

CIOP CHAPTER 1351.27

Enterprise Architecture (EA) Policy

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Section 27.1. Purpose

The U.S. Department of Transportation (DOT) Enterprise Architecture (EA) Policy establishes the framework to develop, maintain and use the DOT EA as a tool for making decisions around information technology investments. The EA Policy implements the requirements specified for all Federal agencies in the *Clinger-Cohen Act of 1996* (Clinger-Cohen Act) and related laws, regulations and other mandatory guidance as well as best practice related to EA. The EA Policy also outlines responsibilities to govern important EA activities.

- The DOT EA is an explicit description and documentation of the current, transitional and desired relationships among business, management processes and information technology (IT).
- The DOT EA will be used to support decision making that ensures IT investments support the DOT mission, strategy and annual performance goals.
- The DOT EA will be used to evaluate IT investments to ensure they maximize business value, support business transformation, are not redundant and adhere to appropriate IT standards. The DOT EA policy implements the “Analysis” functions cited in DOT Order 1351.39, Departmental IT Governance Policy.

- Using the DOT EA, the Department will assist in the improvement of mission performance and optimizing the use of DOT IT assets by identifying capability gaps, eliminating IT redundancies, and improving business and IT alignment.
- The DOT EA Policy outlines the framework and responsibilities for gathering data necessary to link the DOT IT portfolio with DOT vision, mission, annual performance goals and priorities.

The DOT Office of the Chief Information Officer (OCIO), under the responsibility and authority granted by the Secretary of Transportation under Public Law 104-106, *Clinger-Cohen Act of 1996* and the Office of Management and Budget (OMB) Memo M-09-02, *Information Technology Management Structure and Governance Framework*, issues this policy to ensure that the Departmental EA Program is developed, documented and implemented.

The EA Policy replaces previously published EA policy in support of the updated OMB guidance and Departmental IT governance changes.¹

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Section 27.2. Background

The Clinger-Cohen Act requires Federal Agency Chief Information Officers (CIOs) to develop, maintain and facilitate, “a sound and integrated IT architecture for the executive agency.”² The OMB has issued explicit guidance in OMB Circular A-130 requiring departmental information system investments to be consistent with the Department’s EA. This act also levies the responsibility for CIOs to “analyze the missions of the executive agency and, based on the analysis, revise the executive agency’s mission-related processes and administrative processes, as appropriate, before making significant investments in information technology to be used in support of those missions.”³

The EA is a management best practice that provides a consistent view across all program and service areas to support planning, business transformation and IT investment decision making. Used appropriately, EA promotes mission success by serving as an authoritative reference, promoting functional integration and resource optimization with both internal and external service partners. The EAs are composed of multiple solutions architectures, each focused on a particular IT system, whereas the EA provides an overview of an entire IT portfolio.

The overall approach to developing the DOT EA begins with establishing a framework at the Department level. The DOT EA framework consists of a DOT-specific set of reference models that adapt the OMB Federal Enterprise Architecture (FEA) reference models.⁴ The DOT EA framework will also specify artifacts, which will be used to collect

¹ See DOT Order 1351.39, Departmental IT Governance Policy.

² 40 USC 11315(b)(2).

³ 40 USC 11313(5).

⁴ The Common Approach to Federal Enterprise Architecture established by OMB.

data and information about the Department's IT investments and IT standards. The Operating Administrations (OA) architectures populate the artifacts with information about their specific IT investments.

The DOT EA framework provides a comprehensive overview of how DOT IT investments support the Department in accomplishing its mission. The EA framework establishes consistent, decomposable views of all the transportation missions, OA business units, programs, investments, systems, data, infrastructure, networks and business support services.

The DOT EA framework also establishes and extends EA standards identified in the FEA to include the reference models and sub-architecture domain artifacts, which are to be applied in development of segment architectures.⁵ These EA standards can be further extended by the OAs as necessary in order to serve their unique mission requirements.

The DOT EA framework is segmented according to common service areas and/or business units within DOT. These segments are natural groupings of related business functions and outcomes that describe the business and performance of the DOT mission. Segments are defined at the Department level both organizationally (i.e., DOT Component) and functionally (i.e., a vertical or cross-cutting mission support area). Architectures consist of artifacts, which are models or documentation that describe part or all of an architecture, and include reports, diagrams, charts, tables, matrices and spreadsheets. The OAs serve as the authoritative sources for DOT EA artifacts. The OMB Collaborative Planning Methodology⁶ is used to develop an integrated plan for each of the segments to identify strategic improvement opportunities.

The DOT EA will be managed and governed through a set of supporting boards, processes and tools. These include but are not limited a Charter, the EA Program Management Plan, and a maturity model to measure the effectiveness of the DOT EA program.

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Section 27.3. Scope and Applicability

This policy applies to all DOT Operating Administrations (OAs) and the Office of the Inspector General (OIG) (hereafter referred to as DOT Components),⁷ including employees and contractors planning IT investments and budget requests; developing transition plans and IT roadmaps; acquiring IT resources; designing and developing

⁵ The OMB Chief Architect states that Common Approach artifacts are compatible with Department of Defense Architecture Framework (DoDAF) artifacts.

⁶ Available on OMB MAX portal: <https://max.omb.gov/community/display/Egov/Collaborative+Planning+Method>.

⁷ All recommendations and requirements contained in this directive are applicable to all Components but only to the extent that such requirements and recommendations are consistent with the expressed language contained in 49 U.S.C 106, 40110, 40121

software and services; and securing, integrating, operating, maintaining and retiring IT investments.

The DOT OCIO will develop and issue supplemental guidance as necessary to implement this policy in order to assist staff in conducting their responsibilities toward achieving value at both the investment and enterprise levels. Each DOT Component may issue additional policies and guidance provided they are consistent with existing laws, regulations and DOT policies and procedures.

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Section 27.4. Policy

Develop the DOT EA

27.4.1. The DOT shall establish a DOT-wide EA aligned to the Department's Strategic Plan and Annual Performance Plan.⁸ Each DOT Component may extend segment architecture standards as necessary based on specific mission requirements and system architectures.

27.4.1.1. The DOT EA shall conform to the OMB FEA and may extend FEA EA standards and reference models as necessary based on specific DOT mission requirements.

27.4.1.2. The DOT EA shall consist of segments based on natural groupings of related business functions and their outcomes that describe the business and performance of the DOT mission.⁹ Each DOT Component shall align its IT investments within its architecture to the appropriate DOT EA segment(s), DOT reference models and the FEA reference models.

27.4.1.3. The DOT shall document its EA using artifacts, as prescribed by the OMB Common Approach to Federal Enterprise Architecture. The DOT shall establish and maintain uniform metadata for creation of EA artifacts. Periodically, DOT will use these artifacts to prepare an EA Roadmap for submission to OMB.¹⁰ Each OA shall populate artifacts based on Department EA standards.

⁸ OMB Circular A-11 (August 2012): "Once an agency's performance plan is established, agencies should ensure that the enterprise architecture planning documents are consistent with achieving the agency goals and objectives. This will require direct alignment of the capital and enterprise architecture planning efforts to meet the strategic objectives and performance goals in agency strategic and annual performance plans, to the extent that information technology resources are critical to the achievement of those objectives and goals."

⁹ Apply and tailor the FEA Performance Reference Model (PRM) and Business Reference Model (BRM) to align IT with DOT business management and performance outcomes.

¹⁰ Within the six sub-architecture domains: strategy, business, data, applications, infrastructure and security.

27.4.2. The DOT EA shall document a minimum set of IT standards in accordance with established FEA Reference Models.¹¹ The DOT shall establish and revise IT standards as FEA Reference Models are published and/or updated. Each OA shall develop an architecture that documents IT standards in use and alignment with Department level IT standards.

27.4.3. The DOT shall maximize sharing of intra-agency and interagency IT investments.

Maintain the DOT EA

27.4.4. The DOT shall manage EA changes and ensure the EA is developed, verified, versioned, used and sustained over time with the perspectives of all stakeholders in mind. Changes include changes to artifacts and IT standards.

27.4.5. Each DOT Component shall maintain architecture data and artifacts for currency and validity, as well as track and document changes in order for data and artifacts to be trusted for use in planning and decision making.

27.4.6. The DOT EA shall be reviewed and approved by DOT executive management.¹²

Use the DOT EA

27.4.7. The DOT shall use the artifacts, EA and IT standards, and data from the EA to support IT investment decision making.

27.4.7.1. The DOT shall document within each segment the "current architecture," "future architecture" and, as appropriate, "transition architecture," which identifies the annual plan for moving toward the future architecture.

27.4.7.2. The IT investment decision making shall be based on an analysis of EA artifacts, EA and IT standards, and data.

27.4.7.3. As required by OMB, DOT will submit an annual EA Roadmap, documenting its progress and plans for transitioning from its "current" to its "future" architecture.

27.4.8. Each DOT Component shall use the IT standards documented in the DOT EA to evaluate their IT investments for compliance with IT standards and ensure that all IT investments conform.

Measure the DOT EA Program

27.4.9. The DOT EA Program shall be evaluated in accordance with the GAO EA Maturity Management Framework.

¹¹ The FEA has developed and published the following reference models: FEA Data Reference Model, FEA Application Reference Model, FEA Infrastructure Reference Model, and FEA Security Reference Model. Reference Model documentation may be found on the OMB MAX portal (max.omb.gov).

¹² As established under the auspices of DOT Order 1351.39, Departmental IT Governance Policy.

27.4.10. The DOT shall measure the value generated by developing, maintaining and using the EA.

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Section 27.5. Roles and Responsibilities

This section defines the roles key to implementing the departmental EA Program across the DOT and EA-specific responsibilities associated with each role. Provided below is a summary listing of the roles and the levels in the organization where they reside.

Department Level

- Department Chief Information Officer
- Department Chief Enterprise Architect
- Department Chief Financial Officer
- Senior Procurement Executive

Component Level

- Component Chief Information Officer
- Component Enterprise Architect

Program Level

- Business Owners
- System Owners

Department Level

27.5.1. Accountability for directing the information and data integrity of the Agency and its groups and for all IT functions resides with the Chief Information Officer. The **DOT CIO** shall:

27.5.1.1. Ensure the application of the EA is coordinated with other management disciplines within the OCIO.¹³

27.5.1.2. Apply EA standards documented in the EA to optimize supporting infrastructure and reduce IT spending.

27.5.1.3. Leverage the EA to promote the use of a consistent framework for measuring the value of IT investments across DOT.

¹³Coordination shall include IT investment planning and decision making; CPIC; IT governance planning and decision making; information security, to include security categorization and certification and accreditation process; enterprise engineering; strategic planning; value engineering; records management; project management; procurement; infrastructure management; and portfolio management.

27.5.1.4. Submit the EA Roadmap to the appropriate IT Governance body for review and approval.¹⁴

27.5.2. The **Chief Enterprise Architect** shall:

27.5.2.1. Develop, implement and maintain the DOT EA Framework.

27.5.2.2. Align the DOT EA to the FEA and to DOT strategic drivers.¹⁵

27.5.2.3. Establish a DOT EA program management plan.

27.5.2.4. Establish processes to manage and document changes to the DOT EA.

27.5.2.5. Coordinate architecture domains with appropriate domain experts. These offices include, at a minimum:

27.5.2.5.1. The DOT Chief Information Security Officer, to ensure security is included in all DOT information management and IT initiatives.

27.5.2.5.2. The DOT Director of Intelligence, Security, and Emergency Response, to establish, harmonize, promote and maintain IT standards for enterprise data protection and management and support Federal-wide information sharing initiatives.

27.5.2.5.3. The DOT Chief Technology Officer, to ensure application and infrastructure IT standards achieve infrastructure optimization objectives and reduce commodity IT spending.

27.5.2.6. Conduct Department-wide reporting for value associated with IT investments.

27.5.3. The CFO is the responsible authority for: (a) all architectural considerations required under the Chief Financial Officers Act of 1990 (the CFO Act) and (b) coordinating with the DOT CIO to ensure that the Enterprise Architecture and Capital Planning and Investment Control processes support the Agency's strategic and budget planning processes. The DOT **Chief Financial Officer (CFO)** shall:

27.5.3.1. Promulgate financial management policy to implement IT standards and ensure appropriate resources are made available to meet performance objectives and mission-specific goals.

27.5.3.2. Ensure that EA and associated functional priorities are incorporated throughout the Department's budget planning, grants management, financial management, and technology operations.

27.5.3.3. Ensure budget and staff resources are available for monitoring the operational performance of the Department's EA program.

¹⁴ See DOT Order 1351.39, Departmental IT Governance Policy.

¹⁵ DOT Strategic Plan, Annual Performance Report, and IT management initiatives.

27.5.4. Management direction of DOT's procurement system, including implementation of the unique procurement policies, regulations and IT standards of the Department, is the responsibility of the Office of the Senior Procurement Executive (OSPE). The **DOT Senior Procurement Executive (SPE)** shall:

27.5.4.1. Ensure acquisition decisions are based on the DOT EA to reduce duplication of IT investments across the DOT and promote shared services and lower Total Cost of Ownership (TCO).

27.5.4.2. Promulgate strategic sourcing and acquisition policy to implement IT standards, coordinating with the FAA Acquisition Executive as needed.

Component Level

27.5.5. Each **Component Chief Information Officer** shall:

27.5.5.1. Designate a Component Enterprise Architect responsible for implementing an OA architecture program and documenting the OA architectures.

27.5.5.2. Ensure that investments align to enterprise objectives of minimizing duplicative services and maximizing the use of shared services.

27.5.6. The **Component Enterprise Architect** shall:

27.5.6.1. Ensure that Component architectures are aligned with DOT and Component mission and business needs, and are aligned to the DOT EA Framework where appropriate.

27.5.6.2. Ensure that investments comply with the DOT EA and IT standards.

27.5.6.3. Ensure that business transformation needs are being addressed within the system lifecycle.

27.5.6.4. Develop and maintain data and artifacts in compliance with the DOT EA standards where appropriate.

27.5.6.5. Conduct an annual assessment of the OA EA program using the GAO EA Management Maturity Framework.¹⁶

Program Level

27.5.7. **Business Owners** shall:

27.5.7.1. Communicate their business transformation requirements to the Component Enterprise Architect.

27.5.7.2. Use the DOT EA as the framework for measuring the value of their IT investments.

¹⁶ GAO-10-846G, *A Framework for Assessing and Improving Enterprise Architecture Management (Version 2.0)*, available at <http://www.gao.gov/assets/80/77233.pdf>.

27.5.7.3. Conduct business process reengineering to streamline existing business processes and deliver functional requirements to the Component Enterprise Architect.

27.5.8. **System Owners** shall:

27.5.8.1. Develop and maintain IT solutions compliant with the DOT EA.

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Section 27.6. Dates

27.6.1 The effective date of this policy is the date the policy is approved.

27.6.2 The DOT shall meet all reporting deadlines consistent with the most recent OMB EA guidance.

27.6.3 In accordance with the CIOP and the DOT Order Directive Process, this chapter shall be reviewed annually and validated by the Chief Enterprise Architect. The directive content shall be annually reviewed to ensure it has clear intent, contains the right material and complies with the IT Directive Publication Process. Roles and responsibilities shall be reviewed and updated on a quarterly basis.

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Section 27.7. Cancellations

27.7.1 This policy supersedes the previous EA Policy signed by the DOT CIO on September 25, 2009.

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Section 27.8. Compliance

27.8.1 All DOT information management and IT development, modernization, enhancement and acquisitions shall conform to the DOT EA. In doing so, it will comply with applicable EA requirements of the Capital Planning and Investment Control (CPIC) and budget processes as published in periodic procedures, as well as IT standards and guidelines.

27.8.2 All information management and IT initiatives shall adhere to the tenets of the OMB defined FEA.

27.8.3 Compliance will be monitored through EA engagement with IT governance bodies.¹⁷

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Section 27.9. Waivers

27.9.1 Compliance with this policy is mandatory.

27.9.2 The DOT Components may request that the DOT CIO grant a waiver of compliance based on a compelling business reason. The request must include: (1) justification, (2) what measures have been implemented to ensure that EA principles have been implemented and (3) waiver period. The DOT CIO shall provide a written waiver or justification for denial.

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Section 27.10. Audit Procedures

27.10.1 The Chief Enterprise Architect shall monitor implementation and reporting of EA information.

27.10.2 The OA CIOs shall audit DOT Component investments to ensure compliance with DOT and DOT Component EA and IT standards and resolve reported incidents of nonconforming IT projects or purchase requests that do not adhere to future architectures and EA and IT standards.

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Section 27.11. Approval

Brodi Fontenot

Acting DOT Chief Information Officer

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Date

¹⁷ As part of the CPIC and Integrated Program Planning and Management (IPPM) process.

Appendix A – Definition of Terms

Artifact: a documentation product, such as a text document, diagram, spreadsheet, briefing slides or video clip. (Source: The Common Approach to Federal Enterprise Architecture; May 2, 2012)

Business Owner: the spokesperson for the IT service initiative and the owner of the business, functional and funding requirements for the system/service throughout the business's life cycle, from concept to disposal. The business owner works with various parties depending on the life cycle phase of the business. (Source: DOT OCIO IT Governance Guidance Memo, June 2010)

Enterprise Architecture (EA): a strategic information asset base that defines the mission; the information necessary to perform the mission, the technologies necessary to perform the mission and the transitional processes for implementing new technologies in response to changing mission needs; and includes a current architecture, a future architecture, and a sequencing plan. (Source: The Common Approach to Federal Enterprise Architecture; May 2, 2012)

EA Framework: the combination of the templates and structured processes that facilitate the documentation of the architecture in a systematic and discipline manner.

IT: any equipment or interconnected system or subsystem of equipment used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission or reception of data or information by the executive agency; equipment used by the executive agency directly or by a contractor under a contract with the executive agency that requires the use – (i) of that equipment; or (ii) of that equipment to a significant extent in the performance of a service or the furnishing of a product. (Source: Clinger Cohen Act of 1996)

IT Investment: the expenditure of IT resources to address mission delivery and management support. 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. All IT investments should have a defined life cycle with start and end dates, with the end date representing the end of the currently estimated useful life of the investment, consistent with the investment's most current applicable alternatives analysis. (Source: Guidance on Exhibits 53 and 300 – Information Technology and e-government)

Metadata: structured information that describes, explains, locates or otherwise makes it easier to retrieve, use or manage an information resource. Metadata is often called data about data or information about information. (Source: *Understanding Metadata*, a revision and expansion of *Metadata Made Simpler: A guide for libraries* published by National Information Standards Organization (NISO) Press in 2001; www.niso.org)

Reference Model: an authoritative source of information about a specific subject area that guides and constrains the instantiations of multiple models and solutions. (Source: The Common Approach to Federal Enterprise Architecture; May 2, 2012)

Segments: a natural grouping of related business functions and their outcomes that describe the business and performance of the DOT mission. Segments are defined at the department level both organizationally (i.e., a DOT Component) and functionally (i.e., a vertical or cross-cutting mission support area).

Segment Architecture: a detailed, results-oriented architecture (current and future) and a transition strategy for a portion or segment of the enterprise. Segments are individual elements of the enterprise describing core mission areas and common or shared business services and enterprise services. They provide the core linkage of the IT Investment Portfolio to the Agency's performance management system. As such, segments are designed to be common across programs that support the same mission area. Increasingly, shared segments will be common across the government and agencies should plan to use approved government-wide shared segments as their future architecture. (Source: The Common Approach to Federal Enterprise Architecture; May 2, 2012)

Standards:

EA standards refer to reference models, artifacts, metadata and data contained in EA artifacts.

IT standards refer to conforming specifications (e.g., the requirement to support Internet Protocol version 6 to provide access to data through an Application Programming Interface (API) or to implement standard data elements in accordance with the National Information Exchange Model) and/or standard product lists.

Sub-architecture Domain: a specific area of the overall federal EA framework. The six areas are strategic, business services, enabling applications, host infrastructure, security, and data and information. These six sub-architecture domains delineate the types of analysis and modeling that is necessary for architecture to meet stakeholder requirements. (Source: The Common Approach to Federal Enterprise Architecture; May 2, 2012)

Appendix B – Legal Authorities and Guidance

Legislation

- The Chief Financial Officers Act of 1990, P.L 101-576
- Clinger-Cohen Act of 1996, P.L. 104-106
- E-Government Act of 2002, P.L. 107-347

National Policy, Directives and Memorandum

- OMB Circular A-130, "Management of Federal Information Resources"
- OMB Memorandum M-96-20, "Implementation of the Information Technology Management Reform Act of 1996"
- OMB Memorandum M-97-02, "Funding Information Systems Investments"
- OMB Memorandum M-97-16, "Information Technology Architecture"
- OMB Memorandum M-10-25, "Reforming the Federal Government's Efforts to Manage Information Technology Projects"
- OMB Memorandum M-10-26, "Immediate Review of Financial Systems IT Projects"
- OMB Memorandum M-10-27, "[IT] Investment Baseline Management Policy"
- OMB Memorandum M-11-29, "[CIO] Authorities"
- OMB Memorandum M-12-10, "Implementing PortfolioStat"
- Executive Order 13576, "Delivering an Efficient, Effective, and Accountable Government"

DOT Policies

- U.S. Department of Transportation Information Technology Governance Policy (DOT Order 1351.39)

Guidance

- GAO-10-846G, A Framework for Assessing and Improving Enterprise Architecture Management