

UNITED STATES OFFICE OF PERSONNEL MANAGEMENT



**OPM System Development
Life Cycle Policy
and Standards
Chief Information Officer (CIO)**

Version 1.1
April 2013

a New Day for Federal Service

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Revision History

Version Number	Version Date	Revision Summary
1.0	June 2012	Official first OPM version of this document
1.1	April 2013	Address OPM's Office of Inspector General audit recommendations especially the one regarding "We recommend that the OCIO establish an SDLC review process in which the OCIO must review and formally approve SDLC work at various milestones for all OPM system implementation projects." as well as others.

Executive Summary

The Office of Management and Budget (OMB), the Federal Chief Information Officer and the Congress have set ever higher standards for the management and performance of information technology investments within the Federal government. Those standards require IT programs and projects to achieve consistently successful outcomes that maximize alignment with business objectives and meet key cost, schedule and performance objectives.

A key to successful IT management is a solid program and project management methodology that incorporates best government and commercial practices through a consistent and repeatable process, and provides a standard structure for planning, managing and overseeing IT programs and projects over their entire life cycle. Industry and government experience demonstrates that the quality of IT investments is directly proportional to the quality of the management processes used to acquire and operate the IT products those investments produce. This document is the U.S. Office of Personnel Management (OPM) System Development Life Cycle (SDLC) policy and standards guidance.

The OPM SDLC applies to all OPM and contractor personnel who are developing systems, acquiring systems, managing new systems, and making modifications or enhancement of existing systems. System developers, users, and all level of OPM management across all functional areas must adhere to the OPM SDLC or equivalent SDLC processes. The OPM SDLC is crucial to delivering cost effective information systems for OPM.

The version of this document that is posted to the Web is the official, authoritative version and supersedes the Information Technology Systems Manager (ITSM) SDLC policy and standards found in THEO.

1. INTRODUCTION

This document is provided as a resource for the management and development of OPM information technology (IT). This document serves as the mechanism to assure that systems under development are engineered to satisfy the user's requirements, within determined cost, schedule and quality guidelines. It provides a structured approach to managing information systems programs and projects beginning with establishing the need for a systems development or maintenance effort, through development and deployment, and concluding with decommissioning of the system.

1.1 Purpose

The OPM System Development Life Cycle (SDLC) Policy and Standards document provides Business Program Managers, Business Project Managers, Technical Project Managers and other program and project stakeholders guidance and implementation standards for system development. It is a collection of resources designed to support the approval, planning and life cycle development of OPM information systems. To deliver cost effective information, it is crucial that system developers, customers, and all levels of OPM management across functional areas adhere to the OPM SDLC.

1.1.1 OPM SDLC Policy

OPM IT programs and projects must use an SDLC according to standards outlined in this document. An SDLC is a consistent and repeatable process which applies to planning, managing, and overseeing IT programs and projects over their entire life cycle. The OPM approved SDLC methodologies include Waterfall, Incremental, and Agile. In some cases, deviating from one of the approved SDLC methodologies could be more advantageous to OPM. In order to deviate from an approved SDLC methodology, the Technical Project Manager must present to the SDLC Program Manager and Chief Information Officer (CIO) how the alternative methodology meets all seven of the SDLC phases as discussed in section 1.2.

1.1.2 Key Concepts and Principles

OPM's SDLC Policy is based on the following key concepts and principles:

1. **Baseline Management.** The careful development, monitoring, maintenance and management of plans, including cost, schedule and business-related performance as required by the OPM Baseline Management policy is fundamental to the success of all IT programs and projects. All SDLC options addressed by this document require the use of effective baseline management methods. For more information, see OPM's IT Baseline Management Policy at which can be found in an internal OPM link at [Appendix C.1.1](#).
2. **"Line of Sight"**. The reporting of actual cost, schedule and performance of an IT program or project must be easily traced to the original plans. Any reports generated shall be simple and easy to understand. Major investments requiring Earned Value Management reports should reference the OPM Baseline Management policy.
3. **Accountability.** The Clinger–Cohen Act provides that the OPM IT organization be operated as an efficient and profitable entity. To meet that goal, the law requires the

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OPM Director to establish clear accountability for IT management activities by appointing a CIO with the visibility and management responsibilities necessary to carry out the specific provisions of the Clinger-Cohen Act.

4. Cost and Schedule. Cost estimation for IT programs and projects must be performed according to Federal standards. All SDLC options addressed by this document require the use of the Government Accountability Office (GAO) Cost Estimating and Assessment Guide which can be found in an external link at [Appendix C.1.1](#). Since actual costs will be reported on www.USASpending.gov and available for public review, it is imperative that cost estimates be valid. This will also require that each program and project must establish Service Level Agreements (SLA) or Operating Level Agreements (OLA) within the cost estimates, if appropriate.

1.2 Scope and Applicability

This policy document applies to all OPM programs with an information technology component regardless of funding type and funding amounts. There may be an OPM information technology program and project that is not part of any internal OPM mission or program such as an interagency or Government-wide effort, this policy document would still apply to those initiatives. The document applies to both government and contractor efforts.

The use of the OPM SDLC Policy and Standards document applies to all OPM and contractor personnel who are developing, acquiring or managing new systems or making modifications or enhancements to existing systems. The use of the document includes the acquisition of all commercial off-the-shelf (COTS) solutions and Cloud solutions by OPM.

When an analysis of alternatives indicates an IT solution is required to satisfy the identified requirement, a Cloud solution strategy must be the primary focus for Business Program Managers, Business Project Managers and Technical Project Managers as required by Vivek Kundra's "25 POINT IMPLEMENTATION PLAN TO REFORM FEDERAL INFORMATION TECHNOLOGY MANAGEMENT" document (see [Appendix C](#)). If Cloud solutions are found to not meet OPM requirements, COTS or new systems development may be pursued.

OPM staffs are responsible for ensuring that the systems development and management approach described in the document is practiced on a day-to-day basis. Because there may be external Federal agencies (i.e., Government Accountability Office, Office of Management and Budget, etc.) who may request investment information at a moment's notice, the OPM staff must be prepared to provide SDLC documentation or deliverables. This can only be achieved by following the best practice of utilizing an SDLC and documenting the SDLC deliverables.

If the Technical Project Manager wishes to use an alternative SDLC then it must be equivalent in all areas of the OPM SDLC as stated in [Section 4](#) of this document. The Technical Project Manager must provide a presentation to the SDLC Program Manager, other appropriate CIO staff, and the Business Program Manager or Business Project Manager showing how the equivalence is achieved for all seven SDLC phases:

- Determine System Need ([Section 4.2.2](#))
- Define System Requirements ([Section 4.2.3](#))
- Design System Components ([Section 4.2.4](#))

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- Build System Components ([Section 4.2.5](#))
- Evaluate System Readiness ([Section 4.2.6](#))
- Deploy the System ([Section 4.2.7](#))
- Decommission the System ([Section 4.2.8](#))

The presentation must include a portfolio of documentation deliverables which can be expected.

This document applies to the work of the individuals and groups filling the roles described in [section 2](#), “Roles, Responsibilities, and Governance”.

1.3 Compliance, Enforcement and Exceptions

The CIO will enforce the OPM SDLC process to ensure compliance through periodic reviews of randomly selected OPM programs with IT components and OPM IT projects. The reviews may be conducted by the SDLC Program Manager or a designated SDLC subject matter expert (SME) on behalf of the CIO.

The CIO or an authorized designee is the official approver of submitted deviations and waivers to the OPM SDLC Policy and Standards.

All OPM SDLC templates or process documents can be utilized in the Agile methodology. If the Technical Project Manager wishes to use an alternative SDLC then it must be equivalent in all areas of the OPM SDLC as stated in [Section 4](#) of this document. It is recognized that there will be alternative Agile documentation that Project Teams will wish to utilize. Waiver and deviation requests from the OPM SDLC standard are not required when alternative Agile documentation methods convey the OPM SDLC standards’ requirements.

OPM IT programs or projects currently utilizing the previous SDLC standard, Information Technology Systems Manager (ITSM), are grandfathered in using the ITSM standards to complete their implementation. All other OPM IT programs or projects which have just entered into the initial planning stage are subject to the OPM SDLC policy and standards in this document.

1.4 Authority

This document is issued under the following authorities:

- Clinger Cohen Act of 1996 which requires “the head of each executive agency [to] design and implement ... a process for maximizing the value and assessing and managing the risks of the information technology acquisitions of the executive agency” (Clinger-Cohen Act of 1996, Section 5122(a))
- Office of Management and Budget (OMB) Circular A-130, Management of Federal Information Resources, which requires the Chief Information Officer to monitor and evaluate the performance of information technology investments
- Paperwork Reduction Act (PRA)
- OMB Memorandum, M-11-29, CIO Authorities
- Berry, J. (OPM Director) (11/7/2011) “Chief Information Officer Authorities”, Memorandum for Associate Directors and Heads of Offices. Office of Personnel

Management

2. ROLES, RESPONSIBILITIES, AND GOVERNANCE

The roles detailed in the following sections are required for new development as well as maintenance and enhancement programs or projects. An individual can be responsible for multiple roles especially for the small maintenance and enhancement program or project. For example, an individual can be both the system developer and the system quality assurance team of a project. The Business Program Manager or Business Project Manager in collaboration with the Technical Project Manager must ensure that the roles are addressed within the constraints of the assigned members to the program or project.

2.1 The Chief Information Officer (CIO)

The CIO has responsibilities in the following areas:

- Assigning the Technical Project Manager to the IT project;
- Jointly responsible with the OPM Associate Directors, Heads of Offices and Senior Executives for selecting, assessing and managing information technologies;
- Reviewing and approving all information technology-related procurement plans and strategies before any other OPM governance approvals (e.g., Capital Investment Committee, etc.);
- Approving all IT-related procurements;
- Advising the OPM Director on the selection, management and use of information technology, and on risks related to the management of IT;
- Advising the agency head on budgetary implications of information technology decisions as the Chair of the Investment Review Board (IRB);
- Advising the agency head on whether to continue, modify or terminate an IT investment as one of the TechStat Co-Chairs;
- Approving of new and revised baselines for an IT investment;
- Authorizing the waiving or deviating from the policy and standards of this document;
- Designating CIO staff to be on the Integrated Project Team for the program or project;
- Designate CIO staff to be dedicated technical advisors on IT projects if funded by the program office or by the project;
- Chairing the OPM IRB.

2.2 OPM Associate Directors, Heads of Offices and Senior Executives

The OPM Associate Directors, Heads of Offices and Senior Executives have responsibilities in the following areas:

- Selection of the Business Program Manager or Business Project Manager;
- Jointly responsible with the CIO for selecting, assessing and managing information technology;
- Ensuring that all IT-related procurement plans and strategies are approved in advance by the CIO;
- Serving as Authorizing Official (for more information, see Authorizing Official below in Section 2.10.);

- Ensuring compliance with the requirements of this document.

2.3 Chief Financial Officer (CFO)

The CFO obtains the CIO's concurrence on any budgeting decisions that affect OPM funding for IT programs or projects.

2.4 Business Program Manager

The Business Program Manager manages one or more major multi-year IT initiatives of such magnitude they must be carried out through multiple related IT projects and is accountable for the overall success of the program. Responsibilities include:

- Report to the CIO within a matrix organization framework for the life of the program;
- Creating and leading an Integrated Project Team;
- Leading, coordinating, communicating, integrating program activities;
- Ensuring alignment with critical agency priorities;
- Ensuring the work efforts achieve the outcome specified within the agency's business strategy, including appropriate strategic, life cycle management and capital IT investment plans;
- Managing the project selection, prioritization, evaluation and monitoring, cost schedule management, risk management, quality management and resource allocations;
- Representing the program office and the customers during the life of the IT projects within the investment;
- Preparing cost, schedule and business-related performance metric baselines for their investments in accordance with the OPM Baseline Management Policy;
- Monitoring cost, schedule and performance baselines for the investment;
- Responsible for ensuring that IT projects meet budgetary constraints;
- Updating the Federal IT Dashboard with current status for major IT investments;
- Responding to CIO questions about the investment, including questions related to in-depth reviews of the investment;
- Coordinating the business needs with the Technical Project Manager;
- Create and monitor the approved investment baseline and accepting the work products produced as outlined in the OPM Baseline Management Policy;
- Based on the Risk Matrix of the program or project, periodically assess the entire Program's or Project's return on investment (ROI) and successful completion of the program within baseline milestones.

For the Agile (Scrum) methodology, the Business Program Manager can serve as the Product Owner. The Product Owner will ensure that the scrum process is supported as detailed in [Appendix F](#) "Scrum Process Details".

2.5 Business Project Manager

The Business Project Manager manages one IT project and is accountable for the overall success of the IT project. Responsibilities include:

- Report to the CIO within a matrix organization framework for the life of the project;

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- Creating and leading an Integrated Project Team;
- Leading, coordinating, communicating, integrating and being accountable for the overall success of the project;
- Ensuring alignment with critical agency priorities;
- Ensuring the work efforts achieve the outcome specified within the agency's business strategy, including appropriate strategic, life cycle management and capital IT investment plans;
- Managing the project selection, prioritization, evaluation and monitoring, cost schedule management, risk management, quality management and resource allocations;
- Representing the program office and the customers during the life of the IT project;
- Preparing cost, schedule and business-related performance metric baselines for their project in accordance with the OPM Baseline Management Policy;
- Monitoring cost, schedule and performance baselines for the project;
- Responsible for ensuring that the IT project meet budgetary constraints;
- Updating the Federal IT Dashboard with current status for the major IT investments;
- Responding to CIO questions about the project, including questions related to in-depth reviews of the investment;
- Coordinating the business needs with the Technical Project Manager;
- Create and monitor the approved investment baseline and accepting the work products produced as outlined in the OPM Baseline Management Policy;
- Based on the Risk Matrix of the program or project, periodically assess the entire Program's or Project's return on investment (ROI) and successful completion of the program within baseline milestones.

For the Agile (Scrum) methodology, the Business Project Manager can serve as the Product Owner. The Product Owner will ensure that the scrum process is supported as detailed in [Appendix F](#) "Scrum Process Details".

2.6 Technical Project Manager (Technical PM) (Scrum Master)

The Technical Project Manager (Technical PM) has responsibilities in the following areas:

- Meeting the objectives of a IT project;
- Creating and leading a technical Integrated Project Team;
- Coordinating with Business Program Manager or Business Project Manager from the program office on the development of the IT project;
- Selecting a system life cycle methodology, the methods and tools to be used, and the required controls and deliverables;
- Provide overview of the technical approach of the project to the Business Program Manager or Business Project Manager;
- Providing the leadership and management of the SLDC implementation effort and the IT project team;
- Reporting to the Executive Steering Committee on the performance of the IT project.

For the Agile (Scrum) methodology, the Technical Project Manager will serve as the Scrum Master. The Scrum Master will ensure that the scrum process is managed as detailed in [Appendix F](#) "Scrum Process Details".

2.7 Program Management Offices (PMO)

Program Management Offices are responsible for the following:

- Planning for and managing implementation of the requirements of the OPM SDLC;
- Developing the following program or project requirements:
 - The investment's Work Breakdown Structure
 - The investment's Organizational Breakdown Structure
 - The investment's Responsibility Assignment Matrix
 - Summary Earned Value or operational analysis reports
 - The investment's cost, schedule and performance baselines;
- Monitoring the investment's cost, schedule and performance baselines;
- Performing operational analysis for the investment;
- Providing analytical support to the Business Program Manager or Business Project Manager in response to CIO's questions about the investment.

2.8 OPM Contracting Officers

OPM Contracting Officers must consult with the CIO on the development of contract clauses for investments covered by this document to ensure that the clauses reflect the requirements of this document. They must work with the CIO in requesting appropriate documentation from contractors related to validating compliance with this document.

2.9 Configuration Control Board (CCB)

The Configuration Control Board reviews, approves/rejects, and prioritizes change requests which deals with IT System changes. A CCB must exist for each IT program or project.

2.10 Authorizing Official (AO) (Associate Directors, Heads of Offices and Senior Executives)

The following role definition for Authorizing Official is from the Information Security and Privacy Policy which can found by following the link in [Appendix C](#).

The Authorizing Official is an executive with the authority to formally assume responsibility for operating an information system at an acceptable level of risk to organizational operations and assets, individuals, other organizations, and the Nation. The role of an AO has inherent U.S. Government authority and is assigned to Government personnel only. Only an executive can accept risk. Risk justification must be supported with a compelling business case. With the increasing complexity of missions/business processes, partnership arrangements, and the use of external/shared services, it is possible that a particular information system may involve multiple AOs. The AO shall:

- Have budgetary oversight for an information system or be responsible for the mission and/or business operations supported by the system;
- Be accountable for the security risks associated with information system operations;
- Review Security Assessment and Authorization documentation and discuss concerns with the Chief Information Security Officer (CISO) as necessary;

- Deny authorization to operate an information system or if the system is operational, halt operations, if unacceptable risks exist;
- Coordinate their activities with the CISO, System Owner (SO), Information System Security Officers (ISSO), Security Control Assessors, and other interested parties during the security authorization process;
- Establish agreements among AOs, if multiple AOs, and document in the SSP; and
- Be responsible for ensuring all activities and functions delegated to an Authorizing Official Designated Representatives are carried out. The AO is responsible for determining that the system meets appropriate security requirements and formally approves the system for operation.

2.11 Executive Sponsor

The Executive Sponsor is a senior business executive who provides approval, guidance and support for new information system initiatives.

2.12 Chief Architect

The OPM Chief Architect functions as the chief IT architect for all IT initiatives in OPM. The Chief Architect guides the evolution of the OPM enterprise architecture. The Chief Architect maintains the architecture vision, technical standards and implementation plan. The Chief Architect reviews a project's IT architecture to ensure it aligns with the OPM enterprise architecture.

2.13 Customer (User)

The customer is a designated user representative from the investment or program office who supports the Business Program Manager, Business Project Manager and Technical Project Manager to help define requirements, resolve issues, and test IT user requirements for the Technical Project team. There can be many customers who support the system development, enhancement or maintenance process.

For the OPM SDLC, a reference to "user" is synonymous with customer.

2.14 Configuration Management (CM) Team

The CM Team is responsible for adhering to any CIO CM standards or establishing new CM processes (if none exist). The CM Team maintains the integrity of configuration items throughout a system's life cycle. The CM Team can exist at the system, project or program office level within OPM.

2.15 Configuration Management (CM) Practitioner

The CM Practitioner participates in a CM Team and performs the work required to control versions of deliverables such as releases (e.g., system, hardware, etc.), documentation, program artifacts and project artifacts.

2.16 Operations Team/Network Management Team

The Operations Team/Network Management Team is responsible for operations and performance of all network systems (internal and external) related to program or project operations. However, there are certain systems which are outside of Network Management's control and authority.

2.17 Integrated Project Team (IPT)

OMB Circular A-11 states: *“An Integrated Project Team is a multidisciplinary team led by the program manager to manage the acquisition process. Team members may change somewhat for different phases of the project, but members must represent those who have a major interest in the project. Members should be full time or dedicated to the program when needed. Members should include qualified people able to advise the program manager about technical, business, project, schedule, procurement, finance, and other issues, and identify users' concerns about the acquisition.”*

2.18 Requirements Management Team (Requirements Practitioner)

The Requirements Management Team is responsible for the requirements derivation, traceability, and ensuring that business needs are covered completely throughout the system's life cycle.

2.19 Quality Assurance (QA) Team

QA Team reports to the Business Program Manager or Business Project Manager. QA Team is responsible for the formal monitoring of the various work products of the program or project to ensure standards, policies and procedures are being met in addition to monitoring for compliance and effectiveness of the processes being used.

2.20 Software Quality Assurance (SQA) Team

SQA Team reports to the Technical Project Manager. SQA Team is responsible for the formal monitoring of the software products of the program or project to ensure standards, policies and procedures are being met in addition to monitoring for compliance and effectiveness of the processes being used. This team is involved in the technical system development level.

2.21 Technical Advisor (Subject Matter Expert (SME))

Technical Advisor is an IT Specialist engaged to provide technical consultation and support in various IT technical areas of the project to the Business Program Manager or Business Project Manager. If the Program Office provides sufficient funds to the CIO, the CIO can designate dedicated technical advisors to support their specific IT project.

2.22 Security and Privacy Team

The Security and Privacy Team provides the program or project with expertise in computer security, communications security, emissions security, and/or network security and designates a

security officer to ensure security requirements are satisfied. The Security and Privacy Team is an integral part of the development and operational management of any system in order to ensure compliance with Federal Information Security Management Act (FISMA) and National Institute of Standards and Technology (NIST) guidance. Refer to the Information Security and Privacy Policy webpages for the contact information. A link to the webpages is located in [Appendix C](#).

2.23 Designated Security Officers (DSOs)

The following role definition for DSOs is from the Information Security and Privacy Policy which can be found by following the link in [Appendix C](#).

The Designated Security Officer (DSO) is appointed by an OPM Program Office or Department to represent the interests of the program office or department in carrying out the security functions of the organization. The DSO shall:

- Work closely with the CISO, ISSO, and appropriate staff in the program offices to protect information resources from misuse, whether intentional or unintentional. This effort will involve reviewing, evaluating, and recommending appropriate information security and privacy measures along with safeguards;
- Conduct periodic security reviews of system facilities to ensure safeguards are commensurate with the system information being stored, processed, or transmitted;
- Update system security documentation and work with the SO and ISSO to assess the security impact of any information system changes;
- Coordinate with the Software Development Managers and ensure security requirements and issues are addressed consistent with this policy;
- Assist the CISO, Information Systems Security Manager, and ISSO in the identification, implementation, and assessment of common security controls;
- Ensure the implementation of any modifications necessary and correct security control deficiencies found during security assessment testing;
- Advise users of the security features and procedures to be used for information systems;
- Establish access control criteria and administrative procedures consistent with OPM policy;
- Review and approve new user accounts for system and network access after obtaining supervisor or management approval;
- Ensure the development and timely completion of reports to security and privacy including those related to POA&Ms, system inventory, security controls testing and monitoring, contingency plan testing etc.;
- Ensure all actual and suspected security incidents and breaches of PII are reported to the OPM Situation Room (SitRoom);
- Assist in the investigation of actual or suspected security incidents and breaches of PII as appropriate;
- Participate in internal/external reviews, inspections, and audits to ensure compliance with federal laws and OPM policy;
- Coordinate with the CISO to advise contracting officers developing or administering contracts on behalf of OPM regarding the content and implementation of contract clauses related to OPM's information security and privacy policy;

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- Review acquisition documentation to ensure the inclusion of appropriate information security-related clauses, consistent with this policy and the Policy on IT Procurement;
- Develop and maintain (with the assistance of the CISO) an annually verified list of systems requiring security authorization;
- Coordinate the Security Assessment and Authorization process for program office systems (See OPM's Security Assessment and Authorization Procedure for more information.); and
- Attend monthly ITSWG meetings and participate in ITSWG activities.

2.24 System Development Team (Scrum Team)

The System Development Team is responsible for the development or configuration of the technical design of the system and is the author of the work products (e.g., the program code, specification, document, module, screen, component, etc.) actually produced by the program or project in compliance with the system requirements fulfilling the customer needs.

For the Agile (Scrum) methodology, the System Development Team will serve as the Scrum Team. The Scrum Team will ensure that the system development process is followed as detailed in Appendix F "Scrum Process Details".

2.25 System Development Team Lead

The System Development Team Lead is responsible for leading the system development team assigned to perform the specific task of the project.

2.26 Testing Team

The Testing Team is responsible for testing and verifying that the system functions and performs as expected, as defined by the system requirements and design documentation.

2.27 System Owner (Certifying Official)

The OPM Associate Directors, Heads of Offices and Senior Executives for the program offices serves as the System Owners. In addition, the following role definition for System Owner is from the Information Security and Privacy Policy which can found by following the link in [Appendix C](#).

The System Owner is the official responsible for the overall security, procurement, development, integration, modification, or operation and maintenance of an information system. The SO shall:

- Categorize the information system according to the potential impact to OPM of a breach of confidentiality, integrity, or availability;
- Ensure the implementation of the security controls appropriate to the risk rating established through the categorization process for the system;
- Identify and evaluate security risks and vulnerabilities and establish risk mitigation plans;
- Approve System Security Plans (SSPs), and review Memorandums of Agreement or Understanding (MOA/U), and Plans of Action and Milestones (POA&Ms) and determine whether significant changes in the information systems or environments of operation require reauthorization;

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- Ensure the Information Security and Privacy Policy (ISPP) is followed by all users accessing the information system;
- Ensure the management, operational and technical information security controls are implemented and operating as intended for all of their information systems;
- Ensure system users and support personnel receive the requisite security and privacy training;
- Ensure that DSOs are identified and provide security-related support;
- Ensure that program office senior management is aware of the resources required to assess and authorize information systems allowing appropriate work plans and budgets to be developed;
- Ensure appropriate staff (system administrators, technical developers, and other staff) are assigned to coordinate with the DSO in developing Security Assessment and Authorization documentation (See OPM's Security Assessment and Authorization Procedure for more information);
- Provide necessary system-related documentation to the CISO;
- Take appropriate steps to reduce or eliminate system vulnerabilities identified in the Security Assessment and Authorization process;
- Ensure a Privacy Threshold Analysis (PTA) and if applicable, a Privacy Impact Assessment are conducted on all systems before implementation or enhancement, in accordance with OPM's Privacy Impact Assessment Guide;
- Review acquisition documentation to ensure adequate and cost-effective security measures and safeguards are included; and
- Ensure all contracts for IT services, both software and hardware, include clauses incorporating OPM's System Security Plan (SSP) and related references.

2.28 Training Team

The Training Team is responsible for training the users and develops all related training materials as necessary.

2.29 IT Executive Governance Groups

The following are the IT executive governance groups who oversee OPM's use of information technology.

- Investment Review Board (IRB) - For more detail on the roles and responsibilities of the IRB, see the IRB charter located at <http://theo.opm.gov/References/IT/IRB/charter.asp>
- Executive Steering Committee (ESC) - Responsible for providing direct oversight of information technology investments.

2.30 Business Analyst

The Business Analyst provides functional support to the Business Program Manager or Business Project Manager in the area of Business Process Re-engineering (BPR). The business processes must be assessed, evaluated, revised, implemented and verified appropriately in order for the investment to take advantage of the technology solution in an efficient and effective manner.

2.31 Customer Service/Help Desk

The Customer Service/Help Desk (CS/HD) provides support services for both business and

technical issues of an IT project. Issues can range from technical issues such as password resets to business issues such as locating documentation for a software enhancement. The program and project teams must ensure coordination by working with CS/HD to capture specific requirements and touch points regarding the necessary CS/HD involvement for the program and projects.

2.32 Transition Team

A Transition Team may be required if a new IT project is replacing an older IT system. The Transition Team will coordinate the necessary business and technical actions required to ensure that a new IT project is implemented with the least disruption to all customers and capable of being sustained throughout the life cycle.

3. PROJECT INITIATION

This section describes how the program or project's initiation before entering the system development life cycle. Before new system development, maintenance or enhancement begins, the following steps must occur.

3.1 Need Identified

A program or project begins when a need for technology or a solution to a problem is identified. This need can arise from the Business/Functional staff or from the Technical staff. This need may require the development of a new application with new functionality or the purchase/integration of Commercial Off-the-Shelf (COTS) software or Cloud solution; or the need may be satisfied by maintenance/enhancement to an existing system.

3.1.1 New Development or Implementation

When the need is for development of a new application/system, implementation of new COTS product or implementation of a Cloud solution, it must be submitted to the Executive Sponsor, Business Program Manager or Business Project Manager via a recognized communication channel such as email, memorandum or issue tracking software. When a need is new to OPM and there is no assigned Business Program Manager or Business Project Manager, the Executive Sponsor must initially assess the need and determine if it warrants assigning someone the responsibility of being the Business Program Manager or Business Project Manager. The assigned Business Program Manager or Business Project Manager would proceed to Section 3.2 below.

3.1.2 Maintenance or Enhancement

When the need is for maintenance or enhancement requirements to existing systems or Cloud solutions, it must be documented as a Change Request (CR) which is routed to the Business Program Manager or Business Project Manager. The Executive Sponsor had previously authorized the system so review by the Executive Sponsor is not required.

3.2 Executive Sponsor, Business Program Manager, Business Project Manager adopts

the need

The user discusses the need and the rationale for the need with the Executive Sponsor, Business Program Manager or Business Project Manager (in some instances the Business Program Manager or Business Project Manager or user can be the same person).

3.2.1 New Development or Implementation

If the Business Program Manager or Business Project Manager decides the need for the new system development or implementation is worthy of further development, he/she gathers information in preparation for Executive Sponsorship approval.

3.2.2 Maintenance or Enhancement

If the Business Program Manager or Business Project Manager decides the need for the maintenance or enhancement is worthy of further development, he/she gathers information in preparation for Configuration Control Board (CCB) assessment and determination. If the CCB approves the need based on the technical functions requested, the Business Program Manager or Business Project Manager will proceed to Section 3.4 below.

3.3 Executive Sponsorship Approval

The Business Program Manager or Business Project Manager briefs his/her senior management regarding the need. The executive sponsor then approves or disapproves the project for further development and ensures that funding is provided to the Business Program Manager or Business Project Manager.

3.4 Initiate the OPM SDLC

Once the need receives approval for further development, the Business Program Manager or Business Project Manager begins the activities in the OPM SDLC Determine System Need phase. The Business Program Manager or Business Project Manager will determine the Project Documentation Level by selecting the appropriate project categories (i.e., Duration, Risks (High, Medium, Low), etc.). [Appendix E](#) outlines the process to determine the Project Documentation Level.

3.5 Critical Prerequisites to Investment Success

Four factors are critical to successful communication and development within OPM IT system development programs and projects. The Business Program Manager or Business Project Manager for the investment must ensure these factors are satisfied before initiating the OPM SDLC. They include:

3.5.1 Integrated Project Teams (IPTs)

The Business Program Manager or Business Project Manager must ensure that an Integrated Project Team (IPT) is formed and engaged throughout the system development phases. The IPT

facilitates communication and collaboration among all subject matter experts necessary to the success of the investment. At a minimum, the IPT must have representation from the following applicable IT functional areas in the CIO organization:

- IT Security and Privacy
- Accessibility (Section 508)
- Records Management
- Network Management
- Capital Planning and Investment Control.
- SDLC
- Performance Management (i.e., Earned Value Management, etc.)

3.5.2 Central Document Repository

In order to support the OPM SDLC, the Business Program Manager or Business Project Manager must set up a central repository for all documentation, reports and artifacts created for the investment. This central repository must be used as the basis of meeting Configuration Management program or project requirements.

3.5.3 Secured Funding

The Business Program Manager or Business Project Manager must ensure that funding is secured before any technical system development is initiated. This may require that the investment must obtain Capital Investment Committee (CIC) approval for acquisitions over \$250,000.

3.5.4 Familiarization with IT Standards and Federal Laws

There are IT Standards and Federal Laws which the Business Program Manager or Business Project Manager must follow and ensure that their teams adhere to. These IT Standards and Federal Laws include:

- Reporting Standards.
 - Performance reporting is described in the IT Baseline Management Policy. For additional detail information, please contact the EVM PMO Program Manager in the CIO IT Investment Management team. OPM's IT Baseline Management Policy can be found in the OPM reference at [Appendix C.1.1](#).
- Section 508.
 - IT components (hardware, software and services) must be accessible to the disabled community. The OPM Section 508 Policy can be found at: http://theo.opm.gov/policies/IT_policy-accessibility_0104.pdf
- Data Standards.
 - The OPM Enterprise Human Resources Integration (EHRI) and OPM Human Resources Line of Business (HR LOB) investment initiatives have developed data standards for system interfaces which must be used by those IT systems dealing with HR data. The EHRI data standards are located at: <http://www.opm.gov/feddata/guidance.asp>. HR LOB data standards are located

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- at: http://www.opm.gov/egov/documents/architecture/HRLOB_DM.pdf
- In the event that there are additional data standard issues which need to be brought to the attention of EHRI and HR LOB, there is a Data Governance Board which is co-chaired by CIO Records Management and EHRI senior management. Contact the EHRI Program Manager on how to engage the Data Governance Board.
 - System Integration.
 - The Business Program Manager and Business Project Manager must ensure that integration occurs when systems are designed. All hardware and software that are part of the IT solution must work as a cohesive function in meeting the user requirements in accordance with the OPM Enterprise Architecture. Any external system interfaces with other Federal agencies must be managed through a Memorandum of Understanding or Memorandum of Agreement.
 - IT Procurement.
 - Procurement of IT hardware and software must be initiated in the CIO on-line system named IT Procurement Authorization (ITPA). Approved OPM hardware and software that meet OPM Enterprise Architecture standards are stored within ITPA. For hardware and software that are not approved in ITPA, a Business Case Exception request must be submitted to the OPM Helpdesk. The ITPA is accessed by submitting a request to the OPM Helpdesk for sign-in capability to <http://sbm.opm.gov/>.
 - Procurement of IT services must be coordinated with the Office of the CIO through the contract vehicles (e.g., IT Support Services Blanket Purchase Agreements, etc.) that the CIO has implemented with the OPM Contracting Office.
 - IT Security
 - Information security must be integrated into the SDLC at all phases to ensure appropriate protection for the information that the system will transmit, process, and store in compliance with the OPM Information Security and Privacy Policy. Compliance with OPM Information Security and Privacy Policy must be ensured in coordination with the OCIO IT Security Team.

4. OPM SYSTEM DEVELOPMENT LIFE CYCLE (SDLC)

4.1 Introduction

An important objective of the OPM SDLC is to support various types of development within OPM. The OPM SDLC provides the framework needed to accomplish work encompassing new IT system development, implementation of COTS and Cloud solutions, maintenance, and enhancement. The OPM SDLC describes all the phases of system development, process steps in each phase, procedures, product templates and checklists needed to support the system development life cycle. All templates and process documents referenced in this document can be found in the OPM SDLC WebPages (currently in THEO).

After completing the four steps in the previous “Section 3: Project Initiation”, the Business Program Manager or Business Project Manager must initiate the SDLC by documenting the

business need and requirements. The business need documentation will be used by the Technical Project Manager in developing and implementing the IT system.

4.2 SDLC Phases

4.2.1 Overview

The OPM SDLC consists of the following seven phases:

- Determine System Need ([Section 4.2.2](#))
- Define System Requirements ([Section 4.2.3](#))
- Design System Components ([Section 4.2.4](#))
- Build System Components ([Section 4.2.5](#))
- Evaluate System Readiness ([Section 4.2.6](#))
- Deploy the System ([Section 4.2.7](#))
- Decommission the System ([Section 4.2.8](#))

Using the Capability Maturity Model Integration (CMMI) for Development process model as outlined by the Software Engineering Institute (SEI), each phase includes entry and exit criteria, and process steps particular to each phase, and identifies the roles, document templates, procedures, checklists and forms needed for each phase. These phases, combined with the development methodology, define how the project to manage the system development will be structured. The processes and resources within the OPM SDLC should be used for all information systems, systems development, and system maintenance. These phases are applicable across all information technology environments (e.g., enterprise server, distributed, web) and apply to contractually developed and in-house developed applications.

4.2.2 Determine System Needs Phase

4.2.2.1 Purpose

The Determine System Need phase is the period in which an information system need is identified and the decision is made whether to commit the necessary resources to solve the deficiency.

4.2.2.2 Description

The activities of the Determine System Need Phase begin with the identification of an idea or a need. A user or system sponsor may identify the need or it may be the result of a strategic information architecture analysis. For a system which does not currently exist, the need is documented in a Needs Statement (NS) document. For an existing system, the need is documented in a Change Request (CR) document. These documents describe the need and justify the exploration of alternative solutions.

Large-scale development and major system enhancements are described in the Needs Statement by the project sponsoring organization and approved by the Investment Review Board. Smaller development efforts, minor enhancements, or maintenance efforts are described in a CR and approved at the group or division level Configuration Control Board (CCB). After the idea/need has been documented, alternatives for solving the need are identified as necessary. Decisions are made on whether or not to continue development of the need.

Entry Process

After the Customer or Executive Sponsor has identified a need **OR** a CR has been submitted, there are tasks associated with the approval of the need and the documentation of the requirements to meet the needs.

Tasks

The activities are outlined in [Appendix D.1](#)

Exit Criteria

- A CR package has been approved for an existing system
- The Information Technology Investment Analysis Package has been submitted and approved
- Needs Statement and User Requirements Document have been approved and baselined for both new and existing systems
- Approval by the appropriate approvers to proceed to next phase when artifacts support the methodology selected and approvals/directions have been given per the Project Plan and as outlined in [Appendix D.1](#). Approvers must include the Executive Sponsor, CIO, Technical Advisor, Business Program Manager or Business Project Manager as appropriate.

4.2.3 Define System Requirements Phase

4.2.3.1 Purpose

The Define System Requirements Phase is the period in which the User Requirements are broken down into more detailed requirements which can be used during designing and coding.

4.2.3.2 Description

This phase begins formal planning and requirements definition for new projects. The activities of the Define System Requirements Phase include initial project planning activities. System and software requirements are formally defined and delineated in terms of data, system performance, security, and maintainability. All requirements are defined to a level of detail sufficient for systems design to proceed. For applications requiring electronic signatures see the OPM Policy on Electronic Signatures in the OPM THEO webpage as linked in [Appendix C](#). Initial documentation of the Test Plan (Unit & Integration) and the Training Plan begins in this phase and are updated in subsequent phases.

Entry Criteria:

- The program or project has been approved and funded
- Needs Statement and User Requirements Document have been approved and baselined for the new or existing system
- Approval by appropriate approvers to exit the previous phase has been granted

Tasks

The activities are outlined in [Appendix D.2](#)

Exit Criteria

- The Project Plan, Quality Assurance Plan, Configuration Management Plan, Security Impact Analysis and Test Plan (Unit & Integration) have been documented and placed under configuration control
- The System Architecture, Software Requirements Specification, Data Specification, FIPS-199, Privacy Threshold Analysis/Privacy Impact Assessment, Requirements Traceability Matrix and Training Plan have been approved and baselined
- The baselined requirements have been approved as meeting the acceptance criteria for this cycle
- Approval by appropriate approvers to proceed to next phase when artifacts support the methodology selected and approvals/directions have been given per the Project Plan and as outlined in [Appendix D.2](#). Approvers must include the Technical Project Manager, Chief Architect, Business Program Manager or Business Project Manager as appropriate.

A requirements management software tool may be used in the place of a manual matrix. In this case, the tool would need to be updated in place of the manual matrix.

4.2.4 Design System Components Phase

4.2.4.1 Purpose

The objective of the Design System Components Phase is to transform the detailed, defined requirements into complete, detailed specifications for the system to guide the work of the Development Phase. The decisions made in this phase address in detail how the system will meet the defined functional, physical, interface, and data requirements. Design Phase activities may be conducted in an iterative fashion, producing first a general system design that emphasizes the functional features of the system, then a more detailed system design that expands the general design by providing all the technical detail.

4.2.4.2 Description

This procedure defines the steps required to develop the system design. It gives the user details on what activities and steps should occur during this phase, which include developing the Software Design Description, the Database Design Description, Information Systems Security Plan, User Manual, and training materials. It describes the steps required to document and baseline system design.

Entry Criteria:

- The Project Plan, Quality Assurance Plan, Configuration Management Plan, and Test Plan (Unit & Integration) have been documented and placed under Configuration Management (CM) control
- The System Architecture, Software Requirements Specification, Data Specification, Requirements Traceability Matrix, IT Security Planning, and the Training Plan have been approved and baselined
- The baselined requirements have been approved as meeting the acceptance criteria for this cycle
- Approvals by appropriate approvers to exit the previous phase has been granted

Tasks

- The activities are outlined in [Appendix D.3](#).

Exit Criteria:

- The Software Design Description document, Database Design Description document, Information Systems Security Plan, User Manual, Requirements Traceability Matrix, and Training Materials have been approved and baselined
- The Project Plan, Test Plan (Unit & Integration) and Training Plan have been updated. (as required)
- The baselined designs have been approved as meeting the acceptance criteria for this cycle.
- Approvals by appropriate approvers to proceed to next phase when artifacts support the methodology selected and approvals/directions have been given per the Project Plan and as outlined in [Appendix D.3](#). Approvers must include the Technical Project Manager, Business Program Manager or Business Project Manager as appropriate.

A testing support tool may be used in the place of Test Plans (Unit & Integration). In this case, the tool would need to be updated in place of the Test Plans.

4.2.5 Build System Components Phase

4.2.5.1 Purpose

The objective of the Build Phase is to transform the detailed, system design into complete coded software units and eventually, into an integrated product for release. Each software unit and subsequent integrated units are tested thoroughly. System documents that support installation and operations are also developed in this phase.

4.2.5.2 Description

The Version Description Document, Operations Manual, Verification Validation & Test Plan, and the Installation and Conversion Plan are created as a result of this phase. As software source objects and system configuration items are completed, they are placed under configuration control.

Entry Criteria:

- The Software Design Description document, Database Design Description document, Information Systems Security Plan, User Manual, Requirements Traceability Matrix, and Training Materials have been approved and baselined
- The Project Plan, Test Plan (Unit & Integration) and Training Plan have been updated. (as required)
- The baselined designs have been approved as meeting the acceptance criteria for this cycle
- Approvals by appropriate approvers to exit the previous phase has been granted

Tasks:

Follow the activities as detailed in [Appendix D.4](#)

Exit Criteria:

- Unit and integration testing has been conducted and results meet the acceptance criteria
- The Version Description Document, Verification Validation & Testing Plan, Installation & Conversion Plan, Requirements Traceability Matrix and Operations Manual have been approved and baselined
- The Project Plan, Test Plan (Unit & Integration), Training Plan and Training Materials have been updated (as required)
- Approvals by appropriate approvers to proceed to next phase when artifacts support the methodology selected and approvals/directions have been given per the Project Plan and as outlined in [Appendix D.4](#). Approvers must include the Technical Project Manager, Business Program Manager or Business Project Manager as appropriate.

4.2.6 Evaluate System Readiness Phase

4.2.6.1 Purpose

This objective of the Evaluate Phase is to ensure that the system as designed and built satisfies the requirements of the user. Whenever possible, independent testers measure the system's ability to perform the functions that are required by the customer and ensure an acceptable level of quality and performance. Once the phase is complete, it will be evident whether or not the system is ready for operation. This function shall be the responsibility of the system testers and will be heavily supported by the user participants.

4.2.6.2 Description

The Verification, Validation & Testing Plan, Test Results & Evaluation Report, Installation & Conversion Plan, User Manual, and Training Materials are updated, tested (if applicable), and finalized in this phase. The Systems Assessment and Authorization package is created in this phase. As work products are created they are placed under configuration control.

Entry Criteria:

- Unit and integration (including regression) testing has been conducted and results meet the acceptance criteria
- The Verification, Validation, & Testing Plan, Installation & Conversion Plan, Requirements Traceability Matrix, and Operations Manual have been approved and baselined
- The Project Plan, Test Plan (Unit & Integration), Training Plan, and Training Materials have been updated. (as required)
- Technical Project Manager approval with Business Program Manager or Business Project Manager concurrent approval to exit the previous phase has been granted

Tasks:

Follow the activities as detailed in [Appendix D.5](#)

Exit Criteria:

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- The System Assessment and Authorization has been approved by the Authorizing Official
- The Customer, Business Program Manager or Business Project Manager and IT Project Manager has approved the baselined testing results as meeting the acceptance criteria for this cycle
- Business Program Manager or Business Project Manager, IT Project Manager, Software Quality Assurance and the Customer have approved the Test Results and Evaluation Report, Version Description Document, Installation & Conversion Plan, User Manual, updated Requirements Traceability Matrix, and the applicable Training Materials
- The Project Plan has been updated to reflect activities of this phase and has been placed under CM control
- The Phase Exit Review meeting has occurred and Technical Project Manager approval along with IPT members, Business Program Manager or Business Project Manager concurrent approval to proceed to the next phase has been granted as outlined in [Appendix D.5](#).

4.2.7 Deploy the System Phase

4.2.7.1 Purpose

Deploy the System Phase is the final phase of the development life cycle, when the system is released initially to a pilot site and then into the production environment. All necessary training for using the system is accomplished.

4.2.7.2 Description

This phase is to install the system in a production environment for use by the intended user. The production environment is prepared for system installation, which includes the physical environment as well as hardware and software components. Once the system is installed, a thorough test of the system installation is conducted. User training is also conducted to prepare the user for new system functionality or system changes. The Business Program Manager or Business Project Manager and Technical Project Manager verify that the installed system meets all requirements, all specifications and all deliverables have been received.

Entry Criteria:

- Test Results & Evaluation Report, and Requirements Traceability Matrix have been approved and baselined
- System Assessment and Authorization have been approved and baselined
- The Project Plan, Test Plan (Unit & Integration), Training Plan, Training Materials, User Manual, Installation & Conversion Plan, Operations Manual, Version Description Document have been updated (as required)
- Established Service Level Agreements (SLA) or Operating Level Agreements (OLA) for the project have been signed by all parties and ready for implementation
- Technical Project Manager approval along with IPT members, Business Program Manager or Business Project Manager concurrent approval to exit the previous phase and deploy the system has been granted.

Tasks:

Follow the activities as detailed in [Appendix D.6](#)

Exit Criteria:

- System has been installed and is operational
- System Sign-off Package has been approved by Technical Project Manager approval along with Business Program Manager or Business Project Manager concurrent approval
- Project Plan has been updated. (as required)

4.2.8 Decommission the System Phase

4.2.8.1 Purpose

The Decommissioning a System phase is the period in which a system is completely taken off line, or a portion of a system's functionality (due to duplication in another system) is removed. This phase is conducted to retire a system.

4.2.8.2 Description

Once the decision to decommission a system has been made, the activities of the Decommissioning a System Phase begin with the completion of the decommission form. This form documents the information and coordination necessary to end the target systems life cycle. The system is decommissioned following the steps in the Decommissioning procedure. Systems that have interfaces to the targeted system are checked to verify the decommissioning does not adversely affect them. As a result of the system being decommissioned, affected business processes and policies are updated. Once the system has been decommissioned, a formal system close out meeting is conducted.

Entry Criteria:

- User/Executive Sponsor has identified a need **OR** a CR has been submitted
- Business Program Manager or Business Project Manager approval as well as CIO approval to decommission a system

Tasks:

Follow the activities as detailed in [Appendix D.7](#)

Exit Criteria:

- A system, or part of a system, is decommissioned.
- System components and artifacts have been archived or disposed of.
- Completed Decommission Form with input and approval from the IT Security Team and approved by CIO and Business Program Manager or Business Project Manager.
- Affected/interfacing systems continue to operate.
- Meeting Minutes which document that all parties are aware of decommission requirements.

5. METHODOLOGIES

A process model covers the whole life cycle and defines each phase as described in Section 4 above. It also defines the tasks and activities to be performed within that phase. There are several systems development life cycle methodologies. This section provides an overview of the methodologies that are commonly used within OPM. The Technical Project Manager should select a system life cycle methodology based on the nature of the program and application, the methods and tools to be used, and the required controls and deliverables. The Technical Project Manager integrates the selected life cycle methodology with the phases of the OPM SDLC in developing the project's schedule.

5.1 Waterfall

5.1.1 Overview

The waterfall (or "grand design") model is a program strategy which is a "once-through, do-each-step once" strategy. In waterfall, each process as described in Section 4.2 above is performed in sequence, and each process is completed before proceeding to the next process in the sequence. For example, requirements are not documented until the need is approved. Likewise, software build (construction) does not begin until the analysis and design are complete.

5.1.2 Strengths

- Waterfall provides a structured, disciplined method for system development, and can be useful for maintenance projects, and small, new projects with clearly defined and understood requirements.
- Waterfall methodology is well-suited to systems of record where the current process (or lack thereof) can proceed until delivery without negative impact to the organization.

5.1.3 Weaknesses

- Waterfall can prove to be a risky and inflexible strategy. With only a single pass through the process, integration problems often surface too late in development, and a completed product is not available until the very end of the process.
- The long period between project start and product delivery can discourage customer involvement and lead to a system which does not meet changing customer requirements.

5.2 Incremental

5.2.1 Overview

The incremental model of systems development performs the waterfall approach in overlapping phases attempting to compensate for the length of waterfall model projects by producing usable functionality earlier. For those projects whose expertise lies with the waterfall model and may not be able to secure the services of certified Scrum Masters, the incremental methodology is an acceptable solution in lieu of the Agile (Scrum) methodology.

The incremental model of systems development involves sets of requirements that are implemented in a series of small subprojects which follow the seven SDLC phases. A project using the incremental model may start with general objectives. Then some portion of these

objectives is defined as requirements and is implemented as a subproject, followed by the next portion of the objectives until all objectives are implemented within all subprojects.

Incremental model follows the same phases as the OPM SDLC within each small subproject using the entry, activities and exit criteria.

5.2.2 Strengths

- Orderliness appeals to management
- Facilitates allocation of resources
- Early functionality
- Does not require a complete set of requirements at the onset
- Can size the increments based on available resources
- Well-suited to systems of record where the current process (or lack thereof) no longer meets the organization's needs and must be replaced more rapidly than a big-bang delivery would allow

5.2.3 Weaknesses

- Beginning with less defined general objectives may be uncomfortable for project team members
- Requires clean interfaces between modules
- Tendency for difficult problems to be pushed to the future so that the initial promise of the first increment is not met by subsequent products

5.3 Agile (Scrum)

5.3.1 Overview

Agile system development for OPM must adhere to the *Manifesto for Agile Development* (Beck, 2001) which is characterized by the following in the publication:

- *Direct involvement of the customer in product development*
- *Use of multiple development iterations to learn about and evolve the product*
- *Customer willingness to share in the responsibility for decisions and risk*

Agile system development methodologies meet the above by the implementation of a number of phases that are repeated in cycles, with a feedback loop after each cycle is completed. The project team learns from the preceding cycles and plans the next cycle in an attempt to converge on an acceptable solution. At the discretion of the customer, the project team may release a partial solution. The characteristics of Agile development include:

- Iterative structure - structured around iterations that are designed to find and complete the solution
- Just-in-time planning - highest priority features are planned first and executed upon. Planning is finely detailed for immediate features, coarsely detailed for features to be developed later.
- Critical mission projects - Certain projects are considered high risk because of the complexity and uncertainty associated with the project. With that high risk comes high

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business value. They are undertaken because their successful completion is critical to the enterprise.

- Thrives on change through learning and discovery - The learning and discovery can come about only with the customer being heavily involved in the project.

Some of the best practices within the Agile methodology are:

- Teams should be co-located, long-lasting, and persistent
- Do not transition knowledge support of a product to another team
- Start staffing project teams with a focus on resource versatility so that the starting core can do multiple tasks while experts are on-board

Scrum is one of the current popular Agile system development methodologies. The Scrum software development team is self-directed, operates in successive iterations (typically 2 to 3 weeks as indicated by best practices), holds daily team standup meetings of no longer than 15 minutes, continuously offers the customer demos of the current solution, and adapts its development plan at the end of each iteration.

It is the Product Owner who defines the functions and features that the team prioritizes into phases and builds a phase at a time in iterative cycles. The process allows the customer to change functions and features as more of the solution depth is uncovered through the previous iterations.

A diagram of the Scrum life cycle (Figure 1) is presented below:

The Scrum Lifecycle

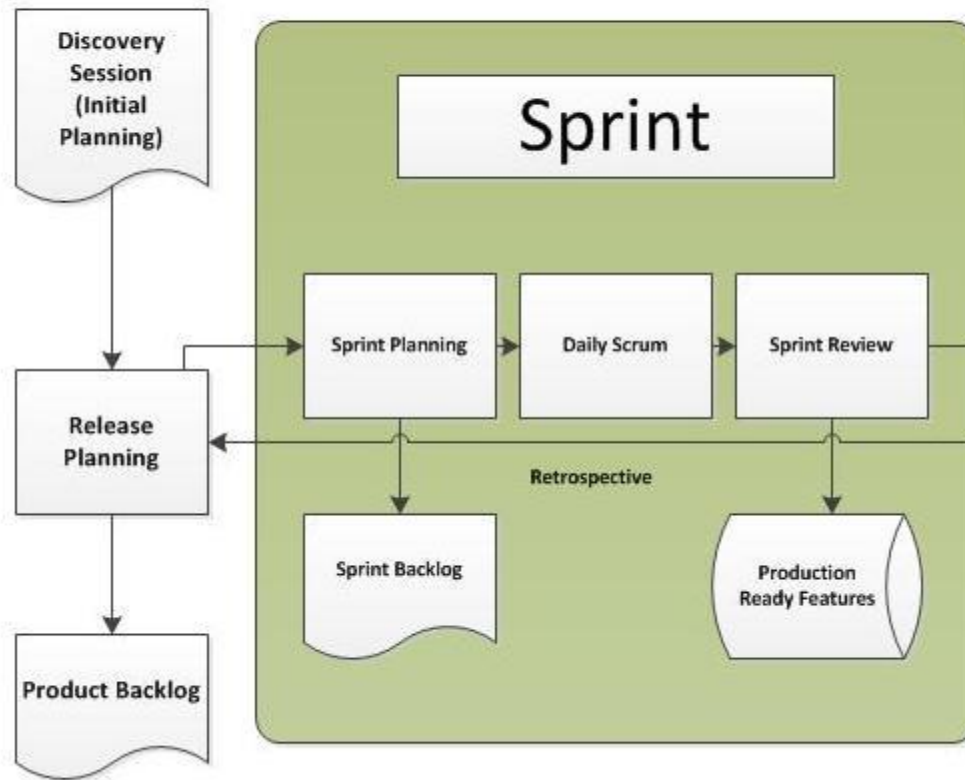


Figure 1: The Scrum Lifecycle

The Scrum Lifecycle diagram illustrates a general overview of the Scrum process. Scrum uses the sprint as the basic unit of development. Each specific function or task is defined within the sprint and can take no longer than six weeks for development as well as are "timeboxed" (i.e. restricted to a specific duration). Each sprint is preceded by planning meetings, where the tasks for the sprints are identified and an estimated commitment for the sprint goal is made. Scrum reviews are conducted where the progress is reviewed and lessons for the next sprint are identified. During each sprint, the team creates finished portions of a task or product. These finished portions must be formally accepted and approved by the Product Owner and Scrum Master using the appropriate SDLC Phase Exit Review procedures and documentation (defined in Section 4.2 "SDLC Phases" above) before additional sprints are initiated or planned. The functionality or tasks that go into a sprint is pulled from a product backlog, which is a prioritized list of requirements, and is determined by sprint planning meetings.

For a more detailed overview of Scrum, the Scrum Process Details can be found in [Appendix F](#) of this document.

5.3.2 Strengths:

- Avoids all management issues in processing scope change requests
- Does not waste time planning uncertainty
- Provides maximum business value within the given time and cost constraints
- Delivers finished, tested, usable code with each iteration
- Provides flexibility and quick feedback which is used to plan the next iteration
- Well-suited to systems of differentiation and innovation so that stakeholders can see a resolving picture of unfamiliar technology/processes
- Utilizes the Rolling Wave planning method which embraces the Lean ideal of making decisions at the last responsible moment, when the possible information is available, and maximizes flexibility and planning accuracy
- Uses empirical methods to monitor progress and direct change, rather than use of definitive methods (i.e. Waterfall) to try to predict progress and stop change
- Assists in:
 - Strategic Planning (Strategic Product line goals)
 - Product Planning (Strategic product goals)
 - Lean/Six Sigma (Specific problems to solve)
 - Release Planning (Large functional goals)
 - Sprint Planning (Small, well-defined work items)
 - Daily Scrum (Tactical organization & execution)

5.3.3 Weaknesses:

- High reliance on meaningful daily customer involvement leads to higher levels of risk
- Cannot identify precisely what will be delivered at the end of the project since requirements may change
- Changes in scope results in rework through multiple iterations which can increase cost

6. PROJECT MANAGEMENT FRAMEWORK

Project management is the application of knowledge, skills, and techniques to project activities in order to meet or exceed stakeholder needs and expectations from a project. Meeting or exceeding stakeholder needs and expectations invariably involves balancing competing demands among:

- Scope, time, cost and quality
- Stakeholders with differing needs and expectations
- Identified requirements (needs) and unidentified requirements (expectations)

The Business Program Manager, Business Project Manager, Technical Project Manager and the Project Teams must follow project management best practices during the SDLC implementation. The Project Management Institute (PMI) is a world-wide organization which has been

recognized as the expert in project management standards. PMI has defined the standards in their publication called the Project Management Book of Knowledge (PMBOK). The PMBOK uses the following 5 process areas with the appropriate procedures:

1. Project Initiation
 - a. Collect historical information
 - b. Determine Project objectives
 - c. Determine high-level deliverables, estimates
 - d. Determine high-level constraints and assumptions
 - e. Determine business need
 - f. Develop product description
 - g. Define Project Manager responsibilities
 - h. Determine high-level resource requirements
 - i. Finalize Project Charter

2. Project Planning
 - a. Create scope statement
 - b. Determine Integrated Project Team (IPT)
 - c. Create Work Breakdown Structure (WBS)
 - d. Finalize the IPT
 - e. Create WBS Dictionary
 - f. Create network diagram
 - g. Estimate time and cost
 - h. Determine critical path
 - i. Create risk management plan
 - j. Develop schedule
 - k. Develop budget
 - l. Determine communication requirements
 - m. Determine quality standards
 - n. Risk identification, qualification, quantification and response planning
 - o. Iterations — go back
 - p. Create other management plans
 - i. Scope
 - ii. Schedule
 - iii. Cost
 - iv. Quality
 - v. Staffing
 - vi. Communications
 - vii. Acquisition
 - q. Create project control system
 - r. Final project plan development
 - s. Gain formal project plan approval
 - t. Conduct Project Kickoff meeting

3. Project Execution
 - a. Execute project plan
 - b. Manage project progress
 - c. Complete Work Packages

- d. Distribute information
 - e. Quality Assurance
 - f. Team Development
 - g. Progress Meetings
 - h. Identify Changes
 - i. Work Authorization
 - j. Manage by Exception to Project Plan
4. Project Control
- a. Integrated change control
 - b. Project performance measurement
 - c. Performance reporting
 - d. Scope change control
 - e. Quality control
 - f. Risk monitoring and control
 - g. Schedule control
 - h. Cost control
 - i. Scope verification
 - j. Compliance with all plans
 - k. Project Plan updates
 - l. Corrective Action
5. Project Closing
- a. Acquisition audits
 - b. Product verification
 - c. Financial closure
 - d. Lesson learned
 - e. Project performance reporting closure
 - f. Formal acceptance
 - g. Project archive (includes contract close-outs)

For more detail information in regards to the above processes and procedures, the IT project team should consult or procure a copy of the PMBOK from the PMI.

In addition to the PMI, the Federal Acquisition Institute (FAI) has developed a Program Management and Project Management certification program for Federal Program and Project Managers. FAI established the necessary competencies, training, and experience requirements for program and project managers in civilian agencies to become certified to manage the acquisition-related aspects of projects. Information about the certification program can be viewed on the FAI website at <http://www.fai.gov/certification/management.asp>.

6.1 OPM SDLC and Project Management

The OPM SDLC and Project Management best practices are interwoven within the IT solution implementation. One cannot exist without the other when IT projects are planned, developed, tested and implemented. For each of the SDLC phases, the Business Program Manager and Business Project Manager must ensure that the appropriate Project Management process is adhered to as follows:

- Project Initiation process must be part of the Determine System Need phase;
- Project Planning process must be part of the Determine System Need, Define System Requirements and Design System Components phases;
- Project Execution must be part of the Design System Requirements and Build System Components phases;
- Project Control must be part of the Evaluate System Readiness phase;
- Project Closing must be part of the Deploy the System and Decommission the System phase.

7. CONFIGURATION MANAGEMENT FRAMEWORK

Configuration Management is the discipline of identifying the configuration of a system at discrete points in time for the purpose of systematically controlling changes to the configuration throughout the system life cycle. The components of configuration management are:

- Section 7.1: Software Configuration Identification
- Section 7.2: Configuration Control
- Section 7.3: Baseline Management
- Section 7.4: Configuration Status Accounting
- Section 7.5: Configuration Auditing

7.1 Software Configuration Identification

Configuration identification involves the effective management of the development of the system by careful definition of its baseline components. Changes to these components are also defined since these changes, together with the baselines, specify the system evolution. Configuration identification also involves identifying what information has been approved for concurrent use in the project, who owns the information, how the information was approved for CM control, and the latest approved release. At a minimum, the following shall be selected as Configuration Items (CIs):

- The system itself, defined as the top-level CI.
- All Commercial Off-the-Shelf (COTS) software and hardware needed for the system (or application) to function or required for procurement.
- Application software components already designated as CIs.
- Project support software essential for system maintenance, including debuggers, test scripts, and configuration checkers.

7.2 Configuration Control

Configuration control involves the process and procedures for designating the level of control through which each work product must pass; identifying the persons or groups with authority to authorize changes and to make changes at each level; and the steps to be followed to obtain required authorization for changes, to process change requests, to track changes, to distribute changes, and to maintain past versions. Configuration control is initiated after the Functional Baseline (FBL) is established and extends to include the Allocated Baseline (ABL) and Product Baseline (PBL). Change control provides the mechanism to build software systems for tests that

have a known configuration and can be exactly reproduced.

7.3 Baseline Management

Once a baseline (made up of baselined documentation) has been established, it should not be changed without a formal action. The typical baselines used for information systems are the FBL, ABL, and PBL. Baselines are normally established successively with each one adding more detail about the final system. Each project Configuration Management Plan (CMP) must list all required contents of each baseline.

- Functional Baseline - The FBL is the approved documentation that describes the system (or product) functional characteristics. After approval of the User Requirements Document during the Define System Needs phase, the FBL is established. This baseline should be maintained throughout the life cycle of the project.
- Allocated Baseline - The ABL is the approved documentation that describes the design of the functional and interface characteristics that are allocated from a higher level CI. All fielded systems shall have an ABL to support test, training, and maintenance. This baseline shall be maintained throughout the life cycle of the project, usually by the organization responsible for maintaining the functional products.
- Product Baseline - The PBL consists of completed and accepted system components and the corresponding documentation that identifies these products. This baseline supports the ability to accurately duplicate software, purchase COTS, and modify COTS. The PBL includes source code on electronic media, COTS (hardware and software), maintenance and user manuals, vendor-supplied COTS manuals, purchase specifications for modified COTS, system and hardware drawings, Version Description Documents, and code listings. This baseline should be maintained throughout the life cycle of the project.

7.4 Configuration Status Accounting

Configuration Status Accounting (CSA) records, stores, maintains, correlates, and reports the status of an evolving CI throughout the system life cycle. CSA requires that all software and related documentation be carefully tracked from initial development, through the approval or disapproval of changes, to the implementation of changes. CSA records and monitors all changes to baselines. As a result of this effort, CSA will maintain traceability of the hierarchy of requirements from the stated user need at the top, through the functional and allocated baseline documentation, and down to the lowest level of the product baseline. The information required for comprehensive CSA includes:

- Baseline name, version, and designation
- Date and time at which the baseline was established
- Date and time when each CI and change was included in the baseline
- Description of each CI
- Status of each change request
- Description of each change.

7.5 Configuration Auditing

Configuration Auditing is a formal review of a project for the purpose of assessing compliance with the CM plan. The purpose of Configuration Audits is to ensure that the functional requirements have been met by the delivered CI and to ensure that all physical attributes listed in the design requirements have been met by the CI to be delivered. Configuration audits shall be performed for application software, COTS products, and customized products that satisfy a functional requirement. The configuration audit is the responsibility of the system tester and the project configuration manager.

All project and contractor personnel who are developing, acquiring, disposing, operating, or maintaining project systems should use documented configuration management methodology to ensure that system requirements are clearly defined and controlled throughout the life of the system and that the operational system satisfies the needs of the project. To accomplish these tasks, the following should be accomplished:

- A project CMP must be developed as required in the Define System Requirements Phase ([Section 4.2.3.2](#)) using the OPM CMP framework if available.
- Configuration baselines must be established, documented and controlled using a formal change control processes.
- Fielded systems must be documented and software releases and system upgrades documented and controlled using a formal process.

8. QUALITY ASSURANCE FRAMEWORK

Project Quality Assurance Management includes the processes required to ensure that the project will satisfy the needs for which it was undertaken. It includes all activities of the overall management function that determine the quality policy, objectives, and responsibilities and implements them by means such as quality planning, quality control, quality assurance, and quality improvement, within the quality system.

To be unbiased, quality assurance needs to have organizational freedom and authority from persons directly responsible for developing the software product or executing the process in the project. A quality product or service, by definition, meets or exceeds the need to which the product or service is applied. This process consists of four activities:

- Section 8.1: Process Implementation
- Section 8.2: Product Assurance
- Section 8.3: Process Assurance
- Section 8.4: Assurance of Quality Systems

8.1 Process Implementation

The quality assurance process should be responsible for conducting ongoing evaluations of software acquisition/initiation, design, development, evaluate, deploy, and supporting process activities and the resulting software products to assure that each process, activity, and task required or described in plans is being performed in accordance with those plans. It also assures that each software product required by a relevant process exists and has undergone software

product evaluations, testing, and problem resolution, as required. A plan for conducting the quality assurance process activities and tasks is developed, documented, implemented, and maintained for the life of the project.

8.2 Product Assurance

Product assurance ensures that all the plans required are documented, comply with requirements, are mutually consistent, and are being executed as required. All software products and related documentation should adhere to the plans. Software products that have fully satisfied contractual requirements may be assumed to be acceptable to the user. The quality assurance process is performed to assure that all products exist, have undergone evaluations in accordance with the plans for conducting quality assurance activities and tasks, and satisfy the acceptance criteria. The results of verification, validation, and other processes to satisfy product assurance tasks may be used.

8.3 Process Assurance

Process assurance ensures that those software life cycle processes (requirements, design, build, evaluate, deploy, and supporting processes, including quality assurance) employed for the project adheres to the plans. Internal software engineering practices, development environment, test environment and libraries must comply with the requirements. The user needs the required support and cooperation to carry out these processes. This means that the staff assigned to the project has the skill and knowledge needed to meet the requirements and receive any necessary training.

8.4 Assurance of Quality Systems

A quality product or service, by definition, meets or exceeds the need to which the product or service is applied. With this as a framework, a few significant characteristics of a quality product or service are:

- Meets the user's need
- Meets the user's requirements
- Meets the user's expectations
- Allows the user to accomplish a task to which the product or service applies
- Is available to the user when the task to which the produce or services applies is accomplished
- For a continuing product or service, uniformly and consistently meeting the user's need, requirement, and/or expectation allows the user to "trust" the continued use of the product or service
- Meets the user's affordability or other constraints

In summary, a quality product or service meets expectations and is useful, available, consistent, and affordable when applied to a task.

9. RECORDS MANAGEMENT FRAMEWORK

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The Records Management Profile recommends that agencies embed records management requirements in the earliest stages of their SDLC. The Profile can be found by referring to Federal Enterprise Records Management Profile, Sections 4.1.1 through 4.1.6; <http://www.archives.gov/records-mgmt/policy/rm-profile.html>.

The document on the following page is a checklist to assist OPM program and project managers integrate records management requirements into their IT system SDLC process. The checklist identifies where in the SDLC process the records management review and approval should take place to ensure that sound records management practices are incorporated into the development of the proposed IT system.

The checklist provides two to six basic questions about records management and recordkeeping for each phase of the OPM SDLC life cycle process. The checklist questions are intended to begin a more detailed discussion with agency records managers, IT and Capital Planning and Investment Control (CPIC) staff, and program managers and staffs that will help identify recordkeeping requirements in each phase, with a great emphasis on identifying records management requirements at the earliest stages of project planning, initiation and requirements gathering.

The checklist is intended to become a part of the IT system documentation and will be used throughout the system life cycle. Please use the comments field for any additional information.

Records Management Checklist

IT System: (Name of IT System)

OPM DIVISION: (Name of Division)

IT System Owner: (Name of IT System Owner)

All electronic records should be managed following the National Archives regulations, NARA Records Management Guidance and Regulations, subchapter B, Record Management, Part 1234 at <http://www.archives.gov/about/regulations/part-1234.html>.

<i>Phase 1: Determine System Need</i>	Requirement Met? Indicate FM = Fully Met PM = Partially Met NM = Not Met	Comments	CIO Records Management Approval
1) Is the OPM Records Officer included from the beginning in the system design process?			

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2) Are records identified that support the business process?			
3) a. Do current record schedules apply to the new system? b. Is a new record schedule required because of changes in the records?			
4) Have you notified your division Records Coordinator and the OPM Records Officer, that this system should be included as an update to the division file plan?			
5) Has the appropriate contract language been inserted into all active contracts and reviewed by the Records Officer? (see http://www.archives.gov/records-mgmt/handbook/records-mgmt-language.html)			
<i>Phase 2: Define System Requirements</i>	Requirement Met? Indicate FM = Fully Met PM = Partially Met NM = Not Met)	Comments	CIO Records Management Approval
6) Are all records-related requirements identified and incorporated into the final CONOPS Report or Business Requirements Document?			
7) Are new records schedules being drafted, if needed?			
8) Has the agency Records Officer reviewed the requirements document?			
<i>Phase 3: Design System Components</i>	Requirement Met? Indicate FM = Fully Met PM = Partially Met NM = Not Met)	Comments	CIO Records Management Approval

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9) Are all records management requirements incorporated into the system design document?			
10) Has the Records Officer reviewed the system design document?			
<i>Phase 4: Build System Components</i>	Requirement Met? Indicate FM = Fully Met PM = Partially Met NM = Not Met)	Comments	CIO Records Management Approval
11) Is the OPM records management staff included in project status meetings as needed?			
12) Are proposed records schedules submitted to the National Archives and Records Administration (NARA)?			
<i>Phase 5: Evaluate System Readiness</i>	Requirement Met? Indicate FM = Fully Met PM = Partially Met NM = Not Met)	Comments	CIO Records Management Approval
13) Are records management requirements incorporated into the system?			
14) Has the agency Records Officer reviewed any Test Reports to validate the records requirement incorporation?			
<i>Phase 6: Deploy The System</i>	Requirement Met? Indicate FM = Fully Met PM = Partially Met NM = Not Met)	Comments	CIO Records Management Approval

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15) Is the agency records management staff included in project status meetings as needed?			
16) Has the OPM Records Officer been notified and granted approval of deployment of the system?			
17) Is the Mid-Cycle Review complete? (Review to occur 3 years after going to production to validate records management requirements and records schedules.)			
18) Are disposition authorities being implemented in accordance with appropriate dispositions?			
19) Has the Mid-Cycle Review report been sent to the OPM records management staff for review?			
20) Is the OPM Records Officer approval on the Mid-Cycle Review certification document?			
<p><i>Phase 7: Decommission The System</i></p> <p>Please reference NARA Code of Federal Regulations - 36 CFR 1236.1 found at http://www.archives.gov/about/regulations/part-1236.html#1236.14</p>	<p>Requirement Met? Indicate FM = Fully Met PM = Partially Met NM = Not Met)</p>	Comments	CIO Records Management Approval
21) At the time of retirement or rollover of the system, are records preserved, retained, and fully accessible for the full retentions in accordance with appropriate dispositions?			
22) At the time of retirement or rollover of the system, are temporary records destroyed in accordance with appropriate dispositions?			

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23) At the time of retirement or rollover of the system, are permanent records transferred to NARA in accordance with the appropriate dispositions?			
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APPENDIX A: ACRONYMS

Description: The following acronym list was created based on the acronyms found within the OPM SDLC.

Group	Acronym	Description
A	ABL	Allocated Baseline
	AO	Authorizing Official
C	CASE	Computer Aided Software Engineering
	CBA	Cost/Benefit Analysis
	CBT	Computer-Based Training
	CCB	Configuration Control Board
	CFO	Chief Financial Officer
	CI	Configuration Item
	CIO	Chief Information Officer
	CM	Configuration Management
	CMMI	Capability Maturity Model Integration
	CMP	Configuration Management Plan
	CO	Contracting Officer
	COTS	Commercial Off-the-Shelf
	CPIC	Capital Planning and Investment Control
	CPU	Central Processing Unit
	CR	Change Request
CSA	Configuration Status Accounting	
D	DBDD	Database Design Description
	DBMS	Database Management System
	DOC	Document
	DS	Data Specification
	DR	Discrepancy Report
E	EA	Enterprise Architecture
	ESC	Executive Steering Committee
F	FAI	Federal Acquisition Institute
	FBL	Functional Baseline
	FRD	Functional Requirements Document
	FS	Feasibility Study
G	GAO	Government Accountability Office
H	HDW	Hardware
I	IAW	In Accordance With
	ICP	Installation and Conversion Plan
	ID	Identification (never “id”)
	i.e.,	id est (Latin “that is”)
	IPT	Integrated Project Team

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Group	Acronym	Description
	IRB	Investment Review Board
	IS	Information System
	IT	Information Technology
	ITIAP	Information Technology Investment Analysis Package
J	JCL	Job Control Language
L	LAN	Local Area Network
	LOE	Level of Effort
N	NS	Needs Statement
O	OCIO	Office of Chief Information Officer
	OM	Operations Manual
	OMB	Office of Management and Budget
	OPM	U.S. Office of Personnel Management
P	PB	Product Backlog
	PBL	Product Baseline
	PLN	Plan
	PM	Project Manager
	PMBOK	Project Management Body of Knowledge
	PMI	Project Management Institute
	POC	Point of Contact
	PP	Project Plan
Q	QA	Quality Assurance
	QAP	Quality Assurance Plan
R	REF	Reference
	RFC	Request for Change
	RM	Requirements Management
	ROM	Rough Order of Magnitude
	RPT	Report
	RTM	Requirements Traceability Matrix
S	SA&A	Security Assessment and Authorization
	SDD	System Design Document
	SEI	Software Engineering Institute
	SFW	Software
	SME	Subject Matter Expert
	SPC	Specification
	SQA	Software Quality Assurance
	SRS	Software Requirements Specification
	SSP	System Security Plan
	STD	Standard
T	TMP	Templates
	TP	Test Plan
	TRM	Technical Reference Model
	TST	Test Scripts
U	URD	User Requirements Document
V	VDD	Version Description Document

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Group	Acronym	Description
	VV&T	Verification, Validation & Testing
W	WBS	Work Breakdown Structure

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APPENDIX B: GLOSSARY

Word/Term	Definition
Acceptance Testing	The final stage in the testing process before the system is commissioned for operational use
Agile	SDLC methodology which implements of a number of phases that are repeated in cycles, with a feedback loop after each cycle is completed. Agile is characterized by: <ul style="list-style-type: none"> • Direct involvement of the customer in product development • Use of multiple development iterations to learn about and evolve the product • Customer willingness to share in the responsibility for decisions and risk
Application	A system providing a set of services to solve some specific user problem.
Approval	Written notification by an authorized representative of the acquirer that the developer's plans, design, or other aspects of the project appear to be sound and can be used as the basis for further work. Such approval does not shift responsibility from the developer to meet contractual requirements.
Architecture	The structure of a computer system, either a part or the entire system; can be hardware, software, or network
Audit	An independent examination of a work product to assess compliance with specifications, standards, quality or security requirements, contractual agreements, or other predetermined criteria
Automated Data Processing	The processing of information by means of a computer.
Availability	The degree to which a system (or system component) is operational and accessible when required for use
Backup	Verb. To copy software files onto a different media that can be sorted separately from the original files and used to restore the original files, if needed. The act of creating these files. Noun. The set of copied files
Baseline	A work product (such as software or documentation) that has been formally reviewed, approved, and delivered and can only be changed through formal change control procedures
Baseline Management	The processes for establishing cost and schedule and business-related performance metric baselines for an IT investment and for managing and reporting any subsequent changes to them
Build	(1) A version of software that meets a specified subset of the requirements that the completed software will meet. (2) The period of time during which such a version is developed. Note: The relationship of the terms "build" and "version" is up to the developer; for example, it may take several versions to reach a build, a build may be released in several parallel versions (such as to different sites), or the terms may be used as synonyms.
Capability	A measure of the expected use of a system.
Central Processing Unit	controls the operation of a computer by performing arithmetic and logical operations and decoding and executing instructions

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Word/Term	Definition
(CPU)	
Change Request (CR)	The formal documentation that is prepared for a request to change a specification in accordance with the Software Configuration Management Configuration Control Procedure
Client/Server	A network application in which the end-user interaction with the system (server) is through a workstation (client) that executes some portion of the application
Commercial Off-The-Shelf (COTS) Software	Commercially purchased, third party software used to accomplish a specific function such as spreadsheets, word processing, utilities, and graphics
Compatibility	The ability of two or more systems or components to perform required functions while sharing the same hardware and software environment. Also, the ability of two or more systems or components to exchange information
Computer Aided Software Engineering (CASE)	The use of computers to aid in the software engineering activities that may include but need not be limited to the application of software tools for software design, requirements tracing, code production, testing, document generation, and other software engineering activities.
Computer Hardware	The physical part of a computer system; the machinery and equipment
Computer Program	A combination of computer instructions and data definitions that enable computer hardware to perform computational or control functions
Configuration	The way a computer is set up (functional and physical), which includes the hardware (type of CPU, peripherals, etc.) and the software
Configuration Audit	A review conducted to verify that the development of a configuration item has been completed satisfactorily, that the item has achieved the performance and functional characteristics specified in the functional and allocated configuration identification, and that its operational and support documents are complete and satisfactory
Configuration Control	An element of configuration management consisting of the evaluation, coordination, approval/disapproval and implementation of changes to configuration items after formal establishment of their configuration identification.
Configuration Control Board (CCB)	Evaluates scope, applicability, and effect of each requested change, focusing on the items that affect cost, schedules, or compliance with requirements and providing approval and disapproval based on business objectives. The CCB has the authority to establish baselines, initiate or change software, accept testing results, and approve the release of software into production
Configuration Identification	The process of identifying items to be placed under configuration control
Configuration Management Library	The tools and procedures to access the contents of the software baseline library.
Configuration	Documents the plan for performing CM activities for a specific project or

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Word/Term	Definition
Management Plan	group of projects including resources, schedule, tools, and procedures
Configuration Status Accounting	An element of CM that focuses on recording and monitoring changes to controlled system configurations and maintaining a controlled documentation library
Code	To transform the system logic and data from design specifications into a programming language. n. The computer program itself; pseudo-code is code written in an English-like logical representation, source code is code written in a programming language, object code is code written in machine language.
CPIC	Capital Planning and Investment Control (CPIC): a management process for ongoing identification, selection, control, and evaluation of investments in information resources. The process links budget formulation and execution, and is focused on agency missions and achieving specific program outcomes. (See OMB Circular A-130, Section 6 at http://www.whitehouse.gov/omb/Circulars_a130_a130trans4/#6.)
Data	Recorded information, regardless of medium or characteristics, of any nature, including administrative, managerial, financial, and technical
Data Dictionary	A repository of information about data, such as its meaning, relationships to other data, origin, usage and format
Data Specification (DS)	Describes the database organization and storage allocation and provides the detailed data model of the logical and physical design, as well as other necessary information
Database	A collection of logically related data stored together in one or more computerized files; an electronic repository of information accessible via a query language interface
Database Management System (DBMS)	A software system that controls storing, combining, updating, retrieving, and displaying data records.
Developer	An organization that develops products ("develops" may include new development, modification, reuse, reengineering, maintenance, or any other activity that results in products) for itself or another organization
Documentation	Written and/or graphical information describing, defining, specifying, reporting, or certifying activities, requirements, procedures, reviews, or results
Earned Value Management	A management technique which uses past performance to predict future cost and schedule performance results. All work is planned, budgeted, and scheduled in time-phased "planned value" increments constituting a cost and schedule measurement baseline. (See OMB Circular A-11, Supplement to Part 7, Capital Programming Guide.)
Enhancement	A change that makes a version of software or hardware better than the previous version
Feasibility	The extent to which the benefits of a new or enhanced system will exceed the total costs and also satisfies the business requirements
Feasibility Study	A formal study to determine the feasibility of a proposed system (new or

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Word/Term	Definition
	enhanced) in order to make a recommendation to proceed or to propose alternative solutions
Function	A set of related actions, undertaken by individuals or tools that are specifically assigned or fitted for their roles, to accomplish a set purpose or end
Functional Requirement	A requirement that specifies functions that a system must perform.
Functional Requirements Document (FRD)	Documentation of initial definition of the system and the environment in which it will operate
Functionality	The ability to perform all required functions
Goals	Signifies the scope, boundaries, and intent of each key process area.
Hardware	The hardware is the physical part of a computer system; the machinery and equipment
Implementation	Installing and testing the final system, usually at the user (field) site; the process of installing the system
Information system	A discrete set of information resources organized for the collection, processing, maintenance, transmission, and dissemination of information, in accordance with defined procedures, whether automated or manual (per OMB Circular A-130)
Information system project	Temporary planned endeavor funded by an approved information technology investment; thus achieving a specific goal and creating a unique product, service, or result. A project has a defined start and end point with specific objectives that, when attained signify completion
Information Technology	Any equipment or interconnected system or subsystem of equipment, that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by an executive agency. For purposes of the preceding sentence, equipment is used by an executive agency if the equipment is used by the executive agency directly or is used by a contractor under a contract with the executive agency which (i) requires the use of such equipment, or (ii) requires the use, to a significant extent, of such equipment in the performance of a service or the furnishing of a product. The term "information technology" includes computers, ancillary equipment, software, firmware and similar procedures, services (including support services), and related resources. The term "information technology" does not include any equipment that is acquired by a Federal contractor incidental to a Federal contract. The term "information technology" does not include national security systems as defined in the Clinger-Cohen Act of 1996 (40 U.S.C. 1452). (See OMB Circular A-130, Section 6 at http://www.whitehouse.gov/omb/Circulars_a130_a130trans4/#6 .)
Integration Test	Testing in which software components, hardware components, or both are combined and tested to evaluate the interaction between them
Integrity	The degree to which a system (or system component) prevents unauthorized

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Word/Term	Definition
	access to, or modification of, computer programs or data.
Interface	To interact or communicate with another system (or system component). (verb) An interface can be software and/or hardware (noun)
Interoperability	A measure of the ability of two or more systems (or system components) to exchange information and use the information that has been exchanged
Investment	Spending by Program Office on information technology regardless of amount or funding source. An IT investment may include a project or projects for the development, modernization, enhancement, or maintenance of a single IT asset or group of IT assets with related functionality and the subsequent operation of those assets in a production environment. While each asset or project would have a defined life-cycle, an investment that covers a collection of assets intended to support an ongoing business mission may not.
Lessons Learned	Any experiences discovered on previous activities that can be used to expedite and/or improve future systems development
Level of Effort Contract	A level of effort contract means that for a specific amount of money the provider will produce as many deliverables as they can
Library	A configuration controlled repository for system components (for example, documents and software)
Life Cycle	All the steps or phases a program or project passes through during its life; from concept development to disposition
Maintainability	The ease with which a software system (or system component) can be modified to correct faults, improve performance, or other attributes, or adapt to a changed environment
Maintenance	Activities required to keep a software system operational after implementation
Managed and Controlled	The process of identifying and defining software work products that are not part of a baseline and, therefore, are not placed under configuration management but that must be controlled for the project to proceed in a disciplined manner
Methodology	A set of methods, procedures, and standards that define the approach for completing a system development or maintenance project
Metrics	A quantitative measure of the degree to which a system, component, or process possesses a given attribute
Milestone	A scheduled event that is used to measure progress against a project schedule and budget
Module	A software unit that is a logically separate part of the entire program
Needs Statement	Document describing the deficiency or justifying the exploration of alternative solutions
Operations Manual (OM)	Provides computer control personnel and computer operators in an information processing center with a detailed operational description of the system and its associated environment. Instructions for installation and operation
Phase	A defined stage in the systems development life cycle; there are seven

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Word/Term	Definition
	phases in the OPM SDLC
Procedure	A series of steps (or instructions) required to perform an activity
Process	A finite series of activities as defined by its inputs, outputs, controls (for example, policy and standards), and resources needed to complete the activity
Product	General term for an item produced as the result of a process; can be a system, subsystem, software component, or a document
Program	One or more major multi-year IT initiatives of such magnitude they must be carried out through multiple related IT projects. A program encompasses the missions, functions, operations, activities, laws, rules, and regulations that an agency is authorized and funded by statute to administer and enforce. It constitutes an ongoing operation.
Project	The complete set of activities associated with all life cycle phases needed to complete a systems development or maintenance effort from start to finish (may include hardware, software, and other components); the collective name for this set of activities. A project has a defined beginning and end. A project serves to develop, modify, or enhance a product, service, or system and is constrained by the relationships among scope, resources, and time. [Source: OPM (11/2011) "IT Program Management Career Path Guide", p. 3.]
Project Management	The process of planning, organizing, staffing, directing, and controlling the development and/or maintenance of a system
Project Plan	A plan that is updated, expanded and refined continually thought system development; covers project scheduling, work breakdown structure (WBS), staffing, resources, adjustments to the software development life cycle structure, selection of tools and techniques, identification of applicable reviews and approvals, CM methods, and other related topics
Project Team	Group of individuals associated with a specific project
Quality	The degree to which a system, component, product, or process meets specified requirements.
Quality Assurance	A discipline used by project management to objectively monitor, control, and gain visibility into the development or maintenance process
Quality Assurance Plan	A formal plan to ensure that delivered products satisfy contractual agreements, meet or exceed quality standards, and comply with approved systems development or maintenance processes
Regression Testing	The rerunning of test cases that previously executed correctly in order to detect errors introduced by the maintenance activity
Release	A configuration management activity wherein a specific version of software is made available for use
Requirement	A capability needed by a user; a condition or capability that must be met or possessed by a system (or system component) to satisfy a contract, standard, specification, or other formally imposed documents
Requirements Management	Establishes and controls the scope of system development efforts and facilitates a common understanding of system capabilities between the System Proponent, developers, and future users

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Word/Term	Definition
Requirements Traceability Matrix	Provides a method for tracking the functional requirements and their implementation through the development process
Resource	In management, the time, staff, capital and money available to perform a service or build a product; also, an asset needed by a process step to be performed
Reusability	A characteristic of some programming styles or languages (for example, object-oriented programming) in which code written for one application can be reused with different applications
Revision	A version that supersedes an earlier version to correct errors
Risk	A potential occurrence that would be detrimental to the project; risk is both the likelihood of the occurrence and the consequence of the occurrence
Schedule	A list of tasks and activities, describing the past and/or future accomplishments of a project/release, used to allocate work, specify deadlines, and manage the project/release
Scope	The established boundary (or extent) of what must be accomplished; during planning, this defines what the project will consist of (and just as important, what the project will not consist of)
Scrum	Scrum is a popular Agile system development methodology. Scrum is characterized by self-directed development teams, operating in successive iterations (typically 2 to 3 weeks as indicated by best practices), holds daily team standup meetings of no longer than 15 minutes, continuously offers the customer demos of the current solution, and adapts its development plan at the end of each iteration.
Security	The establishment and application of safeguards to protect data, software, and hardware from accidental or malicious modification, destruction, or disclosure.
Software	Computer programs (code), procedures, documentation, and data pertaining to the operation of a computer system
Software Design Description (SDD)	Documents the allocation of requirements, system/software designs, and internal/external interfaces.
Software Process	A set of activities, methods, practices, and transformations that people use to develop and maintain software and the associated products (e.g., project plans, design documents, code, test cases, and user manuals).
Standard	An agreed-upon set of specifications for hardware or software
Stress Testing	Testing that determines the maximum capacity of the system, given user requirements for response time and throughput
Subject Matter Expert (SME)	An individual with a specific area of expertise.
Subsystem	A collection of components that meets the definition of a system, but is considered part of a larger system.
System	A collection of components (hardware, software, interfaces) organized to accomplish a specific function or set of functions; generally considered to be a self-sufficient item in its intended operational use

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Word/Term	Definition
System Administrator	The person responsible for planning a system installation and use of the system by other users.
Security Assessment and Authorization	Formerly known as the Certification and Accreditation (C&A) in the IT Security and Privacy area.
System Development Life Cycle (SDLC)	A consistent and repeatable process for planning, managing, and overseeing IT programs and projects through all the steps or phases it passes through during its life; from concept development to disposition.
System Security Plan	A formal document that establishes the processes and procedures for identifying all areas where security could be compromised within the system (or subsystem).
Tailor	To modify a process, standard, or procedure to better match process or product requirements.
Team	A collection of people, often drawn from diverse but related groups, assigned to perform a well-defined function for an organization or a project.
Technical	Relating to agreements, conditions, and/or requirements affecting the functionality and operation of a system. Compare to non-technical
Template	The outline or format for a document or memo. Defines what information needs to be included in the document
Test	The process of exercising the product to identify differences between expected and actual results and performance
Test Case	A specific set of test data and associated procedures developed for a particular test.
Test Results and Evaluation Report	A compilation of test results and summary of the system's readiness for production.
Test Team	Individuals, independent of the software development organization, who are designated by the project sponsor to test system's readiness for production
Training	The formal process of depicting, simulating, or portraying the operational characteristics of a system or system component in order to make someone proficient in its use.
Training Plan	A formal document that outlines the objectives, needs, strategy, and curriculum to be addressed for training users of the new or enhanced system.
Unit	The smallest logical entity specified in the design of a software system; must be of sufficient detail to allow the code to be developed and tested independent of other units
Unit test	A test of one application to see if remediation efforts were successful. The unit test does not test how well the application will work with other applications
User Acceptance Test	A formal test conducted by the end user of a system, to determine if the system works according to specifications and should be accepted
User Manual	A formal document that contains all essential information for the user to

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Word/Term	Definition
	make full use of the new or upgraded system.
Verification, Validation & Testing Plan	Documentation of the testing strategy that provides acceptance testing for all components of a system
Version	An initial release or re-release of a computer software configuration item, associated with a complete compilation or recompilation of the computer software configuration item; sometimes called a build
Version Control	A means to identify and manage configuration items as they change over time, usually provided by a software tool designed for configuration management
Version Description Document	A formal document that describes the exact version of a configuration item and its interim changes. It is used to identify the current version; provides a "packing list" of what is included in the release.
Work Breakdown Structure	A structure of well-defined work efforts and work elements that organizes and defines the total scope of the project and provides for better planning, scheduling and controlling of a project's work efforts.

APPENDIX C: REFERENCES

C.1 External and Internal Issuances Incorporated by Reference

C.1.1 External References

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Records Management policy defined within the Federal Enterprise Records Management Profile, Sections 4.1.1 through 4.1.6 <http://www.archives.gov/records-mgmt/policy/rm-profile.html>

Section 508 of the Rehabilitation Act, August 7, 1998 <http://www.section508.gov/index.cfm?fuseAction=1998Amend>

Software Engineering Institute, Capability Maturity Model Integration (CMMI) for Development version 1.3, at <http://www.sei.cmu.edu/library/abstracts/reports/10tr033.cfm>

The Federal Acquisition Reform Act (FASA) and the Federal Acquisition Regulations (FAR) Implementation of the Federal Acquisition Streamlining Act. See reference library at GSA’s

Acquisition Central at www.acquisition.gov

C.1.2 Internal OPM References

IT Baseline Management Policy, available on OPM website at <http://www.opm.gov/about-us/our-people-organization/support-functions/cio/information-technology-baseline-management-policy.pdf>

Policy on Information Technology (IT) Procurement, available on THEO at http://theo.opm.gov/policies/ispp/it_procurement.pdf

Information Security & Privacy Policy and Supporting Documents, available on THEO at <http://theo.opm.gov/policies/ispp/>

Policy on Electronic Signatures, available on THEO at [http://theo.opm.gov/policies/electronic signature policyv6.pdf](http://theo.opm.gov/policies/electronic%20signature%20policyv6.pdf)

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APPENDIX D : OPM SDLC PHASE ACTIVITIES

Appendix D.1: Determine System Needs Phase Activities

Step	Description of Activity	Inputs/Outputs	Lead	Participants
1.	<p>Determine type of development.</p> <p>The Business Program Manager or Business Project Manager, with assistance from a Technical Advisor, determines the type of development needed to support the project.</p> <p>The type of development is chosen from the following types:</p> <ul style="list-style-type: none"> • New - A system will be implemented where no system currently exists with the intended functionality or will replace an existing system. • COTS - A project that will implement a Commercial Off-the-Shelf (COTS) product requiring integration or with modifications. • Cloud – A project that will implement a Cloud solution requiring integration or with modifications. • Enhancement - A project that will require either changes to an existing system’s architecture or interfaces. • Maintenance - A project that will make changes to an existing system, but not change the architecture or interfaces. 	<p>Inputs: Identified need or Change Request (CR)</p> <p>Outputs: Type of project development selected</p>	Business Program Manager or Business Project Manager	Technical Advisor
2.	<p>Determine a “Rough Order of Magnitude (ROM)” estimate of the cost of the project.</p> <p>The Business Program Manager or Business Project Manager determines the initial estimated cost of the project with the assistance of a Technical Advisor.</p> <p>At this early stage, this cost is a high level estimate based on level of effort (LOE), materials and equipment from development through</p>	<p>Inputs: Identified need or CR, Estimated IT Security Resource Hours/Cost</p> <p>Outputs: Estimated ROM</p>	Business Program Manager or Business Project Manager	Technical Advisor

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<p>deployment. This cost can be derived using an automated estimating tool, based on analogy, or other estimating method.</p> <p>The estimated ROM cost is comprised of the following:</p> <ul style="list-style-type: none"> • Labor – Total estimated cost of labor • Materials – Total estimated cost of materials (including purchased software) • Equipment – Total estimated cost of equipment (computers, facilities, etc.) 	cost		
3.	<p>Determine project risks, project complexity, project duration and special interests which affect the project.</p> <ul style="list-style-type: none"> • Project Risks: Low, Medium and High • Project Complexity: Low, Medium and High • Project Duration: Less than six months or greater than six months • Special Interests affecting Project: Yes or No 	<p>Inputs: Identified need or CR</p> <p>Outputs: Project Assessment for Risk, Complexity, Duration and Special Interest</p>	Business Program Manager or Business Project Manager	Technical Advisor
4.	<p>Determine the project documentation level based on the selected type of project development, estimated ROM cost and project assessment for Risk, Complexity, Duration and Special Interest as outlined in Appendix E</p>	<p>Inputs: Estimated ROM cost; Selected Type of Project Development; Project Assessment for Risk, Complexity, Duration and Special Interest</p>	Business Program Manager or Business Project Manager	Technical Advisor

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
		Outputs: Project Documentation Level		
5.	Determine if the need requires the retirement of an existing system or part of an existing system Is the new need intended to replace an existing system? Perform decommission if system or partial system exists.	Inputs: Existing System, Outputs: Decision to Decommission a System	Business Program Manager or Business Project Manager	Technical Advisor System Owner
6.	Begin Phase Work <ul style="list-style-type: none"> • Based on project category criteria from Appendix E: <ul style="list-style-type: none"> - Project Documentation Level 1 and 2 – Proceed to step 8 in this procedure. - Project Documentation Level 3 – Proceed to the Build System Components Phase or Develop System Design Phase. For some minor changes to the system, the changes could be implemented directly in the production environment. - Project Documentation Level 4 – Proceed to step 7 in this procedure. - Project Documentation Level 5 – Proceed to step 7 in this procedure 	Inputs: Decommissioned System (if applicable), Project Documentation Level Outputs: Begin preparation for Needs Statement or Begin preparation for IT Investment Analysis Package or Begin Build System Components or Develop System Design	Business Program Manager or Business Project Manager	Technical Advisor

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
7.	<p>Document the Need by developing a Needs Statement</p> <ul style="list-style-type: none"> • User/Business Program Manager or Business Project Manager Develops Needs Statement (NS) <ul style="list-style-type: none"> - Identify the benefits expected, existing and planned capabilities, estimated costs, assessment of need. • Review OPM’s Technical Reference Model found in the Enterprise Architecture (EA) document. The EA document can be requested from the CIO Enterprise Architect. • Submit Needs Statement to the Executive Sponsor for internal review • Executive Sponsor provides comments and feedback on the Needs Statement • Comments incorporated to the Final Needs Statement and Submitted to CM for version control 	<p>Inputs: Project Documentation Level, Technical Reference Model, Needs Statement Template,</p> <p>Outputs: Needs Statement (versioned)</p>	<p>Business Program Manager or Business Project Manager</p>	<p>Technical Advisor Executive Sponsor, Chief Information Officer (CIO), Executive Sponsor CM Team, SQA Team</p>
8.	<p>Prepare Information Technology Investment Analysis Package (ITIAP) by conducting a Feasibility Study (FS) using the template provided.</p> <ul style="list-style-type: none"> • Examine system objectives <ul style="list-style-type: none"> - Analyze anticipated functions of the system, considering areas such as: <ul style="list-style-type: none"> ➢ New services ➢ Increased capacity ➢ Legislative and policy requirements ➢ Privacy and security requirements ➢ Audit controls - Identify major performance objectives, such as: <ul style="list-style-type: none"> ➢ Reduced staff and equipment costs ➢ Increased processing speed and productivity ➢ Improved management information services and controls over automated decision making systems 	<p>Inputs: Needs Statement (versioned), IT Investment Analysis Package Template, Feasibility Study Template,</p> <p>Outputs: IT Investment Analysis Package (draft), Feasibility Study (draft), Information</p>	<p>Business Program Manager or Business Project Manager</p>	<p>Technical Advisor, IT Security Team</p>

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> ➤ Compliance with regulations - Identify assumptions and constraints <ul style="list-style-type: none"> ➤ Operational life of the proposed system ➤ Period of time for comparison of system alternatives ➤ Input, output, and processing requirements ➤ Financial constraints ➤ Changing hardware, software and operating environment • Evaluate Alternatives <ul style="list-style-type: none"> - Determine criteria for evaluating alternatives such as: <ul style="list-style-type: none"> ➤ Cost ➤ Priority ➤ Development time ➤ Ease of system use - Identify and summarize alternatives to be considered during the study including: <ul style="list-style-type: none"> ➤ Use of one or more existing system ➤ Development of one or more new system ➤ The potential of purchasing an off-the-shelf system. - Outline time and resource costs <ul style="list-style-type: none"> ➤ Include the time and funding required for all activities of the life cycle from definition through operation. ➤ Use realistic estimates ➤ Include factors such as: <ul style="list-style-type: none"> • The current workload of personnel • Staff absences due to vacation and illness • Lead time for procurement of equipment and software • Staff training • Identify preferred approach by weighing each alternative identified during the evaluate alternatives process against the evaluation criteria • Develop detailed FS <ul style="list-style-type: none"> - Describe system objectives by including such information as: 	Type Classification (FIPS-199), Privacy Threshold Analysis, SORN, Special Security Requirements		

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> ➤ System output ➤ System input ➤ File descriptions ➤ Validation criteria ➤ Security, privacy, and control requirements, data storage and retrieval ➤ Any interfacing systems - Describe current functional procedures whether automated or manual - Describe proposed system including such information as: <ul style="list-style-type: none"> ➤ The overall system concept ➤ Improvements anticipated after successful implementation of the proposed system 			
9.	<p>Prepare ITIAP by conducting the Cost/Benefit Analysis (CBA) using the CBA template or any alternative template</p> <ul style="list-style-type: none"> • Identify the alternatives for development and operation <ul style="list-style-type: none"> - Describe the technical and operational characteristics of current system and identify the input to and output form the system - Summarize the functional objectives of the system and describe the expected input to and output form the system - Describe the alternative system that was discussed in the FS. • Determine the benefits per alternative <ul style="list-style-type: none"> - Determine nonrecurring benefits for each system alternative - Determine recurring benefits including: <ul style="list-style-type: none"> ➤ Equipment ➤ Software and data communications lease ➤ Rental and maintenance - Determine non-quantitative benefits such as: <ul style="list-style-type: none"> ➤ Improved service ➤ Reduced risk of incorrect processing ➤ Improved information handling ➤ Enhanced organizational image 	<p>Inputs: Needs Statement, Investment Analysis Package Template, Cost/Benefit Analysis Template</p> <p>Outputs: IT Investment Analysis Package (draft), Cost/Benefit Analysis (draft)</p>	Business Program Manager or Business Project Manager	Technical Advisor

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> • Determine the cost per alternative <ul style="list-style-type: none"> - Development costs - Operational costs - Nonrecurring costs - Recurring costs • Develop a detailed CBA 			
10	<ul style="list-style-type: none"> • Complete the ITIAP with the Needs Statement as the Appendix • Chief Information Officer (CIO) reviews the package • Submit package to Investment Review Board (IRB) and to CM to be baselined. 	<p>Inputs: IT Investment Analysis Package (draft)</p> <p>Outputs: Reviewed and baselined IT Investment Analysis Package</p>	Business Program Manager or Business Project Manager	Technical Advisor, Chief Information Officer, Investment Review Board
11	<p>IRB conducts review of the IT Investment Analysis Package which contains the Cost Benefit Analysis.</p> <p>IRB renders decision to approve or disapprove.</p> <p>For detailed steps on the IRB refer to the OPM IRB Charter</p>	<p>Inputs: IT Investment Analysis Package</p> <p>Outputs: Approved IT Investment Analysis Package</p>	Investment Review Board	CIO
12	<p>Charter the Project</p> <ul style="list-style-type: none"> • Formally establish the work as a Project • Budget is established for the IT Project which is to be managed by the Business Program Manager or Business Project Manager • Assign a Technical Project Manager 	<p>Inputs: Approved IT Investment Analysis Package</p> <p>Outputs: Technical Project Manager is</p>	CIO	Business Program Manager or Business Project Manager

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> • A Technical Project Manager is assigned or transferred to the work 	assigned		
13	<p>Define High Level System Requirements</p> <ul style="list-style-type: none"> • Gather user requirements • Determine functional requirements <ul style="list-style-type: none"> - Identify the functional requirements - Define current procedures including: <ul style="list-style-type: none"> ➤ Organizational and personnel responsibilities ➤ Equipment being used ➤ Input/output including volume, sources and frequency ➤ Deficiencies such as time delays - Define proposed functions include: <ul style="list-style-type: none"> ➤ Information flows ➤ Business logic ➤ Manual procedures ➤ Security considerations - Identify organizational, operational, and user impacts • Define performance requirements. Determine: <ul style="list-style-type: none"> - Acceptable online response time and batch turnaround time (as applicable) - Capacity limits (as applicable) - Accuracy and validity requirements • Identify and define applicable standards and guidelines: 	<p>Inputs: IT Invest Analysis Package, User Requirements Document Template, Applicable Standards and Guidelines</p> <p>Outputs: User Requirements Document (draft), Security Impact Analysis document</p>	Business Program Manager or Business Project Manager	Technical Advisor, IT Security

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> - Review applicable program office standards - Review the OPM Enterprise Architecture and Technical Reference Model - Review the OPM Information Security and Privacy Policy - Review Section 508 standards • Capture requirements in the User Requirements Document (URD) <ul style="list-style-type: none"> - Review applicable documentation (Needs Statement, ITIAP) - Define assumptions and constraints that will affect development and operation of the system. • The Technical Advisor provides input and advice for the URD 			
14	<p>Deliver the Final User Requirements Document</p> <p>Staff the URD with users and the executive sponsor for comment and approval</p> <p>Incorporate user comments and deliver the final User Requirements Document to Configuration Management to be placed under version control.</p>	<p>Inputs: Customer comments on User Requirements Document</p> <p>Outputs: Final User Requirements Document (versioned)</p>	Business Program Manager or Business Project Manager	Technical Advisor CM Team Users and Executive Sponsor
15	<p>Conduct Phase Exit Review</p> <ul style="list-style-type: none"> • Business Program Manager, Business Project Manager or Product Owner notify the project team and extended project team (users, POCs, support areas) that a Phase Exit Review has been scheduled. <ul style="list-style-type: none"> - Request that all approvers provide feedback at least one week before the exit meeting is to be held. (This will allow the time to 	<p>Inputs: Phase Deliverables produced during current phase, New and existing issues</p> <p>Outputs:</p>	Business Program Manager or Business Project Manager	Technical Advisor

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<p>work issues and develop action plans prior to the exit meeting)</p> <ul style="list-style-type: none"> - Invite participants to attend the exit meeting using the Phase Exit Review Memo that is within the Phase Exit Review Package along with the review material (any other material relevant to the exiting stage which include but are not limited to known issues, and unplanned deliverables) - The participants should be familiar with planned deliverables since it is standard procedure for them to review drafts as they are developed. <ul style="list-style-type: none"> ➤ If this is not the case a list of the planned deliverables should also be distributed at this time. • Review the current outline (at a minimum, a detailed plan for the next phase and high-level plans for the remainder of the project). • Review other relevant materials to verify if they are in accordance with OPM’s SDLC • Receive position from the list of approvers (to include the Executive Sponsor, CIO, Technical Advisor, Business Program Manager or Business Project Manager) using the Phase Exit Position Response Form within the Phase Exit Review Package. This position can be concur, concur with qualifications, or non-concur. The implication of each is as follows: <ul style="list-style-type: none"> - Concur – Proceed with the project according to the current plan. (Ex. The Approver is unaware of any issues for the current phase) - Concur with qualifications – There are issues or concerns and the project can proceed according to the current plan if an acceptable action plan is developed for each issue or concern by the meeting. (Ex. There is no plan for testing an interface to an existing system that is being changed) 	<p>Plans for addressing issues and risks, Concurrence that all activities for this phase is complete and movement to next phase has been approved.</p>		

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> - Non-concur – There are very significant issues or concerns and the project should not move to the next phase until those issues or concerns are resolved. (Ex. Funding for the project has been withdrawn) • Prepare acceptable action plan to address each issue or concern received. • Conduct Exit Meeting <ul style="list-style-type: none"> - Present positions from the Approvers, along with issues and/or concerns, and any other issues that may be open - Action plans must be presented for each issue or concern • Document the meeting including positions, issues, concerns, action plans, and follow-up activity • Obtain concurrence on current stage deliverables, and begin the next phase of development • All items are to be controlled by CM. 			

Appendix D.2 : Define System Requirements Phase Activities

Step	Description of Activity	Inputs/Outputs	Lead	Participants
1.	Scope the Project <ul style="list-style-type: none"> • Estimate size, resources and schedule 	Inputs: Needs Statement, User Requirements Document Outputs: Project Estimates	Technical PM	Project Team
2.	Identify, analyze, and document potential risks.	Inputs:	Technical PM	Business

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> • Identify Risks <ul style="list-style-type: none"> - Risks may occur in the following areas: <ul style="list-style-type: none"> ➤ Budget ➤ Schedule ➤ Development ➤ Design - Utilize Lessons-Learned from previous projects as a significant source for identifying potential risks on a new project - Categorize Risks as follows: (see Risk Types, Items and Cause of Impact to help with the selection of category): <ul style="list-style-type: none"> ➤ Technical – Risks associated with creating a new capability or capacity ➤ Supportability – Risks associated with implementing, operating, and maintaining a new capability ➤ Cost – Risks associated with schedule estimates inaccuracy ➤ Schedule – Risks associated with planned activities • Analyze Risks <ul style="list-style-type: none"> - Characterize <ul style="list-style-type: none"> ➤ Determine the impact of the risk on the project if it occurs. Rate as high, medium, or low. ➤ Determine the likelihood of the risk occurring. Rate as high, medium, or low. - Strategy <ul style="list-style-type: none"> ➤ Determine what needs to be done to prevent the risk from becoming a reality or to minimize its impact. ➤ Develop strategies for eliminating or reducing the risks and incorporate the strategies into project planning - Monitoring <ul style="list-style-type: none"> ➤ Determine metrics to monitor the risk (or probability of risk) to identify when it begins to become a problem ➤ Identify how tasks will be monitored to detect problems early. This typically includes monitoring expenditures versus 	<p>Needs Statement, Project Estimates, User Requirements Document, Lessons Learned from previous projects as applicable, IT Security Analysis, Risk Matrix Template</p> <p>Outputs: Project risks, Security Analysis Impact document, Updated Risk Matrix</p>		<p>Program Manager or Business Project Manager, Project Team, IT Security</p>

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<p>progress for cost risk; scheduled progress versus actual progress for schedule risk; requirements tracking for operational and support risks, and perhaps technical performance measurement plans for technical risks</p> <ul style="list-style-type: none"> - Management <ul style="list-style-type: none"> ➤ Manage the risk by monitoring and reporting on every open risk as required. • Document and review risks. <ul style="list-style-type: none"> - Update the Risk Matrix 			
3.	<p>Develop Project Plan</p> <p>Note: Because project planning is an iterative activity, detailed planning of the subsequent phases can occur.</p> <ul style="list-style-type: none"> • Develop the Project Plan and include the Quality Assurance Plan (QAP) and Configuration Management Plan (CMP) as appendices if applicable. <ul style="list-style-type: none"> - Review the scope of the work <ul style="list-style-type: none"> ➤ Ascertain the users' requirements, constraints and contributions from discussions with the user community and/or Business Program Manager or Business Project Manager ➤ Record the understanding of the user's goals and objectives regarding overall cost schedule and product quality. ➤ Record the understanding of management's risk tolerance level ➤ Record the understanding of products and their characteristics to be delivered to the user - Determine technical approach <ul style="list-style-type: none"> ➤ Select an appropriate life cycle model for performing required activities and appropriate packaging techniques for required products ➤ Refer to Methodologies for reference of various life cycle models ➤ Incorporate the appropriate project activities into the Project Plan 	<p>Inputs: Updated Risk Matrix, Needs Statement, Information Technology (IT) Investment Analysis Package (ITIAP) (if applicable), Project Estimates, Methodologies</p> <p>Outputs: Draft Project Plan, Draft QAP, Draft CMP</p>	Technical PM	Project Team, Business Program Manager or Business Project Manager

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<p>Note: Because project planning is an iterative activity, detailed planning of the subsequent phases can occur.</p> <ul style="list-style-type: none"> • Develop the Project Plan and include the QAP and CMP as appendices if applicable. <ul style="list-style-type: none"> - Determine technical approach <ul style="list-style-type: none"> ➢ Determine the activities, methods, techniques, and products that will help achieve the goals and objectives established for the project. - Define, schedule, and budget the work - Organize the project team <ul style="list-style-type: none"> ➢ Identify the personnel that compose the project team. Clearly state the responsibility for each critical function of the project and establish lines of communication. ➢ Assign the key Roles & Responsibilities for each phase of the life cycle. - Determine resource requirements - Address special project considerations 			
4.	<p>Create the Quality Assurance Plan (QAP) Include the following:</p> <ul style="list-style-type: none"> • Quality objectives in measurable terms • Responsibilities of the Software Quality Assurance (SQA) team • Resource requirements for the SQA team • SQA team participation in Project Plan and procedures • Evaluations to be performed by SQA team • Audits and reviews to be conducted by SQA team • Documenting and tracking noncompliance issues and the escalation procedures • Documentation that SQA team is to produce • Method, audience, and frequency of providing feedback on SQA activities 	<p>Inputs: Project Plan, QAP Template Outputs: Draft QAP</p>	SQA Team	Technical PM
5.	Implement the SQA Plan	Inputs:	SQA Team	Technical PM

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> • The SQA team performs the SQA function as defined in the QAP • Problems or non-conformances with requirements are documented and reported to the Technical PM or appropriate authority • Senior Management addresses noncompliance issues that cannot be resolved within the project 	<p>QAP</p> <p>Outputs: Implemented QAP</p>		Project Team
6.	<p>Create the Configuration Management Plan (CMP)</p> <ul style="list-style-type: none"> • Define CM activities and responsibilities and required resources • Specifically address the following: <ul style="list-style-type: none"> - Identify items that need to be placed under control which includes: <ul style="list-style-type: none"> ➢ Configuration Items (CIs) (software, hardware, communications, and databases) ➢ Technical documentation or baselines describing the CIs ➢ Management documentation (describes the process used to develop or manage the development of the CIs such as plans, standards and procedures) - System and software baselines • Specifically address the following: <ul style="list-style-type: none"> - Configuration control <ul style="list-style-type: none"> ➢ CCB – Decision making body for the program area projects. Evaluates the scope, applicability, and effect of requests by providing approval or disapproval based on defined strategic initiatives, program business objectives, and budgetary parameters with a focus on items that could affect cost, schedules or compliance with technical requirements. ➢ Change Request (CRs) – A request to change technical requirements approved for the project that may affect the scope of the system or may have an impact on the overall cost, schedule, and technical capability and are usually generated by system user. They must be approved by the project CCB before resources are assigned to implement the change. ➢ Discrepancy Reports (DRs) – Software problems requiring corrective maintenance 	<p>Inputs: Project Plan, CMP Template</p> <p>Outputs: Draft CMP</p>	CM Team	Technical PM

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> ➤ Requests for Change (RFCs) – Generated by personnel within OPM who wishes to initiate system enhancements, which are usually activities that have been planned for future implementation. <p>Specifically address the following:</p> <ul style="list-style-type: none"> - Configuration status accounting <ul style="list-style-type: none"> ➤ Focuses on recording and monitoring changes to controlled system configurations and maintaining a controlled documentation library. - Configuration Audits <ul style="list-style-type: none"> ➤ Conduct audits on the Configuration Items identified in the CMP 			
7.	Prepare the System Architecture as outlined in the Enterprise Architecture (EA) document. The EA document can be requested from the CIO Enterprise Architect.	<p>Inputs: User Requirements Document, Needs Statement, OPM Enterprise Architecture and associated Reference Models</p> <p>Outputs: System Architecture</p>	Technical PM	Project Team, Business Program Manager or Business Project Manager, CIO Enterprise Architect
8.	Review the System Architecture and provide comments Review the System Architecture for approval.	<p>Inputs: System Architecture</p> <p>Outputs: Reviewed and approved System Architecture</p>	Technical PM	Project Team, Business Program Manager or Business Project Manager, Other Stakeholders,

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
				CIO Enterprise Architect
9.	Deliver the Final System Architecture Incorporate stakeholder comments and deliver the final System Architecture to Configuration Management (CM) to be baselined.	Inputs: Reviewed and approved System Architecture Outputs: Baselined System Architecture	Technical PM	Business Program Manager or Business Project Manager, CM
10.	Create a Software Requirements Specification (SRS) <ul style="list-style-type: none"> • Document the requirements using the SRS Template • Ensure all non-software requirements are documented • If applicable, load the SRS into automated requirements management tool, which assigns a unique tag number • If an automated tool is not available, ensure that each requirement is numbered and has attributes clearly associated with it (e.g., Requirements Traceability Matrix). • Note: Trace software requirements through design, development, and testing phases. 	Inputs: Validated requirements list, System Architecture, Requirements Traceability Matrix/Requirements Management (RM) Tool Outputs: Updated draft SRS, Draft RTM or Updated RM Tool	Requirements Team	Project Team
11.	Review SRS and Provide Comments Review the SRS for approval.	Inputs: Internally Approved SRS Outputs: Customer Review comments and approval	Requirements Team	Technical PM, QA Team, Business Program Manager or Business Project Manager

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
12.	Deliver the Final SRS Incorporate customer comments and deliver the final SRS to Configuration Management (CM) to be baselined.	Inputs: Customer Review comments and approval Outputs: Baselined SRS	Requirements Team	Technical PM, CM Team, QA Team, Business Program Manager or Business Project Manager
13.	Create the Data Specification <ul style="list-style-type: none"> • Review the User Requirements Document • Categorize and define the data <ul style="list-style-type: none"> - Identify static and dynamic data requirements - Identify internally generated data • Define data constraints <ul style="list-style-type: none"> - Identify source of input - Identify input/output medium and device - Identify data recipients - Specify conversion factors - Specify frequency of update and processing • Identify input responsibilities • Identify data collection requirements <ul style="list-style-type: none"> - Describe detailed formats - Identify data communication media - Determine timing of input • Document data requirements using the Data Specification (DS) • Define assumptions and constraints that will affect development and operation of the system. 	Inputs: Data Specification Template, User Requirements Document, FIPS 199 Document Outputs: Data Specification, Required Data Security Controls based on Data Classification	Technical PM	Requirements Management Team, Software Development Team, Project Team, IT Security Team
14.	Review Data Specification and provide comments Review the Data Specification for approval.	Inputs: Internally Approved Data Specification		Technical PM, QA Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
		Outputs: Customer Review comments and approval		
15.	Deliver the final Data Specification Incorporate customer comments and deliver the final Data Specification to Configuration Management (CM) to place baselined.	Inputs: Customer Review comments and approval Outputs: Baselined Data Specification		Technical PM, CM Team, QA Team, Business Program Manager or Business Project Manager
16.	Create Test Plan (Unit & Integration) <ul style="list-style-type: none"> • Review the baselined SRS • Include Test Strategy • Include Testing of security components (including Role based Access, Data Restrictions, Audit Logging) Note: This Test Plan (Unit & Integration) is a test plan that is an internal testing plan for the software developers and does not replace the Verification, Validation & Testing Plan that is to be done by an Acceptance Team or the Business Program Manager or Business Project Manager/User	Inputs: Baselined SRS, Test Plan (Unit & Integration) Template Outputs: Draft Test Plan (Unit & Integration)	Software Development Lead	Software Development Team, Requirements Team, IT Security
17.	Review Test Plan (Unit & Integration) and Provide Comments Review the Test Plan (Unit & Integration) for approval.	Inputs: Approved Test Plan (Unit & Integration) Outputs: Review comments and approval	Software Development Lead	Technical PM, Software Development Lead, QA Team, IT Security
18.	Deliver the Test Plan (Unit & Integration) Document Incorporate comments and deliver the final Test Plan to CM to place	Inputs: Review comments	Software Development Lead	Technical PM, Software

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	under version control.	and approval Outputs: (baselined) Test Plan (Unit & Integration)		Development Lead, QA Team, CM Team
19.	<p>Create Training Plan</p> <ul style="list-style-type: none"> • Review the baselined SRS • Identify Training Audience <ul style="list-style-type: none"> • Include Training Approach <ul style="list-style-type: none"> - Identify training methods, techniques, and tools <ul style="list-style-type: none"> ➢ Techniques include but are not limited to computer-based training (CBT), self-paced written manual, peer training, hands-on practical session, classroom lecture ➢ Tools include but are not limited to online terminal, training manual, classroom, and computer center - Identify training required for revised office procedures - Develop curriculum <ul style="list-style-type: none"> ➢ Determine the job classifications of the individuals that will need to be trained on the use of the system. ➢ Determine the system functions that each job class must be familiar with to enable them to successfully interface with the system. 	<p>Inputs: Baselined SRS, Training Plan Template</p> <p>Outputs: Draft Training Plan</p>	Training Team	Project Team
20.	<p>Review Training Plan and Provide Comments</p> <p>Review the Training Plan for approval.</p>	<p>Inputs: Internally Approved Training Plan</p> <p>Outputs: Customer Review comments and approval</p>	Training Team	Technical PM Training Team, Software Development Lead SQA Team, Business Program Manager or Business

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
				Project Manager
21.	Deliver the Training Plan Document Incorporate customer comments and deliver the final Training Plan to CM to be baselined	Inputs: Customer Review comments and approval Outputs: Final (baselined) Training Plan	Training Team	Technical PM, Software Development Lead SQA Team, Business Program Manager or Business Project Manager
22.	SQA audits the process and products Refer to the QAP for detailed schedules of the process and products to be audited.	Inputs: QAP, Processes and Procedures for Requirements Phase, SQA Audit Report Template Outputs: SQA Audit Reports	SQA Team	Project Team, Business Program Manager or Business Project Manager
23.	Update the Project Plan <ul style="list-style-type: none"> • Develop Work Breakdown Structure (WBS) • Track Project Activity • Update plan with hardware and software purchases • Update estimates • Create project schedule • Re-assess risks if necessary • Project Plan is reviewed and placed under CM control to be version 	Inputs: Draft Project Plan, WBS Task List, WBS Task Description Outputs: Version controlled Project Plan	Technical PM	Project Team, QA Team, CM Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	controlled.			
24.	<p>Conduct Phase Exit Review</p> <ul style="list-style-type: none"> • Technical PM with assistance from Business Program Manager, Business Project Manager or Product Owner notifies the project team and extended project team (users, Points of Contact (POCs), support areas) that a Phase Exit Review has been scheduled. <ul style="list-style-type: none"> - Request that all approvers provide feedback at least one week before the exit meeting is to be held. (This will allow the Project manager time to work issues and develop action plans prior to the exit meeting) - Invite participants to attend the exit meeting using the Phase Exit Review Memo along with the review material (Project Plan, and any other material relevant to the exiting stage which include but are not limited to known issues, and unplanned deliverables) - The participants should be familiar with planned deliverables since it is standard procedure for them to review drafts as they are developed. <ul style="list-style-type: none"> ➤ If this is not the case a list of the planned deliverables should also be distributed at this time. • Review the current Project Plan (at a minimum, a detailed plan for the next phase and high-level plans for the remainder of the project). • Review other relevant materials to verify if they are in accordance with OPM’s SDLC • Receive position from the list of approvers (to include the Technical PM, Chief Architect, IT Security, Business Program Manager or Business Project Manager) using the Position Response Form. This position can be concur, concur with qualifications, or non-concur. The implication of each is as follows: <ul style="list-style-type: none"> - Concur – Proceed with the project according to the current plan. (Ex. The Approver is unaware of any issues for the current phase) - Concur with qualifications – There are issues or concerns and the project can proceed according to the current plan if an acceptable 	<p>Inputs: Phase Deliverables produced during current phase, Initial Project Plan prior to updates for next phase, Latest version controlled Project Plan, New and existing issues, Phase Exit Package Template</p> <p>Outputs: Positions from the approvers, Issues/concerns (if any) from review of the deliverables, Action plans to resolve all issues/concerns, Risks, Phase Exit Package</p>	Technical PM	Business Program Manager or Business Project Manager, Project Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<p>action plan is developed for each issue or concern by the meeting. (Ex. There is no plan for testing an interface to an existing system that is being changed)</p> <ul style="list-style-type: none"> - Non-concur – There are very significant issues or concerns and the project should not move to the next phase until those issues or concerns are resolved. (Ex. Funding for the project has been withdrawn) • Prepare acceptable action plan to address each issue or concern received. Note: Sometimes action plans extend beyond the Phase Milestone and that is acceptable as long as it will not negatively impact the current Project Plan. Project Plan is high priority for successful management of the project. • Conduct Exit Meeting <ul style="list-style-type: none"> - Present positions from the Approvers, along with issues and/or concerns, and any other issues that may be open - Action plans must be presented for each issue or concern • Document the meeting including positions, issues, concerns, action plans, and follow-up activity • Obtain concurrence on current stage deliverables, and begin the next phase of development 			

Appendix D.3: Design System Components Phase Activities

Step	Description of Activity	Inputs/Outputs	Lead	Participants
1.	<p>Begin the system design activities</p> <ul style="list-style-type: none"> • Review the Software Requirements Specification (SRS) and the Requirements Traceability Matrix (RTM) to get a clear understanding of what the system should do and how the system should respond and look. <ul style="list-style-type: none"> - Gather user and/or customer input if necessary • Design and document the following: 	<p>Inputs: Change Request, SRS, RTM, Software Design Description (SDD) Template,</p>	Software Development Lead	Project Team, IT Security

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> - General system characteristics ensuring each unit has a unique identifier (They may already be defined based on the requirements.) - User interface at the desktop layer - Business rules layer or the application logic - Interfaces from application to application - Interfaces from application to database - Process flow and module hierarchy - Screen templates or prototypes that depict - Menu structure and standard screen background - Security Considerations based on System Security Categorization • For a Change to an existing system, review the Change request and update the system design as needed 	OPM Naming Conventions Standard Outputs: Software design units Conceptual understanding of requirements, draft SDD		
2.	Review the Software Design Description Conduct a formal review of the SDD. Include representatives from: <ul style="list-style-type: none"> • Other development and maintenance teams whose programs interface with the units being designed • The acceptance test team (customer) staff if applicable • User and sponsor organizations 	Inputs: draft SDD Updated RTM, Outputs: Reviewed SDD	Software Development Lead	Project Team, Quality Assurance (QA) Team, IT Security, Other Subject Matter Experts (SMEs)
3.	Review SDD and provide comments Review the SDD for approval.	Inputs: Reviewed SDD Outputs: Customer review comments and approval, Updated SDD	Technical PM	Business Program Manager or Business Project Manager
4.	Deliver the Final SDD Incorporate customer comments and deliver the final SDD to Configuration Management (CM) to be baselined.	Inputs: Customer review comments and approval,	Technical PM	Software Development Lead, CM Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
		Updated SDD Outputs: Final (baselined) SDD		
5.	<p>Create Database Design Description</p> <ul style="list-style-type: none"> • Review the SRS and the Data Specification (DS) to get a clear idea of what the system should do and how the system should respond and look. <ul style="list-style-type: none"> - Gather user and/or customer input if necessary. • Document the unique database names. Specify the: <ul style="list-style-type: none"> - Code Name, tag, or label by which each database table or file will be uniquely identified. - Additional descriptive information whether or not it is implied in the identification code such as system using the database, the database status, and a physical description of the database table or file. - Database mappings and data model • Document any special instructions for database usage. <ul style="list-style-type: none"> - Security Implementation based on Data Categorization • Reference all support software. <ul style="list-style-type: none"> - Include 3rd party, interfacing, and Commercial Off-the-Shelf (COTS) software. - Descriptions should include name, function, major operating characteristics, and machine run instructions for using the support software - Cite the support software documentation by title, number, and appropriate sections. • Document the Database Management System (DBMS) Configuration. Include: <ul style="list-style-type: none"> - The operating system and storage device on which the DBMS is to be located. - Identification of the application software 	Inputs: Change Request DBDD Template SRS, DS OPM Naming Conventions Standard, OPM Enterprise Architecture Outputs: Conceptual understanding of requirements Draft DBDD	Software Development Lead	Software Development Team (Database Lead), Project Team, IT Security

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> - All related computer programs that run the database - The amount of online and offline storage required. - Special hardware or software required to maintain backup copies or archived files - Identification of the Database Schema including the names of all of database related application programs and data files, as well as the file sizes of each and data record layouts and descriptions. • For a Change to an existing system, update the database design as needed 			
6.	Review the Database Design Description Conduct a formal review of the DBDD. Include representatives from: <ul style="list-style-type: none"> • Other development and maintenance teams whose programs interface the units being designed • The acceptance test team staff if applicable • User and sponsor organizations 	Inputs: draft DBDD Updated RTM Outputs: Reviewed DBDD	Software Development Lead	Project Team, Quality Assurance (QA) Team, IT SecurityTeam, Other Subject Matter Experts (SMEs) (Database Lead),
7.	Review DBDD and provide comments Review the DBDD for approval.	Inputs: Internally Approved DBDD Outputs: Customer Review comments and approval	Technical PM	Business Program Manager or Business Project Manager
8.	Deliver the Final DBDD Incorporate customer comments and deliver the final DBDD to CM to be baselined.	Inputs: Customer Review comments and approval Outputs: Final (baselined)	Technical PM	Software Development Lead (Database Lead), CM Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
		DBDD		
9.	Expand the Requirements Traceability Matrix (RTM) to reflect the design units. Note: Use an automated tool if applicable to update the RTM. Ensure all requirements have been included in a design unit.	Inputs: Software design units, SDD, DBDD baselined RTM Outputs: Expanded baselined RTM	Requirements Team	Software Development Lead, Project Team, QA Team, CM Team
10	Create the System Security Plan (SSP) as directed in the Information Security and Privacy Policy Web pages located at http://theo.opm.gov/policies/ispp/	Input: Applicable security standards, SRS Output: Understanding of security standards, draft SSP	Technical PM	IT Security Team, Project Team, QA Team
11	Review the SSP and provide comments Review the SSP for approval.	Inputs: Customer-ready SSP Internally Approved SSP Outputs: Customer Review comments and approval	Technical PM	Business Program Manager or Business Project Manager, IT Security Team
12	Deliver the Final SSP Incorporate customer comments and deliver the final SSP to CM to be placed under control.	Inputs: Customer Review comments and approval Outputs:	Technical PM	IT Security Team, CM Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
		Final (baselined) SSP		
13	Update Test Plan (Unit & Integration) <ul style="list-style-type: none"> • Review test strategy to ensure it coincides with the designs • Create test identifiers • Update test execution • Submit to CM to be version controlled. 	Inputs: Version controlled Test Plan (Unit & Integration) Outputs: Updated Test Plan (Unit & Integration)	Software Development Lead	Software Development Team, Project Team, CM Team
14	Review Training Plan Provide comments and update the plan as applicable. Review the Training Plan for approval.	Inputs: Customer-ready Training Plan Outputs: Customer Review comments and approval	Technical PM	Business Program Manager or Business Project Manager
15	Deliver the Training Plan Document Incorporate customer comments and deliver the final Training Plan to CM to be baselined.	Inputs: Customer Review comments and approval Outputs: Final (baselined) Training Plan	Project Manager	Training Manager, CM Team
16	Develop Training Material as required. <ul style="list-style-type: none"> • Review the Training Plan and SRS • Develop the applicable training materials that are defined in the Training Plan and SRS • Examples of these materials include: <ul style="list-style-type: none"> - Lesson Plans - User Training Guides - Computer-based Training (CBT) 	Inputs: Training Plan SRS Outputs: Training Materials	Training Team	Project Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> - Web-based Training - Pocket Guides - System Support Guides - Training Evaluations <p>Note: References for some of these training materials are listed in the OPM SDLC</p>			
17	<p>Develop User Manual</p> <ul style="list-style-type: none"> • Review the SRS and the User Requirements Document (URD), as needed • Assign User Manual responsibility to Software Development team member(s) • Develop User Manual • Review the SRS • Refer to the SDD and the DBDD for pertinent information • Ensure User Manual is consistent with the actual system operation, the SDD, and the DBDD • Conduct a formal review of the User Manual • Approve (baseline) the User Manual 	<p>Inputs: SRS SDD DBDD URD</p> <p>Outputs: Approved and baselined User Manual</p>	Software Development Lead	Software Development Team Project Team
18	<p>SQA audits the process and products</p> <ul style="list-style-type: none"> • Refer to the SQA Plan for detailed schedules of the processes and products. 	<p>Inputs: SQA Plan Processes and Procedures for Design Phase activities</p> <p>Outputs: SQA Audit Reports</p>	SQA Team	Project Team
19	<p>Update Project Plan</p> <ul style="list-style-type: none"> • Track Project Activity • Update estimates and risks • Update project schedule • Project Plan is reviewed and placed under CM control to be version 	<p>Inputs: Project Plan, WBS Task List, WBS Task Description</p> <p>Outputs:</p>	Technical PM	Project Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	controlled.	Version controlled Project Plan		
20	Project Plan is reviewed and placed under CM control to be version controlled.	Inputs: Updated Project Plan CM Procedures Outputs: Version Controlled Project Plan	Technical PM	CM Team
21	Conduct Phase Exit Review <ul style="list-style-type: none"> • Notify the project team and extended project team (users, POCs, support areas) that a Phase Exit Review has been scheduled. <ul style="list-style-type: none"> - Require that approvers provide feedback at least one week before the exit meeting is to be held. (This will allow the Project manager time to work issues and coordinate action plans prior to the exit meeting) - Invite participants to attend the exit meeting using the Phase Exit Review Memo along with the review material (Project Plan, and any other material relevant to the exiting stage which include but are not limited to known issues, and unplanned deliverables) - The participants should be familiar with planned deliverables since it is standard procedure for them to review drafts as they are developed. <ul style="list-style-type: none"> ➢ If this is not the case a list of the planned deliverables should also be distributed at this time. • Review the current Project Plan (at a minimum, a detailed plan for the next phase and high-level plans for the remainder of the project). • Review other relevant materials to verify if they are in accordance with OPM's SDLC • Receive position from the list of approvers (to include the Technical PM, Business Program Manager or Business Project Manager) using the Position Response Form. This position can be concur, concur with 	Inputs: Phase Deliverables produced during current phase Initial Project Plan prior to updates for next phase Latest version controlled Project Plan New and existing issues, Phase Exit Package Template Outputs: Positions from the approvers, Issues/concerns (if any) from the review of the deliverables, Action plans to resolve all	Technical PM	Project Team Business Program Manager or Business Project Manager, QA Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<p>qualifications, or non-concur. The implication of each is as follows:</p> <ul style="list-style-type: none"> - Concur – Proceed with the project according to the current plan. (Ex. The Approver is unaware of any issues for the current phase) - Concur with qualifications – There are issues or concerns and the project can proceed according to the current plan if an acceptable action plan is developed for each issue or concern by the meeting. (Ex. There is no plan for testing an interface to an existing system that is being changed) - Non-concur – There are very significant issues or concerns and the project should not move to the next phase until those issues or concerns are resolved. (Ex. Funding for the project has been withdrawn) <ul style="list-style-type: none"> • Prepare acceptable action plan to address each issue or concern received. (Note: Sometimes action plans extend beyond the Phase Milestone which is acceptable as long as it will not negatively impact the current project schedule) • Conduct Exit Meeting <ul style="list-style-type: none"> - Present positions from the Approvers, along with issues and/or concerns, and any other issues that may be open - Action plans must be presented for each issue or concern • Document the meeting including positions, issues, concerns, action plans, and follow-up activity • Obtain concurrence on current stage deliverables, and begin the next phase of development 	<p>issues/concerns Risks, Phase Exit Package</p>		

Appendix D.4: Build System Components Phase Activities

Step	Description of Activity	Inputs/Outputs	Lead	Participants
1.	Verify that the Development and Test environment has been	Inputs:	Software	Project Team,

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<p>installed properly</p> <ul style="list-style-type: none"> • Review the Segment Architecture • Review the User Requirements Document (URD) and the Software Requirements Specification (SRS) • Assemble and install the hardware software, communications equipment, databases, and other items required to support the programming and testing effort. 	<p>Segment Architecture, URD, DS, SRS</p> <p>Outputs: Development and test environment in place, Environment configured appropriately for development</p>	Development Lead	Network Team
2.	<p>Review and/or plan coding and testing activities</p> <ul style="list-style-type: none"> • Obtain training on coding and testing methodologies, techniques and tools. • Review the Project Plan for schedule of activities and for any standards or tools that should be used during this phase. • Verify objects included in the Software Design Description and Database Design Description have been included in the schedule and assigned to the appropriate members of the development team 	<p>Inputs: Project Plan, Software Design Description, Database Design Description</p> <p>Outputs: Training, Schedule of activities for coding and testing</p>	Software Development Lead	Project Team, IT Security Team
3.	<p>Code individual software units and database in the programming language(s) selected for the project</p> <p>Note 1: Regardless of the platform, development of code should adhere to a consistent set of programming techniques and error prevention procedures. This will promote reliable, maintainable code, developed in the most efficient and cost effective manner.</p> <ul style="list-style-type: none"> • Review the SDD/DBDD and the SRS • Analyze reuse opportunities <ul style="list-style-type: none"> - Reuse available source code assets found in the Configuration Management Library (CML) - Determine if source code requires classification or security protection - Reuse available test assets 	<p>Inputs: Change Request, SDD, DBDD, SRS, Project Plan, Reusable source code assets</p> <p>Outputs: Developed units, Code reviews</p>	Software Development Lead	Software Development Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> • Develop code <ul style="list-style-type: none"> - If a Computer Aided Software Engineering (CASE) tool is being used, use the tool to generate code from the SDD and DBDD - Generate source code and machine-readable modules. - Generate the physical files and database structure. - Generate video screens, report generation codes, and plotting instructions as applicable. - If conversion of an existing system or data is necessary, generate the program(s) described in the Installation & Conversion Plan (ICP). • Write code instructions in the selected programming language that will perform the logic documented in the SDD/DBDD. • Add comments into the code at appropriate locations to provide clarifications of the function and logic being performed. • The types of software units and programs include but are not limited to: <ul style="list-style-type: none"> - Utility Programs – edit or sort routines, control of user access to functions, or error message handling routines - Input and Output Modules – anticipatory retrieval and caching of data from the database for output, deferred storage or data formatting - Application Programs – performs actual business logic - Command Language – written in operating system command language or job control language and that are used to execute batch jobs, compile programs, execute programs, and control peripheral devices • Update the SDD/DBDD to reflect any required deviations from the documented design. • For a Change to an existing system, implement the changes 			

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<p>as needed</p> <p>Note 2: The developers should meet at scheduled intervals to discuss problems encountered and to facilitate program integration and uniformity</p> <p>Note 3: Program uniformity should be achieved by using a standardized set of naming conventions for programs, data elements, variables, and files.</p> <p>Note 4: All code should be backed up on a daily basis in the CM Library. It should be stored in an offsite location to avoid catastrophic loss if applicable. (See the Project Plan and Configuration Management Plan (CMP) for code backup details.)</p> <ul style="list-style-type: none"> • Review code 			
4.	<p>Compile individual code units and correct errors</p> <ul style="list-style-type: none"> • Compile the source code with error and syntax checking • Identify error messages • Modify the source code to correct the problem • Recompile the program after the changes have been made • Recheck the source code • Repeat the process until no error messages are generated 	<p>Inputs: Developed units, Code reviews, Reusable source code assets</p> <p>Outputs: Error free compiled code</p>	Software Development Lead	Software Development Team
5.	<p>Inspect and modify code</p> <p>Note: The inspection team may include experts outside of the project. Code inspections should be identified as milestones in the Project Plan.</p> <ul style="list-style-type: none"> • Perform a review of code using the coding standards that are referenced in the project plan • Evaluate for: <ul style="list-style-type: none"> - Traceability to the requirements and design of the software item - External consistency with the requirements and design of the software item - Test coverage of the units 	<p>Inputs: Error free compiled code Project Plan,</p> <p>Outputs: Reviewed code</p>	Software Development Lead	Software Development Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> - Appropriateness of coding methods and standards used - Feasibility of the software integration, software testing, operation and maintenance • Provide feedback to developer of code • Update code with comments received from code inspections 			
6.	Expand the Requirements Traceability Matrix (RTM) to reflect the code units and modules Note: Use an automated tool if applicable to update the RTM. Ensure all requirements have been included in a code unit or module	Inputs: Coded units and modules, baselined RTM Outputs: Expanded baselined RTM	Requirements Team	Software Development Lead, Project Team, QA Team, CM Team
7.	Update/Develop Software Test Procedures in the Test Plan (Unit & Integration) <ul style="list-style-type: none"> • Review Test Plan (Unit & Integration) • Review SDD, DBDD, and SRS as applicable • Document a procedure for each unit test to be executed for the program • Examples of what each unit test should contain are as follows: <ul style="list-style-type: none"> - Name of the software module to be tested - Description and objective of the test - Any test stubs or drivers to be used in executing the test - Test data to be used in the test - Job control language to be executed - Expected results - Steps to be taken to execute the test • Review the Test Plan (Unit & Integration) • Version control software test procedures 	Inputs: SDD, DBDD, SRS, Test Plan (Unit & Integration), Test Script Samples Outputs: Updated Test Plan (Unit & Integration)	Software Development Lead	Software Development Team
8.	Execute unit tests and place tested code under configuration control <ul style="list-style-type: none"> • Unit test code 	Inputs: Code, Test Result & Evaluation Report Template,	Software Development Lead	Software Development Team, CM Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> • Test each unit and database ensuring it satisfies its requirements. • Correct any problems found and unit test code again • Repeat this process until no problems are found • Place code (units) under Configuration Management (CM) control • Report integration testing results using Test Results & Evaluation Report Template • Place Test Results & Evaluation Report Template under CM control 	Updated Test Plan (Unit & Integration) Outputs: CM controlled and Unit tested code, Test Results & Evaluation Report		
9.	Define Integration Tests <ul style="list-style-type: none"> • Update the TP (Unit & Integration) as necessary • It should identify the following: <ul style="list-style-type: none"> - Each integration test to be executed - System and program requirements to be tested - Location of each test in the hierarchy of the testing to be performed - Software units and programs that are to be included in the test - Required test data, including database fields - External (or existing) programs needed to support the test - Procedure for reporting errors, test results, and reworking and retesting programs - External APIs/interfaces - Expected test results • Review the Integration Test Procedures • Approve (baseline) software test procedures 	Inputs: Updated Test Plan (Unit & Integration) SDD, DBDD, SRS, Test Script Samples, Unit tested code Outputs: Updated Test Plan (Unit & Integration)	Software Development Lead	Software Development Team, CM Team
10.	Integrate software units and components and test as the aggregates are developed in accordance with the TP (Unit & Integration)	Inputs: Test Plan (Unit & Integration),	Software Development Lead	Software Development Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> • Compile the source code with error and syntax checking • Identify error messages • Modify the source code to correct the problem • Recompile the program after the changes have been made • Recheck the source code • Repeat the process until no error messages are generated • Ensure each aggregate satisfies the requirements of the software item and that the software item is integrated at the conclusion of the integration activity. 	Unit Tested code Outputs: Error free compiled code		
11.	Inspect and modify code <ul style="list-style-type: none"> • Perform a review of code using the coding standards that are referenced in the project plan • Provide feedback to the developer of code • Evaluate the integration with the following criteria in mind: <ul style="list-style-type: none"> - Traceability to the system requirements - External consistency with the system requirements - Internal consistency - Test coverage of the requirements of the software item - Appropriateness of test standards and methods used - Conformance to expected results • Update code with comments received from code inspections 	Inputs: Project Plan Error free Compiled code, Unit Tested Code Outputs: Reviewed code, Modified code	Software Development Lead	Software Development Team
12.	Execute Integration Tests and place code under CM control <ul style="list-style-type: none"> • Create developmental baseline and Build Notification • Conduct integration testing using the TP (Unit & Integration). • Correct any discrepancies and retest code until no discrepancies are found • (Optional) Report integration testing results using Test Results & Evaluation Report Template (some customers may require a report of the integration testing results) • Place code under CM control 	Inputs: Make files/Job Control Language (JCL), Modified code Build Notification Template Test Plan (Unit & Integration) Test Results & Evaluation Report Template Outputs: Updated Make files/JCL,	Software Development Lead	Software Development Team, CM Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> Handoff instructions and code to CM for CM build 	CM controlled and Integration Tested Code, Updated Test Results & Evaluation Report, Build Instructions		
13.	Perform software build (establish baseline) <ul style="list-style-type: none"> Document the internal build procedures and results in the Build Instructions <ul style="list-style-type: none"> Identify errors and describe the corrective action that was taken Distribute Build Notification Handoff software to Software Test Team 	Inputs: CM controlled and Integration Tested Code, Build Instructions, Make files or JCL used to control the build Outputs: Updated Build Instructions, Build Notification, Software Build of code, Updated make files or JCL used to control the build	CM Team	Software Development Team
14.	Develop Version Description Document (VDD) <ul style="list-style-type: none"> Review FRD, SRS, SDD, DS, DBDD, and SSP, and source code and related code documentation Receive input from Developers Draft the VDD plan 	Inputs: FRD, SRS, SDD, DS, DBDD, SSP, Source code, Related code documentation Outputs: Draft VDD	CM Team	Project Team
15.	Develop Verification, Validation, & Testing (VV&T) Plan <ul style="list-style-type: none"> Review FRD, SRS, SDD, DS, DBDD, and SSP Receive user input Review test strategy to include any revision resulting from 	Inputs: FRD, SRS, SDD,	Software Team Test	Project Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<p>the this phase's activities</p> <ul style="list-style-type: none"> • Review the following to ensure they are accurate: <ul style="list-style-type: none"> - Performance requirements - Test methods - Test conditions - Test data criteria • Draft the VV&T plan • Approve (baseline) the VV&T Plan 	<p>DS, DBDD, SSP</p> <p>Outputs: VV&T plan</p>		
16.	<p>Finalize the Training Plan</p> <ul style="list-style-type: none"> • Identify modifications that need to be made to the training approach to reflect the impact of any changes that may have occurred during this phase. Consider the following: <ul style="list-style-type: none"> - Training schedules - Student attendance lists (if applicable) - Training requirements - Training materials • Review the Training Plan • Approve (baseline) Training Plan 	<p>Inputs: SRS, DBDD, SDD</p> <p>Outputs: Finalized Training Plan</p>	Training Team	Project Team
17.	<p>Develop Operations Manual</p> <ul style="list-style-type: none"> • Review SRS, DBDD, SDD • Describe system runs. Include <ul style="list-style-type: none"> - Purpose of each run - Run management requirements - Descriptions of all related files and databases - Requirements and procedures for report generation and reproduction - Any restart and recovery procedures • Review the Operations Manual • Approve (baseline) Operations Manual 	<p>Inputs: SRS, SDD, DBDD</p> <p>Operations Manual (Client-Server) or Enterprise Server Template</p> <p>Outputs: Baselined Operations Manual (Client-Server) or Enterprise Server</p>	Operations Team	Project Team
18.	<p>Develop Installation and Conversion Plan (ICP)</p> <ul style="list-style-type: none"> • Review SRS, DBDD, SDD 	<p>Inputs: ICP Template,</p>	Operations Team	Project Team, IT Security

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> • Develop procedures that must be followed when the system is installed: Include <ul style="list-style-type: none"> - Support materials needed such as Legacy Data Migration Schedule - Personnel requirements - Security requirements - Special training needs if any - Installation schedule - Inventory of hardware and software to be installed - Operation facility requirements - Procedures to be followed during installation • Develop ICP • Review ICP • Approve (baseline) ICP 	SRS, DBDD, SDD Outputs: Baselined ICP		Team
19.	QA audits the Processes and Products	Inputs: Products and processes produced during this phase Outputs: Results from the Reviews and Audits conducted	SQA Team	Project Team
20.	Update Project Plan <ul style="list-style-type: none"> • Track project activities • Update estimates • Update risks • Update schedule • Project Plan is reviewed and placed under CM control to be version controlled. 	Inputs: Project Plan, WBS Task List, WBS Task Description Outputs: version controlled Project Plan	Technical PM	Project Team
21.	Conduct Phase Exit Review <ul style="list-style-type: none"> • Notify the project team and extended project team (users, POCs, support areas) that a Phase Exit Review has been scheduled. 	Inputs: Phase Deliverables produced during current phase, Initial Project Plan prior to	Technical PM	Business Program Manager or Business

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> - Request that approvers provide feedback at least one week before the exit meeting is to be held. (This will allow the Technical Project Manager time to work issues and develop action plans prior to the exit meeting) - Invite participants to attend the exit meeting using the Phase Exit Review Memo along with the review material (Project Plan, and any other material relevant to the exiting stage which include but are not limited to known issues, and unplanned deliverables) - The participants should be familiar with planned deliverables since it is standard for them to review drafts as they are developed. <ul style="list-style-type: none"> ➤ If this is not the case a list of the planned deliverables should also be distributed at this time. • Review the current Project Plan (at a minimum, a detailed plan for the next phase and high-level plans for the remainder of the project). • Review other relevant materials to verify if they are in accordance with OPM’s SDLC • Receive position from the list of approvers (to include the Technical PM, Business Program Manager or Business Project Manager) using the Position Response Form. This position can be concur, concur with qualifications, or non-concur. The implication of each is as follows: <ul style="list-style-type: none"> - Concur – Proceed with the project according to the current plan. (Ex. The Approver is unaware of any issues for the current phase) - Concur with qualifications – There are issues or concerns and the project can proceed according to the current plan if an acceptable action plan is developed for each issue or concern by the meeting. (Ex. There is no 	<p>updates for next phase, Latest version controlled Project Plan, New and existing issues, Phase Exit Package Template</p> <p>Outputs: Positions from the approvers, Issues/concerns (if any) from the review of the deliverables, Action plans to resolve all issues/concerns Risks, Phase Exit Package</p>		<p>Project Manager, Project Team</p>

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<p>plan for testing an interface to an existing system that is being changed)</p> <ul style="list-style-type: none"> - Non-concur – There are very significant issues or concerns and the project should not move to the next phase until those issues or concerns are resolved. (Ex. Funding for the project has been withdrawn) • Prepare acceptable action plan to address each issue or concern received. (Note: Sometimes action plans extend beyond the Phase Milestone and that is acceptable as long as it will not negatively impact the current Project Plan) • Conduct Exit Meeting <ul style="list-style-type: none"> - Present positions from the Approvers, along with issues and/or concerns, and any other issues that may be open - Action plans must be presented for each issue or concern <p>Document the meeting including positions, issues, concerns, action plans, and follow-up activity Obtain concurrence on current stage deliverables, and begin the next phase of development</p>			

Appendix D.5: Evaluate System Readiness Phase Activities

Step	Description of Activity	Inputs/Outputs	Lead	Participants
1.	<p>Finalize the Test Environment and components of the test to be executed.</p> <ul style="list-style-type: none"> • Verify the system test environment meets the specific requirements related to the actual production system. <ul style="list-style-type: none"> - Ensure the hardware has been installed and that computer time has been made available for the test team (if the tests are to be run using the production hardware). 	<p>Inputs: Verification, Validation & Testing (VV&T) Plan</p> <p>Outputs: Finalized test environment, Test procedures, Test data, Updated VV&T Plan</p>	Test Team	Project Team, IT Security Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> - Ensure security access to files and data base areas are in place for the test. • Finalize Test Procedures and Scenarios by making any necessary changes to the procedures in the following areas: <ul style="list-style-type: none"> - Objectives of each test or test description, - Resources needed to execute the test, - Steps to be taken to execute the test, - Expected results. • Finalize Test Data <ul style="list-style-type: none"> - Modify the data, if necessary, to allow all test conditions to be executed. - Make any necessary final modifications to the test data by using utilities provided by the Database Management System (DBMS), Structured Query Language (SQL) or other data manipulation tools. 			
2.	<p>Prepare to execute tests, begin execution of tests, and verify results:</p> <ul style="list-style-type: none"> • Review the following: <ul style="list-style-type: none"> - VV&T Plan, - OPM’s IT Security Policy, - System Security Plan (SSP), - Software Requirements Specification (SRS), - Test Results & Evaluation Report (Unit & Integration Results), - Related opened and deferred, Change Requests (CRs). • Verify: <ul style="list-style-type: none"> • Access and data security requirements are met and procedures to assign and activate user IDs. • Under normal and high-load conditions: <ul style="list-style-type: none"> - System response timing, - Memory, - Performance, 	<p>Inputs: Finalized test environment, Test procedures, Test data, Updated VV&T Plan, OPM’s IT Security Policy, SSP, SRS, Test Results & Evaluation Report (Unit & Integration Results), Opened/deferred CRs Software components</p> <p>Outputs: Refreshing of the test activities and related material</p>	Test Team	Project Team, Business Program Manager or Business Project Manager/Users, IT Security Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> - Security and functional accuracy of logic and numerical calculations, - Query and report capabilities • Any inter-system incompatibilities, performance inadequacies or other deficiencies due to ambiguities or omissions in the systems requirements. • Follow the steps necessary to execute each test procedure (or scenario) as documented in the VV&T Plan. <ul style="list-style-type: none"> - If additional steps are necessary to execute the test, record the additional steps in the test procedure documentation. <p>Note 1: Users are expected to participate in the system tests to gain their confidence in the software product and to receive an early indication of any problems from the user’s perspective.</p> <p>Note 2: Inform users that errors and discrepancies may occur during testing and explain the error correction, configuration management and retest process.</p>	Tested software components Test results		
3.	Record and Verify Test Results <ul style="list-style-type: none"> • Upon completion of individual tests identified in the VV&T Plan, compare the actual results against expected results • If deviations from the expected results are discovered, review the predetermined results to ensure the results are correctly stated. • Record and track results in the Test Results and Evaluation Report each time a test or retest is performed and log the information in chronological order to serve as a historical document of the test. <p>Note: Any failed components should be migrated back to the Build Phase for rework and passed components should be migrated ahead for security testing.</p>	Inputs: Tested software components VV&T Plan Test results Outputs: Change Requests (CRs), Test Results and Evaluation Report	Test Team	Project Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
4.	<p>Report findings (discrepancies) by completing a CR</p> <p>Note: Supporting documentation may include images of the test data before and after the test was executed, series of screen shots with narratives showing the exact sequence of events that led up to the error and actual system reports with errors highlighted</p> <ul style="list-style-type: none"> • If appropriate, minor problems can be corrected and regression tested by the project team programmers within the time frame allotted for the system testing. • If corrective action tool is used, record findings in tool. • If tool is not used, use the CR Form to record findings. 	<p>Inputs: Tested software components Test results, CR Form if applicable</p> <p>Outputs: CRs</p>	Test Team	Project Team
5.	<p>Submit CRs to Configuration Control Board</p> <ul style="list-style-type: none"> • Any corrections or changes to the software product must be controlled under configuration management. • Major problems may be cause to suspend or terminate the system test, which should then be rescheduled to begin after all of the problems are resolved. 	<p>Inputs: CRs</p> <p>Outputs: Decision made on CRs from the CCB</p>	Test Team	Project Team, CM Team
6.	<p>Retest corrections submitted</p> <p>Repeat steps 2-6 as appropriate until all tests have been executed and documented in the Test Results and Evaluation Report</p>	<p>Inputs: Reworked modules</p> <p>Outputs: Completely tested modules</p>	Test Team	CM Team
7.	<p>Evaluate the Results</p> <ul style="list-style-type: none"> • Compile the outcome of each individual test documented in the VV&T plan into the Test Results & Evaluation Report along with evaluation of test methods and test procedures. • Compare the test results to the expected results recorded as part of the test documentation • Submit the Test Results and Evaluation Report to the CCB for final review and approval (baseline) • Close out any open CRs 	<p>Inputs: Test Result VV&T Plan Open CRs</p> <p>Outputs: Test Results and Evaluation Report Risk Assessments Closed CRs</p>	Test Team	Project Team, IT Security Team
8.	Expand the Requirements Traceability Matrix (RTM) to reflect	Inputs:	Requirements Team	Software

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<p>the test cases.</p> <p>Note: Use an automated tool if applicable to update the Traceability Matrix.</p> <p>Ensure all requirements have been included in a test case.</p>	<p>Verification, Validation, & Testing Plan (test cases), SDD, DBDD</p> <p>baselined RTM</p> <p>Outputs: Updated baselined RTM</p>		<p>Development Lead, Project Team, QA Team, CM Team</p>
9.	<p>Conduct Configuration Audit</p> <ul style="list-style-type: none"> Assess whether the system, subsystem or configuration item meets its technical requirements and if any adhoc changes are scheduled for the delivery 	<p>Inputs: System Subsystem Configuration items</p> <p>Outputs: Configuration Audit Report</p>	CM Team	Project Team
10.	<p>Update the Version Description Document (VDD)</p> <ul style="list-style-type: none"> Review Build Notification, Functional Requirements Document (FRD), SRS, Software Design Description (SDD), Data Specification (DS), Database Design Description (DBDD), and SSP, and source code and related code documentation Receive input from Developers if necessary Update the VDD with new information if applicable 	<p>Inputs: Build Notification FRD SRS SDD DS DBDD SSP Source code Related code documentation</p> <p>Outputs: Updated VDD</p>	CM Team	Project Team
11.	<p>Finalize the Installation & Conversion Plan (ICP)</p> <ul style="list-style-type: none"> Update as required the ICP based on any modifications necessary to the system as a result of testing. Address all applicable installation and conversion procedures including pilot and production sites. Sample problems or applications should be provided as test cases to ensure correct installation and operation. 	<p>Inputs: Modifications ICP</p> <p>Outputs: Updated and baselined ICP</p>	Operations Team	<p>CM Team Project Team</p>

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> • Conduct a formal review of the ICP • Approve (baseline) the ICP 			
12.	<p>Test Training Material as required.</p> <ul style="list-style-type: none"> • Review the Training Plan and SRS • Review the applicable training materials that are defined in the Training Plan and SRS • Examples of these materials include: <ul style="list-style-type: none"> - Lesson Plans - User Training Guides - Computer-based Training (CBT) - Web-based Training - Pocket Guides - System Support Guides - Training Evaluations <p>Note: References for some of these training materials are listed in the OPM SDLC</p>	<p>Inputs: Training Plan SRS Training Materials</p> <p>Outputs: Tested Training Materials</p>	Training Team	Project Team
13.	<p>Test User Manual</p> <ul style="list-style-type: none"> • Review the SRS and the User Requirements Document (URD), as needed • Test the User Manual as applicable • Refer to the SDD and the DBDD for pertinent information • Ensure User Manual is consistent with the actual system operation, the SDD, and the DBDD 	<p>Inputs: SRS, SDD, DBDD, URD, User Manual</p> <p>Outputs: Tested User Manual</p>	Software Development Lead	Software Development Team Project Team
14.	<p>Complete the Security Assessment and Authorization (SA&A) for the system.</p> <ul style="list-style-type: none"> • Review OPM's IT Security and Privacy Policy • Create the SA&A package which includes: <ul style="list-style-type: none"> - SSP - Project Plan (Risk Assessment and Mitigation section) - VV&T (security section) - Test Results and Evaluation Report (security section) 	<p>Inputs: OPM's IT Security and Privacy Policy, SSP, Project Plan (Risk Assessment and Mitigation section), VV&T (security section), Test</p>	Technical PM	Security Team, Test Team, Project Team, Certifying Official (CO)

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> - Certification Statement - Accreditation Recommendation • Ensure that the steps outlined in the OPM IT Security and Privacy Policy, which are applicable to the type of software that was developed, have been completed 	Results and Evaluation Report (security section) Outputs: SA&A Package		
15.	Seek Authorization by the Authorizing Official (AO) by submitting the SA&A Package <ul style="list-style-type: none"> • The AO can make one of the three authorization decisions: <ul style="list-style-type: none"> - Authorize the system to operate - Grant interim operating approval for a specific time pending satisfactory completion of satisfied requirements - Deny permission to operate until identified deficiencies are corrected 	Inputs: SA&A Package Outputs: AO decision	AO	Project Team, CO, IT Security Team
16.	SQA audits the process and products	Inputs: Processes and procedures for Evaluation Phase Outputs: QA Audit Reports	SQA Team	Project Team
17.	Update Project Plan <ul style="list-style-type: none"> • Determine if the project estimates for resources, cost, and schedule need to be revised. • Review the Project Plan for accuracy and completeness of all of this phase's activities. • Project Plan is reviewed and placed under CM control to be version controlled. 	Inputs: Project Plan, WBS Task List, WBS Task Description Outputs: Version controlled Project Plan	Technical PM	Project Team
18.	Conduct Phase Exit Review Notify the project team and extended project team (users, POCs, support areas) that a Phase Exit Review has been scheduled. <ul style="list-style-type: none"> - Request that approvers provide feedback at least one week before the exit meeting is to be held. (This will 	Inputs: Phase Deliverables produced during current phase, Initial Project Plan prior to updates for next phase, Updated Project Plan,	Technical PM	Business Program Manager or Business Project Manager,

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<p>allow the Project manager time to work issues and develop action plans prior to the exit meeting)</p> <ul style="list-style-type: none"> - Invite participants to attend the exit meeting using the Phase Exit Review Memo along with the review material (Project Plan, and any other material relevant to the exiting stage which include but are not limited to known issues, and unplanned work product(s)) - The participants should be familiar with planned deliverables since it is common practice for them to review drafts as they are developed. If this is not the case, a list of the planned deliverables should also be distributed at this time. <ul style="list-style-type: none"> • Review the current Project Plan (at a minimum, a detailed plan for the next phase and high-level plans for the remainder of the project). • Review other relevant materials to verify if they are in accordance with OPM’s SDLC • Receive position from the list of approvers (to include the Technical PM, IPT members, Business Program Manager or Business Project Manager) using the Position Response Form. This position can be concur, concur with qualifications, or non-concur. The implication of each is as follows: <ul style="list-style-type: none"> - Concur – Proceed with the project according to the current plan. (Ex. The Approver is unaware of any issues for the current phase) - Concur with qualifications – There are issues or concerns and the project can proceed according to the current plan if an acceptable action plan is developed for each issue or concern. (Ex. There is no plan for testing an interface to an existing system that is being changed) - Non-concur – There are very significant issues or 	<p>New and existing issues</p> <p>Outputs:</p> <p>Positions from the approvers, Issues/concerns (if any) from review of the deliverables, Action plans to resolve all issues/concerns, Concurrence</p>		<p>Project Team</p>

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<p>concerns and the project should not move to the next phase until those issues or concerns are resolved. (Ex. operating system changed during development)</p> <ul style="list-style-type: none"> • Prepare acceptable action plan to address each issue or concern received. (Note: Sometimes action plans extend beyond the Phase Milestone and that is acceptable as long as it will not negatively impact the current Project Plan) • Conduct Exit Meeting <ul style="list-style-type: none"> - Present positions from the Approvers, along with issues and/or concerns, and any other issues that may be open <p>Action plans must be presented for each issue or concern</p> <ul style="list-style-type: none"> • Document the meeting including positions, issues, concerns, action plans, and follow-up activity • Obtain concurrence on current phase deliverables, and begin the next phase of development 			

Appendix D.6 : Deploy the System Phase Activities

Step	Description of Activity	Inputs/Outputs	Lead	Participants
1.	<p>Prepare the pilot (test) site for installation</p> <ul style="list-style-type: none"> • Ensure the pilot environment is correctly established by reviewing all equipment and site facilities. <ul style="list-style-type: none"> - Notify affected personnel and organizations about the upcoming installing and conversion, and schedule meetings to ensure that all affected personnel are aware of any procedural changes. - Consider selecting a site that is most closely aligned with the most complex installation as possible to ensure that all installation and operational issues are 	<p>Inputs: ICP</p> <p>Outputs: Review of the environment</p>	Operations Team	Project Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<p>adequately tested</p> <ul style="list-style-type: none"> - At the pilot site, perform a review of the equipment and physical environment where the equipment will be located to ensure that all safety regulations have been followed and that the installation and conversion procedures were carried out in accordance with the Installation Conversion Plan (ICP) 			
2.	<p>Execute the ICP at the pilot site</p> <ul style="list-style-type: none"> • Install the hardware and software for the new system at the pilot site in accordance with the ICP. • Verify that only required hardware and software are installed in the pilot test environment • Convert or install the necessary data and databases and initiate system performance monitoring functions 	<p>Inputs: ICP System hardware System software</p> <p>Outputs: Installation and conversion of the system</p>	Operations Team	Project Team
3.	<p>Control Pilot Environment</p> <ul style="list-style-type: none"> • Ensure that the integrity of the system is preserved during installation. • Review the list of equipment to ensure that all components necessary for the pilot site are installed. 	<p>Inputs: Pilot environment</p> <p>Outputs: controlled pilot environment</p>	Operations Team	Project Team
4.	<p>Complete the pilot tests</p> <ul style="list-style-type: none"> • Verify by inspection or test that data conversion has been implemented correctly. • If problems are encountered, follow the problem resolution procedures defined in the ICP 	<p>Inputs: ICP installed and converted system</p> <p>Outputs: Passed pilot tests</p>	Operations Team	Project Team
5.	<p>Conduct Pilot Site Training</p> <ul style="list-style-type: none"> • Complete the training modules, acquire the necessary training resources, schedule the training sessions, and notify the system users about the schedule • Monitor training activities to determine if the selected training techniques are achieving the desired results • Analyze feedback received from personnel attending the 	<p>Inputs: Training Plan</p> <p>Outputs: Feedback from training conducted</p>	Training Team	Project Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	pilot training sessions, and based on this analysis, refine the training procedures/materials to ensure the training objectives are met			
6.	<p>Determine Pilot Readiness</p> <ul style="list-style-type: none"> • Notify the Project Sponsor and user organization that piloting activities are ready to begin • Be prepared to discuss the steps of the installation process, the equipment installed, and tests performed to show the users that the system is ready to be used in the pilot environment 	<p>Inputs: Feedback from training conducted Pilot test results ICP</p> <p>Outputs: System that is ready to be operated in the pilot environment</p>	Technical PM	Project Team Business Program Manager or Business Project Manager
7.	<p>Operate the system in the Pilot Environment</p> <ul style="list-style-type: none"> • Ensure the system performs the transactions or functions for which it was designed <ul style="list-style-type: none"> - System performance meets or exceeds required capabilities - Necessary computer time has been scheduled for the system - Resources necessary for the system to run correctly are available - Personnel are available to run the pilot system in parallel with the existing systems 	<p>Inputs: User's Manual</p> <p>Outputs: System operating in the pilot environment</p>	Operations Team	Project Team
8.	<p>Document results and make recommendations</p> <ul style="list-style-type: none"> • Document system performance and problems in a Pilot Test Report or documentation can be created by automated techniques, such as: <ul style="list-style-type: none"> - Using the operating system's ability to capture information concerning Central Processing Unit (CPU) time - Disk input and output - Number of lines printed 	<p>Inputs: System operating in the pilot environment</p> <p>Outputs: Results and recommendations based on the system's reaction to operating in the pilot environment</p>	Operations Team	Project Team

OPM System Development Life Cycle Policy and Standards

Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<ul style="list-style-type: none"> - Elapsed time - The number of jobs or steps processed. 			
9.	<p>Approve System in Pilot Environment</p> <ul style="list-style-type: none"> • Review Pilot Test Results with the Business Program Manager or Business Project Manager, Technical PM. • Highlight: <ul style="list-style-type: none"> - Project requirements and functions performed in the pilot environment, - Results of pilot operation, - Any outstanding system problems • Receive approval to move forward to promote system to production. 	<p>Inputs: Results and recommendations based on the system's reaction to operating in the pilot environment</p> <p>Outputs: Approval to promote system to production</p>	Operations Team	Business Program Manager or Business Project Manager Technical PM
10.	<p>Establish Production Baseline</p> <ul style="list-style-type: none"> • Maintain strict version and configuration control over this baseline • Conduct periodic audits to verify that only approved requirements and changes are incorporated into the baseline • Ensure Service Level Agreements (SLA) or Operating Level Agreements (OLA) are ready to be implemented for the production environment 	<p>Inputs: All software related products Established system CM procedures Established SLA/OLA</p> <p>Outputs: Controlled production baseline</p>	CM Team	Project Team, Business Program Manager or Business Project Manager
11.	<p>Conduct Training for all users</p> <ul style="list-style-type: none"> • Modify training materials to reflect any corrections or changes to the system that may have resulted from deficiencies found during pilot testing • Schedule training classes for all affected personnel • Ensure that training facilities and equipment have been reserved in advance • Conduct training sessions in accordance with the Training Plan • Elicit feedback from personnel to ensure training 	<p>Inputs: Training Plan Training Materials</p> <p>Outputs: Updated Training Plan Updated Training Materials Feedback from training</p>	Training Team	Project Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<p>objectives were met</p> <ul style="list-style-type: none"> • Evaluate effectiveness of training • Make recommendations for changes to training procedures or materials to ensure that training objectives are met • Respond to recommendations made as a result of analyzing feedback 			
12.	<p>Prepare the production site for installation</p> <ul style="list-style-type: none"> • Ensure the production environment is correctly established by reviewing all equipment and site facilities. <ul style="list-style-type: none"> - Notify affected personnel and organizations about the upcoming installing and conversion, and schedule meetings to ensure that all affected personnel are aware of any procedural changes. - At the production site, perform a review of the equipment and physical environment where the equipment will be located to ensure that all safety regulations have been followed and that the installation and conversion procedures were carried out in accordance with the ICP 	<p>Inputs: ICP Outputs: review of the environment</p>	Operations Team	Project Team
13.	<p>Execute the ICP at the production site</p> <ul style="list-style-type: none"> • Install the hardware and software for the new system at the production site in accordance with the ICP. • Install the system in production mode and establish user password and security authorization when required • Complete all conversions of data and databases 	<p>Inputs: ICP Hardware Software Outputs: Installation and conversion of the system</p>	Operations Team	Project Team, IT Security Team
14.	SQA audits the process and products	<p>Inputs: Products and processes produced during this phase Outputs: SQA Audit Reports</p>	SQA Team	Project Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
15.	<p>Update Project Plan</p> <ul style="list-style-type: none"> • Determine if the project estimates for resources, cost, and schedule need to be revised. • Review the Project Plan for accuracy and completeness of all of this phase's activities. • Project Plan is reviewed and placed under CM control to be version controlled. 	<p>Inputs: Project Plan, WBS Task List, WBS Task Description</p> <p>Outputs: Version controlled Project Plan</p>	Technical PM	Project Team
16.	<p>Conduct Phase Exit Review</p> <ul style="list-style-type: none"> • Notify the project team and extended project team (users, POCs, support areas) that a Phase Exit Review has been scheduled. <ul style="list-style-type: none"> - Request that approvers provide feedback at least one week before the exit meeting is to be held. (This will allow the Project manager time to work issues and develop action plans prior to the exit meeting) - Invite participants to attend the exit meeting using the Phase Exit Review Memo along with the review material (Project Plan, and any other material relevant to the exiting stage which include but are not limited to known issues, and unplanned deliverables) - The participants should be familiar with planned deliverables since it is standard procedure for them to review drafts as they are developed. If this is not the case, a list of the planned deliverables should also be distributed at this time. • Review the current Project Plan for task completion • Review other relevant materials to verify if they are in accordance with OPM's SDLC • Receive position from the list of approvers (to include the Technical PM, IPT members, Business Program Manager or Business Project Manager) using the Position Response Form. This position can be concur, concur with 	<p>Inputs: Phase Deliverables produced during current phase Initial Project Plan prior to updates for production rollout Updated Project Plan New and existing issues</p> <p>Outputs: Issues Plans for addressing issues Risks</p>	Technical PM	Project Team

OPM System Development Life Cycle Policy and Standards

Step	Description of Activity	Inputs/Outputs	Lead	Participants
	<p>qualifications, or non-concur. The implication of each is as follows:</p> <ul style="list-style-type: none"> - Concur – Proceed with the project according to the current plan. (Ex. The Approver is unaware of any issues for the current phase) - Concur with qualifications – There are issues or concerns and the project can proceed according to the current plan if an acceptable action plan is developed for each issue or concern by the meeting. (Ex. There is no plan for testing an interface to an existing system that is being changed) - Non-concur – There are very significant issues or concerns and the project should not move to production until those issues or concerns are resolved. (Ex., Operating system changed during development) • Prepare acceptable action plan to address each issue or concern received. (Note: Sometimes action plans extend beyond the Phase Milestone and that is acceptable as long as it will not negatively impact the current Project Plan) • Conduct Exit Meeting <ul style="list-style-type: none"> - Present positions from the Approvers, along with issues and/or concerns, and any other issues that may be open - Action plans must be presented for each issue or concern • Document the meeting including positions, issues, concerns, action plans, and follow-up activity • Obtain concurrence on current phase deliverables, and begin the rollout into production 			
17.	Complete the System Sign-off Package with approval by the Technical PM and Business Program Manager or Business Project Manager concurrent approval	Inputs: Installation and conversion of the system	Technical PM	Business Program Manager or

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
		Outputs: System Sign-off Package		Business Project Manager

Appendix D.7: Decommission the System Phase

Step	Description of Activity	Inputs/Outputs	Lead	Participants
1.	Complete the Decommission Form. <ul style="list-style-type: none"> • Fill in and complete the decommission form as much as possible • Some information may need to be filled in as the system is decommissioned 	Inputs: Identified Need or a Change Request (CR) Decommission Form Template Outputs: Filled in Decommission Form	System Owner	Technical Advisor, IT Security Team
2.	Announce the decommissioning of the target system. <ul style="list-style-type: none"> • Notify all known users of the system of: <ul style="list-style-type: none"> - The decision to terminate the operation of the system before the actual termination date - The planned date after which the system will no longer be available - Include those responsible for other interfacing systems, and operations staff members involved in running the system 	Inputs: Filled in Decommission Form Outputs: Notification of the system be decommissioned	System Owner	IT Security Team
3.	Begin decommissioning the target system. <ul style="list-style-type: none"> • Decommission the target system • Coordinate with affected systems that need data/files transferred/migrated • Coordinate with replacement system PM team to ensure 	Inputs: Target System System artifacts and files Outputs: Archived files and artifacts Equipment/facilities prepared	System Technical Project Manager	Project Team supporting the targeted system, IT Security Team

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Step	Description of Activity	Inputs/Outputs	Lead	Participants
	smooth transition from the old system to the new	for disposal		
4.	Modify affected system interfaces as required.	Inputs: Change Request System interface agreement System design document Outputs: Modified systems	Affected system PMs	Affected system project teams
5.	Test affected systems.	Inputs: System test plan Outputs: Test Results and Evaluation Report	Affected system PMs	Affected system project teams
6.	Update policies and procedures. <ul style="list-style-type: none"> • Based on changes to the system, make changes to the policies and procedures affected by the decommissioning 	Inputs: Change Request Modified systems Outputs: Updated policies and procedures	Affected System Owners	Program Office Personnel/users
7.	Conduct system close out review. <ul style="list-style-type: none"> • Notify the project team and applicable stakeholders (users, support areas, etc) that a System Closeout Review has been scheduled. • Review the status of the decommissioned system and affected systems <ul style="list-style-type: none"> - Archived files and artifacts - Equipment/facilities prepared for disposal - Affected systems status and test results • Document the meeting 	Inputs: Completed Decommission Form Test Results and Evaluation Report(s) Outputs: Meeting minutes	System Owner/Business Program Manager or Business Project Manager	Project Team Executive Sponsor Others as needed, IT Security Team

APPENDIX E: PROJECT CATEGORIES AND PROJECT DOCUMENTATION LEVEL

Appendix E.1: Project Categories

In order to determine the level of SDLC documentation required for a project, the Business Program Manager or Business Project Manager must determine the Project Category within the areas discussed below:

- Appendix E.1.1 - Determine type of development
- Appendix E.1.2 - Estimated funding for the project
- Appendix E.1.3 - Duration of the project
- Appendix E.1.4 - Project Risk
- Appendix E.1.5 - Project Complexity
- Appendix E.1.6 - Special Interests

Appendix E.1.1: Determine type of development

The Business Program Manager or Business Project Manager determines the type of development needed to support the project.

The type of development is chosen from the following types:

- New - A system will be implemented where no system currently exists with the intended functionality or will replace an existing system.
- COTS (base) - A project that will implement a Commercial Off-the-Shelf (COTS) product requiring no modifications and no integration to other systems.
- Cloud (base) – A project that will implement a Cloud solution requiring no modifications and no integration to other systems
- COTS (modification) - A project that will implement a Commercial Off-the-Shelf (COTS) product requiring modifications or integration to other systems.
- Cloud (modification) – A project that will implement a Cloud solution requiring modifications or integration to other systems.
- Enhancement - A project that will require changes to an existing system’s architecture or interface.
- Maintenance - A project that will make changes to an existing system, but not change the architecture or interfaces.

Appendix E.1.2: Funding for the project.

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The Business Program Manager or Business Project Manager determines the initial estimated cost of the project and the authorized funding. At the current time, a project is funded at either less than \$50,000; between \$50,000 and \$100,000; or it is over \$100,000

Appendix E.1.3: Duration of the project

The Business Program Manager or Business Project Manager has reviewed the project needs and determined the estimated time required to development the system. At the current time, a project is either less than 6 months or it is over 6 months.

Appendix E.1.4: Project Risk

The Business Program Manager or Business Project Manager will have reviewed all external and internal factors which can affect the project. These factors will determine the project risk. At the current time, a project can have risk levels that are low, medium and high.

Appendix E.1.5: Project Complexity

The Business Program Manager or Business Project Manager has reviewed the project needs and determined that a project has a certain level of interdependencies. Those interdependencies will affect the project's complexity and be rated low, medium or high.

Appendix E.1.6: Special Interests

There are potential internal and external factors which can affect the project. Some examples would be new presidential directives or other Federal Government directives. The Business Program Manager or Business Project Manager will need to indicative yes or no as to whether the project is affected by internal and external factors.

Appendix E.2: Project Documentation Level

After the Business Program Manager or Business Project Manager has reviewed and determined the Project Categories in Appendix E.1, the Project Documentation Level should be determined. The Project Documentation Level will consist of five levels:

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Project Categories	Project Documentation Level
<p>New Development or COTS (modification) or Cloud (modification)</p> <ul style="list-style-type: none"> – Cost estimation of less than \$50,000 or, – Project duration less than 3 months or, – low Risk or, – low Complexity <p>and</p> <ul style="list-style-type: none"> – no special interest 	1
<p>New Development or COTS (modification) or Cloud (modification)</p> <ul style="list-style-type: none"> – Cost estimation of greater than \$50,000 but less than \$100,001 or, – Project duration greater than 3 months and less than 6 months or, – medium Risk or, – medium Complexity <p>and</p> <ul style="list-style-type: none"> – no special interest 	2
<p>Maintenance, Enhancement, COTS (base) or Cloud (base)</p> <ul style="list-style-type: none"> – Cost estimation of less than \$100,001 or, – Project duration less than 6 months or, – low to medium Risk or, – low to medium Project Complexity <p>and</p> <ul style="list-style-type: none"> – no special interest 	3
<p>New Development or COTS (modification) or Cloud (modification)</p> <ul style="list-style-type: none"> – Cost estimation greater than \$100,000 or, – Project duration greater than 6 months or, – high Risk or, – high Complexity or, – special interest 	4
<p>Maintenance, Enhancement, COTS (base) or Cloud (base)</p> <ul style="list-style-type: none"> – Cost estimation of greater than \$100,000 or, – Project duration greater than 6 months or, – High Risk or, – High Complexity or, – Special Interest 	5

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Appendix E.2.1: Project Documentation Level 1

Project Documentation Level 1 supports projects encompassing new development less than \$50,000, less than 3 months duration, low risk, low complexity and no special interest.

Deliverables	Determine Need	Define Requirements	Develop Design	Build Components	Evaluate Readiness	Deploy System
Needs Statement	Create					
User Requirements Document	Create					
Project Plan		Create	Update	Update	Update	Update
Quality Assurance Plan		Create	Update	Update	Update	Update
Software Requirements Specification		Create				
Requirements Traceability Matrix (RTM)		Create	Update	Update	Update	Update
Test Plan (Unit & Integration)		Create	Update			
Training Plan		Create	Update			
Software Design Description			Create			
Information Systems Security Plan			Create			
Verification, Validation & Testing Plan				Create		
Installation/Conversion Plan				Create		
Test Results & Evaluation Report (Unit & Integration)				Create		
Test Results & Evaluation Report (VV&T)					Create	
Operations Manual				Create	Update	
User Manual					Create	
Training Materials					Create	
System Assessment and Authorization					Create	
System Sign-off Package						Create
Phase Exit Package	Create	Create	Create	Create	Create	Create

Legend: Create – Create the documentation, Update – Update the documentation,

Appendix E.2.2: Project Documentation Level 2

Project Documentation Level 2 supports projects encompassing new development between \$50,000 and \$100,000, greater than 3 months but less than 6 months in duration, medium risk, medium complexity and no special interest.

Deliverables	Determine Need	Define Requirements	Develop Design	Build Components	Evaluate Readiness	Deploy System
Needs Statement	Create					

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Deliverables	Determine Need	Define Requirements	Develop Design	Build Components	Evaluate Readiness	Deploy System
User Requirements Document	Create					
Project Plan		Create	Update	Update	Update	Update
Configuration Management Plan		Create	Update	Update	Update	Update
Quality Assurance Plan		Create	Update	Update	Update	Update
Risk Matrix		Create	Update	Update	Update	Update
Data Specification		Create				
Software Requirements Specification		Create				
Requirements Traceability Matrix (RTM)		Create	Update	Update	Update	Update
Test Plan (Unit & Integration)		Create	Update			
Training Plan		Create	Update			
Software Design Description			Create			
Database Design Description			Create			
Information Systems Security Plan			Create			
Version Description Document				Create		
Verification, Validation & Testing Plan				Create		
Installation/Conversion Plan				Create		
Test Results & Evaluation Report (Unit & Integration)				Create		
Test Results & Evaluation Report (VV&T)					Create	
Operations Manual				Create	Update	
User Manual					Create	
Training Materials					Create	
System Assessment and Authorization					Create	
System Sign-off Package						Create
Phase Exit Package	Create	Create	Create	Create	Create	Create

Legend: Create – Create the documentation, Update – Update the documentation,

Appendix E.2.3: Project Documentation Level 3

Project Documentation Level 3 supports projects encompassing maintenance or system enhancements as well as Cloud or COTS requiring no modifications under \$100K, less than 6 months in duration, low to medium risk, low to medium complexity and no special interest.

- Projects implementing a Cloud or COTS solution with no modification require a Need Statement document to be developed. The project commences with the creation of a Project Plan in the Design Phase.
- Projects requiring maintenance or system enhancement may require a change to the system architecture or interfaces. The need is documented on a CR that has been approved by a CCB. Once the CR has passed through the Needs Phase, the project commences at Develop System Design Phase. The maintenance and enhancement changes could be implemented directly in the production environment with system documentation updated as needed.

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Deliverables	Determine Need	Define Requirements	Develop Design	Build Components	Evaluate Readiness	Deploy System
Needs Statement	Create for Cloud or COTS (base)					
Change Request	Create for maintenance /enhancement					
Project Plan			Create for COTS (base)/ Update	Update	Update	Update
Configuration Management Plan			Create for COTS (base)/ Update	Update	Update	Update
Quality Assurance Plan			Create for COTS (base)/ Update	Update	Update	Update
Risk Matrix			Create for COTS (base)/ Update	Update	Update	Update
Data Specification			Update	Update		
Software Requirements Specification			Update	Update		
Requirements Traceability Matrix (RTM)			Update	Update	Update	Update
Test Plan (Unit & Integration)			Create for COTS (base)/ Update			
Training Plan			Create for COTS (base)/ Update			
Software Design Description			Update			
Database Design Description			Update			
Information Systems Security Plan			Create for COTS (base)/ Update			
Version Description Document				Update		
Verification, Validation & Testing Plan				Create for COTS (base)/ Update		

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Deliverables	Determine Need	Define Requirements	Develop Design	Build Components	Evaluate Readiness	Deploy System
Installation/Conversion Plan				Create for COTS (base)/ Update		
Test Results & Evaluation Report (Unit & Integration)				Create		
Test Results & Evaluation Report (VV&T)					Create	
Operations Manual				Create	Update	
User Manual				Create for COTS (base)	Update	
Training Materials				Create for COTS (base)	Update	
System Assessment and Authorization					Create for COTS (base)/ Update	
Phase Exit Package			Create	Create	Create	Create
System Sign-off Package						Create

Legend : Create – Create the documentation, Update – Update the documentation

Appendix E.2.4: Project Documentation Level 4

Project Documentation Level 4 supports projects encompassing new development, Cloud or COTS product integration over \$100,000, project duration over 6 months, high risk projects, high complexity projects or special interest projects.

Deliverables	Determine Need	Define Requirements	Develop Design	Build Components	Evaluate Readiness	Deploy System
Needs Statement	Create					
Change Request						
IT Investment Analysis Package	Create					
Feasibility Study	Create					
Cost Benefit Analysis	Create					
User Requirements Document	Create					
Project Plan		Create	Update	Update	Update	Update
Configuration Management Plan		Create	Update	Update	Update	Update
Quality Assurance Plan		Create	Update	Update	Update	Update
Risk Matrix		Create	Update	Update	Update	Update
Data Specification		Create				
Software Requirements Specification		Create				
Requirements Traceability Matrix (RTM)		Create	Update	Update	Update	Update

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Deliverables	Determine Need	Define Requirements	Develop Design	Build Components	Evaluate Readiness	Deploy System
Test Plan (Unit & Integration)		Create	Update			
Training Plan		Create	Update			
Software Design Description			Create			
Database Design Description			Create			
Information Systems Security Plan			Create			
Version Description Document				Create		
Verification, Validation & Testing Plan				Create		
Installation/Conversion Plan				Create		
Test Results & Evaluation Report (Unit & Integration)				Create		
Test Results & Evaluation Report (VV&T)					Create	
Operations Manual				Create	Update	
User Guides					Create	
Training Materials					Create	
Certification & Accreditation Package					Create	
Phase Exit Review Package	Create	Create	Create	Create	Create	Create
System Sign-off Package						Create

Legend : Create – Create the documentation, Update – Update the documentation

Appendix E.2.5: Project Documentation Level 5

Project Documentation Level 5 supports projects encompassing maintenance or system enhancement with cost estimation of greater than \$100,000, project duration greater than 6 months, high risk project, high complexity project or special interest.

- Projects requiring a system enhancement may require a change to the system architecture or interfaces. This type of effort begins with an identified need from an existing system. The need is documented on a Change Request (CR) that has been approved by a CCB. Once the CR has passed through the Needs Phase, the project commences at Design System Components Phase.
- Projects dealing with maintenance effort also start with an approved CR. Typically, a maintenance effort will not require a change to the system architecture or interfaces. Once the CR has passed through the Needs Phase, the project commences at the Build System Components Phase.
- Maintenance and system enhancement projects will require an IRB approval to proceed in the Determine System Need phase.

Deliverables	Determine Need	Define Requirements	Develop Design	Build Components	Evaluate Readiness	Deploy System
Needs Statement						
Change Request	Create					

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Deliverables	Determine Need	Define Requirements	Develop Design	Build Components	Evaluate Readiness	Deploy System
IT Investment Analysis Package	Create					
Feasibility Study	Create					
Cost Benefit Analysis	Create					
User Requirements Document						
Project Plan			Update	Update	Update	Update
Configuration Management Plan			Update	Update	Update	Update
Quality Assurance Plan			Update	Update	Update	Update
Risk Matrix			Update	Update	Update	Update
Data Specification			Update	Update		
Software Requirements Specification			Update	Update		
Requirements Traceability Matrix (RTM)			Update	Update	Update	Update
Test Plan (Unit & Integration)			Update			
Training Plan			Update			
Software Design Description			Update			
Database Design Description			Update			
Information Systems Security Plan			Update			
Version Description Document				Update		
Verification, Validation & Testing Plan				Update		
Installation/Conversion Plan				Update		
Test Results & Evaluation Report (Unit & Integration)				Create		
Test Results & Evaluation Report (VV&T)					Create	
Operations Manual				Create	Update	
User Guides				Update	Update	
Training Materials				Update	Update	
System Assessment and Authorization					Update	
Phase Exit Review Package	Create		Create	Create	Create	Create
System Sign-off Package						Create

Legend : Create – Create the documentation, Update – Update the documentation

APPENDIX F: SCRUM PROCESS DETAILS

The Scrum process is comprised of the following steps:

- A. Determine Systems Need / Idea Proposed ([Appendix F.1](#))
- B. Developing and Prioritizing a List of Functionality ([Appendix F.2](#))
- C. Sprint Planning Meeting ([Appendix F.3](#))
- D. Daily Scrum ([Appendix F.4](#))
- E. Sprint Functionality Review ([Appendix F.5](#))
- F. Monthly Business-related Performance Metric Reviews ([Appendix F.6](#))

A diagram of the Scrum process (Figure 2) is presented below:

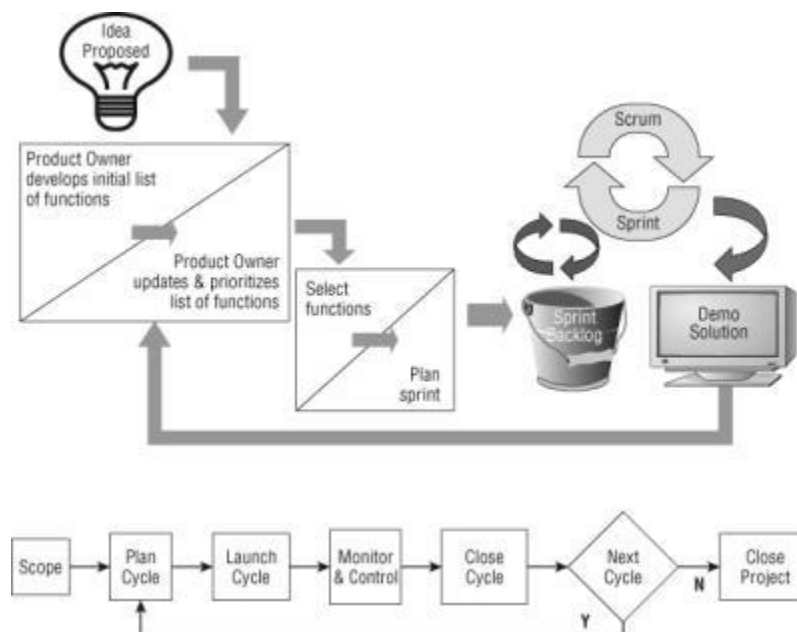


Figure 2: Scrum Process

The Technical Project Manager can be a certified Scrum Master or have a certified Scrum Master assigned to the team reporting to the Technical Project Manager. The Scrum Master simultaneously functions as coach, advisor, mentor, and compliance monitor for the Scrum Team. The Scrum Master focuses on providing the best possible circumstances for realizing the goals fixed for the current Sprint. They do this by removing impediments to the team, elevating issues they cannot resolve, acting as an intermediary with people outside the team so the designers and developers can work undisturbed, and facilitating Scrum Meetings. After each Sprint, the Scrum Master conducts a Sprint Retrospective – an Evaluation Meeting with the team during which experiences and conclusions are reviewed to improve future sprints and overall

team motivation.

All team members agreed during the Sprint planning meeting to build all of the functionality that was allocated to the current Sprint. Senior developers are motivated by the challenge to do so. The Product Owner has to provide the needed input when developers need clarification.

All templates or process documents that are referenced in the OPM SDLC can be utilized in the Agile process. It is recognized that there will be alternative Agile documentation that Project Teams will wish to utilize. If alternative Agile documentation methods are used, they must convey the same information that the current waterfall templates and process documents require. These Agile documentation methods (i.e., templates, etc.) must be reviewed with the Business Project Manager or Business Program Manager before implementation. Upon approval of the Agile documentation methods, the deliverables must be provided to the Business Project Manager or Business Program Manager as appropriate. Waiver and deviation from the OPM SDLC is not required when alternative Agile documentation methods are used.

Appendix F.1 Determine Systems Needs / Idea Proposed

The original idea or need for the system might be concrete or vague. It might be expressed in the form of business terms. A function-level description can be developed as part of the Scoping Phase, but not to the depth of detail that the customer requires. It is not likely to be expressed in system terms. But just like in the waterfall methodology, the user can document the idea in a Needs Statement or Change Request. Currently within the Agile community, there is a preference in using a story board or user story to convey the need. If the need is accepted, approval must be obtained from the appropriate approvers as outlined in Section 4.2 Section “SDLC Phases” above.

Appendix F.2 Develop and Prioritize Product Backlog

The Product Owner is responsible for developing a list of all desired features and changes, which is called the Product Backlog (PB). It helps the team understand more detail about the idea and helps them form some ideas about how to approach the project. Since the Product Owner (PO) maintains this list, it allows the PO to add, remove and re-prioritize items in the PB to account for changing priorities in the work place and mission goals. These changes do not affect the current Sprint Backlog.

Appendix F.3 Sprint Planning Meeting Process

This is a meeting with two distinct parts.

In the first part, the Product Owner presents the prioritized Product Backlog to the team. This is the opportunity for the team to ask questions to clarify each piece of functionality and provides the initial commitment to how much work can be completed in the Sprint.

In the second part, the team decomposes the stories into tasks and confirms the scope of the current Sprint. A Sprint is the iterative development cycle of the committed functionality. The team then develops the high-level plan as to how it will accomplish the Sprint. The work to be done is captured in the Sprint Backlog. The Sprint Backlog is the current list of functionality that is the scope of the current Sprint.

Appendix F.4 Daily Scrum Process

Each day during the sprint, a project status meeting occurs. This is called a *daily scrum*, or the *daily standup*. Daily scrums serve to synchronize the work of team members as they discuss the work of the sprint. This meeting has specific guidelines:

- The meeting starts precisely on time.
- All are welcome, but normally only the Scrum Master, Product Owner and Team members speak.
- The meeting is limited to 15 minutes
- The meeting should happen at the same location and same time every day

During the meeting, each team member answers three questions:

- What have you done since yesterday?
- What are you planning to do today?
- Do you have any problems that would prevent you from accomplishing your goal?

It is the role of the Scrum Master to facilitate resolution of these impediments with input from the Product Owner, although the resolution should occur outside the Daily Scrum in order to keep the daily meeting under 15 minutes if needed.

Appendix F.5 Sprint Functionality Review Process

At the end of the Sprint, the team demonstrates the solution to the customer. They discuss any functionality change requests with the customer and add the requests to the Product Backlog. If the customer accepts the solution, the Product Owner **and** the Scrum Master along with appropriate additional approvers (i.e., Chief Architect, IPT members, etc.) must approve the sprint results using the appropriate SDLC Phase Exit Review procedures and documentation (defined in Section 4.2 “SDLC Phases” above) before authorizing the initiation or planning of further sprints. The Product Backlog is updated and reprioritized for the next Sprint. This entire process continues until the Product Backlog is empty or the customer makes the determination that the current Sprint version is the final solution and does not wish for the project to continue any further.

Appendix F.6 Monthly Business-related Performance Metric Reviews

The OPM Baseline Management Policy requires that a project must use a performance management system, such as an Earned Value Management System for major investments. The Performance Management System must track both government and contractor efforts, regardless of contract type. The Performance Management System shall create the data necessary to populate the IT Dashboard cost and schedule tables on a monthly basis for major investments. This will require that Scrum milestones be defined and the status of the milestones be reported on a monthly basis through the implementation of Stage Gate Reviews.

Stage Gate Reviews are conducted by the IT governance organization, investment stakeholders and the Project Team to ensure that projects are fully complying with IT project management requirements. The Project Team can bundle several sprints into a single Stage Gate Review which will be analyzed on a monthly basis especially if using Earned Value Management. The reviews must analyze the project performance against baselines and may require corrective action plans or rebaselining as appropriate to the situation. Most importantly, Stage Gate Reviews determine that the project is ready to advance to the next sprint, bundle of sprints or phase. The Stage Gate Reviews will provide information to the Business Program Manager or Business Project Manager so that they can make the decision whether the program or project should be terminated.



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