U.S. Environmental Protection Agency

2006 Architecture Standard and Guidance

CIO 2122-S/G-01.0 (no former number)

Version 0.08

June 9, 2006

EPA

OFFICE OF ENVIRONMENTAL INFORMATION

Change History

Date	Version #	Reason
04-07-2006	0.01	First draft of *Phase 1 Baseline Segment Information Collection Guidance* created by Kevin Brett
04-10-2006	0.02	Edited and formatted by Cecilia Farell
04-10-2006	0.03	Updates by Kevin Brett
04-12-2006	0.04	Fixed Table of Contents – Cecilia Farell
04-25-2006	0.05	Added a clarification in the introduction that this is a phased, incremental and iterative approach. Added a Timeline section 1.2 Added clarification and expansion of how to use the Data Asset object. Added a description in section 3.2 of the BMPN notation requirement for any business process diagrams.
04-27-2006	0.06	Added new section 4.7 on a usage convention for representing Geospatially-related assets in the architecture.
04/28/2006	0.01 (started versioning again with new document title)	First draft of 2006 Architecture Standard and Guidance (replaces *Draft Phase 1 Baseline Segment Information Collection Guidance*)
05/01/2006	0.02	Technical Writer edit
05/10/2006	0.03	Incorporated the table of steps in Appendix A into Section 3 as a sub-section above the description of the layers and objects. Added a column to the table with references to the sections that describe the objects involved in each step. Made minor text edits. Re-numbered sections and corrected internal references as needed.
5/10/2006	0.04	Incorporated edits from QA and added EPA cover to the document.
5/11/2006	0.04	Changed Section 3.3 to describe 'Object Reference' in greater detail.
5/15/2006	0.05	Addressed various comments throughout the document that were provided following review of the working draft delivered on 5/1/2006.
5/22/2006	0.06	Addressed comments provided during EAWG review.
5/26/2006	0.07	Revised definition of Data Mart and Data Warehouse and added reference to ADC in Section 3.7.2 in response to EAWG comments.
6/9/2006	0.08	Revised language in Section 2.1 Segment Architecture Compliance based on EAWG comment

Contents

List of Figures

List of Tables

1. INTRODUCTION

This document provides the Environmental Protection Agency (EPA) Enterprise Architecture (EA) Program 2006 requirements for developing and modeling compliant Segment and Solution Architectures. This document will be updated on an ongoing basis to reflect new standards and guidance as compliance requirements evolve. The information in the document is complemented by two additional documents: 1) the *EPA EA Architecture Development Methodology* and 2) the *EPA EA Framework Metamodel*.

EPA is currently engaged in a multiphase development effort designed to increase the breadth and depth of the architecture information represented in the Agency architecture repository. The information collection phases of this effort are defined in Table 1-1 below:

Table 1-1. Data Collection Phases of the EA Development Effort

Phase	Description	Timeline
Phase I	Baseline Segment Information Collection	March – June 2006
Phase II	Target Segment Information Collection	July – September 2006
Phase III	Transition Segment Information Collection	October – December 2006

Each phase is designed to collect a particular subset of the total set of information that could potentially represent a Segment Architecture based on the structure (metamodel) of the new Architecture Repository and Tool (ART 4.0). As time goes on, successive iterations and phases of information collection will encompass more details of the segments. In addition, development of specific Solution Architectures as defined in the ART 4.0 metamodel will be conducted as well.

The organization and contents of this document are listed and described below:

Section 1: Introduction – Provides an introduction to this document.

Section 2: Architecture Compliance Criteria – Describes the 2006 compliance criteria for Segment and Solution Architectures. Details of the Segment Architecture criteria are provided in the remainder of the document.

Section 3: Segment Architecture Development Guidance for 2006 – Provides explanations, definitions, examples, and guidance to aid developers in identifying and representing Segment Architecture information for the Phase I Baseline Segment Data Collection effort. The section also contains a table that provides a suggested sequence for developing a Segment Architecture by listing information collection and modeling steps based on a logical ordering of the defined objects and their relationships. When using this section, readers can refer to Appendix A and Appendix B for additional guidance.

Appendix A: Phase I Information Collection Objects and Relationships – Lists the objects and relationships that define the minimum content standard for Segment Architectures in 2006.

Appendix B: Additional Guidance – Provides additional clarification about certain object properties in response to questions the EA Team has received to-date from Segment Architecture development teams.

This Page Intentionally Left Blank

2. ARCHITECTURE COMPLIANCE CRITERIA

This section defines the 2006 compliance criteria for EPA Segment and Solution Architectures. The compliance criteria represent the minimum requirements that Segment and Solution Architectures must meet to be certified compliant by EPA's Chief Architect. The compliance criteria will be updated on an annual basis to correspond with EPA's adopted incremental, phased approach to defining, collecting, and updating architecture information.

2.1 Segment Architecture Compliance

The figures below depict the minimum set of Segment Architecture metamodel object types that must be identified, populated, and collected during Phase I: Baseline Segment Information Collection. The diagrams represent the following:

- Figure 2-1. Segment Architecture Objects – Required baseline segment architecture objects.
- Figure 2-2. Segment Architecture Properties – Properties to be collected for each of these objects.
- Figure 2-3. Segment Architecture Relationships- Relationships between the objects.

Segment architectures must submit the following documentation by September 1st, 2006:

1. Existing baseline architecture information that meets the required objects and is structured in the EA standard format (either in the Metis metamodel or in the structured excel spreadsheet)
2. A plan of action, including dates and activities, to complete the remaining, or defined scope, of required objects, properties and relationships. Plans of action must be approved by Chief Architect prior to EA certification of segment architecture**.**

Segment Architecture documentation will be certified as EA compliant according to the processes outlined in the *EA Governance Procedure*.

2.2 Future Segment Architecture Activities

Moving forward in the multiphase development effort, the Chief Architect, in consultation with the EAWG, will recommend segments and their architecture priorities to the QIC for formal review and approval. The next stage of EA development will use these approved priorities to define and focus architecture activities in Phase II: Target Segment Information Collection scheduled to begin July 2006.

Segment architecture compliance criteria will evolve iteratively in future years and this document will be updated to reflect new requirements as EPA's EA matures.

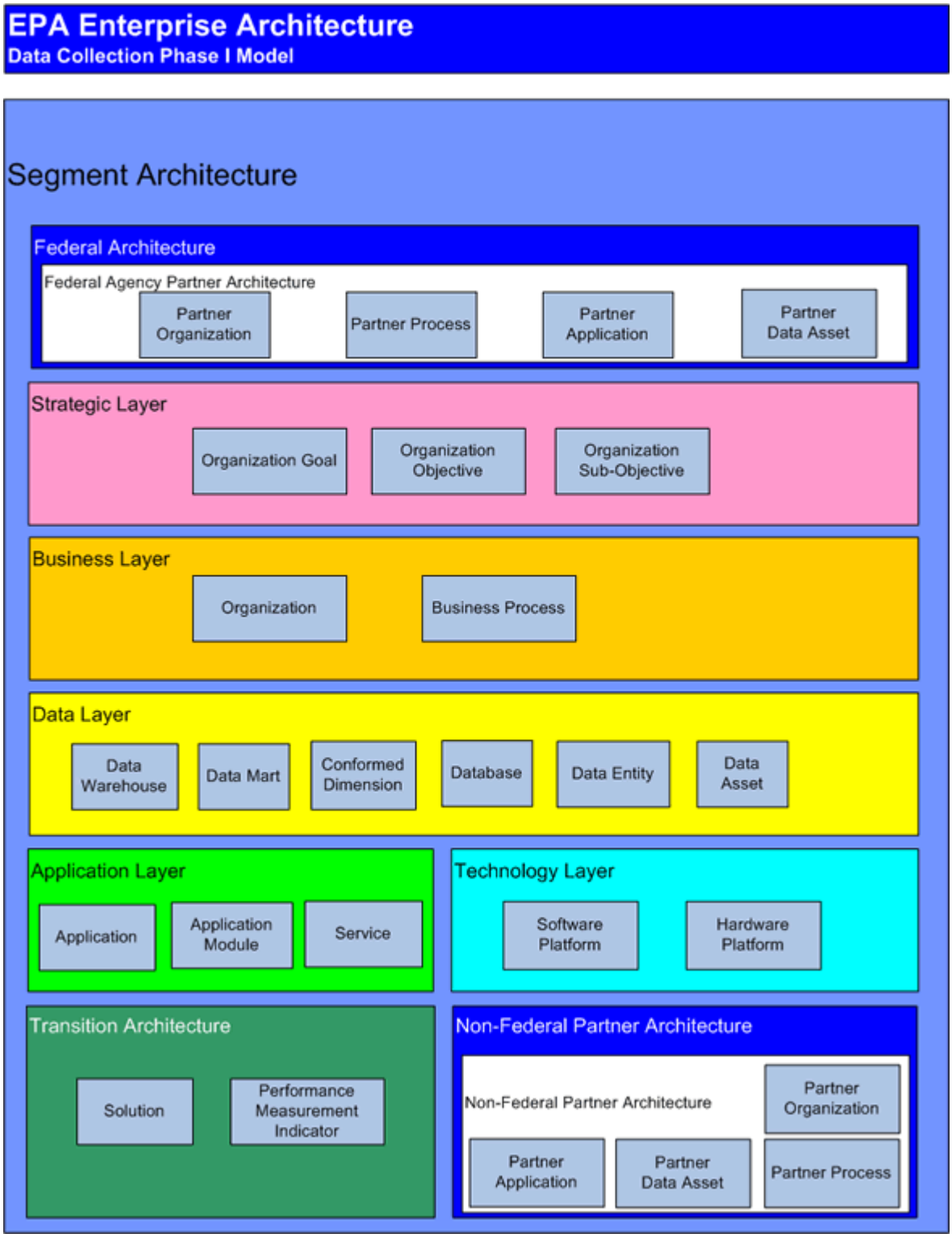

Figure 2-1. Segment Architecture Objects

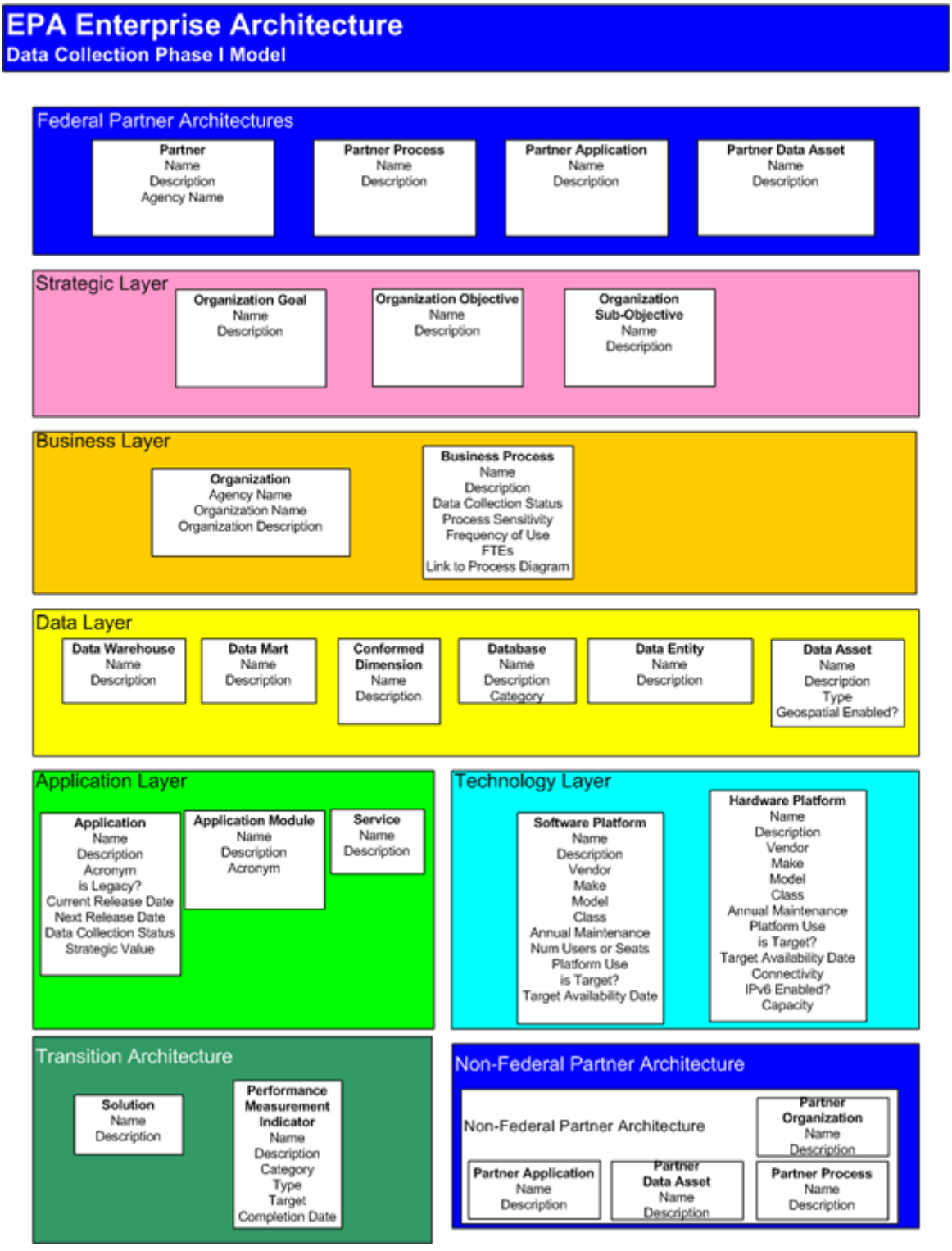

Figure 2-2. Segment Architecture Properties

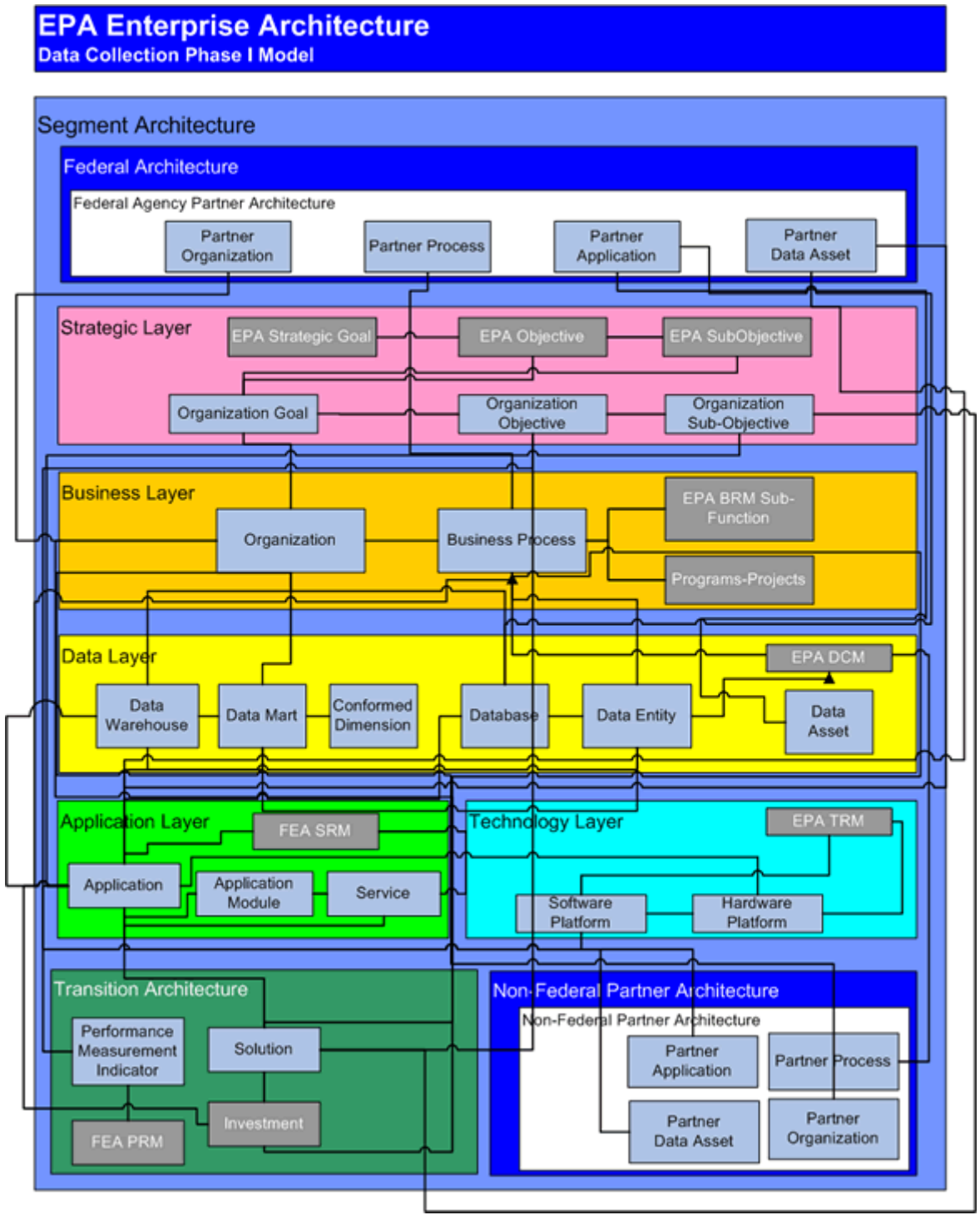

Figure 2-3. Segment Architecture Relationships

2.3 Solution Architecture Compliance

This sub-section defines the 2006 compliance criteria for all EPA information technology (IT) investments funded through the Capital Planning and Investment Control (CPIC) major procedures and non-major (CPIC-Lite) processes.

With the recent CIO approval of the *EA Governance Procedure*, EPA will continue to phase in the Solution Architecture requirements for IT investments. Beginning in FY06, for use in the development of the BY08 IT investment portfolio, Solution Architectures must meet the following documentation requirements:

1. EA questions in the BY08 business cases are completed and accurately documented for all CPIC major investments; and
2. A complete and accurate systems inventory record is documented in the Registry of EPA Applications and Databases (READ). READ is the Agency's authoritative information resource inventory. The inventory record captures important information on EPA's IT systems including the strategic goals the system supports, the data housed and used by the system, and critical architecture information.

Solution Architecture documentation will be certified as EA compliant according to the processes outlined in the *EA Governance Procedure*.

3.1 Introduction

The guidance provided in this section of the document supports the first information collection phase of the EPA EA development effort (Phase I: Baseline Segment Information Collection). Phase I information collection is being conducted from March through June of 2006.

The objects defined below, structured according to the layers of the EPA EA framework, represent an initial subset of the larger set of elements that comprise a fully specified Segment Architecture. This definition of an initial subset is in keeping with the EA Team's approach to the development of EPA's EA as an ongoing effort requiring an iterative and incremental structure. Through various phases of information collection, a more complete picture of the Agency's Baseline, Target, and Transition Architectures will emerge over time. The section preceding the object definitions provides a suggested sequence for developing a Segment Architecture by listing information collection and modeling steps based on a logical ordering of the objects and their relationships.

These objects have been identified as the most crucial in establishing the basic structural foundation of EPA's Segment Architectures. Some of these elements are part of the overall EPA EA metamodel, but need not be collected or identified during this initial phase (for a complete identification of objects required for this phase, see Section 2.1, Segment Architecture Compliance). When reading through the guidance, refer to the appendices in this document for additional information. Appendix A includes a list of all Phase I objects and their relationships. Appendix B includes additional guidance on certain object properties.

As the EA matures through future, more detailed data collection efforts, the Agency will be well-armed to make vital, informed decisions.

3.2 Timetable

Table 3-1 below provides the timetable for Phase I information collection activities.

Table 3-1. Tentative Phase I Information Collection Timeline

Time Range	Activity
March – June 9	Segment Architect identifies and collects Phase I segment data.
June 9	Segment Architect submits Metis models or data collection spreadsheets to EPA EA Team for import into ART test environment.
June 12-16	Segment Architects obtains SIO validation.
June 19	SIO submits validated metis models or data collection spreadsheets and plan of action to Chief Architect
June 20- 30	Chief Architect, or designee, and Segment Architect meet to review segment documentation and concur on action plan
June 20- July 3	Chief Architect certifies segment architecture as EA compliant for 2006
July 3-7	Segment Architect obtains AA approval.
July 10-14	Segment Architect notifies EA Team of AA approval.
July 31	EA Team publishes EA Baseline

3.3 Phase I Information Collection and Modeling Steps

Table 3-2 below provides a suggested sequence for developing a Segment Architecture by listing information collection and modeling steps based on a logical ordering of the objects and relationships defined in the sub-sections below. Although modeling of a segment may begin at any point in any layer of the architecture and proceed outward, the steps outlined below start at the top of the Strategic Layer with the Segment Name and continue through the various supporting layers of the Segment Architecture. Following these steps will result in the creation of a Segment Architecture that represents all of the objects, relationships, and properties required for Phase I of the architecture information collection effort. The "Object Reference" column directs the reader to the location in the document that gives a definition, examples and guidance on the specific object(s) referenced in each step.

Table 3-2. Phase I Information Collection and Modeling Steps

Step	Description	Object Reference
1.	Map the Segment to Organizations that are part of the Segment (the Segment object will already be built into the Segment Architecture).	3.5.2
2.	Map the Organization Goals, Objectives, and Sub-Objectives to the Organization.	3.4.2, 3.4.3, 3.4.4, 3.5.2
3.	Map the Organization Goals, Objectives, and Sub-Objectives to the EPA Objectives and Sub-Objectives.	3.4.2, 3.4.3, 3.4.4

Step	Description	Object Reference
4.	Identify the segment's Business Processes.	3.5.3
5.	Map the processes to the Organizations in the segment.	3.5.3, 3.5.2
6.	Map the processes to the lowest-level EPA BRM Sub-Function.	3.5.3
7.	Map the processes to Program/Project List.	3.5.3
8.	Define Performance Measurement Indicators and map them to the Organization Objectives and Sub-Objectives.	3.10.4, 3.4.3, 3.4.4
9.	Map the Performance Measurement Indicators to the FEA Performance Reference Model (PRM).	3.10.4
10.	Identify Names of Partner Organizations that your segment interacts with. These Organizations may be federal agencies, state or local governments, tribal nations, or industry and academic institutions.	3.9.5
11.	Map the segment Organizations to the Partner Organizations.	3.5.2, 3.9.5
12.	Identify Partner Business Processes that interact with EPA Business Processes in some manner.	3.9.3, 3.5.3
13.	Map the EPA Business Processes in your segment to Partner Business Processes they interact with or are part of.	3.5.3, 3.9.3
14.	Identify any Data Warehouses and relate them to their constituent Data Marts. **Note:** Some Data Marts may not be part of a Data Warehouse. There may also be some situations where a typical database is referred to as a "data warehouse." If the object being represented is actually just a database, then use the Database object to represent it even if it is called a data warehouse. If the object is a dimensional data mart and it is part of a collection of data marts that make up a larger actual data warehouse or a collection of data marts that are conceptually viewed as a data warehouse, use the Data Mart object and group the related data marts by linking them all to the same Data Warehouse object.	3.6.7, 3.6.6
15.	Identify the Names of the Conformed Dimensions represented by all Data Marts. Link the Conformed Dimensions to their owning Data Marts.	3.6.3, 3.6.6
16.	Identify all Conceptual Data Entities that are represented in the Data Marts and map the Conceptual Data Entities to their owning Data Marts.	3.6.2, 3.6.6
17.	Map Conceptual Data Entities to Business Processes that Create, Read, Update, or Delete (CRUD) these entities.	3.6.2, 3.5.3
18.	Map the Data Warehouses and Data Marts to the Organizations.	3.6.7, 3.6.6, 3.5.2
19.	Identify Databases that are part of the segment.	3.6.4
20.	Map the Conceptual Data Entities to the Databases that contain them.	3.6.2, 3.6.4
21.	Map the Databases to the Organizations.	3.6.4, 3.5.2

Step	Description	Object Reference
22.	Identify other Data Assets such as: • Data Set • Registry • Data Service • Repository	3.6.5
23.	Map the Data Assets to the Organizations.	3.6.5, 3.5.2
24.	Identify Partner Applications that interface with EPA Databases and Data Marts.	3.9.2, 3.6.4, 3.6.6
25.	Map the Partner Applications to the EPA Databases and Data Marts that they use.	3.9.2, 3.6.4, 3.6.6
26.	Identify EPA Applications in the segment that interface with external Partner Applications.	3.7.2, 3.9.2
27.	Map the EPA Applications to the Partner Applications that they interface with.	3.7.2, 3.9.2
28.	Identify remaining Applications in the segment that do not have interfaces with external Partner Applications.	3.7.2, 3.9.2
29.	Map Applications to the Conceptual Data Entities that they Create, Read, Update, or Delete (CRUD), or simply map the Applications to the Conceptual Data Entities and indicate that the relationship is “uses” if the CRUD relationships are not known.	3.7.2, 3.6.2
30.	Map Applications to any Data Marts that they use.	3.7.2, 3.6.6
31.	Map Applications to any Databases that they use.	3.7.2, 3.6.4
32.	Map Applications to any other Data Asset they use such as: • Data Set • Registry • Data Service • Repository	3.7.2, 3.6.5
33.	Map Applications in the segment to Investments whether the Investment is a Major or Non-Major. There may be one or more Applications per Investment. In the case where an Application is not covered by a Major or Non-Major Investment, map the Application to the Solution that it is part of.	3.7.2, 3.10.2, 3.10.3
34.	A Solution to a business problem can be composed of one or more Investments. Map the Investments to the Solutions that they belong to.	3.10.3, 3.10.2
35.	Map the Applications to the Business Processes that they support.	3.7.2, 3.5.3
36.	Map the Business Processes to the Solution that they are part of.	3.5.3, 3.10.3
37.	Map the Business Processes to the Investment that they are part of. However, note that not all Business Processes are funded for re-engineering by an Investment.	3.5.3, 3.10.2

Step	Description	Object Reference
38.	Identify the Application Modules or major sub-systems of each Application.	3.7.3, 3.7.2
39.	Map the Application Modules to the Applications they are part of.	3.7.3, 3.7.2
40.	Identify the Services provided by either the Application or the Application Modules.	3.7.4, 3.7.2, 3.7.3
41.	Map the Services to the Application Modules or Applications (if the Application cannot be decomposed into Application Modules).	3.7.4, 3.7.3, 3.7.2
42.	Map the Services to the FEA Service Component Reference Model (SRM). Services should be described at a specific level as a decomposition or further elaboration of the lowest level of the SRM.	3.7.4
43.	Identify the Hardware Platforms (servers, server farms, mainframes, etc.) that the Applications run on.	3.8.2, 3.7.2
44.	Map the Hardware Platforms to the Applications that run on them.	3.8.2, 3.7.2
45.	Identify the Software Platforms that host or support the Applications.	3.8.3, 3.7.2
46.	Map the Software Platforms to the Hardware Platforms that they run on.	3.8.3, 3.8.2
47.	Map the Software Platforms to the EPA Technology Reference Model (TRM).	3.8.3
48.	Map the Hardware Platforms to the EPA TRM.	3.8.2

3.4 Strategic Layer

3.4.1 Overview

The primary purpose of the segment *Strategic Layer* is to describe the goal structure of the segment. The goal structure consists of *Organization Goals*, supported by *Organization Objectives* and *Organization Sub-Objectives*. An Organization Goal maps directly to one or more EPA (i.e., enterprise) Objectives or Sub-Objectives making it, in effect, a further decomposition and specification of the EPA Objective/Sub-Objective. Since segments are an organizing principle of the EPA EA, a segment's Organization Goals give it its driving force and provide the "Why" for the supporting layers of the Segment Architecture and its supporting Solution Architectures.

NOTE: Segments themselves are an architectural construct and, as such, do not have their own distinct goals. It is the Organization or Organizations composing the segment that have Goals, Objectives, and Sub-Objectives.

The capabilities of the segment Strategic Layer include mapping Organization Goals to the EPA goal structure. This mapping ensures fulfillment of existing EPA Strategic Goals and helps minimize deviation from them. Population of segment Drivers and Critical Dependencies (to be performed during later phases of data collection) enables business decision-makers and architects to analyze and evaluate factors that influence the establishment and successful accomplishment of the segment's goals and objectives, and to plan for the necessary steps to achieving them.

The Strategic Layer, specifically the *Segment* object itself, provides the ability to establish a high-level mapping to other Organizations such as federal and non-federal partners (i.e., state and local governments, tribes, industry, academia, and international partners). The Organization Objectives in the

Strategic Layer facilitate mapping to initiatives in the segment's Business Layer, which in turn map to projects supporting these Initiatives in the Transition Architecture (to be captured in later data collection phases). These combined sets of relationships provide the ability to select and target expenditures towards specific goals and measure their progress, and to assess the Solutions and Investments supporting the Organization Goals.

OBJECTS:

- Organization Goal (3.4.2)
- Organization Objective (3.4.3)
- Organization Sub-Objective (3.4.4)

3.4.2 Organization Goal

Agency Program Offices and business/service functions have goals, and generally these goals are decomposed into objectives or even sub-objectives.

Definition:
An *Organization Goal* articulates the way a segment Organization's business is intended to be conducted once the Target Architecture is achieved. An Organization Goal may also add a new function to the existing work of the segment. An Organization Goal may map to one or more EPA Objectives or Sub-Objectives.

Examples:

- "Improve the scientific defensibility of existing monitoring programs."
- "Create an emergency response capability that provides on-site response teams within two hours of a disaster."

Guidance:
Start by identifying your Organization Goals and continue by identifying any Organization Objectives and Sub-Objectives. Next, identify how these Organization Goals, Objectives, and Sub-Objectives map to the EPA Strategic Plan in order to establish a line of sight from segment, through goals, to objectives and, where applicable, sub-objectives.

3.4.3 Organization Objective

Organization Objectives can be related to their parent Organization Goals and decomposed into Organization Sub-Objectives.

Definition:
An Organization Objective is a discrete and measurable action to be carried out or state to be achieved in furtherance of an Organization Goal. An Organization Objective directly supports the accomplishment of an Organization Goal and must be directly mapped to it.

Examples:
- "Replace 80% of existing monitoring stations with state-of-the-art technology by August 2007."
- "Deploy 200 trained field personnel at 20 national sites by the end of 2009."

Guidance:
Link Organization Objectives to Organization Goals to provide a line of sight from the organization and segment up to the goals, objectives, and sub-objectives of the EPA Strategic Plan.

3.4.4 Organization Sub-Objective

Organization Sub-Objectives are decomposed from Organization Objectives.

Definition:
An Organization Sub-Objective is a discrete and measurable action to be carried out or state to be achieved in furtherance of an Organization Objective.

Examples:
- "Complete reliability testing of state-of-the-art monitoring stations by September 2006."

Guidance:
Enter the information for the Organization Sub-Objectives and identify the Organization Objectives that they relate to or support.

3.5 Business Layer

3.5.1 Overview

The purpose of the segment *Business Layer* is to provide the context and description of the functions, processes, and initiatives that compose the segment's business domain. The Business Layer provides support to the Strategic Layer goal hierarchy through initiatives and *Business Processes*. The Business Layer supports process reengineering and optimization as well as data integration and management. It also provides a functional orientation to the Segment Architecture and defines the human capital elements required to perform the Business Processes (e.g., Person and Competency). The Segment Architecture encapsulates the business subset of the EPA EA allocated to a given segment. The specific scope of the segment is defined by activities identified in the *Definition* property of the Segment object.

Documentation of baseline and target Business Processes facilitates the discovery of similarities or redundancies among processes that may be consolidated, reused, or reengineered to meet new performance criteria. Business Processes have a *Data Collection Status* property ("Red," "Yellow," or "Green") that gives architects and business users an indication of the extent to which information about a Business Process has been defined, documented, or validated. Business Process interfaces document the connectivity between any two Business Processes. This connectivity includes related details such as

frequency of exchange, type and format of data exchanged, and the purpose for which the sending or receiving process uses the information. Interfaces in the Target Architecture are qualified by a *Target Completion Date*, which allows architects and business users to plan for future transformations of Business Processes based on new or modified interfaces and exchanges of information.

Representation of people and their roles and skills in relation to Business Processes provides key elements for human capital planning. These essential elements provide the ability to identify excess or insufficient resources for performing Business Processes and conducting the business of the segment. Alignment of Business Processes to *EPA Business Reference Model (BRM) Sub-Functions* minimizes duplication of functions or processes across the Agency and corrects scoping of *Solutions* within the segment.

Mapping Business Processes to the Solutions they support and to the *Applications* that support them establishes a chain of connected elements that makes it possible to identify all related elements of a Solution Architecture, thus providing architects with the ability to visualize the baseline or target well in advance of developing the architecture more specifically and in more detail as part of the System Life Cycle Management (SLCM) Procedures. Also, mapping Applications and Business Processes to *Investments* provides the association of these elements to the Investments that fund them.

OBJECTS:

- Organization (3.5.2)
- Business Process (3.5.3)

3.5.2 Organization

An *Organization* is a designated group within the Agency as defined by the Agency's organizational structure.

Definition:
An Organization is a designated group within the Agency as defined by the Agency's organizational structure. The internal organizations are one set of stakeholders.

Examples:
- OW – Office of Water
- AIEO – American Indian Environmental Office
- OSWER – Office of Solid Waste and Emergency Response
- LRS – Land Revitalization Staff

3.5.3 Business Process

A *Business Process* is a set of sequential or related steps that together accomplish a business function or provide a service. Steps in a Business Process are time-bound and denoted by verbs and nouns. (e.g., "interview candidate").

Based on guidance from the Object Management Group (creators of the Business Process Modeling Notation (BPMN) standard),[1] Business Processes are made up of activities, i.e., work that is performed as part of a Business Process. An activity can be either atomic or non-atomic (a compound entity that can be decomposed into more steps at a lower level of detail). The types of activities that are a part of a *Business Process Model* are: Process, Sub-Process, and Task. One or more Business Processes make up a business

[1] Object Management Group (OMG) Business Process Management Initiative. http://www.bpmn.org/index.htm.

function. Business functions (*EPA BRM Sub-Functions*) are defined in the EPA Business Reference Model (BRM).

Definition:
A Business Process is a set of sequential or related steps that together accomplish a business function or provide a service. Steps in a Business Process are time-bound and denoted by verbs and nouns. (e.g., "interview candidate").

Examples:

- "Register Pesticide"
- "Process New Hire"
- "Acquire Staff"
- "Develop Budget"

Guidance:
If your segment owns or uses business processes, provide information about them via the Business Process object. If a process is represented and it interfaces in some way with another process within EPA, enter a record for both processes and indicate how they interface with one other.

If you use a process that belongs to a Federal or Non-Federal *Partner Organization*, create this process as a *Partner Process*, and link the Organization's processes to it in order to indicate that an interface exists.

Business Processes should be named starting with a verb followed generally by the noun that the verb acts upon. Avoid long names such as "Develop the Initial Budget for the Next Fiscal Year" and simply name the process "Develop Budget." Save the details and enhancements or qualifying text for the *Description* property of the Business Process.

NOTE: Some organizations have and are providing process maps, flowcharts of tasks, or process flows. For compatibility reasons, these process diagrams must be developed using the BPMN standard developed by the Object Management Group. BPMN templates for flowchart tools such as Visio are available by doing a search on the Web. Process maps or flowcharts are not mandatory for this first phase of data collection. However, realizing that many will likely be submitted as part of this phase, the EA Team wants to ensure that all segment developers are aware of the BPMN requirement.

3.6 Data Layer

3.6.1 Overview

The purpose of the segment *Data Layer* is to promote data integration and data management. The Data Layer is structured to represent the data resources of the segment and to show critical relationships between these vital resources and the *Business Processes* and *Applications* that use or rely on them.

The Data Layer is consistent with the FEA Data Reference Model (DRM) 2.0 and consists of three primary areas: *Data Description*, *Data Context*, and *Data Sharing*. All three areas of the Data Layer, and the objects and relationships within them, contribute to achieving the goal of improved information sharing, management, and discovery.

To achieve improved integration, the EPA EA must make evident to business users, architects, and system owners the sources, locations, structure, content, stewardship, exchanges, and queries of Segment and Solution Architecture data. This information about the data, together with its relationship to Business

Processes and Applications, is the cornerstone for improving interoperability within the Agency and between the Agency and its partners.

Integrating details of the various data schemas (such as those in the EPA XML Repository) into the EA enables system designers and architects to identify reusable, similar, or redundant schemas for use in the design of Agency Business Processes and Applications. Mapping to data standards and resources enables architects and business users to understand the format, structure, purpose, and validity of the data and its sources.

OBJECTS:

- Data Entity (3.6.2)
- Conformed Dimension (3.6.3)
- Database (3.6.4)
- Data Asset (3.6.5)
- Data Mart (3.6.6)
- Data Warehouse (3.6.7)

3.6.2 Data Entity

Definition:
A *Data Entity* is an abstraction (a class of something) that is part of a conceptual data model.

Examples:
- Regulated Entity
- Waste Stream
- Employee
- Organization

Guidance:
Enter any Data Entities that are used by an Application or a Business Process and indicate how they are used by either Business Processes or Applications. For each Data Entity, indicate the database in which it is represented. You can also indicate the Application Modules that use each Data Entity.

3.6.3 Conformed Dimension

Definition:
A *Conformed Dimension* is a common element that appears in multiple *Data Marts*.

Examples:
- Facility
- Substance
- Time
- Organization

Guidance:
Conformed Dimensions must be identically identified everywhere they are used so they mean exactly the same thing to every user.

3.6.4 Database

Definition:
A *Database* is an organized collection of electronic records stored in a computer in a systematic way that can be accessed by a user to answer questions. Typically, a Database refers to a relational database.

Examples:
- "Toxics Release Inventory"
- "Air Quality System Database"

Guidance:
If your segment owns or uses databases, identify them through the Database object. Even if the databases belong to other Organizations within EPA, indicate their names, and then identify mappings between Databases and their supporting and related object types.

If a Database belongs to a Federal or Non-Federal *Partner Organization*, represent it as a Federal or Non-Federal *Partner Data Asset*, then link your Organization's Databases to the Federal or Non-Federal Partner Data Asset to indicate that an interface exists. Finally, decompose an EPA Database in order to indicate the Conceptual Data Entities and Logical Databases that are represented in the Database.

3.6.5 Data Asset

A *Data Asset* is a term used to identify a variety of other data resources under a somewhat generic object type. Data Assets can be created to represent a Data Set, a Registry, a Directory, a Data Service, or a Repository.

Some Data Assets are often referred to as a "Data Set," which in fact is true for any Database, Data Mart, Data Warehouse, or other data structure. Knowing what technology underlies a Data Asset can often help determine which object type to use to model it. For example, something known as a "Data Set" that is actually implemented in an Oracle database should *not* use the Data Asset object. Instead, it should be modeled by creating a Database object with the name of the data set and then linking the Database object to a Software Platform object that is an instance of an Oracle database. The *Software Platform* object can in turn be linked to a *Hardware Platform* object that represents the server on which the data set resides inside its Database.

Definition:
A *Data Asset* is a managed container for a collection of data. The Data Asset is the physical representation of a digital data source.

Examples:
- Data Set
- Registry
- Directory
- Data Service
- Repository

Guidance:
Link Data Assets to known related objects.

3.6.6 Data Mart

A *Data Mart* is a specialized type of Database that is optimized for efficiency for a particular purpose and audience. Data Marts draw data from other sources, such as multiple contributing Databases.

In the EPA EA, Data Marts are assumed to be "dimensional," using conformed and un-conformed dimensions with fact tables (often known as a star schema). Data Marts are for analytical use only: they do *not* process transactions or manage data prior to publication. Data Marts are able to hold a great deal of historical data and are often a sub-set or specialized collection of data within a larger *Data Warehouse* that is broader in scope and purpose.

Definition:
"A Data Mart is a database, or collection of databases, designed to help managers make strategic decisions about their business. Whereas a Data Warehouse combines databases across an entire enterprise, Data Marts are usually smaller and focus on a particular subject or department. Some Data Marts, called dependent Data Marts, are subsets of larger Data Warehouses." - www.Webopedia.com

A Data Mart only exists because there is a need to "report" on the data it is collecting. It provides easier access to disparate data by combining it into a Data Mart, for ease of use and accessibility.

Examples:
- "AQS Data Mart" (which holds historical ambient air quality data for analytical use)
- "Children's Health Data Mart" (a hypothetical data mart that combines information relevant to children's health analysis from multiple databases)

Guidance:
Enter the names and descriptions of any Data Marts owned or used by your segment. Even if the Data Marts are not all owned by your segment, you will need to enter the names of those that are used by Applications in your segment.

Indicate any relationships between your Data Marts and any Data Warehouses they may be a part of. Not all Data Marts are contained within a Data Warehouse. Some may be free-standing specialized Data Marts, in which case it is not necessary to relate them to a Data Warehouse. In cases where a collection of related Data Marts exists, they may collectively define a Data Warehouse. If this is the case, create a Data Warehouse and relate the constituent Data Marts to it.

3.6.7 Data Warehouse

Definition:
"A Data Warehouse is a database geared towards the business intelligence requirements of an organization. The Data Warehouse integrates data from the various operational systems and is typically loaded from these systems at regular intervals. Data Warehouses contain historical information that enables analysis of business performance over time. It is the cohesive data model that defines the central data repository for an organization. An important point is that we don't define a warehouse in terms of the number of databases. Instead, we consider it a complete, integrated data model of the enterprise, regardless of how or where the data is stored." – SQL Server Magazine www.sqlmag.com

Generally, a Data Warehouse is used to store data on a temporal basis (e.g. snapshots of data stored every night at 3am, once a week, etc.) while maintaining previous information -data is added, and not

deleted, from the Data Warehouse. The collection of this data in a warehouse allows you to perform long-term analysis on your data. A Data Warehouse allows you to see how your data changes over time by maintaining copies of this data in discrete time intervals.

Examples:
- "Administrative Data Warehouse – ADW"
- "Financial Data Warehouse – FDW"
- "Cleanup Data Warehouse – CDW"

3.7 Application Layer

3.7.1 Overview

The purpose of the *Application Layer* is to facilitate improved data management and application interoperability. This is achieved in part by providing key information about segment *Applications*, the nature of their interfaces with other Applications, mappings to the *Business Processes* they support, and the degree and quality of support provided.

One of the key capabilities provided by the Application Layer is the ability of baseline Applications to link to one or more target or replacement Applications. Target Applications have a *Target Completion Date* property that enables time-based views of interim targets for the Application Layer. For example, a user of the EPA EA would be able to query the architecture to see which Applications will be completed or in existence in a given fiscal year. This capability supports the notion of interim targets in a Transition Strategy and Sequencing Plan as described in the *OMB FEA Program EA Assessment Framework 2.0*.

Another key capability of the Application Layer is the ability to run queries that show how EPA Applications interface with each other and under what conditions, as well as how EPA Applications interface with *Partner Applications*. This capability supports EPA's continuing efforts to achieve data and application integration and to improve the interoperability of its systems.

The Application Layer enables architects to indicate the *Services* provided by an Application and, in a more detailed breakdown, the Services provided by the *Application Modules* (or sub-systems) of an Application. The identification and mapping of these Services to the FEA Service Component Reference Model (SRM) enable EPA to identify candidates for submission to Core.gov's inventory of reusable service components. The mapping of Services also enables EPA to search its own EA as well as Core.gov to determine whether EPA is building redundant service components or whether existing service components in the EPA EA or in Core.gov can be reused in EPA Applications to achieve more economical implementations of EPA *Solutions*.

Other key object relationships to the Business Layer of the segment include the mapping of an Application to any or all Business Processes that it supports. This mapping provides the ability to identify the extent to which the Business Processes are supported by Applications. This information provides inputs to the gap analysis process and definition of future Target Architectures and performance measurements. Applications have a *Data Collection Status* property ("Red," "Yellow," or "Green") that gives architects and business users an indication of how much information has been collected or created about the Application.

OBJECTS:
- Application (3.7.2)
- Application Module (3.7.3)

- Service (3.7.4)

3.7.2 Application

An *Application* is a computer program designed to fulfill one or more business functions. It may be a single product designed for a single business function, or it may be a multi-module or multi-sub-system entity with modules that support multiple business functions. An Application may be purchased (COTS), custom-developed in-house, or repurposed from another entity.

Although products like Microsoft SQL Server, Oracle, Windows XP, and others are technically applications, the EPA EA does not represent them in the Application Layer as an Application object. Instead, they are represented in the Technology Layer as a *Software Platform* object. This is because these types of applications do not perform direct, mission-oriented business functions, but play a system support role and often host, support, or otherwise facilitate end-user applications.

The term "application" tends to be used synonymously with "system." A system may be one Application or a group of related Applications, Business Processes, people, and other business elements.

Definition:
An Application is a computer program designed to fulfill one or more business functions.

Examples:
- "Deltek" (a commercial application with numerous modules or sub-systems performing various financial management business functions)
- "eCPIC" (an application that is used to store business cases and investment information for OMB Exhibit 300s)

Guidance:
If your Organization owns or uses Applications, enter information about them through the Application object. This information can first be obtained by importing portions of the application's inventory record contained in the Registry of EPA's Applications and Databases (READ) into your spreadsheet or Metis model and then filling in gaps in application properties and relationships. Additional application information may also be gathered from the Application Deployment Checklist. Even if the Applications belong to other Organizations within EPA, enter their Names and Acronyms to establish an initial mapping and interface between them. If an Application interfaces in some way with another Application within EPA, enter both Applications and indicate which Applications interface with each other. Later data collection phases will focus on more specific details of the interfaces and data exchanges between the Applications. For now, the focus is on identifying the fact that interfaces exist.

If an Application belongs to a Federal or Non-Federal *Partner Organization*, create it as a Federal or Non-Federal Partner Application and link your Organization's Applications to the Partner Application to indicate that an interface exists. Also, remember to indicate any Services that this Application supports. If the Application is going to be decomposed into Application Modules, indicate the Services each Application Module provides or supports rather than indicating the Services at the more generic Application level of mapping.

3.7.3 Application Module

The highest grouping of functional software units is an Application. An Application is often composed of numerous *Application Modules* (sub-systems or smaller applications).

Definition:
An *Application Module* is a sub-part or sub-system of an Application. It provides a distinct business function that contributes to the overall functionality of the Application.

Examples:
- "Payroll Processing"
- "Timesheet Management"
- "Invoice"
- "Contract Reports"

Guidance:
Use the Application Module object to identify the modules for any Applications that can be decomposed into their next smallest constituent units. A key aspect of both Applications and Application Modules is that they provide or support a Service. It is important to note that it is not necessary for a Service to be a Web Service. It can be a service in the broader sense as defined in the FEA Service Component Reference Model (SRM).

Although the FEA SRM defines "service" to a certain level of granularity, you should identify functionality to a lower level of granularity that is more specific to the business function and to EPA. Defining these services using the Service object will provide for very EPA-specific functionality to be characterized as part of a Service Oriented Architecture (SOA). Once some or all of the Application Modules have been identified, indicate which Services these Application Modules provide or support.

3.7.4 Service

A *Service* is a self-contained business function that accepts requests and returns responses through a well-defined standard interface. Services are "stateless," that is, they do not depend on any pre-existing conditions to operate. Services can be provided or supported by Applications, or they may be specified at a more granular level by relating them to Application Modules.

Services are provided or supported by Applications and Application Modules. Within the context of the EPA EA, Services are more specialized instances of "services" as defined in the FEA SRM. Services need not be limited to Web Services, but should follow from the definition in the FEA SRM.

Definition:
A *Service*, as defined within the Application Layer of a Segment Architecture, is a self-contained business function that accepts requests and returns responses through a well-defined standard interface.

Examples:
- "A service that returns estimated latitude and longitude coordinates based on an address"
- "A service that provides local weather updates"
- "A service that allows data capture of employee timesheet data"

Guidance:
Enter all Services provided by your segment's various Applications and Application Modules, and relate them to the Applications or Application Modules that provide or support them.

3.8 Technology Layer

3.8.1 Overview

The purpose of the segment *Technology Layer* is to facilitate improved application and network interoperability, reliability, security, processing and storage capacity, and adherence to technology standards. The Technology Layer enables EPA to identify the capabilities and capacities of its hardware and software base. Networks can be reconfigured for improved performance and resource sharing based on segment-wide or enterprise-wide views of Technology Layer elements. Enterprise planning and acquisitions can be made more efficient through an enterprise view of hardware and software licenses for EPA standard technology elements. EPA can more effectively interface with other Federal and Non-Federal *Organizations*, and show these interfaces in the EA across all segments to improve data flows between Organizations.

The three primary objects of the Technology Layer of Segment and Solution Architectures are *Software Platform*, *Hardware Platform*, and *Network/Telecom Platform*.[2] Each of these objects maps to multiple

[2] This phase of information collection focuses only on Hardware Platform and Software Platform.

services of the Agency's Technical Reference Model (TRM) as defined within the EA Framework. These generic object groupings were established to simplify the capture and reporting of technology data in support of Segment and Solution Architectures.

The EPA EA Team expects that architects will most often select the hardware, software, and networks that support their segments and solutions from the instances of objects defined in the EPA EA Framework. The Agency's technology and security architecture program will establish an inventory of hardware, software, and networks available for use throughout the Agency. In the case that a Segment or Solution Architecture relies upon technology not captured or supported at the enterprise level, the architecture can populate instances of these objects to depict unique aspects of the Agency's Technology Layer. In all cases, Segment and Solution Architecture technologies should map to Agency technology standards (*EPA Technology Standards*). Failure to do so will reveal a gap in standards compliance that requires either a change to the architecture or a waiver from Agency policy.

OBJECTS:

- Hardware Platform (3.8.2)
- Software Platform (3.8.3)

3.8.2 Hardware Platform

Definition:
A *Hardware Platform* is any physical hardware device on which software runs.

Examples:
- "Web Server"
- "Domain Name Server"
- "Handheld Wireless Device"
- "Firewall Server"
- "Mainframe"
- "High Performance Computer (supercomputer)"
- "Mass Storage Device"

Guidance:
Enter the general types or specific names of the Hardware Platforms that make up a Segment Architecture. Hardware Platforms can be identified for the various types listed in the *Platform Class* drop-down list.

One example of how to identify Hardware Platforms is to create a record and indicate that its name is simply "Development Server" or "Production Server." If it is known, for example, that a particular server has a specific name, such as "Lincoln," put that in the *Name* property and use the *Platform Use* drop-down list to indicate the purpose for which that server is typically used. Either way, give a generic name to your server, such as "GEO Main Server" or "Katrina Response Server," or use the specific name assigned to it by the network teams.

3.8.3 Software Platform

Software Platforms host Applications and Application Modules, and run on Hardware Platforms. Software Platforms may also host other Software Platforms. The primary difference between an Application and a Software Platform is that a Software Platform is not characterized as an end-user application that performs some mission-oriented function. Software Platforms play more of a support role

for end-user applications and constitute the system environment for these applications. Although Software Platforms often provide important business functions, they do not provide or perform Agency mission-related functions.

Definition:
A Software Platform is generally a commercial software environment in which COTS or custom-built Applications run or reside. Software Platforms include database packages, operating systems, web servers, network management packages, and other system-oriented software that supports or facilitates the operation or execution of Applications and networks that perform business functions.

Examples:
- "Database" – Oracle, SQL Server, Sybase
- "Operating System" – Windows Server, MVS, Linux
- "Web Server" – Cold Fusion Server, J2EE, IBM WebSphere, BEA Web Logic, Apache
- "Network Management" – CISCO Works for Switched Internets (CWSI)
- "API" – An application program interface:
  DPMI – DOS Protected Mode Interface
  ISAPI – MS Internet Server API
  J2ME – Java 2 Platform Micro Edition
  MIDP – Mobile Information Device Profile
  NSAPI – Netscape Server API
  SAX – Simple API for XML

Guidance:
Once the segment's Software Platforms have been identified, indicate what Hardware Platforms they run on and what Applications they host.

3.9 Partner Architectures

3.9.1 Overview

The EPA Partner Architecture is a modeling construct that allows Agency architects to identify Federal and Non-Federal Partners with which EPA interacts in various ways. The main elements of this architecture include state and local governments, tribal governments, industry partners, academia, and international partners and other federal agencies.

Major aspects represented in this architecture also include *Partner Processes*, *Applications*, *Data Assets*, and network interfaces. For each partner that interfaces with EPA, an instance of a Partner Architecture should be created to represent the partner's Organization and its elements. This structure supports the ability to model data flows and process interaction between EPA and all federal and non-federal entities.

OBJECTS:

- Partner Application (3.9.2)
- Partner Business Process (3.9.3)
- Partner Data Asset (3.9.4)
- Partner Organization (3.9.5)

3.9.2 Partner Application

Definition:
A *Partner Application* is an Application used by an EPA partner in relation to a Partner Business Process.

Examples:
- "eRulemaking"
- "STORET"

3.9.3 Partner Business Process

Definition:
A *Partner Business Process* is a Business Process carried out by a partner in relation to some process in which EPA plays a role.

Examples:
- "Criteria pollutant air quality monitoring"

3.9.4 Partner Data Asset

A *Partner Data Asset* is essentially the same as the *Data Asset* object type. The main difference is that the Partner Data Asset can be used to represent any type of data asset in a Partner Architecture and is not limited to the short list of data asset types in the *Types* property of the Data Asset object.

This object type is used to identify a variety of data resources under a somewhat generic object type. Data Assets can be created to represent *Databases*, *Data Marts*, *Data Warehouses*, Data Sets, Registries, Directories, Data Services, and Repositories.

Definition:
A *Partner Data Asset* is a repository of data that is a managed container for a Partner collection of data. The Data Asset is the physical representation of a digital data source.

Examples:
- "Data Set"
- "Registry"
- "Directory"
- "Data Service"
- "Database"
- "Data Mart"
- "Data Warehouse"
- "Repository"
- "Taxonomy"

Guidance:
Once you have created one or more Partner Data Assets, map them to related objects.

3.9.5 Partner Organization

Definition:
A *Partner Organization* is a federal, state, local, tribal, or commercial organization that plays a role within an EPA Business Process.

Examples:
- "California Air Resources Board"
- "Federal Emergency Management Agency"
- "Department of the Interior"
- "NASA"

3.10 Transition Architecture

3.10.1 Overview

The Transition Architecture is a model of the elements of the Transition Strategy that the Agency has developed to govern the transition from the Baseline Architecture to the Target Architecture. These elements include *Investments*, *Gaps*, *Solutions*, *Projects*, *Performance Measurement Indicators* for the Target Architecture (which compose the performance improvement plan), and the sequencing of milestones.

The Transition Architecture is used to track and report on progress of milestones toward the construction of the Target Architecture and their relationships to Performance Measurement Indicators (PMIs). The Transition Architecture enables 1) identification of relationships between Investments and funding sources, 2) tracing of expenditures on *Organization Goals* and *Objectives*, and 3) establishment of a line of sight from Solutions up through *EPA Strategic Goals* and *EPA Objectives*.

The bulk of the Transition Architecture information will be captured in a third phase of information collection. However, during this first phase, the following elements are essential to laying the foundation for the Transition Architecture.

OBJECTS:
- Investment (3.10.2)
- Solution (3.10.3)
- Performance Measurement Indicator (3.10.4)

3.10.2 Investment

Definition:
An *Investment* is any ongoing expenditure subject to the Capital Planning and Investment Control (CPIC) Procedure. Investments include Major Investments, Non-Major Investments, and small investments.

Examples:
- "FinRS – Financial Replacement System" (the single Investment that covers the entirety of the Solution for Financial System Modernization)
- "CDX – Central Data Exchange" (one of several Investments that collectively define the Agency Solution for data integration)

Guidance:
One or more Investments may compose a single Solution. Applications and Business Processes can be mapped to Investments that fund them, although not all Business Processes re-engineering and Applications may be funded by an Investment. Those Applications and Processes not currently funded by some Investment can still be mapped to a Solution of which they are a part.

3.10.3 Solution

A *Solution* is an answer to a business problem and typically funds one or more Investments with a corresponding OMB Exhibit 300 or 53. According to the *EPA EA Policy*, a Solution Architecture must be developed for each Solution to ensure compliance with EA standards and the Target Architecture. A Solution may have a number of *Business Processes* and/or *Applications* associated with it. Some of these may or may not be funded by the Investments composing the Solution, but are still part of the Solution.

Definition:
A Solution is an answer to a business problem and typically funds one or more Investments with a corresponding OMB Exhibit 300 or 53.

Examples:
- "FinRS – Financial Replacement System" (an Investment, but it is also a Solution to the financial systems modernization issue)
- "Enterprise Tools" (a Solution made up of a number of Investments that fund the various systems or Applications that compose Enterprise Tools – including CDX, EPA Portal, IAM, ETL and others)

Guidance:
Once Solutions for the segment have been identified, map the Investments that compose those Solutions to the Solutions themselves.

3.10.4 Performance Measurement Indicator

Definition:
A *Performance Measurement Indicator* (PMI) is a quantifiable measure of progress against a benchmark state.

Examples:
- "In 600 of the Nation's watersheds, water quality standards are met in at least 80% of the assessed water segments" (Mission and Business Results)
- "Reduce the response time for each help desk call from 1 day to 1 hour" (Customer Results)
- "Increase the percentage of help desk calls that are closed within one call from 20% to 50%" (Processes and Activities)
- "Install 25 additional help desk stations by the end of the calendar year" (Technology)

Guidance:
Indicators may be applied to multiple object types and align with the terminology and structure of the FEA Performance Reference Model, which recognizes four measurement areas that operate along a "line of sight":

1. Mission and Business Results – Measures that capture the outcomes that the Agency seeks. In EA Segments, mission and business results measure link to objectives and sub-objectives at the Enterprise level, not the segment level.
2. Customer Results – Measures how well a specific process within the Agency is serving its customers, internal or external, including citizens where applicable.
3. Processes and Activities – Measures outputs that are the direct result of the process in question.
4. Technology – Captures key elements of performance that directly relate to the object in question, if appropriate.

Note that Technology measures are only applicable where technology plays a role, such as in an IT Investment. A PMI can relate to other PMIs to indicate line of sight. It should also be mapped to Organization Objectives and Sub-Objectives (whatever is the lowest level in the goal hierarchy for the Organization.), EPA Objectives and Sub-Objectives, and finally to the appropriate level in the FEA Performance Reference Model.

The examples given above show statements that can be transformed into PMIs at various levels within the architecture that relate to or support Organization Objectives and Sub-Objectives.

APPENDIX A: PHASE I INFORMATION COLLECTION OBJECTS AND RELATIONSHIPS

The table below identifies all objects and relationships that are part of the Phase I Baseline Information Collection Spreadsheet and that are supported by ART 4.0. There are a number of instances where there may be multiple relationship types that exist between two object types. Generally, there should only be one relationship used between any two instances. For example: Organization A *owns* Application B, OR Organization *uses* Application B, but not both. However, the existence of multiple relationship types between two objects allows the architecture developer to choose the relationship that most accurately describes the situation that is being modeled.

Information Type	Relationship Type	Related Information Type
Application	contains	Application Module
Application	critical to	Business Process
Application	uses	Data Entity
Application	accesses	Data Asset
Application	accesses	Data Mart
Application	accesses	Data Warehouse
Application	accesses	Database
Application	performs	EPA BRM
Application	contains	EPA Data Class
Application	provides	FEA SRM (service)
Application	is hosted by	Hardware Platform
Application	is contained in	Investment
Application	is used by	Organization
Application	supports	Organization
Application	is owned by	Organization
Application	supports	Organization Goal
Application	supports	Organization Objective
Application	supports	Organization Sub-Objective
Application	interfaces	Partner Application
Application	exposes	Service
Application	uses	Software Platform
Application	composes	Solution
Application Module	is contained in	Application
Application Module	uses	Data Entity

Information Type	Relationship Type	Related Information Type
Application Module	accesses	Data Asset
Business Process	relies on	Application
Business Process	uses	Data Entity
Business Process	supports	EPA BRM
Business Process	uses	EPA Data Class
Business Process	is contained in	Investment
Business Process	is used by	Organization
Business Process	regulated by	Organization
Business Process	involves	Organization
Business Process	is owned by	Organization
Business Process	is executed by	Organization
Business Process	is consultant to	Organization
Business Process	supports	Organization Goal
Business Process	supports	Organization Objective
Business Process	supports	Organization Sub-Objective
Business Process	is funded by	Program/Project
Business Process	is critical to	Solution
Data Entity	is used by	Application
Data Entity	is used by	Application Module
Data Entity	is used by	Business Process
Data Entity	is contained in	Data Mart
Data Entity	is represented in	Database
Conformed Dimension	is conformed dimension of	Data Mart
Cross-Goal Strategy	is supported by	Organization Goal
Data Asset	is accessed by	Application
Data Asset	is accessed by	Application Module
Data Asset	sources	Data Mart
Data Asset	sources	Database
Data Asset	is hosted by	Hardware Platform
Data Asset	is owned by	Organization
Data Asset	is hosted by	Software Platform
Data Mart	is accessed by	Application

Information Type	Relationship Type	Related Information Type
Data Mart	contains	Data Entity
Data Mart	has	Conformed Dimension
Data Mart	sourced from	Data Asset
Data Mart	is contained in	Data Warehouse
Data Mart	is used by	Organization
Data Mart	is owned by	Organization
Data Mart	is managed by	Organization
Data Warehouse	is accessed by	Application
Data Warehouse	is accessed by	Application Module
Data Warehouse	contains	Data Mart
Data Warehouse	is owned by	Organization
Database	is accessed by	Application
Database	represents	Data Entity
Database	sourced from	Data Asset
Database	is hosted by	Software Platform
EPA BRM	is performed by	Application
EPA BRM	is supported by	Business Process
EPA Data Class	is contained in	Application
EPA Data Class	is used by	Business Process
EPA TRM	is aligned to	Hardware Platform
EPA TRM	is aligned to	Software Platform
FEA PRM	is aligned to	Performance Measurement Indicator
FEA SRM (service)	is provided by	Application
FEA SRM (service)	includes	Service
Hardware Platform	hosts	Application
Hardware Platform	hosts	Data Asset
Hardware Platform	aligns with	EPA TRM
Hardware Platform	is used by	Organization
Hardware Platform	supports	Organization
Hardware Platform	is owned by	Organization
Hardware Platform	is hosted by	Organization
Hardware Platform	hosts	Software Platform

Information Type	Relationship Type	Related Information Type
Investment	contains	Application
Investment	contains	Business Process
Investment	is contained in	Solution
Objective	is supported by	Organization Goal
Organization	uses	Application
Organization	is supported by	Application
Organization	owns	Application
Organization	uses	Business Process
Organization	regulates	Business Process
Organization	participates in	Business Process
Organization	owns	Business Process
Organization	executes	Business Process
Organization	consults on	Business Process
Organization	owns	Data Asset
Organization	uses	Data Mart
Organization	owns	Data Mart
Organization	manages	Data Mart
Organization	owns	Data Warehouse
Organization	uses	Hardware Platform
Organization	is supported by	Hardware Platform
Organization	owns	Hardware Platform
Organization	hosts	Hardware Platform
Organization	is included in	Segment
Organization	uses	Software Platform
Organization	is supported by	Software Platform
Organization	owns	Software Platform
Organization Goal	is supported by	Application
Organization Goal	is supported by	Business Process
Organization Goal	supports	Cross-Goal Strategy
Organization Goal	supports	Objective
Organization Goal	supports	Organization Objective
Organization Goal	supports	Segment

Information Type	Relationship Type	Related Information Type
Organization Goal	is supported by	Sub-Objective
Organization Objective	is supported by	Application
Organization Objective	is supported by	Business Process
Organization Objective	supports	Organization Goal
Organization Objective	is supported by	Organization Sub-Objective
Organization Objective	is supported by	Performance Measurement Indicator
Organization Objective	is supported by	Solution
Organization Sub-Objective	is supported by	Application
Organization Sub-Objective	is supported by	Business Process
Organization Sub-Objective	supports	Organization Objective
Organization Sub-Objective	is supported by	Performance Measurement Indicator
Organization Sub-Objective	is supported by	Solution
Organization Sub-Objective	supports	Sub-Objective
Partner Application	interfaces with	Application
Partner Application	is owned by	Partner Organization
Partner Business Process	is owned by	Partner Organization
Partner Data Asset	is owned by	Partner Organization
Partner Organization	owns	Partner Application
Partner Organization	owns	Partner Business Process
Partner Organization	owns	Partner Data Asset
Performance Measurement Indicator	aligns with	FEA PRM
Performance Measurement Indicator	supports	Organization Objective
Performance Measurement Indicator	supports	Organization Sub-Objective
Program/Project	funds	Business Process
Segment	includes	Organization
Segment	is supported by	Organization Goal
Service	is exposed by	Application
Service	maps to	FEA SRM (service)
Software Platform	is used by	Application
Software Platform	hosts	Data Asset

Information Type	Relationship Type	Related Information Type
Software Platform	hosts	Database
Software Platform	aligns with	EPA TRM
Software Platform	is hosted by	Hardware Platform
Software Platform	is used by	Organization
Software Platform	supports	Organization
Software Platform	is owned by	Organization
Solution	is composed of	Application
Solution	relies on	Business Process
Solution	contains	Investment
Solution	supports	Organization Objective
Solution	supports	Organization Sub-Objective
Sub-Objective	supports	Organization Goal
Sub-Objective	supports	Organization Sub-Objective

APPENDIX B: ADDITIONAL GUIDANCE

This appendix provides additional clarification about certain object properties in response to questions the EA Team has received to-date from Segment Architecture development teams.

Data Collection Status – This property is a qualitative or subjective assessment of how much information about an Application has been collected and put into the architecture. If only the Name and Acronym have been identified, the status should be "Red." If a few of the properties and some relationships to other related objects have been identified, the status should be "Yellow." If most or all of the properties have been populated and most or all of the relationships to other objects have been established, or if the information collected thus far is as complete as it is likely to be, the status should be "Green."

Strategic Value – This property is a qualitative or subjective assessment of the strategic value of an Application as it relates to its use by multiple Organizations. The following guidelines should be used when making this assessment:

- If an Application is used by multiple Organizations, it has high strategic value because of its widespread use.
- If an Application is used only internally by a single Organization, it is more likely of medium to low strategic value.

This property is in effect a measure of the Application's value to the Agency as a whole and could be termed "Agency Strategic Value."

Application Criticality – This property is related to Strategic Value in that it is a measure of the importance of the Application. The following guidelines should be used when assigning a value to this property:

- The difference between Application Criticality and Strategic Value is that Application Criticality is more of an internal assessment of the importance of an Application to the Organization that owns it and of the Organization's ability to safely and effectively operate and perform its function.
- An Application could be critical to the Organization that owns it—which would give it an Application Criticality rating of "High"—but still have a "Low" or "Medium" Strategic Value because it is used only internally by a single Organization and not more broadly across the Agency in support of a wider array of Organizations.

Deployment Profile – This property characterizes the installation of the Application. The following guidelines should be used when assigning a value to this property:

- If an Application resides on several servers in a single server farm acting as a cluster and there are several instances of it installed on each machine in the cluster, it should be flagged as "Single Instance" because the cluster still functions as a single instance of the Application, which is merely load-balanced to handle the number of users it must handle.
- If an Application is distributed, it should still be flagged as "Single Instance."
- If an Application is installed on various desktops or laptops (e.g., an MS-Access application installed on many desktops), it should be flagged "Multiple Instances."

- If an Application is installed on multiple, geographically dispersed servers and is *not* considered distributed but, in fact, these individual server instances are being used separately and are hosting separate instances of a supporting database for the Application, the Application should be flagged "Multiple Instances."

Application Accessibility – This property indicates whether an Application is available to the public and has potential security ramifications. The following guidelines should be used when assigning a value to this property:

- If an Application is used by EPA only, it should be flagged "Agency Only."
- If an Application is used by EPA and other Federal Agencies, it should be flagged "Intra-Government."
- If an Application is used by the public, industry, academia, or tribal, state, or local governments, it should be flagged "Public."