for Award Management (SAM) unless there is an exception that applies.

³⁴ See Appendix III for the official definition of awardee/recipient unique identifier.

³⁵ SAM is the primary database in which those wishing to do business with the Federal government must maintain an active registration unless exempt. SAM is administered by GSA.

³⁶ FSRS provides data on first-tier sub-awards as reported by the prime grantee and contract award recipients (awardees). FSRS is administered by GSA.

³⁷ See Appendix III for the official definition of this data element.

- File C represents a sub-portion of data from File B. Specifically, agencies report contract and financial assistance transactions at the TAS, object class, and program activity level.³⁸ Accordingly, there should be no combinations of these key fields present in File C that are not also in File B.
- File C includes only transactions that occur during the submission period.
- Files D1 and D2, collectively referred to as the award files, are linked to File C by the award identification number.³⁹
- There are no field-level or cross-file validations for Files E and F. The prime awardee is responsible for reporting executive compensation information in SAM and sub-award information in FSRS. As such, the data is reported directly from the authoritative sources, SAM and FSRS, respectively.
- Reporting agencies are responsible for reviewing the Broker's validation checks of Files A through D2 and making modifications to submission files as required.
- Each reporting agency's Senior Accountable Official (SAO)⁴⁰ must certify that their agency's internal controls support the reliability and validity of its data submitted for display on USAspending.gov and that the linkages among Files A through D2 are valid. The SAO has the option to include a quarterly assurance statement with the submission to provide specific details or limitations the public should know about the submission.
- Following certification by the agency's SAO, the Broker uploads each agency's submission for publication on USAspending.gov. Agency quarterly assurance statements are available for download by USAspending.gov users for each set of quarterly submission files.

The Broker contains two main portals, the DATA Act Broker Submission portal (DABS) and the FABS. The DABS supports Federal agencies quarterly submissions, where data from Files A through F are aligned by their linkages, which are the common elements that occur across files.⁴¹ The FABS portal allows the Broker to receive financial assistance data submissions directly from agencies.⁴² The Broker maintains a daily extraction and loading from source systems described above for display of information updated daily on USAspending.gov. The Broker generates Files D1 and D2 using an agency-defined date range at the time of quarterly submission. The Broker generates Files E and F based on data element linkages in Files D1 and D2.

USAspending.gov

USAspending.gov is the official online source for Federal spending data. The DATA Act PMO is responsible for the development and deployment of USAspending.gov. FFATA requires Federal contract, grant, loan and other financial assistance awards be displayed on a searchable, publicly accessible website to give the

³⁸ Program activity is optional for File C.

³⁹ For File D1, the award identification number used for linkage is a combination of the Procurement Instrument Identifier (PIID) and the Parent Award Identification Number when available. For File D2, the award identifier used for linkages is a combination the Federal Award Identification Number (FAIN) and the Unique Record Indicator (URI). See Appendix III for the official definitions of Award Identification Number and Parent Award Identification Number.

⁴⁰ Specific requirements for the SAO are laid out in OMB M-17-04, Memorandum for Agency Senior Accountable Officials (November 4, 2016).

⁴¹ The DABS also has an option for monthly submission. Agencies are required to submit bulk files for Files A through C on a quarterly basis with data generated from their financial systems. These files are generally due 45 days after the final day of a fiscal quarter. When Files A through C are submitted, the Broker accesses the tables that store other information that has been collected by the Broker during the quarter for Files D1 through F.

⁴² Prior to FABS, agencies submitted financial assistance information directly to USAspending.gov through an Award Submission Portal. Agencies have the option to submit data more often than bi-monthly, which is the minimum requirement.

American public access to information on how their tax dollars are spent. In 2008, a legacy version of USAspending.gov was launched. In 2015, the website was updated and relaunched.

A modernized USAspending.gov, adapted for the DATA Act, was implemented as Beta.USAspending.gov and co-existed with the legacy version of the website between May 2017 and March 2018. The DATA Act PMO initially released the modernized USAspending.gov in 2016 as OpenBeta.USAspending.gov with limited functionality through which the DATA Act PMO collected user feedback about the display and content of information. Through on-going feedback collection and the modeling of various user personas,⁴³ the DATA Act PMO settled on a final production-ready design for Beta.USAspending.gov. As of March 2, 2018, Beta.USAspending.gov officially replaced the legacy USAspending.gov site and was renamed to the traditional USAspending.gov. Accordingly, although our audit objectives originally focused on Beta.USAspending.gov, the new production version of the website became the focus after this date.

The Broker and USAspending.gov are hosted via AWS, with back-end data tables populated by the Broker feeding the display on USAspending.gov. USAspending.gov includes several sorting, display, and download functions and features. For example, under the *Spending Explorer* menu, a user is able to view a summary of spending by program activity, object class, award recipient and award. A “Budget Function” filter allows users to view the financial breakdown for each budget function,⁴⁴ account, and program activity. An “Object Class” filter allows users to view spending by all object class codes.

Under the *Award Search* menu option, an advanced search allows users to view spending on multiple sub-elements for contracts and financial assistance transactions. Keyword search enables a user to search award information by a word or phrase.

Under the *Profiles* section, a user can view spending sorted by agency, Federal accounts and states. The *Download Center* menu allows a user to download previously created versions of files or to customize a user’s download on various parameters. Additionally, agency submission file downloads are available via an AWS Agency Submission Files portal⁴⁵ which enables users to download any raw quarterly file certified by an agency, including official quarterly assurance statements provided by the agency’s SAO. Data stored on the AWS Agency Submission File portal is a point-in-time data pull so that the public can view what the source data showed at the time of submission. The website also includes a Data Lab⁴⁶ feature that was outside the scope of the current audit.

Security

Treasury’s DAOI team is responsible for the design and implementation of security processes and controls to ensure the data submitted to the Broker and published on USAspending.gov is adequately protected from unauthorized access. The DAOI team employs the AWS cloud model to the Broker and USAspending.gov, which is hosted in the GovCloud (US)⁴⁷ region of AWS. From a security perspective, AWS performs application security reviews for services, and significant feature additions to ensure security risks are identified and mitigated. AWS makes the results of these reviews, as well as new controls and services, available to its customers.

⁴³ Software production teams often develop personas as a way of documenting the known needs and requirements of different stakeholders who are expected to utilize a tool.

⁴⁴ The Federal budget is divided into approximately 20 categories, known as budget functions. These categories organize Federal spending into topics based on the major purpose the spending serves (e.g., national defense, transportation, health).

⁴⁵ <http://usaspending-submissions.s3-website-us-gov-west-1.amazonaws.com/>

⁴⁶ The Data Lab feature on USAspending.gov allows users to do more in-depth analytics and visualizations of the available data.

⁴⁷ AWS GovCloud (US) gives vetted government customers and their partners the flexibility to architect secure cloud solutions that comply with Federal regulations and guidelines.

AWS services are designed with the assumption that all service offerings and security controls are reviewed by its customers — in this case Treasury — to ensure the controls are adequate to prevent unauthorized access to or use of data stored in the systems.

Agile Development

The DATA Act PMO uses an Agile development methodology to build, assess, and provide iterative updates to the DAIMS, Broker, and USAspending.gov throughout the development lifecycle. Agile is a software development methodology characterized by short build cycles, an emphasis on working software, and responsiveness to evolving requirements and solutions.

The DATA Act PMO works in two-week sprint cycles⁴⁸ with each sprint focused on completing discrete, time-boxed tasks with clear acceptance criteria. At the end of the sprint, the team participates in an evaluation and review of the work accomplished and then plans for the tasks (i.e., user stories)⁴⁹ for the next sprint.

The Agile process is designed to be open and transparent. Stakeholders can follow the progress of the tasks in the development and publication workstreams on the DATA Act PMO's Jira site.⁵⁰ To ensure transparency in system development, in addition to transparency of data, the DATA Act PMO utilizes a GitHub⁵¹ repository for its code. This sharing platform allows both internal and external stakeholders to monitor the progress of the DATA Act implementation.

Audit Results

The DATA Act Program Management Office (PMO) Continues to Make Progress in Its Government-wide DATA Act Implementation Efforts

We found that, as of May 4, 2018, the DATA Act PMO established internal controls to monitor and maintain the DAIMS, Broker, and USAspending.gov.⁵² However, we identified areas of concern with controls that pose risks that, if not addressed, could hinder the DATA Act PMO's efforts to increase the quality of spending data publicly available on USAspending.gov. Specifically, we identified concerns with process documentation, implementation of the DAIMS v1.1 validation rules, full disclosure of limitations on USAspending.gov, the completeness of DAIMS documentation of external interfaces, and the comprehensiveness of security reviews.

We assessed internal controls for the following aspects of the Broker environment:

- Controls for program and change management of the DAIMS, Broker, and USAspending.gov;

⁴⁸ A sprint cycle is usually a two-to-four week concentrated work cycle during which an Agile project team completes designated tasks.

⁴⁹ Consistent with its Agile methodology, Treasury deploys a user story format for capturing requirements. A user story is a concise description of a feature told from the perspective of the person who desires the new capability, usually a user or customer of the system. A user story typically follows a simple template: As a < type of user >, I want < some goal > so that < some reason >.

⁵⁰ Jira is a software development tool used for bug tracking, issue tracking, and project management. Treasury's Jira site is located here: <https://federal-spending-transparency.atlassian.net/secure/Dashboard.jspa>

⁵¹ The GitHub portal referenced here is a web-based hosting service for version control to track changes in computer files and coordinate work on those files among multiple people. The GitHub portal used for project documentation is a more technical portion of the public-facing GitHub Federal Spending transparency site. The Treasury GitHub repositories can be found here: <https://github.com/fedspendingtransparency>

⁵² Controls reviewed include those related to the DAIMS artifacts described in the Background section of this report.

- Validation controls defined in the DAIMS and implemented in the Broker;
- Controls for the display of information on USAspending.gov; and
- Security controls in place to mitigate the risk that unauthorized access to the systems may occur.

We reviewed internal controls over the DAIMS, Broker, and USAspending.gov for their support of completeness, validity, accuracy, and quality of data made publicly available.⁵³ Completeness was defined as the extent to which required data was present and available for download on USAspending.gov. We assessed completeness in two ways: (1) whether all agency validated data available in source files is provided by the Broker to USAspending.gov via the AWS Agency Submission Files portal; and (2) whether all data provided to the website is displayed accordingly and available for download with appropriate limitations associated with data display and availability noted.

Validity was defined as the extent to which data displayed on USAspending.gov underwent and passed a rigorous validation process. We assessed validity in two ways: (1) whether the Broker and FABS validation rules effectively flagged anomalies in data that were manipulated for testing purposes; and (2) whether warning and error reports generated by the Broker provided appropriate output to users.

Accuracy was defined as the extent to which data displayed and downloaded from USAspending.gov and the Broker were consistent with source files and DAIMS standards. Accuracy was assessed in two ways: (1) whether files produced by the Broker match the data from source files; and (2) whether data manipulated through website filters remains consistent.

Quality was defined as a combination of utility, objectivity, and integrity. Utility refers to the usefulness of the information to the intended users. Objectivity refers to whether the disseminated information is being presented in an accurate, clear, complete, and unbiased manner. Integrity refers to the protection of information from unauthorized access or revision. We assessed quality in three ways: (1) the proper functionality of data display tools on USAspending.gov; (2) the appropriateness of limitation statements and disclaimers when data or displays were inconsistent or deviated from standards; and (3) the presence of repeatable processes for documenting and testing software features to support data validation and display.

Controls for Program and Change Management of the DAIMS, Broker, and USAspending.gov

Due to its Agile implementation approach, the DAIMS, Broker, and USAspending.gov website are in a state of continuous improvement as user requirements are collected and refined. The DATA Act PMO regularly modifies tools and existing code to resolve issues and to improve the efficiency, effectiveness, and usability of the software.

Prior to releasing iterative updates to the DAIMS, Broker, and USAspending.gov, the DATA Act PMO constantly refines plans for program updates by reviewing the backlog. The backlog is a list of features or technical tasks maintained by the team that, at a given moment, are known to be necessary and sufficient to complete a project. Sprint activities start when a particular need is identified, and the development team is assigned around the need. The team develops user stories in Jira to identify the specific requirements and document progress. During the two-week sprint, the team conducts sprint backlog grooming to ensure the backlog contains the appropriate items, the backlog items are prioritized, and the

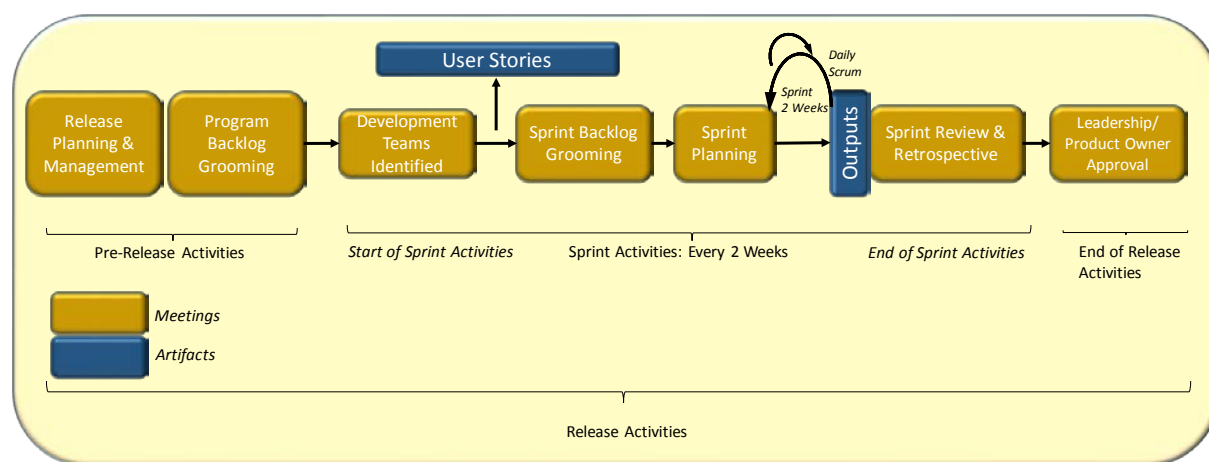
⁵³ We did not review the data submitted by agencies for this audit. Instead, this audit focused on the internal controls the DATA Act PMO has put in place to support the completeness, validity, accuracy, and quality of data throughout the processes of submission, extraction, translation, loading, display, and downloading.

items at the top of the backlog are in progress for delivery. The team plans for delivery of the sprint outputs and conducts daily scrum sessions⁵⁴ to plan activity for every 24-hour period.

At the conclusion of a sprint, the team reviews the user stories and supporting documentation. The team conducts a review of sprint activity through a retrospective meeting to identify things that went well, things that need to be improved, things that are still puzzling, and actions to initiate. After the team review of any completed user story, the product owner⁵⁵ verbally approves the completed user story for release and it is marked as “Done” in Jira. Minor releases may occur following each sprint cycle. Major updates are queued for a future, larger release. The DATA Act PMO’s sprint cycle is presented in Exhibit 2, as maintained in a document entitled *DATA Act Documentation: Systems and Processes*. These steps are consistent with what we were told verbally by DATA Act PMO personnel, but there is no documentation of SOPs that maps to every step presented.

The DATA Act PMO follows protocols laid out in the *DATA Act Operating Infrastructure Enterprise Change and Configuration Management Plan v1.8.3*, the *DATA Act Schema Change Process* guide, and test scripts⁵⁶ for integration and regression testing.⁵⁷ The DATA Act PMO utilizes Jira and GitHub for documentation of agile user stories and testing.

Exhibit 2. The DATA Act PMO Agile Sprint Cycle



Source: DATA Act PMO (recreated by The Center for Organizational Excellence to simplify the view). This diagram is consistent with *DATA Act Documentation: Systems and Processes* document provided by the DATA Act PMO. However, the PMO notes that in practice, the ordering of the steps may be: *Sprint Review; Development Teams Identified; Leadership/Product Owner Approval; Retrospective; Sprint Planning*. *Program Backlog grooming is done via road-mapping (not part of the Agile Sprint Cycle)*.

The DATA Act PMO tracks user stories for the DAIMS, Broker, and USAspending.gov under the same project in Jira. The audit team reviewed summary documentation of 8,901 documented issues tracked through Jira in a user story format. To narrow the pool, we downloaded and analyzed 556 user stories

⁵⁴ Scrum sessions are quick daily meetings to ensure an entire team working on an Agile project understands current progress and impediments.

⁵⁵ The product owner is the official designated with decision-making authority for acceptance of completed user stories for the DAIMS, Broker or USAspending.gov. The PMO has four product owners: Product Owner (Acting), Web and Broker; Product Owner, Analytics; Product Owner, DAIMS, and Product Owner, Service Desk.

⁵⁶ Test scripts are instructions for testing Broker and USAspending.gov core functionality following a sprint cycle to ensure the integrity of existing functions was maintained.

⁵⁷ Regression testing is conducted during software development to ensure new functionality has not inadvertently or negatively impacted existing functionality.

and bugs pertaining to DAIMS and validation rules, which were marked as “Done.” Our goal was to determine the consistency of format used, and when deviations occurred, to identify any SOPs the DATA Act PMO implemented to guide the development of user stories. We found that the major deviation in documentation for user stories related to how supporting material was presented. Some user stories included a link to the GitHub repository, others contained an attachment, some included both, and the remaining included neither a link nor an attachment. There is no requirement as to how user stories are supported, but there is an expectation that internal process documentation would describe the type of information required to support completion of user stories. This documentation would support an Agile team by ensuring the consistency and continuity of business practices.

Overall, we found the process documentation provided during this audit demonstrates a partial view of the DATA Act PMO’s Agile approach to software development, testing, and deployment. We note that the DATA Act PMO does not have documentation to substantiate its process and ensure on-going consistency and continuity necessary to iteratively develop, test, and implement changes to the DAIMS, Broker, and USAspending.gov. This issue is described further in Finding 1.

In addition, while the DATA Act PMO and OMB are responsible for the Government-wide implementation of the DATA Act, the DATA Act PMO maintains executive oversight of the DAIMS, Broker, and USAspending.gov. The DATA Act PMO also keeps stakeholders informed of iterative updates and decisions to these systems and processes. Specifically, the DATA Act PMO communicates with stakeholders through many on-going channels including Government-wide data calls, bi-weekly office hours conference calls, in-person technical sessions, newsletters, and interactions with Government-wide functional committees and councils. Major program decisions are maintained in internal tracking documents including the Executive Dashboard, risk register, and meeting notes from the ESC meetings.

We were unable to substantiate how the DATA Act PMO manages its resources for its Government-wide DATA Act responsibilities within the PMO. Previously, the DATA Act PMO developed a Resource Management Plan identifying and documenting the organizational structure, project roles, responsibilities, required skills, reporting relationships, staffing management plan, and staffing risks. During fieldwork, we learned that the Resource Management Plan is no longer in use and has not been updated to account for recent changes of three key leadership roles within the PMO, including the Deputy Assistant Secretary for Accounting Policy and Financial Transparency; Deputy Assistant Commissioner (Acting), Data Transparency; and Product Owner (Web and Broker).

DATA Act PMO personnel indicated that the Resource Management Plan was no longer relevant because the DATA Act PMO adopted Fiscal Accounting’s standard processes for tracking and managing resources and engaging leadership in decision-making regarding resource allocation, which includes budget reporting, capital planning and investment control, and organizational charts. However, the DATA Act PMO does not have an organizational chart with all current members of the project team. For example, the Deputy Assistant Secretary for Accounting Policy and Financial Transparency was not listed with a DATA Act PMO-related role in any organizational chart provided even though she was presented to the audit team as the DATA Act Program Manager for the DATA Act PMO. This issue is also discussed in Finding 1.

Validation Controls Defined in the DAIMS and Implemented in the Broker

The DAIMS v1.1 includes two sets of validation rules documentation: *Validation Rules v1.1* (updated to v1.1.2 prior to this audit) for submission of Files A through C and *FABS Validation Checklist v1.1* for FABS submissions. Each rule is designated as either a fatal error or a warning. As described in an internal working document entitled *SCHEM-1495 DAIMS Validation Rules Rationale for Severity Level*:

- Fatal errors prevent inaccuracies within data fields from being accepted by the Broker during the submission process. Fatal errors are validated through direct comparisons to authoritative sources or comparisons to other submitted values.
- Warnings represent potential data quality issues that are not verifiable⁵⁸ with existing DAIMS architecture. Warnings are accepted by the Broker but serve as an alert for the submitting agency to review and then confirm the accuracy of the field that has been flagged. The agency may decide to modify their data to dispose of the warning or to accept the warning and proceed with submission. Data with warnings may impact the quality of the data available, bringing into question its usefulness and accuracy of information publicly displayed on USAspending.gov. This issue is discussed further in Finding 2.

In addition, all violations of formatting specifications provided in the RSS and IDD are treated as fatal errors during the agency submission process. However, not all different types of formatting violations, such as incorrect character count or numeric versus string data type,⁵⁹ are specified in *Validation Rules v1.1.2*.⁶⁰ The *FABS Validation Checklist v1.1* has an in-depth presentation of element-by-element checks. However, none of the validation rules documents contained a rationale for why a warning versus a fatal error designation was specified for each individual rule provided.

Federal agencies are notified of the warnings and errors associated with their data submission via Broker-generated output files⁶¹ upon submission. The Broker provides output files separately for fatal errors and warnings. The DATA Act PMO confirmed that current designations of warnings and fatal errors are reviewed iteratively for potential changes. For example, validation rules currently designated as warnings may be modified to fatal errors at a later point if a reason is identified to change the designation.

The DATA Act PMO implemented validation rules in the Broker to ensure data submissions pass the DATA Act specifications for formats, alignment with authoritative sources such as GTAS, and cross-file alignment. We tested the DAIMS-defined formatting specifications and the validation rules used to ensure data is validated before it is displayed on USAspending.gov. We referenced the RSS, IDD, and validation rules documents to review established standards for submitting allowable data. These parameters were used in the creation of test files, which could be submitted through the Broker with known flaws. Throughout the process, we reviewed DAIMS documentation for completeness to determine any omissions and potential opportunities for improvement.

We applied two tiers of tests. In the first tier, referred to as black-box testing, we examined Broker-generated output files to determine how the Broker would respond to invalid data being submitted. We designed tests to trigger a specific warning or fatal error. The second tier of testing, referred to as white-box testing, involved reviewing publicly available code developed by the DATA Act PMO for the implementation of the Broker and USAspending.gov.

⁵⁸ The DAIMS-aligned file submissions do not contain enough information to definitively test whether some values are correct or inaccurate. The Broker can only flag the questionable data for agency submitters to examine further. For example, File D1 and D2 contain award modification numbers, but File C does not. If obligation amounts differ between the files for a particular award, the Broker generates a warning. However, the Broker cannot determine whether the warning was a result of a true mis-match in amounts reported for a particular award transaction.

⁵⁹ String data fields may include any combination of letters, numbers and other special characters unless specific exclusions are noted.

⁶⁰ Some validation rules for specific elements like Object Class do specify a required format.

⁶¹ After conducting validations, the Broker produces output files compatible with Microsoft Excel that list the validation rule warnings and fatal errors.

The goal of each test was to ensure that validation rules and formatting specifications documented in the DAIMS were implemented accurately, controls were in place to ensure data was valid and complete, and that the resulting data accepted by and displayed on USAspending.gov was of quality.

We selected five agencies as a baseline for black-box testing. We used Broker-validated agency submissions as the foundation for our manipulation and introduction of invalid data. The agency test files were selected to achieve a representative sample based on the potential quality of the submission. We selected agencies whose submissions received a very high and very low number of Broker warnings from quarter 4 of FY 2017 and chose the agencies at approximately the 25th, 50th, and 75th percentile of the raw number of warnings based on information received from the DATA Act PMO. Statistical sampling was not used because the entire source files were used for the selected agency data. Each edited file for an agency was considered its own sample. We made edits to test rules associated with Files A, B, C, D1 and D2 (including FABS submissions) and the linkages between files. Within each sample, we tested specific DAIMS-defined validation rules or formatting specifications.⁶²

When any submission file triggers a warning or fatal error, the Broker generates different versions of output files that can be downloaded and reviewed by the submitting agency. There is no current instruction guide to assist users in understanding the output. The output files contain lists of issues and associated information but do not provide explanations as to why these issues were deemed warnings versus fatal errors. For more analysis of validation rule designations and output files, see Finding 2.

Through testing, we found inconsistencies⁶³ in the way validation rules were implemented in the Broker and deviations between the Broker's coding of rules versus the official validation rules documents in the DAIMS v1.1. See Finding 3 for more information on the inconsistencies and deviations we identified.

For white-box testing, we copied the code available on GitHub⁶⁴ and analyzed it using CodeClimate⁶⁵ and DeepScan,⁶⁶ which are tools used for reviewing the coding languages used by the DATA Act PMO. We analyzed the code for loopholes and anomalies using static code analysis.⁶⁷ This analysis yielded no findings, which would allow for loopholes, anomalies, or other exploitation. Accordingly, any anomalies observed were deemed to be a result of purposeful decisions for display and function, rather than faults in the code itself. When examining coding behind validation rules, we noted that 15 rules contained coding logic that deviated from the validation rules as officially documented in the DAIMS. Many of the validation rules defined by the DAIMS regarding an agency's File A submission compare appropriations account data against the SF-133. The code allows data issues to be undiscovered when there is a lack of an SF-133.

When we presented the DATA Act PMO with a description of this situation involving a lack of an SF-133, personnel noted that the code was developed properly in the production ready broker for known

⁶² Some data fields violate multiple validation rules. When data is manipulated, the impact is not always isolated to a single rule. However, each of our manipulations were designed to map as closely as possible to one specific rule violation.

⁶³ Inconsistencies here and forward do not necessarily indicate that the Broker is coded incorrectly. In some instances, the Broker may be coded properly, but the output was not intuitive enough to decipher where expected rule violations appeared in the results. Alternatively, the Broker may be purposely coded to exclude certain output for logical reasons that were not immediately available in official DAIMS documentation.

⁶⁴ Treasury maintains open access to the developer code for the Broker and USAspending.gov on GitHub. For testing, we downloaded and reviewed all available code from projects related to the Broker and USAspending.gov.

⁶⁵ CodeClimate is a tool to provide automated code review for GitHub.

⁶⁶ DeepScan is a JavaScript code inspection tool that helps identify bugs and quality issues.

⁶⁷ Static code analysis is a method of computer program debugging that is done by examining the code without executing the program. The process provides an understanding of the code structure, and can help to ensure that the code adheres to industry standards.

exceptions to the rule and to allow agencies to test their submissions prior to the availability of GTAS validation data. However, we were unable to find the exceptions in the actual validation rules documentation. DATA Act PMO personnel also told us that as of May 2018, agencies may still have been able to submit files after by-passing the validation checks. This issue is discussed in Finding 3.

Further, DATA Act PMO personnel had concerns that we conducted our tests in an approved non-production staging environment. DATA Act PMO personnel stated that this environment allowed for new code to be implemented for future versions of the DAIMS (e.g., v1.2) without interfering in the normal production operations. There was potential for false positives to be noted during testing as certain datasets associated with the staging environment may not have matched production at the time of testing. Additionally, DATA Act PMO personnel noted the Broker is constantly evolving and that some bugs identified during our testing period may have been resolved through various updates since the testing ended.

For a separate analysis, the DATA Act PMO also provided us with warnings previously generated by the Broker for Files A, B, and C reported by the five selected agencies for quarter 4 of FY 2017. We confirmed that the warnings generated were accurate for 557 of 558 within-file warnings examined. We also reviewed files provided for cross-file warnings, pertaining to matches of award identifier and obligation. We examined warnings between File C and Files D1 and D2 data for Rule C23⁶⁸ for agencies' Broker output in quarter 4 of FY 2017. For the analysis of Rule C23, we found discrepancies totaling two percent of total warnings examined. In one agency, we identified double the amount of Rule C23 violations than what was present in the Broker output. For this particular issue, the DATA Act PMO noted that it had been previously identified and fixed for future submissions. This issue is discussed further in Finding 3.

Controls for the Display of Information on USAspending.gov

At the surface level, we reviewed the functionality of all available buttons and menus on USAspending.gov. We found all functions to work intuitively as expected via menus, buttons, and search controls.⁶⁹ We also reviewed test scripts and output for USAspending.gov and regression testing that was completed by the DATA Act PMO. The test scripts addressed the functionality of website features that were within the audit scope, and we confirmed that the DATA Act PMO routinely checked for appropriate functionality of the major features.

To ensure accuracy of information displayed, we compared raw agency DATA Act submission Files A, B, and C from the five agencies selected for validation testing to the data in the AWS Agency Submission Files portal. We also reviewed data available in the AWS Agency Submission Files portal for Files A through F versus data as displayed and available for download on other portions of the website.⁷⁰ AWS serves as a data storage for raw data until it is posted for display on USAspending.gov, and our tests were designed to ensure there was a clean translation from the AWS tables to the display. We examined how the raw data is extracted from submission files and transformed for display through various data sorts on USAspending.gov.⁷¹ In reviewing the selected agencies' submission files, we found that data in the AWS

⁶⁸ Rule C23 identifies whether obligation amounts between Files C and D are equal for Award IDs that match between the files. A warning occurs when award identification numbers match but the obligation amounts differ.

⁶⁹ We tested all display and sort functionality available on USAspending.gov. Every unit tested performed as expected with various mobile and web-based browsers, such as Firefox, Internet Explorer, Google Chrome and Microsoft Edge.

⁷⁰ USAspending.gov has multiple ways for users to access and download data. Users can apply any number of filters to the data through the *Advanced Search* functionality. The number of potential downloads becomes very large and we focused on examining data display and download only for the five sets of agency files we examined for Quarter 4 of FY 17.

⁷¹ There are numerous mechanisms within USAspending.gov that can be utilized for downloading and viewing data. The variety of sort and search functionality available via USAspending.gov make the number of potential downloads and views exponentially high. Therefore, our results are not reflective of all potential data displays available via USAspending.gov.

Submission Files portal on USAspending.gov is consistent with the information the agencies submitted and certified quarterly through the Broker.

When testing the controls for accuracy of the search features and data downloads on USAspending.gov, we were unable to confirm controls for these features because:

- There was no indicator that any agency data was missing from the *Spending Explorer* display even though data for the Department of Defense (DoD) was not shown.
- Obligation amounts presented in the *Spending Explorer* are inconsistent depending on the sorting parameters chosen.
- Data in File D1 did not fully match the display of procurement data two months after quarterly submission. Nonetheless, real-time comparisons of FPDS-NG downloads to USAspending.gov downloads for procurement data matched. In discussions with the DATA Act PMO, we determined that the quarterly files represented a point-in-time comparison that would not necessarily align with up-to-date real-time information available through other downloads.
- Data in File E did not fully match information displayed on the website regarding highly compensated officers two months after quarterly submissions. In discussions with the DATA Act PMO, we determined that the quarterly files represented a point-in-time comparison and that information pulled from SAM daily may differ when SAM is updated subsequent to the quarterly submission.
- Awards reported in File C but not File D1 or D2 for a selected time period were missing from search results.
- Limitation statements do not note that data quality procedures are only applied to data submitted under the DATA Act and not to legacy data that is available on the site.
- Some data searches did not yield complete and verifiable results. For example, a multi-pronged search using parameters of date range, agency, and zip code should have resulted in data pertaining to all award identifiers that aligned with those parameters. We found matches on only 9 of 19 searches for award data.

We determined that these issues are a result of USAspending.gov display decisions made by the DATA Act PMO, rather than true data quality issues. In Finding 4, we discuss how the DATA Act PMO's decisions pertaining to some displays of data on USAspending.gov were either misleading or did not disclose known data limitations.

Controls Impacting Validation and Display

During fieldwork, DATA Act PMO personnel provided us with 25 data elements that require links to external tables and systems for validation, derivation, and display purposes, as described in detail in Appendix IV. The specific data utilized from these external tables, or the cadence on which they are updated, are not documented in an accessible and consolidated format in the DAIMS. The links to external tables are provided in the *Practices and Procedures* document, but details of the interfaces were not available in the IDD, which was established to explain external interfaces between the Broker and other systems. Some of the tables referenced in Appendix IV are used for validation, and others for deriving or display purposes.

The "DAIMS Element or Area Informed" column in Appendix IV displays the element or area of the DAIMS impacted by the reference table. The "Update Frequency" was reported to us by DATA Act PMO personnel as the frequency with which the data for the table was updated for use by the Broker. The update frequency is essential for ensuring agency submissions are vetted against the most current set of validation information. The cadence of updates for the majority of these tables was supplied to us by the DATA Act PMO as "ad hoc," indicating the DATA Act PMO had no official schedule for monitoring and

updating the information. Further discussion about DAIMS integration with external systems and tables is provided in Finding 5.

Security Controls

The Broker and USAspending.gov are maintained in an AWS environment. Treasury-wide security procedures include guidance for the AWS environment and the supporting information technology (IT) environment. Standard policies and procedures exist for project management, system administration, configuration management, and quality assurance. The Treasury DAOI team has continuous security protocols in place. These include the identification, assessment, mitigation, reporting, and monitoring of risk, and an evaluation of the design and operating effectiveness of implemented controls. Additionally, security documentation exists that is aimed to respond to security events, such as the Contingency Plan and Systems Security Plan.

Because the DAOI uses the cloud model and is hosted by AWS, the DAOI team stated that they rely on the AWS-recommended controls based on AWS being an industry recognized leader in their capabilities. DATA Act PMO personnel review the AWS Federal Risk and Authorization Management Program (FedRAMP)⁷² documentation as part of the annual security assessment, and they rely on inherited AWS controls and automated AWS security updates to modify and/or enhance existing security controls. The Treasury DAOI team did not provide evidence of reviewing potential complementary security controls available from AWS. Some examples of complementary controls include encrypted financial data, security monitoring, and physical access.

Issues identified during our review of security controls are discussed further in Finding 6.

Finding 1: The DATA Act PMO's Process and Resource Planning Documentation Puts Consistency and Continuity of System Development at Risk

The DATA Act PMO does not have SOP documentation that fully aligns with its Agile methodology to ensure consistency and continuity of updates to the DAIMS, Broker, and USAspending.gov. In addition, the DATA Act PMO has not updated its Resource Management Plan since 2016, even though it has experienced a number of key leadership changes.

Section 3.3.5 of the *DAOI Enterprise Change and Configuration Management Plan v1.8.3* stipulates that "all features must include appropriate unit and integration tests to prevent errors and regressions, as well as proper documentation." Section 3.1.1 of the same document includes additional descriptions of needed documentation, such as "Training materials – courseware, instructor and user manuals for in-house tools, operating system, and utilities that are developed for the customer." The DATA Act PMO's current internal process documentation for their Agile methodology is incomplete for the training purposes described. For example, the existing documentation was not at a sufficient level of detail to serve as an effective user manual for the tools used during software development, such as Jira, in a manner consistent with the DATA Act PMO's deployment of its Agile methodology.

The DATA Act PMO has developed numerous governance documents to support its effort to guide Government-wide reporting of data. The *DAOI Enterprise Change and Configuration Management Plan 1.8.3* provides overarching guidance on visible boundaries of ownership, identification of DAOI configuration items, control of configurations, recording of changes, reporting, and auditing of the infrastructure.

⁷² FedRAMP is a government-wide program that provides a standardized approach to security assessment, authorization, and continuous monitoring for cloud products and services.

The *DATA Act Schema Change Process* guide shows how suggested changes are provided to and subsequently implemented in the DAIMS. The procedures in the *DATA Act Schema Change Process* guide are very high level and depict general processes related to changes in the DAIMS only, but they do not provide full alignment to the Agile development procedures. Without step by step procedures, the *DATA Act Schema Change Process* guide does not ensure consistency within software development, change management, testing, and approval procedures for user stories. Further, the process flows outlined in the guide do not align with the content and terminology in the DATA Act PMO's sprint cycle diagram. For example, the 'Development' process only includes three documented steps: Prioritize Stories and Sub-Tasks; Implementation; and Socialize Change. None of the step descriptions involve the terms backlog, grooming, or "retrospective" that are presented in the sprint cycle diagram.

The DATA Act PMO's current contractor also maintains a guide entitled *DATA Act Documentation: Systems and Processes* for supporting Treasury's DATA Act implementation. This guide is contractor-branded but has a more detailed presentation of processes than other documents. This document appears to be a work in progress rather than a comprehensive and complete process documentation. It contains links to several key resources. However, three out of 14 sections include only a section header and links without a description of the links' purposes. Additionally, the key steps in the DATA Act PMO's sprint cycle diagram are not mapped to the procedures provided. It is also not clear from the document itself whether it is an official guide for the entire DATA Act PMO team to use or just internal guidance for a contractor.

The DATA Act PMO uses Jira to track user stories. However, the way the DATA Act PMO deploys Jira does not allow traceability of user story approval. During interviews, DATA Act PMO personnel indicated that official sprint review and verbal approval occurred by the product owner to determine whether the objectives of the sprint were met. However, the product owner is not identified in completed user stories. Accordingly, there is no way to retroactively determine if the "Done" status of a user story was the result of legitimate approval.

In addition, we could not identify internal Treasury guidance pertaining to the specific procedures or the documentation developers are required to use in assigning different user story themes.⁷³ We searched user stories for the use of the following methods in documenting outcomes: (1) attachments and (2) GitHub links. While Agile development does not require user stories to utilize a specific type of supporting documentation, it is important for internal consistency to ensure developers know how they are expected to support their work. Of the 556 stories reviewed:

- 354 contained no attachments or links to GitHub for documentation
- 111 had only GitHub link(s)
- 70 had only an attachment
- 21 had both an attachment and links to GitHub

Since software was created in an Agile environment, DATA Act PMO personnel do not believe step-by-step documentation of SOPs is needed. Instead, they orient new team members through various training activities. Nonetheless, the DATA Act PMO's internal documents pertaining to the performance of Agile development processes are not at a sufficient level of detail to ensure consistency and continuity. A new team member should be able to learn what the steps, tools, mechanisms related to key processes are and how to perform them through a combination of process documentation and training. The current process documentation does not contain an adequate description of the tools and mechanisms used during the

⁷³ Themes are general business categories that are used to align user stories pertaining to common topics.

steps, how to perform the steps, any caveats associated with the steps, and where outputs from the steps should be stored.

Overall, maintaining documentation is a fundamental tenet of government accountability and transparency. The Federal Records Act⁷⁴ and Government-wide guidance on the *Creation and Maintenance of Federal Records*⁷⁵ require each Federal agency to make and preserve records necessary to document the agency's policies, decisions, procedures, and essential transactions. Treasury Directive 80-05⁷⁶ asserts that program officials have the primary responsibility for creating, maintaining, using, protecting, and disposing of records in their program areas. They shall create those records needed to ensure adequate and proper documentation of their area of responsibility.

It is important for programs focused on system development to have supporting documentation developed to ensure new team members with appropriately aligned training experiences can step into their roles and perform key processes. Without official Treasury-approved SOPs that align with its sprint cycle, business continuity at the DATA Act PMO is at risk. In addition, software is at risk of being developed and tested inconsistently, leading to deployment of new features that may contain bugs or errors that go undetected.

The overarching issue does not pertain to the breadth of documentation available, but rather with its completeness and consistency in order to ensure continuity in the face of key leadership changes. Since late 2017, the DATA Act PMO has experienced changes in multiple key leadership positions, including:

- A new Deputy Assistant Secretary for Accounting Policy and Financial Transparency
- A new Deputy Assistant Commissioner (Acting), Data Transparency
- A change in Product Owner (Web and Broker)

The DATA Act PMO indicated that its Resource Management Plan was no longer relevant due to the DATA Act PMO's recent move to Fiscal Accounting within Fiscal Service. According to the Government Accountability Office (GAO), an agency should determine the critical skills and competencies its workforce needs to achieve current and future agency goals and missions. Recent changes in staffing raise concerns for continuity and consistency in the absence of such a plan.

Recommendations to Address Finding 1

We recommend the Fiscal Assistant Secretary:

1. Enhance and complete existing SOPs to align with the steps of the DATA Act PMO's Agile development cycle.
2. Update the DATA Act PMO's resource documentation to give prompt attention to staffing and succession planning for DATA Act implementation efforts to mitigate against resource gaps.

Management Response

Treasury management accepted the recommendations.

⁷⁴ 44 U.S.C. 3101 et. seq

⁷⁵ 36 CFR Part 1222

⁷⁶ Treasury Directive 80-05, Department of Treasury Records Management (January 31, 2018).

Finding 2: Documentation of Validation Rules Is Insufficient to Ensure Data Quality

Validation rules do not include the rationale explaining why each rule receives a “warning” or “fatal error” designation. While potential formatting violations for Files A through C are assumed by RSS and IDD specifications, only potential formatting violations for a few specific elements such as object class are described in the validation rules document for Files A through C. Further, sub-sets of validation rules displayed in Broker submission output are not captured in DAIMS guidance.⁷⁷ Finally, there is no written guidance or Broker output that explains how agency users should interpret their report of validation rules violations.

It is important that when violations to the rules occur, the output provided by the Broker is clear and presented in a way that makes it easy for an agency to identify why their submission contained violations. Without a firm understanding of what issues caused the violation, it may be difficult for agencies to correct the issues and re-submit their data, if needed. With incomplete documentation describing all possible ways data submissions may fail validations, agencies may be unable to prepare for situations that lead to fatal errors, which may prevent complete submission of quarterly data. Also, should a new validation rule be established and defined, there would be no documentation in place to compare reasoning for the new designation against previously defined rules. Additionally, inconsistent output displays may make it difficult for an agency to determine a root cause for why their files trigger a warning or fatal error. If agency stakeholders do not know why something is a warning and cannot understand the output, there may be a temptation to allow the data to be submitted as is. Data with warnings can be certified, and the time required to decipher the output and resolve issues may be extensive and may prevent timely agency submissions.

The DATA Act states that data standards should apply to data on the website by May 2018. Validation rules are the mechanism the DATA Act PMO implemented to ensure that only data complying with these data standards passes through the Broker for display on USAspending.gov. These rules are maintained in *DAIMS Validation Rules v1.1.2*, *FABS Validation Checklist v1.1*, and formatting specifications within the RSS and the IDD.

We asked the DATA Act PMO why it has not developed a user guide or other written guidance for interpreting the output files as provided by the Broker. DATA Act PMO personnel noted that agencies have never requested this type of guidance. DATA Act PMO personnel believe format specifications are clearly laid out in the RSS and IDD and that no additional detail is required for agencies to understand that violations of formatting specifications will trigger fatal errors

DATA Act PMO personnel also stated that current designations are sufficient when applying a fatal error or warning label to a rule, and that further rationale behind those designations is not needed. Further, DATA Act PMO personnel stated that system developers may use their judgment in developing code to address a nuance of a validation rule that isn't fully specified in the validation rules documents, such as creating sub-sets of rules. There is no process to ensure the additional details are incorporated into validation rules after the fact, which could cause the rules as implemented to be inconsistent with the rules as documented. When the implementation of rules differs from their documentation, agencies may have difficulty understanding why their submissions receive warnings or fatal errors, and there is an increased burden to reconcile violations.

⁷⁷ For example, Broker output displays violations of Rules C23.1, C23.2, or C23.3, but there is no decimal beyond “C23” in the official validation rules that ensures all violations are captured during an agency’s review and remediation process.

Recommendations to Address Finding 2

We recommend the Fiscal Assistant Secretary:

1. Develop an internal reference document for the DATA Act PMO development team that explains why a designation of warning versus fatal error was assigned to each rule.
2. Incorporate sub-rules that already appear in Broker output (i.e., C23.1, C23.2, C23.3) and an explanation of potential formatting violations (with appropriate error designations) into the *DAIMS Validation Rules v1.1.2* and *FABS Validation Checklist v1.1* (or the most updated versions of these).
3. Either develop an instruction guide to interpret Broker output or incorporate mechanisms in the output itself to aid user interpretation when multiple fields are impacted by the same rule.

Management Response

Treasury management accepted the recommendations.

Finding 3: DAIMS Specifications Do Not Fully Align With Validation Rules

The Broker output does not display all warnings and fatal errors that could be found within Files A, B, and C and FABS submissions. The Broker does not simultaneously apply all validation rules as defined in the DAIMS to data submitted by agencies. DATA Act PMO personnel explained that some validation rules are triggered in a hierarchical order. If data fails one time for a given field against a rule, the Broker stops reviewing the remaining data for further possible violations.⁷⁸ Therefore, some, but not all, of the discrepancies noted below likely occurred due to this hierarchical application of rules.⁷⁹ DATA Act PMO personnel indicated that the cause for any individual rule failing to be triggered would be unique to its specific circumstances and not generalizable to a broad, shared cause. However, DATA Act PMO personnel specified that there is no way to plan for all potential iterations of bad data, especially if the data is incorrect but aligns with proper formatting standards. Nonetheless, without a full explanation of what data may be invalid and why there are potential inaccuracies, it may be difficult for an agency to correctly update their submission to pass all validations.

The Broker inconsistently displays results when multiple validation rules have been violated or when multiple fields are involved in the validation. Further, inaccurate data does not always trigger the full set of expected validation rule violations, as documented in the DAIMS. The DAIMS validation rules and formatting specifications contain specific criteria that are applied to the data, which should yield a violation flagged in Broker output.

The output generated by the Broker provides some logic that deviates from the official validation rules. During Broker testing, we noted error messages provided in output files did not always match the rule defined by the DAIMS. An example of this discrepancy can be noted in validation rule A33:

- Broker-generated output message: *Each TAS reported to GTAS for SF133 should be reported in File A, with the exception of Financing Accounts, or when all monetary amounts are zero for the TAS.*
- DAIMS defined rule for A33: *Each TAS reported to GTAS for SF133 should be reported in File A, and vice versa, for the same reporting period, with the exception of Loan Financing Accounts.*

⁷⁸ For example, this hierarchical application of rules may be likely if a violation impacts both within-file and cross-file violations. The Broker may report the within-file issues and not subsequently assess the submission for cross-file issues.

⁷⁹ Because the hierarchical application of rules is not documented in the DAIMS, we cannot identify all of the specific cases to which this would apply.

The following inconsistencies were identified for Files A, B, C and FABS submissions when data was submitted to violate specific validation rules or formatting specifications as identified through DAIMS documentation:

Exhibit 3. Validation Test Results

Submission Files	Results of Testing	Inconsistencies Noted
Appropriations Account Data (File A)	<ul style="list-style-type: none"> ▪ 89 of 118 rules tests had manipulations that were captured by the Broker. ▪ 89 out of 99 format tests yielded violations displayed in Broker output. 	<ul style="list-style-type: none"> ▪ 29 of 118 rules tests had manipulations that were not captured by the Broker. 16 out of these 29 tests should have failed a cross validation between the Broker and GTAS. ▪ 10 of 99 tests failed to trigger expected formatting violations. ▪ 35 of 89 tests that passed had manipulations that were captured by the Broker, but the validation rule referenced was not the expected result.
Program Activity and Object Class Data (File B)	<ul style="list-style-type: none"> ▪ 58 of 69 rules tests had manipulations that were captured by the Broker. ▪ 191 of 201 format tests yielded format violations displayed in Broker output. 	<ul style="list-style-type: none"> ▪ 11 of 69 rules tests had manipulations that were not captured by the Broker. ▪ 3 of 58 rules that passed had violations that were captured by the Broker, but the validation rule referenced was not the expected result. ▪ 10 of 201 format tests failed to yield expected format violations.
Award financial Data (File C)	<ul style="list-style-type: none"> ▪ 18 of 18 rule tests had manipulations that were captured by the Broker. ▪ 19 of 22 file C cross-validation test files had manipulations that were captured by the Broker. ▪ 82 of 87 tests yielded format violations displayed in Broker output. 	<ul style="list-style-type: none"> ▪ 2 of 18 rules tests had a manipulation that was captured by the Broker, but the validation rule referenced was not the expected result. ▪ 3 of 22 File C cross-validation test files had manipulations that were not captured by the Broker. ▪ 1 of 19 File C cross-validation test files had an error that was captured by the Broker, but the validation rule referenced was not the expected result. ▪ 5 of 87 format tests failed to yield expected format violations.

Submission Files	Results of Testing	Inconsistencies Noted
Financial Assistance Data (FABS Submission Formatting and Validation Rules)	70 of 81 tests yielded all violations pertaining to the data elements tested.	<ul style="list-style-type: none"> ▪ 11 of 81 tests had manipulations that were not captured by the Broker.

Source: Auditor testing conducted between February and May 2018 in the DATA Act Broker staging environment based on DAIMS v1.1 specifications.

Specific examples where the Broker did not operate as expected are listed below:

- An amount was inserted that should trigger an error for not matching against the value for the SF-133; however, no violation was triggered.
- The value of a cell was changed to a value that should have triggered a violation stating the cell value must equal the value in another cell; however, no violation was triggered.
- We manipulated a Unique Record Indicator (URI) in File C to remove a valid value from File C that was in the D2 file; however, the Broker did not capture the violation.
- In a D2 File, a required data element field was left blank; however, the Broker did not capture this violation.
- A required data element field allows a maximum of 21 characters. We inserted 25 characters into this field and the Broker did not capture the violation.
- We deleted a required data element field value; however, the Broker did not capture the violation.

We also reviewed warnings the Broker generated for agency files submitted in quarter 4 of FY 2017. In one agency, we identified double the amount of Rule C23 violations than what was present in the Broker output. We provided these results to the DATA Act PMO personnel, who confirmed that this was due to a known Broker issue that was resolved following quarter 4 of FY 2017.⁸⁰

We also noted the DATA Act PMO coded the validation rules in the Broker in a way that allowed data to pass through the validation process while violating documented rules. For example, if the SF 133 does not exist for the given account, all efforts to match File A to the SF 133 should result in a rule violation. However, the DATA Act PMO's validation code, as implemented in the Broker, allowed agencies to submit data in File A that did not agree to the SF 133 and did not activate warnings for the submitting agency. We provided this example to the DATA Act PMO personnel, who stated this code was implemented correctly. Further, they stated it was designed to allow agencies to test other submission files prior to the close of the GTAS reporting window. Nonetheless, the revised validation code was not documented in DAIMS validation rules. We confirmed that the code, as tested, allowed agencies to submit prior to the GTAS window, and successfully certify after SF-133 was available, without resubmitting their files to view the true warnings and errors. However, we did not confirm whether this potential event actually occurred in any agency submissions. In effect, validation rules are coded in the Broker in such a way that data may be posted to USAspending.gov, which does not conform to the exact wording of DAIMS guidance, even if the coding deviation had a legitimate rationale.

⁸⁰ The resolution identified by Treasury in this analysis was identified after our fieldwork had been completed, and we were not able to independently verify if the issue has been resolved.

DATA Act PMO personnel also noted that there are some instances where developers modify rules while coding based on nuances discovered during the development process. However, those nuances are not subsequently addressed by modifying the validation rules documentation to match the final code. This results in instances of sub-rules reported in the output files that are not documented in DAIMS validation rules.

Recommendations to Address Finding 3

We recommend the Fiscal Assistant Secretary:

1. Perform testing and provide documentation assuring that the limited validation rules identified as having inconsistencies⁸¹ operate as intended in the Broker with accurately displayed output.
2. Develop procedures to ensure changes to rules implemented during coding are subsequently captured in official DAIMS documentation.

Management Response

Treasury management accepted the recommendations. However, Treasury was unable to replicate the audit findings in the Broker production environment as early as August of 2018 when the audit findings were initially received. This may be, in part, because the audit testing did not account for the hierarchical application of validation rules, as this report acknowledges. It may also be due to the audit testing having been performed in the staging environment (which is used to model system changes) as opposed to the production environment. Nonetheless, Treasury embraces the opportunity to improve and will implement the recommendations associated with this finding.

Finding 4: Full Disclosures of Known Data Limitations Are Not Present on USAspending.gov

USAspending.gov does not provide the public with full disclosure of known or potential data quality issues. USAspending.gov has a banner message that includes a general statement about data quality and a link to an “About” page. This “About” page discusses processes used to ensure data quality, but it does not present the details of known data quality issues. Agency specific data quality issues are documented in quarterly quality assurance statements provided by SAOs. However, this information is not provided in a Government-wide format that addresses issues beyond individual agency submissions for a given quarter.⁸² In addition, a disclaimer associated with the *Spending Explorer* function on USAspending.gov describes issues that ‘*may*’ occur on the site but does not address known issues that ‘*do*’ occur on the site. The statement notes that Treasury expects “available data to become more complete in the future,” which suggests that the current data set is incomplete without further details.

The DATA Act PMO made progress toward ensuring information posted on USAspending.gov aligns with data submitted by agencies. However, decisions described below, made during implementation of the website have resulted in display anomalies that are not fully addressed by the current disclaimers and data limitation statements on USAspending.gov.

1. When examining FY 2018 spending by agency, DoD data was not available for display through Spending Explorer. However, there was no indicator on the Spending Explorer page that agency data was missing due to data not being submitted by the quarterly submission timeframe. See

⁸¹ We provided a full list of manipulations that failed to trigger expected validation rules to the DATA Act PMO.

⁸² Because each agency submits a separate quarterly assurance statement, a website user may have to download, read, and synthesize dozens of separate individual agency statements for every quarter to understand the comprehensive data quality issues of any data display or download.

Exhibit 4 below. If an agency does not submit data by the quarterly submission timeframe, its spending will not be displayed in Spending Explorer. Although a 'Learn More' section includes a note that data may be missing, there is no indicator on the data display pages when data actually is missing. Nonetheless, agency data is updated when it is submitted, even if after the quarterly submission timeframe.

2. Obligation amounts presented in the Spending Explorer are inconsistent depending on the sorting parameters chosen. Obligated Amount values on the display differ by \$100 billion for quarter 3 of FY 2017 when sorting by Agency versus Budget Function. The DATA Act PMO noted that the source of the data for the Budget function view was GTAS, whereas the source of the data for the Agency view was agency submissions, which led to the discrepancy.⁸³ See Exhibits 5 and 6 for an example from quarter 3 of FY 2017. DATA Act PMO personnel stated that following our fieldwork the display was improved by pulling the totals for all sorts from the GTAS system. We were unable to confirm as part of this audit because this change fell outside the timeframe of our fieldwork.
3. Despite the DATA Act PMO's assertion that warnings are not necessarily data quality issues, USASpending.gov display parameters prevent data with some warnings from being viewed through search functions. For example, data that received warnings for non-matching award identifiers between File C and Files D1 and D2 does not consistently appear on the website when using the Award Search function. Search functionality is linked to data displayed in Files D1 and D2; therefore, searches will not yield results when File C contains entries for award identifiers that Files D1 and D2 do not. The result is that data, certified by agency SAOs with warnings, are prevented from displaying even though the DATA Act PMO believes these do not have quality issues.

We note that while the DATA Act PMO's internal tracking shows some agency submissions with warning rates as high as 70 percent, these data warnings are not disclosed to users. DATA Act PMO personnel indicated disclaimers for warnings are not needed because warnings are not "indicators of data quality issues." We agree that there are multiple reasons for warnings, but current validation methods do not allow the Broker to determine if warnings represent true quality issues. However, we note that according to an internal document, SCHEM-1495 DAIMS Validation Rules Rationale for Severity Level, "Some data with warnings may truly affect the quality of the data available, bringing into question its usefulness and accuracy."

4. USAspending.gov highlights data quality procedures used for validation purposes in accordance with the DATA Act and other underlying guidance. These data quality procedures were not applied to the legacy data available on the site. Limitation statements do not note this. Legacy data submitted prior to the incorporation of DATA Act standards in the second quarter of 2017 was not subject to the rigorous validations that are currently applied to data submissions before being displayed on USAspending.gov.
5. Data from Files D1 and E examined from quarterly submission files did not fully align with data available for display and download from portions of the website that are updated daily. DATA Act PMO personnel noted that Files D1 and E are based on point-in-time data pulls and align with other data present depending on updates made in SAM and FPDS-NG. By design, the data available in the quarterly submission files for a given quarter can later differ from the authoritative source if the source system's data is updated after the quarterly DATA Act

⁸³ DATA Act submissions are validated against GTAS information via comparisons to SF-133 data. However, the Government-wide data will not match when displayed if the available data submitted for DATA Act is incomplete.

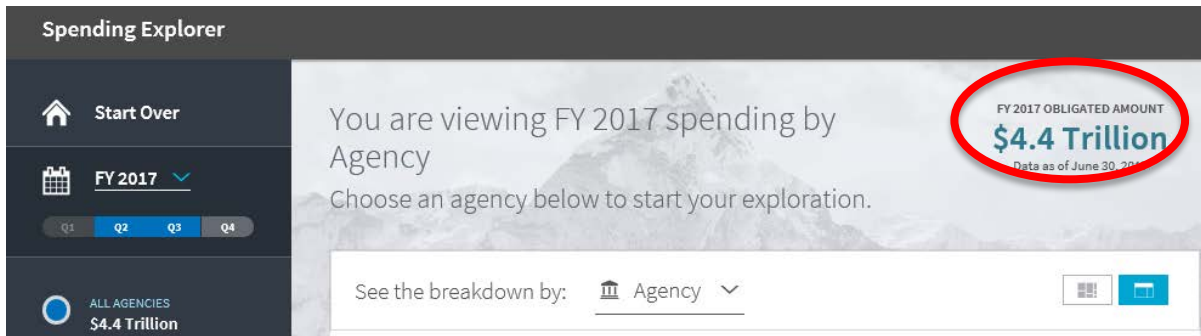
submission timeframe. However, this scenario is not noted in a limitation statement or disclaimer.

Exhibit 4. Screenshot of Spending by Agency from USAspending.gov



Source: <https://www.usaspending.gov/#/explorer/agency> (screenshot taken 4/30/2018)

Exhibit 5. FY 17 Obligated Amount By Agency (Quarter 3)



Source: <https://www.usaspending.gov/#/explorer/agency> (screenshot taken 5/03/18)

Exhibit 6. FY 17 Obligated Amount By Budget Function (Quarter 3)



Source: https://www.usaspending.gov/#/explorer/budget_function (screenshot taken 5/03/18)

The current limitation statements on USAspending.gov do not address issues in a manner consistent with OMB M-17-06.⁸⁴ According to this guidance, agencies must be transparent about the quality of the information that they disseminate and must take reasonable steps where practicable to inform users about the information quality of disseminated content, such as: (1) clearly identifying the inherent limitations in the information so users are fully aware of its quality and integrity; (2) taking steps, when and where practicable, to remove these limitations; and (3) if necessary, reconsidering whether to disseminate the information if its information quality is not sufficient. Accordingly, we believe that data limitation information is not currently presented in sufficient detail to meet the Government's obligation of transparency. The responsibility for data standards, transparency, and quality are intertwined with the quality of limitation statements made available on the website. A description of limitations should be provided to users when data either deviates from standards or is displayed in a way that could be confusing to the user.

Lack of complete data limitation statements may mislead the user about the data or cause inaccurate data to be reported. Without full disclosure of known and potential data limitations, the public is at risk of analyzing data available on USAspending.gov without recognizing the full extent of its display anomalies or potential deviation from the standards of the DATA Act. This may lead to the DATA Act PMO or agencies spending time to field questions about quality or display issues that could be disclosed ahead of time.

Recommendation to Address Finding 4

We recommend the Fiscal Assistant Secretary enhance generic disclaimers on USAspending.gov and expand the use of limitation statements on pages with known and potential display issues so that the public has a clear understanding of known limitations when using the data as displayed and available for download.

Management Response

Treasury management accepted the recommendation.

⁸⁴ OMB M-17-06, *Policies for Federal Agency Public Websites and Digital Services* (November 8, 2016)

Finding 5: Data Elements from External Sources Are Not Fully Documented Through DAIMS Specifications.

The IDD for DAIMS v1.1 does not include specifications of all data interfaces that are used for validating data, deriving data elements, and/or extracting data for display. The IDD v1.1 specifies how an agency's data and corresponding data elements will be extracted from interface systems by the DATA Act Broker. These specifications include elements pertaining to awards, vendors, and sub-contracts, which are submitted as File D1, File D2, File E, and File F, respectively. The DATA Act PMO developed the IDD v.1.1 to serve as the DAIMS standard for elements extracted through interfaces with the Broker.

Appendix IV lists external systems and tables that must interface with the Broker in order to validate, derive, and display DATA Act elements. Each of these tables have a variety of elements. However, the specific elements required for validation, derivation, and display are not noted in the IDD or elsewhere in the DAIMS. Nonetheless, these external systems and tables are essential for ensuring valid data is displayed on USAspending.gov and informing users of how some DATA Act elements are validated and derived.

DATA Act PMO personnel indicated that current validations, based on external systems and tables are documented in the SQL rules,⁸⁵ which can only be identified by reviewing Treasury code. We also note that links to most of the external tables are provided in the *Practices and Procedures* document. These links, however, lead to complex tables that have more than one data element. Current documentation does not provide details of the specific data elements from the external tables that are used for validation, derivation, and display purposes. The *Practices and Procedures* document also does not note the cadence on which the DATA Act PMO checks to ensure these external links and tables have the most updated information.

Making data details available primarily through code is inconsistent with the format of other information integrated and documented in the IDD. Code is a complex and technical way to store important information about data elements from integrated tables. Only specialized personnel with the high-level training and education would be able to understand it. Without a complete portrayal of how information is used and validated, such as data elements utilized from external tables and the frequency on which they are pulled, agencies may have a difficult time correcting the discrepancies within their submission files. Agencies may be unaware of the full scope of internal controls they need to develop and maintain to ensure the data submitted through the Broker passes all validation rules.

Additionally, without direct documentation of the expected cadence for updates to the external tables, the DATA Act PMO may not fully track linkages between external tables and the Broker to ensure updates occur on a proper frequency.

Recommendation to Address Finding 5

We recommend the Fiscal Assistant Secretary either expand the IDD or create a complementary document that includes all elements used for validation, derivation, and display purposes from external tables that interface with the Broker and USAspending.gov. Documentation should include the cadence on which the tables are pulled or referenced by the Broker.

⁸⁵ SQL rules are data transformation coding parameters used for extracting and preparing the data from external tables for Broker import. They are available to the public.

Management Response

Treasury management accepted the recommendation.

Finding 6: The Treasury DATA Act Operating Infrastructure (DAOI) Team Has Not Evaluated the Completeness of Amazon Web Services (AWS) Security Features

The Treasury DAOI team has not developed processes and controls to enable the review and evaluation of the comprehensive security features, including complementary controls, offered by AWS for protecting the data stored in the Broker and ultimately presented on USAspending.gov. The Treasury DAOI team reviews the AWS FedRAMP documentation as part of their annual security assessment. The Treasury DAOI team also monitors the AWS security bulletin to ensure any changes to the AWS environment are captured. The Treasury DAOI team reviews the AWS standard suite of security controls for implementation in the Broker and USAspending.gov environment. However, the Treasury DAOI team has not evaluated whether AWS complementary controls should be implemented. The Treasury DAOI team also has not developed processes to review the AWS security review reports and the impact it has on the DATA Act transparency efforts because they rely on automated AWS security updates to modify and/or enhance existing security controls. However, AWS services are designed with the assumption that all service offerings and security controls are reviewed by Treasury to ensure the controls are adequate to prevent unauthorized access to or use of data stored in the systems.

GAO Standards for Internal Control in the Federal Government⁸⁶ state that management may engage external parties to perform certain operational processes for the entity, such as IT security services. However, management retains the responsibility for the performance of processes assigned to external providers. This topic is particularly important as DAOI relies on AWS for changing vendor or factory-set administrator accounts. Therefore, management needs to understand the controls each service organization has designed and implemented for the assigned process and how the service organization's internal control system impacts the entity's internal control system. Further, OMB M-17-06 provides guidance for security of public-facing websites. Accordingly, agencies must follow the policies, principles, standards, and guidelines on information security and privacy. Each agency is required to implement security and privacy policies as set forth in OMB Circular A-130 and guidance from the National Institute of Standards and Technology (NIST).⁸⁷

There may be controls available for the AWS environment that the Treasury DAOI team has not evaluated for ensuring security of the DATA Act applications. As such, the Broker and USAspending.gov systems may be at risk for security violations, unauthorized access, and inappropriate use of data. A lack of review over AWS reports may also result in inadequate risk assessment processes of the control environment.

Recommendations to Address Finding 6

We recommend the Fiscal Assistant Secretary:

1. Incorporate a review of the AWS complementary controls into the existing review process.
2. Perform independent assessments to verify whether controls outside the standard package of controls offered by AWS could be adopted to mitigate the risk that security violations will occur.

⁸⁶ GAO-14-704G, *Standards for Internal Control in the Federal Government* (Sept. 2014)

⁸⁷ NIST Special Publication 800-44, *Guidelines on Securing Public Web Servers* and other associated standards and 800 series guidelines from NIST.

3. Develop and implement a process to obtain and review AWS notifications of changes to the control environment, including new controls available.

Management Response

Treasury management accepted the recommendations.

Overall Auditor Comment

We appreciate the courtesies and cooperation provided to our staff during the audit. Major contributors to this report are listed in Appendix V. A distribution list for this report is provided as Appendix VI.

APPENDICES

Appendix I — Objective, Scope and Methodology

The objective of our audit for the Department of the Treasury (Treasury) Office of Inspector General (OIG) is to assess the effectiveness of internal controls that Treasury's DATA Act Program Management Office (PMO) has designed, implemented, and placed into operation to help ensure the security, processing integrity and quality of the data extracted from the Digital Accountability and Transparency Act of 2014 (DATA Act) Broker (Broker) for display on USAspending.gov. Fieldwork was conducted between January and May 2018.

At a high level, the objective was addressed by:

- Analyzing DATA Act Information Model Schema (DAIMS) version 1.1 and associated program and change controls used for tracking and modifying the model, data elements, and validation rules.
- Analyzing the testing procedures and approvals consistent with the Agile development approach used by Treasury's DATA Act PMO for Broker and website development.
- Analyzing the completeness and effectiveness of validation procedures deployed through the Broker to govern data submissions from agencies.
- Analyzing the completeness, validity, accuracy, and quality of the data displayed and available for download via USAspending.gov.⁸⁸
- Analyzing the security controls governing the Broker and USAspending.gov.

Methods used to perform these functions included:

- Review of process documentation, internal controls documentation, key decision documents, and results of software testing.
- Interviews with key staff and personnel involved with the implementation and maintenance of the DAIMS, oversight of the Broker and USAspending.gov, and monitoring of security controls.
- A walkthrough of technical processes associated with the Agile development cycle and monitoring of system controls.
- Direct testing of validation rules through the manipulation of submitted data that had already passed through the Broker by incorporating known errors, formatting inaccuracies, and/or violations of rules. We conducted 721 tests of validation rules to thoroughly assess the resiliency and repeatability of output files generated by the Broker.
- Comparison of data from source files to output produced for download and/or display by the Broker and USAspending.gov.
- Examination of publicly available code used to design, create and maintain the implementation of the Broker validations governing data submission to USAspending.gov.
- Review of documentation for security controls.

We designed the methodology to determine the effectiveness of internal controls in the Broker environment and to ensure that data made available to the public on USAspending.gov is complete, valid, accurate, and of quality.

Internal controls were assessed for the following aspects of the Broker environment:

- Controls for program and change management of the DAIMS, Broker, and USAspending.gov;

⁸⁸ We did not examine the data itself, but rather controls in place to ensure that completeness and accuracy of submitted data are maintained during the submission, extraction, translation, loading, display, and downloading of data.

- Validation controls defined in the DAIMS and implemented in the Broker;
- Controls for the display of information on USAspending.gov; and
- Security controls in place to mitigate the risk that unauthorized access to the systems may occur.

Documentation Review

To accomplish our audit objectives, we reviewed the following documentation:

The DATA Act Background

- The Federal Funding Accountability and Transparency Act of 2006 (FFATA), which outlines requirements for the Office of Management and Budget (OMB) to establish a single searchable website to provide the public with access to data on Federal spending.
- The DATA Act, which outlines the requirements for Treasury to establish Government-wide financial data standards and increase the availability, accuracy, and usefulness of Federal spending information.
- The DATA Act background documentation including:
 - The DATA Act Concept White Paper
 - Treasury Executive Dashboards
 - DATA Act Master Project Plan
 - Schema and Operating Infrastructure Roadmap (June 2016)

Records Management

- Documentation to ensure Treasury's compliance in the preservation of records management which include the following:
 - Federal Records Management Act (44 U.S.C. 3101 et. Seq, November 2011)
 - Creation and Maintenance of Federal Records (36 CFR Part 1222, October 2009)
 - Treasury Directive 80-05, Department of the Treasury Records Management (January 2018) and associated guidance

Previous U.S. Government Accountability Office (GAO) Reports and Guidance

- GAO-09-680G, Assessing the Reliability of Computer-Processed Data (July 2009)
- GAO-12-331G, *Government Auditing Standards* (December 2011)
- GAO-12-681, Software Development: Effective Practices and Federal Challenges in Applying Agile Methods (July 2012)
- GAO -13-830SP, Standards for Internal Control in the Federal Government (September 2013)
- GAO-14-704G, Standards for Internal Control in the Federal Government (September 2014)
- GAO-18-138, OMB, Treasury, and Agencies Need to Improve Completeness and Accuracy of Spending Data and Disclose Limitations (November 2017)

DATA Act PMO's Key Implementation Documents

- DATA Act Operating Infrastructure (DAOI) Enterprise Change and Configuration Management Plan v1.8.3, which is used to define standards for validating and processing data files submitted by agencies.
- "White Paper: Implementing the DATA Act," (June 2014)
- DATA Act Schema Change Process
- DATA Act Documentation: Systems and Processes
- Contingency Plan and Systems Security Plan
- Financial Assistance Broker Submission (FABS) Architecture

- DATA Act Broker Backend documentation
- DAIMS Architecture
- DAIMS Overview
- DAIMS Schedule
- DAIMS Metadata Dictionary
- DAIMS Interface Definition Document (IDD) v1.1
- DAIMS Reporting Submission Specifications (RSS) v1.1
- DAIMS Practices and Procedures For DATA Act Broker Submissions v1.1
- DAIMS Domain Values
- DATA Act Elements Relationship
- Broker website mappings
- SCHEM 1495: Rationale for Rule Severity
- DAIMS Validation Rules v1.1.2
- DAIMS_FABS_Validation_Checklist_v1.1
- DATA Act Developers
- DATA Act Implementation – Executive Dashboard
- DAIMS v1.2 Implementation Timeline
- Sprint Reports
- Risk management registers
- DAIMS Feedback Tracker
- Common agency Inspector General DATA Act audit issues from Government-wide DATA Act audits reported in November 2017

Security Controls

- DAOI System Security Plan_v1.9.1
- Amazon Web Services (AWS) Service Organization Control Report

Documentation of Testing

- Documentation provided by the DATA Act PMO to ensure all stages of software development underwent testing before deployment which include the following artifacts:
 - USASpending.gov Test Scripts 12
 - DATA Act Broker Functional Test Cases
 - Bureau of the Fiscal Service_Broker_UserTesting
 - Unit tests performed by Treasury
 - Jira and GitHub repositories
 - Regression testing scripts

DAIMS Update Notes

- Memoranda and publications informing agencies about changes regarding the DATA Act implementation, which include the following:
 - DAIMS v1.2 Final Release
 - DATA Act Digests

Change Management and Process Documentation

- Key documentation regarding system updates and change management regarding all aspects of the DATA Act which include the following:
 - Data Quality Improvements for DAIMS

- Data Transparency Team: Key Updates for Senior Leadership
- DAOI Enterprise Change Management and Configuration Management Plan
- Treasury's relevant Jira and GitHub user stories and repositories to ensure consistency in the handling of bugs and system updates.
- Treasury's documentation to ensure system updates and changes are properly scheduled, executed and approved which include the following documentation:
 - Jenkins Tool SF133 documentation
 - Broker load from Federal Procurement Data System-Next Generation (FPDS-NG)
 - DUNS® data loads
 - Product Owner Approval Process Correspondence
 - Service Desk Standard Operation Plan
 - User story meta-data
- Broker output files for warnings, fatal errors, and cross-file validations

Meeting Minutes

- Agendas, topics discussed and minutes from numerous meetings, which include the following:
 - Data Architecture Review Developer Meeting
 - Data Architecture Review Session: Database Maintenance
 - DATA Act Executive Steering Committee Meetings
 - Retrospective Notes
 - DATA Act PMO Office Hours (notes taken by auditor)

Interview Sessions

- Responses to questions asked during interview sessions conducted with the DATA Act PMO and led by the audit team regarding the following subject areas:
 - DAIMS
 - Broker
 - USAspending.gov
 - Security Controls
 - Status of previous GAO Audits and Recommendations
 - Procedures surrounding how user stories are used to capture system updates and change requirements through GitHub and Jira

Audit Standards

- GAO-12-331G, *Government Auditing Standards*, December 2011
- GAO's *Federal Information System Control Audit Manual* to evaluate internal controls and their effect on audit risk, as well as criteria for evaluating security management.

OMB Guidance

- OMB M-17-06, Policies for Federal Agency Public Websites and Digital Services (November 4, 2016)
- OMB M-17-04, Memorandum for Agency Senior Accountable Officials (November 4, 2016)
- OMB M-15-12, Increasing Transparency of Federal Spending by Making Federal Spending Data Accessible, Searchable and Reliable (May 8, 2015)
- OMB's Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies (February 22, 2002)

Prior OIG Reports

- OIG-18-008 *DATA Act: Council Met Reporting Requirements Under the DATA Act Despite Challenges*, November 2, 2017
- OIG-18-010R *Treasury Continues to Make Progress in Meeting DATA Act Reporting Requirements, But Data Quality Concerns Remain*, November 8, 2017
- OIG-16-047 *Treasury's Government-wide DATA Act Implementation Continues, but Project Management Concerns Remain*, June 22, 2016
- OIG-15-034, *Treasury Is Making Progress in Implementing the DATA Act But Needs Stronger Project Management*, May 29, 2015

We conducted this performance audit in accordance with generally accepted government audit 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 objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II — Management Response

The Treasury management response is provided in its entirety on the next two pages.



DEPARTMENT OF THE TREASURY
WASHINGTON, D.C.

ASSISTANT SECRETARY

JUL 16 2019

Richard K. Delmar
Acting Inspector General, Office of Inspector General
U.S. Department of the Treasury
1500 Pennsylvania Ave, NW
Washington, DC 20220

Dear Mr. Delmar:

Thank you for the opportunity to review the draft report entitled *DATA Act: Treasury's Efforts to Increase Transparency Into Federal Spending Continue, But Further Refinement is Needed* (Draft Report). The Draft Report examines the Department of the Treasury's (Treasury) work under the Digital Accountability and Transparency Act of 2014 (DATA Act) and reviews the effectiveness of Treasury's internal controls related to the DATA Act Broker (Broker) and USAspending.gov.

The implementation of the DATA Act has been a large undertaking, and we are pleased by the Draft Report findings that Treasury successfully developed the DAIMS, implemented the Broker, and updated USAspending.gov. We also appreciate the Draft Report's acknowledgements that Treasury has made great progress toward achieving the DATA Act's objectives and that the Draft Report's recommendations should be viewed as potential iterative improvements to a software development environment that is operating effectively.

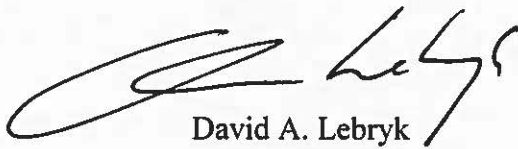
With respect to the Draft Report's findings and recommendations, the Draft Report details six findings related to resource and system documentation, data validation, disclaimers, and system security and makes recommendations intended to improve the usability of USAspending.gov, the Broker, and the associated data. We accept all of the Draft Report's recommendations and will work to implement them over the coming months. In fact, we have already taken steps to disclose known data quality limitations. With regard to DAIMS, we have updated release documentation to better explain the differences between validation rule warnings and errors and have provided information explaining their differences as it relates to agency validation and submission processes. We have also made changes to the DAIMS Practices and Procedures documentation to document Broker dependencies on external data sources and the cadence of Broker updates from those sources.

While we accept all of the recommendations, as we have discussed with your team, Treasury was unable to replicate the audit findings in the Broker production environment — *i.e.*, the environment used by agencies for DATA Act submissions — as early as August of 2018 when the audit findings were initially received. This may be, in part, because the audit testing did not account for the hierarchical application of validation rules, as the Draft Report acknowledges; it may also be due to the audit testing having been performed in the Broker staging environment

(which is used to model system changes) as opposed to the production environment. Nevertheless, Treasury embraces the opportunity to improve and will implement the recommendations associated with this finding.

Thank you once again for the opportunity to review and comment on the Draft Report. We appreciate your suggestions for enhancing the DAIMS, Broker, and USAspending.gov internal controls environment as we continue working to meet the DATA Act's requirements and objectives.

Sincerely,

A handwritten signature in black ink, appearing to read 'D. Lebryk', written in a cursive style.

David A. Lebryk
Fiscal Assistant Secretary

Appendix III – Government-wide Standard Financial DATA Act Elements and Definitions

This table contains data elements defined as part of the Government-wide standardization effort in 2014 through 2015. In the official DATA Act Information Model Schema (DAIMS) V1.1 documentation, the Reporting Submission Specifications (RSS) and the Interface Definition Document (IDD) operationalize these elements through multiple sub-elements across multiple files. The full versions of the RSS and IDD contain numerous other elements included in agency submissions that were established as part of the implementation of the Federal Funding Accountability and Transparency Act of 2006 (FFATA). The RSS and IDD documents should be referenced if a comprehensive picture of submission files is desired.

Data Element	Data Definition
Action Date	The date the action being reported was issued / signed by the Government or a binding agreement was reached.
Action Type	Description (and corresponding code) that provides information on any changes made to the Federal prime award. There are typically multiple actions for each award.
Amount of Award	The cumulative amount obligated by the Federal Government for an award, which is calculated by USAspending.gov. For procurement and financial assistance awards except loans, this is the sum of Federal Action Obligations. For loans or loan guarantees, this is the Original Subsidy Cost.
Appropriations Account	<p>The basic unit of an appropriation generally reflecting each unnumbered paragraph in an appropriation act. An appropriation account typically encompasses a number of activities or projects and may be subject to restrictions or conditions applicable to only the account, the appropriation act, titles within an appropriation act, other appropriation acts, or the Government as a whole.</p> <p>An appropriations account is represented by a Treasury Appropriation Fund Symbol (TAFS) created by the Department of Treasury (Treasury) in consultation with the Office of Management and Budget (OMB). (defined in OMB Circular A-11)</p>
Award Description	A brief description of the purpose of the award.
Award Identification Number (Award ID)	<p>The unique identifier of the specific award being reported, i.e. Federal Award Identification Number (FAIN) for financial assistance and Procurement Instrument Identifier (PIID) for procurement.</p> <p>Note: IN DAIMS v1.1, a Unique Record Indicator (URI) is also used for some financial assistance awards, such as when data is aggregated to protect personally identifiable information.</p>
Award Modification/Amendment Number	The identifier of an action being reported that indicates the specific subsequent change to the initial award.

Data Element	Data Definition
Award Type	Description (and corresponding code) that provides information to distinguish type of contract, grant, or loan and provides the user with more granularity into the method of delivery of the outcomes.
Awardee/Recipient Legal Entity Name	The name of the awardee or recipient that relates to the unique identifier. For U.S. based companies, this name is what the business ordinarily files in formation documents with individual states (when required).
Awardee/Recipient Unique Identifier	The unique identification number for an awardee or recipient. Currently the identifier is the 9-digit number assigned by Dun & Bradstreet referred to as the DUNS® number.
Awarding Agency Code	A department or establishment of the Government as used in the TAFS.
Awarding Agency Name	The name associated with a department or establishment of the Government as used in the TAFS.
Awarding Office Code	Identifier of the level “n” organization that awarded, executed or is otherwise responsible for the transaction.
Awarding Office Name	Name of the level “n” organization that awarded, executed or is otherwise responsible for the transaction.
Awarding Sub Tier Agency Code	Identifier of the level 2 organization that awarded, executed or is otherwise responsible for the transaction.
Awarding Sub Tier Agency Name	Name of the level 2 organization that awarded, executed or is otherwise responsible for the transaction.
Budget Authority Appropriated	A provision of law (not necessarily in an appropriations act) authorizing an account to incur obligations and to make outlays for a given purpose. Usually, but not always, an appropriation provides budget authority. (defined in OMB Circular A-11)
Business Types	A collection of indicators of different types of recipients based on socio-economic status and organization / business areas.
Catalog of Federal Domestic Assistance (CFDA) Number	The number assigned to a Federal area of work in the CFDA.
Catalog of Federal Domestic Assistance (CFDA) Title	The title of the area of work under which the Federal award was funded in the CFDA.
Current Total Value of Award	For procurement, the total amount obligated to date on a contract, including the base and exercised options.
Federal Action Obligation	Amount of Federal Government’s obligation, de-obligation, or liability, in dollars, for an award transaction.

Data Element	Data Definition
Funding Agency Code	The 3-digit Common Government-wide Accounting Classification agency code of the department or establishment of the Government that provided the preponderance of the funds for an award and/or individual transactions related to an award.
Funding Agency Name	Name of the department or establishment of the Government that provided the preponderance of the funds for an award and/or individual transactions related to an award.
Funding Office Code	Identifier of the level “n” organization that provided the preponderance of the funds obligated by this transaction.
Funding Office Name	Name of the level “n” organization that provided the preponderance of the funds obligated by this transaction.
Funding Sub Tier Agency Code	Identifier of the level 2 organization that provided the preponderance of the funds obligated by this transaction.
Funding Sub Tier Agency Name	Name of the level 2 organization that provided the preponderance of the funds obligated by this transaction.
Highly Compensated Officer Name	<p>First Name: The first name of an individual identified as one of the five most highly compensated “Executives.” “Executive” means officers, managing partners, or any other employees in management positions.</p> <p>Middle Initial: The middle initial of an individual identified as one of the five most highly compensated “Executives.” “Executive” means officers, managing partners, or any other employees in management positions.</p> <p>Last Name: The last name of an individual identified as one of the five most highly compensated “Executives.” “Executive” means officers, managing partners, or any other employees in management positions.</p>
Highly Compensated Officer Total Compensation	The cash and noncash dollar value earned by the one of the five most highly compensated “Executives” during the awardee's preceding fiscal year and includes the following (for more information see 17 C.F.R. § 229.402(c)(2)): salary and bonuses, awards of stock, stock options, and stock appreciation rights, earnings for services under non-equity incentive plans, change in pension value, above-market earnings on deferred compensation, which is not tax qualified, and other compensation.
Legal Entity Address	The awardee or recipient’s legal business address where the office represented by the Unique Entity Identifier (as registered in the System for Award Management) is located. In most cases, this should match what the entity has filed with the State in its organizational documents, if required. The address is made up of five components: Address Lines 1 and 2, City, State Code, and ZIP+4 or Postal Code.
Legal Entity Congressional District	The congressional district in which the awardee or recipient is located. This is not a required data element for non-U.S. addresses.

Data Element	Data Definition
Legal Entity Country Code	Code for the country in which the awardee or recipient is located, using the ISO 3166-1 Alpha-3 GENC Profile, and not the codes listed for those territories and possessions of the United States already identified as "states."
Legal Entity Country Name	The name corresponding to the Country Code.
Non-Federal Funding Amount	For financial assistance, the amount of the award funded by non-Federal source(s), in dollars. Program Income (as defined in 2 C.F.R. § 200.80) is not included until such time that Program Income is generated and credited to the agreement.
North American Industrial Classification System (NAICS) Code	The identifier that represents the NAICS Code assigned to the solicitation and resulting award identifying the industry in which the contract requirements are normally performed.
North American Industrial Classification System (NAICS) Description	The title associated with the NAICS Code.
Object Class	Categories in a classification system that presents obligations by the items or services purchased by the Federal Government. Each specific object class is defined in OMB Circular A-11 § 83.6 (defined in OMB Circular A-11).
Obligation	Obligation means a legally binding agreement that will result in outlays, immediately or in the future. When you place an order, sign a contract, award a grant, purchase a service, or take other actions that require the Government to make payments to the public or from one Government account to another, you incur an obligation. It is a violation of the Antideficiency Act (31 U.S.C. § 1341(a)) to involve the Federal Government in a contract or obligation for payment of money before an appropriation is made, unless authorized by law. This means you cannot incur obligations in a vacuum; you incur an obligation against budget authority in a Treasury account that belongs to your agency. It is a violation of the Antideficiency Act to incur an obligation in an amount greater than the amount available in the Treasury account that is available. This means that the account must have budget authority sufficient to cover the total of such obligations at the time the obligation is incurred. In addition, the obligation you incur must conform to other applicable provisions of law, and you must be able to support the amounts reported by the documentary evidence required by 31 U.S.C. § 1501. Moreover, you are required to maintain certifications and records showing that the amounts have been obligated (31 U.S.C. § 1108). The following subsections provide additional guidance on when to record obligations for the different types of goods and services or the amount. Additional detail is provided in OMB Circular A11.

Data Element	Data Definition
Ordering Period End Date	For procurement, the date on which, for the award referred to by the action being reported, no additional orders referring to it may be placed. This date applies only to procurement indefinite delivery vehicles (such as indefinite delivery contracts or blanket purchase agreements). Administrative actions related to this award may continue to occur after this date. The period of performance end dates for procurement orders issued under the indefinite delivery vehicle may extend beyond this date.
Other Budgetary Resources	New borrowing authority, contract authority, and spending authority from offsetting collections provided by Congress in an appropriations act or other legislation, or unobligated balances of budgetary resources made available in previous legislation, to incur obligations and to make outlays (defined in OMB Circular A-11).
Outlay	Payments made to liquidate an obligation (other than the repayment of debt principal or other disbursements that are “means of financing” transactions). Outlays generally are equal to cash disbursements but also are recorded for cash-equivalent transactions, such as the issuance of debentures to pay insurance claims, and in a few cases are recorded on an accrual basis such as interest on public issues of the public debt. Outlays are the measure of Government spending (defined in OMB Circular A-11).
Parent Award Identification (ID) Number	The identifier of the procurement award under which the specific award is issued, such as a Federal Supply Schedule. This data element currently applies to procurement actions only.
Period of Performance Current End Date	The current date on which, for the award referred to by the action being reported, awardee effort completes, or the award is otherwise ended. Administrative actions related to this award may continue to occur after this date. This date does not apply to procurement indefinite delivery vehicles under which definitive orders may be awarded.
Period of Performance Potential End Date	For procurement, the date on which, for the award referred to by the action being reported if all potential pre-determined or pre-negotiated options were exercised, awardee effort is completed, or the award is otherwise ended. Administrative actions related to this award may continue to occur after this date. This date does not apply to procurement indefinite delivery vehicles under which definitive orders may be awarded.
Period of Performance Start Date	The date on which, for the award referred to by the action being reported, awardee effort begins, or the award is otherwise effective.
Potential Total Value of Award	For procurement, the total amount that could be obligated on a contract, if the base and all options are exercised.
Primary Place of Performance Address	The address where the predominant performance of the award will be accomplished. The address is made up of six components: Address Lines 1 and 2, City, County, State Code, and ZIP+4 or Postal Code.

Data Element	Data Definition
Primary Place of Performance Congressional District	U.S. congressional district where the predominant performance of the award will be accomplished. This data element will be derived from the Primary Place of Performance Address.
Primary Place of Performance Country Code	Country code where the predominant performance of the award will be accomplished.
Primary Place of Performance Country Name	Name of the country represented by the country code where the predominant performance of the award will be accomplished.
Program Activity	A specific activity or project as listed in the program and financing schedules of the annual budget of the United States Government (defined in OMB Circular A-11).
Record Type	Code indicating whether an action is an individual transaction or aggregated.
Treasury Account Symbol (TAS) - (excluding subaccount)	<p>TAS: The account identification codes assigned by the Treasury to individual appropriation, receipt, or other fund accounts. All financial transactions of the Federal Government are classified by TAS for reporting to Treasury and the OMB (defined in OMB Circular A-11).</p> <p>TAFS: The components of a TAS – allocation agency, agency, main account, period of availability and availability type – that directly correspond to an appropriations account established by Congress (defined in OMB Circular A-11).</p>
Ultimate Parent Legal Entity Name	The name of the ultimate parent of the awardee or recipient. Currently, the name is from the global parent DUNS® number.
Ultimate Parent Unique Identifier	The unique identification number for the ultimate parent of an awardee or recipient. Currently the identifier is the 9-digit number maintained by Dun & Bradstreet as the global parent DUNS® number.
Unobligated Balance	Unobligated balance means the cumulative amount of budget authority that remains available for obligation under law in unexpired accounts at a point in time. The term “expired balances available for adjustment only” refers to unobligated amounts in expired accounts. Additional detail is provided in OMB Circular A-11.

Source: OMB, Federal Spending Transparency Data Standards, August 31, 2015

Note: The standards defined above are further operationalized, refined, and split into sub-elements in the DAIMS v1.1.

Appendix IV — DATA Act Information Model Schema (DAIMS) Linkages to External Systems and Tables Not Fully Documented in the Interface Definition Document (IDD)

DAIMS Element or Area Impacted	Reference Table: Source for Validation or Derivation of Data	Update Frequency
Treasury Account Symbol	Central Accounting and Reporting System (CARS)	Updated daily during Government-wide Treasury Account Symbol Adjusted Trial Balance System (GTAS) submission window.
Program Activity Code Program Activity Name	List provided by OMB and uploaded manually. Current list exists at: https://files.usaspending.gov/reference_data/program_activity.csv	Ad-hoc, as provided by OMB
Product Service Code	https://www.fpds.gov/downloads/psc_data_Oct012015.xls	Ad-hoc, as needed
Agency Identifier	https://community.max.gov/x/oAFtQ	Ad-hoc, as needed
Funding Sub Tier Agency Code Awarding Sub Tier Agency Code	https://community.max.gov/x/oAFtQ	Ad-hoc, as needed
Primary Place of Performance Code	See validation checklist: https://s3-us-gov-west-1.amazonaws.com/prod-data-act-web-static-files/help-files/DAIMS_FABS_Validation_Checklist_v1.1.pdf (Note this link is no longer active) City and county code source is: https://geonames.usgs.gov/domestic/download_data.htm	Ad-hoc, as needed
ObjectClass	https://obamawhitehouse.archives.gov/sites/default/files/omb/assets/a11_current_year/s83.pdf	Ad hoc, as needed

DAIMS Element or Area Impacted	Reference Table: Source for Validation or Derivation of Data	Update Frequency
Catalog of Federal Domestic Assistance (CFDA) Number CFDA Title CFDA description	Catalog of Federal Domestic Assistance (CFDA.gov) is now retired and has moved to SAM.gov	Daily
CountyCode	https://geonames.usgs.gov/domestic/download_data.htm	Ad-hoc, as needed
North American Industrial Classification System (NAICS)_Description	https://www.census.gov/eos/www/naics/	Ad-hoc, as needed
Zip Codes	Not provided	Not provided
SF-133 validations	GTAS	Updated daily during GTAS submission window
Agency Mission Statements Agency website	Agency provided	Ad-hoc, as needed
Budget Function	CARS	Ad-hoc, as needed
Awarding Office Name Funding Agency Name	https://community.max.gov/x/oAftQ	Ad-hoc, as needed
Primary Place Of Performance Country Name	https://nsgreg.nga.mil/genc/discovery?type=gp&field=name&searchText=&day=30&month=6&year=2017	Ad-hoc, as needed
Primary Place Of Performance State Name	https://postalpro.usps.com	Ad-hoc, as needed
Primary Place Of Performance County Name	https://postalpro.usps.com	Ad-hoc, as needed
Primary Place Of Performance City Name	https://postalpro.usps.com	Ad-hoc, as needed

DAIMS Element or Area Impacted	Reference Table: Source for Validation or Derivation of Data	Update Frequency
Primary Place Of Performance Congressional District	https://postalpro.usps.com	Ad-hoc, as needed
Legal Entity Country Name	https://nsgreg.nga.mil/genc/discovery?type=gp&field=name&searchText=&day=30&month=6&year=2017	Ad-hoc, as needed
Legal Entity State Name	https://postalpro.usps.com	Ad-hoc, as needed
Legal Entity County Name	https://postalpro.usps.com	Ad-hoc, as needed
Legal Entity City Name	https://postalpro.usps.com	Ad-hoc, as needed
Legal Entity Congressional District	https://postalpro.usps.com	Ad-hoc, as needed

Source: DATA Act PMO. Some of the links in the table were modified or became inactive after they were provided to us by the DATA Act PMO and may now lead to different locations. However, they were accurate at the time of the audit.

Appendix V — Major Contributors to This Report

Lyn McGee, Vice President, Audit Oversight, The Center for Organizational Excellence, Inc.

Frank Banda, Partner, Auditor-in-Charge (Data), CohnReznick

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Appendix VI — Report Distribution

Department of the Treasury

- Deputy Secretary
- Fiscal Assistant Secretary
- Deputy Assistant Secretary for Accounting Policy and Financial Transparency
- Office of the Deputy Chief Financial Officer, Risk and Control Group
- Office of Strategic Planning and Performance Improvement

Bureau of the Fiscal Service

- Commissioner
- Director, Finance and Internal Control Division
- OIG Liaison

Office of Management and Budget

- Controller
- OIG Budget Examiner

U.S. Senate

- Chairman and Ranking Member, Committee on Homeland Security and Governmental Affairs
- Chairman and Ranking Member, Committee on the Budget
- Chairman and Ranking Member, Committee on Finance

U.S. House of Representatives

- Chairman and Ranking Member, Committee on Oversight and Reform
- Chairman and Ranking Member, Committee on the Budget
- Chairman and Ranking Member, Financial Services Committee

U.S. Government Accountability Office

- Comptroller General of the United States

Abbreviations

AWS	Amazon Web Services
Broker	DATA Act Broker
CARS	Central Accounting and Reporting System
CFDA	Catalog of Federal Domestic Assistance
DABS	DATA Act Broker Submission portal
DAIMS	DATA Act Information Model Schema
DAOI	DATA Act Operating Infrastructure
DATA Act	Digital Accountability and Transparency Act of 2014
DoD	Department of Defense
DUNS®	Data Universal Numbering System
ESC	Executive Steering Committee
FABS	Financial Assistance Broker Submission portal
FAIN	Federal Award Identification Number
FedRAMP	Federal Risk and Authorization Management Program
Fiscal Service	Bureau of the Fiscal Service
FFATA	Federal Funding Accountability and Transparency Act
FPDS-NG	Federal Procurement Data System – Next Generation
FSRS	FFATA Subaward Reporting System
FY	Fiscal Year
GAO	U.S. Government Accountability Office
GSA	U.S. General Services Administration
GTAS	Government-wide Treasury Account Symbol Adjusted Trial Balance System
IDD	Interface Definition Document
IT	Information Technology
JAMES	Joint Audit Management Enterprise System
NAICS	North American Industrial Classification System
NIST	National Institute of Standards and Technology
OIG	Office of Inspector General
OMB	Office of Management and Budget
PIID	Procurement Instrument Identifier
PMO	Program Management Office
RSS	Reporting Submission Specifications
SAM	System for Award Management

SAO	Senior Accountable Official
SBR	Statement of Budgetary Resources
SF-133	Standard Form-133, <i>Report on Budget Execution and Budgetary Resources</i>
SOP	Standard Operating Procedures
TAFS	Treasury Appropriation Fund Symbol
TAS	Treasury Account Symbol
Treasury	Department of the Treasury
URI	Unique Record Identifier
XBRL	eXtensible Business Reporting Language



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