Architecture Alignment and Assessment Guide

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1. Introduction

The Architecture Alignment and Assessment Guide provides an introductory overview to the integration of enterprise architecture with the Information Technology (IT) Capital Planning process. This document is a guide to Agencies and provides examples for relating capital investments to the architecture project assessment and IT capital planning functions. It is intended for Federal Agency senior management as well as the architecture practitioner. The focus of this Guide is to present, step-by-step, the Architecture Alignment and Assessment process. The Chief Information Officer (CIO) Council views architecture and IT capital planning not as competing functions, but believes they complement one another.

Sections 1 through 4 provide a summary of information technology reform and how it has evolved since the Clinger/Cohen Act of 1996 became law. The sections highlight guidance that the Office of Management and Budget (OMB) has given to the Federal community, which extended information technology reform beyond the Clinger/Cohen Act.

Section 5, An Approach to IT Capital Planning and Enterprise Architecture (EA) Integration <u>In Practice,</u> provides an example of how one Bureau of the Department of Treasury, the U.S. Customs Service, conducted architecture alignment and assessment on a business function investment. It begins with a description of the architecture alignment and assessment function as implemented within Customs Investment process. The section concludes with a detailed description that applied the alignment and assessment principles, integrating the architecture with the IT capital planning function.

The General Accounting Office (GAO) developed the IT Investment Management (ITIM) Framework (GAO/AIMD-10.1.23) to provide a common structure for discussing and assessing IT capital planning at Federal Agencies in 2000. ITIM enhances previous Federal IT investment management guidance by embedding the Select/Control/Evaluate phases within a description of the organizational processes required to carry out good investment management processes. ITIM has been released as an exposure draft, and once comments have been received and it is finalized and Agency awareness and understanding of ITIM increases, the CIO Council will update the Architecture Alignment and Assessment Guide to reflect the new processes.

2. How Do Agencies Manage Information Systems and IT?

Federal Agencies face increasing challenges in managing information systems and IT. Agencies operate in an age where information and the technological capability to deliver this information to external clients as well as clients within other Government Agencies are essential to core business strategies.

In the past, budgets and workforce often increased to meet demands for information technology-based services. Today, the funds and IT staff required to meet these increased requirements can no longer be assumed. The downsizing of the Federal workforce has forced the Federal IT manager to use diminishing staff more effectively and efficiently. Congressional and Executive funding sources require Agencies to demonstrate proven capability to invest in and manage IT resources. Sharing information among Federal and other Government organizations is a necessity.

Federal organizations are under increasing pressure to manage information systems and information technology as an enterprise key capital resource. Decreased funding, budget cuts, and manpower reductions have underscored the need for Agencies to plan, allocate, and manage funds based upon sound investment strategies.

Evolving Federal guidance from Congressional and Executive branches mandated the establishment and management of synergistic IT capital planning and enterprise architecture functions within an organization. IT capital planning ensures mature investment decisions on the use of technology within an organization in direct support of core business processes. Enterprise architecture guarantees the organization has the strategic information asset base to define the mission, information and technologies necessary to perform the mission, and transitional processes for implementing new technologies in response to changing mission needs.

These changing conditions resulted in the growing awareness that Agencies must implement an Enterprise Architecture process and an IT Capital Planning process to receive the necessary funding to implement new and improved technologies to carry on core business functions. The next step is to successfully integrate these two processes. Federal management needs new tools and techniques to achieve this integration.

The Federal Architecture Working Group presents this Guide as a validated approach for Agency managers and practitioners to use in reaching the goal of integrating enterprise architecture and IT capital planning. The tools and techniques presented in this Guide are collectively called architecture alignment and assessment.

3. Background on Information Technology Reform

3.1   Goals of the Clinger/Cohen Act of 1996

The Clinger/Cohen (formerly known as the ITMRA) Act of 1996 was the most significant information technology reform of the last decade. It directed Federal Agencies to establish a comprehensive approach to manage the acquisition, use, and disposal of information technology, in part to avoid the practices of the past. The Clinger/Cohen Act encourages the use of performance- and results-based management.

Agencies had been acquiring information technology based on the strategy of buying the latest technology at the best price, not on the strategy of buying the technology best suited to support Agency mission and goals. This led to business functions being forced to change to support the latest technology, instead of technology serving the mission and goals of the Agency. The focus is not on technology, but the effect technology has on the business itself; however, the CIO Council recognizes the potential for technology to change an enterprise, and technology is enabling a closer coupling of separate organizations in extended value chains.

Clinger/Cohen Act reform measures now require Federal Agencies to shift from managing technology to managing information. Information technology investments must support strategic operational goals and, as appropriate, delivery of services to the public. Agencies must prove each proposed information technology investment supports business programs and is supported by a sound business case.

Clinger/Cohen Act reform measures mandated the use of quantitative and qualitative investment evaluation techniques. Explicit criteria associated with costs, benefits, and risks are used as the basis for selecting IT investments in the Federal Government.

The Clinger/Cohen Act holds the Head of an Executive Agency responsible for the following.

'   Establishing quantitative and qualitative criteria for comparing and prioritizing alternative investments

'   Establishing a system of milestones for measuring progress, on an independently verifiable basis, in terms of costs, capability of the system to meet specified requirements, timeliness, and quality

The Clinger/Cohen Act holds the Chief Information Officer of an Executive Agency responsible for developing, maintaining, and facilitating the implementation of a sound and integrated information technology architecture (ITA). Increasingly, this terminology has been interpreted to mean an enterprise architecture.

Once an investment is selected, it must be controlled throughout the system development lifecycle. When placed in production, the investment must be evaluated to determine whether it should be continued, further developed, modified, or in rare cases, terminated for not meeting expectations. Thus, the Clinger/Cohen Act mandated a comprehensive approach to selecting IT investments, monitoring development, and evaluating performance so the best judgements can be made about the future of the investment.

System development lifecycles are unique to each Agency; most lifecycles have the following stages.

- Design
- Construction
- Implementation
- Production
- Evaluation

At each stage, information is presented to senior management personnel of an Executive Agency regarding the progress of an investment in an information system, including costs, capability of the system to meet specified requirements, timeliness, and quality. At these key stages, it is necessary to reach a determination regarding alignment of an investment with the business architecture. Later, it is necessary to assess whether the investment is in accordance with the technical architecture.

3.2 Implementation of the Clinger/Cohen Act of 1996

Most Federal Agencies responded to Clinger/Cohen Act compliance reform measures by employing two existing functions that pre-dated the reforms. One was the information management planning function (i.e., IT capital planning function) and the other was the information engineering function (i.e., IT architecture planning and development function). The purpose of this Guide is to link the IT capital planning and the IT architecture planning and development functions.

The CIO Council supports the following principles.

- It is critical to link the elements contained in the Clinger/Cohen Act and other IT-related laws, guidance, regulations, or Directives

- The Federal Government must use whatever governance bodies, techniques, and tools available to shift the proportion of resources dedicated to maintaining existing stovepiped systems to architected systems focusing on enterprisewide data, processes, and technology

The IT capital planning function was often responsible for developing a comprehensive set of procedures to execute the mandated reforms, while the IT architecture planning and development function was frequently assigned the task of developing the IT architecture to guide the IT capital planning function. Many Agencies assigned these functions to different organizations; therefore, there was often insufficient coordination and understanding of the relationship between the two functions and related processes. This Guide bridges the gap and explains how the functions should be integrated.

3.3 Revision of OMB Circular A-130, "Management of Federal Information Resources"

Revised OMB Circular A-130, "Management of Federal Information Resources," provides a one-stop shopping document for OMB policy and guidance on information technology management. Guidance from the following sources are found in the revised OMB Circular A-130.

- The Paperwork Reduction Act as amended in 1995
- The Clinger/Cohen Act of 1996
- The Privacy Act of 1974 as amended
- The Chief Financial Officers Act of 1991
- The Federal Property and Administrative Services Act of 1949 as amended
- The Computer Security Act of 1987
- The Budget and Accounting Act of 1950 as amended
- Executive Order 12046 of March 27, 1978
- Executive Order 12472 of April 3, 1984
- Executive Order 13011 of July 17, 1996
- OMB Circular A-11 (2000)

With the publication of revised Circular A-130, OMB rescinds the following memoranda.

- M-96-20 Implementation of the Information Technology Reform Act of 1996
- M-97-02 Funding Information Systems Technology
- M-97-09 InterAgency Support for Information Technology
- M-97-15 Local Telecommunications Services Policy
- M-97-16 Information Technology Architectures

Future revisions to OMB Circular A-130 will incorporate other related OMB guidance, including issuance on computer security and Agency use of electronic transactions.

Section 8(b) of the revised Circular is devoted to Clinger/Cohen Act reform requirements and provides additional specificity to previously-issued guidance. For example, and as illustrated in figure 1, 21 actions are prescribed for the IT capital planning function (13 in the Select phase, 5 in the Control phase, and 3 in the Evaluate phase) as well as 3 principles that must be adhered to

in developing an enterprise architecture and 3 steps that must be followed when acquiring information technology.

Does the investment meet the business decision criteria?	Is the investment being managed within the planned cost, schedule and design?	Did the investment meet the promised performance goals?
13 Actions	5 Actions	3 Actions

	Select Phase	Control Phase	Evaluate Phase
Planning			
Architecture	Business Alignment	Technical Alignment	Architecture Assessment

1 Step	1 Step	1 Step
Does the investment support the Agency mission?	Does the investment interoperate within the technology infrastructure?	Is there a need to update the architecture?

Figure 1, IT Capital Planning Phases

A new term is introduced referring to IT capital planning functions as the Capital Planning and Investment Control (CPIC) process. This new term is defined as a management process for ongoing identification, selection, control, and evaluation of investments in information resources. The process is linked to budget formulation and execution and focuses on Agency missions and achieving specific program outcomes.

CPIC and enterprise architecture functions are closely linked processes. Each Agency must implement these functions in a way that best suits the Agency's particular organization, culture, and internal management practices. Certain basic relationships exist between the two functions and both have a common focus: the effective and efficient management of IT investments. The following section provides guidance on the generic relationship of CPIC and enterprise architecture functions.

4. Relationship Between the CPIC Function and the Enterprise Architecture Function *In Theory*

As mandated in the Clinger/Cohen Act of 1996, Federal Agencies must develop and maintain an information technology architecture or enterprise architecture. An early goal of the CIO Council was to develop a framework to assist Agencies in preparing an architecture. The *Federal Enterprise Architecture Framework (FEAF)*, Version 1.1, September 1999, consists of various approaches, models, and definitions for communicating the overall organization and relationships of architectural components required for developing and maintaining a Federal enterprise architecture.

The FEAF provides a mechanism for linking Agency Federal architecture activities and promotes the development of quick successes within an overall Federal architecture plan. While this plan is evolving, the Framework allows Agencies to work architecture issues within the broader context of the Federal enterprise architecture to reap the benefits of resource sharing and interoperability. Additionally, by allowing for quick successes, the Framework addresses real-world business needs of initiatives providing strategic value.

Figure 2 represents the FEAF as it was approved and published in 1999 by the CIO Council. At the time, the relationships between the architecture and other transitional processes were evolving. It is now apparent that the Architecture Alignment and Assessment process is also a key transitional process, especially when Agencies adopt the Framework.
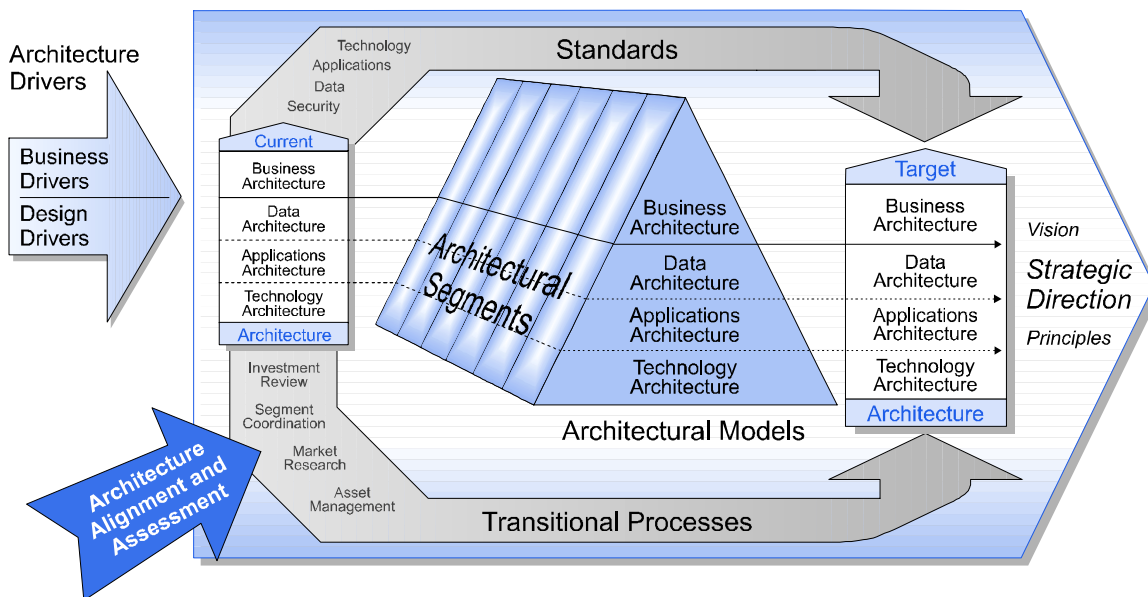

Figure 2, Federal Enterprise Architecture Framework

An enterprise architecture is a strategic information asset base defining the mission functions, information and technologies necessary to perform the mission, and transitional processes for implementing new technologies in response to changing mission needs.

An architecture is a management tool that guides information technology investment decisions associated with an enterprise. More specifically, an enterprise uses a defined architecture to help manage IT and ensure that decisions on information technology investments provide measurable business outcomes.

Section 5125 of the Clinger/Cohen Act defines an information technology architecture as an integrated framework for evolving or maintaining existing information technology and acquiring new information technology to achieve the Agency's strategic and information resources management goals.

Every Agency's enterprise architecture has three time-phased views.

- ′   Baseline Architecture - Present IT environment (i.e., "as is" model)

- ′   Target Architecture - Future IT environment (i.e, "to be" model)

- ′   Transition Architecture - Plan for getting from "as is" to the "to be" model (i.e., migration plan)

The model illustrated in figure 3 depicts the phases leading to the target architecture containing an agreed upon "to be" set of investments the Agency is committed to acquiring within a specified planning period.

Defines where/what the enterprise is today . . .

Baseline	**Transition**	**Target**
• Describes the current state of the environment • Presents the "as-is" picture	• Business improvement efforts • Technology migration strategies • Project development initiatives • Deployment plans	• Describes a planning state of the environment • Presents a "to-be" picture • Several targets may be developed to phase planning horizons over several periods
Architecture	**Architecture**	**Architecture**

. . . and where/how the enterprise plans to change in the future.
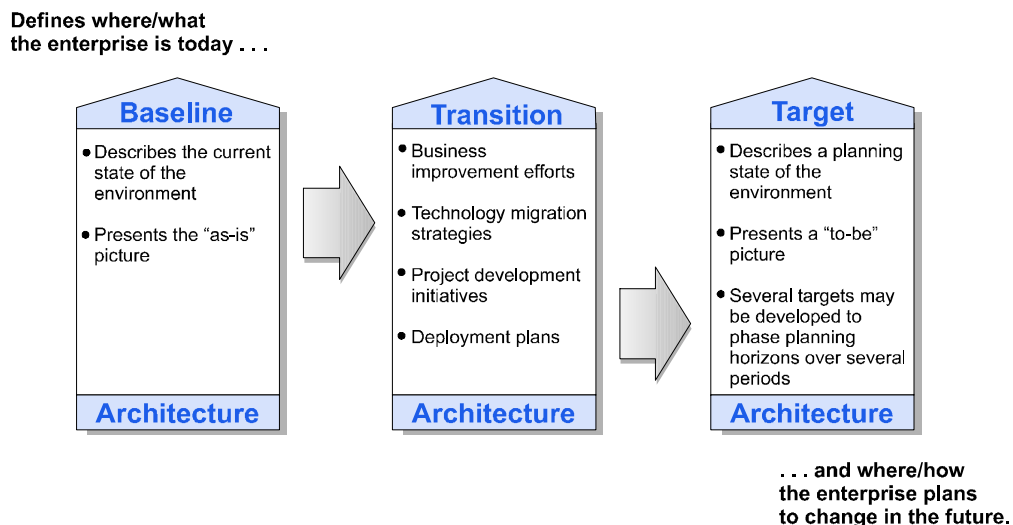
Figure 3, Time-Phased Model

An EA includes the IT Enterprise Architecture Framework, the Technical Reference Model (TRM), and the Standards Profile (including the Security Standards Profile). These are important components in the Architecture Alignment and Assessment process. Agencies are required to document and submit an initial EA to OMB. (See revised OMB Circular A-130 for a detailed description of enterprise architecture requirements.)

As part of an EA effort, Agencies are required by OMB to use or create an EA Framework (EAF). The EAF documents linkages between mission needs, information content, and information technology capabilities and guides strategic and operational investment resource planning. Some Agencies adopted the FEAF, while others such as the Departments of Energy, Treasury, and Defense, have robust frameworks from which the FEAF was modeled.

The TRM identifies and describes the information services (e.g., database, communications, Intranet, etc.) used throughout the Agency.

The Standards Profile defines the set of IT standards supporting the services articulated in the TRM. Agencies are expected to adopt standards necessary to support the entire EA. These adopted standards must be enforced consistently throughout the Agency.

The Security Standards Profile (SSP) identifies the security standards specific to the security services specified in the EAF and covers such services as identification, authentication, and non-repudiation. (See revised OMB Circular A-130 for detailed information.)

Once Agency management approves an EA, the Agency CIO staff within the CPIC function must ensure it is followed. This is done via the CPIC procedures developed by the Agency. Regardless of how good an EA is when first developed, it must be continually updated. Proposed investments and changes to existing legacy systems, which undergo architecture alignment and assessment, result in one of four outcomes.

'   The investment is sufficiently aligned to the architecture such that it can be recommended to proceed.

'   The new investment is rejected because of poor alignment or other CPIC criteria failure.

'   The investment is determined to be valid even though not aligned to the EA, and the EA is updated to reflect missing alignment, functions, data objects, and the target application.

'   Agency management decides (for documented reasons) to pursue the investment via a waiver irrespective of EA misalignment. Justifications for these investments require strong rationale, which are reviewed by external oversight.

The proportion of architected systems is expected to continually increase as legacy systems are replaced or modified and incorporated into the EA.

The CPIC function reviews proposed investments to determine compliance with the CPIC mandated requirements. These proposals often reflect the latest changes in the Agency's business functions as well as providing a window to the latest technology advancements. This information is valuable to the EA planning and development function, because the architecture must be changed to reflect the latest business functions and the latest advances in technology must be considered when updating the enterprise architecture.

As illustrated in figure 4, the EA planning and development function creates an enterprise architecture and the processes guiding the CPIC function. The CPIC function yields information that guides changes to the enterprise architecture. The Architecture Alignment and Assessment process provides the mechanism to integrate the functions.

UPDATES

Enterprise Architecture and Process

Architecture Alignment and Assessment

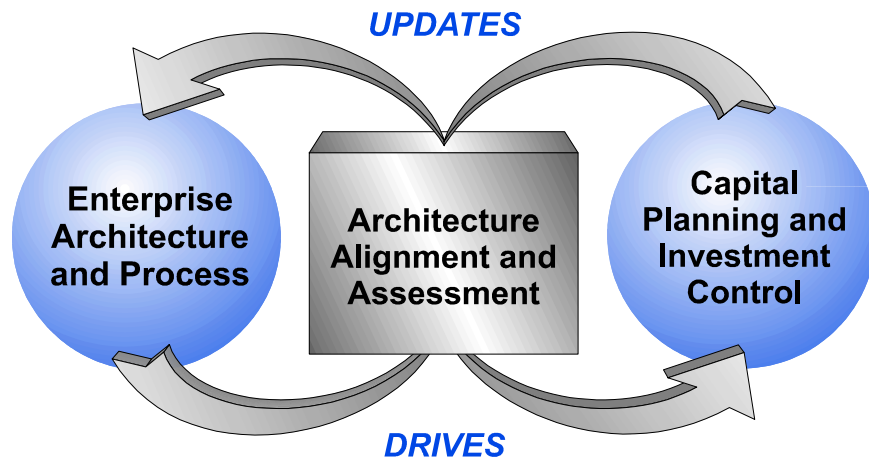**Capital Planning and Investment Control**

DRIVES

Figure 4, Enterprise Architecture and Process, CPIC, and Architecture Alignment and Assessment Process Integration

5. An Approach to CPIC and EA Integration *In Practice*

Enterprise architecture supports IT capital investment planning by defining a target direction for future IT acquisitions (e.g., application systems and infrastructure) as well as facilitating Agency IT capital investment decision-making. The Federal Architecture Working Group conducted a prototype in an organization where the architecture, system lifecycle, and CPIC were an integrated process with funding approval contingent upon architecture compliance.

5.1   CPIC/Architecture Project Assessment Processes

The architecture-related processes provide checkpoints during the lifecycle of an IT project and manage the technical standards comprising the target technical architecture. These processes are identified with the roles and responsibilities of the organizational entities within the enterprise that manage, govern, facilitate, and assist the performance of the architecture activities.

There are numerous benefits to planning and developing an enterprise architecture that are relevant to or critical enablers of effective IT management practices, including the following.

- ' Capturing facts about the business in an understandable manner to enable better decision-making

- ' Improving communication between the IT organization and business units

- ' Reducing the risk of building systems or acquiring and implementing technologies that do not meet business needs

- ' Eliminating false starts and associated wasted funding

- ' Providing a decision support tool for management to use in the CPIC process

The broader the scope of the architecture across the enterprise and the deeper its level of detail, the greater the potential benefit. These architecture processes are illustrated in figure 5.
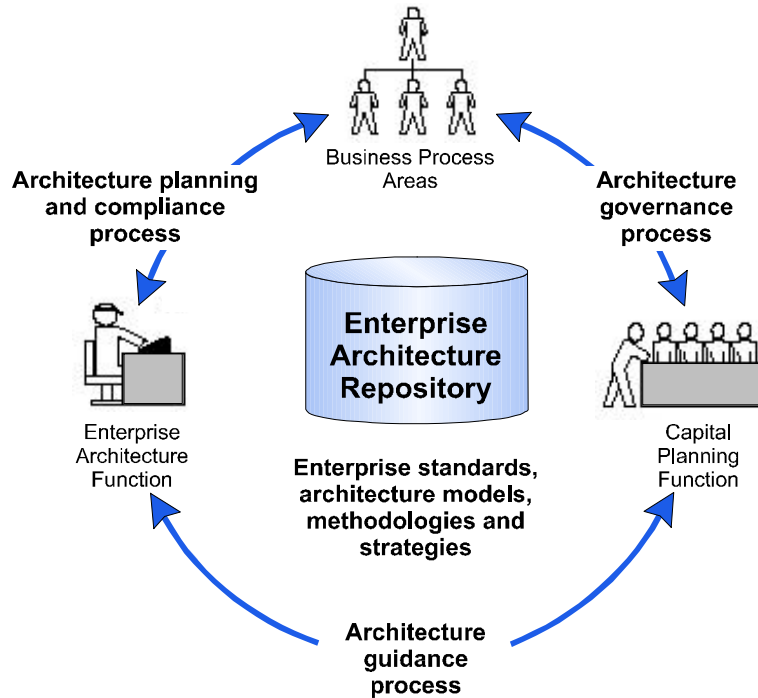
Figure 5, Architecture-Related Processes

These processes enable architecture governance to be applied to the CPIC and system lifecycle functions. The goal is to ensure a project provides demonstrable alignment for the business and technological architecture conditions. The output of these touchpoints includes alignment scorecards and appropriateness opinions. Key role players providing governance include review committees composed of the lead technologists in the IT organization, the architecture office, process area business and technical representatives, and the systems development group. The above model was used and tested during the prototype project described in section 5.3.

5.2   Investment Management Planning (High-Level) Phases and Architecture Process Touchpoints

The three high-level CPIC phases, Select, Control, and Evaluate, include the following three architecture process touchpoints.

- Business Alignment (Select Phase)
- Technical Alignment (Control Phase)
- Architecture Assessment (Evaluate Phase)

5.2.1 Select Phase

The Select phase of the CPIC process is where the decision is made to fund or not fund a proposed IT investment. Funding decisions are based on the following.

Select Phase	Control Phase	Evaluate Phase
Business Alignment	Technical Alignment	Architecture Assessment

'   Specified conditions have been met and formal criteria established and documented
'   The decision is based on and justified by the results of specific mandated evaluations

Numerous prerequisite conditions must be met at the preliminary stage of an investment proposal before a business case is developed. Examples of these conditions include, but are not limited to, the following.

'   Prove the investment supports a reengineered business function so funds are not spent automating an inefficient business process

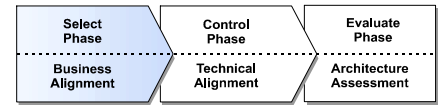'   Prove that commercial-off-the-shelf (COTS) or Government-off-the-shelf (GOTS) software cannot meet the requirements prior to custom software development being pursued

'   Prove the proposed investment is compliant with the Rehabilitation Act of 1973

'   Prove the investment avoids unnecessarily restricting the prerogatives of State, Local, and Tribal governments

Some of these prerequisites, such as the last example, can be specific to core Agency legislation and can be unique, while other prerequisites are generic.

Business Alignment

One of the most important prerequisite conditions is to assess whether and to what degree the proposed investment aligns with the business component of the Agency's enterprise architecture. This analysis is referred to as the business alignment.

The FEAF recommends that each Agency's EA be comprised of a business component and a design component. The business component contains a detailed definition of the business functions and strategic goals of the Agency as well as the information needed to properly execute those functions. The elements of the business component of the Agency's EA are one set of criteria used for determining the degree a proposed investment aligns with the architecture. The business component also contains the broad information technology principles used to guide the management of information technology selection and strategy for phased or modular implementation.

Business Case Solution - The business alignment is often part of the prerequisite screening process. While it is an important evaluation, it is recommended that it be a prerequisite to business case development. The business alignment assesses high-level concepts as opposed to detailed technical requirements; therefore, it can be performed at the preliminary investment proposal (PIP) stage, at the time when concepts for the system or investment needs are clearly articulated.

When the business case is developed, information to conduct the specific financial and risk evaluations must also be developed. For example, return on investment (ROI), benefits and cost analysis (BCA), and risk assessment (RA) are developed in detail. It is here the user and system requirements sketched in general terms in the PIP are thoroughly developed. This detailed scrutiny often yields changes in addition to substantive new information.

The final step of the Select phase is recommending proposed investments to add to the Agency's IT portfolio and identifying investments not to fund. Recommendations are based on the ROI, BCA, RA, and the alignment evaluation (i.e., Business Alignment).

5.2.2 Control Phase

Once a proposed investment is recommended for the Agency's IT Portfolio and funding is approved, the Control phase of the CPIC process begins. During this phase, the investment is monitored throughout its system development lifecycle, starting from the detailed requirements and functional design stage through the system implementation and customer acceptance stages. Schedules, costs, and changes in system requirements are monitored and managed.
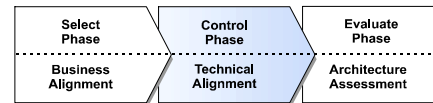
Technical Alignment

The second battery of architecture assessment, the Technical Alignment process, focuses on how well the technology (design) of the investment aligns with the enterprise technology architecture (infrastructure). These assessments compare the final design specifications of the investment to the higher level and common design components of the Agency's EA (i.e., the data, applications, and technology architecture subcomponents of the EA).

The Technical Alignment process begins as soon as the proper information from an investment or system is available. Since most design documentation is not begun until funding is approved, and since most final design documentation is not completed until the first step in the Control phase of the CPIC process, the technical alignment and assessment of an investment against the Agency's EA is most often conducted during the Control phase of the CPIC process. The TRM security facets and standards identified earlier are important components in this assessment.

5.2.3 Evaluate Phase

Once the technical alignment is completed, the investment's total architecture compliance or alignment rating can be determined. Past this point; however, it is important that Agencies conduct periodic reviews to ensure new developments and changes to the investment do not render previous architecture assessments invalid or lower the alignment rating below an acceptable level. Each Agency must identify certain points in the CPIC Evaluate phase where reviews can be conducted.
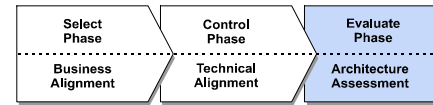
In other words, at certain points in the system lifecycle, it is common for new information regarding a substantive change to potentially impact an investment's EA alignment and assessment rating or its compliance with the architecture. These points vary with the particular system lifecycle methodology used, so each Agency should determine potential points of vulnerability in the process. Formal reviews must be instituted to review documentation and system development in progress at these points. The architecture assessment is completed during the Evaluate phase.

Architecture Assessment

The Evaluate phase comes after the system is accepted by the customer and is placed into production for an initial period of time. The intent is to identify and document lessons learned not only about the system/investment in question, but about the entire CPIC process.

During this phase, three actions are mandated. First is a post-implementation review or PIR. The PIR compares performance promised in the initial proposal, business case, and requirements to actual performance of the system in production. The second action is an evaluation of the ROI to validate estimated benefits. Results of this evaluation determine the recommendation for continuation, modification, or, in rare cases, cancellation of the system. Finally, process improvements or architectural changes required are captured and documented. The following sample questions, while not exhaustive, are typical of those commonly answered during these actions.

- Did the technology used follow the prescribed standards?

- Was the technology sufficiently interoperable with the infrastructure?

- Were improvements in process time, cycle time, or other expected process/time-saving enhancements as expected?

- Has the availability of data for new purposes been explored?

5.3 CPIC/Architecture Project Assessment Prototype

The architecture touchpoints described in the preceding section were the focus of a prototype project conducted January to May 2000, under Federal Architecture Working Group sponsorship. In the prototype project, the Select phase was segmented into the Business Alignment and Business Case Solution touchpoints, which reflected the investment management process of the enterprise.

The architecture office based the prototype on a successful Agency application. The goal of the project was to demonstrate and document the need for a well-defined and integrated Architecture and Investment Management process. The project team also developed and documented a methodology of processes, supporting procedures, and forms to be used for subsequent project assessments conducted on new or enhanced applications seeking investment management funding approval.

A set of tools was developed for use in this prototype. Examples of the tools with their usage guidelines are included for reference in appendix A. *These are offered as an example only of how one Agency developed workable tools for alignment and assessment activities.* Each enterprise can develop their own toolkit reflecting their specific requirements, IT culture, and business mission.

5.3.1 Prototype Description

The IT project selected for this architecture alignment and assessment prototype was the Automated Targeting System Anti-Terrorism (ATS-AT) module, one of a suite of targeting applications. This project investment was chosen because it met the criteria established within U.S. Customs Service (USCS) for architectural assessment and alignment determination. The project also focused on significantly enhancing core business process efficiency and effectiveness.

The intent was to select a project with a high probability of success to allow validation of the Assessment process steps. The ATS-AT module complied with Year 2000 requirements during the system lifecycle. System lifecycle documentation was complete and technical and business architecture information had been gathered. This information was entered into the relevant segments of the EA repository, including the business process area profiles, business operating units, and the TRM.

From the business driver view, ATS-AT was developed to improve USCS ability to target and inspect outbound cargo; thereby, helping prevent potential acts of terrorism and the transfer of technology or materials benefitting those who perform or support terrorist activities.

This module is directly related to the Outbound process stated in the strategic business plan. ATS-AT automatically reviews electronic export documentation filed through the Automated

Export System (AES). ATS-AT searches for inspector-defined criteria indicating a high-risk shipment. It ranks shipments based on degree of suspicion for inspector review and possible examination. This automated review permits a greater volume of export shipments to be uniformly analyzed than can be done by manual targeting. The ability to review more export shipments in less time increases the possibility of discovering export violations. This is a valid proposed core business capability enhancement.

5.3.2 Business Alignment

The business alignment and assessment determines the degree to which the project idea submitted by the process area is directly supportive of strategic plans, goals, and objectives. The goal is to establish alignment of the business objectives to conceptual, high-level requirements of the project.

Tools in this process are the business alignment matrix used to map objectives to requirements and scorecards to score the value of relationships between high-level requirements to the process area business objectives. The output of the process is the documented business alignment decision reflecting the degree of alignment or compliance demonstrated and documented as decision input in the matrix and scorecards.

In this prototype, the final score indicated a strong alignment between user business requirements and the business process area strategies (i.e., 88 percent of the requirements were aligned with the business strategies). The final 2 x 2 matrix and scorecard are included in appendix A.

5.3.3 Business Case Solution

The business case solution assessment examines the proposed solution at a high level to determine the impact on the organization's technology environment. This requires the architect to take an active role in the business case/solution development step. Within the investment management process, the purpose is to ensure controlled level of risks, schedule, cost, and implications to the organization are addressed. This is done by assessing scores for the investment management business case criteria. The assessment also ensures the solution provides demonstrable applicability for the business and technical architectures. The prototype determined the application was feasible from a business perspective and developed on an existing proven platform in conformance with the technical architecture.

Before and during this step, the architecture office provides guidance to the process area/project teams on technical architecture-related issues and emerging trends in the industry. The output of the process is the documented opinion on the appropriateness of the proposed solution after completion of the applicability review. The opinion refers to the detailed business case worksheet, which includes information on project participants, business objectives, and high-level project costs. A sample business case worksheet is included in appendix A.

5.3.4 Technical Alignment

The Technical Alignment process determines whether the technology architecture of the proposed solution is in compliance with the enterprise standards, architecture (i.e., information, data, applications, knowledge, and technology), and methodology (i.e., software development, data definitions, and network design) as defined by the TRM. It requires the architect to interpret how well the business, IT, and user requirements are met by the technology designs (i.e., application topologies, data architectures, movement versus access strategies, and system parameters) and if technology selections have conformed to TRM standards. The TRM is a generally-accepted representation of the generic components of an information system.

The goal is management of the compliant technology architectural content for IT projects. The output of the process is twofold: documentation of the Technical Alignment process outcome and presentation of results to the review committee. At this point, the investment project technical design can require changes or the EA TRM may require update.

The principal tool used by the architecture office in this process is the TRM compliance framework. The contents of the TRM, based upon the architect's interpretation of the project technical scope and proposed solution, allow a determination of degree of technical alignment. The technical alignment matrix in appendix A provides detailed information regarding the enterprise assessment factors applied to the prototype project's technical and business information. The prototype project technology selections conform to TRM standards, as required.

5.3.5 Architecture Assessment

The Architecture Assessment determines whether the documentation (i.e., functional analysis, general design, detailed design) complies with the architecture components approved through the Technical Alignment. The goal is to audit system design and analysis documentation to ensure architecture compliance.

The principal tool used by the architecture office in this process is the EA assessment factors. CPIC/system lifecycle projects must comply with these factors. The architectural evaluation matrix in appendix A validates and extends the detailed information regarding the enterprise assessment factors. These factors were applied to the prototype application's technical and business information provided in the request in the Technical Alignment process.

The output of the process step is twofold: documentation of the technical alignment and presentation of results to the review committee.

5.4   Next Steps

The prototype project was completed in May 2000. The Architecture Project Assessment procedures developed during the project are being validated, further detailed, and refined with other application projects. The architecture office briefed the Federal Architecture Working Group, OMB, Emerging Information Technology and Interoperability Committee (EIEITC), and the Capital IT Planning Committee of the CIO Council on the outcome of the prototype.

The architecture office is exploring the feasibility of developing a set of factors, included in the EA assessment factors, to produce an overall metric of compliance with the requirements of the Rehabilitation Act.

6. Conclusion

This Guide offers an approach for communicating the use of enterprise architecture in a Federal Agency with particular emphasis on the integration of architecture with the IT Capital Planning process. The theory described here and the practical examples demonstrated by the prototype project at U.S. Customs Service should save Agencies countless staff hours in trying to define and reinvent the steps, processes, methods, and tools described in this Guide. The Federal Architecture Working Group-sponsored example demonstrates a successful integration of architecture alignment and assessment with the IT Capital Planning process that achieved its objectives and merits consideration as a consistent and commonly-endorsable methodology for use by other Federal Agencies.

The implementation of the Clinger/Cohen Act with respect to IT capital planning and architecture has been a struggle for most Agencies. The Federal Architecture Working Group, as a Federal group of IT architect practitioners, believes this Guide to be worthwhile and valuable.

The Federal Architecture Working Group is always looking for new members to join the professional pursuit of making IT effective and efficient in Government. If you are interested in this challenge or just want to stay in closer touch with the practical use of enterprise and information architecture, contact the Federal Architecture Working Group chairperson, Rob C. Thomas, at rob.c.thomas@customs.treas.gov.

Appendix A
Architecture Project Assessment Tools

This appendix contains examples of the tools used by the Architecture Project Assessment (APA) project team members.

- ' *Business Alignment Tool (A.1)* provides a method to illustrate the arrangement of project concepts/requirements in relation to the business area goals and objectives.

    - S The *2 x 2 matrix (A.1.a)* indicates where a relationship exists (i.e., project requirement No. 2 supports organizational objective No. 1) by identifying a point of interaction on the matrix.

    - S The *business scorecard (A.1.b)* extends the 2 x 2 matrix to include the use of a subjective alignment score (-3 to +3) to describe the interaction and relative weighting criteria to amplify the results based on the importance of the goals, objectives, and the requirements.

- ' *Business Case Worksheet (A.2)* organizes the strategic, technical, and financial request information necessary to make a funding decision in a consistent, structured format. The worksheet provides sufficient information for the investment and architectural evaluators in the enterprise to evaluate and rank the proposal against other proposed investments according to the project benefits, costs, risks, and architecture criteria.

- ' *Technical Alignment Matrix (A.3)* provides a framework for determining if the technology architecture of the solution proposed is compliant with the enterprise standards, architecture (i.e., information, data, applications, knowledge, and technology), and methodology (i.e., software development, data definitions, and network design) as defined by the TRM.

- ' *Architecture Assessment Matrix (A.4)* provides a framework for determining if the documentation (i.e., functional design, general design, and detailed design) is compliant with the architecture components approved through the Technical Alignment process.

A.1 Business Alignment Tool

A.1.a 2 x 2 Matrix

Goals/Objectives (Columns)

Concept / Requirements (Rows)	1. Improve the safety of the public by interdicting possible terrorist activity.	2. Automatically review electronically filed export documentation through AES searching for inspector defined criteria that could indicate a high risk shipment.	3. Improve Outbound Inspector(s) ability to screen and target export cargoes for inspection.	4. Obtain advance notice of cargo receipt at warehouse.	5. Develop automated mechanisms to speed pre-departure targeting of cargo.	6. Screen 100% of electronically filed export declarations.	7. Obtain interface to research databases and reference materials.	8. Enable system to adapt to changing requirements.	9. Assist Inspectors in targeting terrorism-related shipments in accordance with Customs aviation security law enforcement responsibilities.
1. Should increase the number of export documents reviewed.	x	x	x	x	x	x	-	-	x
2. Should assign Inspector-defined weights to specific criteria, creating an aggregate score.	x	x	x	x	x	x	-	x	x
3. Should perform pre-flight screening of cargo, based on Bills and SED's at the national level (before distributing the results to the local ports and review).	x	x	x	x	x	x	x	-	x
4. Should perform pre-flight profiling of cargo, based on Bills and SED's at the national level (before distributing the results to the local ports for additional ports and review).	x		x	x	x	x	x	-	x
5. ATS-AT will need to be capable of analyzing both import and export data.	x	x	x	x	x	x	x	x	x
6. Provide pre-departure notice of cargo arrival at warehouses.	x	x	x	x	x	x	x	-	x
7. Provide targeting facility based on external intelligence.	x	x	x	x	x	x	x	-	x
8. Assist Inspectors in performing post cargo detentions research.	x	x	x	x	-	x	x	-	x
9. Support post seizure processing.	x	x	x	x	-	x	x	-	x
10. Enable Inspectors to develop ATS-AT rules.	x	x	x	x	-	-	-	x	x
11. Provide port level users with information tailored to their regional and local needs.	x	x	x	x	x	x	x	x	x
12. Provide port level users with online access to national views of information.	x	x	x	x	x	x	x	x	x
13. Provide port level users with the power to process and analyze that tailored national information in a near real-time fashion.	x	x	x	x	x	x	x	x	x
14. Provide system performance with acceptable query response times for online applications processing.	x	x	x	x	x	x	-	x	x
15. Response times will vary depending on the nature of the request and the location of the data to be evaluated.	x	x	x	x	x	x	-	x	x
16. Provide system performance with optimal throughput time - maximum 10 minutes.	x	x	x	x	x	x	-	x	x
17. Provide system performance with maximum end to end data availability - 5 minutes.	x	x	x	x	x	x	-	x	x
18. Provide system performance with optimal operational: 24 hours per day, 7 days a week, 52 weeks per year.	x	x	x	x	x	x	-	x	x
19. Provide availability greater than 95%. Longest unplanned outage is 1 hour.	x	x	x	x	x	x	-	x	x
20. Assist Inspectors in verifying that the exporter has proper authorization to export the described commodity to the specified consignee and country of ultimate destination.	x	x	x	x	x	x	x	-	x
21. Verify that export control documentation correctly describes what is, in fact, being shipped.	x	x	x	x	x	x	x	-	x

ITCD Business Alignment Scorecard

Goals/Objectives (Columns)

1. Improve the safety of the public by interdicting possible terrorist activity.
2. Automatically review electronically filed export documentation through AES searching for inspector-defined criteria that could indicate a high risk shipment.
3. Improve Outbound Inspector(s) ability to target export cargoes for inspection.
4. Obtain advance notice of cargo receipt at warehouse.
5. Develop automated mechanisms to speed pre-departure targeting of cargo.
6. Screen 100% of electronically filed export declarations.
7. Obtain interface to research databases and reference materials.
8. Enable system to adapt to changing requirements.
9. Assist Inspectors in targeting terrorism-related shipments in accordance with Customs aviation security law enforcement responsibilities.

	Concept / Requirements (Rows)	RWF	1.	2.	3.	4.	5.	6.	7.	8.	9.	Total
	Avg. Obj. Fit		+2.4	+2.9	+2.7	+1.9	+2.9	+2.9	+1.4	--	+2.4	**+2.6**
		RWF	3	3	3	2	3	3	1	2	3	**Avg. Reqmt. Flt +2.4**
1.	Should increase the number of export documents reviewed.	3	3	3	3	3	3	3			3	+3.0
2.	Should assign Inspector-defined weights to specific criteria, creating an aggregate score.	2	2	3	3	0	3	3		0	2	+2.0
3.	Should perform pre-flight screening of cargo, based on Bills and SED's at the national level (before distributing the results to the local ports and review).	3	3	3	3	0	3	3	0		3	+2.3
4.	Should perform pre-flight profiling of cargo, based on Bills and SED's at the national level (before distributing the results to the local ports for additional ports and review).	3	3	3	3	0	3	3	0		3	+2.3
5.	ATS-AT will need to be capable of analyzing both import and export data.	2	2	3	3	0	3	3	0	0	2	+1.8
6.	Provide pre-departure notice of cargo arrival at warehouses.	2	2	3	3	3	3	3	0		2	+2.4
7.	Provide targeting facility based on external intelligence.	3	3	2	3	0	2	2	0		3	+1.9
8.	Assist Inspectors in performing post cargo detentions research.	3	0	2	0	0		2	3		0	+1.0
9.	Support post seizure processing.	3	0	2	0	0		2	2		0	+0.9
10.	Enable Inspectors to develop ATS-AT rules.	3	3	3	3	0				0	3	+2.0
11.	Provide port level users with information tailored to their regional and local needs.	3	3	3	3	3	3	3	2	0	3	+2.6
12.	Provide port level users with online access to national views of information.	3	3	3	3	3	3	3	2	0	3	+2.6
13.	Provide port level users with the power to process and analyze that tailored national information in a near real-time fashion.	3	3	3	3	3	3	3	2	0	0	+2.2
14.	Provide system performance with acceptable query response times for online applications processing.	3	3	3	3	3	3	3		0	3	+2.6
15.	Response times will vary depending on the nature of the request and the location of the data to be evaluated.	1	0	3	3	3	3	3		0	3	+2.3
16.	Provide system performance with optimal throughput time - maximum 10 minutes.	3	3	3	3	3	3	3		0	3	+2.6
17.	Provide system performance with maximum end to end data availability - 5 minutes.	3	3	3	3	3	3	3		0	3	+2.6
18.	Provide system performance with optimal operational: 24 hours per day, 7 days a week, 52 weeks per year.	3	3	3	3	3	3		3	0	3	+2.6
19.	Provide availability greater than 95%. Longest unplanned outage is 1 hour.	3	3	3	3	3	3	3		0	3	+2.6
20.	Assist Inspectors in verifying that the exporter has proper authorization to export the described commodity to the specified consignee and country of ultimate destination.	3	3	3	3	3	3	3	3		3	+3.0
21.	Verify that export control documentation correctly describes what is, in fact, being shipped.	3	3	3	3	3	3	3	3		3	+2.3

A.2   Business Case Solution

A.2.a Business Case Worksheet

United States Customs Service **Office of Information and Technology**	**Investment Managment Process** **Business Case Worksheet**

1. Submission Date:	FY: 2001
2. Project Name:	**3.** Project Number:

4.   Process Owner:
Name:_____   Office: _____
Signature:_____   Division: _____

5.   Business Information Technology Representative (BITR):
Name: _____ Signature: _____ Phone #:_____

Business Project Manager:
Name: _____ Signature: _____ Phone #: _____

6.   Business Interface Representative:
Name: _____ Signature: _____ Phone #:_____

7.   Nature of project:
☐ New Project   ☐ Enhancement   ☐ Maintenance

8.   If there has been a name change, provide the former name/acronym:

9.   Describe the project's objectives, the business needs it meets, related projects, and a brief
description of any guiding legislative, regulatory, or process improvement requirements
or initiatives:

10.   Summary Costs (include costs from
other funding sources):

	With FTE	Without FTE	Infrastructure Costs
Initial Fiscal Year Costs:	_____	_____	_____
FY + 1 Total Costs:	_____	_____	_____
FY + 2 Total Costs:	_____	_____	_____
FY + 3 Total Costs:	_____	_____	_____
FY + 4 Total Costs:	_____	_____	_____

Total lifecycle costs (minimum of 5 years):

11.   Processes/strategies supported by this project (check all that appy):
☐ Passenger   ☐ Trade Compliance   ☐ Outbound
☐ Narcotics   ☐ Mission Support   ☐ Money Laundering   ☐ Other:

12.   Describe the project's relationship to the processes checked:

13.   If this is an infrastructure project, indicate the primary (P) and all secondary (S) applications:
___ACE   ___AES   ___ACS   ___EDW   ___IBIS   ___SEACATS
___TAP   ___Admin. Systems   ___TECS   ___ATS   ___Other:

Are the following documents included? (Yes/No)

Required Document Checklist:

14. Conformance to the Business Architecture . . . . <u>yes</u>

15. Business Process Improvement . . . . <u>yes</u>

16. Linkage to Strategic Plan . . . . <u>yes</u>

17. Legislative Compliance . . . . <u>yes</u>

18. Impact of Non-implementation . . . . <u>yes</u>

19. Change Management . . . . <u>yes</u>

20. Improved Service to Stakeholders . . . . <u>yes</u>

21. Defined Performance Measure . . . . <u>yes</u>

22. OMB's 3 Pesky Questions . . . . <u>yes</u>

23. Risk Analysis . . . . <u>yes</u>

24. Project Timeline . . . . <u>yes</u>

25. Project Cost Estimate . . . . <u>yes</u>

26. CBA . . . . <u>yes</u>

27. Acquisition Strategy . . . . <u>yes</u>

Note: If any of the above answers are "No," provide an explanation.

28. Data Sensitivity Category:
☐ Non-Sensitive Information   ☐ Classified
☐ Sensitive but Unclassified   ☐ Other:

29. Miscellaneous Comments:

OMB's Three Pesky Questions:

1. Does the investment in a capital asset support core, priority mission functions that need to be performed by the Federal Government?

2. Does the investment need to be undertaken by the requesting Agency because no alternative private sector or Governmental source can better support the function?

3. Does the investment support work processes that have been simplified or otherwise redesigned to reduce costs, improve effectiveness, and make maximum use of commercial-off-the-shelf technology?

A.3   Technical Alignment

A.3.a   Technical Alignment Matrix (extract)

Category	Compliance Dimension	Document where dimension is addressed	Template Location	Factor Addressed in this Document?	EA Repository Target Location	Key Attributes	Compliance	Comments
Business	Business functions describe the major lines of business used to conduct business. The functions can be broken down further into activities/sub-activities and usually cross-organizational boundaries.	Business Case User Requirements	IMP: Chapter 2.2 Appendix B Page B-4 No. 9,12 & 15 SDLC II 14-4 to 14-16	No	Business Processes/ Area Profiles	User Access Profiles and Access Requirements	Yes	Outbound is defined by Customs as one of its core process; the primary function is to maximize the degree of compliance with export requirements while simultaneously facilitating international trade. Outbound can be further divided into sub-processes and activities describing the ways Outbound objectives are achieved. Beneath the Analyze and Target sub-process, ATS-AT is most prominently featured in the Perform Preliminary Targeting activity.
Information	Information is presented through an intuitive interface that users find acceptable.	User Requirements	SDLC: Volume II Chapter 14 Para. 2.1.3 Para. 3.1.3 Para. 4.3 Para 6.1 Para. 7.2	No	Application System Profiles	Yes	Level of Intuitive Interface	Original Functional Requirements document specifies that ATS-AT provide a user-friendly interface. Field interviews and system demos indicate information is presented through an intuitive interface.

Category	Compliance Dimension	Document where dimension is addressed	Template Location	Factor Addressed in this Document?	EA Repository Target Location	Key Attributes	Compliance	Comments
Data	Data is accessible to those who need to use it.	User Requirements	SDLC: Chapter 16 Para. 1.4.1, 1.4.2, 1.4.6, 3.1, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 3.0	Yes	Application System Profiles	Yes	OIT interviews and surveys	Since USCS standard equipment is needed to run the module, users are able to access ATS-AT data directly through an HTML user interface.
Applications	The development methodology for this application uses industry-accepted standards and best practices.	Project Plan	SDLC: Volume II Chapter 13 Para. 4.2, 4.5		TRM Technology Profiles/TRM Platform Views	Yes	OIT interviews and surveys	Rapid Application Development (RAD) is an industry-accepted standard.
Infrastructure	Service delivery.	Project Plan	SDLC: Volume II Chapter 13 Para. 1.3, 4.2, 4.5	No		Yes	OIT interviews and surveys	Service is provided by Operations, as specified in the Project Plan.
Standards	This application represents the mutual agreement on many standard definitions of business functions, and data and information needs.	Quality Assurance Plan	SDLC: Chapter 13 Para. 3.2, 4.0, 5.0	Yes	TRM Technology Profile	Business Definitions	Yes	This application is based on the ATS applications utilizing standard definitions of business functions, data and information needs across platforms.

Category	Compliance Dimension	Document where dimension is addressed	Template Location	Factor Addressed in this Document?	EA Repository Target Location	Key Attributes	Compliance	Comments
Technical Standards	This application will be built using standards-based application tools and technology infrastructure.	Business Case	SDLC: Volume II, Chapter 13, Para. 4.2, 4.5 IMP: Chapter 2.2, Appendix B, P. B-4 No. 9, 12, 14	Yes	TRM Technology Profile/ Products	Standard Tools	Yes	Products and services listed. CA Datacom, LXX Exit, COBOL, Prolog, C, C++, AIX, ORACLE. These are listed in the EA Repository except LXX Exit and Prolog.
Network	This application will be built as a Web based browser application using TCP/IP Network	Business Case	IMP: Chapter 2.2, Appendix B, P. B-4 No. 9, 12, 14	Yes	TRM Technology Profile/ Products	Standard Tools	Yes	

A.4   *Architecture Assessment*

A.4.a   Architecture Assessment Matrix (extract)

Category	Compliance Factor	Document where factor is addressed	Template Location	Factor Addressed in This Document?	EA Repository Target Location	Compliance?	Validated during PIR Project	Comments:
Business	Business functions describe the major lines of business used to conduct business. The functions can be broken down further into activities sub-activities and usually cross- organizational boundaries.	Business Case User Requirements	IMP: Chapter 2.2 Appendix B Page B-4 No. 9,12 & 15	No	Business Processes Area Profiles	Yes	Business Process Owner survey and/ or interview	Outbound is defined by Customs as one of its core process; the primary is to maximize the degree of compliance with export requirements while simultaneously facilitating international trade. Outbound can be further divided into sub-processes and activities describing the ways Outbound objectives are achieved. Beneath the Analyze and Target sub-process, ATS-AT is most prominently featured in the Perform Preliminary Targeting activity.
Information	The application provides levels of information that top management needs through tools like rolled-up detail data, summary reports, or decision support systems.	User Requirements Functional Requirements	SDLC: Volume II Chapter 14 Paragraph 5.0 SDLC: Volume II Chapter 14 Paragraph 4.2	No	Application System Profiles	Yes	Field interviews and user satisfaction surveys	The ATS-AT system provides regular weekly, monthly, and annual automated reports in addition to ad-hoc reporting capabilities. Although some management reports are manually constructed, developers are installing a COTS package with

Category	Compliance Factor	Document where factor is addressed	Template Location	Factor Addressed in This Document?	EA Repository Target Location	Compliance?	Validated during PIR Project	Comments:
								tracking and statistical capabilities.
Data	Data entities are clearly defined and maintained in a data model. Data elements are contained in a data dictionary and include element name, attributes, and relationships with other entities.	Data Management Plan	SDLC: Chapter 13 Para. 2.2, 4.0	Yes	Application System Profiles	Yes	OIT interviews and surveys	The Data Management Plan lists entities, definitions, and identifiers. The ATS data model, stored in the COOL:Gen Encyclopedia, shows how entities interact.
Applications	The development methodology for this application uses industry-accepted standards and best practices.	Project Plan	SDLC: Volume II Chapter 13 Para. 4.0	No	TRM Technology Profiles/ TRM Platform Views	Yes	OIT interviews and surveys	Rapid Application Development (RAD) is an industry-accepted standard.
Infrastructure	Service delivery.	Project Plan	SDLC: Volume II Chapter 13 Para. 1.3, 4.2, 4.5	Yes	TRM Domain Hierarchy	Yes	OIT interviews and surveys	Service is provided by Operations, as specified in the Project Plan.
Security	Protection of business information through policies and guidelines ensures the free flow of information within enterprises without risk.	Security Plan Security Features Users Guide Risk Assessment	SDLC: Chapter 15 Para. 1.6, 2.0, 3.0, 3.1, 3.2.	Yes	Security is not addressed within the Repository	Yes	OIT interviews and surveys	System uses info protected by the Trade Secrets and Privacy Acts. Access control and Rules of Behavior are specified within the Security Plan and Security Features Users Guide to promote

Category	Compliance Factor	Document where factor is addressed	Template Location	Factor Addressed in This Document?	EA Repository Target Location	Compliance?	Validated during PIR Project	Comments:
								risk-free flow of information.

Category	Compliance Factor	Document where factor is addressed	Template Location	Factor Addressed in This Document?	EA Repository Target Location	Compliance?	Validated during PIR Project	Comments:
Standards	This application represents the mutual agreement on many standard definitions of business functions, and data and information needs.	Quality Assurance Plan	SDLC: Chapter 13 Para. 3.2, 4.0, 5.0	Yes	TRM Technology Profile	Yes	OIT interviews and surveys	

Glossary of Terms

Note: *The Federal Enterprise Architecture Framework, Version 1, September 1999, contains a comprehensive glossary of terms in appendix C. The following terms are introduced in the Architecture Alignment and Assessment Guide.*

Business Operating Units	A specific organizational unit that supports an identified set of detailed business functions.
Business Process Area	A specific business area that supports an organizational structure with a defined mission, vision, work roles, business processes, and information flows.
Business Alignment and Assessment	Analysis to assess whether and to what degree the proposed investment aligns with the business component of the Agency's information technology architecture.
Capital Planning and Investment Control (CPIC) Process	A management process for ongoing identification, selection, control, and evaluation of investments in information resources. The process is linked to budget formulation and execution and is focused on Agency missions and achieving specific program outcomes.
Enterprise Architecture Framework (EAF)	Required by OMB; documents linkages between mission needs, information content, and information technology capabilities and guides strategic and operational investment resource planning.
Information Technology Architecture	An integrated framework for evolving or maintaining existing information technology and acquiring new information technology to achieve the Agency's strategic goals and information resources management goals.
Security Standards Profile (SSP)	Identifies the security standards specific to the security services specified in the Enterprise Architecture Framework.
Standards Profile	Defines the set of IT standards supporting the services articulated in the Technical Reference Model.
Technical Alignment Process	Assessments comparing the final design specifications of the investment to the design component of an Agency's information technology architecture (i.e., the data, applications, and technology architecture components of the enterprise architecture).
Technical Reference Model (TRM)	Identifies and describes the information services (e.g., database, communications, Intranet, etc.) used throughout the Agency.

References

Documents

1.   Federal Chief Information Officer (CIO) Council, *Federal Enterprise Architecture Framework (FEAF)*, Version 1.1, September 1999.

2.   General Services Administration (GSA), *Capital IT Planning and Investment Guide*, February 2000.

3.   Office of Management and Budget (OMB) Circular No. A-11 (2000).

4.   OMB Circular No. A-130, *Management of Federal Information Resources*, revised February 1996.

5.   Spewak, Steven H. with Steven C. Hill. *Enterprise Architecture Planning, Developing a Blueprint for Data, Applications and Technology*. John Wiley & Sons, Inc., 1992.

Web Sites

1.   Architecture*Plus*
        http://www.itpolicy.gsa.gov/mke/archplus/archhome.htm

2.   Federal CIO Council
        http://cio.gov/

3.   GSA, Office of Information Technology
        http://www.itpolicy.gsa.gov

4.   Office of Management and Budget (OMB)
        http://www.whitehouse.gov/OMB/index.html

4.   U.S. Chief Financial Officers (CFO) Council
        http://www.financenet.gov/fed/cfo