



U.S. GOVERNMENT PRINTING OFFICE  
OFFICE OF INSPECTOR GENERAL

ASSESSMENT REPORT  
REPORT NUMBER 12-03

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FEDERAL DIGITAL SYSTEM  
INDEPENDENT VERIFICATION AND VALIDATION  
FIFTEENTH QUARTER REPORT

January 18, 2012

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**Date**

January 18, 2012

**To**

Chief Technology Officer

**From**

Inspector General

**Subject**

Federal Digital System (FDsys) Fifteenth Quarter Independent Verification & Validation (IV&V) Report  
Report Number 12-03

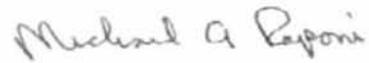
Attached is the fifteenth quarter IV&V Report on the U.S. Government Printing Office's (GPO) development and implementation of FDsys. The Office of Inspector General (OIG) contracted with American Systems to conduct an IV&V in accordance with methodology established by the Institute of Electrical and Electronic Engineers (IEEE) Standard 1012-2004, the IEEE Standard for Software Verification and Validation.

American Systems provides quarterly observations and recommendations on technical, schedule, and cost risks. Additionally, at the end of each FDsys release phase, American Systems provides a summary program management report.

The enclosed report is American Systems' quarterly report for the period March 11, 2011 to July 6, 2011. American Systems is responsible for the attached IV&V report and the conclusions expressed in the report. However, in connection with the contract, we reviewed American Systems' report and related documentation and inquired of its representatives. Our review disclosed no instances where American Systems did not comply, in all material respects, with contract requirements.

Chief Technology Officer  
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January 18, 2012  
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If you have any questions or comments about this report, please do not hesitate to contact me at (202) 512-0039.



Michael A. Raponi  
Inspector General

Attachment

cc:  
Deputy Public Printer  
Chief of Staff  
Assistant Public Printer, Superintendent of Documents  
Assistant public Printer, Operations  
General Counsel  
Chief Financial Officer  
Chief Information Officer  
Acquisitions Director

| <b>IV&amp;V RISK MANAGEMENT,<br/>ISSUES, AND TRACEABILITY REPORT</b> |   |
|--|---|
| <b>TO:</b>   | Michael A. Raponi   |
| <b>FROM:</b>   | David Harold  |
| <b>IV&amp;V OF:</b>  | Quarterly Report (Amended Final – Document Number 02-039) |
| <b>SUBJECT:</b>  | March 12, 2011 – July 6, 2011 Quarterly Report            |
| <b>DATE:</b>   | January 9, 2012   |
| <b>CC:</b>   | Dan Rose, Margaret Brown                                  |

***Background:***

This report presents the critical technical, schedule, and cost risks identified for the Government Printing Office (GPO) Federal Digital System (FDsys) Program. Specifically, it provides a high-level overview of the key risks and issues that Independent Verification & Validation (IV&V) has identified during the quarter ending June 30, 2011.

This is the fifteenth (15<sup>th</sup>) IV&V Quarterly Report and covers the period from March 11, 2011 to July 6, 2011. The period covered by this Quarterly Report began later than scheduled because the period covered by the previous IV&V Quarterly Report (fourteenth Quarterly) had been extended to March 11, 2011. The period covered by this IV&V Quarterly Report was therefore extended to July 6, 2011, due to the completion and submittal of an IV&V FDsys Requirements Evaluation Task Report. This extension was discussed with and agreed to by the Office of the Inspector General (OIG).

During this reporting period, the FDsys Program Management Office (PMO) completed the deployment of four (4) Release 2 production builds, and prepared/updated FDsys technical documentation. The production releases are summarized below along with the other events that occurred during the third quarter of Fiscal Year (FY) 2011.

***References:***

- a. *FDsys Release 2 (R2) Master Schedule*, July 6, 2011, (in SharePoint)
- b. *IV&V Quarterly Risk Report*, Final, March 14, 2011
- c. *Transition Master Plan*, January 21, 2011, (in SharePoint)
- d. *GPO's Federal Digital System Program Review*, November 8, 2010

***FDsys Program Management Office (PMO) Summary:*****PMO Completion Plan Summary**

The tasks and activities those are required for the design and development of FDsys Release 2

have been incorporated into a *Release 2 (R2) Master Schedule* that is maintained by the FDsys Program Director. Release 2 has been split into six (6) Groups (i.e., Groups A-F); each Group having been allocated desired features and capabilities. Original planning had Release 2 separated into four (4) Groups; however, due to requests from other government agencies for new Collections (i.e., Cost Accounting Standards (CAS) and Coastal Zone Information Center (CZIC)), the number of Groups have increased. These new Collections were requested by the Office of the Federal Register and National Oceanic and Atmospheric Administration (NOAA) respectively. The *Release 2 Master Schedule* currently contains the tasks and activities through Group D which is slated to be complete in the November 2011 timeframe.

The *Release 2 Master Schedule* is being updated and maintained on a timelier basis than the Release 1 Master Schedule. Start and Finish dates are being accurately monitored as is the Percent Complete. Currently, the FDsys Program is working on the design and development of Release 2 Group C which has been split into two (2) parts. The main tasking for Part 1 is:

- Development of a Pilot/refresh for the internal search engine for Documentum;
- Addition of new Collection named ECON1; and
- Work on the Integrated Library System (ILS) (requirements gathering and design).

The focus on Part 2 is the:

- Completion of the Pilot/refresh for the internal search engine for Documentum;
- Addition of a new rendition (Government Manual); and
- Some Program Tracking Reports (PTR)/bug fixes.

### **Transition Plan Summary:**

As reported in the last *IV&V Quarterly Report (March 2011)*, remaining tasks and activities to be accomplished in order to sunset GPO Access were being maintained in a *Transition Master Plan* that was being monitored/maintained by a GPO Transition Team. The *Transition Master Plan* is available on SharePoint; however, the document has not been maintained, i.e., initial due dates that were once scheduled and missed have not been updated and the document still has a January 2011 date. Note that because the *Transition Master Plan* is not being maintained and has not changed in nearly six (6) months, IV&V cannot determine the status of the activities and tasks contained therein.

### **Current Release Summary:**

The FDsys PMO is currently working on Release 2. As reported in the *GPO's Federal Digital System Program Review*, "Release 2 is going to be implemented over four (4) major releases" with functionality mapped to Groups A through D. Since the initial planning, two (2) additional Groups have been added, i.e., Groups E and F. Due to the work being performed on the development tasks and activities for new Collections, i.e., Constitutional Authority Statements

(CAS) and Coastal Zone Information Center (CZIC), the design and development of FDsys features and capabilities delineated in the *FDsys Requirements Document* have been further delayed. In addition to working on the new Collections, the FDsys PMO has been fixing Program Tracking Reports (PTRs) that were assigned to each Group.

#### **Release 2.2.0.07**

The deployment of Release 2.0.2.07 occurred on June 7, 2011. This build consisted of the Coastal Zone Information Center (CZIC) Collection; enhanced Documentum workflow; revision of a form for gpo.gov; and a link for Coconino Rural Environment Corps/Constitutional Authority Statements (CREC/CAS).

#### **Release 2.1.0.04**

The deployment of Release 2.0.1.04 occurred on April 29, 2011. This build consisted of the new Constitutional Authority Statements (CAS) Collection and, PTR fixes for the Package Creation Tool and format validation.

#### **Release 2.0.2.02:**

The deployment of Release 2.0.2.02 occurred on March 24, 2011. This build consisted of an Emergency patch and redeployment of the Documentum component that includes the need to rollback code that deletes folders not having packages in them.

#### **Release 2.0.1.02:**

The deployment of Release 2.0.1.02 occurred on March 22, 2011. This build consisted of twenty-one (21) PTR fixes for Interim Release A.

### **IV&V Activity Summary:**

#### **Key IV&V Efforts:**

IV&V continues to meet on a bi-weekly basis with the FDsys PMO Program Director in an exchange of technical and programmatic information. These meetings provide insight into the FDsys Release activities and tasks that cannot always be found on a Schedule/Plan. The meetings also provide the IV&V group an opportunity to express ideas and request programmatic and technical documentation that may be available, and will enable IV&V to complete its own plan/schedule, activities and tasks coinciding with those in the FDsys Plan.

### IV&V Reports:

For Release 2, IV&V submitted five (5) Task Reports to the OIG during the timeframe covered by this quarterly report. These tasks reports evaluated the:

- FDsys Master Test Plan;
- FDsys Program Management implementation;
- FDsys Continuity of Operations System Design Document;
- FDsys Continuity of Operations Testing (including Test and Performance Plans); and
- FDsys Requirements Evaluation.

## **1. Technical Risks Identified**

Since March 2011, the PMO has concentrated its efforts on the development of Release 2 Groups A, B, and C which includes activities and tasks related to developing new Collections, CAS and CZIC and fixing PTRs that were mapped to the Release. These two (2) collections were not part of the original functionality for Release 2; based on the information provided in the *GPO's Federal Digital System Program Review*. Rather, this development work was the result of requests made by other Government agencies, specifically, the Office of the Federal Register and the National Oceanic and Atmospheric Administration. If outside agency requests are required to be acted upon by the FDsys PMO, cost overruns and schedule slips, based on documented requirements, will continue to occur. IV&V believes that this is an agency-level issue that needs to be reviewed and resolved.

The FDsys PMO is currently working on the Release 2 Group C effort that is currently planned to be ready for test in August 2011 and includes a new Collection (i.e., ECON1). Lastly, thirty-six (36) PTRs are currently assigned to Release 2 Group C.

According to the FDsys Program Manager, there are five hundred eighty-one (581) PTRs currently with an Open status in ClearQuest. The FDsys PMO recently conducted a review of all open PTRs to determine if there were any duplicates that describe the same problem and PTRs that no longer applied due to being overcome by events. The FDsys PMO identified ninety (90) PTRs for closure based on this review. This effort and the planned deployment of Release 2 Group C have the potential to reduce the PTR count to four hundred fifty-five (455). In collaboration with the FDsys PMO, future IV&V Quarterly Reports will include a breakdown of the PTRs depicting the percentage of open PTRs by defect, non-defect, and enhancements.

## **2. Schedule Risks Identified**

There is the potential for schedule risks associated with IV&V evaluation findings from the IV&V Task Reports.

The FDsys Program continues to work on outside government agency requests for new Collections resulting in the delay of design and development of FDsys based on documented

requirements. The re-prioritization to accomplish this additional tasking continues to push the schedule out resulting in delayed functionality not only to FDsys but also to the stakeholder community. In addition to these schedule risks, the GPO risks the alienation of a once supportive stakeholder community due to the continued delay of anticipated and promised functionality.

Also note that problems continue to be found with the deployed FDsys; identified since the initial Beta deployment in March 2009. The open PTRs (581) referenced in Section 1 above are actively being worked; however, even with the reduction of PTRs due to the completion of Release 2 Group C and recent identification and tagging of duplicate and no longer applicable PTRs, over four hundred (400) PTRs will still be open. These problems require the PMO to divert resources away from Release 2 tasks and activities resulting in schedule delays.

### **3. Cost Risks Identified**

There are cost risks inherent with the technical issues identified during the March to July 2011 timeframe. While the FDsys Program continues to make progress with the design and development of Release 2, the Program still suffers from not using proven earned value analysis to track schedule and cost. This is especially critical because significant effort has been diverted away from performing actual FDsys design and development work based on the FDsys requirements. Instead, the FDsys Program often seems required to respond to requests from other government agencies for new Collections; thus, diverting resources once allocated to the completion of FDsys. These additional requests force the FDsys Program to incur additional costs for completion of the design, development, testing, and implementation of the FDsys.

### **4. Evaluate Master Test Plan**

During this quarter, IV&V performed an evaluation of the *FDsys Master Test Plan* to determine if the content of the document provides a definitive testing strategy for testing to be accomplished in Release 2. The intent of a comprehensive test strategy and its subsequent implementation is to ensure the stability, sustainability, and availability of the FDsys. Test management and execution is a critical function that encompasses requirements verification and validation, management of test processes, procedures, and test results, change management, software build process, and more. The *GPO FDsys Master Test Plan* is an end-to-end strategy that prescribes a bottoms-up testing approach where each subsequent test phase builds upon its predecessor. This methodology provides assurance that the FDsys system will satisfy the requirements of the GPO PMO and its stakeholders.

Results from this evaluation revealed that the current version of the *FDsys Master Test Plan* lacks detail and consistency. Little discussion on the strategy for conducting Performance Testing, Regression Testing, and 508-compliance testing is provided. Security Test and Evaluation (ST&E) and Certification and Accreditation (C&A), while highlighted therein is largely ignored; no connection to the certification and final acceptance of FDsys is ever

provided. Failure to clearly define that strategy puts in jeopardy the integrity (i.e., stability, sustainability, and availability) of the final deployed system.

## **5. Evaluate Program Management**

IV&V reviewed the FDsys Program Management function this quarter. The goal of the evaluation was to analyze the current GPO program management practices, assess their effectiveness, and provide potential recommendations for improvements moving forward with Release 2 of FDsys.

The role of a Government PMO on an Information Technology (IT) project is multi-faceted. Managed by an experienced Program Manager (PM), the PMO is an organizational entity established for the purpose of centralizing programmatic decision making; they are the sole authority for decision making on the project. The PMO, though comprised of numerous engineering and programmatic disciplines, coordinates all internal program activities and is ultimately responsible for management of engineering and programmatic entities under its domain. The Government PMO is charged with execution of the project to a successful completion in accordance not only with the contract, but also to the organization's strategy, plans, processes and procedures. Through centralized management and coordination, the Government PMO provides executive leadership and is responsible for supporting entities that comprise the PMO including:

- Program Management;
- Risk Management;
- Requirements Management;
- Configuration Management;
- Document Management;
- Quality Management;
- Engineering Management;
- Test Management, and Contracts Management;
- Operations/Training/Security Specialists; and
- Organizational Change Management.

Results of the assessment indicate that while there was some improvement in this area since the last IV&V evaluation, many of the program management practices previously recommended in past IV&V reports have not been implemented. To ensure that the Program has insight into potential problems resulting in cost overruns and schedule delays it has been recommended that the FDsys Program initiate the use of earned value analysis including variance analysis at the project level. Other recommendations include the timely update of the Master Schedule, conduct of periodic program management reviews, development of a Quality Assurance program, development of Quality Assurance Surveillance Plans to be used by the Program to monitor contractor performance, and the enhancement of the risk management processes.

## 6. Evaluate COOP System Design Document

The task assessed the GPO *FDsys COOP System Design Document (SDD)* to determine if the content of the document provides a definitive design, development, and implementation strategy for the COOP to be used as the Primary FDsys backup in the event of a failure to the FDsys Production Instance. The intent of this strategy and its subsequent implementation is to ensure the availability of the FDsys system and continued access to the electronic records of all three (3) branches of the federal government in the event of such a failure.

The results of the evaluation determined that the current version of the document, though much improved from earlier versions, still contains inconsistencies that require update. The requirements listed in Appendix A of the document are a combination of new COOP requirements and a listing of requirements taken from the FDsys Release 1 Master Requirements List. To ensure that the FDsys COOP Instance has been completely tested, COOP-related requirements listed in the *Release 1 Master Requirements*, *Release 1 Master Requirements RTVM*, and *FDsys COOP SDD* must be in agreement. Not testing all requirements due to inconsistencies between documentation could result in the COOP Instance not satisfying all of its expected capabilities and, problems (latent or new) may be missed during the formal testing because of inadequate and/or missing test cases.

## 7. Evaluate COOP Testing

The COOP testing effort is a critical component of the test program for FDsys Release 2: enabling the sustainability and availability of federal government documents in the event of failure and/or preventive maintenance downtime of the FDsys Production Instance. The goal of this effort was clear: to determine if the FDsys COOP Instance satisfied its requirements to ensure that FDsys can be fully recovered in terms of implementation, function, and performance.

The evaluation assessed both the system and performance testing that was performed for the COOP Instance. The system test results were quite positive demonstrating that FDsys Production Instance could be manually failed over to the COOP Instance. The test further demonstrated that the COOP Instance was able to mimic the Production Instance and had the ability to failback to the Production Instance. These results, however, are skewed because many of the COOP requirements were not adequately verified. Many COOP requirements were verified using the Analysis verification method; however, the test cases do not provide specific steps taken to verify these requirements; using generic references instead.

The results of the Performance testing that was performed are also mixed. The actual COOP Performance Test Plan listed but two (2) requirements, one (1) of which that failed. It is unclear to IV&V why only two (2) performance requirements were part of this testing since there are numerous other COOP performance requirements. The requirement that failed testing indicates that the COOP Instance must provide the capability "to maintain required response times when there are 20,000 concurrent users performing a variety of functions representing peak time operational use (RD-38)."

The inability of the COOP Instance to achieve the 20,000 concurrent user requirement is potentially problematic once GPO Access is officially retired; where the number of FDsys users

will increase exponentially. Though this requirement was not met, the effect is mitigated by the fact that both the FDsys Production and COOP Instances have been able to achieve 10,000 concurrent users and easily meet RD-42 which states that *“The system shall provide a response within 2 seconds of a user initiating an operation within FDsys of the GPO Intranet.”* However, the FDsys PMO must determine how to resolve this issue before GPO Access is retired.

## 8. Evaluate FDsys Release 2 Requirements

The evaluation of the FDsys Release 2 requirements was focused on the actual wording and intent of the requirements themselves. The review focused primarily on whether requirements were well formed (i.e., understandable), unambiguous, testable, and whether or not the requirement was a compound requirement. Requirements that fall into any of these categories make it more difficult to test which could lead to technical, schedule, and cost risks in the deployed system.

The results indicate that the initial requirement set has remained largely intact with very few changes since the Beta release nearly three and one half (3 ½) years ago. While it is unlikely that a major overhaul of the requirements will occur at this point in the project, the PMO should give strong consideration to reviewing the individual requirements allocated per Release and fixing them as appropriate.

It is also important to note that the *FDsys Requirements Master List* did not agree in the number of Release 2 requirements when compared to the *FDsys Requirements Master List Requirements Traceability Verification Matrix*.

Not fixing the issues with the requirements could lead to difficulties in testing; inability to determine the capabilities in the various increments; the system not performing as expected; potential cost overruns; and contractual dispute.

1. **Difficulty in testing the system** - Requirements are difficult to test if they are found to be vague, compound, or not well-structured. Also, inadequate testing of the system could result in problems and issues that could affect the availability of the system and its ability to perform as intended.
2. **Inability to determine the capabilities of the various increments** – Problems with requirement allocation and numbering (due in part to the flattening of the requirements set) make it difficult to determine what functionality the developer is claiming is included in the various releases, which in turn makes testing and verification of requirements difficult.
3. **System may not function as expected/required** - Ambiguous requirements have the potential to result in misunderstandings between GPO and the developer, further resulting in the system being built incorrectly.

4. **Cost overruns** – Problems with requirements often lead to poor design and poor implementation, which often lead to schedule and cost overruns. It is incrementally less expensive to fix a problem at the requirements stage than in subsequent stages of development.
5. **Contractual issues** - The requirements document and the requirements therein usually represents contractually-binding documents between GPO and the developer. In the event of a dispute, the developer will frequently cite the requirements as to what they are required to build; therefore, it is important to have clear, accurate requirements.

## 9. Recommendations

Recommendations from IV&V evaluations (i.e., Task Reports) performed during the third quarter in Fiscal Year 2011 are provided below. Note that a number of the recommendations below were previously reported in prior IV&V Task Reports. A number of these recommendations were closed based on the PMO response to implement the changes going forward into Release 2; however, as the findings (from the IV&V Reports) indicate, many of the same problems and issues continue to persist in the FDsys Program.

### FDsys Master Test Plan:

1. Update the *GPO FDsys Master Test Plan* to convey a complete and comprehensive strategy that will delineate, define, and describe the testing approach to be implemented for all levels/phases of testing that will be conducted on the FDsys.

**Management's Response. Concur.** Management plans to make the recommended adjustments to the FDsys Master Test Plan by 2/1/2012.

**Evaluation of Management's Response.** Management's planned action is responsive to the recommendation. The recommendation is resolved but not yet implemented and will remain open for reporting purposes pending completion and confirmation of the planned action.

### FDsys Program Management:

2. Update the *FDsys Program Management Plan* and initiate the use of earned value analysis based on the *ANSI-EIA-748-B-2007, Standard for Earned Value Management Systems (EVMS)*.

**Management's Response. Concur.** Management stated that the update of the Program Management Plan is being worked in conjunction with the proposed and gradual integration of Earned Value Management processes.

**Evaluation of Management's Response.** Management's planned action is responsive to the recommendation. The recommendation is resolved but not yet implemented and will remain

open for reporting purposes pending completion, implementation, and confirmation of the planned action.

3. Update schedule completion dates and percentage complete data in the Release Schedules.

**Management's Response. Concur.** Management stated schedule completion dates and percentage complete data in the Master Schedule is being reviewed and updated.

**Evaluation of Management's Response.** Management's planned action is responsive to the recommendation. In the past, the Master Schedule data has not always been available on SharePoint for IV&V to review. We request that Master Schedule data be kept current on SharePoint in order to facilitate IV&V's timely review. The recommendation is resolved but not yet implemented and will remain open for reporting purposes pending completion and confirmation of the planned action.

4. Conduct more frequent internal Program Management Reviews to include FDsys Project personnel and stakeholders.

**Management's Response. Concur.** Management stated that internal program management reviews will be conducted on a feature development basis with relevant stakeholders, and that a more defined schedule will be established to provide stakeholders with an opportunity for participation in reviews.

**Evaluation of Management's Response.** Management's planned action is responsive to the recommendation. The recommendation is resolved but not yet implemented and will remain open for reporting purposes pending completion and confirmation of the planned action.

5. Develop and implement a Quality Assurance program;

- a. Note that the OIG previously closed a prior recommendation (09-03-10, from IV&V Fourth Quarterly Report) on this subject based on having received notification (i.e., email November 2010) that a position description was being developed (for a Quality Assurance Director position). The position description was to be used for the express intent of hiring qualified personnel for that role.*

**Management's Response. Partially Concur.** Management stated that IT&S has hired a Quality Director to oversee and manage Systems Testing and Configuration Management.

**Evaluation of Management's Response.** Management was partially responsive to our recommendation. While hiring a Quality Director is the appropriate first step in developing a Quality Assurance program, management's response does not address whether a Quality Assurance program for FDsys will be developed and implemented. We request that management provide additional information to clarify whether an FDsys Quality Assurance program will be developed and implemented.

6. Develop and implement a Quality Assurance Surveillance Plan to oversee contracted work effort; to include designating existing staff or hiring expertise to support the GPO PMO in monitoring the contracted work effort.

**Management's Response. Partially Concur.** Working with the office of the Chief Human Capital Officer, management agrees that an acquisition-based Program and Project Management training curriculum is important for business units working in conjunction with Acquisitions that develop, specify, implement, and administer programs heavily dependent on information technology. Over the span of two years (i.e., by 1 July 2013), all such Program Managers will be certified at Federal Acquisition Certification for Program and Project Managers (FAC-P/PM), Entry/Apprentice, Mid-Level/Journeyman, or Senior/Expert, based upon PG grade level, in the spirit of the Office of Federal Procurement Policy (OFPP) policy memorandum dated April 25, 2007, dependent upon available funding over this timeframe for necessary approval. This recommendation and our response does not involve or concern the IT Quality Assurance program (Systems Testing and Configuration Management) in any way.

**Evaluation of Management's Response.** Management's planned action is partially responsive to the recommendation. To clarify, the recommendation isn't suggesting that the QASP be tied to the actual QA Group; however, given the history of this program and the difficulty on the program with contract management, the QASP or equivalent would be a useful tool to help Program and Project Managers manage the contractor(s) whether they (Program and Project Managers) were FAC-P/PM) certified or not.

7. Develop and implement an organizational change management program.

**Management's Response. Concur.** Management stated that GPO is examining opportunities to institute a governance model to provide agency-level direction and oversight, with improvements in documented change-control processes.

**Evaluation of Management's Response.** Management's planned action is responsive to the recommendation. The recommendation is resolved but not yet implemented and will remain open for reporting purposes pending completion and confirmation of the planned action.

**COOP System Design Document:**

8. At this stage, the FDsys COOP Instance is considered to be operational; however, to ensure that key requirements have been addressed by the testing, the FDsys PMO must take steps to resolve the requirement discrepancies to ensure that all required testing was actually performed on the FDsys COOP Instance. IV&V recommends that the *Release 1 Master Requirements*, *Release 1 Master Requirements RTVM* and the *FDsys COOP SDD* be reconciled to ensure consistency and to verify and validate that all FDsys COOP requirements have been satisfied.

**Management's Response. Concur.** GPO will ensure that the FDsys COOP SDD does contain all the relevant requirements. The PST Office will take the lead on planning for this. Steps

taken to perform testing on the FDsys COOP Instance will be revisited in terms of documentation. The Release 1 Master Requirements document has changed over time based upon shifting stakeholder requirements and will be revisited and updated through stakeholder review discussions. Requirements that are added, modified, or deleted will be documented, and will be tested as part of COOP processes.

**Evaluation of Management's Response.** Management's planned action is responsive to the recommendation. The recommendation is resolved but not yet implemented and will remain open for reporting purposes pending completion and confirmation of the planned action.

**COOP Testing:**

9. Verification of Functional requirements should be performed using the Demonstration and/or Test verification methods. The use of the Analysis verification method should be used sparingly and only when requirements can't otherwise be tested or demonstrated. When the Analysis verification method is used, to simply cite text in a design document is not sufficient to ensure that requirements have actually been verified. As with Test or Demonstration methods, the test case should have steps that indicate how the requirement is actually being verified. There needs to be an explanation describing/delineating how the design documentation for example can be used to verify a particular requirement, i.e., verification steps need to be included in the test case.

**Management's Response. Partially Concur.** The FDsys COOP instance was tested by the FDsys PMO team. The FDsys COOP instance at the backup site (ACF) served as the production instance during February 16-22, 2011 (the primary system was not accessible during that time), to ensure that the system could handle FDsys requirements. GPO does not agree, as the recommendation seems to suggest, that every single requirement must be explicitly tested on a COOP instance of any application including FDsys. The FDsys COOP test conducted was witnessed by IT&S STB, and the test plan, report and results were later reviewed by IT&S IT Security as part of the C&A. The results indicated that the COOP instance provides a reasonable, acceptable contingency instance for FDsys operations when the primary system is out of service. The FDsys team and GPO business management explicitly accepted the functional and operational capabilities of the FDsys COOP instance. Since that time, in order to support a re-index activity on Production servers, the COOP instance was utilized as the public-facing site from July 16<sup>th</sup>, 2011 to July 19<sup>th</sup>, 2011. The primary system was not accessible at this time. This COOP event was a planned maintenance activity for the Production instance. COOP procedures were used to initiate failover and failback. Therefore, GPO believes that the FDsys COOP instance was adequately and reasonably tested and no further testing (beyond normal, routine periodic contingency testing on an annual basis) is required or necessary to meet GPO directives and business requirements.

**Evaluation of Management's Response.** Management was partially responsive to our recommendation. The COOP testing documentation used the Analysis verification method where testing supposedly had been performed. Because of this, IV&V questioned the use of Analysis rather than Test or Documentation where requirements could have actually been tested with little to no cost or disruption. IV&V's point in the recommendation is that the

documentation needs to reflect the correct verification method and a link to the results and test cases. Simply assigning the Analysis verification method and referencing a document is not sufficient to substantiate that the requirements were verified using Analysis. We are not averse to using the Analysis verification method; however, steps/information on how the requirement(s) are being met also needs to be provided. We request that management provide further comments on IV&V's concerns regarding COOP testing documentation.

10. The FDsys PMO should develop a solution and/or workaround so that the FDsys Production Instance and the FDsys COOP Instance can meet the 20,000 concurrent user requirement (RD-38) prior to the retirement of GPO Access.

**Management's Response. Partially Concur.** Management stated that the original FDsys performance requirement for 20,000 concurrent users was not based on actual experience with usage on the existing public site and did not adequately define the concept of "concurrent users". The operational experience with FDsys over the last two years indicates 12,500 – 15,000 concurrent users based on the actual user profile of FDsys system logs. Therefore, GPO will define the FDsys performance requirements by December 1, 2011. Additionally, GPO will continue to optimize FDsys for public usage through leveraging the Content Delivery Network and updating the architecture for web content delivery in FY12. GPO will also continue to monitor FDsys performance to ensure capacity meets user needs, and scale FDsys as appropriate.

**Evaluation of Management's Response.** Management's planned action is responsive to the recommendation. The recommendation is resolved but not yet implemented and will remain open for reporting purposes pending completion and confirmation of the planned action.

#### **FDsys Requirements:**

11. Before development begins on future releases (or Groups within Releases), IV&V recommends the FDsys Program Management Office form a requirements Integrated Product Team (IPT) or equivalent that consists of members of the system and software engineering teams, and members of the test team. This IPT should evaluate and review each requirement to ensure they meet the criteria specified in IEEE standards and rework requirements that were found to have issues as identified in the attached file. Additionally, the IPT should ensure that the *FDsys Requirements Master List* and the *RTVM* are in agreement.

**Management's Response. Concur.** Currently the PMO and FDsys design and development team work closely with the Systems Test Branch (STB) at the start of a release to determine requirements and fixes that will be addressed within the release. The PMO will work with the STB to formalize and document this process, with a focus on reviewing and evaluating that the associated requirements are in a state to be fully testable by STB.

**Evaluation of Management's Response.** Management's planned action is responsive to the recommendation. The recommendation is resolved but not yet implemented and will remain open for reporting purposes pending completion and confirmation of the planned action.

## Appendix A. Management's Response



U.S. GOVERNMENT  
PRINTING OFFICE  
KEEPING AMERICA INFORMED

UNITED STATES GOVERNMENT  
MEMORANDUM

DATE: November 4, 2011

REPLY TO  
ATTN OF: Chief Technology Officer

SUBJECT: Federal Digital System (FDsys) Independent Verification and Validation (IV&V) – Fifteenth Quarterly Report

TO: Assistant Inspector General for Audits and Inspections

Thank you for the opportunity to respond to the draft Fifteenth Quarterly Report regarding GPO's Federal Digital System (FDsys). Below are the responses to the recommendations put forth in the report.

### Recommendations

#### FDsys Master Test Plan:

1. Update the GPO FDsys Master Test Plan to convey a complete and comprehensive strategy that will delineate, define, and describe the testing approach to be for all levels/phases of testing that will be conducted on the FDsys.

Response: Concur. IT&S plans to make the requested adjustments to the FDsys Master Test Plan by 12/1/2011.

#### FDsys Program Management:

2. Update the FDsys Program Management Plan and initiate the use of earned value analysis based on the ANSI-EIA-748-B-2007, Standard for Earned Value Management Systems (EVMS).

Response: Concur. The update of the PMP is being worked in conjunction with the proposed and gradual integration of Earned Value Management processes within the Programs, Strategy, and Technology office. The addition of the Quality Assurance organization under the Office of the Chief Technical Officer will help drive the integration of various EVM processes to help strengthen the overall process and provide additional performance and progress reporting metrics. As the available EVM tools are put into place, PST plans on strengthening its ability to demonstrate the value of effective and detailed project and program planning with an emphasis on reporting and performance metrics. Training will be needed for staff on the use of EVMS in order to lead to its implementation.

3. Update schedule completion dates and percentage complete data in the Release Schedules.

Response: Concur. Schedule completion dates and percentage complete data in the Master Schedule is being reviewed and updated.

4. Conduct more frequent internal Program Management Reviews to include FDsys Project personnel and stakeholders.

Response: Concur. Internal Program Management reviews will be conducted on a feature development basis with relevant stakeholders. A more defined schedule will be established to provide stakeholders with an opportunity for participation in reviews.

5. Develop and implement a Quality Assurance program; a. Note that the OIG previously closed a prior recommendation (09-03-10, from IV&V Fourth Quarterly Report) on this subject based on having received notification (i.e., email November 2010) that a position description was being developed (for a Quality Assurance Director position). The position description was to be used for the express intent of hiring qualified personnel for that role.

Response: GPO hired an IT&S Quality Director to oversee and manage Systems Testing and Configuration Management, and the incumbent started work at GPO on 8/4/11. We believe this addresses this recommendation and that it can be closed.

6. Develop and implement a Quality Assurance Surveillance Plan to oversee contracted work effort; to include designating existing staff or hiring expertise to support the GPO PMO in monitoring the contracted work effort.

Response: Partially concur. Working with the office of the Chief Human Capital Officer, management agrees that an acquisition-based Program and Project Management training curriculum is important for business units working in conjunction with Acquisitions that develop, specify, implement, and administer programs heavily-dependent on information technology. Over the span of two years (i.e., by 1 Jul 2013), all such Program Managers will be certified at Federal Acquisition Certification for Program and Project Managers (FAC-P/PM), Entry/Apprentice, Mid-Level/Journeyman, or Senior/Expert, based upon PG grade level, in the spirit of the Office of Federal Procurement Policy (OFPP) policy memorandum dated April 25, 2007, dependent upon available funding over this timeframe for necessary approval. This recommendation and our response does not involve or concern the IT Quality Assurance program (Systems Testing and Configuration Management) in any way.

7. Develop and implement an organizational change management program.

Response: Concur. GPO is examining opportunities to institute a governance model at the level to provide agency-level direction and oversight, with improvements in documented change-control processes. This approach has

started with the creation of the Strategic Investment Committee (SIC), which reports directly to executive management on existing and new agency priorities.

**COOP System Design Document:**

8. At this stage, the FDsys COOP Instance is considered to be operational; however, to ensure that key requirements have been addressed by the testing, the FDsys PMO must take steps to resolve the requirement discrepancies to ensure that all required testing was actually performed on the FDsys COOP Instance. IV&V recommends that the Release 1 Master Requirements, Release 1 Master Requirements RTVM and the FDsys COOP SDD be reconciled to ensure consistency and to verify and validate that all FDsys COOP requirements have been satisfied.

Response: Concur. GPO will ensure that the FDsys COOP SDD does contain all the relevant requirements. The PST Office will take the lead on planning for this. Steps taken to perform testing on the FDsys COOP Instance will be revisited in terms of documentation. The Release 1 Master Requirements document has changed over time based upon shifting stakeholder requirements and will be revisited and updated through stakeholder review discussions. Requirements that are added, modified, or deleted will be documented, and will be tested as part of COOP processes.

**COOP Testing:**

9. Verification of Functional requirements should be performed using the Demonstration and/or Test verification methods. The use of the Analysis verification method should be used sparingly and only when requirements can't otherwise be tested or demonstrated. When the Analysis verification method is used, to simply cite text in a design document is not sufficient to ensure that requirements have actually been verified. As with Test or Demonstration methods, the test case should have steps that indicate how the requirement is actually being verified. There needs to be an explanation describing/delineating how the design documentation for example can be used to verify a particular requirement, i.e., verification steps need to be included in the test case.

Response: Partially Concur. The FDsys COOP instance was explicitly tested by the FDsys PMO team. The FDsys COOP instance at the backup site (ACF) served as the production instance during February 16-22, 2011 (the primary system was not accessible during that time), to ensure that the system could handle FDsys requirements. GPO does not agree, as the recommendation seems to suggest, that every single requirement must be explicitly tested on a COOP instance of any application including FDsys. The FDsys COOP test conducted was witnessed by IT&S STB, and the test plan, report and results were later reviewed by IT&S IT Security as part of the C&A. The results indicated that the COOP instance provides a reasonable, acceptable contingency instance for FDsys operations when the primary system is out of service. The FDsys team and GPO business management explicitly accepted the functional and operational capabilities of the FDsys COOP instance. Since that time, in order to support a re-index activity on Production servers, the COOP Instance was

utilized as the public-facing site from July 16th, 2011 to July 19th, 2011. The primary system was not accessible at this time. This COOP event was a planned maintenance activity for the Production Instance. COOP procedures were used to initiate failover and fallback processes, and were successful in all efforts related to COOP failover and fallback. Therefore, GPO believes that the FDsys COOP instance was adequately and reasonably tested and no further testing (beyond normal, routine periodic contingency testing on an annual basis) is required or necessary to meet GPO directives and business requirements. We believe this adequately addresses this recommendation and that it can be closed.

10. The FDsys PMO should develop a solution and/or workaround so that the FDsys Production Instance and the FDsys COOP Instance can meet the 20,000 concurrent user requirement (RD-38) prior to the retirement of GPO Access.

Response: Partially concur. The original FDsys performance requirement for 20,000 concurrent users was not based on actual experience with usage on the existing public site and did not adequately define the concept of "concurrent users". The operational experience with FDsys over the last two years indicates that the current system investment for its current performance peak capability is a reasonable state for this GPO system (12,500 -15,000 concurrent users based on the actual user profile of FDsys system logs), therefore GPO believes the correct course of action is to properly define the FDsys performance requirements. The PMO has begun this analysis and will have the recommended requirements by December 1, 2011. In addition, GPO will continue to optimize FDsys for public usage through leveraging the Content Delivery Network and updating the architecture for web content delivery in FY12. GPO will also continue to monitor performance of FDsys from the user perspective to assure capacity meets user needs, and scale as appropriate. We believe this addresses this recommendation and that it can be closed.

#### **FDsys Requirements:**

11. Before development begins on future releases (or Groups within Releases), IV&V recommends the FDsys Program Management Office form a requirements Integrated Product Team (IPT) or equivalent that consists of members of the system and software engineering teams, and members of the test team. This IPT should evaluate and review each requirement to ensure they meet the criteria specified in IEEE standards and rework requirements that were found to have issues as identified in the attached file. Additionally, the IPT should ensure that the FDsys Requirements Master List and the RTVM are in agreement.

Response: Concur. Currently the PMO and FDsys design and development team work closely with Systems Test Branch (STB) at the start of a release to determine requirements and fixes that will be addressed within the release. PMO will work with STB to formalize and document this process, with a focus on reviewing and evaluating that the associated requirements are in a state to be fully testable by STB.

If I can answer any questions or provide additional comments, please contact me.

A handwritten signature in black ink, appearing to read "Richard G. Davis". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Richard G. Davis  
Chief Technology Officer

## Appendix B. Status of Recommendations

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(Final Report Only)

| Recommendation No. | Resolved | Unresolved | Open/ECD* | Closed |
|--------------------|----------|------------|-----------|--------|
| 1                  | X        |            | 12/1/2011 |        |
| 2                  | X        |            |           |        |
| 3                  | X        |            |           |        |
| 4                  | X        |            |           |        |
| 5                  | **       |            |           |        |
| 6                  | **       |            | 7/1/2013  |        |
| 7                  | X        |            |           |        |
| 8                  | X        |            |           |        |
| 9                  | **       |            |           |        |
| 10                 | X        |            | 12/1/2011 |        |
| 11                 | X        |            |           |        |

\*Estimated Completion Date

\*\* Partially Resolved

## Appendix C. Report Distribution

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