Contact Information Service (CIS)

System Design Document



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Version 1.0

Department of Veterans Affairs

Revision History

| Date | Version | Description | Author |
| --- | --- | --- | --- |
| 02/12/2016 | 1.0 | Initial Draft | SMS |
| 03/04/2016 | 1.1 | Sprint 4 release. Extensive additional details |  |

Artifact Rationale

The System Design Document (SDD) is a dual-use document that provides the conceptual design as well as the as-built design. This document will be updated as the product is built, to reflect the as-built product.

When to Complete Each Section of the SDD

| Section | Completed On or Before PMAS Phase | Rationale |
| --- | --- | --- |
| 1 – Introduction | MS 0 Review; updated thereafter | Conceptual design should inform evaluation of investments |
| 2 - Background | MS 0 Review; updated thereafter | Conceptual design should inform evaluation of investments |
| 3 – Conceptual Design | MS 0 Review; updated thereafter | Conceptual design should inform evaluation of investments |
| 4 – System Architecture | MS 0 Review; updated thereafter | Conceptual design should inform evaluation of investments |
| 5 – Data Design | MS 1 Review; updated thereafter | Design details should be elaborated upon during PMAS Planning phase and prior to development |
| 6 – Detailed Design | MS 1 Review; updated thereafter | Design details should be elaborated upon during PMAS Planning phase and prior to development |
| 7 – External System Interface Design | MS 1 Review; updated thereafter | Design details should be elaborated upon during PMAS Planning phase and prior to development |
| 8 – Human Machine Interfaces | MS 1 Review; updated thereafter | Design details should be elaborated upon during PMAS Planning phase and prior to development |
| Attachments | MS 1 Review; updated thereafter | Design details should be elaborated upon during PMAS Planning phase and prior to development |

A product’s system design should be defined conceptually prior to the allocation of personnel and resources that occur at project initiation. This gives the enterprise an opportunity to evaluate IT investments before project teams are stood up and funding is allocated. Sections 1- 4 which discuss the high level design should be completed prior to MS 0. All sections should be completed and updated before MS 1. Projects will need to address all SDD approval constraints prior to the MS 2 review. In addition, the SDD should reflect the as-built product going into the MS 2 review.

The following project types are required to complete this artifact. Exceptions are outlined where needed throughout the document.

| Activity | New Capability (1) | Feature Enhancement (2) |
| --- | --- | --- |
| **Field Deployment (A)** | Yes | Yes |
| **Cloud/Web Deployment (B)** | Yes | Yes |
| **Mobile Application (C)** | Yes | Yes |

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# Introduction

This document provides the system description for the Contact Information Service (CIS, hereafter) Enterprise Shared Service. It is a component of the VA’s Customer Data Integration (CDI) initiative. CIS is being defined, architected and built to provide subscriber systems an “enterprise web service” where authoritative veteran physical, phone and electronic contact information can be stored, shared, collectively managed and consumed. These services are intended to:

* Standardize contact information for all business lines within the VA
* Provide a mechanism to implement standard processes for the management of contact information.
* Employ standard processes for the management of contact information across the entire VA.
* Provide consistent contact information across all lines of business.
* Integrate CIS with other lines of business while developing standards for consistent data quality across all lines of business.
* Emphasize and promote contact information as a valued data service shared across LOBs.
* Eliminate the need for subscribers to constantly update address information across all LOBs.
* Provide the capability for any subscriber system to access the authoritative contact information for each customer.
* Provide the capability for any subscriber system to use the authoritative data to pre-populate all VA business process enhancements.

This purpose and scope of the service was described at a high level in the [CDI Service Charter document](http://vaww.yourserver.domain/sites/vrm/MSTI/MSTI%20Coordination/PMAS%20Documentation/CDI/CDI%20Project%20Charter%202015%2010%2006.pdf). Additional information can be found in the [CDI CIS Business Requirements Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/CDI%20-%20eCIS/Business%20Requirements%20Document%20(BRD)/CDI%20CIS%20Business%20Requirements%20Document_Signature.pdf) and [CDI Requirements Specification Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/CDI%20-%20eCIS/Requirements%20Specification%20Document%20(RSD)/CDI_Requirements_Specification_Document.12_17.docx).

## Scope

The scope establishes the boundaries of the design document and should describe features outside of the scope, for example, if certain requirements were not included in the design due to budgetary or time constraints.

Table 1 : Scope Inclusions

|  |
| --- |
| Includes |
| 1. Defining the architecture of CIS with sufficient detail to develop the first part of the overall solution. |
| 1. Enough background information and associated plans to gain an appreciation for the entire scope of the effort. |

Table 2 : Scope Exclusion

|  |
| --- |
| Excludes |
| 1. Duplicative information that exists in other documents. These documents will be referenced instead. See Table 13: Referenced Documents for a complete listing of referenced documents. |
| 1. Separate Security Plan, C&A, and/or ATO – CIS will initially be created within the VIERS security boundary. |
| 1. Detail for every service and capability defined. This development increment is focused on Read Active Contact Info only. |

## User Profiles

CIS is designed as an enterprise shared service. As such, it does not provide an end user interface. It is designed to be consumed by other systems within the enterprise using the VA’s service oriented architecture (SOA) platform environment and guidelines.

Enrollment System (ES), CorpDB, and Chapter 33 have been identified as the first consumers of this service. Other systems have not been identified at this time.

The CIS enterprise shared service will be a component in future development and enhancements of various VA application systems. It is VA policy that all individuals involved in the design and development of said systems be proficient in their understanding of VA standards for information technology and the support and maintenance of those systems.

# Background

## Overview of the System

The VA requires a consistent enterprise view of VA customer contact information to efficiently and effectively deliver benefits and services to customers.

CIS provides the following capabilities to meet the above stated need.

* Apply contact information updates across the VA from any input source and facilitate the process of propagating changes to contact information throughout the enterprise by creating a single point of entry for customer address maintenance.
* Provide a single, consistent view of VA customer contact information to all users and eliminate the current scenario where VA customers are requested to provide the very same contact information multiple times to multiple groups when interacting with the VA.
* Function as the VA’s authoritative source of contact information which will lead to improvement in the accuracy of contact information data through focused data quality (DQ) efforts on a single authoritative source as well as reduce business/technical costs of multiple information capabilities

CIS will provide the following benefits to the VA:

* Improved customer and user experience by providing consistent information from VA regardless. of how the customer requests VA benefits
* Significantly reduce the costs associated with IT sustainment

## Overview of the Business Process

The following scenarios are provided in section 7.1 of the [CDI CIS Business Requirements Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/CDI%20-%20eCIS/Business%20Requirements%20Document%20(BRD)/CDI%20CIS%20Business%20Requirements%20Document_Signature.pdf):

1. A Veteran/Customer needs the ability to make contact information changes via mail/fax, self-service, call center or walk-in.
2. A Veteran/Customer would like to add additional contact information types to their profile for VA use via mail/fax, self-service, call center or walk-in.
3. A Fiduciary for an incompetent Veteran/Customer needs to provide new contact information to continue handling the business affairs.
4. A Veteran/Customer would like to opt out of receiving communication from the VA.
5. A Veteran/Customer would like to specify the permitted use of contact information provided to the VA.
6. A Veteran/Customer would like to establish a temporary address during the winter that is different from their physical address and effective for a designated time period.

These above scenarios result in business processes that directly interact with legacy VA systems to update contact information. These legacy systems currently utilize their own data stores, but over time will be updated to directly interact with the CIS authoritative source through web services being defined in this document. Until that is achieved, a propagation process as visualized in appendix C of the [CDI CIS Business Requirements Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/CDI%20-%20eCIS/Business%20Requirements%20Document%20(BRD)/CDI%20CIS%20Business%20Requirements%20Document_Signature.pdf) (see Figure 1: High-Level Propagation Process) will be used to keep these legacy systems consistent with the authoritative source.

Figure 1: High-Level Propagation Process



## Overview of the Significant Requirements

Table 3: Significant Requirements provides the requirements that may significantly impact the solution’s architecture. Since most of these requirements are non-functional, they come from Section 8 of the [CDI CIS Business Requirements Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/CDI%20-%20eCIS/Business%20Requirements%20Document%20(BRD)/CDI%20CIS%20Business%20Requirements%20Document_Signature.pdf) or Appendix A of the [CDI Requirements Specification Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/CDI%20-%20eCIS/Requirements%20Specification%20Document%20(RSD)/CDI_Requirements_Specification_Document.12_17.docx). An understanding of all of the business needs and requirements may provide additional appreciation for the solution provided in the rest of this document.

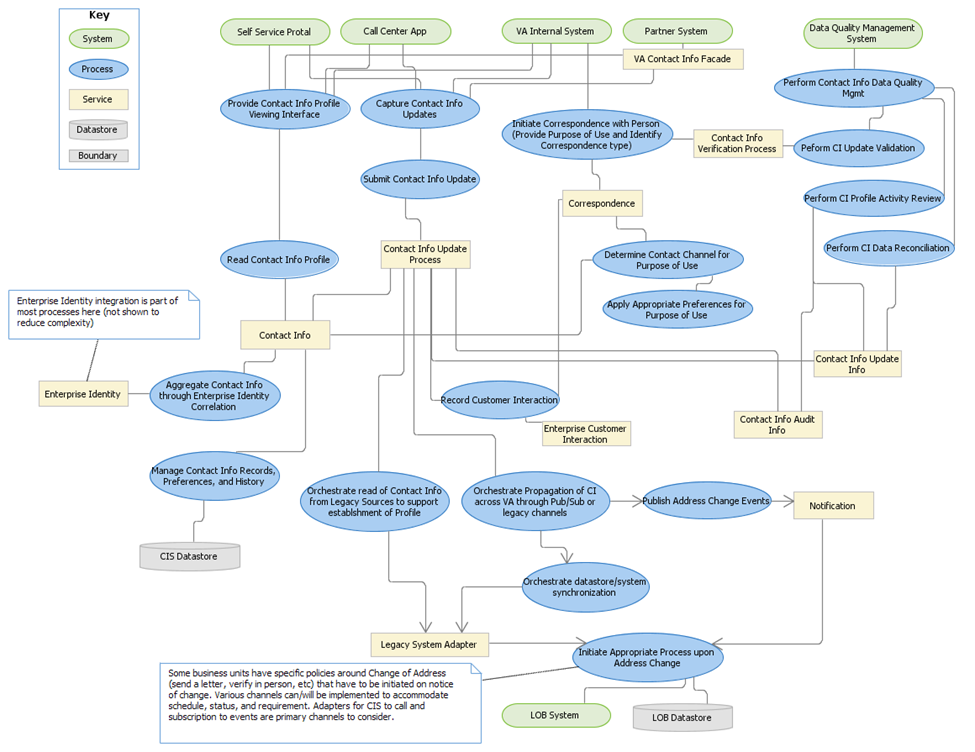
Table 3: Significant Requirements

| # | Reference | Theme | Requirement or Question/Answer |
| --- | --- | --- | --- |
| 1 | BRD 8.1 #1 | Availability | Q: How much time should the system be available (and how much down time is acceptable due to incident [unexpected] outage)? A: As the CIS, I will be available 99.99% (99.999%) of the time except for scheduled maintenance. |
| 2 | BRD 8.1 #3 | Availability | Q: How soon should the system fully recover from an outage? (Includes Mean Time to Restore) A: As the CIS, I will provide redundant nodes to enable subscriber systems a seamless transition during a failure event The transition will be no more than 1 minute. |
| 3 | BRD 8.1 #4 | Availability | Q: How much data will be restored when outage is recovered? A: As the CIS, I will ensure that redundant nodes are mirrored which will eliminate the need for data recovery. |
| 4 | BRD 8.1 | Availability | As a service, I will notify all users via a message when the system is unavailable due to scheduled maintenance so that all subscribers are aware of maintenance. Note: Leverage BENS for notifications – TBD |
| 5 | BRD 8.1 | Availability | As a service, I will capture data processing errors for all requests so that subscribers are notified of the errors. |
| 6 | BRD 8.1 | Availability | As a service, I will employ priority queuing for data services in order to smoothly handle and decrease the probability of bottlenecks. |
| 7 | BRD 8.2 #3 | Capacity | Q: What are the anticipated peak user times during the day? A: As the CIS, I will provide capacity to support peak usage between the business hours of (0600-2100 EST) Monday to Sunday. |
| 8 | BRD 8.2 #6 | Capacity | Q: How many more (if any) transactions will be added in one year? A: As the CIS, I will provide capacity to support a 2nd year volume of 1-2% growth web service requests per year for the Contact Domain. |
| 9 | BRD 8.2 | Capacity | As a service, I will support a minimum of ‘6Million’ requests accessing the Contact Domain so that I can successfully process all requests. |
| 10 | BRD 8.2 | Capacity | As a service, I will support approximately ‘20Million’ users that may potentially access or update Veteran Contact Data so that I can support large user base. |
| 11 | BRD 8.2 | Capacity | As a service, I will expect a ‘1-2%’ year-on-year growth of users who may potentially access contact data information so that I can support any new users |
| 12 | BRD 8.2 | Capacity | As a service, I will have the capacity to store a minimum of ‘5’ terabytes of data per database so that I can support huge volumes of data. |
| 13 | BRD 8.2 | Performance | As a service, I will employ load balancing to handle high volume during peak usage and disperse connections geographically so that all service requests are completed |
| 14 | BRD 8.3 #2 | Metrics | Q: Will this system require additional monitoring for Information Technology system metrics? A: Yes. CDI CIS will be monitored and usage and performance statistics will be gathered for the service. |
| 15 | BRD 8.3 #3 | Security | Q: Will this system contain Personally Identifiable Information (PII), Protected Health Information (PHI), Health Insurance Portability and Accountability Act (HIPAA) information, or other confidential/regulated data? A: Yes. PII data (.e.g., VA customer Contact Information) will be integrated from multiple VA systems. |
| 16 | BRD 8.3 | Authorization | As a service, I want to utilize IAM standards for authorizing subscribers so that I am in compliance with enterprise standards. |
| 17 | BRD 8.3 | Authentication | As a service, I want to utilize IAM standards for authenticating subscribers so that I am in compliance with enterprise standards. |
| 18 | BRD 8.3 | Authorization | As a service, I want to employ RBAC (Role Based Access Control) to restrict systems access to only data elements that they have permissions or rights so that data requests are processed based on access levels. |
| 19 | BRD 8.3 | Encryption | As a service, I want to meet industry standards for any encryption of person data so that I can ensure secure data exchange. |
| 20 | RSD Appendix A Performance #3 | Performance | Provide patient data (for data within the system) transactions (e.g., capture, search, request for data) within .5 seconds |
| 21 | BRD BR023 | Data Management | As a LOB, I want the ability to subscribe to be notified by CIS leveraging BENS notification when contact information has been changed so that users are aware of contact information updates. |
| 22 | BRD BR031 | Audit Management | As a service, I want to capture and store the requestor information when a customer's record has been requested so that the captured metadata can be used for auditing. Ex: User ID, Date, Time |

# Conceptual Design

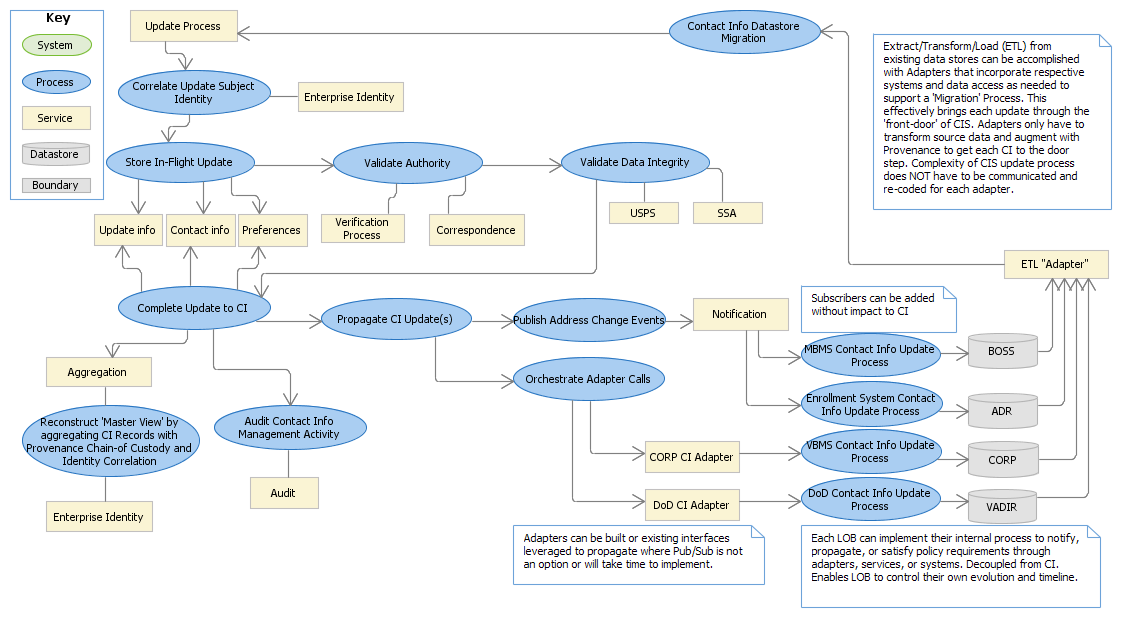
As the authoritative source for contact information, the CIS Enterprise Shared Service must provide a solution which provides access to read, manipulate, populate, and inform other systems of changes to the information. Numerous systems will ultimately be dependent on this system and its business processes. Figure 2: High Level Conceptual Design identifies some of the systems, processes, services and data stores that have been identified as eventually using this service.

Figure 2: High Level Conceptual Design



The update process is further characterized in Figure 3: High Level Data Propagation. This diagram helps to explain how the initial data population is performed and the overall solution for keeping the dependent data stores that may have previously been considered authoritative for their respective subset of the contact information.

Figure 3: High Level Data Propagation



## Conceptual Application Design

### Application Context

CIS is a set of enterprise shared services that will support information access, update, and keeping multiple systems in sync. To provide a clear understanding, the application context has been split into two diagrams. Figure 4: Consumer Application Context represents the consumer’s view of the system.

Figure 4: Consumer Application Context



Figure 5: Migration Application Context shows the interactions with other systems that must maintain contact information that is in sync with the data in the authoritative data store.

Figure 5: Migration Application Context



Table 4: Application Context Description

**Object**

| ID | Name | Description | Interface Name | Interface System |
| --- | --- | --- | --- | --- |
| 1 | Consumer | Consumer of the service. Many different systems within the VA could use this service eventually. | N/A | CIS |
| 3 | CIS | The system being defined by this document. | Service Request from Consumer, Propagate ES Updates, Propagate BGS Updates | ADR, ES, BGS, BENS |
| 5 | ADR | Database that stores CIS data. | Query/Update from CIS, Update DB | N/A |
| 7 | BENS | Event notification system used to inform consumers of changes to contact information. | Inform of Change | N/A |
| 10 | BGS | Another data source that must be in sync with CIS. BGS services will be utilized to read and update CORP. May have changes applied to its records that must be pushed to CIS. | Propagate CIS Updates to BGS | CIS |
| 14 | ES | Enrollment system that must be in sync with CIS. May have changes applied to its records that must be pushed to CIS. | Propagate CIS Updates to ES | CIS |

Interfaces External to OI&T

| ID | Name | Related Object | Input Messages | Output Messages | External Party |
| --- | --- | --- | --- | --- | --- |
| N/A |  |  |  |  |  |

Interfaces Internal to OI&T

| ID | Name | Related Object | Input Messages | Output Messages | External Party |
| --- | --- | --- | --- | --- | --- |
| 2 | Service Request | Consumer | See Section 4.5 and Section 6.5.2 | N/A | N/A |
| 4 | Query/Update | CIS | SQL | SQL | N/A |
| 6 | Inform of Change | CIS | See BENS Service Description | See BENS Service Description | N/A |
| 8 | Inform of Change | BENS | See BENS Service Description | See BENS Service Description | N/A |
| 9 | Propagate CIS Updates to BGS | CIS | See BGS Service Description | See BGS Service Description | N/A |
| 11 | Propagate BGS Updates | BGS | See BGS Service Description | See BGS Service Description | N/A |
| 12 | Update DB | CIS | SQL | SQL | N/A |
| 13 | Propagate CIS Updates to ES | CIS | See ES Service Description | See ES Service Description | N/A |
| 15 | Propagate ES Updates | ES | See ES Service Description | See ES Service Description | N/A |

Externally Shared Data Stores

| ID | Name | Data Stored | Owner | Access |
| --- | --- | --- | --- | --- |
| 5 | ADR | Contact, profile information |  | CRUD |

### High-Level Application Design

At a high level, CIS will provide a number of consumer-oriented services, a number of administrative services, and an adapter-based solution to manage data propagation both to and from other system. Internally, CIS will consume services that provide additional data (such a GIS information), services that provide validation (deliverable address validation and correction), and messaging systems for notifications. Figure 6: High-Level Application Design provides an understanding of the components necessary in the resulting application based on the business needs and requirements.

Figure 6: High-Level Application Design



#### High-Level Environment

CIS provides a set of shared enterprise services to the VA and will be initially deployed within the existing VIERS/CGS environment. It will store and access contact information from the Administrative Data Repository (ADR). The services will be implemented as a combination of message flows on WebSphere Message Broker and service implementations on WebLogic server. All externally visible service endpoints and orchestration related to calling external services will be hosted as message flows within WebSphere Message Broker. All internal data-facing functionality will be hosted within WebLogic. Within this environment, Apache Web Server is used as a proxy, reverse proxy, and load balancer for consumer access, including access to services called from within CIS. Services consumed by CIS may be either within or external to the VIERS boundary.

Figure 7: High-Level Environment illustrates the high-level environment solution conforming to the existing VIERS environment. In this diagram the numbered items represent the new CIS components.

Figure 7: As-Is High-Level Environment



Table 5: Objects / Components to be Built or Modified

| ID | Name | Description | Service or Legacy Code | External Interface Name | External Interface ID | Internal Interface Name | Internal Interface ID | SDP Sections 1&2 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| #1 | CIS Message Flows | Process layer services implemented as Message Flows on WMB | N/A | TBD | TBD | TBD | TBD | TBD |
| #2 | CIS  Services | The implementation of the CIS service | N/A | TBD | TBD | TBD | TBD | TBD |

Table 6: Internal Data Stores

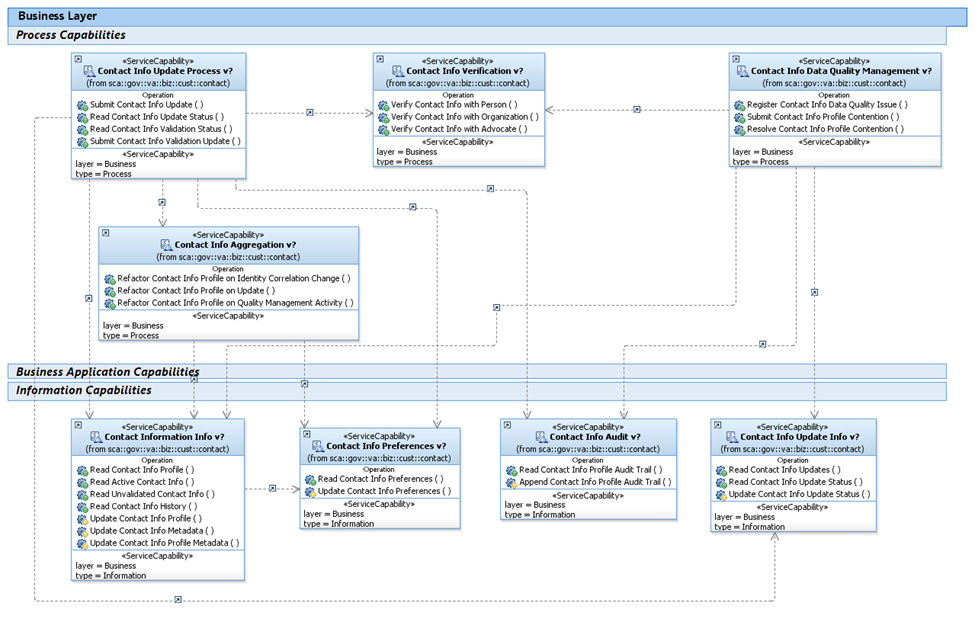
| ID | Name | Data Stored | Steward | Access |
| --- | --- | --- | --- | --- |
| N/A |  |  |  |  |

#### Service Capability Architecture

The Service Capability Architecture provides a more refined picture of the capabilities that will be deployed to the environments at multiple service architecture levels and has directly influenced the proceeding design. Please refer to the scope in section 1.1 to better understand which services/capabilities are being designed for this increment. Additional information can be found in section 4.4.

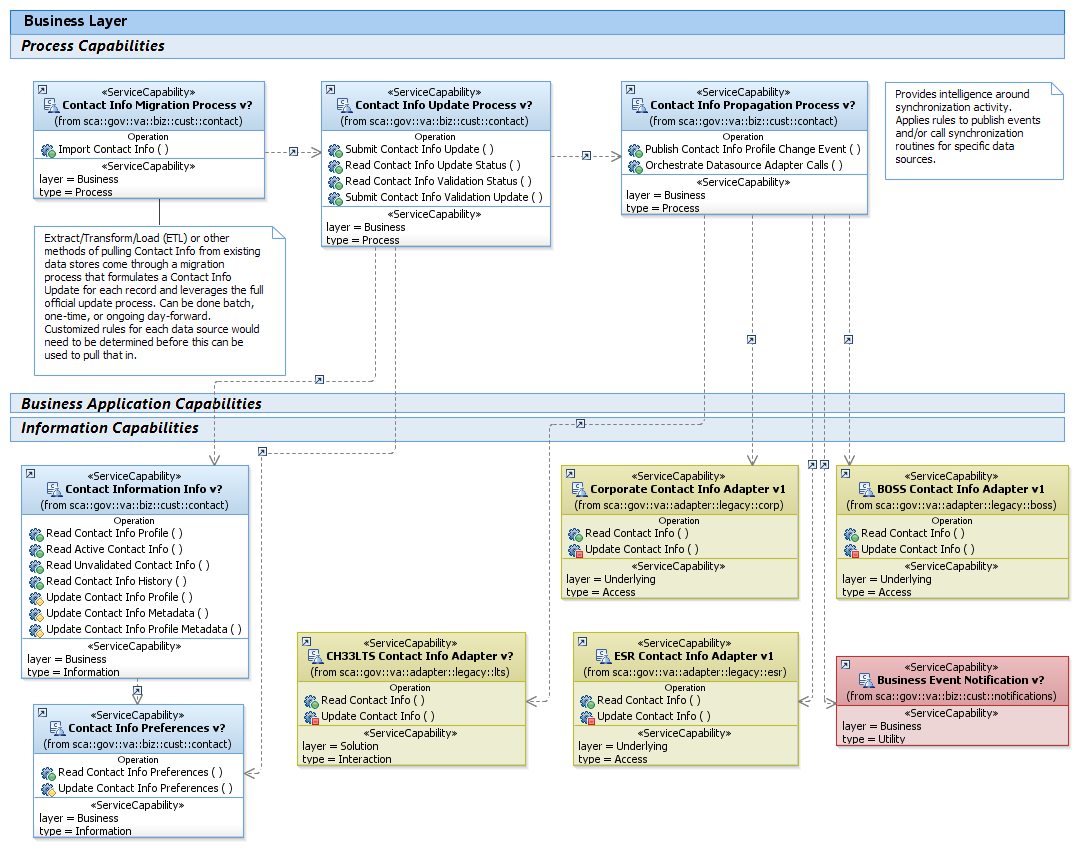
Figure 8: SCA: Core Capabilities defines the set of capabilities that will be available, including administrative services that may not be used directly by an end consumer.

Figure 8: SCA: Core Capabilities



Migration and propagation of data both from and to CIS will require additional capabilities that will not be exposed to consumers directly. Figure 9: SCA: Migration/Propagation Capabilities depict these additional services.

Figure 9: SCA: Migration/Propagation Capabilities



### Application Locations

Physically production CIS will be initially deployed on existing VIERS systems running in Austin, TX at the Austin Information and Technology Center (AITC). The to-be state will include a second active site in Hines, IL at the Hines Information Technology Center (HITC).

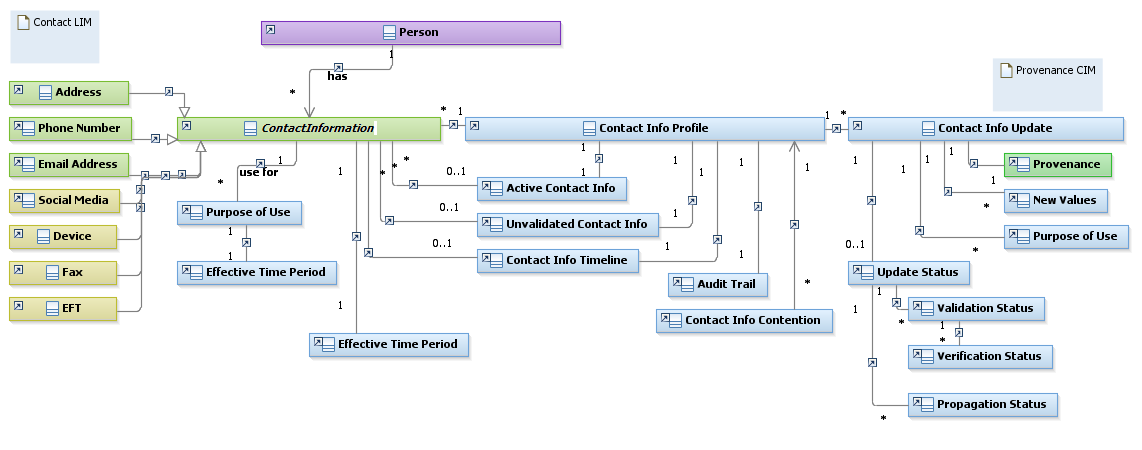
## Conceptual Data Design

The CIS solution will store authoritative contact and related information into the ADR database. While it will be the authoritative source for this information, the existing enterprise architecture contains other data stores that must be maintained such that their contact information is in sync with the data in the authoritative system.

### Project Conceptual Data Model

Figure 10: Conceptual Data Model is conceptual information model that depicts the high-level view of the data that will be stored in ADR. This model is further refined into logical and physical models in following sections.

Figure 10: Conceptual Data Model



### Database Information

Table 7: Database Inventory provides a list of the databases that will be directly utilized by the CIS enterprise shared service.

Table 7: Database Inventory

| Database Name | Description | Type | Steward |
| --- | --- | --- | --- |
| ADR | Administrative Data Repository. | Oracle |  |

### User Interface Data Mapping

Not Applicable – CIS does not provide a user interface.

#### Application Report Interface

Not Applicable – CIS does not have a report interface.

#### Unmapped Data Element

Not Applicable – CIS does not provide a user interface.

## Conceptual Infrastructure Design

The Conceptual Infrastructure Design is a high-level overview of the infrastructure that will be used to support the application.

### System Criticality and High Availability

#### As-Is Production Environment

The VIERS environment which will be used for the initial installation of the CIS Enterprise Shared Service fails to meet the established requirements. Specifically:

* Support for 99.99% uptime. The VIERS environment is only capable of 99.9% if it has a failover site set up and managed.
* Support for geographic load balancing. The VIERS environment is geographic failover, not load balancing, which is significantly less capable and does not require all sites being active at the same time.

#### To-Be Production Environment

As described in Table 3: Significant Requirements this is a mission critical enterprise shared service that must operate 24x7 with stringent downtime requirements (99.99%/52 minutes per year) and high availability. As a result the to-be solution will require a significant deviation from the existing VIERS environment, including:

* Geographic load balancing
* Multiple active instances of the CIS service per site on separate VMs
* Fully redundant physical network and hardware architecture supporting the VMs
* All sites active and servicing requests
* Write functionality performed at the leader site, Read provided at all sites.
* Automatic leader election
* Underlying high-speed database replication between geographic sites
* Underlying database solution must be highly available/support 99.99% or greater uptime including planned downtime.

### Special Technology

No special technology is currently planned for use.

### Technology Locations

Physically production CIS will be initially deployed on existing VIERS systems running in Austin, TX at the Austin Information and Technology Center (AITC). The to-be state will include a second active site in Hines, IL at the Hines Information Technology Center (HITC).

### Conceptual Infrastructure Diagram

CIS will initially be deployed into the existing VIERS production environment described in section 4.1.2.1. This section will focus on the conceptual infrastructure for the to-be solution.

The to-be infrastructure identifies a number of networking products that may or may not be implemented physically, including a firewall, load balancer, and switch. Any or all of these may be software-defined but logically they are needed to support the solution. The CIS VLAN provides the security boundary between CIS required systems and external systems that send or receive information.

Figure 11: To-Be Conceptual Production Infrastructure provides the conceptual infrastructure as well as conceptual network requirements. In this context, ESB stands for the Message Broker or other enterprise service bus, and AS stands for WebLogic or other application server.

Figure 11: To-Be Conceptual Production Infrastructure



#### Location of Environments and External Interfaces

The set of environments provided in section 4.1.2.1 will not change in the to-be solution. However, multiple active production environments will be deployed as noted in section 3.3.3.

#### Conceptual Production String Diagram

Figure 12: Production String Diagram shows the production infrastructure using only a single string.

Figure 12: To-Be Production String Diagram



# System Architecture

This section describes the system architecture of CIS from several different viewpoints. Since CIS is a sub-system of CDI, additional information may be found in the CDI System Design Document.

## Hardware Architecture

The hardware architecture that is being defined is a centralized solution. The to-be solution will include multiple active geographically distributed sites.

### Physical Hardware

This solution is implemented on a virtualized environment that is supplied by Enterprise Operations (EO). As such, the environment may change significantly as long as the virtual hardware remains the same. No special hardware is anticipated for CIS support.

In the to-be solution, we will continue to use virtualized environments although the EO service catalog suggests that 99.9% is the highest level of availability that they support, so the provider of the virtualized environment may not be EO.

### Virtual Hardware

#### As-Is VIERS environment

The following table provides the virtual hardware that has been deployed at AITC in support of the multiple VIERS environments. This same virtual hardware will be used for the initial implementation of CIS.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Apache (handles load balancing and SSL/mutual TLS)** | | | | | | |  |  |  |
| **Hosts** | **Environment** | **# of CPU** | **CPU Speed (MHz/ghz)** | **RAM GB** | **Amount Storage** | **Cloud** | **# of Nics** | **Nic Speed (Mbps/gbp)** | |
| Server redacted | PREPROD | 1 | 2.40GHz | 2 | 40 GB | No | 2 | 1000 Mb/s Full Duplex | |
| Server redacted | PROD | 1 | 2.40GHz | 2 | 80 GB | No | 2 | Production NIC | 10000Mb/s Full Duplex |
| Backup         NIC | 1000Mb/s Full Duplex |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **WebLogic (NOTE:  Apache is co-located on DEV and CERT servers)** | | | | | | | | |  |
| **Hosts** | **Environment** | **# of CPU** | **CPU Speed (MHz/ghz)** | **RAM GB** | **Amount Storage** | **Cloud** | **# of Nics** | **Nic Speed (Mbps/gbp)** |  |
| Server redacted | DEV | 4 | 2.40GHz | 8 | 45 GB | No | 2 | 1000Mb/s Full Duplex |  |
| Server redacted | CERT | 4 | 2.40GHz | 8 | 55 GB | No | 2 | 10000Mb/s Full Duplex |  |
| Server redacted | PREPROD | 2 | 2.40GHz | 8 | 45 GB | No | 2 | 1000Mb/s Full Duplex |  |
| Server redacted | PROD | 2 | 2.40GHz | 8 | 85.8 GB | No | 2 | 1000Mb/s Full Duplex |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| **WebSphere Message Broker** | | | | | | | | |  |
| **Hosts** | **Environment** | **# of CPU** | **CPU Speed (MHz/ghz)** | **RAM GB** | **Amount Storage** | **Cloud** | **# of Nics** | **Nic Speed (Mbps/gbp)** |  |
| Server redacted | DEV | 2 | 2.40GHz | 8 | 50 GB | No | 2 | 10000Mb/s Full Duplex |  |
| Server redacted | DEV | 2 | 2.40GHz | 8 | 70 GB | No | 2 | 10000Mb/s Full Duplex |  |
| Server redacted | CERT | 2 | 2.40GHz | 8 | 35 GB | No | 2 | 10000Mb/s Full Duplex |  |
| Server redacted | PREPROD | 2 | 2.27GHz | 8 | 35 GB | No | 2 | 10000Mb/s Full Duplex |  |
| Server redacted | PREPROD | 2 | 2.40GHz | 8 | 65 GB | No | 2 | 10000Mb/s Full Duplex |  |
| Server redacted | PROD | 2 | 2.27GHz | 8 | 35 GB | No | 2 | 10000Mb/s Full Duplex |  |
| Server redacted | PROD | 2 | 2.40GHz | 8 | 65 GB | No | 2 | 10000Mb/s Full Duplex |  |
| Server redacted | PROD | 2 | 2.40GHz | 8 | 65 GB | No | 2 | 10000Mb/s Full Duplex |  |

Each of these systems are running Red Hat Enterprise Linux (RHEL).

## Software Architecture

CIS defines a set of services, so much of the overall software architecture, such as the endpoints implemented, is covered in Sections 4.4 and 6.5. This section will cover the software architecture as it relates to the software implementing those endpoints. This software architecture is intended to be high level and avoid constraining the developer where it is not necessary.

### Solution Discussions

This section provides discussion and constraints that will be applied across the software architecture. The intent here is to provide broad understanding so that particular design choices are more self-evident and any decisions made by the development team will more clearly align with the overall intention described herein.

#### Service Implementation Location

Within the infrastructure described, services could be implemented on the Message Broker or on the WebLogic application server. The solution intends to focus ESB solutions on orchestration, governance, and security. As a result, the software solution will follow these rules:

* All externally visible service endpoints and orchestration related to calling external services will be hosted as message flows within WebSphere Message Broker.
* All internal data-facing functionality and complex logic will be hosted within WebLogic.

#### Performance Considerations

Service Implementations will deploy to multiple servers in an active-active load balanced configuration. As a result caching should be disabled by default and only employed after detailed analysis has been performed on the particular set of entities.

Optimistic locking should be employed as reads should vastly exceed writes. However the developer must ensure that write failures have a retry mechanism that can recover a failed write. Ideally this will be reusable and follow a common pattern for all writes.

The solution must be capable of servicing multiple requests simultaneously. Limit the use of any synchronization mechanisms that may impact multiple threads of execution within a single server. These mechanisms are probably of limited value due to the expectation that multiple active servers are part of the overall architecture.

#### Availability Considerations

The availability and performance characteristics of the solution must be taken into account when building interfaces to external data providers, validation services, and event notification services which are consumed. Since the CIS SLA is 99.99%, it can only depend on services that have 99.999% SLA including planned outages. All other consumed services will need to have contingency solutions built into CIS to avoid a consumed service causing an outage on CIS. This will take the form of fail-fast mechanisms when requests are made in a synchronous or interactive manner. However in a batch/asynchronous type of situation – especially with propagation adapters, these will take the form of spinning off durable or scheduled jobs that perform the calls.

#### Propagation Adapters

As shown in the SCA and high level application design, the system must propagate updates both to and from several external systems. This will be supported by the concept of an adapter that manages the interaction. These adapters must support a number of sub-problems, including:

* Impedience mismatch between the lifecycles of CIS and the external system.
* Handling error conditions, such as data which is not provided, consistency issues, and conflicting updates.
* Cycle detection and resolution. It is possible that an update propagated to an external system in turn generates propagation from that external system to the authoritative system resulting in a never-ending cycle.
* Transformation between the external information models and CIS.
* Ensuring that all updates follow the same set of business rules. This is the primary reason for avoiding a separate ETL process for the seeding process.
* The seeding process must be completed reasonably quickly, but will include a huge volume of requests. As a result latency must be very low and the throughput very high to support this process. Less than 50ms should be the target for this functionality.
* While there will be ongoing propagation, it will not be nearly as stressful as the seeding process. As a result an elastic solution would be ideal where additional servers could be added to support this process for as short period of time.
* The propagation process cannot stop due to an error, and it may not even be possible to have humans manage identified failures after the fact due to sheer volume. It is very important to get the error handling and triage mechanism correct.
* There cannot be a dependency in the propagation process for immediate external validation, aggregation, etc. Slowness or failure of these external processes could induce cascading failures.

As a result, each adapter will observe the following constraints:

* Specific to a single external system
* Utilize the public CIS consumer service endpoints to perform updates triggered by the external system.
* Deployed as an independent artifact separate from other adapters and consumer services. This will allow an independent life cycle and independent scaling.
* Will share common software with other artifacts.

Since adapters will be independent of the consumer service interfaces and the set and endpoints may change over time, they will need to be configured. This configuration will take the following form:

* Part of the administration service endpoints functionality
* The set of adapters to utilize during the update process and their related details will be persisted to the database.

#### Update Process

The update process is potentially very complex. This section aims at providing a detailed understand of how this process will be accomplished.

* Provide a synchronous and asynchronous solution.
* The synchronous solution will perform all integration with external systems in order. It will be fail-fast, providing a response in a specific amount of time regardless of underlying external system slowness. This may result in more errors, but consistent responses, and will allow calling systems to make adjustments based on the degraded state of CIS.
* The asynchronous solution will perform the same logic, but will be a much more fire-and-forget mechanism. This will be used in propagation and other solutions that do not need to know if the update succeeded or failed. This will include both more time for external systems to respond and the ability to perform retries for failed calls.
* Utilize the service endpoint for each configured adapter to send notification of the update to external systems that must be kept in sync.

### Languages

The services and adapters defined for this service will ultimately be implemented in Java. Service Descriptors implemented on IBM Integration Bus will be constructed using the IBM Integration Designer visual tool or Java where appropriate. Java should be the primary solution for any functionality that cannot be built with a simple and maintainable message flow.

### Tools

Table 8: Tools lists the tools utilized both in the creation of the software and the implementation.

Table 8: Tools

| Tool | Reason |
| --- | --- |
| IBM Integration Bus (formerly Known as WebSphere Message Broker) | Consumer Service implementation/orchestration |
| IBM WebSphere Service Registry and Repository (WSRR) | Consumer lookup of Services |
| IBM WebSphere Application Server (WAS) | Service Implementation Host |
| Oracle Database | Data storage |
| Apache HTTP Server | Reverse Proxy and Load balancer |
| IBM Integration Designer (IID) | Build Consumer Service implementation/orchestration |
| Rational Software Architect | Build Architecture/Design Models |
| Rational Team Concert | Configuration Management |

### Libraries/Technologies

Table 9: Libraries/Technologies lists the libraries and Technologies utilized within the solution to provide necessary functionality.

Table 9: Libraries/Technologies

| Library/Technology | Reason |
| --- | --- |
| JNDI | Access JDBC Connections, etc. |
| JDBC | CRUD operations on Database |
| SOAP 1.2 | Service Messaging Format |
| WSDL 1.1 | Service Definition |

### Design Patterns

This section documents the primary design patterns that should be utilized in the software that is implemented in Java.

#### Layered Architecture

As with most software products, the solution should be a layered architecture where interface functionality (web services) are separated from business functionality, and data access functionality.

#### Inversion of Control (IoC)

The solution should use an IoC solution such as the Spring framework to allow for configurable component connectivity and flow control. This supports both run-time solutions as well as unit testing.

#### Object-relational mapping (ORM)

ORM products provide a binding between the in-memory object-oriented programming structures and the in-database relational data model. In addition to the convenience of this functionality, they provide an abstraction that allows for easily moving to other databases, security benefits (SQL injection is often thwarted), and standard models for caching and optimistic locking.

### Deployment Artifacts

This section details the deployment artifacts that will be generated for this project. The set of deployment artifacts directly impacts how various aspects of the system can scale as well as techniques that may be used to limit access to some capabilities. The system should have the following artifacts:

* Consumer Services – the services that are intended for interaction with consumers of this service
* Administrative – the capabilities necessary to maintain and configure the CIS service.
* Adapter – each adapter should have an independent deployment artifact.

## Network Architecture

### As-Is

CIS will be deployed into the VIERS environment. Figure 13: Existing VIERS Network Topology provides an understanding of the existing VIERS network environment.

Figure 13: As-Is VIERS Network Topology

Image redacted for internal VA network configuration information

As can be seen on the diagram, this environment does not utilize encrypted traffic inside of the VLAN. Instead a gateway proxy/reverse proxy is utilized to encrypt the traffic with systems external to the VLAN. This is insecure because, while not shown on the diagram, there are other ways in/out of the VLAN – more specifically maintenance interfaces for systems administrators. As a result if one of the machines in the VLAN is compromised, all traffic could be intercepted. For a system moving PII, this is not acceptable.

### To-Be

The to-be network topology overcomes the gaps identified in the existing VIERS network topology. All sensitive traffic both within and crossing VLAN boundary will be encrypted. Figure 14: To-Be Conceptual Network Topology shows a conceptual view of the to-be solution.

Figure 14: To-Be Conceptual Network Topology



## Service Oriented Architecture / ESS

This section describes the service oriented architecture being implemented at a high level. Additional information from the consumer’s perspective which may be useful to the reader can be found in the [CIS Service Description Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/Forms/AllItems.aspx?RootFolder=%2Fsites%2Fvrm%2FMSTI%2FCGS%2FCDI%20%2D%20eCIS%2FService%20Description%20Document%20%28SvDD%29&FolderCTID=0x012000FEDD9A2C226E9B47BB2D6DD93C34694E&View=%7bA83FAC0F-9B78-4471-8B77-F3477A99EF44%7d).

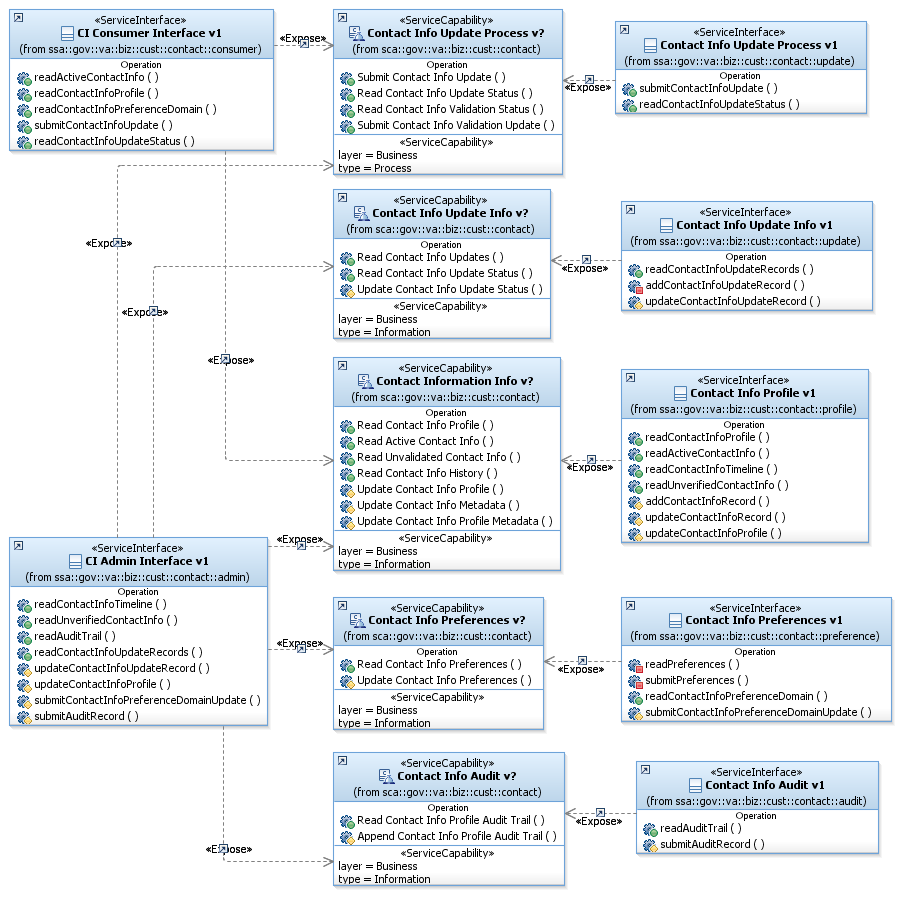
### Service Capability Architecture

The SCA has been provided in section 3.1.2.2 to provide one aspect of the high level design.

### Service Interfaces

The capabilities defined in the above figure and in section 3.1.2 are further refined in Figure 14: Service Specification Architecture (SSA) Exposition, which shows how the planned service interfaces expose these capabilities.

Figure 15: Service Specification Architecture (SSA) Exposition

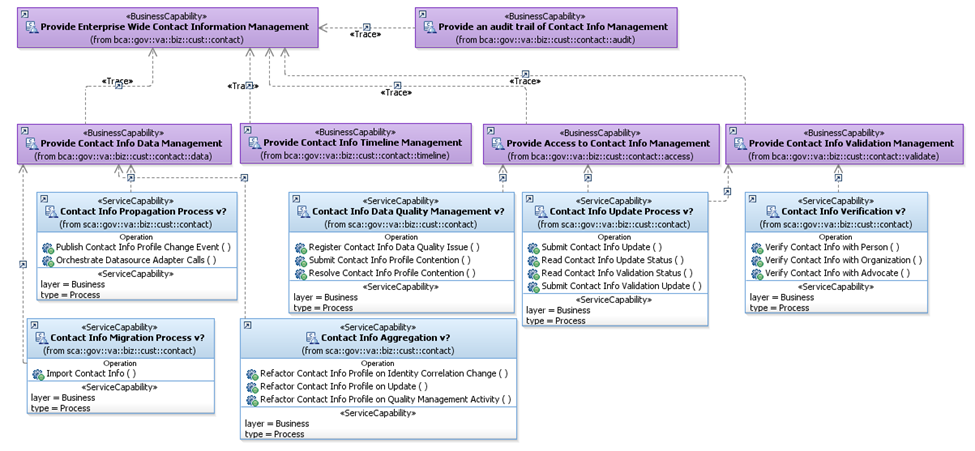


## Enterprise Architecture

### Business Capability Architecture Trace

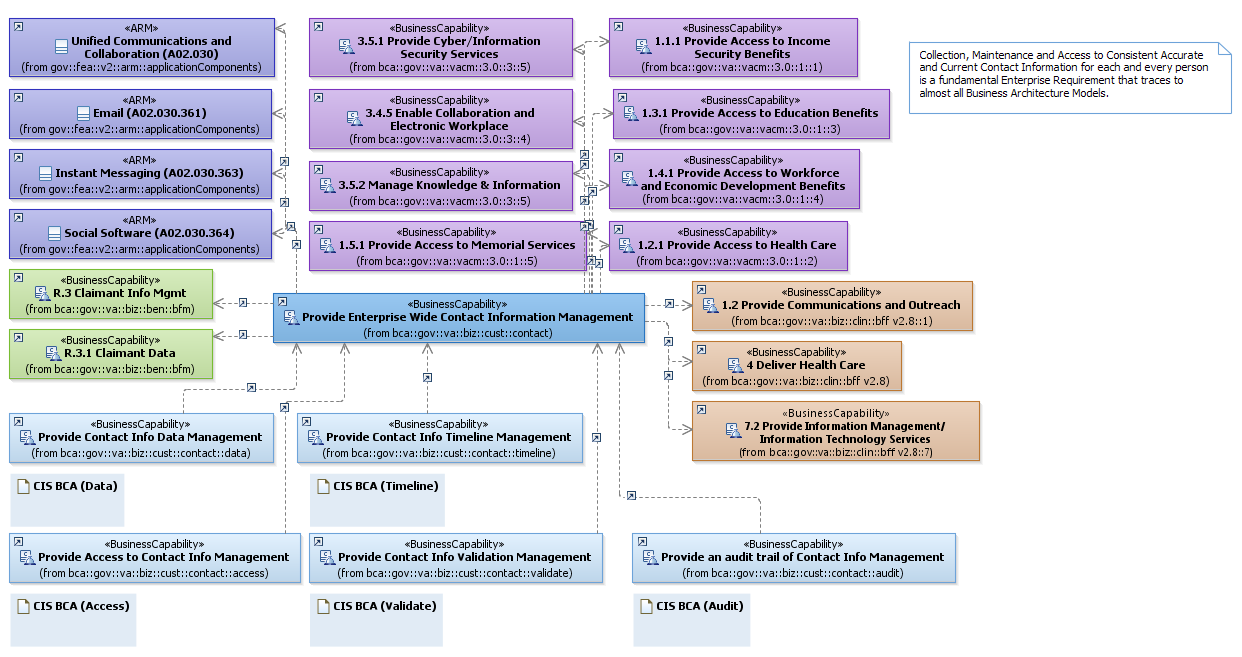
Figure 15: Service Capabilities trace to Business Capabilities illustrates how the Service Capability Architecture (SCA) being described traces to the core business capabilities. The SCA is further detailed in Section 4.4.

Figure 16: Service Capabilities trace to Business Capabilities



This is further traced into the Business Capability Architecture (BCA) and related business architecture models in Figure 16: Business Capability Architecture.

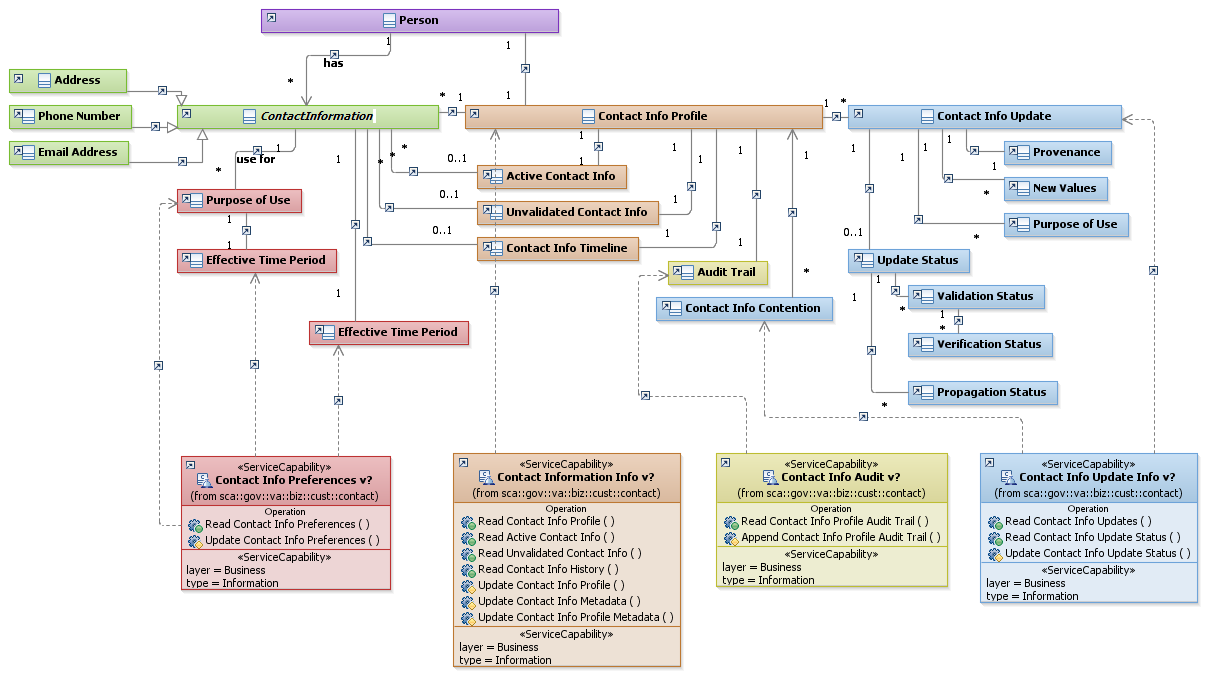
Figure 17: Business Capability Architecture



### Conceptual Data Model Trace

The conceptual data model presented in section 3.2.1 can further be traced to the service capabilities. Figure 17: Conceptual Data Model Service Capability depicts this association.

Figure 18: Conceptual Data Model Service Capability



### Technical Reference Model

This section shows the Enterprise Architecture (EA) of the system and adherence to the VA Technical Reference Model (TRM)/Standards Profile (SP). The TRM provides the set of products which may be utilized in a solution. Table 10: TRM Products shows that products referenced in this solution have been validated against [TRM v16.2](http://www.domain/trm/):

Table 10: TRM Products

|  |  |  |  |
| --- | --- | --- | --- |
| Product | Approved Versions | Version(s) | Reason |
| WebSphere Message Broker also known as IBM Integration Bus | 8, 9 | 8 |  |
| Oracle Database | 11.2, 12.1 |  |  |
| Apache HTTP Server | 2.2,2.3,2.4 | 2.3 |  |
| Red Hat Enterprise Linux | 6.x, 7.x | Apache: 5.11 WebLogic:5.11  WMB:6.7 | Existing environment. |
| Java SE | 8u45 | WMB:1.7 | Existing environment. WMB version 8 only supports 1.7 |
| Java EE | 7 | WebLogic:7 |  |
| SOAP | 1.2 | 1.2 |  |
| WSDL | 2.0 | WMB:1.1 | Existing environment. WMB version 8 only support 1.1 |
| WS-I Basic Profile | 2.0 | 2.0 |  |
| WebSphere Queue Manager | 7.5.x, 8.0 | 7.5 |  |
| WebLogic Server | 10.3.6.x,12.1.x,12.2.x | 12.1.3 |  |

The implementation will include additional products such as Java Libraries. These will be added by the developer.

### Enterprise Design Patterns

The office of Technology Strategies provides a set of design patterns that are recognized as the way to solve certain needs across the enterprise. Table 11: Enterprise Design Patterns provides a list of these enterprise design patterns that are relevant to this solution and are incorporated in the architecture presented in this document.

Table 11: Enterprise Design Patterns

|  |  |  |
| --- | --- | --- |
| Standard | Version | Comments |
| [Enterprise Secure Messaging Enterprise Design Pattern](http://www.server_wasredacted.domain/docs/designpatterns/AAA%20Enterprise%20Secure%20Messaging%20Design%20Pattern_Ver_1_05142015_508.pdf) | Aug-15 | SOA message security |
| [Non-Person Entity Security Enterprise Design Pattern](http://www.server_wasredacted.domain/docs/designpatterns/1.5%20Non-Person%20Entity%20Security%20Design%20Pattern%20%2810-20-2015%29.pdf) | Nov-15 | System to System security. |
| [Enterprise Auditing Enterprise Design Pattern](http://www.server_wasredacted.domain/docs/designpatterns/1.6%20Enterprise%20Auditing%20Design%20Pattern%20(020116)_final.pdf) | Feb-15 | Enterprise auditing of systems. Primarily aimed at OS and device level audit. |
| [Enterprise Messaging Capabilities and Message Exchange Patterns Enterprise Design Pattern](http://www.server_wasredacted.domain/docs/designpatterns/VA%20Enterprise%20Design%20Patterns%20-%20Overview%20of%20Enterprise%20Messaging%20Capabilities%20and%20Message%20Exchange%20Patterns%20-%20FINAL%20(4-22-15)_508.pdf) | Feb-15 | Enterprise messaging design patterns |
| [Enterprise SOA Enterprise Design Pattern](http://www.server_wasredacted.domain/docs/designpatterns/2.5%20Enterprise%20SOA%20Design%20Pattern%20(10-20-2015).pdf) | Oct-15 | Core enterprise pattern that defines ESS. |

# Data Design

The CIS solution stores authoritative contact and related information into the ADR database following the conceptual model provided in Section 3.2.1.

## DBMS Files

CIS retrieves data from the ADR database:

* CIS will function with the current ADR database data formats, storage capabilities, data retention and integrity policies, etc.
* The CIS requirements are for the ADR database to process 1 Million queries per hour.

### Data Dictionary

The CIS physical data dictionary is embedded below for reference.

## Non-DBMS Files

Not Applicable – there are no non-dbms files referenced in the CIS architecture.

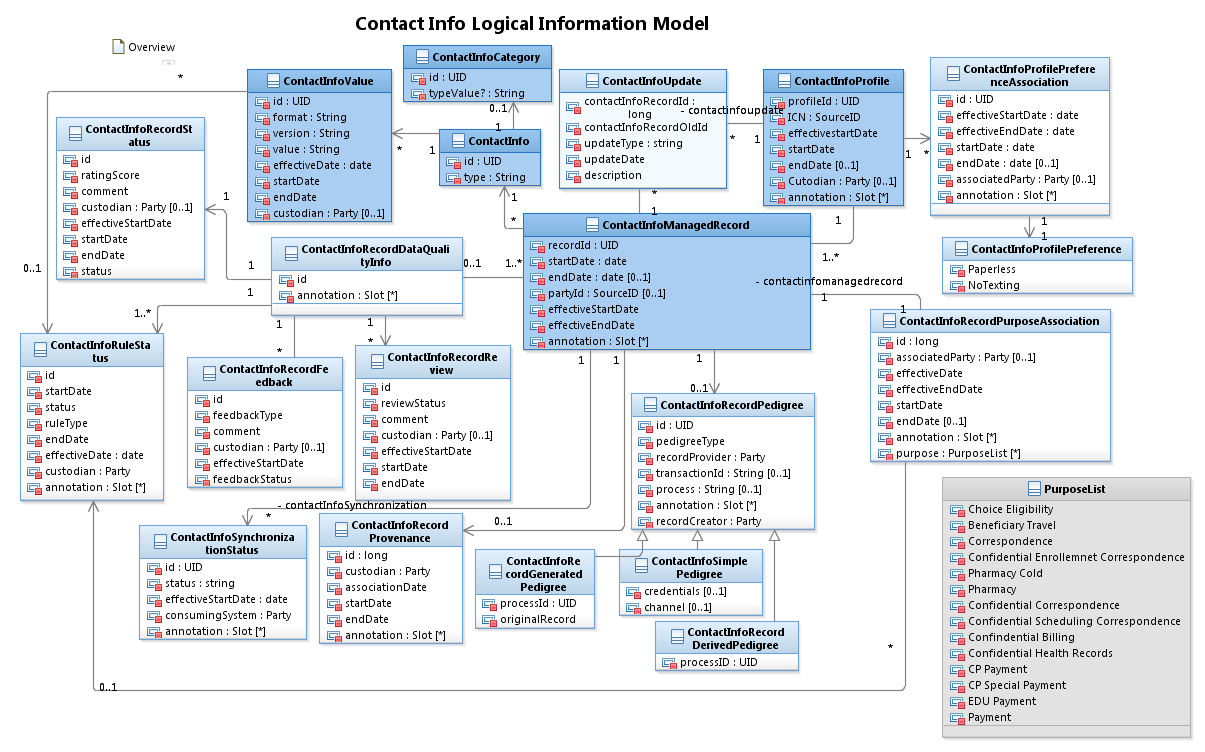
## Data View

Visualizations of the data and information models are provided in this section that represent the data provided by the service and how it is stored.

### Logical Information Model

The logical information model provides an understanding of how the contact data is logically associated.

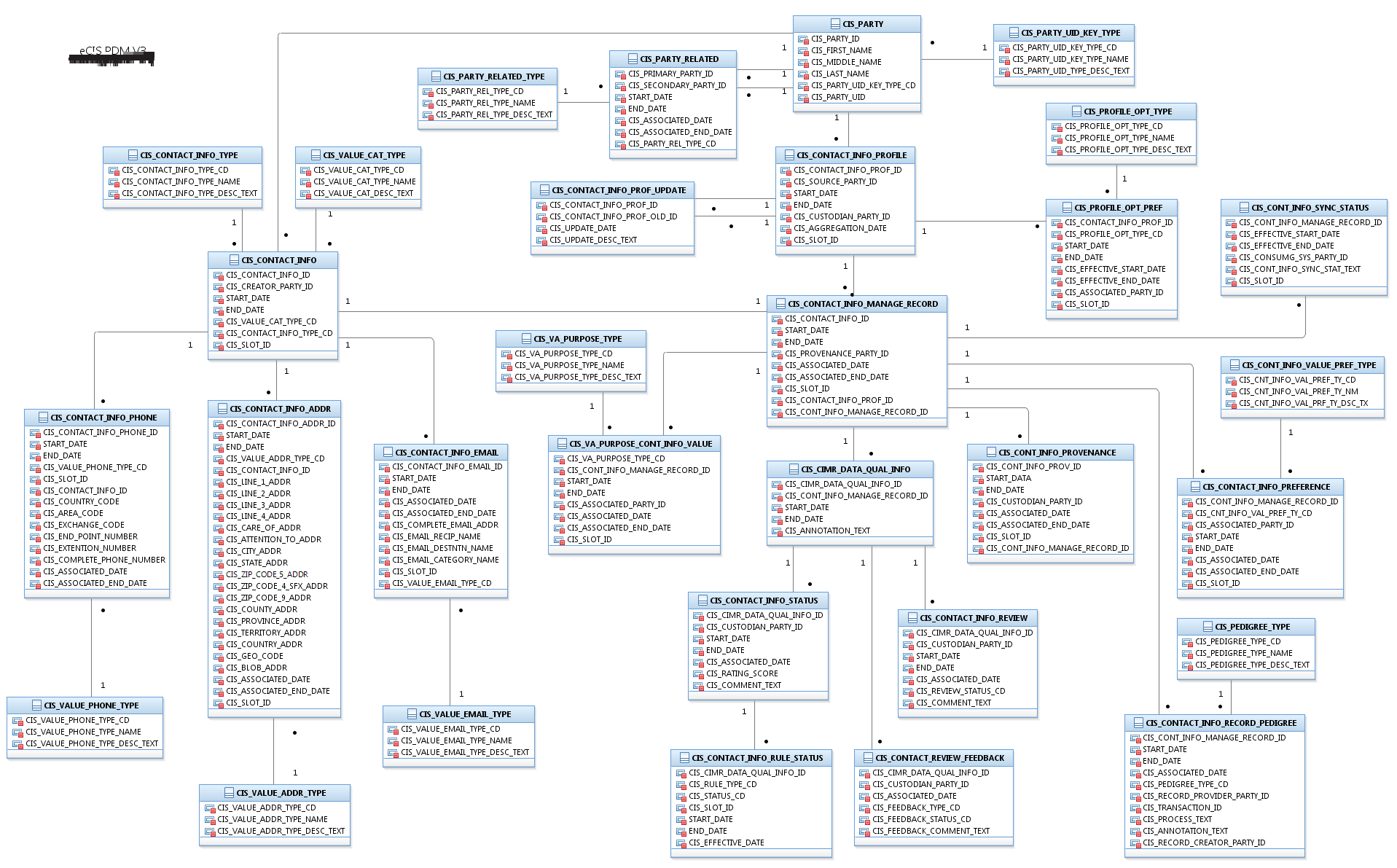
Figure Figure 19: Logical Information Model



### Physical Data Model

The physical data model provides an understanding of how the data is represented physically within the database.

Figure 19: Physical Data Model



# Detailed Design

## Hardware Detailed Design

CIS will be initially installed and run on the existing VIERS infrastructure. Figure 19: Hardware Detail Design shows the hardware components and logical network connections that are defined in this environment. Additional information can be found in sections 4.1.2.1 and 4.3.1.

Figure 20: Hardware Detail Design

Image redacted for internal VA network configuration information

## Software Detailed Design

### Conceptual Design

#### Product Perspective

As with all enterprise services, CIS is intended to be part of the larger overall VA enterprise solution. Section 3 provides an understanding of the VA enterprise systems that will be consuming this service initially.

##### User Interfaces

This system has no human interfaces. It does define system interfaces as specified in the associated Service Description Document.

##### Hardware Interfaces

This section is not applicable as this system does not require specific hardware, nor should it interface with it in any special way.

##### Software Interfaces

This section will be provided by the developer as the specific software products that will be integrated to provide this system are their domain.

##### Communications Interfaces

The communications interfaces are illustrated in section 3.1.1. All communications should be at a minimum encrypted since this solution may send PII over any of its communications interfaces.

Inbound service communications, including from a consumer or from an internal message flow will include the following stack of protocols (interfaces #2, #12 on the conceptual model in 3.1.1):

* TCP/IP
* HTTPS with Mutual TLS
* SOAP 1.2

Data communications directly with a relational database will include the following stack of protocols (interfaces #4, #9, #11 on the conceptual model in 3.1.1):

* TCP/IP
* JDBC (Secure)

Imbedded Calls to other services will include the following stack of protocols (interfaces #6, #12 on the conceptual model in 3.1.1):

* TCP/IP
* HTTPS with Mutual TLS
* SOAP 1.2

##### Memory Constraints

There are no particular memory constraints outside of the constraints of the hosting ESB or Application Server. The running application is not expected to consume more than 1GB of heap memory per installation.

##### Special Operations

No special operations are necessary for this service

#### Product Features

Please refer to section 2.1 for a summary of the product features. This is further expanded on in the [CDI CIS Business Requirements Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/CDI%20-%20eCIS/Business%20Requirements%20Document%20(BRD)/CDI%20CIS%20Business%20Requirements%20Document_Signature.pdf).

#### User Characteristics

Users of this system will be other systems that will interact with CIS directly via SOAP-based web service calls and responses. Some users may expect asynchronous (push) notification of updates.

#### Dependencies and Constraints

The dependencies and constraints have been listed in other parts of this document or related documents. Please see:

* Business constraints including those in section 8 of the [CDI CIS Business Requirements Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/CDI%20-%20eCIS/Business%20Requirements%20Document%20(BRD)/CDI%20CIS%20Business%20Requirements%20Document_Signature.pdf).
* Required constraints including those in Appendix A of the [CDI Requirements Specification Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/CDI%20-%20eCIS/Requirements%20Specification%20Document%20(RSD)/CDI_Requirements_Specification_Document.12_17.docx).
* Significant requirements found in section 2.3.
* Conceptual application design found in section 3.1.
* Software constraints described in section 4.2.
* TRM constraints described in section 4.5.3.
* Enterprise Design Patterns described in section 4.5.4.
* Regulatory Policies, Standards described in section A.1.

### Specific Requirements

#### Database Repository

Please see section 5 for the database repository information.

#### System Features

Please refer to the [CDI CIS Business Requirements Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/CDI%20-%20eCIS/Business%20Requirements%20Document%20(BRD)/CDI%20CIS%20Business%20Requirements%20Document_Signature.pdf) and [CDI Requirements Specification Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/CDI%20-%20eCIS/Requirements%20Specification%20Document%20(RSD)/CDI_Requirements_Specification_Document.12_17.docx) for a complete list of system features.

#### Design Element Tables

##### Routines (Entry Points)

This is not applicable as this system does not impact VistA.

##### Templates

This is not applicable as this system does not impact VistA.

##### Bulletins

This is not applicable as this system does not impact VistA.

##### Data Entries Affected by the Design

This section is not applicable.

##### Unique Record(s)

This section is not applicable.

##### File or Global Size Changes

This section is not applicable as this system does not impact VistA.

##### Mail Groups

This section is not applicable as this system does not impact VistA.

##### Security Keys

This section is not applicable as this system does not impact VistA.

##### Options

This section is not applicable as this system does not impact VistA.

##### Protocols

This section is not applicable as this system does not impact VistA.

##### Remote Procedure Call (RPC)

This section is not applicable as this system does not impact VistA.

##### Constants Defined in Interface

This section is not applicable as this system does not impact VistA.

##### Variables Defined in Interface

This section is not applicable as this system does not impact VistA.

##### Types Defined in Interface

This section is not applicable as this system does not impact VistA.

##### GUI

This section is not applicable as this system does not provide any interface for human interaction.

##### GUI Classes

This section is not applicable as this system does not provide any interface for human interaction.

##### Current Form

This section is not applicable as this system does not provide any interface for human interaction.

##### Modified Form

This section is not applicable as this system does not provide any interface for human interaction.

##### Components on Form

This section is not applicable as this system does not provide any interface for human interaction.

##### Events

This section is not applicable as this system does not provide any interface for human interaction.

##### Methods

This section is not applicable as this system does not provide any interface for human interaction.

##### Special References

This section is not applicable as this system does not provide any interface for human interaction.

##### Class Events

This section is not applicable as this system does not provide any interface for human interaction.

##### Class Methods

This section is not applicable as this system does not provide any interface for human interaction.

##### Class Properties

This section is not applicable as this system does not provide any interface for human interaction.

##### Uses Clause

This section is not applicable as this system does not impact VistA.

##### Forms

This section is not applicable as this system does not provide any interface for human interaction.

##### Functions

This section is not applicable as this system does not impact VistA.

##### Dialog

This section is not applicable as this system does not impact VistA.

##### Help Frame

This section is not applicable as this system does not provide any interface for human interaction.

##### HL7 Application Parameter

This section is not applicable as this system does not work with HL7.

##### HL7 Logical Link

This section is not applicable as this system does not work with HL7.

##### COTS Interface

This section is not applicable as this system does not interface to COTS with the exception of already established databases and ESBs.

## Network Detailed Design

This system will be hosted in the VIERS environment on VIERS application servers and ESB. As a result it will follow the existing network design paradigm defined for VIERS.

## Security and Privacy

CDI CIS is defined, architected and built to allow subscribing systems the ability to connect to a service such that authoritative customer information can be accessed, shared, updated and collectively managed. It is designed as a middleware service for other services to consume and is not directly accessed by an end user. It will reside on an existing infrastructure that has active authority to operate (ATO) and data governance policies. System to system security controls, network security, data security and access considerations adhere to the VA Handbook 6500 policies and guidelines at a minimum.

### Security

CDI CIS components reside on the secure data center of AITC. It operates on the SOA services layer of the VIERS Enterprise Service Bus and is governed by its security domain. All forms of communication between CIS and consumers are accomplished via mutual TLS, while adhering to data governance and access control policies of the VA Enterprise Shared Services developed by ASD.

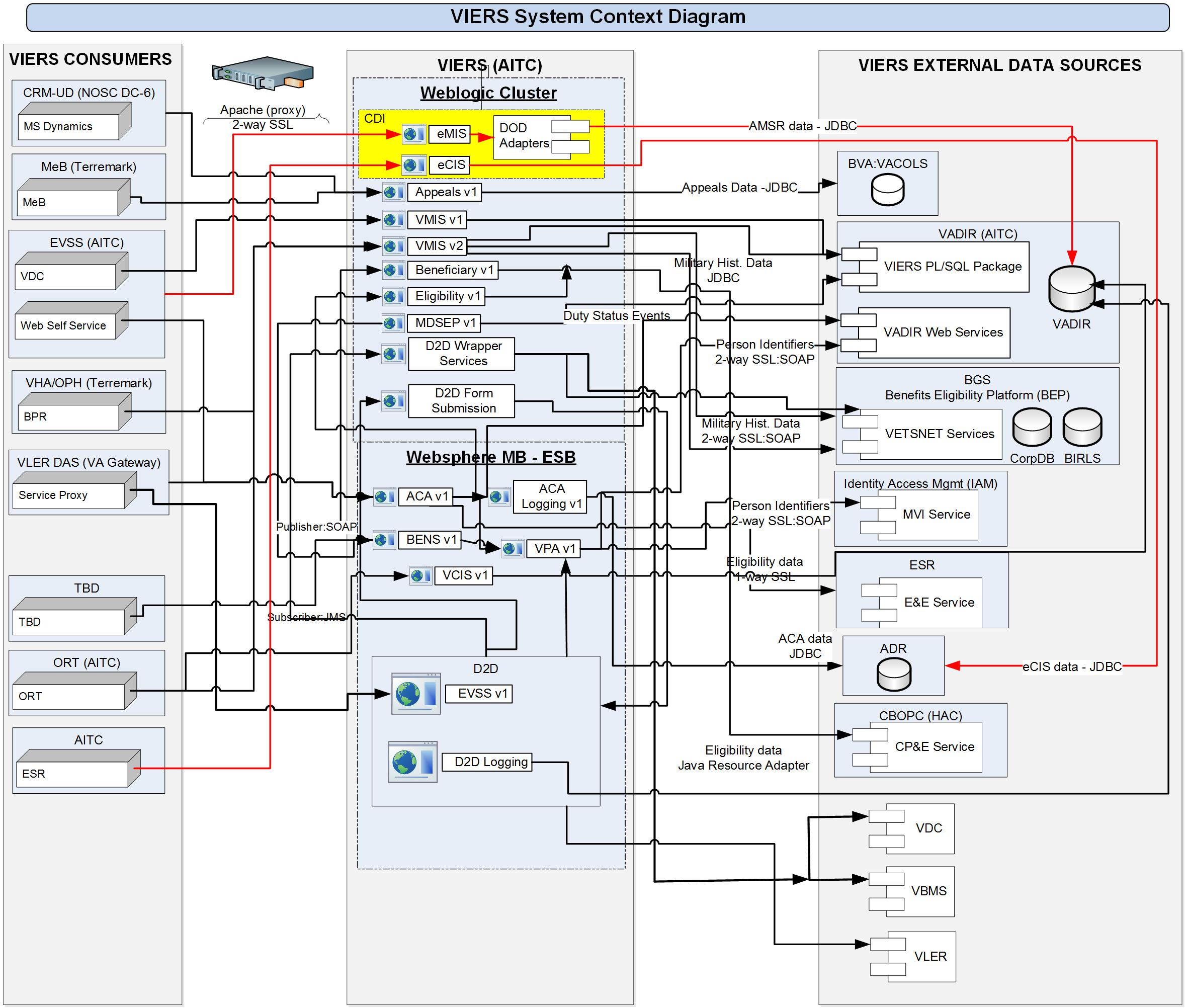
VIERS has an existing Governance, Risk and Compliance (GRC) accreditation including existing System Security Plan (SSP), Risk Assessment (RA), Change Management Plan (CMP), Incident Response Plan (IRP), Privacy Impact Assessment (PIA), Configuration Management Plan (CMP) and Authority to Operate (ATO). It is also under the General Support System (GSS) of AITC.

CDI has a Disaster Recovery Plan (DRP) in draft that addresses the proper policies and procedures to respond to unexpected disaster scenarios. CDI also has a System Security Plan (SSP) in draft to address the 18 security controls required for compliance.

#### Deployment Platform

The following depicts the deployment platform for CIS within the VIERS infrastructure of AITC. The service will reside on the existing WebSphere cluster with data access to ADR’s oracle database and connectivity using secured JDBC.

Figure 21: VIERS Sytem Context Diagram



#### Detailed Security Requirements

The Requirements Specifications Document (RSD) for CDI indicates the following security controls are the requirements recommended by the Security Requirements Steering Committee (SRSC), the organization that manages and manages and maintains a bank of comprehensive, authoritative enterprise security and privacy requirements.

CDI also has a System Security Plan (SSP) in draft that will address these security controls for compliance.

#### External System Connections

All connections between CDI CIS and subscribing systems outside the VA network must use Mutual TLS as the only means permitted for authentication and encryption between external subscribers and CIS. Before consuming the services of CIS, subscribers must complete a rigorous Memorandum of Understanding (MOU) and comply with all data sharing agreements.

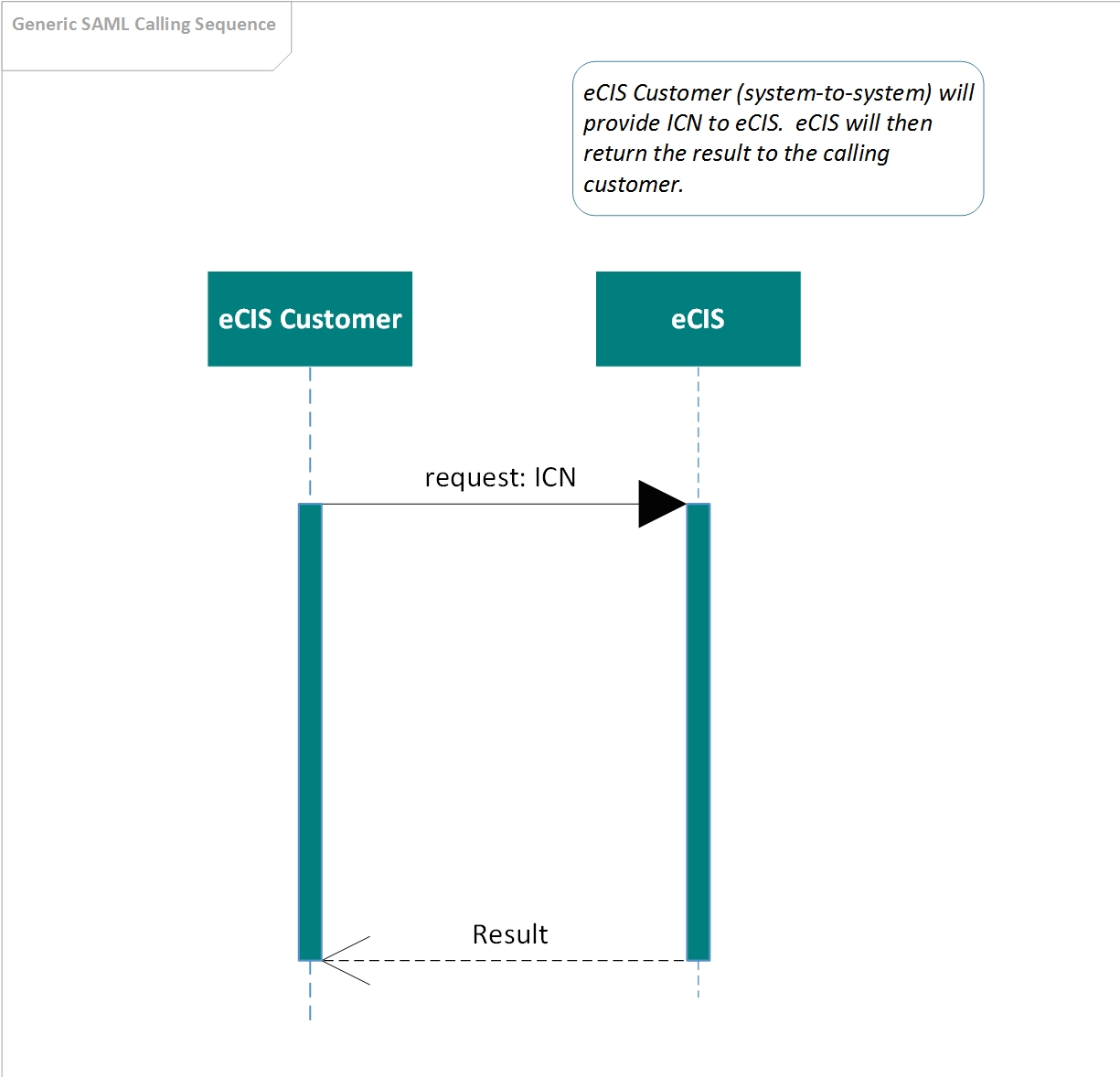
#### User Authentication

CIS is a service that will be subscribed by other services. It does not have interaction with a user since it is a system to system web service. CIS subscribers are expected to fully authenticate the users through the VA Enterprise Shared Services authentication and authorization mechanism. Once authenticated, the calling subscriber will pass the Integration Control Number (ICN) of the user to CIS when calling a particular operation. The ICN is created from the Master Veteran Index (MVI) and is the unique enterprise identifier for each individual Veteran within VA. Once CIS receives the ICN from the calling subscriber, it will execute the selected service operation and return the appropriate result to the subscribing system.

##### Generic Customer Calling Sequence

The diagram below displays the flow of the calling sequence when a CIS subscriber (customer) invokes the operations of CIS. The CIS customer is expected to have validated the user (veteran) through the standard ESS authorization and validation process and obtain the Integration Control Number (ICN) of the user. The ICN will then be used as parameter to CIS. The appropriate result is returned to the subscriber depending on the operation invoked.

Figure 22: Generic Customer Calling Sequence



### Privacy

CIS is a service consumed by other services. It will reside in the security domain of VIERS infrastructure in the AITC secure data center. The handling of VA-owned PII/PHI information will be governed within the scope of System Security Plan (SSP) and Privacy Impact Assessment (PIA) of VIERS.

The privacy specific requirements from the Requirements Specifications Document (RSD) will be addressed in the CDI System Security Plan (SSP) currently in draft.

## Service Oriented Architecture / ESS Detailed Design

### Service Description for BENS

The BENS service will be utilized to push the notification of a change to contact information to interested consumers. See the [BENS Service Description Document](http://vaww.yourserver.domain/sites/vrm/MSTI/IPT/Business%20Documents/FY15Reference/Event%20Notification%20V1.0%20Service%20Description%20Document.docx).

### Service Design for CIS CI Consumer Interface

#### Introduction

##### Purpose and Scope of Service

Please refer to the [CIS Service Description Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/Forms/AllItems.aspx?RootFolder=%2Fsites%2Fvrm%2FMSTI%2FCGS%2FCDI%20%2D%20eCIS%2FService%20Description%20Document%20%28SvDD%29&FolderCTID=0x012000FEDD9A2C226E9B47BB2D6DD93C34694E&View=%7bA83FAC0F-9B78-4471-8) section 1.

##### Links to Other Documents

See section A for other relevant documents to review.

#### Service Details

##### Service Identification

Please refer to the [CIS Service Description Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/Forms/AllItems.aspx?RootFolder=%2Fsites%2Fvrm%2FMSTI%2FCGS%2FCDI%20%2D%20eCIS%2FService%20Description%20Document%20%28SvDD%29&FolderCTID=0x012000FEDD9A2C226E9B47BB2D6DD93C34694E&View=%7bA83FAC0F-9B78-4471-8) section 2.

##### Service Versions

Table 12: Service Versions

|  |  |  |
| --- | --- | --- |
| Version Numbers | Current Status of Version | A Brief Description of the change implemented in that version |
| 1.0 | Being Designed | Initial Version. Includes Read Active Contact Info use case only. |

##### Summary of Design and Platform Details

###### SOA Pattern(s) Implemented

One Way Delivery is utilized to inform interested consumers of the CIS enterprise shared service when an update to the authoritative data is changed. BENS is used for this pattern.

Request/Reply is utilized to receive requests from consumers, as well as for integrating with ES and BGS.

###### COTS Platform vendor names and versions for hosting platform

CIS enterprise shared services will be hosted on WebSphere Message Broker.

#### Dependencies

Please refer to section 3.1.1 for a context diagram showing the dependencies of the CIS service and explanation of their connectivity.

#### Service Design Details

##### Interface Technical Specs

###### Service Invocation Type

Please refer to the [CIS Service Description Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/Forms/AllItems.aspx?RootFolder=%2Fsites%2Fvrm%2FMSTI%2FCGS%2FCDI%20%2D%20eCIS%2FService%20Description%20Document%20%28SvDD%29&FolderCTID=0x012000FEDD9A2C226E9B47BB2D6DD93C34694E&View=%7bA83FAC0F-9B78-4471-8)  section 3.3.1.

###### Service Interface Type

Please refer to the [CIS Service Description Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/Forms/AllItems.aspx?RootFolder=%2Fsites%2Fvrm%2FMSTI%2FCGS%2FCDI%20%2D%20eCIS%2FService%20Description%20Document%20%28SvDD%29&FolderCTID=0x012000FEDD9A2C226E9B47BB2D6DD93C34694E&View=%7bA83FAC0F-9B78-4471-8)  section 3.3.2.

###### Service Name

Please refer to the [CIS Service Description Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/Forms/AllItems.aspx?RootFolder=%2Fsites%2Fvrm%2FMSTI%2FCGS%2FCDI%20%2D%20eCIS%2FService%20Description%20Document%20%28SvDD%29&FolderCTID=0x012000FEDD9A2C226E9B47BB2D6DD93C34694E&View=%7bA83FAC0F-9B78-4471-8)  section 2.

###### Interface

Please refer to the [CIS Service Description Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/Forms/AllItems.aspx?RootFolder=%2Fsites%2Fvrm%2FMSTI%2FCGS%2FCDI%20%2D%20eCIS%2FService%20Description%20Document%20%28SvDD%29&FolderCTID=0x012000FEDD9A2C226E9B47BB2D6DD93C34694E&View=%7bA83FAC0F-9B78-4471-8)  section 3.3.4.

###### End Points

Please refer to the [CIS Service Description Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/Forms/AllItems.aspx?RootFolder=%2Fsites%2Fvrm%2FMSTI%2FCGS%2FCDI%20%2D%20eCIS%2FService%20Description%20Document%20%28SvDD%29&FolderCTID=0x012000FEDD9A2C226E9B47BB2D6DD93C34694E&View=%7bA83FAC0F-9B78-4471-8)  section 3.3.5.

###### Operations or Methods

###### Message Schemas

Please refer to the [CIS Service Description Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/Forms/AllItems.aspx?RootFolder=%2Fsites%2Fvrm%2FMSTI%2FCGS%2FCDI%20%2D%20eCIS%2FService%20Description%20Document%20%28SvDD%29&FolderCTID=0x012000FEDD9A2C226E9B47BB2D6DD93C34694E&View=%7bA83FAC0F-9B78-4471-8)  sections 3.3.6 and 3.3.7.

##### Information Model

Please refer to the [CIS Service Description Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/Forms/AllItems.aspx?RootFolder=%2Fsites%2Fvrm%2FMSTI%2FCGS%2FCDI%20%2D%20eCIS%2FService%20Description%20Document%20%28SvDD%29&FolderCTID=0x012000FEDD9A2C226E9B47BB2D6DD93C34694E&View=%7bA83FAC0F-9B78-4471-8)  section 3.1.

###### Class Diagram and Description of Entities Involved

###### Mappings from ELDM to Standards Based Schemas

##### Behavior Model (AKA Use Case Realization)

Please refer to the [CIS Service Description Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/Forms/AllItems.aspx?RootFolder=%2Fsites%2Fvrm%2FMSTI%2FCGS%2FCDI%20%2D%20eCIS%2FService%20Description%20Document%20%28SvDD%29&FolderCTID=0x012000FEDD9A2C226E9B47BB2D6DD93C34694E&View=%7bA83FAC0F-9B78-4471-8)  section 3.2.

###### Use Cases (Use Case Model)

Please refer to the [CIS Service Description Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/Forms/AllItems.aspx?RootFolder=%2Fsites%2Fvrm%2FMSTI%2FCGS%2FCDI%20%2D%20eCIS%2FService%20Description%20Document%20%28SvDD%29&FolderCTID=0x012000FEDD9A2C226E9B47BB2D6DD93C34694E&View=%7bA83FAC0F-9B78-4471-8)  section 2.

###### Interaction Diagrams

#### Gap Analysis

##### Variances from Enterprise Target Architecture

##### Variances from SLDs

##### Variances from Standards and Policies

##### Justification for Exceptions and Mitigation

# External System Interface Design

CIS interfaces to databases through JDBC and other systems through ESS compliant SOAP-based web services. Please refer to section 6.5 for details on the web services. Refer to section 5 for details on the JDBC connectivity.

## Interface Architecture

Not Applicable

## Interface Detailed Design

Not Applicable

# Human-Machine Interface

As an enterprise web service, CIS does not have any human-machine capabilities. See the specific consuming system for this information.

## Interface Design Rules

Not Applicable (refer to the disclosure in section 8 header section)

## Inputs

Not Applicable (refer to the disclosure in section 8 header section)

## Outputs

Not Applicable (refer to the disclosure in section 8 header section)

## Navigation Hierarchy

Not Applicable (refer to the disclosure in section 8 header section)

# Attachment A – Approval Signatures

This section is used to document the approval of the System Design Document. The review should be conducted face to face where signatures can be obtained ‘live’ during the review. If unable to conduct a face-to-face meeting then it should be held via LiveMeeting and concurrence captured during the meeting. The Scribe should add /es/name by each position cited. Example provided below.

The Business Sponsor and Project Manager are required to sign.



1. Additional Information

Table 13: Referenced Documents are referenced throughout this document and provide additional information for the reader.

Table 13: Referenced Documents

|  |  |
| --- | --- |
| Document | Provides |
| [CDI Service Charter](http://vaww.yourserver.domain/sites/vrm/MSTI/MSTI%20Coordination/PMAS%20Documentation/CDI/CDI%20Project%20Charter%202015%2010%2006.pdf) | Charter which includes this project |
| [CDI CIS Business Requirements Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/CDI%20-%20eCIS/Business%20Requirements%20Document%20(BRD)/CDI%20CIS%20Business%20Requirements%20Document_Signature.pdf) | Business requirements for the contact information service |
| [CDI Requirements Specification Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/CDI%20-%20eCIS/Requirements%20Specification%20Document%20(RSD)/CDI_Requirements_Specification_Document.12_17.docx) | Requirements for CDI |
| [CGS System Design Document](http://vaww.yourserver.domain/sites/vrm/MSTI/Release%20Management/CGS%20Inc%201/06_AERB/CGS%20SDD%20updates/CGS_System_Design_Document_Inc_1_v1.3.docx) | Background on the release environment |
| [BENS Service Description Document](http://vaww.yourserver.domain/sites/vrm/MSTI/IPT/Business%20Documents/FY15Reference/Event%20Notification%20V1.0%20Service%20Description%20Document.docx) | Interface specifications for the BENS event notification system |
| [CIS Service Description Document](http://vaww.yourserver.domain/sites/vrm/MSTI/CGS/Forms/AllItems.aspx?RootFolder=%2Fsites%2Fvrm%2FMSTI%2FCGS%2FCDI%20%2D%20eCIS%2FService%20Description%20Document%20%28SvDD%29&FolderCTID=0x012000FEDD9A2C226E9B47BB2D6DD93C34694E&View=%7bA83FAC0F-9B78-4471-8) | Service description for the services provided by this system. |

* 1. Identification of Technology and Standards

Table 14: Identification of Technology and Standards

|  |  |  |
| --- | --- | --- |
| Standard | Version | Comments |
| WSI Basic Profile | v2.0 |  |
| WSDL | v1.1 |  |
| SOAP | v1.2 |  |
| [VA Technical Reference Model](http://www.domain/trm/) | v16.2 | Approved products |

* 1. Constraining Policies, Directives and Procedures

Table 15: Constraining Policies, Directives and Procedures

|  |  |  |
| --- | --- | --- |
| Standard | Version | Comments |
| [VA Handbook 6500](http://vaww.domain/vapubs/viewPublication.asp?Pub_ID=793&FType=2) | Jun-05 | VA Information Security Handbook |
| [VA Technical Reference Model](http://www.domain/trm/) | v16.2 | Approved products |
| [FISMA](http://www.gpo.gov/fdsys/pkg/STATUTE-116/pdf/STATUTE-116-Pg2899.pdf) | Jun-05 | Federal Security Act |
| [FIPS 199](http://www.nist.gov/manuscript-publication-search.cfm?pub_id=150439) | Jun-05 | Standards for Security Categorization of Federal Information and Information Systems |
| [FIPS 200](http://www.nist.gov/manuscript-publication-search.cfm?pub_id=50835) | Jun-05 | Minimum Security Requirements for Federal Information and Information Systems |
| [NIST 800-53](http://dx.doi.org/10.6028/NIST.SP.800-53Ar4) | Jul-05 | Security and Privacy Controls for Federal Information Systems and Organizations |
| [NIST 800-59](http://csrc.nist.gov/publications/nistpubs/800-59/SP800-59.pdf) | Jun-05 | Guideline for Identifying an Information System as a National Security System |
| [NIST 800-60](http://csrc.nist.gov/publications/nistpubs/800-60-rev1/SP800-60_Vol1-Rev1.pdf) | Jul-05 | Guide for Mapping Types of Information and Information Systems to Security Categories |
| [Enterprise Secure Messaging Enterprise Design Pattern](http://www.server_wasredacted.domain/docs/designpatterns/AAA%20Enterprise%20Secure%20Messaging%20Design%20Pattern_Ver_1_05142015_508.pdf) | Aug-15 | SOA message security |
| [Non-Person Entity Security Enterprise Design Pattern](http://www.server_wasredacted.domain/docs/designpatterns/1.5%20Non-Person%20Entity%20Security%20Design%20Pattern%20%2810-20-2015%29.pdf) | Nov-15 | System to System security. |
| [Enterprise Auditing Enterprise Design Pattern](http://www.server_wasredacted.domain/docs/designpatterns/1.6%20Enterprise%20Auditing%20Design%20Pattern%20(020116)_final.pdf) | Feb-15 | Enterprise auditing of systems. Primarily aimed at OS and device level audit. |
| [Enterprise Messaging Capabilities and Message Exchange Patterns Enterprise Design Pattern](http://www.server_wasredacted.domain/docs/designpatterns/VA%20Enterprise%20Design%20Patterns%20-%20Overview%20of%20Enterprise%20Messaging%20Capabilities%20and%20Message%20Exchange%20Patterns%20-%20FINAL%20(4-22-15)_508.pdf) | Feb-15 | Enterprise messaging design patterns |
| [Enterprise SOA Enterprise Design Pattern](http://www.server_wasredacted.domain/docs/designpatterns/2.5%20Enterprise%20SOA%20Design%20Pattern%20(10-20-2015).pdf) | Oct-15 | Core enterprise pattern that defines ESS. |

* 1. Requirements Traceability Matrix
  2. Packaging and Installation
  3. Design Metrics

Template Revision History

| Date | Version | Description | Author |
| --- | --- | --- | --- |
| June 2015 | 2.10 | Changed Heading 1 default setting to eliminate page break before | Process Management |
| May 2015 | 2.9 | Edited for Section 508 conformance and remediated with Common Look Office tool | Process Management |
| February 2015 | 2.8 | Incorporates revisions from PMAS Reform Lockdown; namely removing requirements for information that can be obtained from other PMAS authoritative sources. | , Office of Technology Strategies |
| September 2014 | 2.7 | Adds Enterprise Shared Services terms and requires AERB Compliance Certificate attachment. | Process Management |
| August 2014 | 2.6 | Signature block update authorized by AERB CR\_018934 | Process Management |
| March 2014 | 2.5 | Section 508 repairs to new version approved by AERB Chair approved | Process Management |
| August 2013 | 2.3 | Replaced the Service Architecture sub-section with new sub-sections for consumed and provided services. Also applied miscellaneous feedback from VA team. | ASD Enterprise Shared Services (ESS) Work Group |
| June 2013 | 1.3 | Upgraded to MS Office 2007-2010 format | Process Management |
| June 2013 | 1.2 | Address inconsistencies in Section 3, Conceptual Design, Correct headings | Process Management |
| March 2013 | 1.1 | Formatted to documentation standards and edited for Section 508 conformance | Process Management |
| January 2013 | 1.0 | Initial Document | PMAS Business Office |