PREFACE TO SELECTED INFORMATION DIRECTIVES

CIO Transmittal No.: 15-010	CIO Approval Date: 06/12/2015

Issued by the EPA Chief Information Officer,
*Pursuant to Delegation 1-19, dated 07/07/2005*

CHIEF INFORMATION OFFICER MEMORANDUM

SUBJECT: Chief Technology Officer (CTO) Responsibilities in Selected Information Directives

Re-assigned CTO responsibilities

Effective immediately, CTO responsibilities detailed in the selected information directives (i.e., Information Policies, Procedures, Standards, and Guidance) listed in Appendix A are re-assigned to the OEI Office of Technology, Operations, and Planning (OTOP) Director and the Senior Agency Information Security Officer (SAISO) as detailed. The re-assignment does not change any requirements in the selected information directives.

The OEI Information Directives Program Manager is directed to attach this memorandum and Appendix A as a Preface to each of the Information Directives listed. OEI will then update the Roles and Responsibilities section of each Information Directive in accordance with the normal review and update cycle.
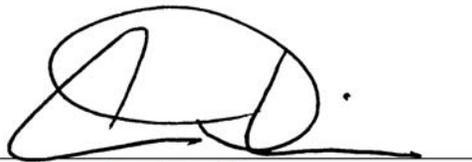
Ann Dunkin
Chief Information Officer
U.S. Environmental Protection Agency

Information Directive	Prior CTO Responsibilities	Re-assignment
CIO 2104.1 Software Management and Piracy Policy	Provide procedures, standards, and guidance to senior level managers to: support the Agency's Software Management and Piracy Policy and manage enterprise software licenses.	OTOP Director
CIO 2104-P-01.0 Software Management and Piracy Procedure	Provide procedures, standards, and guidance to senior level managers to: support the Agency's Software Management and Piracy Policy, manage enterprise software licenses, and provide covered users within their office with training and awareness on the Software Management and Piracy Policy through the annual Cybersecurity Awareness Training.	OTOP Director
CIO 2121.1 System Life Cycle Management (SLCM) Policy	Establish and publish procedures, technical operational procedures and standards (TOPS), and guidance supporting the Agency's SLCM Policy. Review and approve waivers to the SLCM Procedure.	OTOP Director
CIO 2121-P-03.0 SLCM Procedure	Establish and publish procedures, TOPS, and guidance supporting the Agency's SLCM Policy. Review and approve waivers to the SLCM Procedure.	OTOP Director
CIO 2122.1 Enterprise Architecture (EA) Policy	Issue procedures, guidance, and technical standards associated with the EA with a specific focus on the technology architecture, chair the Quality Technology Subcommittee (QTS), and review technology and security considerations in the Enterprise Target Architecture and Enterprise Transition Plan.	OTOP Director
CIO 2122-P-01.1 EA Governance Procedures	Issue procedures, guidance, and technical standards associated with the EA, with a specific focus on the technology architecture, chair the QTS, and review technology and security considerations in the Enterprise Target Architecture and Enterprise Transition Plan.	OTOP Director
CIO 2122-P-03.0 Information Technology Infrastructure Standard Procedure	Recommend to the CIO a specific IT standard, product or specification to be added to the official Agency IT Standards Profile with consultation from the Quality Information Council (QIC) and the QTS, and develop and maintain the Agency's Technology Architecture.	OTOP Director
CIO 2122-S-02.0 Personal Computer Configuration and Management Standard	Review and approve requests for waivers in regard to this standard.	OTOP Director
CIO 2123.1 Configuration Management Policy	Provide procedures, standards, and guidance to senior level managers in support of the Agency's Configuration Management Policy; institute change management processes; and provide a change management database.	OTOP Director

Information Directive	Prior CTO Responsibilities	Re-assignment
CIO 2150-P-01.1 Information Security - Interim Access Control Procedures	Approve all methods of dial-up access, approve all wireless connections, establish, document, authorize, and monitor all methods of remote access to an information system; delegate to Regions and other entities, as appropriate; and address co-management responsibilities for the Agency Security Architecture.	OTOP Director
CIO 2150-P-08.1 Information Security - Interim Incident Response Procedures	Determine Operational Status Categories during Alerts and Risks (OSCAR) 5 level (page 7).	SAISO
	Be available when the Computer Security Incident Response Capability (CSIRC) must report and coordinate incidents (page 16). Be available to meet with the Director of Cyber Security Staff (CSS) when senior managers are informed of incidents, occurrences and their status (page 18).	OTOP Director
CIO 2150-P-14.1 Information Security - Interim Risk Assessment Procedures	Approve the use of and, as appropriate, acquire and deploy enterprise vulnerability management technology. Consult with the SAISO to determine the coverage and compliance of enterprise vulnerability management technology with respect to federal and Agency requirements, including use of these tools to meet assessment requirements of other control families in NIST 800-53A, Revision 1, and to ensure the most cost effective, complete and accurate results.	OTOP Director
CIO 2150-P-15.1 Information Security - Interim System Services Acquisition Procedures	For the procurement of external information system services where a sufficient level of trust cannot be established, be available to confer regarding risks associated with the network and the Agency.	OTOP Director
CIO 2150-P-16.1 Information Security - Interim System and Communications Protection Procedures	Approve use of mobile VoIP-enabled units.	OTOP Director
CIO 2150.4 Mobile Computing Policy	Oversee policy and procedure implementation regarding use of mobile computing technologies. Approve mobile computing technology and device deployment.	OTOP Director
CIO 2150-P-01.1 Mobile Computing Management Procedures	Oversee policy and the implementation of the procedures. Approve enterprise mobile device types to be deployed. Review and approve requests for waivers in regards to the procedures.	OTOP Director

EPA Classification No.: CIO 2122-P-01.1	CIO Approval Date: 11/05/2012
CIO Transmittal No.: 12-007	Review Date: 11/05/2015

Issued by the EPA Chief Information Officer,
Pursuant to Delegation 1-19, dated 07/07/2005

ENTERPRISE ARCHITECTURE GOVERNANCE PROCEDURES

1. PURPOSE

The purpose of the EPA Enterprise Architecture[1] Governance Procedures ("EA Procedures") is to describe the architecture business processes that support the EPA EA Policy and lay out a structured methodology for identifying, collecting, and maintaining architectural information across the Agency. The EA Procedures aim to ensure that EA activities are performed in a consistent, structured, and reusable manner. This document specifies high-level architecture development and approval processes, and also links to the Federal Segment Architecture Methodology (FSAM), which provides best practices for architecture development.

The EA Procedures distinguish between the roles of the National Program Offices and OEI's EA Team in leading architecture activities. As the Program Offices maintain architectures for the business functions under their purview, the EA Team collects, validates, and integrates those architectures into EPA's overarching Enterprise Architecture. The complementary relationship between the EA Team and Program Offices should improve overall IT investment decision making, reduce redundancy among investments, and support improved program performance.

2. SCOPE AND APPLICABILITY

These EA Procedures: outline the recommended architecture phases for the definition, acquisition, development, implementation, operations and maintenance, and termination of EPA information technology (IT) systems and applications; apply to all EPA IT systems and projects, both applications and general support systems (GSS); are applicable to custom-developed, commercial-off-the-shelf (COTS), and government-off-the-shelf (GOTS) projects; and apply to all systems and contractor developed IT systems, whether hosted at the EPA National Computer Center (NCC) or another location.

3. AUDIENCE

The audience for the EA Policy includes individuals who manage, plan, or oversee EPA's business, data, applications, technology, and IT investments, as specified in the EPA EA Policy, Section 3.

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[1] The Enterprise Architecture is a strategic information asset base that describes the Agency's business, the information necessary to operate the business, the technologies necessary to support the business operations, and the transitional processes necessary for implementing new technologies in response to changing business needs.

4. BACKGROUND

4.1. EA Policy

The EA Policy establishes the high-level governance of the EPA EA program, sets direction for how the EA will be developed and maintained, and establishes how information technology (IT) investments will be evaluated for compliance with the EA. It aims to increase EPA's ability to provide consistent services, accessible information, scalable infrastructure, and flexible technology integration on demand, to ensure the alignment of IT with the EPA mission and program goals. These EA Procedures provide the steps for implementing the EA Policy.

4.2. EA Framework

The EPA EA Framework, as depicted in Figure 1 below, shows how EPA develops and maintains the *Baseline*, *Target*, and *Transition* states of the Enterprise Architecture by integrating the architectures of its various programs—from the IT *Solution* level, to the functional *Segment* level, and up to the Agency-wide *Enterprise* level. The architecture at each of the three levels describes the following five layers: *Strategy*, *Business*, *Data*, *Applications*, *Infrastructure*, and *Security*.
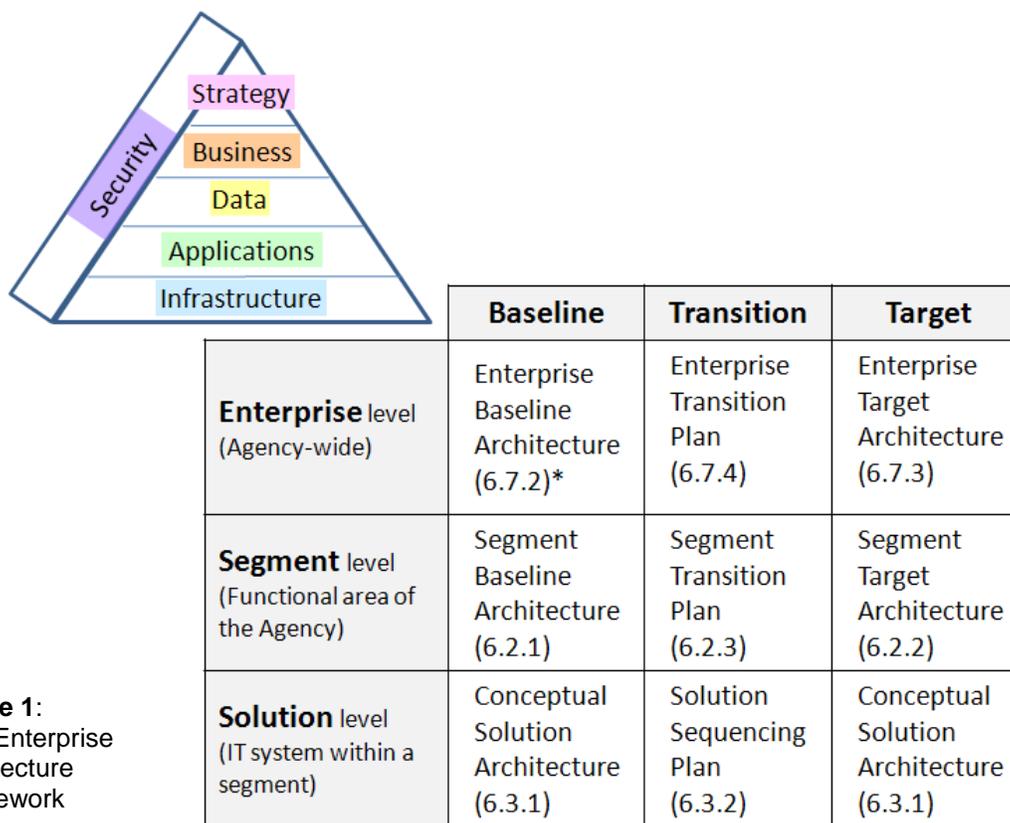

	Baseline	Transition	Target
Enterprise level (Agency-wide)	Enterprise Baseline Architecture (6.7.2)*	Enterprise Transition Plan (6.7.4)	Enterprise Target Architecture (6.7.3)
Segment level (Functional area of the Agency)	Segment Baseline Architecture (6.2.1)	Segment Transition Plan (6.2.3)	Segment Target Architecture (6.2.2)
Solution level (IT system within a segment)	Conceptual Solution Architecture (6.3.1)	Solution Sequencing Plan (6.3.2)	Conceptual Solution Architecture (6.3.1)

*Section number in *EA Governance Procedures*

Figure 1: EPA Enterprise Architecture Framework

As depicted in Figure 1 above,

The **enterprise** level of the architecture enables the integration of multiple segment architectures. The EPA EA Team is responsible for developing and maintaining the enterprise level.

The **segment** level is composed of segment architectures, which are architectures developed around common business or service functions. EPA's segments include:

- "Core Mission" segments. These segments define the architecture of EPA's core business areas, e.g.: Air Quality Management and Climate Change, Emergency Management, Enforcement and Compliance, Land Quality Management, Substance Management, and Water Quality Management; and,

- "Business Service" or "Enterprise Service" segments. These segments define the architecture of service areas supporting the Core Mission Segments, e.g.: Administrative Services, Financial Management, Geospatial Services, Information Management, Information Sharing, Internal Controls & Oversight, IT Infrastructure Management, and Research & Science.

Segment Managers/Architects are responsible for developing segment architectures, and a team of architects may assist in the development process.

The final tier of the EPA EA Framework is the **solution** level. A segment may contain one or more solutions. A solution is a specific investment or initiative that addresses a business problem. Solutions, if they are IT investments, are also subject to EPA's Capital Planning and Investment Control (CPIC) Procedures and System Life Cycle Management (SLCM) Procedure.

Although a solution typically is managed and funded within one segment, multiple segments may use that same solution. In this manner, the EPA EA Framework supports the objective of reuse while ensuring clear lines of responsibility for the architecture and implementation of solutions. Solution/System Architects are responsible for developing solution architectures.

4.3. Information Systems Life Cycle Management Framework

A Practical Guide to Federal Enterprise Architecture[2] states that "Key Decision Points (KDPs) are points where management should take action regarding project scope, approach, funding, etc. EA enforcement should be applied at KDPs, when possible, since it is at those points that senior management will convene to consider investment decisions. . . Since the EA is a major management tool for monitoring and guiding change within the agency, the important outcome is to schedule reviews to ensure that planned investments stay on schedule, within budget, and achieve defined goals."

EPA implements these Key Decision Points as "SLCM Control Gates" in an Information Systems Life Cycle Management Framework. This framework, illustrated in Figure 2 below, facilitates the identification, planning, and implementation of IT systems by integrating EA, CPIC, SLCM, and Security lifecycles.

The *EPA SLCM Procedure* (Section 6.01 and Appendices A through D) provides tailoring guidance for the Control Gate documents listed in Figure 2 below. The *EPA SLCM Documents Guidance* provides a description of each Control Gate document.

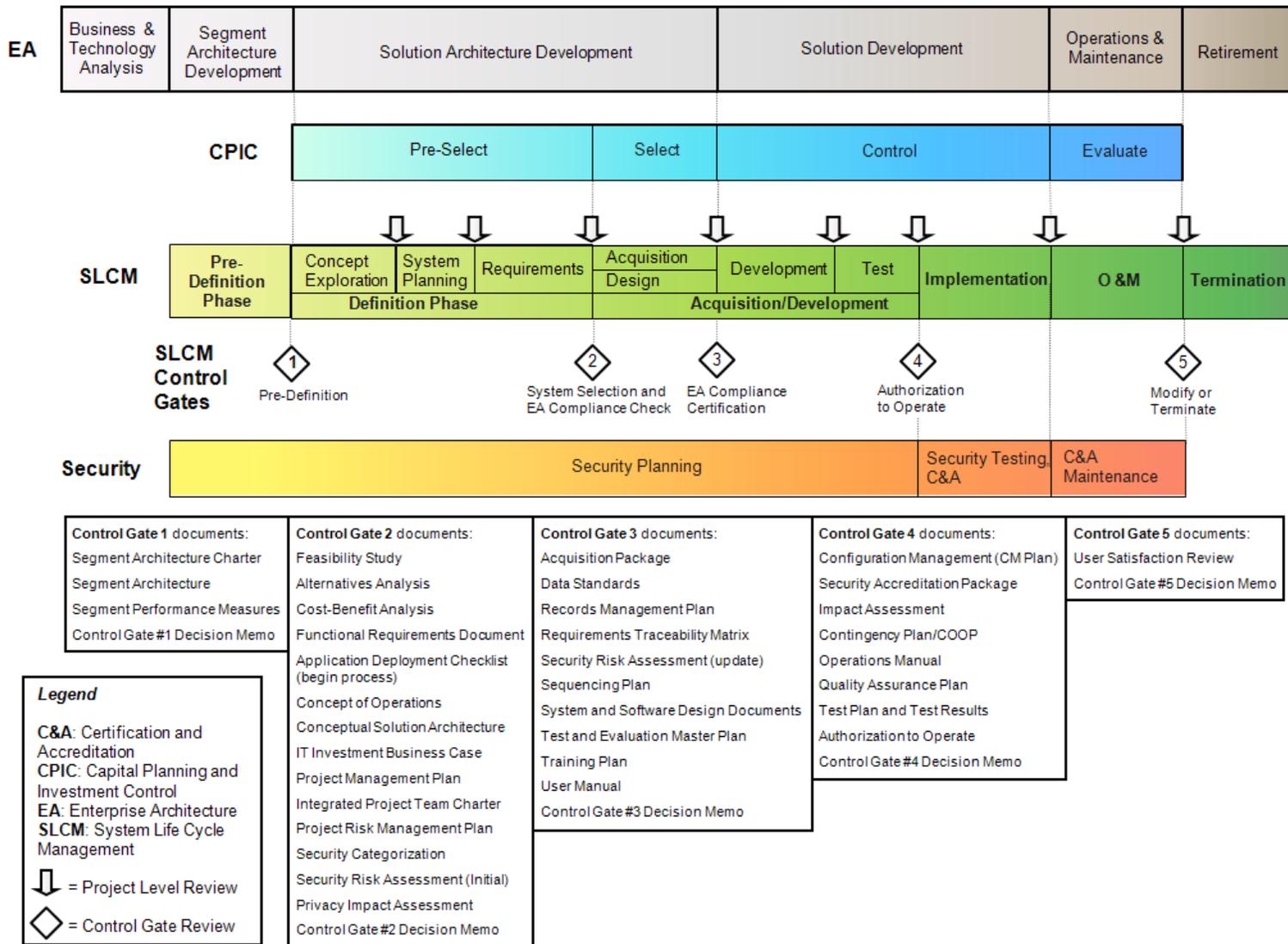[2] Chief Information Officer Council. February 2001. http://www.gao.gov/bestpractices/bpeaguide.pdf

Figure 2: EPA's Information Systems Life Cycle Management Framework

5. AUTHORITY

- The Clinger-Cohen Act of 1996 (also known as the Information Technology Management Reform Act of 1996) (Pub. L. 104-106, Division E)
  http://www.cio.gov/Documents/it_management_reform_act_feb_1996.html
- OMB Circular A-130 Revised, Transmittal Memorandum #4, Management of Information Resources (November 28, 2000) ← (This memorandum provides descriptive information about enterprise architecture, in support of the Clinger-Cohen Act)
  http://www.whitehouse.gov/omb/circulars_a130_a130trans4

- Executive Order 13011, Federal Information Technology, FR 61-140, July 16, 1996
- OMB Circular A-11, Preparation, Submission, and Execution of the Budget
- EPA Enterprise Architecture Policy

6. EA GOVERNANCE PROCEDURES

The EA Life Cycle depicted in the top row of Figure 2 is composed of specific activities and procedures that are outlined in Figure 3 (below) and follow the EA best practice of "Architect, Invest, Implement."

The Program Level Procedures (top half of Fig. 3) depict the activities undertaken for a Segment and Solution. These activities are performed primarily by the Segment Architects and their teams, and Solution Architects/IT Project Managers.

The Agency Level Procedures (bottom half of Fig. 3) depict the activities required to maintain an overall architecture for the Agency. These activities are led by EPA's Office of Environmental Information, including the Chief Architect and EA Team.

During the EA Life Cycle, there are hand-off points between the National Program Offices/Segments and the EA Team. For example, every year the EA Team reviews the updated Segment and Solution Architectures and integrates these updates into the Enterprise Architecture documents, as depicted in Fig. 3 and described in Sections 6.2.5, 6.3.3, and 6.7. Reciprocally, the Enterprise Architecture provides direction and boundaries for development of EPA's Segment and Solution Architectures.
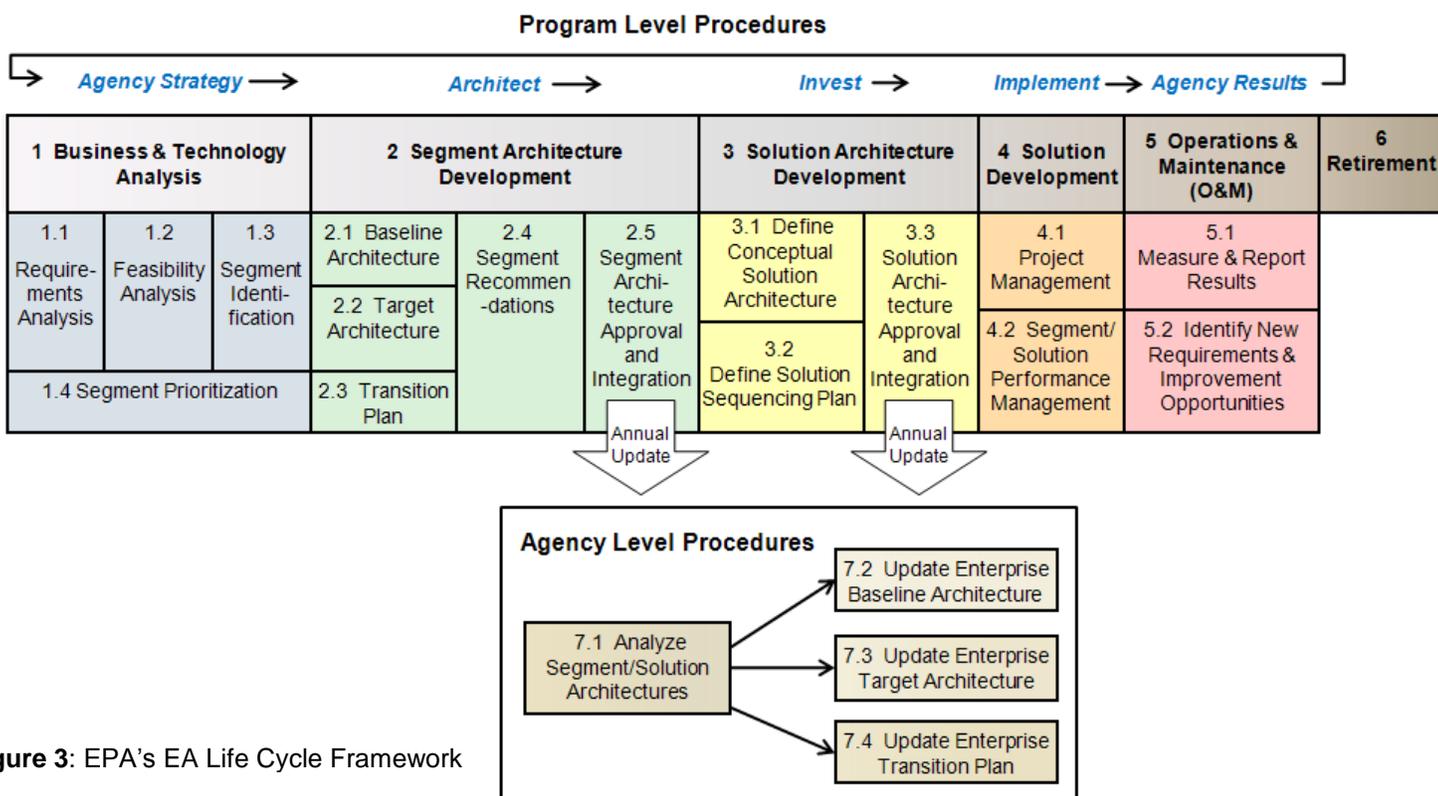

Figure 3: EPA's EA Life Cycle Framework

6.1. Business & Technology Analysis

The Business & Technology Analysis steps in the EA Life Cycle help EPA managers and architects collect, analyze, and prioritize business and technology needs. These needs or requirements can be identified based on the EPA Strategic Plan, National Program Office plans, and Regional plans; government mandates; and stakeholder input. The goal of Business and Technology Analysis is to identify and agree upon high-level needs and mission-centric improvement opportunities prior to commencing segment architecture work. The Project Management Institute (PMI) provides detailed standards and guidance for project management processes: http://www.pmi.org
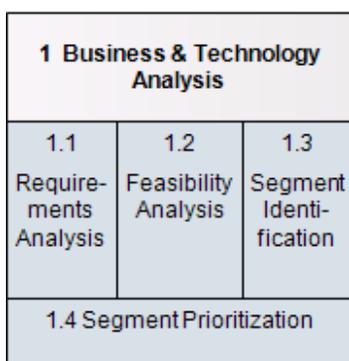

Figure 4- Business & Technology Analysis components

6.1.1. Requirements Analysis

The Requirements Analysis phase identifies business and technology requirements from stakeholders'/customers' perspective. Requirements can originate from a variety of sources, such as: cycle time improvements, transaction volume, stakeholder/customer satisfaction, and federal mandates. Requirements should be actionable, measureable, and mission-driven. Requirements Analysis is conducted by Segment Architects, Solution Architects, and other participants on an ongoing basis within a National Program Office or Region.

6.1.2. Feasibility Analysis

After the business and technology requirements are identified, a feasibility study is completed. This study reviews the identified requirements and compares them to the drivers, budget constraints, human capital constraints, and overall Agency strategy to prioritize which requirements can and will be addressed, and on what timeline.

6.1.3. Segment Identification

The Segment Identification phase categorizes and groups stakeholders with similar sets of requirements, in order to design, develop, and implement solutions that best fit EPA's needs while facilitating inter- and intra-Agency collaboration and reuse.

The SIO of the sponsoring program office identifies a segment core team to include representatives of affected organizations. The Federal Segment Architecture Methodology (FSAM), Step 1, provides guidance for forming a segment core team

and developing a segment charter:
http://intranet.epa.gov/architec/pdfs/lawguidance/fsamv1.pdf.

Potential new segments, and their business and technology requirements, are recommended to the Chief Architect and EA Team.

6.1.4. Segment Prioritization

The Segment Prioritization phase identifies a phased rollout or schedule for Segment Architecture development across EPA. *This step in the EA life cycle is implemented only when a greater number of requirements and segments are identified than EPA can manage simultaneously.*

Based on criteria such as mission criticality, expected management and stakeholder participation, IT expenditures, and federal mandates, the segments are prioritized and sequenced for development. Segment prioritization is conducted by the Chief Architect and EA Team, with support from the EAWG. The basic steps for segment prioritization are:

1. Establish draft prioritization criteria

2. Gather feedback on prioritization criteria

3. Assess segments against criteria, to determine feasibility and criticality for development.

4. Prioritize segments for development

6.2. Segment Architecture Development

The Segment Architecture Development activities begin after the Business & Technology Analysis. Segment Architecture development results in a detailed, results-oriented architecture (baseline, target, and transition strategy) for a specific set of mission-driven business or service capabilities. The results of a Segment Architecture may include but are not limited to new IT investments, organizational changes, and/or business process improvement activities.

Guidance for developing a Segment Architecture is provided in the Federal Segment Architecture Methodology (FSAM): http://intranet.epa.gov/architec/pdfs/lawguidance/fsamv1.pdf.

The key deliverables for Segment Architecture at EPA are described in the *SLCM Procedure* and *SLCM Requirements Guidance.*[3]
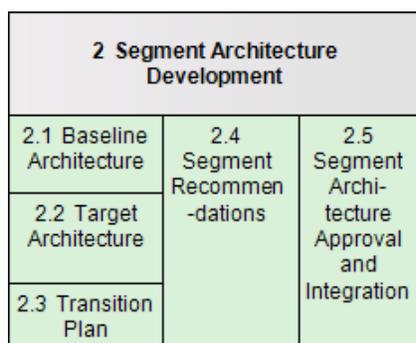

2 Segment Architecture Development		
2.1 Baseline Architecture	2.4 Segment Recommen-dations	2.5 Segment Archi-tecture Approval and Integration
2.2 Target Architecture		
2.3 Transition Plan		

Figure 5- Segment Architecture Development components

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[3] Maintained in the IT Policy Wiki: http://intranet.epa.gov/itpolicy

6.2.1. Segment Baseline Architecture

Segment Baseline Architecture development activities involve documenting and understanding the current state of an organization's business and IT environment.

6.2.2. Segment Target Architecture

Segment Target Architecture development activities involve documenting and understanding the desired future state of an organization's business and IT environment. These activities outline how the organization will operate after the requirements and improvement opportunities are addressed.

6.2.3. Segment Transition Plan

The Segment Transition Plan development activities involve documenting, scheduling, and sequencing the maturation from the current state to the desired future state of an organization's business and IT environment.

6.2.4. Segment Recommendations

A Segment Architecture will culminate in a set of recommendations (after assessing the Baseline, defining a Target, and establishing a Transition Plan). These recommendations might specify the need for a new IT investment, process improvement activity, or organizational change.

Guidance, templates, and the specific steps recommended to document the Segment Recommendations are provided in the Federal Segment Architecture Methodology (FSAM) Steps 4 & 5: http://intranet.epa.gov/architec/pdfs/lawguidance/fsamv1.pdf.

6.2.5. Segment Architecture Approval and Integration

The segment architecture should be reviewed, approved, and integrated into the overarching Enterprise Architecture. These activities are conducted at the completion of a Segment Architecture, and then as an annual update.

If the segment is a "sub-segment"—i.e. a smaller-scale architecture effort focused on addressing specific issues within one of the parent segments mentioned in Section 4.2—then the parent segment architecture should be updated to reflect the sub-segment's recommendations.

Process Steps:

1. Segment Architect provides Segment Architecture to IMO for validation.

2. IMO validates that the Segment Architecture addresses the relevant business needs and technical standards, and either recommends SIO approval or informs Segment Architect of areas needing modification.

3. If SIO concurs, IMO submits Segment Architecture to the Chief Architect for EA compliance certification.

4. Chief Architect conducts a compliance certification review to assess segment architecture alignment with the Agency EA.

5. If the Segment Architecture is compliant:

- the Chief Architect certifies it as such and provides EA certification documentation to the IMO, and

- it passes System Life Cycle Control Gate 1 (per *EPA SLCM Procedure*[4]*)*.

If the Segment Architecture is not compliant, the Chief Architect indicates areas of non-compliance to the IMO. The IMO either submits a revised Segment Architecture or applies for a waiver (see Section 10 ("Waivers") of this document for a description of the EA Waiver process).

6. EA Team integrates Segment Architectures with the Agency EA. The process of updating the Enterprise Architecture to reflect changes in the Segment Architectures is described in Section 6.7 ("Agency Level EA Governance Procedures").

6.3. Solution Architecture Development

Solution Architecture Development activities begin after the Segment Recommendations have been reviewed and approved, and after SLCM Control Gate 1.

At the beginning of Solution Architecture Development, the Project Manager for the solution:

- Checks EPA's System of Registries (SoR)[5]—including the Registry of EPA Applications and Databases (READ)[6] for existing systems, the Reusable Component Services (RCS)[7] for existing assets,[8] the Data Element Registry Services (DERS) for data elements, and the Substance Registry Services (SRS)[9] for standardized substance nomenclature—to discover components to reuse and other systems to integrate with.

- Creates a record in READ for the solution.[10]

Guidance for developing a solution architecture is provided in the Federal Segment Architecture Methodology (FSAM): http://intranet.epa.gov/architec/pdfs/lawguidance/fsamv1.pdf.

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[4] EPA's IT policies and procedures (draft and approved), including the SLCM Procedure, are maintained in the IT Policy Wiki: http://intranet.epa.gov/itpolicy
[5] http://epa.gov/sor
[6] http://epa.gov/read
[7] http://epa.gov/rcs
[8] "Assets" include web services (SOAP or REST), software tools, XML schema, widgets, APIs, programming code (classes, routines, etc.), and data models.
[9] http://epa.gov/srs
[10] Or *updates* the record for an existing solution. A solution (i.e. IT application) should have a record in READ if: EPA spent extramural dollars for its operations and maintenance or during its development; or the system contains personally identifiable information; or the system is used by 10 or more individuals; or the Program or Region determines the system is important enough to track by having a record in READ
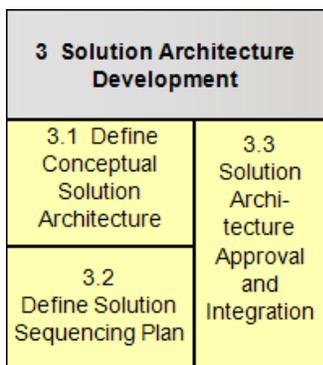
Figure 6- Solution Architecture Development components

6.3.1. Define Conceptual Solution Architecture

A Conceptual Solution Architecture depicts an IT solution/system and its interfaces and information flows at a high level.

A Conceptual Solution Architecture is a requirement for EPA SLCM Control Gate 2, as described in the *EPA SLCM Procedure*.

6.3.2. Define Solution Sequencing Plan

A Solution Sequencing Plan specifies the Work Breakdown Structure (WBS), project schedule, and dependencies for a solution's internal modules and external interfaces. It helps system managers plan the implementation of their own systems, and it helps managers of interfacing systems understand mutual dependencies.

The Solution Sequencing Plan is a requirement for EPA SLCM Control Gate 3, as described in the *EPA SLCM Procedure*.

6.3.3. Solution Architecture Approval and Integration

The solution architecture should be reviewed, approved, and integrated into the overarching Segment and Enterprise Architectures.

Process Steps:

Solution Architectures (including the Conceptual Solution Architecture, Solution Sequencing Plan, and other documentation) are reviewed each year, concurrent with a corresponding Segment Architecture review (per Section 6.2.5).

- For solutions in the Definition phase of the System Life Cycle, the Solution Architecture Review is required to pass SLCM Control Gate 2 and advance to the Acquisition/Development phase (per *EPA SLCM Procedure*).

- For solutions in later phases of the System Life Cycle (i.e. Acquisition/Development, Implementation, or Operations & Maintenance), an updated version of the solution architecture is reviewed each year.

The solution review process and roles are described below:

1. The System Owner and Segment Architect ensure that the solution architecture accurately addresses the segment's business needs and complies with the Enterprise Architecture.

2. IMO or designee:

- reviews the solution architecture and assesses solution architecture alignment with the Agency EA,

- validates that the solution architecture addresses the segment's business needs, and

- either recommends the solution for SIO approval or indicates areas needing modification to Solution Architect.

3. If SIO concurs, IMO submits solution architecture to the Chief Architect for EA compliance certification.

4. Chief Architect and EA Team review the solution architecture for EA compliance.

5. If the solution architecture is EA compliant, the Chief Architect certifies it as such and provides EA certification documentation to the IMO.

If the solution architecture is not EA compliant, the Chief Architect indicates areas of non-compliance to IMO. The IMO resubmits the revised solution architecture or applies for a waiver (see Section 10 ("Waivers") of this document for a description of the EA Waiver process).

6. EA Team integrates the solution architecture with the Agency EA (see Section 6.7).

6.4. Solution Development

In the Solution Development phase, new systems/solutions are developed and/or existing system/solutions are modified, in accordance with the Segment and Solution Architectures. The solution development process is supported by defining and tracking quantifiable performance measures for the system/solution.
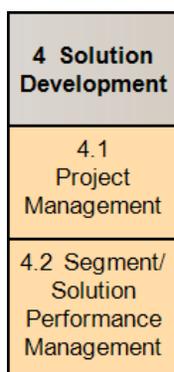
4 Solution Development

4.1 Project Management

4.2 Segment/ Solution Performance Management

Figure 7- Solution Development components

6.4.1. Project Management

There are many EA activities that fall into the Project Management component of developing a solution and/or implementing a system. In sum, the main goal is to ensure that the solution described in the solution architecture is the system actually being developed. If there is a modification to the original architecture, this modification should be represented in the updated Solution Architecture, Segment Target Architecture, Segment Transition Plan, Enterprise Target Architecture, and Enterprise Transition Plan.

Between the "Test" and "Implementation" SLC phases, the IMO conducts Control Gate 4 (Authorization to Operate Review). For additional details on Solution Development, see the "Development", "Test", and "Implementation" sections of the *EPA SLCM Procedure.*

The Project Management Institute (PMI) provides detailed standards and guidance for project management processes: http://www.pmi.org

6.4.2. Segment/Solution Performance Management

The primary objective of Segment/Solution Performance Management is to ensure that the solution or system performs as defined in the target segment/solution architectures. The EA components of Performance Management are to establish, track, and regularly assess quantifiable Performance Measurement Indicators (PMIs) tied to the FEA Performance Reference Model (PRM). The PMIs are included in baseline, target, and transition architecture documentation, and they are part of the CPIC artifacts required in the investment lifecycle. For additional information on Solution Development and Performance Management, refer to the *EPA SLCM Procedure* and PRM.[11]

6.5. Operations and Maintenance

The Operations and Maintenance (O&M) phase ensures that the system operates correctly in its production environment. O&M oversight is accomplished through periodic performance reviews. The primary goal of the O&M phase from an architecture perspective is to ensure that the solution is delivering the business and technology capabilities documented in the Segment Target Architecture and Solution Architecture.

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[11] EPA's IT policies and procedures (draft and approved), including the SLCM Procedure, are maintained on the IT Policy Wiki: http://intranet.epa.gov/itpolicy
The PRM is undergoing revision by OMB, and a link to the new version is not yet available (as of May 2012).
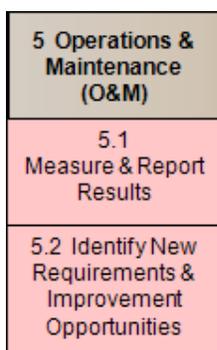
Figure 8- Operations & Maintenance components

6.5.1. Measure and Report Performance Results

The segment architect establishes and measures against segment architecture performance indicators, to determine whether the implementations of the architecture are successfully meeting the objectives of the segment and its stakeholder's needs. The segment architect annually submits segment performance results to the IMO and segment owner for review. Concurrent with segment-level performance measurement, individual investments undergo performance measurement per guidance in the Exhibit 300: http://intranet.epa.gov/cpic

6.5.2. Identify New Requirements and Improvement Opportunities

As an annual update:

- Segment architects identify new stakeholder requirements and improvement opportunities. These requirements feed into updates to the Segment Target Architecture.

- Solution architects ensure that information about their system (including components and services, reusable or not) is catalogued and up-to-date in the applicable registries within the SoR (e.g. READ, DERS, EDG, and RCS), as described in Section 6.3. If the solution includes publically accessible data, those data should be registered in the EDG.

- Best practices for identifying segment requirements and improvement opportunities are defined in the Federal Segment Architecture Methodology (FSAM) Step 2**:** http://intranet.epa.gov/architec/pdfs/lawguidance/fsamv1.pdf.

6.6. Retirement

During the Retirement phase, Project/System Managers retire and close down systems that have been declared redundant or obsolete (per SLCM Control Gate 5 "Modify or Terminate"). EPA's EA artifacts are updated to reflect the resulting changes in business and technology capabilities. A Business & Technology Analysis (Section 6.1) is conducted to reflect any new business and technology needs identified during the retirement of a system, and the EA Lifecycle starts anew.

6.7. Agency Level EA Governance Procedures

The EA Team undertakes a standard set of activities to establish, maintain, and mature an enterprise view of EPA's architectural components. This section describes those activities:
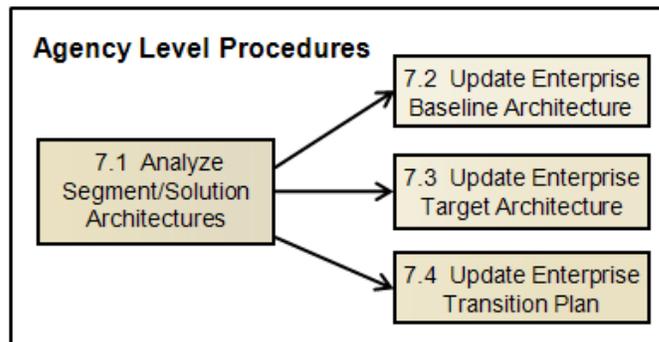

Figure 9- Agency-Level EA Procedures

6.7.1. Analyze Segment/Solution Architectures

1. Chief Architect, EAWG, and EA Team perform an annual analysis of:

a) EPA's baseline and target segment and solution architectures, READ records, and investment business cases.

b) Updates to relevant Federal and Agency strategic plans and requirements (to determine their impact on the Agency Enterprise Architecture). Such strategic plans and requirements include the EPA Strategic Plan, Annual Performance Plan, Strategic Action Plan, NPM Guidance, new legislation, OMB mandates (including Federal Enterprise Architecture guidance), data and metadata standards, records management requirements, and security requirements.

c) Emerging technologies (to determine their potential impact on the enterprise architecture).

2. Chief Architect, EAWG, and EA Team update the Enterprise Baseline Architecture, Target Architecture, and Transition Plan, as described in Sections 6.7.2, 6.7.3, and 6.7.4.

6.7.2. Update Enterprise Baseline Architecture

The Enterprise Baseline Architecture (EBA) is refreshed annually through segment and solution architecture submissions from the National Program Offices and Regions to OEI's EA Team (see sections 6.2.5 and 6.3.3). The EA Team updates the baseline enterprise architecture (managed in an architecture repository) with the updated segment and solution architecture information.

6.7.3. Update Enterprise Target Architecture

1. The EA Team annually works with Segment Architects, the EAWG, and National Program and Regional Managers to redefine and update the Enterprise Target Architecture (ETA) based on the analysis completed during the annual segment/solution architecture review (per Section 6.7.1). In updating the ETA, the EA Team and EAWG also account for updates to relevant Federal and Agency strategic plans and requirements, as well as emerging technologies.

2. Chief Architect reviews ETA and concurs or indicates areas needing modification to the EA Team.

3. Chief Architect presents ETA to QTS and CTO.

4. QTS and CTO review and concur with technology and security considerations or indicate areas needing modification to Chief Architect.

5. Chief Architect presents ETA to QIC.

6. QIC reviews and concurs with the ETA and recommends to the CIO or indicates areas needing modification to Chief Architect.

7. CIO reviews, approves, and issues the ETA or indicates areas needing modification to Chief Architect.

8. SIOs, IMOs, Segment Managers, and Regional managers use the Enterprise Target Architecture to facilitate IT capital planning decisions and realize efficiencies in procurement and development.

6.7.4. Update Enterprise Transition Plan

The Enterprise Transition Plan (ETP) is composed of a Transition Strategy and a Sequencing Plan.

1. EA Team annually works with Segment Architects and National Program and Regional Managers to redefine and update the ETP based on the analysis conducted during the annual EA review (see Section 6.7.1) and the update of the Enterprise Target Architecture (see Section 6.7.3).

2. Chief Architect reviews ETP and concurs or indicates areas needing modification to EA Team.

3. Chief Architect presents ETP to QTS and CTO.

4. QTS and CTO review and concur with technology and security considerations or indicate areas needing modification to Chief Architect.

5. Chief Architect presents ETP to QIC.

6. QIC reviews and concurs with the ETP and recommends to the CIO or indicates areas needing modification to Chief Architect.

7. CIO reviews, approves, and issues the ETP or indicates areas needing modification to Chief Architect.

8. SIOs, IMOs, Segment Managers, and Regional managers use the ETP as a roadmap for planning, developing, sequencing, and transitioning new IT projects.

7. RELATED DOCUMENTS

The EA Governance Procedures complies with all Federal Laws and Guidance identified in the *EPA Enterprise Architecture Policy.* Additional related policies, procedures, standards, and guidance are described in Section 11.

8. ROLES AND RESPONSIBILITIES

Assistant Administrators and Regional Administrators: The Assistant Administrators and Regional Administrators shall ensure that their organizations actively participate with the CA and comply with the *EA Policy* and *EA Governance Procedures.*

Assistant Administrator for Administration and Resources Management: The Assistant Administrator for Administration and Resources Management is responsible for ensuring that information technology grants and inter-agency agreements (IAGs) contain requirements for compliance with the *EA Policy* and *EA Governance Procedures.*

Assistant Regional Administrators (ARAs):
- Coordinate the development of the information resource investment proposals within their respective Regions,
- Monitor the implementation of information resource investments to ensure the IT used and managed by their Region supports its business needs and mission and helps to achieve EPA's strategic goals, and
- Approve segment architectures that are specific to their Region.

Chief Acquisitions Officer (CAO): The CAO is responsible for ensuring that information technology services contracts contain requirements for compliance with the *EA Policy* and *EA Governance Procedures.*

Chief Architect (CA):
The CA is responsible for:
- developing, maintaining, communicating, and promoting use of the Agency EA,
- promoting architecture within the Agency, and
- serving as the external interface on architecture matters.
The CA, working for the CIO and in consultation with the EAWG, advises on:
- enterprise-level use of technology,
- promoting common business architectures,
- facilitating the use of architectural development processes, and

- applying EA products and practices.

The CA:

- Works with senior leadership to better understand their needs,
- Provides direction and priorities of the EA Team,
- Promotes both Agency and federal-wide collaboration on segment and solution architectures to support the Agency goals,
- Assesses and consults with investment owners on their alignment to Agency EA processes/practices,
- Promotes sound information management practices, and Annually reviews EPA's IT investments, including segment and solution architectures, and provides recommendations to the CIO.

Chief Financial Officer (CFO): The CFO is the responsible authority for: (a) all architectural considerations required under the Chief Financial Officers Act of 1990 (CFO Act) and (b) coordinating with the CIO to ensure that the EA and the CPIC processes support the Agency's strategic and budget planning processes. The CFO remains responsible for the Agency strategic and budget planning processes.

Chief Information Officer (CIO):

- Provides an IT strategic direction which helps inform the EA.
- Reviews, approves, and issues the Enterprise Baseline Architecture, Enterprise Target Architecture and Enterprise Transition Plan.

Chief Technology Officer (CTO):

- Is responsible for issuing procedures, guidance, and technical standards associated with the EA, with a specific focus on the technology architecture,
- Chairs the Quality Technology Subcommittee (QTS), and
- Reviews technology and security considerations in the Enterprise Baseline Architecture, Enterprise Target Architecture and Enterprise Transition Plan.

Enterprise Architecture Team Lead (EATL):

- Is responsible for managing the EA Team, including strategic planning, establishing program priorities, managing the day-to-day functions and operations of the program, and directing the activities of the EA Team towards establishing, maturing and maintaining an efficient and effective EA.
- Works with the CA in fulfilling the CIO's strategic direction and ensuring collaboration with the EAWG and Segment Managers on realizing enterprise-level architecture goals.

Enterprise Architecture Team (EA Team):

- Includes an Architecture Core Team led by the EA Team Lead and consisting of dedicated OEI staff and matrixed staff/architects/subject matter experts from other EPA programs.
- Supports the Chief Architect in annually reviewing segment architectures and developing and maintaining an Enterprise Target Architecture and Enterprise Transition Plan.

Enterprise Architecture Working Group (EAWG): The EAWG is the Agency's architectural subject matter authority, representing EPA National Program Offices and Regions to provide

recommendations and decision support to the governing bodies (i.e. Quality Information Council, Information Investment Subcommittee, Quality Technology Subcommittee). The EAWG is composed of IMOs or designees, Segment Managers/Architects, Project Managers/System Managers/Solution Architects, and other stakeholders from EPA National Program Offices and Regional Offices.
An EAWG member:

- Advises and works collaboratively with the CA and EA Team to facilitate EA Team strategic planning and enterprise-level problem solving,
- Ensures that the EA reflects the requirements of their National Program Office, Segment, or Region,
- Provides insight and access into their organization's architecture products, practices, enhancements, and innovations, and
- Champions EPA EA requirements/priorities by serving as the communications liaison to their organization regarding the Agency- level EA.

The EAWG meets monthly and on an ad hoc basis as needed.

Information Investment Subcommittee (IIS): ". . .The purpose of the IIS is to advise and assist the QIC on information investment proposals as required under the Clinger-Cohen Act requirements and in accordance with the Agency's Enterprise Architecture." (Source: IIS Charter section 1. Also see IIS Charter section 2.)

Information Management Officer (IMO):

- IMO or designee is responsible for coordinating and reviewing the segment and solution architectures within their National Program Office, Laboratories, and Field Offices.
- IMO or designee represents their National Program Office at the EAWG.
- IMO or designee is responsible for coordinating and overseeing currency of content in the System of Registries[12] and conformance with data, security, and IT standards for systems within their National Program Office, Laboratories, and Field Offices. An IMO may engage their Information Security Officer (ISO) for security-related issues.

Information Resource Management Branch Chief (IRM BC):

- IRM Branch Chief or designee is responsible for coordinating and reviewing the segment and solution architectures within their Region, Regional Laboratories, and Field Offices.
- IRM Branch Chief or designee represents their Region at the EAWG.
- IRM Branch Chief or designee is responsible for coordinating and overseeing currency of content in the System of Registries and conformance with data, security, and IT standards for systems within their Region, Regional Laboratories, and Field Offices.

Project Manager[13]/ System Manager/ Solution Architect:

- May be the same person or separate people (for a large system),
- Develops a Solution Architecture in conformance with the relevant Segment Architecture, EPA Enterprise Architecture, and best practices (i.e. Federal Segment Architecture Methodology), and

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[12] EPA System of Registries: http://epa.gov/sor
[13] The Office of Personnel Management (OPM)'s *Job Family Standard for Administrative Work in the Information Technology Group* is available at http://www.opm.gov/fedclass/GS2200A.pdf. OPM's *Interpretive Guidance for Project Manager Positions* is available at http://www.opm.gov/fedclass/cg03-0001.pdf.

- Ensures that the system is managed in compliance with all applicable EPA IM/IT policies as identified at http://intranet.epa.gov/oei/imitpolicy/policies.htm.

Quality and Information Council (QIC): Reviews and concurs with the Enterprise Target Architecture and Enterprise Transition Plan. Recommends to the CIO for approval or indicates areas needing modification to Chief Architect. (See the QIC charter for a full description of the QIC's responsibilities: http://intranet.epa.gov/oei/imitpolicy/qic/documents/final_qic_charter070705.pdf)

Quality and Information Council Steering Committee (QIC SC): "The primary role of the QIC SC is to assist the QIC in developing the IT/IM and related policy agenda. . ." (Source: QIC Charter section 4-2).

Quality Technology Subcommittee (QTS): "The QTS addresses enterprise-wide issues regarding the Agency's information technology infrastructure including customer and mission needs that require technical solution, long-term technology planning, and systems integration." (Source: QIC Charter section 4-4). The QTS reviews the Enterprise Target Architecture and Enterprise Transition Plan for technology and security considerations. The QTS is a subcommittee of the QIC.

Segment Manager/Architect:
- Manages development of a segment architecture,
- Represents his/her segment in the EAWG, and
- Is appointed by the SIO of the National Program Office leading the segment.

There may be multiple Segment Managers within one National Program Office, and a Segment Manager may manage a segment that spans across more than one National Program Office. There are usually multiple solutions / investments within a Segment. For more information on Segment Architecture development processes and tools, see the *EPA EA Governance Procedures* and *Federal Segment Architecture Methodology* (http://intranet.epa.gov/architec/pdfs/lawguidance/fsamv1.pdf).

Senior Information Official (SIO):
- Coordinates the development of the information resource investment proposals within their respective offices,
- Monitors the implementation of information resource investments to ensure the IT used and managed by their organization supports its business needs and mission and helps to achieve EPA's strategic goals,
- Grants the authority to access sensitive Personally Identifiable Information (PII) remotely or transmit/transport it off site, and
- Approves segment architectures for their National Program Office.

System Owner:
- Monitors compliance with and concurs on applicable waivers from the SLCM Policy and Procedure,
- Appoints IT Project Managers/System Managers/Solution Architects, and
- Coordinates SLCM development activities with those of the EA, CPIC, and Security processes.

9. DEFINITIONS

Application: The information resources (information and information technology) used to satisfy a specific set of user requirements. (Source: Appendix III to OMB Circular No. A-130)

Architecture: The set of products that portrays an organization's strategic goals, business practices, data assets, IT services, and technical infrastructure.

Baseline Architecture: The set of products that portrays an organization's existing strategic goals, business practices, data assets, IT services, and technical infrastructure. Commonly referred to as the "as-is" architecture.

Collaboration: A process in which different parties work together to achieve a goal.

CPIC Process: The Capital Planning and Investment Control (CPIC) process, mandated by the Clinger-Cohen Act of 1996, is a systematic approach to selecting, managing, and evaluating IT investments. It requires federal agencies to focus on the results achieved through IT investments.

Enterprise: An organization (or cross-organizational entity) supporting a defined business scope and mission. An enterprise includes interdependent resources (e.g., people, organizations, and IT) that must coordinate their functions and share information in support of a common mission (or set of related missions).

Enterprise Architecture (EA): A strategic information asset base that describes the enterprise mission, the information and technologies necessary to perform the mission, and the transitional processes for implementing new technologies in response to changing mission needs. EA includes a baseline architecture, target architecture, and enterprise transition plan.

Enterprise Architecture (EA) Blueprint: A composite document describing the Enterprise Baseline Architecture, Enterprise Transition Plan, and Enterprise Target Architecture.

Enterprise Services: Common or shared IT services that support core mission areas and business services.

Enterprise Target Architecture (ETA): See **Target Architecture**.

Enterprise Transition Plan (ETP): A document that defines the strategy for transitioning the enterprise from the baseline architecture to the target architecture. The ETP describes key planning and implementation activities necessary to migrate business processes, information resources, and supporting information management systems to the Enterprise Target Architecture.

Federal Enterprise Architecture: A business-based framework for government-wide improvement developed by the OMB that is intended to facilitate efforts to transform the federal government to one that is citizen-centered, results-oriented, and market-based. (Source: NIST 800-18)

Information Technology (IT): Applied computer systems, both hardware and software, and often

including networking and telecommunications, usually in the context of a business or other enterprise. Often the name of the part of the enterprise that deals with all things electronic.

Major IT Investment: An OMB IT designation. OMB defines a Major IT Investment as an IT project or system meeting one or more of the following criteria:

- A system or acquisition requiring special management attention because of its importance to the mission or function of the agency, a component of the agency or another organization;
- Is for financial management and obligates more than $500,000 annually;
- Has significant program or policy implications;
- Has high executive visibility;
- Has high development, operating, or maintenance costs (for EPA this is greater than or equal to $5 million annually);
- Is funded through other than direct appropriations; or
- Is defined as Major by the Agency's CPIC process.

Non-Major IT Investment (i.e. CPIC Medium or CPIC Lite): Any IT initiative or investment not meeting the definition of Major or Small and Other that is part of the Agency's IT Portfolio of investments. "CPIC Medium" investments are subject to spending between $2 million and $5 million per year. "CPIC Lite" investments are subject to spending between $250,000 and $2 million per year.

Repositories and Tools: A collection of databases, architectural and modeling tools, and other electronic support for developing, modeling, managing, analyzing, and publishing the enterprise baseline architecture, enterprise target architecture, ETP, and segment architectures. Collectively, the EA repositories and tools comprise the strategic information asset base of the EA.

Segment Architecture: "A segment architecture provides a detailed results-oriented architecture and a transition plan for a portion (or segment) of the Agency/enterprise. Segments are individual building blocks in the Enterprise Transition Plan (ETP) describing core mission areas and common or shared business services or application services. A segment architecture comprises a series of work products describing the baseline architecture, the target architecture and a transition plan.   The segment shall address all investments that comprise that segment. Typical segment architecture products capture segment-level change drivers; describe baseline and target performance, business, data, services and technology architecture; and provide a roadmap to enhance business operations and achieve measurable performance improvements. (OMB, *Enterprise Architecture Segment Report*, December 2008 v1.0)

Sequencing Plan: A sequencing plan defines the logical dependencies between, and relative priorities (i.e. chronological sequence) among, the activities to transition from the baseline to target architecture, at the enterprise, segment and solution levels.

Service: From an enterprise perspective, a service describes the systematic utilization of distributed business/technology capabilities managed and synchronized across the enterprise for the purpose of delivering the results from well defined tasks or for expediting business transactions that address the needs of customers and attain defined business outcomes. A service-oriented approach to doing business allows a task to be defined so it can be accomplished by others as a mutually agreed or contractually provided assistance or supporting business/technology capability.

Small and Other IT Investment: Any IT initiative or investment that is part of the Agency's IT Portfolio of investments and subject to spending of less than $250,000 per year.

Solution: An information technology system or application.

Solution/System Architecture: A solution architecture is a blueprint of an information technology system—including its business processes, data classes, security controls, application interfaces, and technologies.

System: An interconnected set of information resources under the same direct management control which shares common functionality. A system normally includes hardware, software, information, data, applications, communications, and people." (Source: Appendix III to OMB Circular No. A-130)

System Lifecycle Management (SLCM): EPA's System Lifecycle Management is the Agency's approach and practices in the definition, acquisition, development, implementation, operations and maintenance, and termination of EPA information technology (IT) systems and applications. System owners and project managers must maintain required documentation for each phase, step, and activity during the lifecycle of an IT system or application. Each system must fit within the overarching Enterprise Architecture (EA) of the Agency, and thus the System Lifecycle includes control gates where management can review and approve EA, security, and system requirements before the system may proceed to the next phase of its lifecycle.

Target Architecture: A high-level master blueprint describing the optimal state of the Agency, or an individual segment, in terms of strategic goals, business practices, data assets, IT services, and technical infrastructure. Commonly referred to as the "to-be" architecture. The Enterprise Target Architecture (ETA) is a target architecture for the Agency.

10. WAIVERS

Requests for waivers from the EA Governance Procedures are addressed to the CIO or his/her designee through the IT waiver process. Offices have the right to appeal a CIO decision to the Deputy Administrator as outlined in the QIC Charter.

When a solution or segment architecture is determined to be non-compliant with the EA, the Solution or Segment Architect may apply for a compliance waiver by following the waiver process (as described in the document *Procedure: Obtaining a Waiver from an EPA IT Requirement*). If the waiver is not approved, the Solution Architect or Segment Architect develops an EA compliance plan for approval by the Chief Architect or designee.

Waivers are *not* permanent. Waiver terms are documented for each waiver specifying 1) a time period after which the solution or segment architecture must comply with the Agency EA, 2) the modifications that shall be made to the Agency EA to accommodate the solution, or 3) some combination of the two approaches specified.

Whenever an EA requirement is waived, the Chief Architect and EAWG will determine if a change to the Agency architecture is necessary. If such a change is necessary, the Chief Architect initiates measures as may be necessary to accommodate the non-compliant architecture. The changes are subsequently approved by the CIO during the next annual update of the Agency architecture.

11. RELATED POLICIES, PROCEDURES, STANDARDS AND GUIDANCE[14]

EPA Strategic Plan

EPA Enterprise Architecture Policy

EPA Capital Planning and Investment Control (CPIC) Policy & Procedures

EPA System Life Cycle Management (SLCM) Policy & Procedure

Agency Network Security Policy

NIST 800-18 Guide for Developing Security Plans for Federal Information Systems: http://csrc.nist.gov/publications/nistpubs/800-18-Rev1/sp800-18-Rev1-final.pdf

EPA Data Standards Policy: http://intranet.epa.gov/oei/imitpolicy/qic/ciopolicy/2133.0.pdf

Procedure: Obtaining a Waiver from an EPA IT Requirement

QIC Charter: http://intranet.epa.gov/oei/imitpolicy/qic/documents/final_qic_charter070705.pdf

QTS Charter: http://intranet.epa.gov/oei/imitpolicy/qic/docs/QTS_Charter.pdf

IIS Charter: http://intranet.epa.gov/oei/imitpolicy/qic/pdfs/iis-charter.pdf

EAWG Charter: http://intranet.epa.gov/architec/doc/charter_final.doc

Information Technology Infrastructure Standards Procedure: http://intranet.epa.gov/oei/imitpolicy/qic/ciopolicy/itis.pdf

EPA IT Standards Profile: http://cfint.rtpnc.epa.gov/otop/itarchitecture/standards.cfm

Personal Computer Configuration and Management Standard: http://intranet.epa.gov/oei/imitpolicy/qic/ciopolicy/percom.pdf

Data Exchange Procedure: http://intranet.epa.gov/oei/imitpolicy/qic/ciopolicy/CIO_2122-P-04.0.pdf

EPA Enterprise Target Architecture

EPA EA Principles: http://intranet.epa.gov/architec/pdfs/EPA-EA-Principles.pdf

Section 10 of the *EPA Enterprise Architecture Policy* describes additional related Laws, Regulations, and Guidance.

12. MATERIAL SUPERSEDED

Enterprise Architecture Governance Procedure (CIO 2122-P-01.0 dated April 4, 2006)

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[14] EPA's IT policies and procedures (draft and approved) are maintained on the IT Policy Wiki: http://intranet.epa.gov/itpolicy

13. ADDITIONAL INFORMATION

For more information on these procedures, please contact the Office of Environmental Information, Office of Technology Operations and Planning, Mission Investment Solutions Division.

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