

Nationwide Health Information Network

Adapter Version 5.0



System Design Document Version 5.0

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**Department of Veterans Affairs
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Product Development**

Revision History

Date	Version	Description	Author
09/15/2011 – 09/22/2011	3.0	Branching from the 4.1 version before 4.1 has gone thru the Peer Review. This 5.0 draft version is needed for PMAS review. Any 4.1 Peer Review comments/issues that pertain to 5.0 will be added to this branched version at a later time. This draft version focuses on 5.0 increment functionality which has not been fully identified for March 2012. Option combinations will be presented as Options 1, 2 and 3 in this draft.	
09/28/2011	3.1	Updating to remove Options 2 and 3 of the initial draft – and adding modifications to Option 1 based upon recent planning meetings for increment 5.	
11/22/2011	3.2	Adding additional diagrams and edits after sprint 43 review	
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12/07/2011	3.4	Scope corrections and diagram updates – corrected RPC calls from NHIN namespace to VPRD (AViVA) namespace. Also, applied signature line criteria for collecting e-signatures. [Laura Manning]	
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02/15/2012	3.8	Updated all sequence diagrams to reflect Adapter 5.0 pass through processing. Applied changes based on peer review feedback.	
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Date	Version	Description	Author
07/25/2012	4.2	Implemented Satish's changes to section 1.6 and 2.5.4. However, 2.5.4 still does not provide a TRM-compliance statement as requested. Back to Nabeel for clarification. Fixed multi-level header numbering.	
09/13/2012	4.3	Updated requirements in table in section 2.5.4. TRM conformance statement confirmed with FF. Provided TSPR link to Sprint 44 Review Report. Updated signature blocks. Replaced signature block with one for . Replaced signature block with one for . This version is ready for FR.	
08/14/2012	4.4	Update Connect Gateway version to 3.2.2.1:	
09/2012 - 11/2012	4.5	Contents updates as requested by	
11/23/2012	4.6	TW Review – Reviewed/edited new text, fixed minor formatting issues This version is ready for peer review.	
12/05/2012	4.7	Updating with peer review comments. Submitted for Peer Review to	
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1. INTRODUCTION

The Nationwide Health Information Network (NwHIN) program will ensure that appropriate medical information is shared through secure and interoperable information management systems—making the necessary information available to those who need it, when they need it, and in a form that is suited to meet stakeholders' needs. The Department of Veterans Affairs (VA), Department of Defense (DoD) and other partners also understand that there is a compelling need to promote the sharing of health information with not only other government agencies but also with private sector healthcare entities to provide for the continuity and quality care of all veterans.

In order to accomplish these goals NwHIN will provide the ability to exchange health information securely through a standards-based approach that connects federal entities and in addition provides the following capabilities:

- Exchange medical information between trusted healthcare providers who share some of the same patients to improve the quality, safety, continuity, and/or efficiency of healthcare
- Exchange health information in compliance with applicable Health Information Technology Standards Panel (HITSP)
- Demonstrate a phased, step-wise approach to migrating existing Health Information Exchanges (HIEs) to multiple, connected HIE's through the NwHIN gateways

The NwHIN program—under the umbrella of the Virtual Lifetime Electronic Records (VLER) Initiative—is primarily focused on exchanging standards-based healthcare information between different HIE's. The functional data exchange needs for VLER implementation are categorized according to a series of VLER Capability Areas (VCAs) available to service healthcare providers, service members, and veterans. The VCAs do not describe advanced uses of the data once it is available to the user within a department, agency, or external organization.

- VCA 1 represents the exchange and availability of the initial set of Clinical Information needed for the delivery of health care in a clinical setting.
- VCA 2 expands health information from the initial set exchanged in VCA 1 to include the exchange of additional electronic Health Information for Disability Adjudication. VCA 2 will incorporate personnel and administrative information in order to authorize and provide disability benefits to Service members and Veterans.
- VCA 3 provides needed information for Delivery of Additional Benefits services, including housing, insurance, education, and memorials for Service members and Veterans and beneficiaries.
- VCA 4 provides information access capabilities needed by Service members, Veterans and their beneficiaries and/or designees.

Completion of a VCA indicates the availability of specific information set in electronic format for authorized users, service members, veterans, and their beneficiaries and/or designees.

Adapter 5.0 addresses VCA 1 by facilitating the exchange of clinical information. VCA 2 is addressed by the addition of SSA as a partner, using data to determine eligibility for benefits.

1.1. Purpose of This Document

This document provides details regarding how the NwHIN Adapter 5.0 system is to be constructed. The System Design Document (SDD) translates the Requirement Specifications Document (RSD) into a document of record from which project developers can create the actual system. It details the top-level system architecture and identifies hardware, software, communication, and interface components.

1.2. Identification

This SDD applies to the NwHIN Adapter version (5.0) subsystem within NwHIN, release 5.0.1

The following standards apply to the design and development of the system.

- Simple Object Access Protocol (SOAP) is a lightweight protocol intended for exchanging structured information in a decentralized, distributed environment. (See Technical Reference Model for underlying ANSI / ISO and IEEE standards.)
- [_____](#)
- The Java Platform, Enterprise Edition, or Java EE (formerly known as J2EE) is a platform for large scale server programming in the Java programming language. (See Technical Reference Model for underlying ANSI / ISO and IEEE standards.)
- [_____](#)
- OMB Circular No. A-130, Management of Federal Information Resources:
http://www.whitehouse.gov/omb/circulars_a130_a130trans4
- OMB Circular No. A-11, Preparation, Submission and Execution of the Budget
http://www.whitehouse.gov/omb/circulars_a11_current_year_a11_toc
- OIT OED Change Control Process Plan:
- [_____](#)
- NIST SP 800-30 rev 1: <http://csrc.nist.gov/publications/nistpubs/800-30/sp800-30.pdf>
- NIST SP 800-95: <http://csrc.nist.gov/publications/nistpubs/800-95/SP800-95.pdf>
- NIST SP 800-53 rev3: http://csrc.nist.gov/publications/nistpubs/800-53-Rev3/sp800-53-rev3-final_updated-errata_05-01-2010.pdf
- NIST SP 800-122: <http://csrc.nist.gov/publications/nistpubs/800-122/sp800-122.pdf>
- VA 6500 Directives [_____](#)
- Adapter Documentation Folder:
[_____](#)

1.3. Scope

The scope of this project includes development of the VA NwHIN Gateway Adapter (version 5.0) using upgraded 3.2 version of the NwHIN Gateway (for details about NwHIN Gateway, see the opening statement of [Background](#)). This latest development of the VA NwHIN Adapter will meet the required capabilities for both functional and non-functional capabilities, as follows.

For Adapter 5.0, functional capabilities will include:

- Support Social Security Administration (SSA) Exchange with SSA Authorization by means of Veterans Authorizations and Preferences (VAP)
- Enhance VA C32 Data Content
- Support Purpose of Use = Coverage (for SSA) and Purpose of Use = Emergency (for NwHIN Partner UHIN)
- Enhance VA C32 Narrative Blocks to Remove Duplicate Data
- Enhance VA C32 Structured Data Entries to Resolve NIST CDA Validation Errors
- Modify VA Response to Query for Documents (QD) Request with No Document Class Codes to Provide All Documents (C32, C62)

For Adapter 5.0, non-functional capabilities will include:

- Implement New VA Gateway Version (Configure Gateway in Pass-Thru mode and Move Gateway orchestrations into Adapter)
- Optimize Performance of C32 Document Assembly

Note: For specific details on Adapter 5.0 capabilities, refer to the Adapter 5.0 Requirements Specifications Document (RSD) and the Adapter 5.0 Acceptance Criteria Plan (ACP).

Adapter will also continue to support indirectly the addition of new partners. New partner additions affect applications that display content delivered by Adapter, but do not affect processing or design changes directly to Adapter architecture. The SSA partner is an exception.

Adapter will continue to contain and support the following existing capabilities implemented in previous version increments:

- Interfacing with a Gateway
- Support for multiple assigning authorities
- Continued support of the eleven existing health data exchange partners and additional partners as they come onboard
- Interface with the Master Veteran Index (MVI) for patient demographic data as well as for storage of correlations to data exchange partners
- Interface with VistA systems for patient clinical data
- Interface with VETS for code translation services
- Interface with VAP for Patient Discovery / Announce / Check Policy
- Interface with the Enrollment System Redesign (ESR) in order to extract the VA Preferred Facility
- Support for HITSP C32 CCD and C62 Unstructured document

The VA NwHIN Adapter 5.0 software deliverable will also include the delivery of documents, guides, and manuals required to comply with the VA and Product Development (PD) documentation standards and/or Pro Path requirements.

As the VA's participation in the NwHIN evolves, the required capabilities of the NwHIN Adapter will be refined, expanded, and further conformed to the needs of the business owners and the clinical community. These refinements will be prioritized into subsequent software release versions.

In addition, much of the NwHIN capabilities are provided through enhancements to the existing VA systems. The specific requirements for each application are found in that application's documentation.

Table 1: NwHIN Adapter 5.0 Scope Inclusions

BN#	Includes
BN 8.1	Update to the latest version of the Nationwide Health Information Network NHIN specifications as required by the Data Use and Reciprocal Support Agreement (DURSA) (for example, this includes HITSP C32 and patient discovery).
NHIN_CR426	Support SSA Exchange with SSA Authorization via VAP.
NHIN_CR420	Enhance VA C32 Data Content.
BN 5.2.4	In an emergency (defined as a situation involving possible death or injury/harm), Service Provider authorization and access control services shall support the capability to enforce access privileges and consent directives to appropriate policies defined by the purpose of use of "emergency access."
NHIN_CR421	Enhance VA C32 Narrative Blocks to Remove Duplicate Data.

BN#	Includes
NHIN_CR423	Enhance VA C32 Structured Data Entries to Resolve NIST CDA Validation Errors.
NHIN_CR428	Optimize Performance of C32 Document Assembly.
NHIN_CR454	Implement New Gateway Version (V3.2) for Adapter v5.0 by configuring GW in pass thru mode and implementing GW orchestration in Adapter.
NHIN_CR464	Modify VA Response to QD Request with No Document Class Codes to Provide All Documents (C32, C62).

For a complete listing of requirements that are out of scope for NwHIN Adapter 5.0, see [Appendix A: NwHIN Adapter Scope Exclusions](#).

1.4. Relationship to Other Plans

The following documents relate to this system design document and may provide further understanding of the project. Many of the documents in the table below can be access from the _____ unless otherwise noted.

Table 2: Adapter 5.0 Reference Documents

Document Title	Notebook Section/Other Location	Post Date
NwHIN Enhancements Request #20100102 Business Requirements Document	ProPath Home Page – Business Requirements Document	July 2011
NwHIN 5.0 Adapter Acceptance Criteria Plan	Project Planning – Acceptance Criteria Plan	June 2012
NwHIN Adapter 5.0 Requirements Specification Document	Project Planning – Requirements Specification Document	June 2012
NwHIN Adapter 5.0 Interface Control Document	Product Architecture – Interface Control Document	June 2012
NwHIN Adapter 5.0 Epic Stories	Requirements Elaboration – Use Case Specifications	June 2012
NwHIN Adapter Production Operations Manual	Product Documentation – Production Operations Manual	June 2012
NwHIN Adapter 5.0 Requirements Traceability Matrix	Requirements Elaboration - Requirements Traceability Matrix	June 2012
NwHIN Adapter 5.0 Test Defect Log	Product Build – System Test Defect Log	June 2012
MASTER HITSP C32 Data Mapping Spreadsheet	TSPR Project Planning – Requirements Specification Document	August 2011
MASTER VLER C62 Data Mapping Spreadsheet	TSPR Project Planning – Requirements Specification Document	August 2011
Adapter Design Code Review for Sprint 44	TSPR Prior Document Types -- Reports	August 2012
HITSP C80-Clinical Document and Messaging Terminology	HITSP C80-Clinical Document and Messaging Terminology	NA

Document Title	Notebook Section/Other Location	Post Date
C83 CDA Content Modules Component	C83 CDA Content Modules Component Version:2.0	NA
C154 HITSP Data Dictionary	C154 HITSP Data Dictionary Version:1.0	NA
2010 NHIN Final Production Specifications	HHS Federal Health Architecture (FHA) NHIN Resources web site	NA
Veterans Health Administration (VHA) Section 508 Office (19F) Health Data & Informatics (HDI) Section 508 Checklist for Web-based Internet Information and Applications	_____ _____	NA

In addition, the IPO Joint Business and Technical Requirements (JBTR) version 0.2 has provided guidance throughout this document. The following specifications have been provisionally approved by the NwHIN Technical Committee. This approval is subject to the validation of the NwHIN reference implementation.

- [Access Consent Policies Production Specification - v1.0 \[PDF - 176 KB\]](#)
- [Authorization Framework Production Specification v2.0.1 \[PDF - 256 KB\]](#)
- [Query for Documents Production Specification v2.0 \[PDF - 212 KB\]](#)
- [Retrieve Documents Production Specification v2.0 \[PDF - 178 KB\]](#)
- [Health Information Event Messaging Production Specification v2.0 \[PDF - 152 KB\]](#)
- [Messaging Platform Production Specification v2.0 \[PDF - 248 KB\]](#)
- [Patient Discovery Production Specification v1.0 \[PDF - 214 KB\]](#)
- [Web Services Registry Production Specification v2.0 \[PDF - 378 KB\]](#)

Lastly, this document owes much of its accuracy and comprehensiveness regarding Gateway Architecture to the [Software Architecture Document](#) made available on the CONNECT Community Portal.

1.5. Methodology, Tools, and Techniques

The NwHIN Adapter 5.0 SDD was created from the appropriate ProPath template: system_design_document_template.docx. Per ProPath recommendation, NwHIN Architecture Support has provided the technical detail to flush out this initial draft through [Conceptual Design](#). Technical writing then provides a clean-up service on the document before the PMAS Review. From that review, changes will be implemented to further refine the accuracy of the document's technical content.

With the input of several program and project peers, the document is now ready for Formal Review. Any feedback from this review gets implemented, as well. Should the document receive approval from the Formal Review, it is then archived in the Rational Tools (ReqPro) for change control management. Any SDD change requests made during the development phase are then addressed as needed and changes captured throughout.

In addition, the NwHIN Adapter 5.0 project shall maintain a repository that contains all required artifacts (as defined in ProPath and the PMAS Guide section 3.1). The PMAS Artifact Central Repository (ACRe) will be a Microsoft Office SharePoint Server (MOSS) site created for all OI&T projects. The process for establishing a project artifact repository is in ProPath. PMAS projects will keep using their current organizational repositories until the new PMAS Artifact Central Repository is available.

1.6. Policies, Directives and Procedures

This document is based on the system design document template from ProPath. Creating the SDD is part of the process of determining requirements during Project Planning. ProPath guidance expects the SDD to come prior to or at the same time as Developing the Project Management Plan.

The following table lists constraints or requirements placed on this document by policies, directives, or procedures.

Table 3: Constraints, Requirements of the Adapter 5.0 SDD

Organization	Policy#	Description
VA	VA 6500	Directive Information Security Program Defining overall Security Framework for VA IAM
VA	VA 6501	VA Identity Verification In Person Proofing (IPP) Process Defining overall Identity Proofing Methodology for VA IAM
VA	VA 6300	Directive Records and Information Management Defining information management framework for VA IAM
NIST	SP-800-53	Special Publication - Recommended Security Controls for Federal Information Systems and Organizations Defining the required security controls for VA IAM (FISMA)
NIST	SP-800-63	Special Publication - Electronic Authentication Guideline Defining the data and procedural requirements for VA IAM
NIST	FIPS 140-2	Federal Information Processing Standards Publication, Security Requirements For Cryptographic Modules
NIST	FIPS 201-1	Federal Information Processing Standards Publication, Personal Identity Verification (PIV) Of Federal Employees And Contractors
US Congress	FISMA	Federal Information Security Management Act (FISMA) of 2002, Public Law 107-347
OMB	OMB Circular A- 1130, Section 8b(3)	Securing Agency Information Systems
US Congress	Rehabilitation Act, Section 508	Section 508 of the Rehabilitation Act Amendments in 1998

1.7. Constraints

The design of NwHIN Adapter 5.0 must remain in compliance with the specifications and requirements identified by the Office of the National Coordinator for Health Information Technology (ONCHIT) in order to transmit data through the NwHIN Gateway. The NwHIN Adapter will comply with all guidelines set forth by the Data Use and Reciprocal Support Agreement (DURSA) with external partners. Furthermore, the system must enforce privacy and security policies that best serve participating organizations and patients.

- The system shall comply and follow the HITSP standards for clinical documents that will be exchanged with the partners. The enhancement will be compliant with the NwHIN Adapter interface specifications for successfully communicating with other systems, including Veterans Authorizations

and Preferences (VAP), Master Veteran Index (MVI), VistAWeb, and VHA Enterprise Terminology Services (VETS)

1.8. Design Trade-offs

For Adapter 5.0, several design trade-offs were made.

- The use of multiple VistALink calls to fetch data of a larger document rather than a single VistALink call to fetch the large document.
- Consideration of Cloud technology.

1.8.1. Multiple VistALink Calls

Currently, in order to support incoming requests from external partners for document query and document retrieval, the NwHIN Adapter uses VistALink calls to fetch data from the VistA systems in order to construct C32 and C62 documents. Rather than using one VistALink call to fetch a monolithic document (with all data domains) from the VistA systems, the Adapter makes several calls to the VistA systems to fetch data for each domain a specific document supports. Then it aggregates and assembles the data into a C32 document or C62 document.

During development testing, it was discovered that issuing multiple calls to fetch data was less time consuming than using a single call to fetch a large document. Furthermore, the processing load on VistA systems was much less in case of multiple calls. As such, even though multiple calls to VistA systems increases the load on the network, this design trade-off was made for better performance and scalability.

1.8.2. Cloud Technology

The use of Cloud technology was considered, but for deployment and development purposes, it was thought to be a risk that wasn't going to yield an adequate benefit. There are also some security issues that were a possible barrier to implementation. However, the basic architecture is such that with little effort, the Adapter could be re-hosted in a private cloud, or with some more thought to the security implications, to a public cloud.

1.9. User Characteristics

Within the scope of this project, there is one primary user community for the NwHIN Adapter subsystem: the clinical users of VistAWeb.

1.9.1. Clinical Users of VistAWeb

The following are problems experienced by the Adapter user community.

1.9.1.1. User Problem Statement

When Veterans are cared for in multiple places, including VA and non-VA facilities, a lack of a unified medical record often causes tests to be re-run, or clinical decisions to be made without all available information, which can lead to sub-optimal care. The lack of visibility to information already stored in disparate places has a negative cost implication for overall care, in addition to the deleterious effect on overall Veteran care.

Adapter, in concert with the NwHIN, provides a mechanism to make clinical information about Veterans and their dependents available to providers both inside and outside of the VA _ in a timely way from multiple sources, which should improve patient care and reduce overall cost of care.

1.9.1.2. User Objectives

The users' objectives in using the NwHIN Adapter and requirements are to gain the information they need to make the best decision for the care of the patient.

2. BACKGROUND

The VA NwHIN Adapter interfaces with the VA NwHIN Gateway, which is an implemented instance of the NwHIN Gateway software. The NwHIN Gateway is a product deliverable of the Federal Health Architecture (FHA) under the Department of Health and Human Services (HSS). This product is the result of the collaboration and shared development cost of a group of more than twenty government agencies known as the Federal Consortium. The VA has been exchanging medical information with the Department of Defense (DoD) for several years. By using the VA NwHIN Gateway together with the VA NwHIN Adapter, the VA will now be able to share patient health data with other federal partners as well as with private providers (such as Kaiser Permanente).

The purpose of the VA NwHIN Gateway Adapter is to act as an interfacing application between VA healthcare systems and the VA NwHIN Gateway so that healthcare information can be exchanged successfully with the NwHIN partners while following security and privacy rules. The VA NwHIN Gateway Adapter uses a service-oriented architecture (SOA) to share patient health data and to communicate between systems.

2.1. Overview of the System

The VA NwHIN Gateway Adapter is an application that acts as an interfacing application between VA healthcare systems and the VA NwHIN Gateway to share clinical patient records with network healthcare providers who are external to the VA. The VA NwHIN Gateway Adapter is deployed as a single, national instance from the Austin Information Technology Center (AITC). Payloads are standards-based Clinical Document Architecture (CDA) XML documents. VistA data is retrieved through the use of VistALink-mediated Remote Procedure Calls (RPC) calls; HIE data retrieved by the NwHIN Adapter is displayed by VistAWeb.

Note: The NwHIN Adapter provides a read-only service. It does not create a clinical repository with the data it mediates.

The system performs the following main business functions:

- Submit and retrieve correlations of patient identities in MVI, between VA and other provider partners
- Exchange of healthcare information bi-directionally between the VA and other provider partners
- Enforcement of Security and Privacy policies
- Capture audit information and provisions audit report data
- Announcement of new patients (who have opted-in) to NwHIN partners

2.2. Overview of the Business Processes

The NwHIN Adapter 5.0 will support the business processes listed in the sub-sections below.

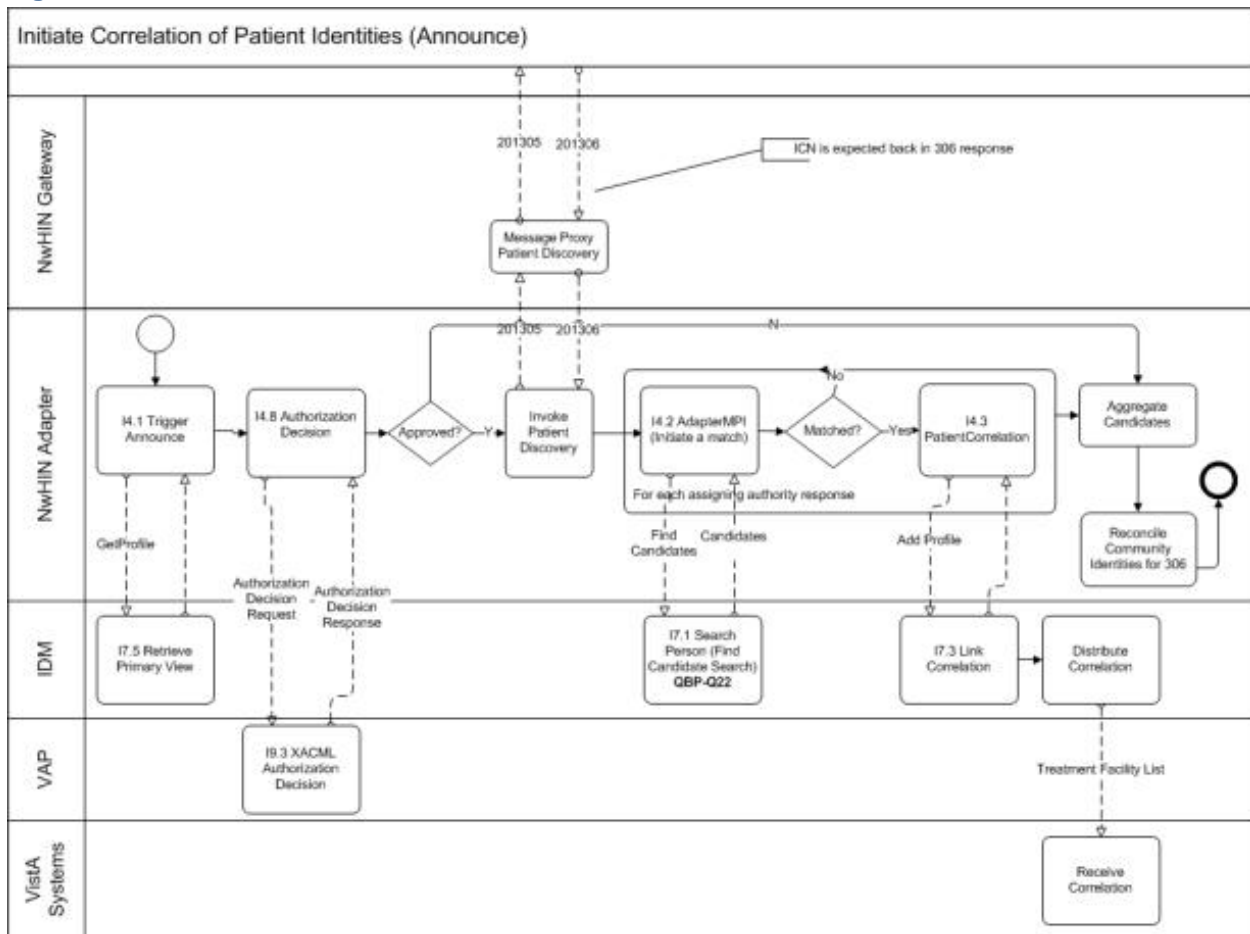
Note: Each business process is listed by ID number and process name.

2.2.1. 001 Initiate Correlation of Patient Identities

The Initiate Correlation of Patient Identities business process is an existing process owned by the Identity management group. This process correlates identities between VA patients and identities known in other partners as depicted in the following diagram.

PMAS Draft Note: The implementation of SSA support will require additional processing flows added to the following diagrams as the details in design are established during development cycles - such as the deferred Patient Discovery and correlation with MVI.

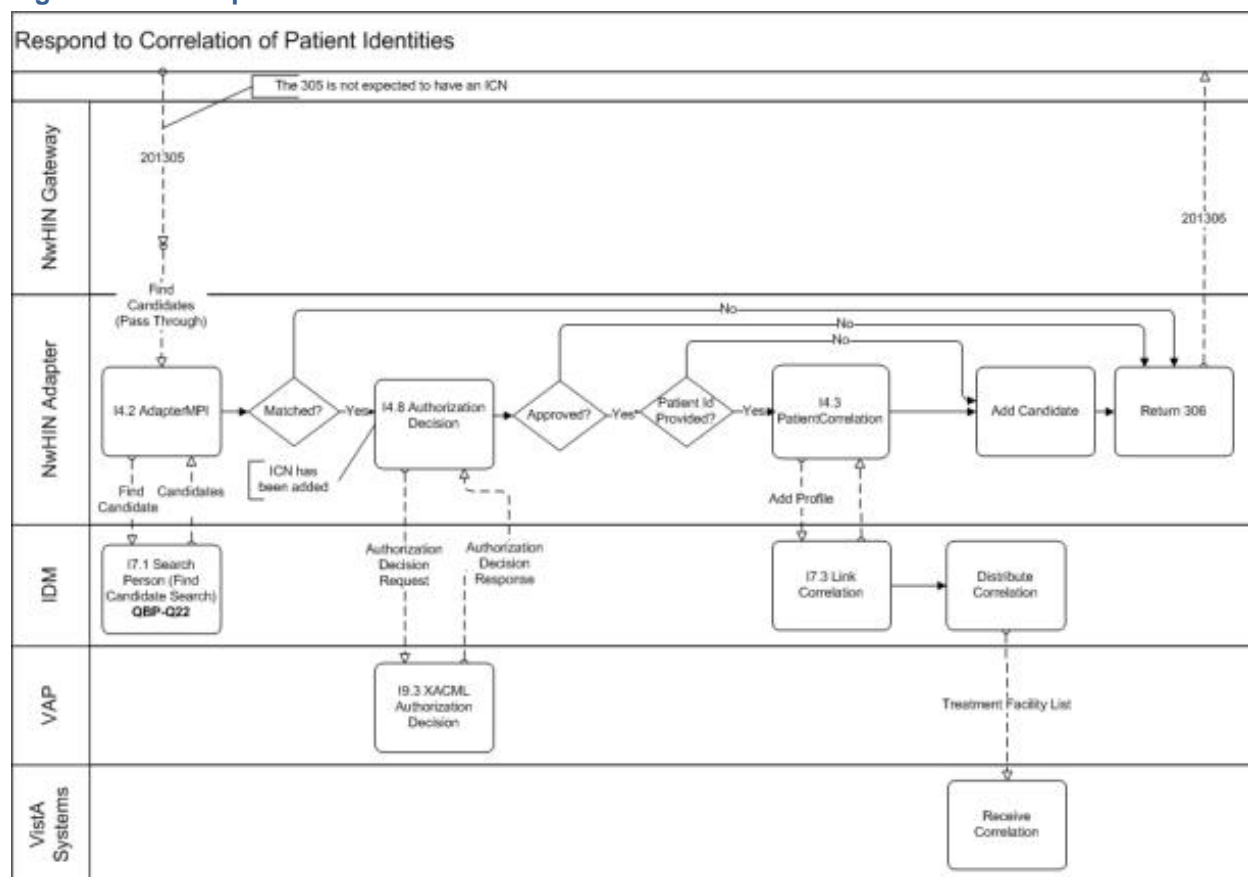
Figure 1: 001 Initiate Correlation of Patient Identities



2.2.2. 002 Respond to Correlation of Patient Identities

The Respond to Correlation of Patient Identities business process is an existing process owned by the Identity management group. This process correlates identities between VA patients and identities known in other partners as depicted in the following diagram.

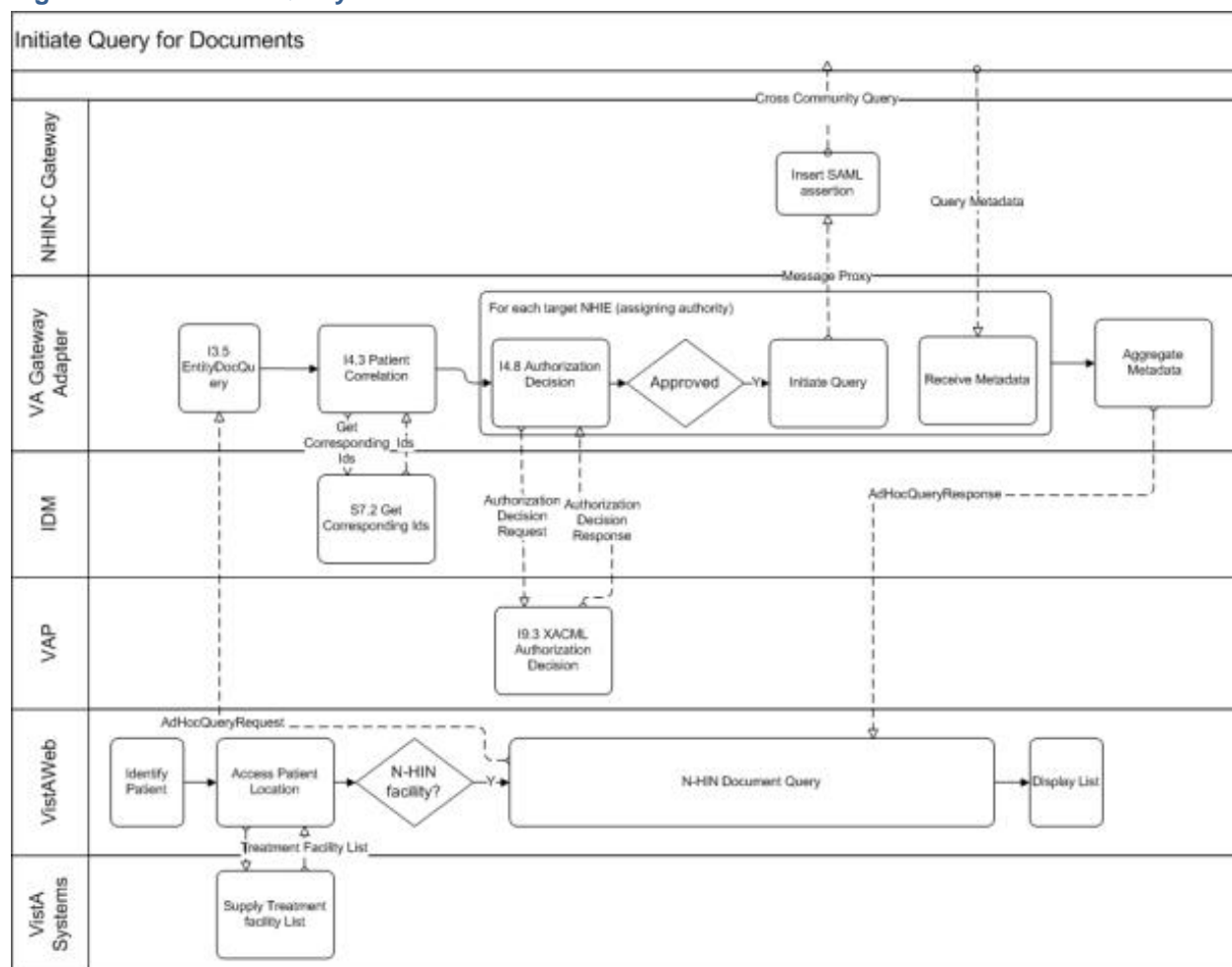
Figure 2: 002 Respond to Correlation of Patient Identities



2.2.3. 003 Initiate Query for Documents

The Initiate Query for Documents business process is an existing process owned by VLER Health. This process initiates queries for documents (from VistAWeb users) across NwHIN partners as depicted in the following diagram.

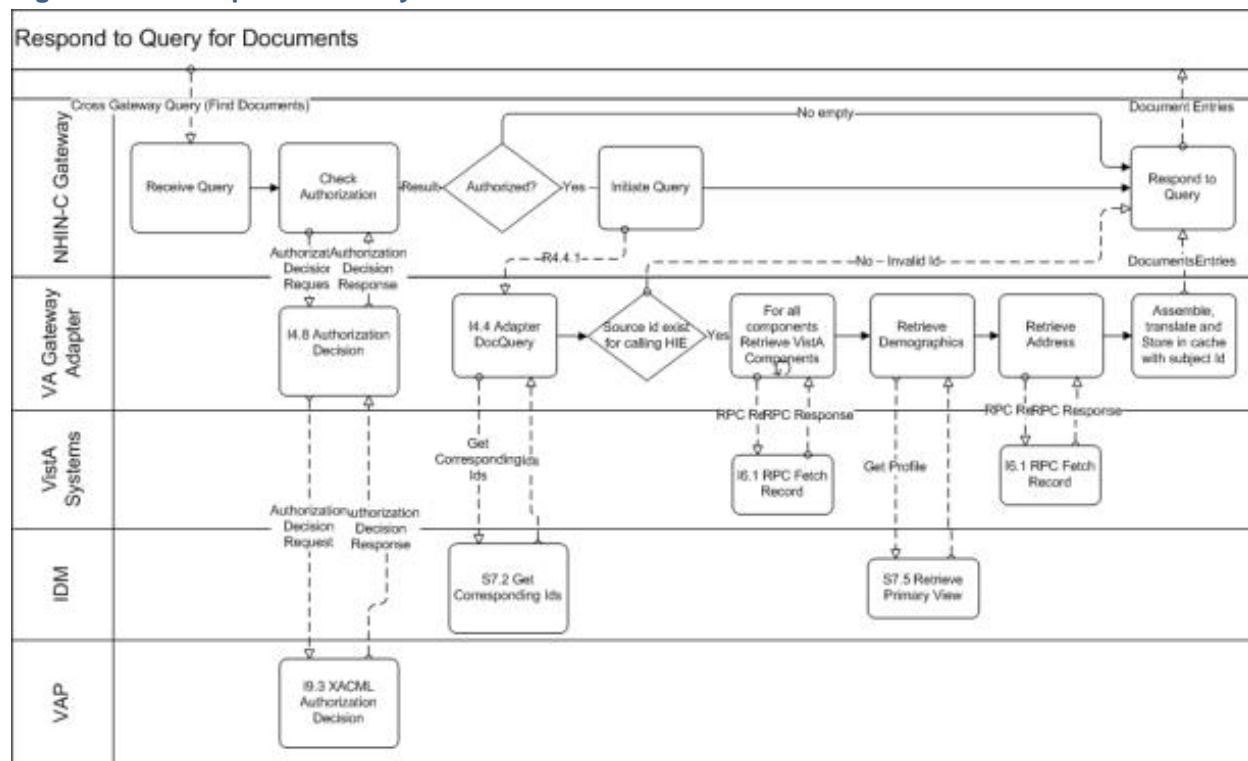
Figure 3: 003 Initiate Query for Documents



2.2.4. 004 Respond to Query for Documents

The Respond to Query for Documents business process is an existing process owned by VLER Health. This process responds to queries for documents requested by NwHIN partners as depicted in the following diagram.

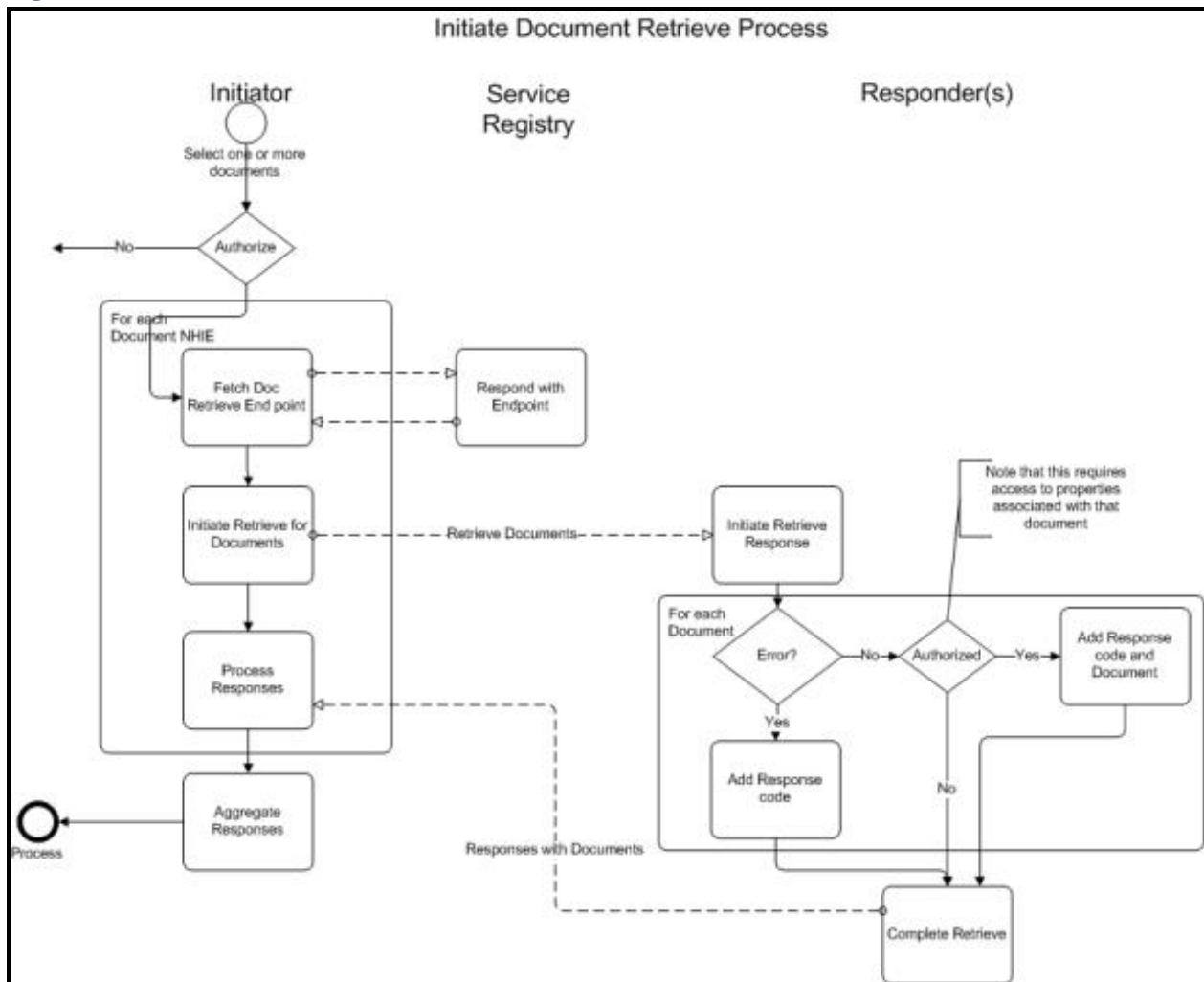
Figure 4: 004 Respond to Query for Documents



2.2.5. 005 Initiate Document Retrieve

The Initiate Document Retrieve business process is an existing process owned by VLER Health. This process initiates document retrieve queries (from VistAWeb users) across NwHIN partners for specific documents as depicted in the following diagram.

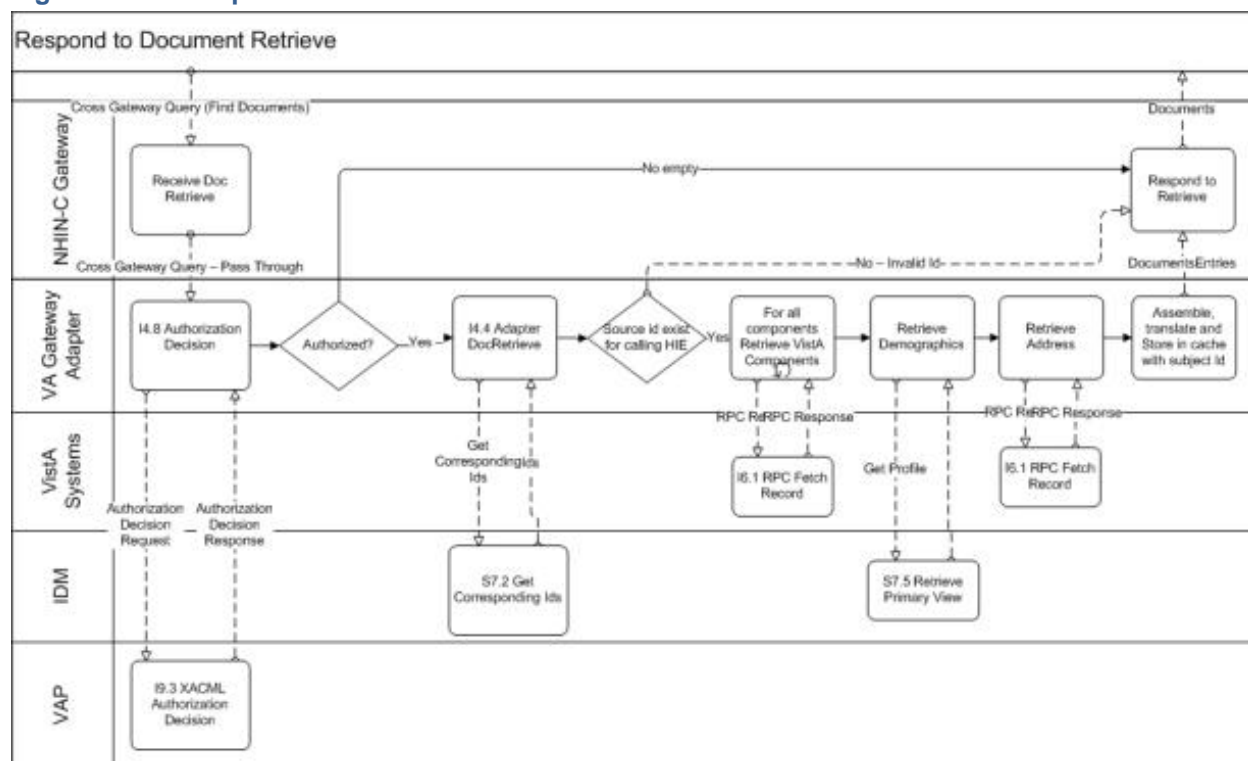
Figure 5: 005 Initiate Document Retrieve



2.2.6. 006 Respond to Document Retrieve

The Respond to Document Retrieve business process is an existing process owned by VLER Health. This process responds to document retrieve requests from NwHIN partners for specific documents as depicted in the following diagram.

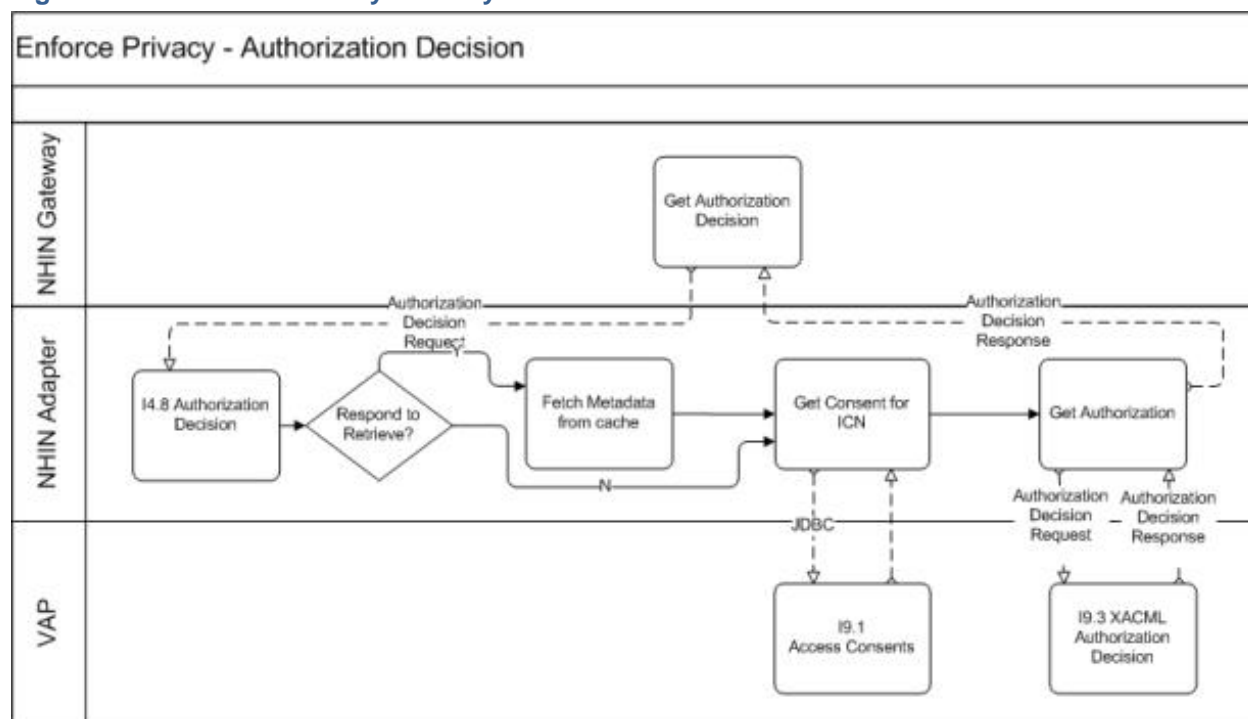
Figure 6: 006 Respond to Document Retrieve



2.2.7. 007 Enforce Privacy/Security

The Enforce Privacy/Security business process is a modernized process owned by Privacy. This process enforces security and privacy policies as depicted in the following diagram.

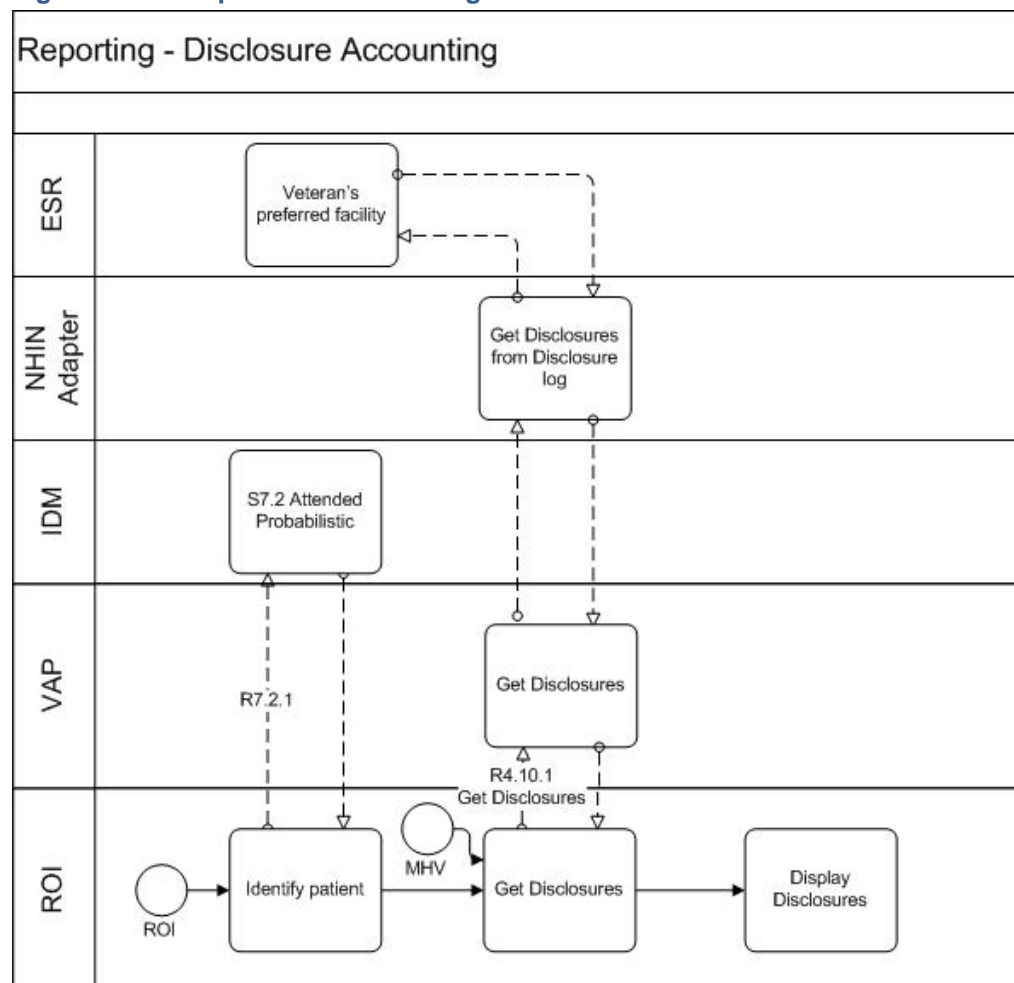
Figure 7: 007 Enforce Privacy/Security



2.2.8. 008 Reports for Accounting of Disclosures

The Reports for Accounting of Disclosures business process is an existing process owned by the Release of Information (ROI) Office. This process generates a patient's Accounting of Disclosure and other reports as depicted in the following diagram.

Figure 8: 008 Reports for Accounting of Disclosures



2.3. Business Benefits

Once developed, the enhancements for VA NwHIN Adapter 5.0 will:

- Allow VA clinicians and external partners to view additional data domains for patient's healthcare information that is currently being exchanged including discharge summaries, consults and referrals, results of diagnostic studies, procedure notes and histories, and physicals.
- Allow VA to exchange healthcare data bi-directionally with more partners (HIE's) including Community Health Information Collaborative (CHIC), Minnesota; South Carolina Health Information Exchange, South Carolina; MultiCare Puget Sound, Washington, and Western New York HealtheLink, New York.

2.4. Assumptions, and Constraints

This section describes the assumptions and constraints that impacted the design of the system.

2.4.1. Design Assumptions

This section addresses assumptions that impacted the design of the system.

- While the scope of NwHIN Adapter 5.0 is limited to exchanging data with selected partners, the system will be designed to accommodate a large number of partners.
- The support of SSA exchange will use synchronous interfaces for key data exchanges (PD, QD, Retrieve Documents [RD]).
- It is assumed that VAP will provide the necessary support for authorization decisions related to SSA exchange.
- Toward integration with existing systems, NwHIN Adapter 5.0 will be an incremental release to the previous release of Adapter and will maintain backward compatibility.
- VistAWeb will be modified to support new content (additional data domains for patient's healthcare information) exchanged.
- VHA Enterprise Technology Services (VETS) will be used in NwHIN Adapter 5.0 for limited translation of codes to different standards as required by C32 and C62 document specifications.
- The NwHIN Adapter 5.0 will support indirect access by eBenefits portal and ROI administration via the Veteran's Access and Preferences (VAP) system which will communicate with Adapter directly. The VAP subsystem will be iterated independently of the Adapter.
- It is assumed that continuing support will be provided for AViVA VPR RPC development and support for calls to VistA. This support has been coming from the VA mumps development group.
- The NwHIN pilot will bi-directionally exchange healthcare information with its partners using standardized documents. Currently only C32 and C62 documents are supported. Going forward, NwHIN adapter will be designed to exchange more document formats in order to be able to support added data domains.
- The latest versions of HITSP standards and NwHIN Gateway will be implemented within the specified timeframe for adopting new standards (usually within 6 months of the approval of a new or updated standard).
- The NwHIN Adapter 5.0 will interface with the Enrollment System Redesign (ESR) to obtain a Veteran's Preferred Facility in order to Support VAP reporting enhancements.

2.4.2. Design Constraints

The design of the NwHIN Adapter must remain in compliance with the [specifications and requirements](#) identified by the ONCHIT in order to transmit data through the Gateway. Furthermore, the system must also support all Identity Management (IdM) or MVI currently in place at VA.

- The system shall comply with all HITSP requirements and standards.
- The enhancements will be compliant with the NwHIN authorization interface specification.
- MVI currently does not support searching for multiple names as defined by the Patient Discovery Production Specification v1.0. The requirement for multiple names will not be met.
- The system only supports synchronous exchanges at this time. Refer to Patient Discovery specification (section 3.1.1) for responding gateway synch requirement.

2.5. Overview of the Significant Requirements

The material in this section is not to replace either the existing functional and technical requirements documents, nor serve as the basis for the Requirements Traceability Matrix, but only to inform non-project personnel reading this document as to the basis for the design.

2.5.1. Overview of Significant Functional Requirements

What follows is an overview of the major functional requirements for the NwHIN Adapter 5.0 system. The major functions to be performed and the few major requirements that drive the design will be identified and described. The emphasis of these sections will be on identifying the impact that these requirements have on the design. These requirements are comprehensive and include existing features as well as any additions the current increment is adding to functionality and overall system design. A synopsis of specific selected requirements is provided and their source identified in Table 4.

The following tables list the comprehensive set of requirements that the Adapter 5.0 system design includes.

Table 4: NwHIN Adapter 5.0 Functional Requirements (supported prior to increment 5)

ID	Specific Requirement / Synopsis	Requirement
BN3	Consent Management – Administrator electronic management of organizational security and privacy policies	3.7.1.1 Provide filtering capability to support VAP reports 3.7.1.1 Provide summarization capability to support VAP reports (includes using VAP interface for policy checks)
BN7	Support Multiple Assigning Authorities within a HIE (Home Community OID)	BN 7 Enhancement of identity management processes between VA and external entities 7.4 Provide the ability to support a patient's record when there are multiple identities within the same community (multiple assigning authorities)

ID	Specific Requirement / Synopsis	Requirement
BN10	<p>Support C62 Exchange-Data Content updates for:</p> <ul style="list-style-type: none"> ▪ C62 Template ▪ VistA RPCs (for getting appropriate data from VistA systems required by the C62 document) ▪ C62 Data Mapping spreadsheet 	<p>10.6 Share consult/referral documents (notes) (ICIB 9/9/2010) Discharge Summaries</p> <p>LOINC Codes:</p> <ul style="list-style-type: none"> ▪ 11488-4: Consultation Note ▪ 34140-4 Transfer of Care Referral Note <p>10.8 Share discharge summaries documents (notes) (ICIB 9/9/2010) Results of Diagnostic Studies (collection of docs)</p> <p>LOINC Codes:</p> <ul style="list-style-type: none"> ▪ 18842-5: Discharge Summarization Note ▪ 18761-7 Transfer Summarization Note ▪ 47046-8 Summary of Death <p>10.9 Share results of diagnostic studies (ICIB 9/9/2010)</p> <ul style="list-style-type: none"> ▪ 18726-0: Radiology Studies ▪ 26441-6: Cardiology Studies ▪ 26442-4: Obstetrical Studies ▪ 27897-2: Gastroenterology endoscopy Studies ▪ 27896-0: Pulmonary Studies ▪ 27897-8: Neuromuscular Electrophysiology Studies ▪ 27898-6: Pathology Studies ▪ 28619-5: Ophthalmology/optometry ▪ 28634-4: Miscellaneous Studies ▪ 34122-2: Pathology Procedure Note Procedure Notes <p>10.10 Share procedure notes (ICIB 9/9/2010) Histories and Physicals</p> <p>LOINC Code:</p> <ul style="list-style-type: none"> ▪ 28570-0 Procedure Note ▪ 34121-4 Pathology Procedure Note <p>10.11 Share Histories & Physicals (ICIB 9/9/2010)</p> <p>LOINC Codes:</p> <ul style="list-style-type: none"> ▪ 34117-2: History and Physical Note ▪ 47039-3 Admission History and Physical Note
BN10	<p>Support C62 NwHIN-Exchange Message Changes:</p> <ul style="list-style-type: none"> ▪ Doc Class Code ▪ Service Date Range (From, To) ▪ Doc Meta Data at Doc Query, Assemble at Doc Retrieve 	<p>BN 10 Expand information sharing beyond subset of HITSP C32 information currently shared in the VLER 1A pilot</p>

ID	Specific Requirement / Synopsis	Requirement
BN10	Support C62 Exchange-Adapter CPP Report Changes (doc type hard coded, and view link) Accounting of Disclosures Received NwHIN Documents	BN 10 Expand information sharing beyond subset of HITSP C32 information currently shared in the VLER 1A pilot.[2]
BN8	Integrate VETS Translation Services Receive VETS service, install, test	BN8 Interoperability enhancements 8.4 Provide terminology translation as specified within the content standards (such as HITSP standards).
BN TBD	Use the ESR System Interface to retrieve the Veteran's Preferred Facility for Adapter Audit Records	TBD
BN TBD	VAP Reporting Enhancement Requirements	<p>TBD Accounting of Disclosure Report. Add following additional fields to this report:</p> <ul style="list-style-type: none"> ▪ VA Facility ▪ Test Patients ▪ Recipient Facility ▪ Recipient ▪ Total ▪ Grand Total <p>TBD Received NwHIN Report. Add following additional fields to this report:</p> <ul style="list-style-type: none"> ▪ VA Facility ▪ Test Patients ▪ VA Requestor ▪ Total ▪ Grand Total <p>TBD Patient Opt In/Opt Out Report. Add following additional fields to this report:</p> <ul style="list-style-type: none"> ▪ VA Facility ▪ Total ▪ Grand Total ▪ Action <p>TBD Patient Discovery Audit Report. Add following additional fields to this report:</p> <ul style="list-style-type: none"> ▪ VA Facility ▪ Test Patients ▪ Total ▪ Grand Total Fails ▪ Grand Total Passes ▪ Explanation

ID	Specific Requirement / Synopsis	Requirement
N/A	Modify C32 to assemble at Doc Retrieve not Doc Query Architecture Decision to make Adapter routines standard/uniform between C32 and C62, but GNG Documentation requires load testing using Rational Tool Suite. Do not have capability to perform load testing on Document Retrieve (license issue).	No associated business need

Table 5: NwHIN Adapter 5.0 Functional Requirements (implemented for increment 5)

ID	Specific Requirement / Synopsis	Requirement
BN 8	Interoperability enhancements.	8.1 Update to the latest version of the Nationwide Health Information Network NHIN specifications as required by the Data Use and Reciprocal Support Agreement (DURSA) (for example, this includes HITSP C32 and patient discovery).
NHIN_CR 426	Adapter support for Purpose of Use = Emergency for UHIN Coverage for SSA	
NHIN_CR 420	Expand information sharing beyond subset of HITSP C32 information shared in the VLER 1A pilot	Enhance VA C32 Data Content
BN 5	Access Control - Support enforcement of VA approved security and privacy policies	5.2.4 In an emergency (defined as a situation involving possible death or injury/harm), Service Provider authorization and access control services shall support the capability to enforce access privileges and consent directives to appropriate policies defined by the purpose of use of "emergency access"
NHIN_CR 421	Repair flawed implementation	Enhance VA C32 Narrative Blocks to Remove Duplicate Data
NHIN_CR 423	Repair flawed implementation	Enhance VA C32 Structured Data Entries to Resolve NIST CDA Validation Errors
NHIN_CR 464	Modify VA Response to QD Request with No Document Class Codes to Provide All Documents (C32, C62)	

2.5.2. Functional Workload and Functional Performance Requirements

Functional workload volumes describe in business terms the amount of work to be performed and should be independent of any technical design decisions that are made and any business performance goals that must be met.

Table 6: Significant Workload, Performance Requirements and Non-Functional Requirements

ID	Requirement
BN 17	Additional non-functional requirements
NHIN CR454	NHIN_CR454 Implement New Gateway Version (V3.2) for March 2012
NHIN CR428	Optimize Performance of C32 Document Assembly

Note: For a report on performance enhancements achieved with the Adapter 5.0 code, refer to the Adapter Design Code Review for Sprint 44 (see [Relationship to other Plans](#)).

2.5.2.1. Workload Volumes

The following metrics were gathered from the *Clinical Data Repository/Health Data Repository (CHDR) CONOPS* document and the *Capacity and Scalability for NwHIN Specifications* document.

- It is expected that within the first year of the NwHIN, three transactions per second will be the peak traffic through the NwHIN Adapter. These transactions include patient announcements, queries, and retrievals. Within five years, this peak number could increase to six transactions per second.
- Archived documents must be kept for seven years. An average size for the health summary documents is 30 kb. At the peak rate of three queries per second for an eight-hour day, the daily storage capacity for seven years would be seven terabytes.
- $30\text{kb/file} \times 3 \text{ files/second} = 90\text{kb/second}$
- $90\text{kb/second} \times 60 \text{ seconds/minute} = 5400\text{kb/minute}$
- $5400\text{kb/minute} \times 60 \text{ minutes/hour} = 324,000\text{kb/hour}$
- $324,000\text{kb/hour} \times 8 \text{ hours/(work) day} = 2.5\text{GB/day}$
- $2.5\text{GB/day} \times 365 \text{ days/year} = 0.9\text{TB/year}$
- $0.9\text{TB/year} \times 7 \text{ years} = 6.3\text{TB}$

2.5.2.2. Compliance

The NwHIN Adapter 5.0 project is in compliance with IT infrastructure standards and will be using a newly defined infrastructure at AITC specified in more detail below in Section 4. The project will be fully compliant with VA's Enterprise Architecture. At the time of this writing, a SEDR review was completed for the 5.0 version release ().

PMAS Draft Note: When available, this document will reference the SEDR library for this review process. The project is in conformance with the VA Certification and Accreditation process, and project documents relating to conformance with the C&A process are available in the SMART database.

2.5.2.3. Workload Projection

The following are a list of assumptions about the anticipated workload of NwHIN Adapter 5.0.

- By December 2012, there will be four million VA patients announced. With approximately 125 weeks until that date, the average number of patients added to the system per week is 32000. All VA patients will be discovered at DoD and possibly in the private sector.
- In five years, 200 million patients will be on the NwHIN. VA patients will constitute two percent (2%) of that total. Therefore, approximately 800,000 inbound patient discoveries will occur per week, of which only two percent (2%) will match.
- VA patients will update an identity trait every two years—40,000 updates per week (after steady state) which will result in patient discoveries.
- The volume of outbound document queries will match the current BHIE volume of 50,000 per week.

- There will be a matching volume of document queries incoming—50,000 per week.
- Each document query will result in one or more document retrieve.
- Each inbound document retrieve will make one MVI call to get the treatment facilities (assumed three) and seven calls to each of the three VistA's (21 calls).
- As new partners join the NwHIN project, there will be a flurry of initial patient correlation activity. This activity will vary greatly depending on the number of patients in the organization joining the NwHIN. It could range from tens to millions of patient correlations.
- The VETS translation calls will be cached and VETS will only need to be called when new un-cached codes are encountered – or a cached version has expired. Normally 1 - 5 calls will be made for each document and eventually 0 calls will need to be made to the VHA Enterprise Terminology Services (VETS) upon document retrieval (in both directions).

The following table shows the expected loading of the services.

Table 7: Loading Projections

Item	Weekly Volume	Search Probabilistic	Link Person Identifier	Retrieve Primary View	Get Corresponding IDs	Update Patient Information	VistALink RPC Calls	VETS Calls
Patient Discovery Outbound	32000	32000	32000	32000	32000	0	0	0
Patient Discovery Inbound	800000	800000	16000	16000	16000	0	0	0
Patient ID Trait update	40000	40000	40000	40000	40000	40000	0	0
Internal Initiating Document Query	50000	0	0	0	50000	0	0	0
External Initiating Document Query	50000	0	0	50000	50000	0	0	0
Internal Initiating Document Retrieve	50000	0	0	0	0	0	0	50000 - 250000
External Initiating Document Retrieve	50000	0	0	0	0	0	1050000	50000 - 250000
TOTAL Weekly		872000	88000	138000	188000	40000	1050000	50000 - 250000

Therefore, the most significant loadings are on the unattended probabilistic matching of just under 900,000 per week. These are average figures and do not indicate maximum burst rates.

Table 8. Updated Load Projections by Quarter

Item	Quarterly Volume of Business Transactions (MINIMUM)	Search MVI with Traits	Request MVI Correlation be Created	Retrieve Primary View / Extended View (runs RPCs)	Get Corresponding IDs
Component sending message to MVI		VAP Adapter	Adapter	VAP	Adapter
Patient Discovery Outbound (from VA to external partners)	$5000(N) + (65000 \times 3)[\text{Batch}]$	200k (VAP) + 200k (Adapter) = 400k	200k	200k	200k
Patient Discovery Inbound (from external partners to VA)	800k	800k	16k	16k	16k
Document Query Outbound	20k	0	0	0	20k
Document Query Inbound	20k	0	0	20k	20k
Document Retrieve Outbound	20k	0	0	0	0
Document Retrieve Inbound	20k	0	0	0	0
TOTAL Weekly		1200k	216k	236k	256k

2.5.3. Operational Requirements

Specific operational requirements from the project RSD are not available. The following requirements are based on the VLER CONOPS document.

Note: For additional and up-to-date information, refer to the VLER CONOPS.

Table 9: Adapter Availability Requirements

Agency	System Performance Measures	Proposed Target Value	Proposed Threshold Value
DoD/VA	VLER System operational availability (Ao) measured per month, as perceived by the end user, where Ao is defined as the production capability is operational and predictably responding in a commercially reasonable manner. Ao is given by Mean Time Before Maintenance (MTBM) / MTBM + Mean Downtime. This does not include scheduled maintenance periods.	99%	95%
DoD/VA	VLER Server operational availability (Ao) measured per month, where Ao is defined as the production capability is operational and predictably responding in a commercially reasonable manner. Ao is given by Mean Time Before Maintenance (MTBM) / MTBM + Mean Downtime. This does not include scheduled maintenance periods.	99.9%	99%

Table 10: Adapter Server Utilization

Agency	System Performance Measures	Proposed Target Value	Proposed Threshold Value
DoD/VA	VLER Server processing capacity utilization	40%	50%
DoD/VA	VLER Server storage capacity utilization (% of 12 month projected required capacity)	70%	80%

Table 11: Adapter Response Time

Agency	System Performance Measures	Proposed Target Value	Proposed Threshold Value
VA	Response time to turn on communications with approved partner after passing opt-in confidence test	< 1 min	< 2 min
VA	Update of identity trait for patient discovery	< 5 secs	< 10 secs

2.5.4. Overview of the Technical Requirements

The following technologies/software/tools are utilized by Adapter project.

- CONNECT 3.2.1
- Glassfish 2.1.1.17
- LINUX Redhat
- Java JDK 1.6.0_30
- Weblogic Server 10.3.4
- Oracle 11g
- ClearCase

- Hibernate 3

Note: The CONNECT product is approved for use as a NwHIN COTS product.

From a performance perspective, faster XML libraries are used to construct C32 data, improving performance by approximately 20%.

To the extent that they are known, following table lists the major technical requirements that drive the conceptual design for the Adapter 5.0.

Table 12: Adapter 5.0 Technical Requirements

ID	Requirement
BN 2.1/CR426	Provide the ability to receive a patient discovery request from SSA with the following SSA Security Assertion information: Subject ID, Subject Organization, Subject Organization ID, Home Community ID, Subject Role, Purpose of Use, Patient Identifier & the following patient information: Name (first, middle, last), gender, date of birth, social security number, address, city, state, zip code (specifically for the Subject Role).
BN 8.1	Update to the latest version of the NwHIN specifications as required by the Data Use and Reciprocal Support Agreement (DURSA). For example, this includes HITSP C32 and patient discovery. Update to current CONNECT gateway version 3.2.2.1. Upgrade to Glassfish version 2.1.1.17.
BN 8.4	Additional VETS code translations (Code Priority Groups 2+, 2). Provide terminology translation as specified within the content standards (such as HITSP standards).
CR464	Modify VA Response to QD Request with No Document Class Codes to Provide All Documents (C32, C62).
CR420	The data content of the VA C32-Summarization of Episode Note will be enhanced to provide any specific health data needed by the SSA for the disability determination.
CR421	The narrative blocks of the VA C32-Summarization of Episode Note will be enhanced so that no structured data entries are duplicated when rendered by an NwHIN partner.
CR423	The Structured Data entries of the VA C32-Summarization of Episode Note will be revised so that no errors are reported through the NIST CDA Validation Tool.

Note: The NwHIN Adapter 5.0 conforms to the Technical Resource Model (TRM).

2.5.5. Overview of the Security or Privacy Requirements

This section defines the security requirements that apply to the interoperable exchange of patient data between NwHIN participants. Privacy requirements will be addressed by the VAP subsystem. In summary, NwHIN participants must comply with the following:

- Health Insurance Portability and Accountability Act (HIPPA)
- Mission Assurance Category (MAC) II controls and Confidentiality Level Sensitivity Controls defined in DoD Instruction 8500.2 and the VA equivalent
- NwHIN security documentation development in accordance with the DITSCAP and VA equivalent, to document the secure exchange of patient identifiable information
- VA Directive 6502 – Privacy Program (DRAFT)

NwHIN Adapter 5.0 shall comply with the following VA equivalents:

- PL 85-857, 38 USC Title 38 Veterans' Benefits, 2 Sep 1958 Sections 5701, 5705, 7332 (Confidentiality of certain information)
- 5USC552a (PL093-579 Privacy Act), 1973
- United States Code of Federal Regulations Title 18 USC Sec.1030 Fraud and Related Activity in Connection with Computers (Public Law 99-474 Computer Fraud and Abuse Act), 1986
- Public Law 100-235 Computer Security Act of 1987 codified at 40USC Sec.759, 8 January 1988
- United States Code of Federal Regulations Title 18 USC Sec.2701 Unlawful Access to Stored Communications, 1/16/96
- OMB, Circular No. A-130, Revised February 8, 1996
- Public Law 104-191, "Health Insurance Portability and Accountability Act (HIPAA) of 1996," August 21, 1996

2.5.6. System Criticality and High Availability Requirements

The Adapter requires a Disaster Recovery program in place that ensures not only the Adapter application is available at all times but also the dependent applications Adapter requires to process clinical requests which include: CONNECT Gateway, VAP, VETS, MVI, ESR and VistA systems.

2.5.7. Special Device Requirements

There are no special device requirements for the Adapter.

2.6. Legacy System Retirement

The legacy systems listed in the table below will not be adversely affected in the NwHIN Adapter 5.0 release timeframe, but future increments are planned which allow the transition of traffic and domains to NwHIN in a phased manner.

Table 13: Proposed Legacy Retirements

Legacy System/System Component	Retired/Workload Reduced	Reduced by How Much
BHIE	Not within the NwHIN Adapter 5.0 release timeline	NA
CHDR	Not within the NwHIN Adapter 5.0 release timeline	NA
FHIE	Not within the NwHIN Adapter 5.0 release timeline	NA

3. CONCEPTUAL DESIGN

3.1. Conceptual Application Design

In this section, we provide diagrams that depict the context within which the NwHIN Adapter application exists. The diagrams include:

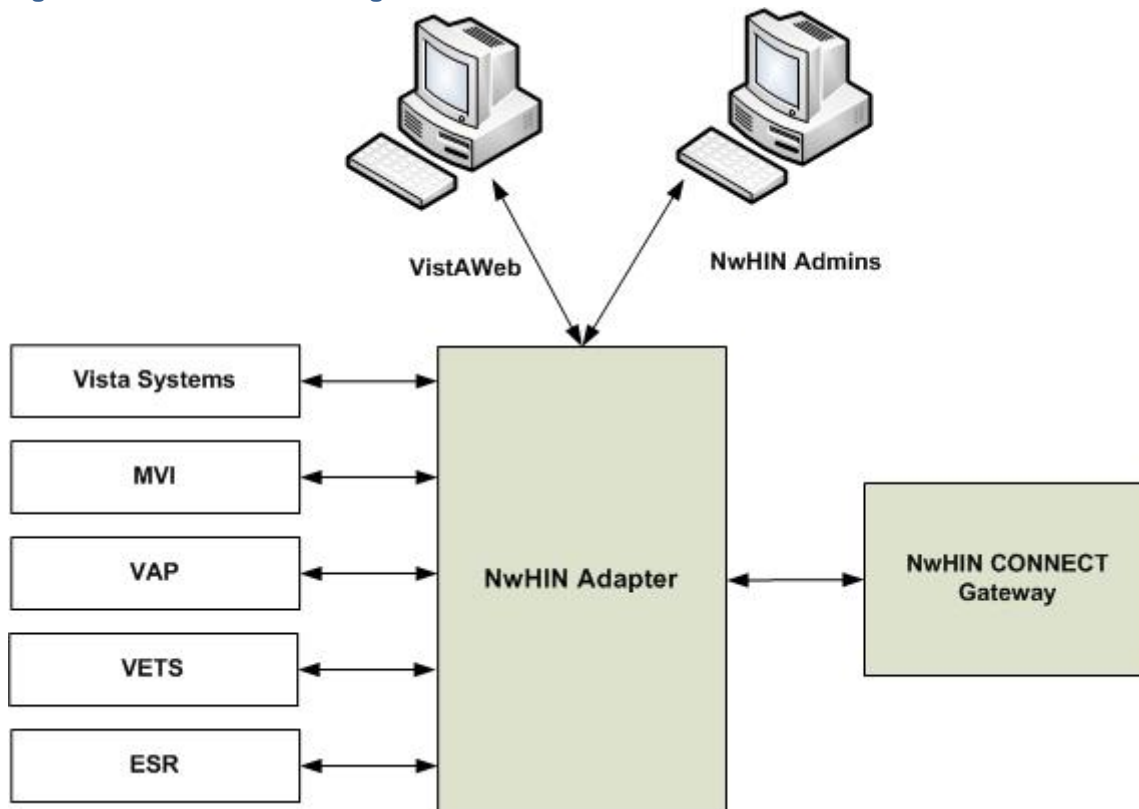
- One object for the NwHIN Adapter 5.0
- One object for each system or external service with which the NwHIN Adapter 5.0 will interface
- One object for each Program Office system or subsystem with which the NwHIN Adapter 5.0 will interact
- One object for each data store that the NwHIN Adapter 5.0 shares with other systems

3.1.1. Application Context

The figure below depicts the interconnected subsystems that are used by the NwHIN Adapter. All these subsystems with the possible exception of the NwHIN Gateway have separate but dependent build and delivery activities associated with them. The NwHIN Gateway is a COTS product that is configured and deployed inside the VA by the NwHIN development team and must be included in the SDD.

Other dependent systems include approved NwHIN partners, the NwHIN Service Registry, and the NwHIN Certificate Authority. Although these are not subject to build and deliver activities within the VA, they are necessary for the test and production processes of the system and must therefore be included in the Project Management Plan (PMP).

Figure 9: NwHIN Context Diagram



The key sub-systems with which NwHIN Adapter interacts within the VA are described below.

3.1.1.1. NwHIN VA Gateway

The NwHIN VA Gateway is a subsystem that is comprised of services and components. These services and components are necessary to connect a NwHIN exchange participant into the NwHIN, and for the most part, are intended to be used as-is. A handful of components could be replaced or overridden provided that the web service interface of the replacement component is identical to that of the component being replaced. The services provide mechanisms for receiving and passing messages between the NwHIN and the agency adapter. In addition to supporting NwHIN standard services, they also provide components to manage NwHIN connection endpoint URL data, patient correlation, and a variety of other services.

Note: For the most part, these are intended to be used without modification. Depending on local needs, a portion of those components could be replaced or overridden provided that the replacement component's Web Service Interface is identical to that of the component being replaced.

3.1.1.2. NwHIN Gateway Adapter

The NwHIN Gateway Adapter is the subsystem that provides NwHIN capability for the VA. The Adapter system connects all the subsystems together in order to provide VA clinicians with the C32 Health Summary Record and C62 Unstructured Document Component needed to treat VA patients.

NwHIN Gateway Adapter 5.0 is the software that the agency will use to communicate bi-directionally through the NwHIN Gateway. It is meant to be a system that aggregates data from different VA's healthcare systems, assembles that data and transforms the data into a HITSP standard document format (C32, C62, etc.) to be exchanged with the NwHIN partners. It will be required to implement a specific set of interfaces that are defined by NwHIN Gateway. NwHIN Gateway will use these interfaces to send messages to and receive responses back from the Adapter. Although the Adapter can provide any implementation required to support the interface, a reference implementation will be provided that may be used as a basis. Enterprise-class, open-source tools have been and will continue to be released for the NwHIN Gateway; if necessary, these may be used by the VA. Currently, Entity and Agency Service interfaces enable the NwHIN Adapter to communicate with the NwHIN Gateway.

3.1.1.3. VA MVI

The VA's Master Patient Index VistA (MVI) is the subsystem that stores veterans' demographics and Integration Control Numbers (ICNs), which clinical users of the system can request through the NwHIN Adapter to identify a patient in question.

The ability to uniquely identify a patient and the facilities where that patient has received healthcare previously is a key asset in enabling a clinician to deliver quality care to veterans. It is upon this foundation that the Computerized Patient Record System (CPRS) Remote Data Views Project enables clinicians to retrieve medical information from wherever a patient has received care. When the ICN of a medical record is populated at the Health Eligibility Center (HEC) and other national databases, it also assists in eliminating duplicate records throughout the systems. The need also exists between the Department of Veterans Affairs (VA) and other agencies [such as Indian Health Service (IHS) and the DoD] to uniquely identify patients and share information regarding any patient who has received care from more than one facility/agency.

A suite of applications make up the VA MVI and contain the following three modules: Master Patient Index Austin Automation Center (AAC), Master Patient Index VistA (MVI), Patient Demographics (MVI/PD). A patient index is maintained within the MVI (located at the AAC in Austin, Texas) by establishing a correlation between each unique system record and the MVI's unique identifier (the ICN). The correlated list is maintained to enable the sharing of patient data between operationally diverse systems and to maintain the integrity of the correlations to the ICN.

The MVI is the authoritative source for the following identity fields:

- ICN
- Name (all components)
- Date of Birth
- Mother's Maiden Name
- Social Security Number (SSN)
- Gender
- Correlated domains (treating facilities/systems of interest) that are known by that ICN

3.1.1.4. VAP

The Veterans Authorization and Preferences (VAP) subsystem enables veterans to manage, integrate, and enforce their opt-in/opt-out preferences electronically. VAP technology enables veterans to update and change those preferences through the use of the eBenefits application. VAP technology also satisfies organizational security requirements and privacy policies relative to Health Information Exchange (HIE). Working with VAP, the NwHIN Adapter can verify a VA patient's preference to opt in or opt out of the HIE system.

3.1.1.5. eBenefits

The eBenefits Web application component allows Veterans to opt into the NwHIN data exchange or opt out of it by accessing the VAP Web Service.

3.1.1.6. VistAWeb

VistAWeb is a web-based system that works with the NwHIN Adapter to display health information sent from an external healthcare facility to VA clinicians. It also enables VA clinicians (who have access control rights) to request VA patients' Health Summary Records from VistA systems.

3.1.1.7. VETS

The Veterans Health Administration (VHA) Health Administration's Enterprise Terminology Services (VETS) translates clinical data terminology between different applications. For example, VETS is used by the Adapter when assembling a C32 or a C62 document for trusted, external healthcare partners.

3.1.1.8. ESR

The Enrollment System Redesign (ESR) is a VA enterprise application that houses Veteran administrative, eligibility, and enrollment data. The Adapter uses a Web Service Interface with ESR to retrieve Veteran Preferred Facility information. In turn, the Adapter stores the Veteran Preferred Facility information in its Audit table so that it can provide it for VAP Audit Summary and Detail Reports.

Following is a slightly broader context diagram of the Adapter and participating systems with communication data flow.

Figure 10: Context Diagram with Communication Data Flow (Adapter and participating systems)

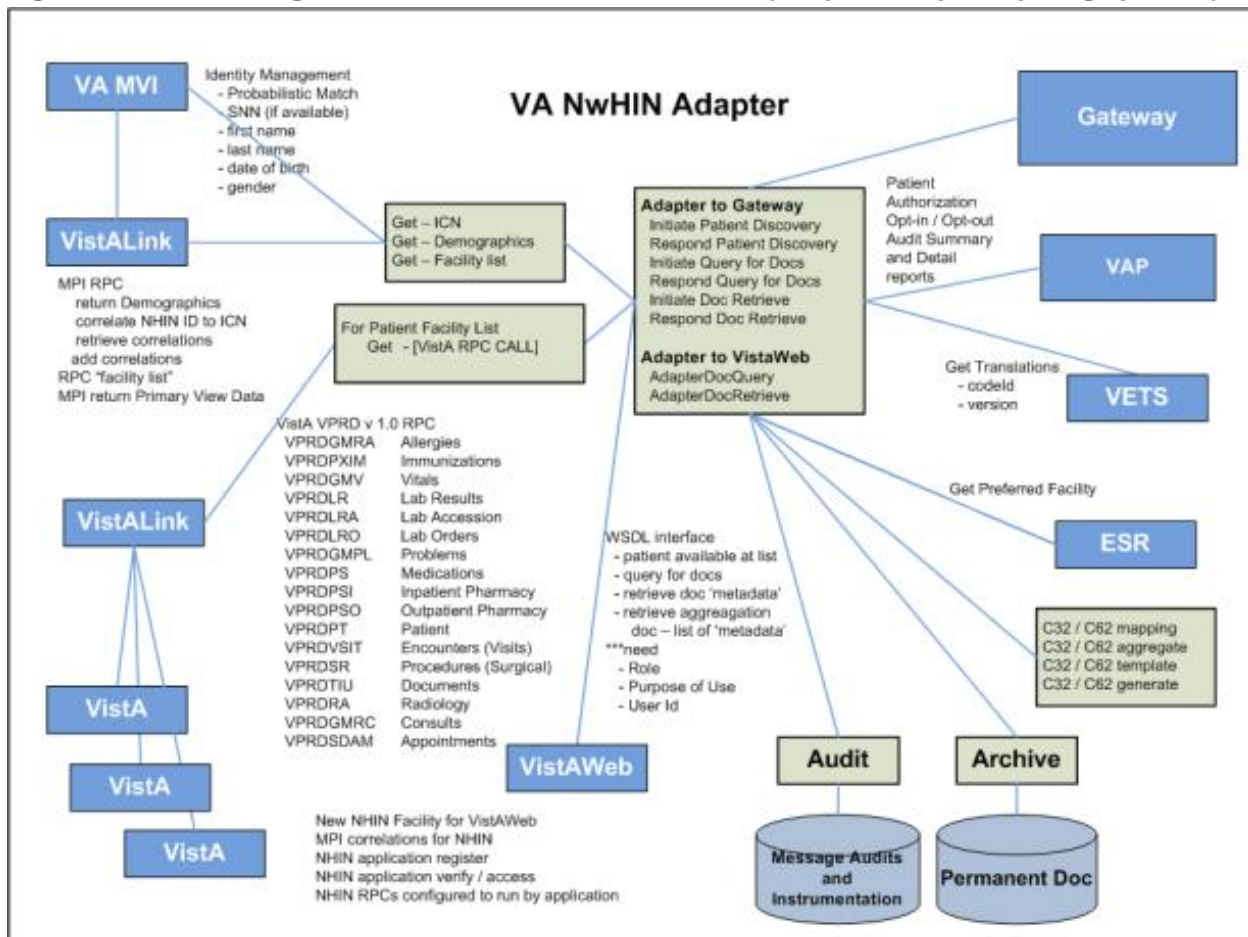


Table 14: Application Context Description (Objects)

ID	Name	Description	Interface Name	Interface System
S1	Service Registry (UDDI)	<p>The service registry is a UDDI service containing the participant Health Information Exchanges (HIEs) and the network addresses for all the service end points that they support. The service specification is identified below.</p> <p>There are two registries for the NwHIN – Test and Production</p> <p>Web Services Registry Production Specification v2.0 [PDF - 378 KB]</p>	Inquiry API	NwHIN Gateway Other Partner gateways
S1			Subscription API	NwHIN Gateway Other Partner gateways
S2	Certificate Authority	This is the system to support certificate revocation and is included in the messaging specification.	OCSP	NwHIN Gateway Other Partners
S2			CRL	NwHIN Gateway Other Partners
S3	VA NwHIN Gateway	Patient Discovery Production Specification v1.0 [PDF - 214 KB] External interface for other partners to access the VA	I3.1 Patient Discovery	Other Partner gateways
S3		Query for Documents Production Specification v2.0 [PDF - 212 KB] External interface for other partners to access the VA	I3.2 Document Query	Other Partner gateways
S3		Retrieve Documents Production Specification v2.0 [PDF - 178 KB] External interface for other partners to access the VA	I3.3 Document Retrieve	Other Partner gateways
S3		Service that orchestrates processing of requests from existing system(s) serviced by Gateway to locate patients on remote systems on the NwHIN based on demographic information.	I3.4 EntityPatientDiscovery	VA NwHIN Adapter

ID	Name	Description	Interface Name	Interface System
S3		Service that orchestrates processing of requests from existing system(s) serviced by Gateway to locate electronic health information, represented as documents, associated with a specific patient on remote systems on the NwHIN to be retrieved by the Retrieve Documents service.	I3.5 EntityDocQuery	VA NwHIN Adapter
S3		Service that orchestrates processing of requests from the NwHIN to retrieve documents containing patient health information on the existing system(s) serviced by Gateway that were located by the Query for Documents service.	I3.6 EntityDocRetrieve	VA NwHIN Adapter
S4	VA NwHIN Adapter	Service that acts as the proxy to the production master patient index (MPI) service, a customizable or replaceable service within the adapter.	I4.2 AdapterMPI (201305)	VA NwHIN Gateway
S4		Service that manages the correlation of patient IDs from existing system(s) serviced by GATEWAY and other NHIEs.	I4.3 PatientCorrelation	VA NwHIN Gateway
S4		Encapsulation of the GATEWAY adapter service interface that processes requests to locate electronic health information documents on the existing system(s) serviced by GATEWAY.	I4.4 AdapterDocQuery	VA NwHIN Gateway
S4		Encapsulation of the GATEWAY adapter service interface that processes requests for electronic health information documents on the existing system(s) serviced by GATEWAY.	I4.5 AdapterDocRetrieve	VA NwHIN Gateway
S4		This is the interface provided by the adapter which enables an internal VA system to invoke a Query for Documents.	I4.6 InternalDocQuery	VistaWeb server
S4		This is the interface provided by the adapter which enables an internal VA system to invoke a Retrieve Document Set.	I4.7 InternalDocRetrieve	VistaWeb server

ID	Name	Description	Interface Name	Interface System
S6	VistA Systems	This is the NwHIN RPC capabilities implemented with VistALink for accessing the content on local VistA systems.	I6.1 RPC Fetch Record	VA NwHIN Adapter
S7	Identity Management Service (MVI)	All VA NwHIN Adapter queries need to be in a synchronous mode.	I7.1 Search Person (Find Candidate Search) QBP-Q22	VA NwHIN Adapter VAP
S7		The OMG PIDS specification defines this feature/interface as an operation that "returns the IDs in the destination ID Domains that correspond to the ID passed in. In the VA IdM Service we define the VA ID Domain (see VA Id Domain Reference Model figure below) to include any of the SourceID that correlate to our Enterprise Identifier (ICN).	I7.2 Get CorrespondingIds	VA NwHIN Adapter
S7			I7.3 Link Correlation	VA NwHIN Adapter
S7			I7.4 UnLink Correlation	VA NwHIN Adapter
S7			I7.5 Retrieve Primary View	VA NwHIN Adapter
S9	VAP Subsystem	The Release of Information VAP subsystem is the system that supports the ROI office to perform manual consent management for patients who submit authorizations physically (by mail). The VAP subsystem will be enhanced to handle release authorizations handled electronically through eBenefits portal.	I9.1 Access Consents	VA NwHIN Adapter
S9		Interface for making the Authorization Decision	I9.3 XACML Authorization Decision	VA NwHIN Adapter
S14	VA Enterprise Terminology Service (VETS)	Service for translating between one code system and another	I14.1 Mediation Interface	VA NwHIN Adapter

ID	Name	Description	Interface Name	Interface System
S19	Enrollment System Redesign	Service that provides a veteran's preferred facility used in VAP reporting.	I19.1 Get Preferred Facility	VA NwHIN Adapter

Table 15: Application Context Description (Interfaces External to OI&T)

ID	Interface Name	Related Object	Input Messages	Output Messages	External Party
I3.1	I3.1 Patient Discovery	VA NwHIN Gateway	Find Candidate	Candidates	Other Partner initiates
	External Patient Discovery	External Gateway	Candidates	Find Candidate	Other Partner responds
I3.2	I3.2 Document Query	VA NwHIN Gateway	Find Documents	Document Entries	Other Partner initiates
	External Patient Document Query	External Gateway	Document Entries	Find Documents	Other Partner responds
I3.3	I3.3 Document Retrieve	VA NwHIN Gateway	Retrieve Documents	Document Set	Other Partner initiates
	External Patient Retrieve Document	External Gateway	Document Set	Retrieve Documents	Other Partner responds

Table 16: Application Context Description (Interfaces Internal to OI&T)

ID	Interface Name	Related Object	Input Messages	Output Messages	Other CBP Party
I3.4	EntityPatientDiscovery	VA NwHIN Gateway	PatientDiscoveryRequest(IN2 01305)	PatientDiscoveryResponse(IN 201306)	VA NwHIN Adapter
I3.5	EntityDocQuery	VA NwHIN Gateway	AdhocQueryRequest	AdhocQueryResponse	VA NwHIN Adapter
I3.6	EntityDocRetrieve	VA NwHIN Gateway	RetrieveDocSetRequest	RetrieveDocSetResponse	VA NwHIN Adapter
I4.2	AdapterMPI	VA NwHIN Adapter	FindCandidates	Candidates	VA MVI
I4.3	PatientCorrelation	VA NwHIN Adapter	AddPatientCorrelation	Ack	VA NwHIN Gateway

ID	Interface Name	Related Object	Input Messages	Output Messages	Other CBP Party
I4.3			RetrievePatientCorrelations	Correlations	VA NwHIN Gateway
I4.4	AdapterDocQuery	VA NwHIN Adapter	AdhocQueryRequest	AdhocQueryResponse	VA NwHIN Gateway
I4.5	AdapterDocRetrieve	VA NwHIN Adapter	RetrieveDocSetRequest	RetrieveDocSetResponse	VA NwHIN Gateway
I4.6	InternalDocQuery	VA NwHIN Adapter	AdhocQueryRequest	AdhocQueryResponse	VistaWeb server
I4.7	InternalDocRetrieve	VA NwHIN Adapter	RetrieveDocSetRequest	RetrieveDocSetResponse	VistaWeb server
I4.8	PolicyCheck	VA NwHIN Adapter	Authorization Decision Request (XACML)	Authorization Decision Response	VAP
I6.1	RPC Fetch Record	VistA Systems	RPC Request	RPC Response	VA NwHIN Adapter
I7.1	Search Person (Find Candidate Search) QBP-Q22	Identity Management Service (MVI)	(Find Candidate Search) Unattended Probabilistic QBP-Q22	Single Candidate For those inbound VA NwHIN Adapter queries from external NHIE's the query should only return either a single ICN or "NF" or "No Matches Found" type response.	VA NwHIN Adapter
I7.2	Get CorrespondingIds	Identity Management Service (MVI)	GetCorrespondingIds	Results	VA NwHIN Adapter
I7.3	Link Correlation	Identity Management Service (MVI)	AddProfile	Result	NwHIN Adapter
I7.4	UnLink Correlation	Identity Management Service (MVI)	?	?	NwHIN Adapter

ID	Interface Name	Related Object	Input Messages	Output Messages	Other CBP Party
I7.5	Retrieve Primary View	Identity Management Service (MVI)	GetProfile	Profile	VA NwHIN Adapter
I9.3	XACML Authorization Decision	S9 VAP Policy Decision Point	Authorization Decision Request (XACML)	Authorization Decision Response	VA NwHIN Adapter
I14.1	Mediation Interface	S14 VA Enterprise Terminology Service (VETS)	Code to be translated	Translation	VA NwHIN Adapter
I19.1	Preferred Facility	S19 Enrollment System Redesign (ESR)	Patient ICN	Preferred Facility	VA NwHIN Adapter

Table 17: Application Context Description (Externally Shared Data Stores)

ID	Name	Data Stored	Owner	Access	

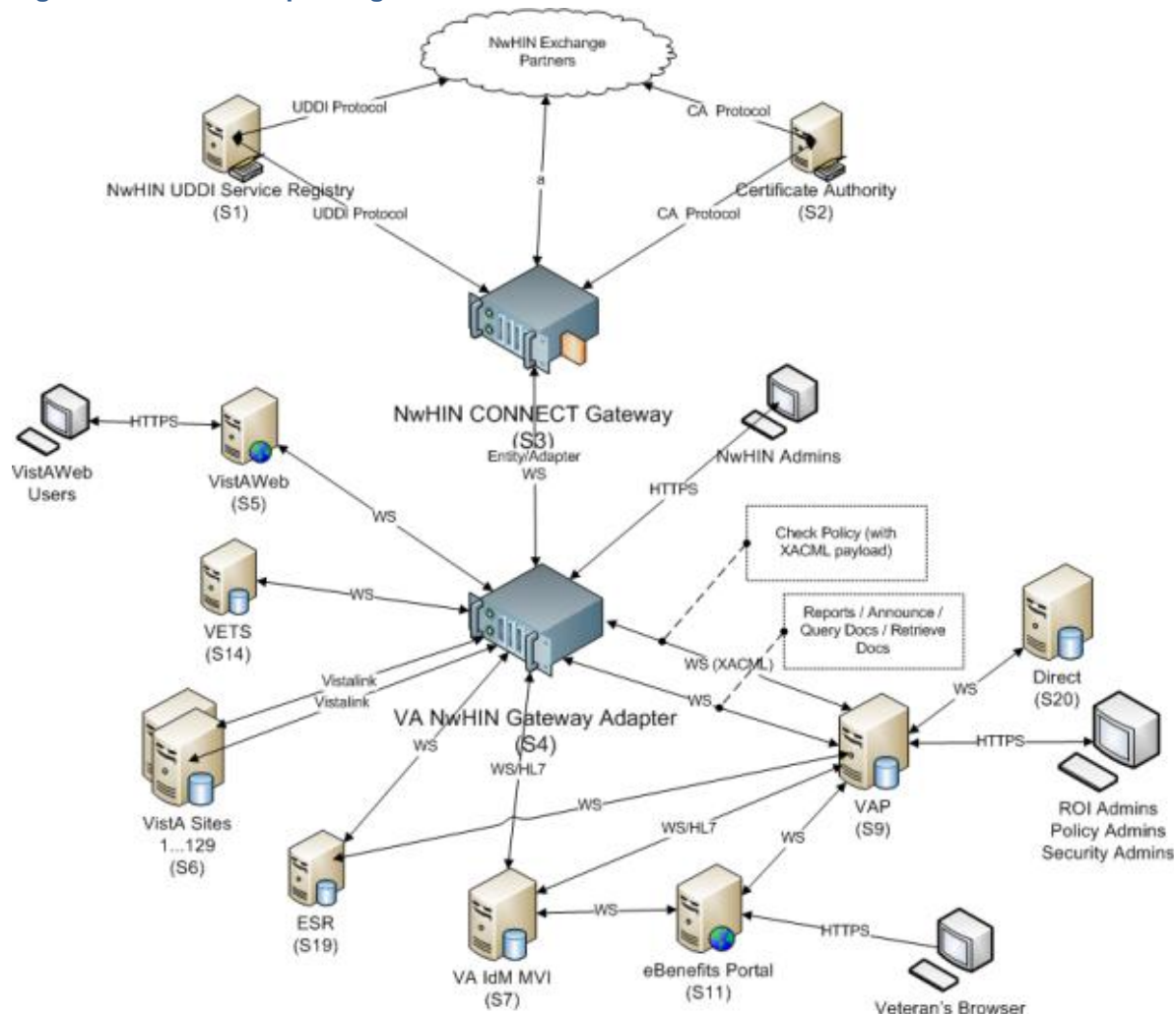
Note: Adapter does not have externally shared Data Stores.

3.1.2. High Level Application Design

The High Level Application Design is intended to identify the NwHIN Adapter's major components, the relationships between them and to surrounding applications. The NwHIN Adapter's major components are at the subsystem or top-level service area.

The figure below depicts NwHIN Adapter system components and its interactions with other sub systems and users.

Figure 11: NwHIN Adapter High Level Architecture



The VA NwHIN Gateway Adapter application provides necessary interfaces between several VA systems and the NwHIN Gateway in order to share a patient's clinical records with other HIEs. The VA NwHIN Gateway Adapter is deployed as a single, national instance at AITC. The NwHIN Adapter uses MVI for all patient correlation purposes. Payloads are standards-based Clinical Document Architecture (CDA) XML documents. VistALink-mediated RPC calls are used to retrieve data from all relevant VistA systems; VistAWeb displays the HIE data that the NwHIN Adapter retrieves. The NwHIN Adapter works with the VAP subsystem to access and retrieve the security-related information of patients and organizations.

The NwHIN Adapter system performs the following main business functions:

- Store and retrieve correlation of patient identities in MVI between VA and other HIE partners

- Exchange healthcare information bi-directionally between the VA and other trusted partners
- Enforce security and privacy policies of patients and organizations
- Provide reports
- Announce new patients (who have opted-in) to NwHIN partners

3.1.3. Application Locations

The following table lists the locations at which the NwHIN Adapter 5.0 components will be hosted

Table 18: NwHIN Adapter Component Locations

Application Component	Description	Location at Which Component is Run	Type
NwHIN UDDI Service Registry	The service registry is a UDDI service containing the participant Health Information Exchanges (HIEs) and the network addresses for all the service end points that they support. The service specification is identified below.	Department of Health and Human Services	Data Logic
Certificate Authority	This is the system to support certificate revocation and is included in the messaging specification.	Department of Health and Human Services	Security
VA NwHIN Gateway	External interface for other partners to access the VA	AITC	Application
VA NwHIN Gateway Adapter	Integration server between NwHIN Gateway and VA systems	AITC	Application
VistAWeb	User interface for viewing HIN data and aggregating with local VA data	AITC	User Interface
VLER VistA RPCs	Access mechanisms to get data from VistA	All 129 VistA sites	Data Logic
VA IdM MVI	Probabilistic matching and linking and unlinking of correlations	AITC	Data and Application Logic
VAP	System for Consent management and Access Control System	AITC	Privacy Logic
eBenefits Portal	Primary access mechanism for Veteran access to VAP	AITC	User interface

Application Component	Description	Location at Which Component is Run	Type
ESR	Enrollment System Design – used to obtain a Veteran’s Preferred Facility	AITC	Data Logic
VETS	Service for translating from one code system to another	AITC	Data Logic

3.1.4. Application Users

The following table lists the likely users of the NwHIN Adapter 5.0 application.

Table 19: NwHIN Adapter 5.0 Users

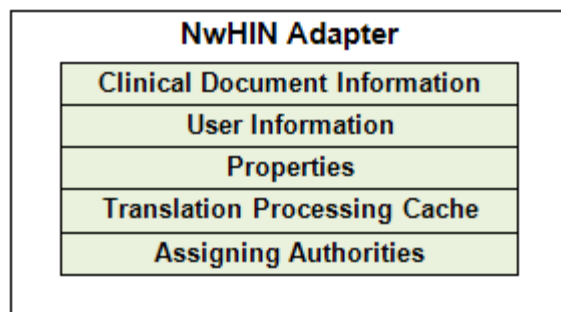
Component	Access Location	User
VistAWeb	Browser interface at Pilot VAMCs	Clinical staff who view the patient records (particularly data obtained from external partners using NwHIN)

3.2. Conceptual Data Design

3.2.1. NwHIN Adapter 5.0 Conceptual Data Model

This Conceptual Data Model (CDM) depicts the data necessary to support the Adapter systems and any relationships. Only the data for the system identified as custom systems is included in the conceptual data model. All other COTS product data models are considered proprietary and will not be discussed in this document. The figure below depicts the NwHIN Adapter 5.0 project CDM.

Figure 12: Project Conceptual Data Model



The NwHIN Adapter 5.0 CDM covers four areas of information:

- **Clinical Document Information:** Restricted to information found in the C32 Health Summary documents and C62 Documents.
- **User Information:** Passed by the user system as part of the authorization framework.
- **Properties:** Data Holds system-wide properties that are used to dynamically configure the Adapter.
- **Translation Processing Cache:** Mechanism that allows caching of VETS translations for improved performance.
- **Assigning Authorities:** Data that tracks multiple facilities within an HIE (multiple Assigning Authorities).

3.2.2. Database Information

The table below identifies all databases that will be created, replaced, interfaced with, or whose structure will be modified (i.e., add or delete tables or add or delete columns to a table) as part of this effort.

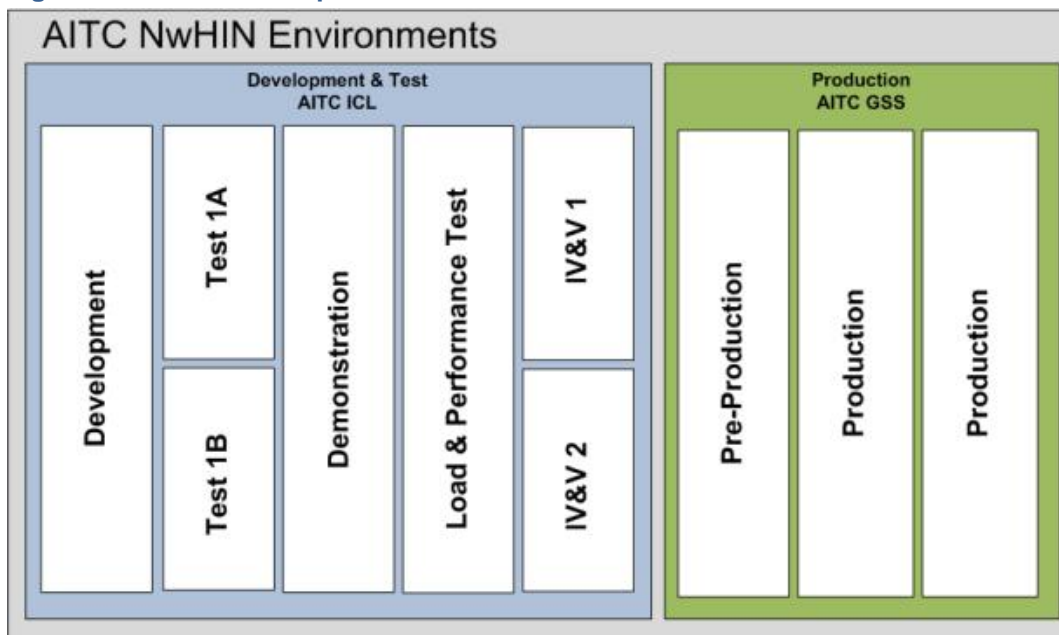
Table 20: Database Inventory

Database Name	Description	Type	Steward
NwHIN	NwHIN Adapter Database	Oracle 11g	AITC
NHIE-Gateway	NwHIN Gateway Database	Oracle 11g	AITC

3.3. Conceptual Infrastructure Design

The following diagram shows the environments that will be supported and locations they will be installed.

Figure 13: NwHIN Conceptual Networks and Environments



- **ICL Development Environment:** Environment used internally by developers to perform integration testing of the system.
- **ICL Functional Test 1A & 1B Environment:** Environments used by testers to do a fully integrated functional testing of the system.
- **ICL Developer Demonstration Environment:** Environment used by external groups to get a preview look at functionality. This environment is expected to be somewhat unstable.
- **ICL Load & Performance Test Environment:** Environment used by load and performance engineers when testing those characteristics of the system. This testing is generally done in parallel to SQA testing.
- **ICL IV&V Test Environment 1:** Environment used to do independent verification and validation of the system's functionality.
- **ICL IV&V Test Environment 2:** Environment used to do independent verification and validation of the system's performance and scalability characteristics.

- **GSS Pre-Production Environment:** Environment used to do initial field testing of the system under development. Generally one or more test sites or partners are selected to test the capabilities of the system.
- **GSS Production Environment:** Environment that hosts the full production system.

3.3.1. System Criticality and High Availability

The NWHIN Adapter system will be located at AITC and shall employ a Disaster Recovery Plan to support high availability.

3.3.2. Special Technology

The Adapter requires no special technology.

3.3.3. Technology Locations

All systems participating in the NWHIN Adapter system of systems will be located at the Austin Information Technology Center (AITC) except the VistA systems. The VistA systems are located partly in VAMC's and partly in Regional Data Centers (RDCs). Development and test systems will be located in the Integrated Customer LAN (ICL) environment at the AITC and the Pre-Production and Productions system will be located in the GSS environment.

4.SYSTEM ARCHITECTURE

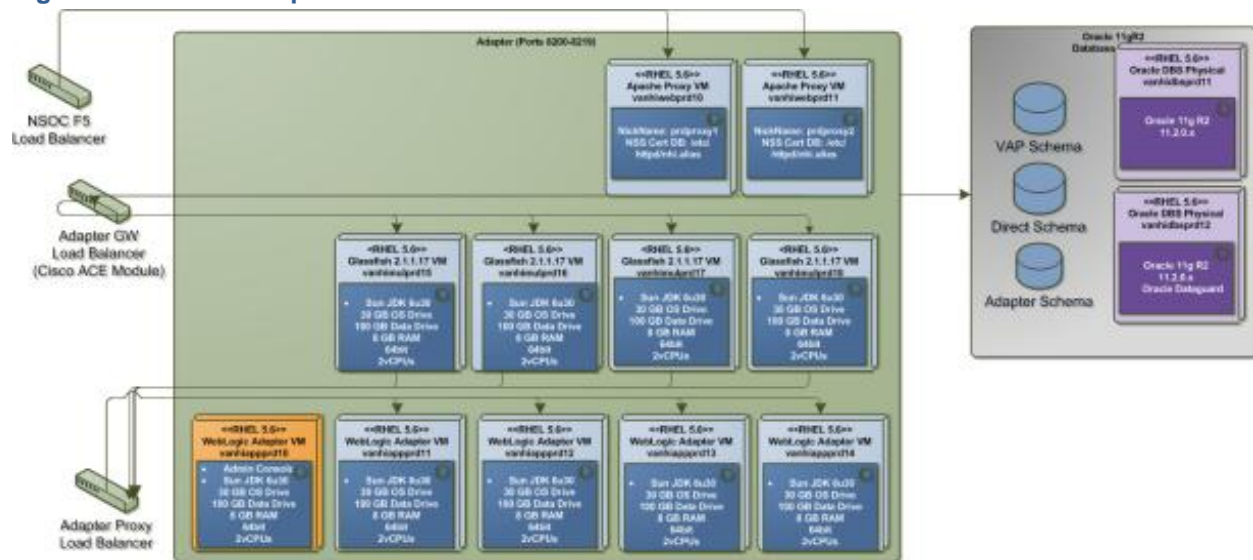
4.1. Hardware Architecture

The Adapter 5.0 deployment will be composed of virtual machines (VM) based and deployed on hardware at AITC data center on a VMware farm. The Adapter 5.0 deployment consists of two VM Apache Proxy Servers, four VM servers for CONNECT Gateway, four VM WebLogic Application for the Adapter Cluster, and one Database servers with schemas for CONNECT and Adapter.

The operating system for the Apache Proxy server is RHEL 5.8. The CONNECT Gateway, the Adapter Application, and Oracle Database servers will also be running on RHEL 5.8 platform.

The following diagram illustrates the design of the NwHIN Adapter hardware architecture.

Figure 14: NwHIN Adapter Hardware Architecture



The table below describes the minimum required system components.

Table 21: NwHIN Adapter Environment

Tier	Platform	Component	Version	Description
Proxy	Linux	Apache Proxy		Until a Load Balancer with SSL offloading is procured be it an F5, Cisco, or Brocade, we have to have proxies.
Adapter CONNECT Gateway	RHEL 5.8	GlassFish	2.1.1.17	
Application	Linux	Java JDK	1.6.0_30	Java
		WebLogic	10.3.5	Web container

Tier	Platform	Component	Version	Description
Database	Linux	Oracle	11gR2	Data Base Server Servicing the Gate Way and Adapter Servers
Database	Linux	Oracle	11gR2	Database Server Back-Up

The following versions will be installed at AITC to support the application.

- WebLogic Server Version 10.3.5
- GlassFish version 2.1.1.17
- JDK Version jdk1.6.0_30
- Oracle Version : 11.2.0.4

4.2. Software Architecture

As previously discussed, the VA NwHIN Adapter (Adapter) interfaces with the VA NwHIN CONNECT Gateway (CONNECT). The NwHIN CONNECT Gateway is comprised of the services and components necessary to connect the agency to the NwHIN. These services provide mechanisms for passing messages to and from the NwHIN and the Adapter as well as managing NwHIN connection endpoint URL data.

The NwHIN Gateway Adapter (Adapter) is a system that provides the functionality needed to interface with internal systems for checking permissions, patient correlations, data retrieval, document generation, code translations and auditing. The Adapter system connects all the subsystems together in order to provide the clinicians with the C32 and C62 documents used in the treatment of patients.

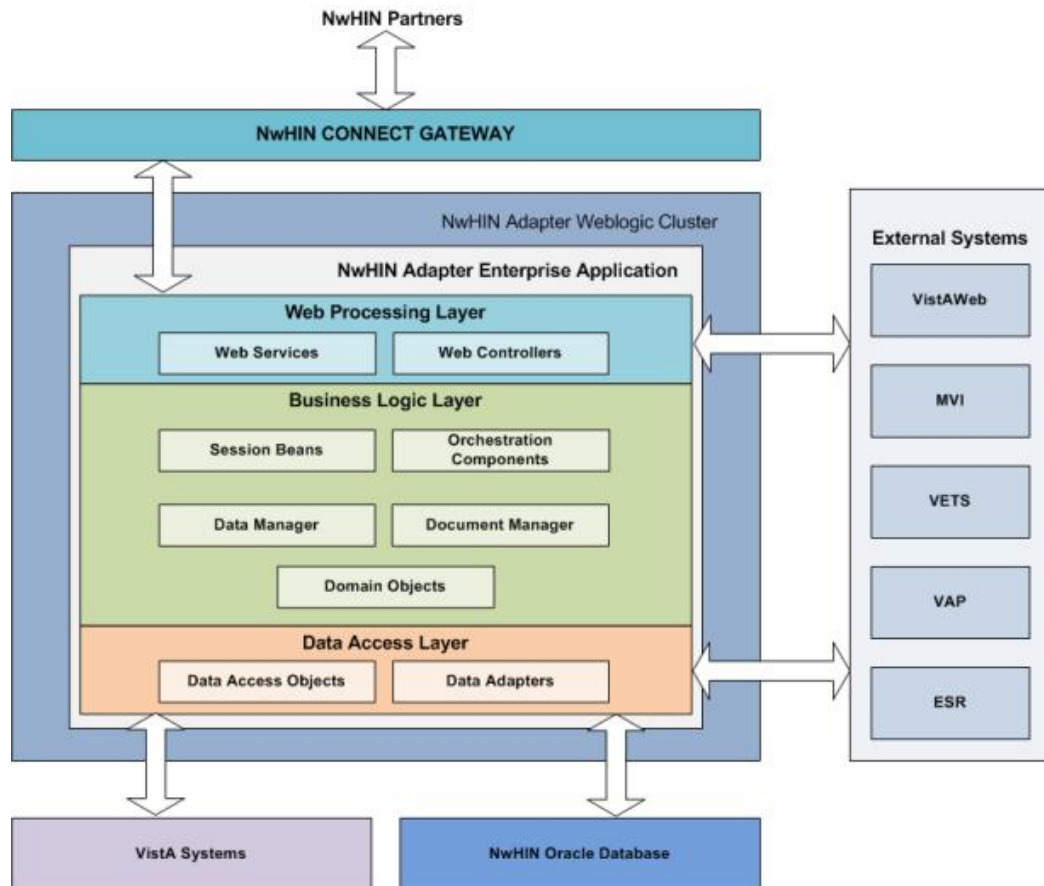
The NwHIN Gateway Adapter software facilitates bi-directional communication with the NwHIN CONNECT gateway. The Adapter implements a specific set of interfaces defined within the NwHIN CONNECT which are discussed in more detail in [Detail Design](#).

The application is comprised of three main software modules.

- **Web Processing Layer:** A SOAP Web service layer that provides service interfaces exposed through WSDL and Web Controllers (handlers) that parse incoming requests and parameters and routes the request to the appropriate Session Bean in the Business layer.
- **Business Layer:** Business Application layer composed of Session Beans and Manager objects that manage Document generation and translation and transformation, Data Access management processes, business rules and logic.
- **Data Layer (Data Access Layer):** Composed of Data Adapter objects that handle connections to external systems such as the Oracle Database, Vista Systems, MVI, VAP, VETS as well as Data Access Objects and Hibernate ORM mapping tools.

The diagram below shows a high level view of the NwHIN Adapter application design.

Figure 15: Adapter High Level Software Design



4.3. Communications Architecture

The following table describes the communication protocols used within the Hardware Architecture to facilitate communication between Adapter module components and external systems.

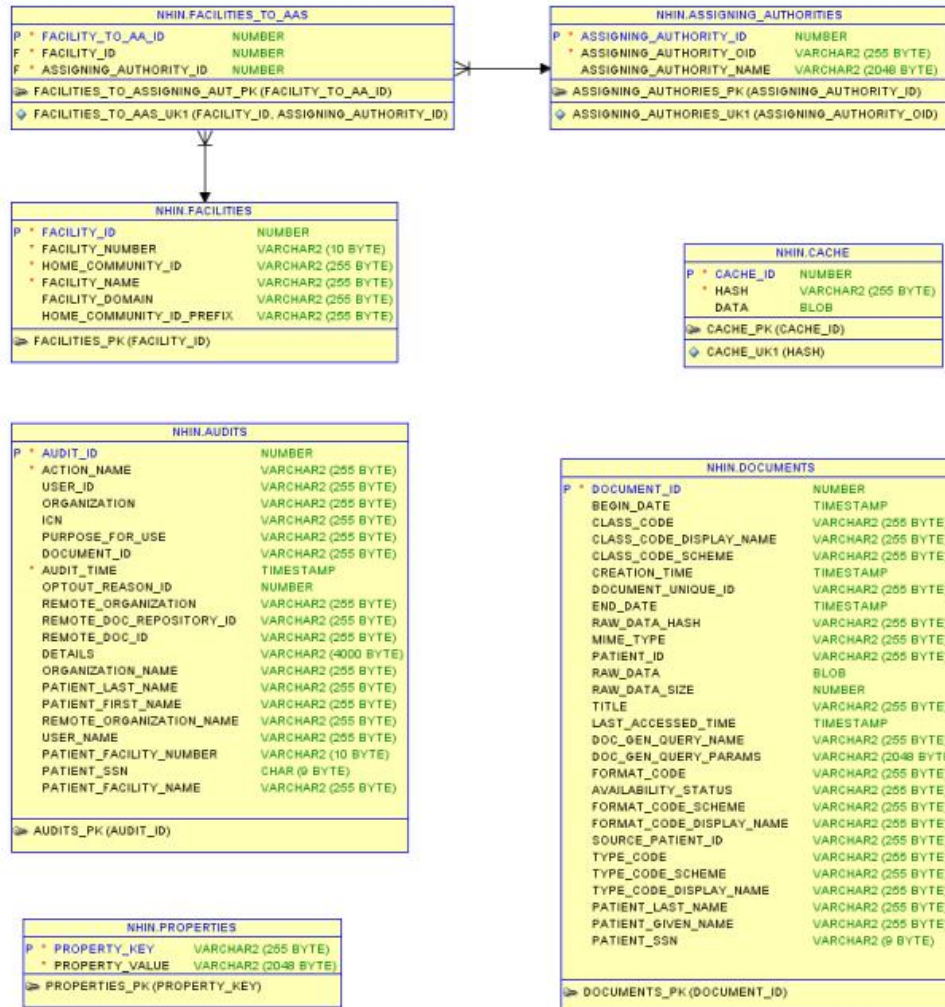
Table 22: NwHIN Adapter Hardware Communication Protocols

Communications Protocol	Component(s) / Module	Description
HTTPS	Web Services / Processing	NwHIN CONNECT Gateway
HTTPS	Web Services / Processing	VistAWeb
HTTP	Data Layer / Data Adapters	VAP
HTTP / MLLP	Data Layer / Data Adapters	MVI
HTTP	Data Layer / Data Adapters	VETS
HTTP	Data Layer / Data Adapters	ESR
TCP / RPC	Data Layer / Data Adapters	VistA Sites
Oracle Java thin driver	Data Layer / Data Access Objects	Oracle database communication

5. DATA DESIGN

This section includes the Entity Relational Diagram, database scripts, and data fields descriptions of the database table definitions of the NwHIN Adapter database.

Figure 16: Entity Relational Diagram of the NwHIN Adapter Database



The following table lists the table names, a brief description of the tables, and the SQL scripts used to create NwHIN Adapter tables.

Table 23: NwHIN Adapter Database Tables

Table Name	Table Description	Links
AUDITS	Table used for instrumentation of events within the adapter. This will allow for viewing of Accounting of Disclosure reports, Received Documents reports, and Patient Discovery reports.	NHIN_AUDITS.sql NHIN_AUDITS.sql NHIN_AUDITS.sql

Table Name	Table Description	Links
DOCUMENTS	Temporary cache of documents and meta-data that have been generated by the Adapter. Records for documents that have not been retrieved within a configurable amount of time are deleted.	_____ _____ _____
PROPERTIES	Holds system-wide properties that are used to dynamically configure the Adapter.	_____ _____ _____
CACHE	VETS Translation cache to facilitate improved performance during code translations	_____ _____ _____
FACILITIES	Table of the participating facilities that will be able to share electronic health records on the NwHIN.	_____ _____ _____ _____
ASSIGNING_AUTHORITIES	Assigning Authority – used to facilitate multiple facilities associated with an HIE	_____ _____ _____ _____
FACILITIES_TO_AAS	Intersection table between FACILITIES and ASSIGNING_AUTHORITIES – stores multiple facilities for an Authority.	_____ _____ _____ _____

5.1. Adapter Table Details

The following table includes the details for the table names, field names, and data types of the Adapter database tables.

Table 24: NwHIN Adapter Table Names, Field Names, Data Types

Table Name	Field Name	Data Type
AUDITS	AUDIT_ID – (PK)	NUMBER
	ACTION_NAME	VARCHAR2(255 Byte)
	USER_ID	VARCHAR2(255 Byte)
	ORGANIZATION	VARCHAR2(255 Byte)
	ICN	VARCHAR2(255 Byte)
	PURPOSE_FOR_USE	VARCHAR2(255 Byte)
	DOCUMENT_ID	VARCHAR2(255 Byte)
	AUDIT_TIME	TIMESTAMP(6)
	OPTOUT_REASON_ID	NUMBER
	REMOTE_ORGANIZATION	VARCHAR2(255 Byte)
	REMOTE_DOC_REPOSITORY_ID	VARCHAR2(255 Byte)
	REMOTE_DOC_ID	VARCHAR2(255 Byte)
	DETAILS	VARCHAR2(4000Byte)
	ORGANIZATION_NAME	VARCHAR2(255 Byte)
	PATIENT_LAST_NAME	VARCHAR2(255 Byte)
	PATIENT_FIRST_NAME	VARCHAR2(255 Byte)
	REMOTE_ORGANIZATION_NAME	VARCHAR2(255 Byte)
	USER_NAME	VARCHAR2(255 Byte)
	PATIENT_FACILITY_NUMBER	VARCHAR2(10 BYTE)
	PATIENT_SSN	CHAR(9 BYTE)
	PATIENT_FACILITY_NAME	VARCHAR2(255 Byte)
DOCUMENTS	DOCUMENT_ID – (PK)	NUMBER
	BEGIN_DATE	TIMESTAMP(6)
	CLASS_CODE	VARCHAR2(255 Byte)
	CLASS_CODE_DISPLAY_NAME	VARCHAR2(255 Byte)
	CLASS_CODE_SCHEME	VARCHAR2(255 Byte)
	CREATION_TIME	TIMESTAMP(6)
	DOCUMENT_UNIQUE_ID	VARCHAR2(255 Byte)
	END_DATE	TIMESTAMP(6)
	RAW_DATA_HASH	VARCHAR2(255 Byte)
	MIME_TYPE	VARCHAR2(255 Byte)
	PATIENT_ID	VARCHAR2(255 Byte)
	RAW_DATA	BLOB
	RAW_DATA_SIZE	NUMBER
	TITLE	VARCHAR2(255 Byte)
	LAST_ACCESSED_TIME	TIMESTAMP(6)
	DOC_GEN_QUERY_NAME	VARCHAR2(255 Byte)
	DOC_GEN_QUERY_PARAMS	VARCHAR2(2048 Byte)
	FORMAT_CODE	VARCHAR2(255 Byte)
	AVAILABILITY_STATUS	VARCHAR2(255 Byte)
	FORMAT_CODE_SCHEME	VARCHAR2(255 Byte)
	FORMAT_CODE_DISPLAY_NAME	VARCHAR2(255 Byte)
	SOURCE_PATIENT_ID	VARCHAR2(255 Byte)
	TYPE_CODE	VARCHAR2(255 Byte)
	TYPE_CODE_SCHEME	VARCHAR2(255 Byte)
	TYPE_CODE_DISPLAY_NAME	VARCHAR2(255 Byte)
	PATIENT_LAST_NAME	VARCHAR2(255 Byte)
	PATIENT_GIVEN_NAME	VARCHAR2(255 Byte)
	PATIENT_SSN	VARCHAR2(9 Byte)

Table Name	Field Name	Data Type
PROPERTIES	PROPERTY_KEY – (PK) PROPERTY_VALUE	VARCHAR(255 Byte) VARCHAR(2048 Char)
CACHE	CACHE_ID – (PK) HASH DATA	NUMBER VARCHAR2(255 Byte) BLOB
FACILITIES	FACILITY_ID – (PK) FACILITY_NUMBER HOME_COMMUNITY_ID FACILITY_NAME FACILITY_DOMAIN HOME_COMMUNITY_ID_PREFIX	NUMBER VARCHAR2(10 Byte) VARCHAR2(255 Byte) VARCHAR2(255 Byte) VARCHAR2(255 Byte) VARCHAR2(255 Byte)
ASSIGNING_AUTHORITIES	ASSIGNING_AUTHORITY_ID – (PK) ASSIGNING_AUTHORITY_OID ASSIGNING_AUTHORITY_NAME	NUMBER VARCHAR2(255 BYTE) VARCHAR2(2048 BYTE)
FACILITIES_TO_AAS	FACILITY_TO_AA_ID – (PK) FACILITY_ID ASSIGNING_AUTHORITY_ID	NUMBER NUMBER NUMBER

5.2. Non-Database Management System Files

This section does not apply to the Adapter because all application data and business data are contained in the database.

6.DETAILED DESIGN

This chapter describes the proposed software design in detail. Here, we provide the necessary information for the development team to integrate the hardware components, write the software code, so that the hardware and software components will provide a functional product.

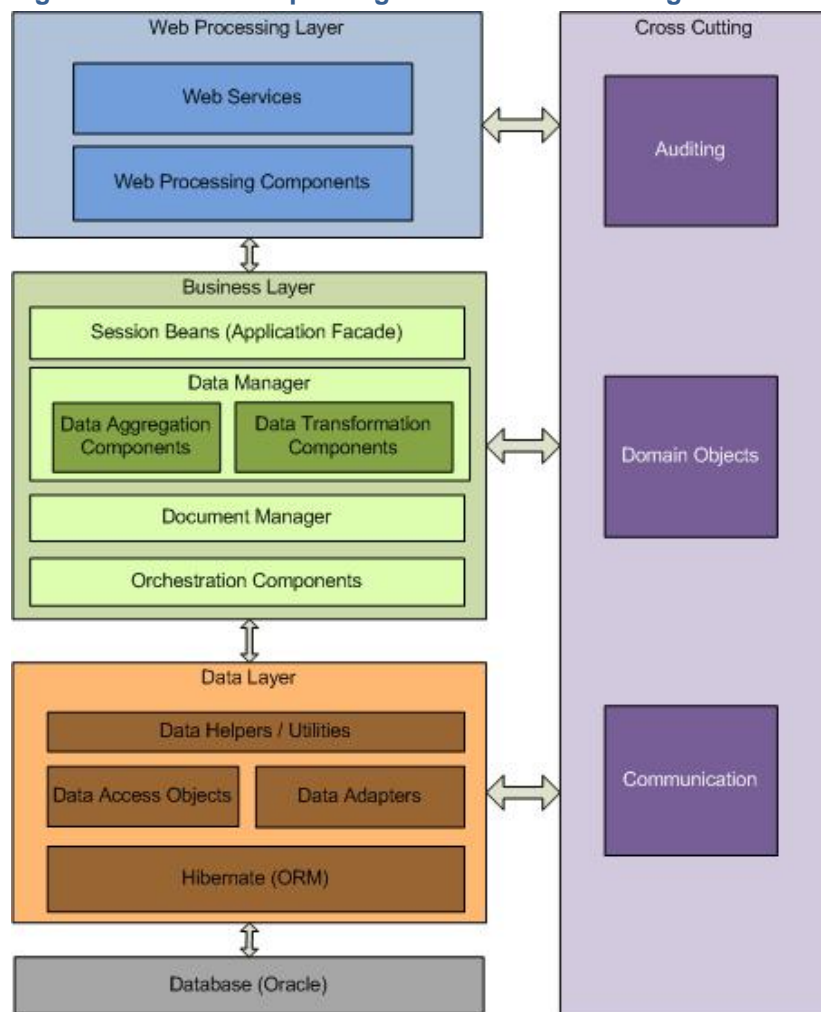
6.1. Hardware Detailed Design

All of the Adapter Hardware design will be based upon the AITC VMware Farm established for production.

6.2. Software Detailed Design

This section discusses the NWHIN CONNECT Gateway (CONNECT) and the NWHIN Adapter (Adapter) systems in detail. The NWHIN CONNECT Gateway is an open source project supported by ONC and is used as a COTS product within the VA. The NWHIN CONNECT Gateway is included in discussion because of the dependent relationship between the Adapter and external NWHIN Partner communications. All communications with the Adapter are made through the NWHIN CONNECT Gateway and so a basic understanding of that system is important in defining Adapter Software design. This section also discusses the function of each module, conditions under which they are called and any processing that occurs within these modules.

Figure 17: NwHIN Adapter High Level Software Design



6.2.1.COTS – NwHIN CONNECT Gateway

The NwHIN CONNECT Gateway is an open source project that is supported by ONC as a reference implementation for the NwHIN specifications. The Gateway is comprised of the services and components necessary to connect an agency to the NwHIN. For the most part, these components and services are intended to be used as is without any change. There are a handful of components that can be replaced or overridden providing the web service interface of the replacement component is identical to the one it is replacing. These services provide mechanisms for receiving messages from the NwHIN and passing them to the agency adapter, as well as for receiving messages from the agency adapter and sending them to the NwHIN. In addition to supporting the NwHIN standard services, they also provide components to manage NwHIN connection endpoint URL data, patient correlation, and a variety of other services.

6.2.1.1. Processing

The NwHIN CONNECT Gateway is responsible for interfacing and communicating with other partner Gateways that are conformant with NwHIN specifications. The NwHIN CONNECT Gateway also interfaces with the NwHIN Adapter system to aggregate and assemble the healthcare information that needs to be shared with the partners after ensuring that the release of records was authorized. The NwHIN CONNECT Gateway interacts with the central UDDI repository to download the information for service endpoints for different partners. The information about Web Service endpoints for different NwHIN partners is stored in an XML file locally on the NwHIN CONNECT Gateway and this information is used

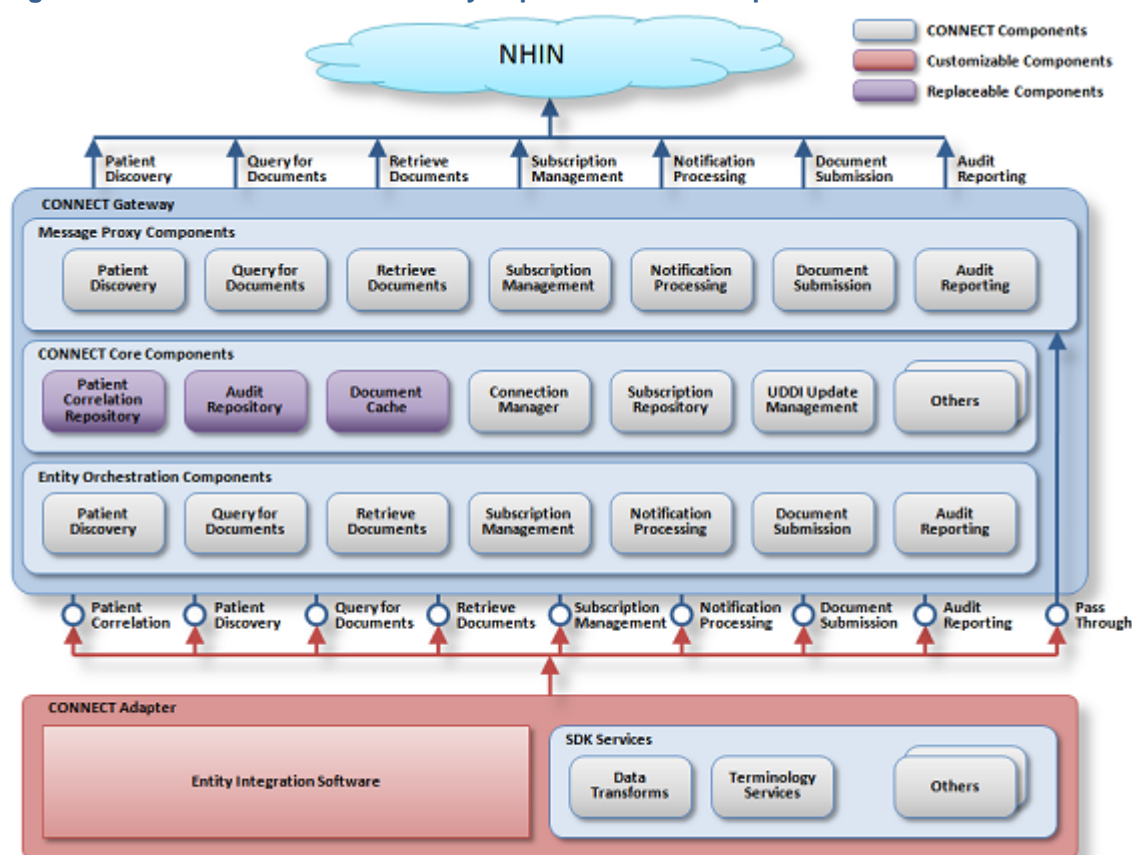
to make a connection to an NwHIN partner for Patient Discovery, Document Query and Document Retrieve.

All communication between Gateways (over the Internet) is secured by the use of two-way SSL. All SOAP messages containing PHI are encrypted by the use of SSL certificates which are issued by ONC. The Gateway-to-Gateway communication uses SOAP over HTTPS as a messaging platform. Once a message is received by the NwHIN CONNECT Gateway, it is delegated to the NwHIN adapter for further processing. VA uses the NwHIN CONNECT Gateway in pass-through mode for all NwHIN transactions (PD, QD, RD). As such, the orchestration of messages has been moved into the NwHIN Adapter component. The Patient Discovery messages (requests and responses) received from the NwHIN partners or sent to the NwHIN partners are [Cross Community Patient Discovery](#) (XCPD) messages wrapped in a SOAP envelope. The [Document Query](#) and [Document Retrieve](#) Messages (requests and responses) received from the NwHIN partners or sent to the NwHIN partners are Cross Community Access (XCA) messages wrapped in a SOAP envelope.

The high level design for the NwHIN CONNECT Gateway (COTS product) is shown below. More information about the architecture and detailed design of the NwHIN CONNECT Gateway can be found at this location:

<https://developer.connectopensource.org/display/NHINR24/Software+Architecture+Documentation>

Figure 18: NwHIN CONNECT Gateway Implementation Components



6.2.1.2. Local data structures

The NwHIN CONNECT Gateway uses various database tables to store information about component configuration, auditing, transaction volumes, etc. This schema for NwHIN CONNECT Gateway resides

in an Oracle database. Since the NwHIN CONNECT Gateway is used as a COTS product, the internal structure of these tables is opaque.

Refer to NwHIN CONNECT database set up at this location:

[https://developer.connectopensource.org/display/NHINR24/Source+Code+Install+\(Windows\)#SourceCodeInstall%28Windows%29-Databasesetup](https://developer.connectopensource.org/display/NHINR24/Source+Code+Install+(Windows)#SourceCodeInstall%28Windows%29-Databasesetup) for additional details on data structures and configuration.

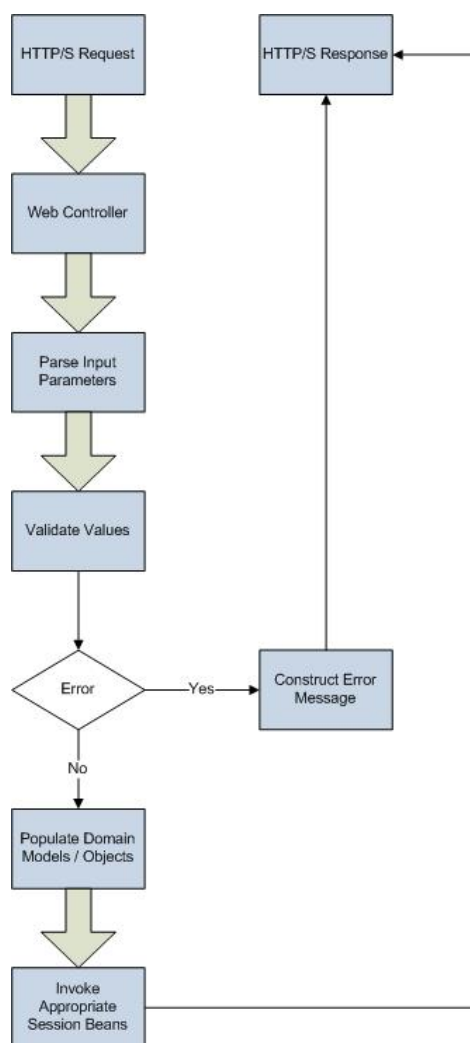
6.2.2. Web Processing Layer

The NwHIN Adapter's web processing layer comprises of components that are responsible for receiving HTTP/S requests from the clients and returning a HTTP/S response back. The NwHIN adapter does not have any user interface components but instead uses WebServices to interact with the clients and some of the enterprise services. Adapter exposes standards based (SOAP) Web Service interfaces and provides WSDLs for all the services that are exposed by Adapter. The WSDLs provide information to the clients about all input parameters (names and types) and outputs (result formats). Adapter's web processing layer comprises of WSDL's and controllers to process the incoming HTTP/S requests and other helper components to render the response back in SOAP format.

6.2.2.1. Processing

An HTTP/S request is received by the application server and delegated to the correct web controller for processing. A mapping (configuration) file provides information about which HTTP/S request needs to be handled by which controller. Once the controller receives the HTTP/S request, it parses out all the input parameters that were passed in by the clients, validates the values, populates all appropriate domain models/objects and delegates the processing of these requests to appropriate Session Beans.

Figure 19: Application Processing Flow



6.2.2.2. Local data structures

All incoming request parameters (received as strings) are mapped to appropriate domain models/objects. These domain models/objects have appropriate fields (names and types) defined to map the incoming values correctly and logically. The received parameter values are processed to convert them to the appropriate type in order to fit the model.

6.2.3. Business Layer

The NwHIN Adapter's business layer at a high level is comprised of components that are responsible for taking the input from the web layer, processing this input, aggregating response data, transforming data (terminology translations) and constructing a standards-based payload to be delivered back to the web layer. The business layer also comprises of orchestration components and business logic components that call services in a specific order, process the data obtained from these services and apply business logic to this data.

The Adapter uses the DocumentManager and the DataManager to support all incoming requests for documents. Document Manager is the main component in the Adapter that manages the creation of the requested document. Data Manager is involved in gathering all of the data required to create the document. Document Manager passes all the generated data to the Document Generator in order to create

the requested document. The four diagrams below shows different components views of NwHIN Adapter: The Adapter EAR, the Common EAR and the share Libraries.

Figure 20: Adapter Internal Components

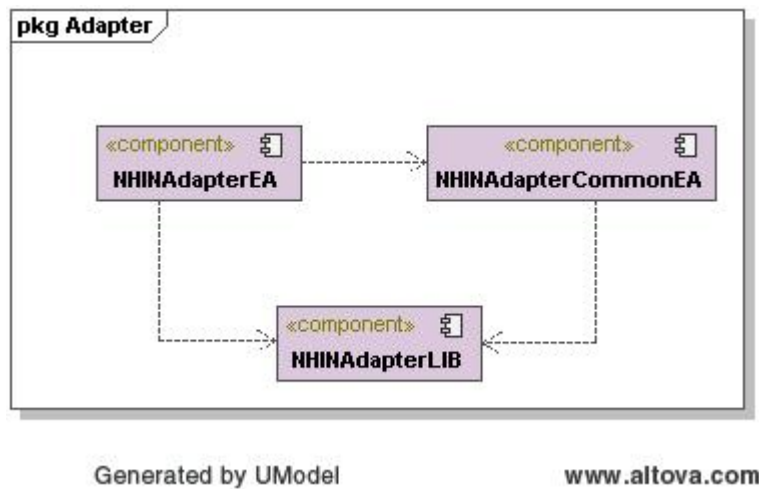
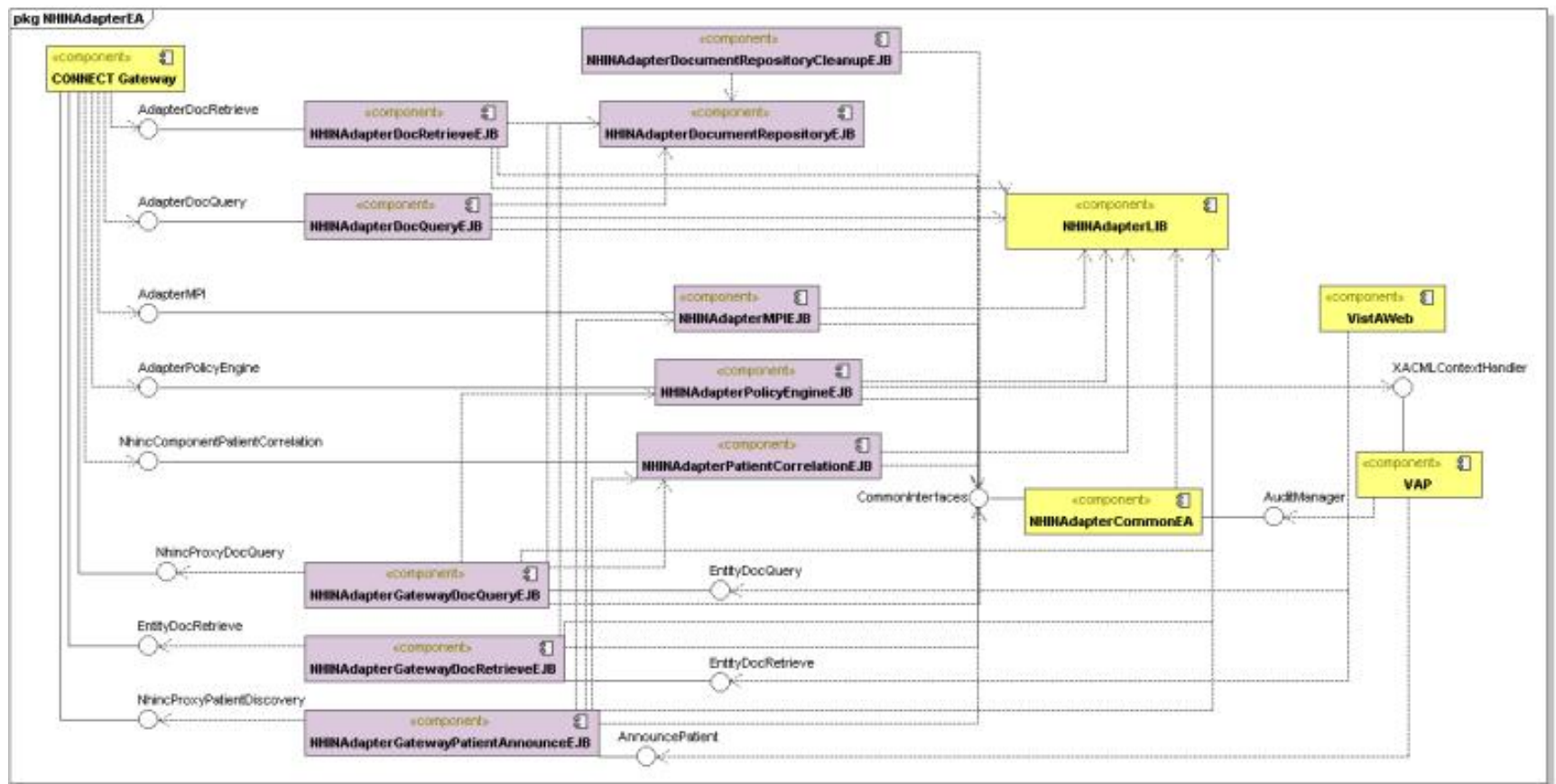


Figure 21 Adapter Internal Components – Adapter EAR



Generated by UModel

www.altova.com

Figure 22 Adapter Internal Components – Lib

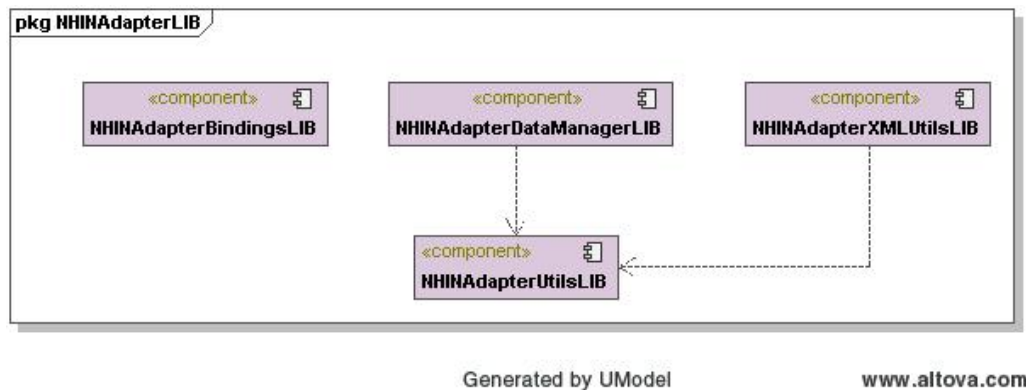
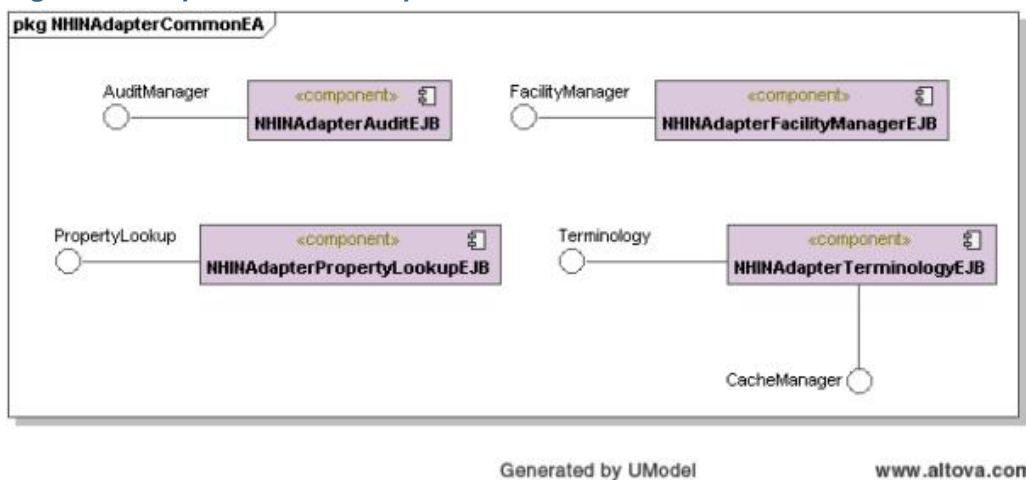
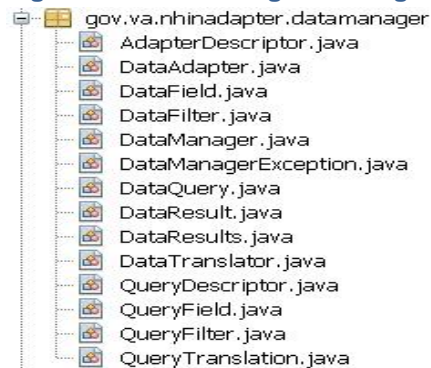


Figure 23 Adapter Internal Components – Common EAR



The figures below list details of the packages and classes that are involved in gathering, creating, transforming, and returning the documents.

Figure 24: DataManager Package



6.2.3.1. DataManager Operations

The DataAdapter interface provides a common way to query for and retrieve data from multiple sources of data. It does so by providing a common method to query for the data as well as a common structure in which the data is returned.

- `DataManager.loadConfig (filename):`

Loads a DataManager's configuration from an XML-based file.

filename: String

- **DataManager.registerDataAdapter (cls):**

Registers a DataAdapter implementation with a DataManager instance.

The DataAdapter implementation must be annotated to describe how the data source can be queried and how the data is transformed.

cls: Class<T>

- **DataManager.getQuery (queryName):**

Returns a DataQuery object that can be used to query a data source for data.

queryName: String

- **DataManager.addQuery (qd):**

Add a QueryDescriptor object, which can be used to add a query for data source for data.

qd: QueryDescriptor

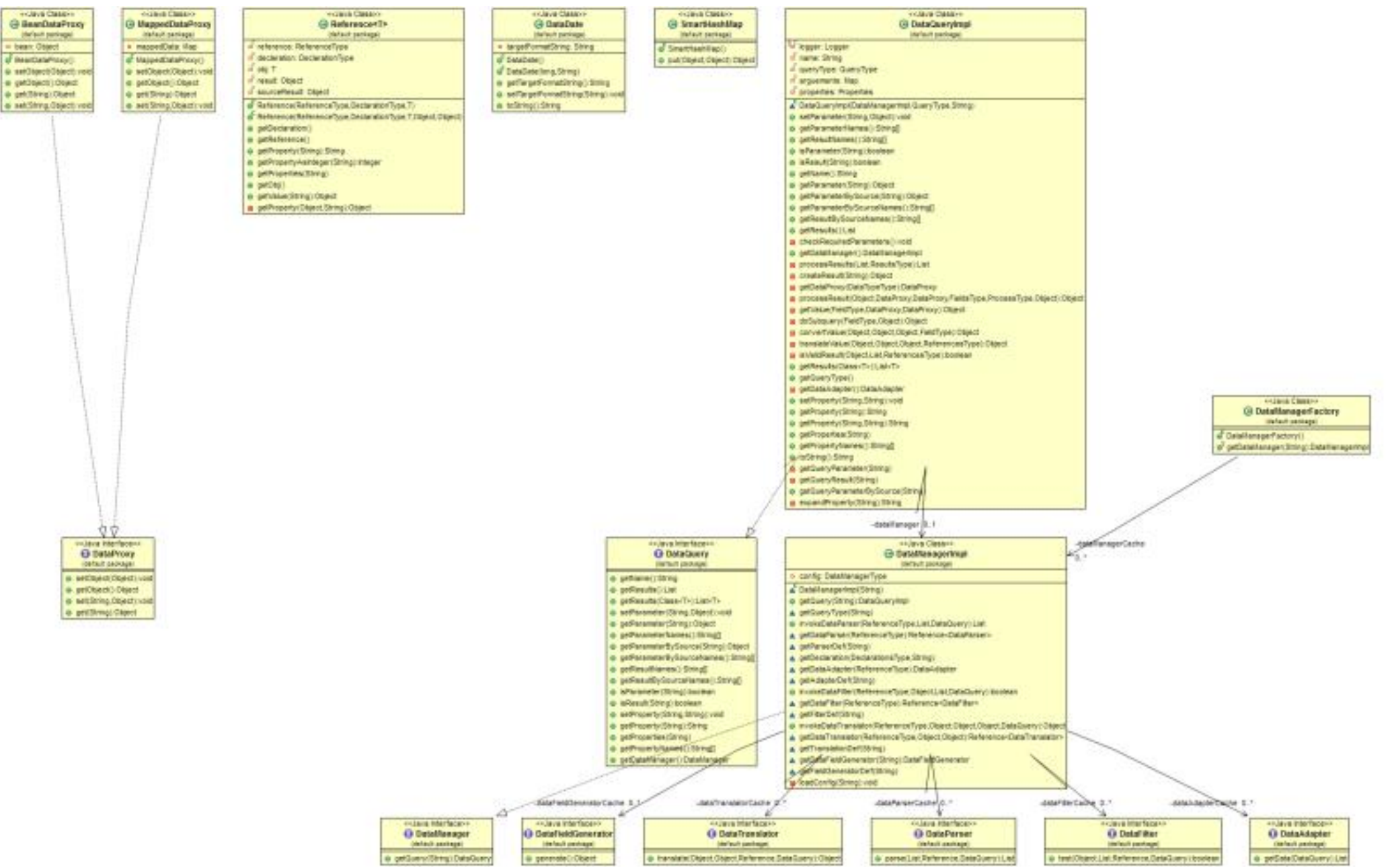
6.2.3.2. Processing

The Web (Service) Layer passes all the data obtained from HTTP/S request to appropriate Session Beans through value objects. The Session Bean contains the business logic for orchestration and data aggregation and data pruning. Session Bean delegates the creation of the document to a Document Manager. The Document Manager is responsible for the creation and aggregation of data by the use of Data Manager. The Data Manager uses different adapters to communicate with relevant systems in order to fetch data. Some of the adapters that Data Manager uses are:

- **HL7DataAdapter:** Used for communicating with MVI system and parsing HL7 messages.
- **VistALinkDataAdapter:** Used for communicating with VistA systems and parsing XML based data content received from RPC calls.
- **JDBCDataAdapter:** Used for communicating with the Oracle database.
- **XMLDocumentGeneratorAdapter:** Used for generating and transforming XML payloads.

Once the data is gathered by the Data Manger, the document manager creates a standards based payload (C32 or C62) from this data, runs transformation on this data (though the use of terminology services) and provides this standards based payload back to the Web layer.

Figure 25: DataManager 5.0 UML Class Diagram



6.2.3.3. Local data structures

All information passed from the Web Layer to Session Bean and subsequently to Document manager and Data Manger make the use of domain/value objects. These objects have fields defined that map accurately with the medical domains that are supported by adapter for the exchange of healthcare information.

The orchestrations supported by the Adapter are: Patient Discovery, Query for Documents and Retrieve Document. The following sequence diagrams capture the main software components and the most interesting collaborations involved in the implementation of these orchestrations. The diagrams do not capture every processing step in the orchestration, such as calls to ESR or VETS.

Figure 26: Patient Discovery Inbound (Partner to VA) Sequence Diagram

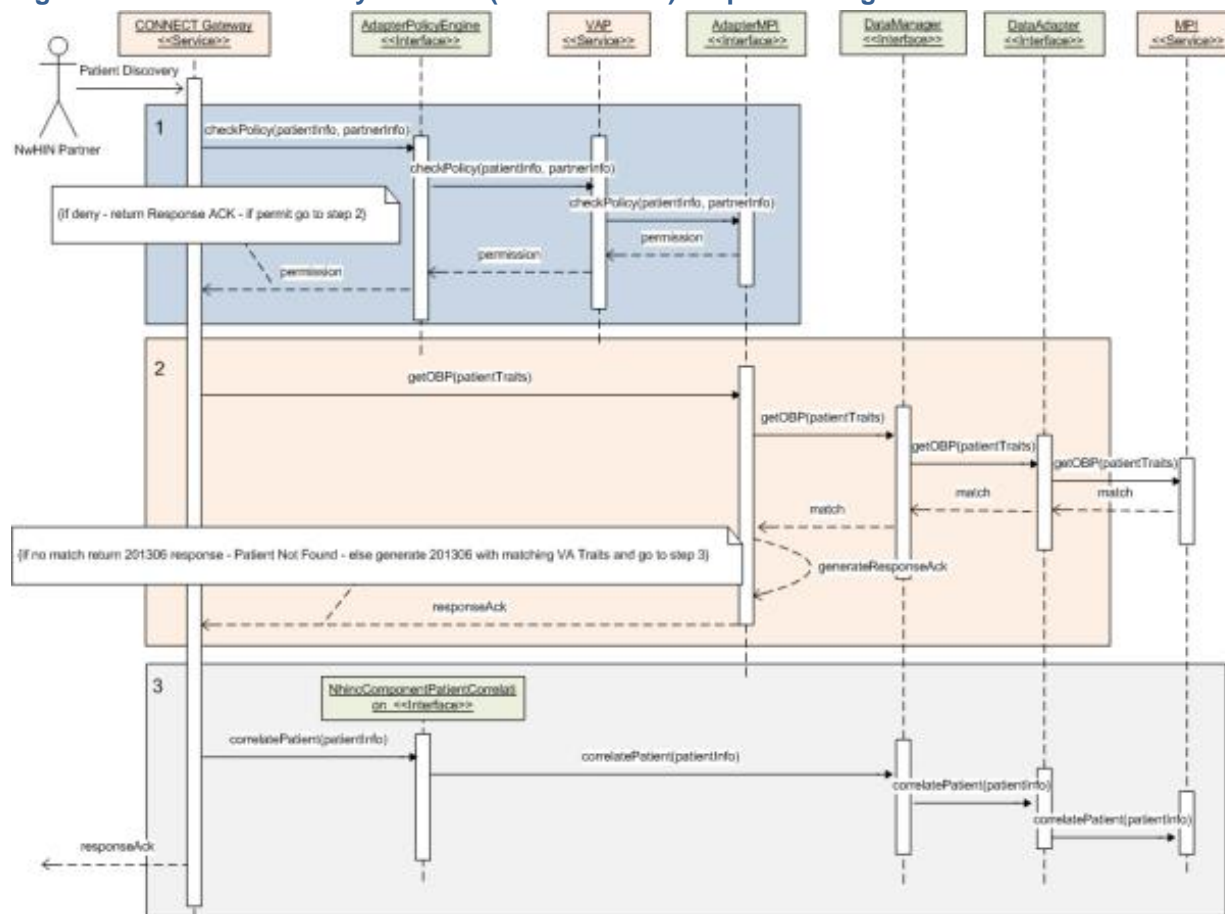


Figure 27: Query For Document Inbound (Partner to VA) Sequence Diagram

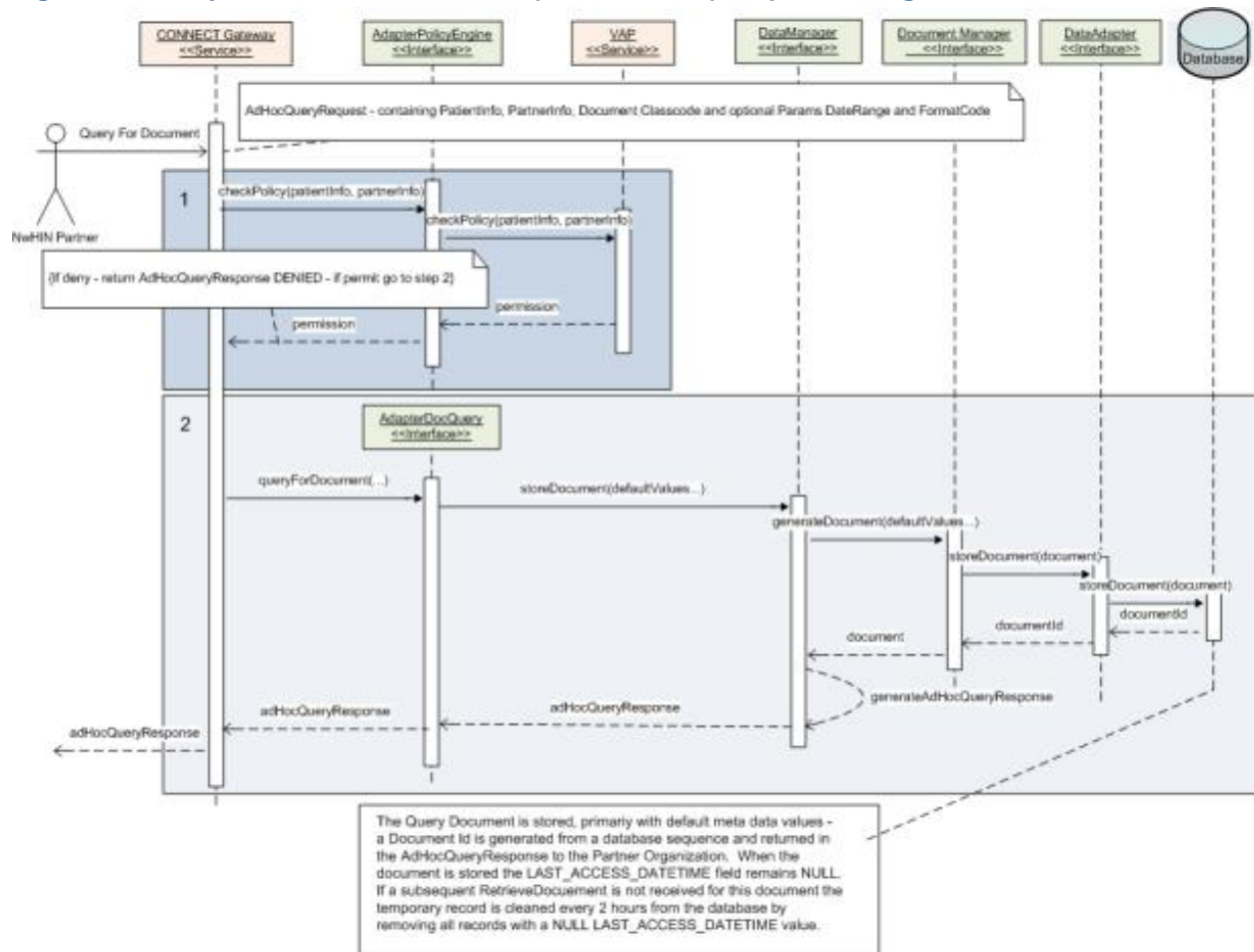
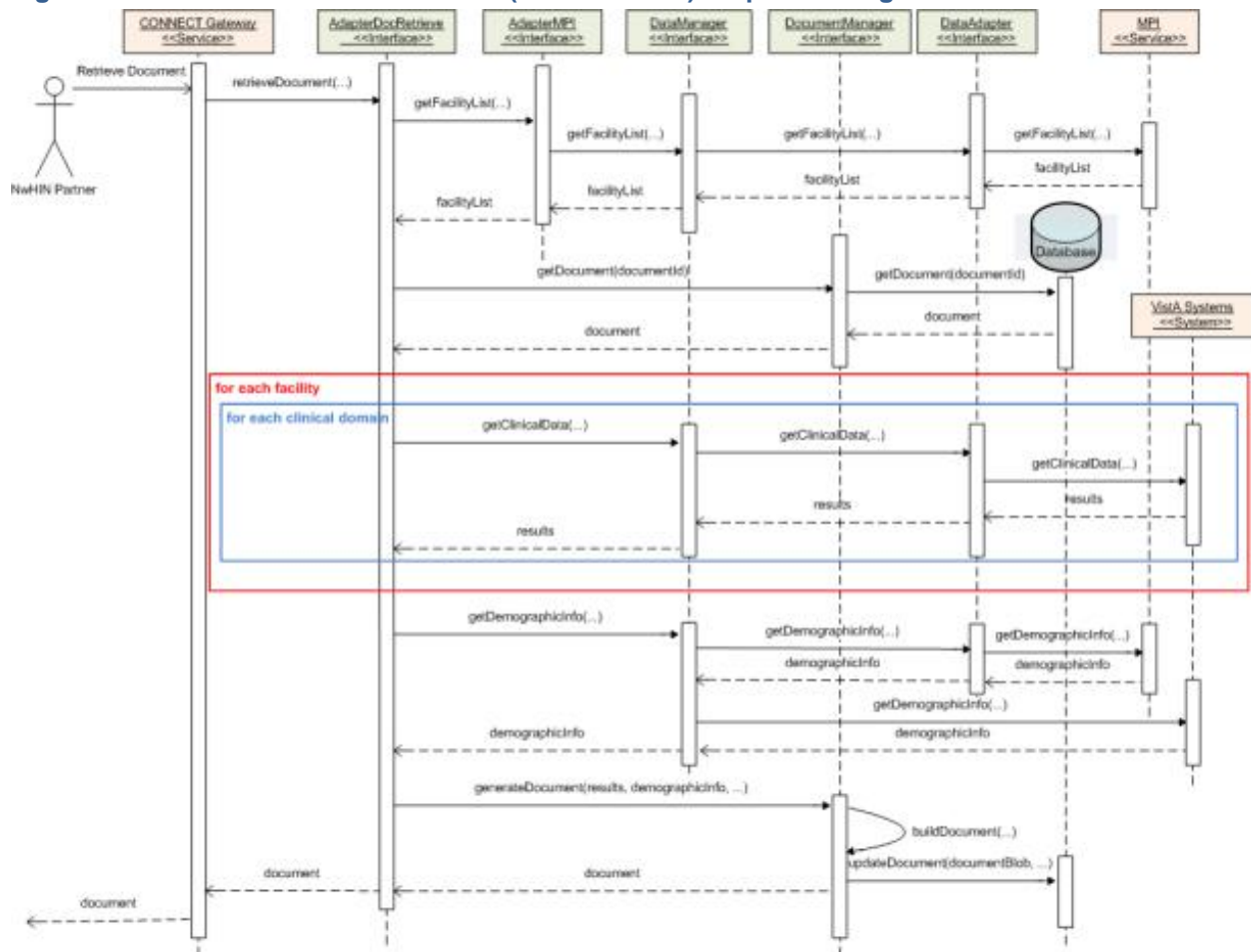


Figure 28: Retrieve Document Inbound (Partner to VA) Sequence Diagram



6.2.4. Data Layer

The data layer is responsible for taking input from the business layer, processing this input and communicating with the database in order to read or write data to the database. NwHIN adapter mostly stores auditing and configuration related information in the database. The database layer consists of Data Access Objects, Data Utilities and Object Relational Mapping (ORM) tools. The Data Utilities are used to transform data back and forth from complex object structure to a linear structure in database table columns.

6.2.4.1. Processing

The business layer invokes Data Access Objects through the use of a JDBC based Data Manager Adapter. The data access objects contain methods to read, write and update data to the database. Data Access Objects use hibernate as an ORM mapping tools to generate appropriate SQL queries and mapping the data model defined in the domain/value objects to the columns in the database table. The mapping configuration is stored in hibernate mapping XML files.

6.2.4.2. Local data structures

Hibernate is used as an ORM tool to map all columns in the database table to domain/value objects when reading or writing data to the database.

6.3. Communications Detailed Design

Based on the AITC VMWare Farm each virtual server instance has been allocated two LAN interfaces, one public and one backup.

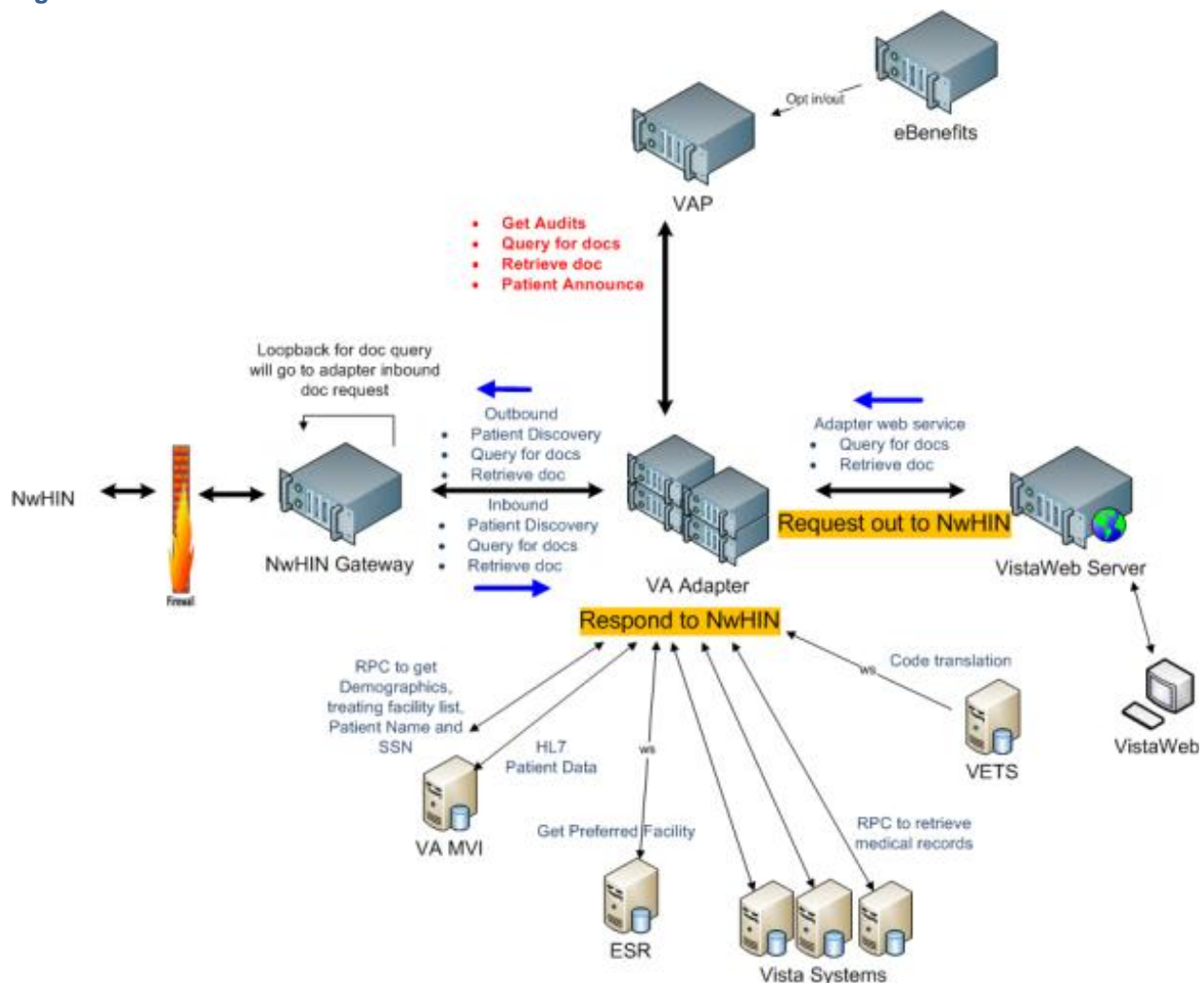
7.EXTERNAL INTERFACE DESIGN

Adapter is a component of the larger NwHIN which is a system of systems pattern after the Service Orient Architecture (SOA) which primarily utilizes secured web services for the invocation of and transfer of data between systems. Other protocols and payloads are utilized only when the service communicating with the Adapter does not support a web service interface (such as the MVI, a MUMPS based system). This section of the SDD describes the interfaces exposed by the Adapter to external systems.

7.1. Interface Architecture

The following context diagram describes the interface data flow between Adapter and external systems. There are 2 major types of interfaces; those used to respond to NwHIN and those used to request data from NwHIN.

Figure 29: Business Interface



7.2. Interface Detailed Design

The VA NwHIN Adapter is deployed as a single, national instance from the Austin Information Technology Center (AITC). Payloads are standards-based Clinical Document Architecture (CDA) XML documents. VistA data is retrieved through the use of VistALink-mediated Remote Process Calls (RPC) calls; HIE data retrieved (web services) by the NwHIN Adapter is displayed by VistAWeb.

All interfaces are synchronous and will communicate over Hypertext Transfer Protocol Secure (HTTPS) which uses Secure Socket Layer (SSL) to ensure that all data over the wire is encrypted.

The following sub-sections describe the most relevant interface messages that are exchanged between the VA Adapter and other systems.

Note: For additional interface information, refer to the Adapter 5.0 Interface Control Document (ICD).

7.2.1. Get Audits

Get Audits is used to retrieve detail audit records which may be used for reporting purposes. This interface is geared to support reporting applications.

The input data elements consist of several fields that are used as filter criteria is the audit data query, these data fields include:

- From Date
- To Date
- List of Patients IDs
- Facilities
- Remote Organization IDs

Note: For detail interface data information, refer to the Adapter Interface Control Document (ICD).

7.2.2. Get Audits Summary

The Get Audits Summary operation allows an external system such as VAP to retrieve aggregated audit information from the VA Adapter. This operation returns a count or total of the Audit Data that satisfies the request parameters grouped by the specified Group By parameter, if provided (e.g.: 1st by Facility and 2nd by NwHIN Partner Organization).

- The input data elements consist of several fields that are used as filter criteria is the audit data query, these data fields include:
- From Date
- To Date
- List of Patients IDs
- Facilities
- Remote Organization IDs

Note: For detailed interface data information, refer to the Adapter ICD.

7.2.3. Patient Discovery

Patient Announce was developed by the VA as a simpler alternative to the NwHIN Patient Discovery interface. It is used to establish patient correlation with VA NwHIN partners. It is the first in a three step process used to retrieve document information.

Step 1: Arbitrate patient identity

Step 2. Query for list of available documents

Step 3. Retrieve documents

The primary input data elements consist of:

- Requestor's Home Community ID
- Patient ID (Assigning Authority OID + Patient ID)
- List of target Facilities (VA Trusted Partners filtered from UDDI Registry)
- Requesting user
- Purpose of Use (TREATMENT)
- User Role (MEDICAL DOCTOR)

The response data includes a list of patient identifiers matching the identity traits.

The following outbound demographic traits (from VA to NwHIN Partners) are used in patient correlation process:

- SSN
- First name
- Last name
- Middle initial
- Address
- Date of birth
- Gender
- VA identifier (ICN)

The following inbound demographic traits (from NwHIN Partners to VA) are used in patient correlation process:

- SSN
- First name
- Last name
- Middle initial
- Address
- Date of birth
- Gender
- External identifier

Inbound Patient Discovery response (for successful patient discoveries) from each partner is stored in MVI. The SOAP envelope contains the XCPD message.

Additional Notes:

- Adapter calls MVI (QBP) to find a match in the MVI
- The Adapter ONLY responds if there is a single match
- The Adapter will store the external identifier and external traits in the MVI
- The announce response will contain the VA traits along with the ICN
- Adapter sends out the XCPD in SOAP envelope as a PD response

7.2.4. Query for Documents

Query for documents is the second in the three-step process which defines the Query/Retrieve information exchange pattern in the NwHIN.

Step 1: Arbitrate patient identity

Step 2. Query for list of available documents

Step 3. Retrieve documents

Query for documents is used to retrieve a list of documents for a specific patient (ICN) for subsequent retrieval.

The primary input data elements consist of:

- Home Community ID (OID)
- Patient ID (which contains two parts: Patient Identity Assigning Authority in the form of an OID and an identifier in the above Assigning Authority domain)

The response data includes a list of document unique identifiers matching the query.

Note: For detail interface data information, refer to the Adapter Interface Control Document (ICD).

7.2.5. Document Retrieve

Document Retrieve is used to retrieve a specific document by unique doc ID. It is assumed (and a precondition) that the invoking application has previously obtained the Document ID and any associated metadata needed to retrieve a document; typically through a prior Query for Documents transaction.

Document retrieve is the third in the three-step process which defines the Query/Retrieve information exchange pattern in the NwHIN.

Step 1: Arbitrate patient identity

Step 2. Query for list of available documents

Step 3. Retrieve documents

The input data elements consist of:

- Home Community ID
- Repository Unique ID
- Doc Unique ID

The response data includes:

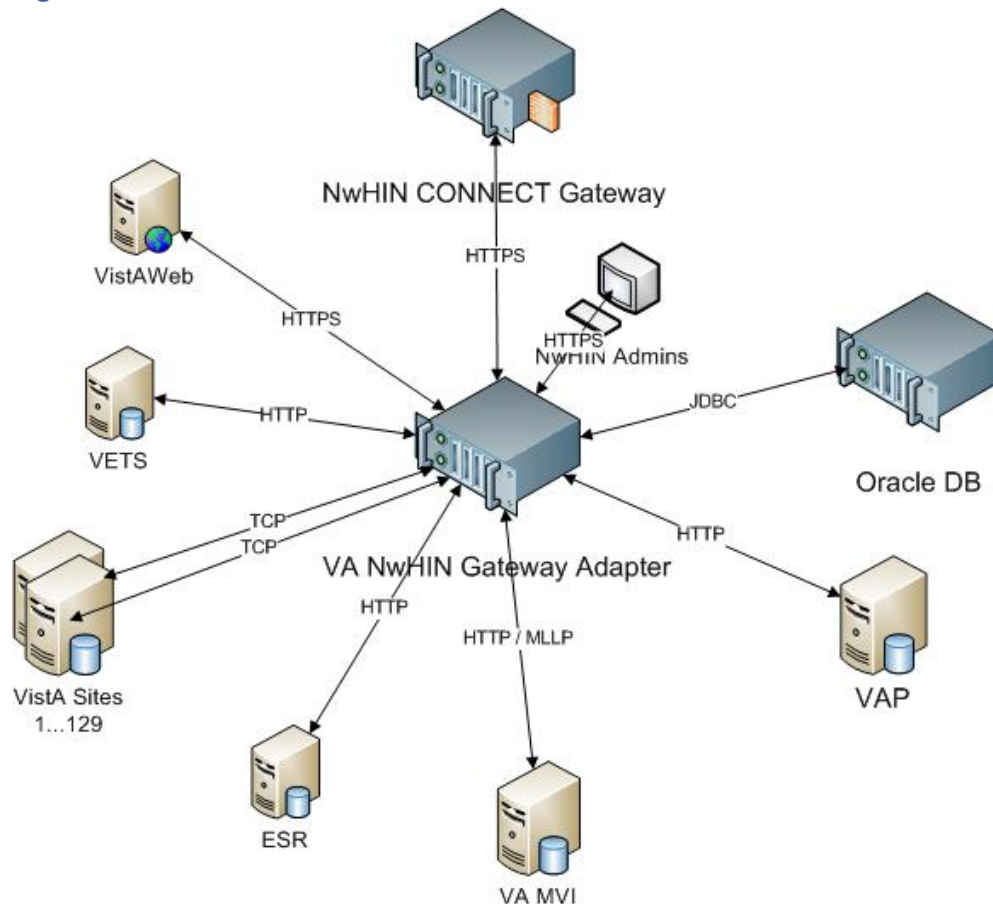
- Document Unique ID
- Repository Unique ID
- The retrieved document in base64binary encoded format
- The MIME type of the retrieved document
- Errors or warnings in the case the document could not be retrieve

Note: For detail interface data information, refer to the Adapter ICD.

7.3. Interface Communication Protocols

The following diagram shows the physical communication and protocols of the Business Interface described and illustrated above followed by some standard descriptions of each communication protocol employed.

Figure 30: Interface Protocols



7.3.1. Hypertext Transfer Protocol

HTTP functions as a request-response protocol in the client-server computing model. HTTP is an Application Layer protocol designed within the framework of the Internet Protocol Suite. The protocol definitions presume a reliable Transport Layer protocol for host-to-host data transfer. The Transmission Control Protocol (TCP) is the dominant protocol in use for this purpose. HTTP Resources are identified and located on the network by Uniform Resource Identifiers (URIs) or, more specifically, Uniform Resource Locators (URLs) using the http or https URI schemes.

7.3.2. Hyper Text Transfer Protocol Secure

Hypertext Transfer Protocol Secure (HTTPS) is the combination of the Hypertext Transfer Protocol (HTTP) with the Secure Socket Layer (SSL) / Transport Layer Security (TLS) protocol to provide encrypted communication and secure identification of a network web server. HTTP operates at the highest layer of the OSI Model, the Application layer; but the security protocol operates at a lower sublayer, encrypting an HTTP message prior to transmission and decrypting a message upon arrival. Strictly speaking, HTTPS is not a separate protocol, but refers to use of ordinary HTTP over an encrypted

SSL or TLS connection. NwHIN VAP 1.0 systems will use this protocol for all web-based (browser-based) and web-service invocations that come from sources outside of the data center.

7.3.3.Minimal Lower Layer Protocol

The Lower Layer Protocol (LLP), sometimes referred to as the Minimal Lower Layer Protocol (MLLP), is the absolute standard for transmitting HL7 messages via TCP/IP. Since TCP/IP is a continuous stream of bytes, a wrapping protocol is required for communications code to be able to recognize the start and the end of each message. The Lower Layer Protocol is the most common mechanism for sending unencrypted HL7 via TCP/IP over a local area network, such as those found in a hospital.

When using LLP, an HL7 message must be wrapped using a header and trailer (also called a footer) to signify the beginning and end of a message. These headers and footers are usually non-printable characters that would not be shown in the actual content of an HL7 message.

The typical structure of an HL7 message being sent via LLP is described in the table below. It contains four parts:

Table 20: Structure of MLLP Message

Header	HL7 Message	Trailer	CR
Vertical tab character (0x0B)	The HL7 message is wrapped using a header and trailer (immediately followed by a carriage return): MSH ^~\& 199908180016 ADT^A04 ADT.1.1698593	Field separator character (0x1C)	Carriage return (0x0D)

NwHIN Adapter 5.0 will utilize this protocol for communicating with the Master Veteran Index (MVI) system for use cases that don't support a HTTP/SOAP based web-service invocation.

7.3.4. Transmission Control Protocol

The Transmission Control Protocol (TCP) is a communication protocol developed for the internet to get data from one network device to another. TCP uses a retransmission strategy to insure that data will not be lost in transmission.

8.HUMAN-MACHINE INTERFACE

The NwHIN Adapter does not have a graphical user interface (GUI); the system is a service that responds to requests for clinical data and returns data payloads. VistAWeb currently is the only GUI application accessing the NwHIN Adapter within the VA. All GUI requirements are being met by VistAWeb. Refer to the VistAWeb SDD for more detailed information.

9.SYSTEM INTEGRITY CONTROLS

The NwHIN Adapter logs information for Retrieve Documents, Patient Discovery and incoming documents from external partners. The auditing process is described in more detail in the section entitled [Detail Design](#).

The data captured for Audits is stored in the AUDIT table and the DOCUMENTS tables. See the section entitled [Data Design](#) for more detailed information on the data each table captures and stores.

The Adapter audit logs and database exist in the VA Corporate Data Center GSS environment which ensures protection of audit information & audit tools from unauthorized access, modification, and deletion. The raw database audit information is restricted to authorized AITC security personnel and DBAs.

APPENDIX A: NWHIN ADAPTER 5.0 EXCLUSIONS

The following requirements were not included in the NwhIN Adapter 5.0 design due to budgetary or time constraints.

Table 25: NwhIN Adapter 5.0 Scope Exclusions

BN#	Description	Comment
1.8	As a temporary/intermediate step, provide the ability to import ROI Office approved opt-in forms from the CPP ROI System into VistA Imaging for storage in the patient's official health record.	
1.10	Provide the ability to batch announce a list of VA/DoD patients	Handled by client applications –VAP supplies batching to synchronous PD in Adapter.
2.1.4	Receive and validate an authorization that has been provided by external trusted partners.	
2.1.5	Detect a change in the patient's preferences from the external trusted partner, and automatically update the CPRS status (technical note: attempt to re-correlate patient fails)	
2.3	Provide the capability to restrict ROI based upon OASIS XSPA.	Restriction is to Opt-in/opt-out
2.4.1	Provide the patient an online consent packet that can be printed and mailed-in.	
2.4.2	Allow additional identifier information to be appended to the form when completed online.	The EDI-PN will be appended only
2.4.3.1	Provide patients with the ability to print and download draft consent directives in humanly readable format as a file (pdf).	
2.4.3.2	Provide patients with the ability to download signed (current and historical) and submitted consent directives in humanly readable format as a file (pdf)	
2.4.4	Provide patients with the ability to begin a consent directive online and complete it at a later session and delete a draft without re-entering information.	
2.4.6	Provide patients with the ability view frequently asked questions (FAQ) for basic assistance in completing forms and clarifying participation requirements.	
2.4.7	Provide patients with an electronic display of created, changed, and revoked consent directives.	Only current active consent
2.5	Provide Line of Business consumer (e.g. patient) digital signature capability for integration with Line of Business consumer applications.	

BN#	Description	Comment
2.6	Provide the ability for patients to request and view a report of who, on the GATEWAY, has seen information enforced by their consent directive(s) (accounting of disclosures).	Only Accounting of Disclosure
3.1.2	Provide the ability for the ROI system to receive, review and process electronically submitted consent directives not pre-approved by policy.	
3.1.2.3	Provide the ROI Office with the ability to view electronically submitted consent directives in a humanly readable format.	See 1.8
3.1.2.4	Provide the ROI Office with the ability to print electronically submitted consent directives.	See main 3.1.2
3.1.2.5	Provide the ROI Office with a view of current and historical signed consent directives (created, changed, and revoked).	
3.1.2.6	Provide the ROI Office with the ability to download current and historical signed consent directives (created, changed, and revoked) in humanly readable format as a file (pdf)	
3.3	Provide the ability for the system to generate and send an electronic notification to the patient.	
3.3b	Notify patients, via the portal, ahead of the go live date for a new partner that their information will be shared with a new partner.	
3.4	Consent Administration: Provide consent management services to administer organizational and patient privacy policies.	
3.5	Provide properly authorized privacy policy administrators with the ability to centrally validate, grant or deny patient requests and privacy attributes.	
3.6.1	Provide the ability to search and sort through the accounting of disclosure by patient and date range and to print the accounting of disclosures for a specific patient.	
3.7	Provide consent directive administrators with the ability to create, retain, and forward electronic reports and records as required.	
4.1	Provide the ability for an Access Control System (ACS) to download/receive organizational security and privacy policies from security management services.	
4.2	Provide security administrators with the ability to download organizational security and privacy policies from ACS.	
4.3	Provide security administrators with the ability to upload deploy organizational security and privacy policies to ACS.	

BN#	Description	Comment
4.4	Provide the ability to download and integrate approved patient privacy policies from Consent Management Services to create composite security and privacy policy sets for ACS enforcement.	
5.1	Provide authorization and access control as a common service with the goal of eliminating the need for individual application accounts and for managing and enforcing access control in each application.	
5.2.1	Except in an emergency (see 5.2.4), provide for the secure electronic exchange of health information with a requesting organization only if the patient has executed an “opt-in” policy as a prerequisite to evaluating any other policies authorizing such exchange.	This is generally applied but does not apply to DoD
5.2.2	Provide the ability to mask (such as delete or hide) specific patient-specified information from standard response messages (e.g., HITSP C32, C37) in accordance with VA composite security policies prior to the release of information.	Outside Nationwide HIN Access control specification
6.5	Applications/Services shall process update notifications to person identity traits received from the authoritative source for Identity Management.	Outside Nationwide HIN specifications
6.7	Applications/services that persist person related data shall register persons of interest with the authoritative source for Identity Management.	Not applicable
7.1.1	Support correlation of patient identities between VA and external entities using multiple aliases per the GATEWAY production specifications.	Waiting for change from IdM
7.2.2	Provide response from system when insufficient traits are provided (i.e. name, dob and gender (minimum required, yet insufficient) from the sender which prompts for addition of SSN which is necessary for definitive matching.	
7.6	Create a report, by VA facility number, that provides a count of the number of VAMC patients who are correlated with each GATEWAY partner	Maybe this will be done?
7.8	For all correlated patients, provide a list (VistA report) of the patients, by facility, and all of their future appointments	
8.6	Create a tool to monitor the functioning of the system.	Deferred to AITC
8.7	Provide a patient discovery report that lists announcements sent, and response, or lack of response from each partner	
9.4	Provide the ability to monitor and detect problems with the new partner.	
10.3.1	Share results of diagnostic studies (ICIB 9/9/2010)	

BN#	Description	Comment
10.13	Share plan of care (ICIB 9/9/2010)	
11.4	Support transition to new interface platforms if/when they become available (such as AViVA).	
11.8	Remove redundancies from the same source of data when providing the display (for example, multiple DoD allergies coming from same DoD source).	
11.11	Support performance evaluation study by providing user interface audit logs and click streams.	Defer to VistAWeb
11.12	CPRS will inform the end user that there may be outside clinical information to view. (Currently done by a local Clinical Reminder)	Class III change in San Diego
12.1	Automate extraction of core set of evaluation data for opt-in and opt-out patients from multiple sources, such as CPRS, enrollment files, and appointments.	
12.2.1	Generate an HITSP C32 summary automatically upon opting in of the patient	
12.2.3	Generate a HITSP C32 summary automatically in response to trigger events, such as a scheduled visit	
12.3	Remove PHIs from each HITSP C32 summary generated for performance measurement purposes.	
13.1	Provide for the storage of all variants/forms of original patient consent directives including final versions approved by privacy administrators.	
13.2	Provide for the creation and storage of a humanly readable form of patient consent directives.	See 1.8
13.4	Provide for the creation and storage of an HL7 standard Clinical Document Architecture (CDA) Release 2 (R2) attribute form of patient consent directives.	
13.5.3	Enforce rule that patient consent directives shall be digitally signed with a signature representing the patient or the patient representative.	Password only
14.1	The ROI application shall be capable of receiving and using an electronic HL7 CDA R2/Release 3 (R3) formatted consent directive.	
14.2	For GATEWAY versions not fully compliant with the OASIS XSPA SAML specification, the ROI office CPP ROI system shall provide an electronic file that includes the full identifier of providers authorized to query for VHA patient information, their National Provider Identifier (NPI), and their structural role as specified in ASTM E1986.	Not supported by Nationwide HIN specifications

BN#	Description	Comment
14.3	Upon completion and approval of a patient consent directive, the CPP ROI system shall place the approved HL7 CDA R2 consent directive in a Cross Enterprise Document Sharing (XDS) repository for provisioning to the ACS.	This is outside the scope of a BRD
14.4	Organizational security policies will be available in a humanly readable format.	Hard coded
14.5	Organizational privacy policies will be available in a humanly readable format.	Hard coded
15.1	HITSP Collect and Communicate Security Audit Trail Requirement: VA security services shall comply with the HITSP Collect and Communicate Security Audit Trail Transaction (T15) to provide assurance that security policies are being followed or enforced and that risks are being mitigated.	
17.2	Leverage the VA facility portal coordinator at the VLER Health Communities to also administer the GATEWAY authentication and consent processes.	
17.3	The GATEWAY will utilize an enterprise level, shared patient identification and authentication service, when available.	
17.5	Ensure performance as new GATEWAY partnerships (additional opportunities with external entities) are incorporated.	
17.7	The standard response time for a new partner to join is 7 seconds.	Change request to AITC
17.10	The authorization process to turn on communications between VA and a new partner that has passed the opt-in confidence test should take no more than one minute.	Change request to AITC
17.15	Establish a Capacity to address new partners.	
17.22	The System will be able to support a population of approximately 6 million patients.	Note that this number might be added without meeting the requirement
17.26	Automate processing list of GATEWAY partners--communicate this information to CPP, VistA Web.	
17.28	Improve system latency of information sharing by from the GATEWAY to the VA user. Appropriate processing times to be defined by the business owner.	
17.29	Identify/highlight duplicate entries in aggregated List: Meds, Problems, Allergy, Labs (for example, multiple prescriptions for the same medication) (business owner to provide additional detail)/	Defer to VistAWeb

BN#	Description	Comment
17.30	From user request to availability of Nationwide HIN document(s) list over VLER (first pass), accessible over VLER 5 seconds 90% of the time, and within 10 seconds 99% of the time, and 15 seconds 99.99% of the time.	New requirement proceeding through review
17.31	<p>1) Single Document request will be returned/displayed within 5 seconds 90% of the time, and within 10 seconds 99% of the time, and 15 seconds 99.99% of the time.</p> <p>2) If requested document(s) is/are over 500 KB, it will be returned/displayed within 10 seconds, 90% of the time, and within 15 seconds 99% of the time, and 20 seconds 99.99% of the time.</p>	New requirement proceeding through review

APPENDIX B: ADDITIONAL INFORMATION

Attach any addition information that supplements the design specification.

Requirements Traceability Matrix

For a requirements traceability matrix that traces modules and data structures to the software requirements, see the Adapter 5.0 Requirements Traceability Matrix on the [_____](#).

Packaging and Installation

For special considerations for software packaging and installation, see the Adapter 5.0 Production Operations Manual on the [_____](#).

Design Metrics

Describe all metrics to be used during the design activity.

Required Technical Documents

The following documents must be submitted for review to support proper approval:

- Product Architecture Document (for Adapter, see ICD and SDD)
- Disaster Recovery Plan
- Interface Data Mapping
- Security Assurance Strategy

For additional information regarding how to obtain proper approval for this project, refer to the following documents:

- [IT Infrastructure Standards](#)
- [Technical Analysis Review-Technical Analysis Summary \(TAR-TAS\) process](#)
- [Enterprise Architecture Web page](#)
- [One-VA TRM](#)

APPENDIX C: GLOSSARY TERMS AND ACRONYMS

This section provides listings of terms and acronyms commonly used throughout this document.

Glossary of Terms

The following is a table of terms (and definitions) that establish meaning within the context of the plan.

Table 26: Glossary of Terms

Term	Definition
CONNECT	A flexible, extensible, cross-platform solution to enable public and private organizations to participate in the NwHIN by leveraging their existing health information systems.
CONNECT Adapter	CONNECT architecture that encapsulates the components most likely to be customized or replaced by an organization implementing CONNECT.
CONNECT Gateway	CONNECT architecture that encapsulates the components most likely to be use as-is by an organization without modification. These components are primarily responsible for orchestrating information exchange with the NwHIN.
Core NwHIN Services	A set of the ten primary services identified in the NwHIN Trial Implementations to enable secure exchange of electronic health information.
Health Information Exchange	Or HIE, an entity that enables the movement of health-related data among entities within a state, a region, or a non-jurisdictional participant group, which might include a "classic" regional health information organizations at regional and state levels, integrated delivery systems and health plans, or health data banks that support health information exchange.
Healthcare Information Technology Standards Panel	Or simply HITSP, a cooperative partnership between the public and private sectors formed and supported by ONC for the purpose of harmonizing and integrating standards that will meet clinical and business needs established by AHIC use cases for sharing information among organizations and systems.
Nationwide Health Information Network	NwHIN in initiative to provide secure, nationwide, interoperable health information infrastructure that will connect providers, consumers, and others involved in supporting health and healthcare.
Security Assertion Markup Language	Or SAML, is an XML-based standard for exchanging authentication and authorization data between security domains.
Service Oriented Architecture	Or SOA, is an architecture approach that packages functionality as interoperable, loosely-coupled units, or services, made accessible over a network and communicating by passing data independent of operating system or programming language.

Term	Definition
Web Services Description Language	Or WSDL, an XML format for describing network services as a set of endpoints operating on messages containing either document-oriented or procedure-oriented information.

Table 27: Acronyms

Acronym	Meaning
AHIC	American Health Information Community
BHIE	Bidirectional Health Information Exchange
CCD	Continuity of Care Document
CDA	Clinical Document Architecture
CHDR	Clinical Data Repository/Health Data Repository
CHIO	Chief Health Informatics Office
CONOPS	Concept of Operations
CPP	Consumer Preference and Policy
DoD	Department of Defense
ERR	Enterprise Requirements Repository
ESR	Enrollment System Redesign
HER	Electronic Health Record
HDR	Health Data Repository
HIO	Health Information Organization
HIPAA	Health Insurance Portability and Accountability Act
HHS	Department of Health and Human Services
HIE	Health Information Exchange
HITSP	Health Information Technology Standards Panel
HL7	Health Level 7
ICD	Interface Control Document
ICN	Internal Control Number
HIS	Indian Health Service
KP	Kaiser Permanente
LAN	Local area network
MVI	Master Veteran Index
MTF	Medical Treatment Facility
NHIE	Nationwide Health Information Exchange (conforms to NwHIN)
NwHIN	Nationwide Health Information Network

Acronym	Meaning
NwHIN-C	Nationwide Health Information Network Connect (name of the Gateway)
ONCHIT	Office of National Coordinator for Health Information Technology
PHI	Personnel Health Information
ROI	Release of Information
SOA	Service-Oriented Architecture
SSA	Social Security Administration
VA	Department of Veterans Affairs
VAP	Veterans Authorizations and Preferences
VETS	Veterans Enterprise Terminology Server
VHA	Veterans Health Administration
VISTAWEB	Veterans Information Systems and Technology Architecture Web
VLER	Virtual Lifetime Electronic Record
WSDL	Web Service Description Language

ATTACHMENT A: APPROVAL SIGNATURES

Associated email signature files are stored with this document's source file in SharePoint. .

The Chair of the governing Integrated Project Team (IPT), Business Sponsor, IT Program Manager, Project Manager, and the members of the Technical and Enterprise Architectural Review Team are required to sign. Until the Engineering and Architecture Review Board is stood up, both the Engineering IPT member(s) and the Architecture IPT member(s) must approve/sign the SDD. Please annotate signature blocks accordingly.

Signatures

/es/ Date: December 14, 2012

/es/ Date: December 14, 2012

/es/ Date: December 18, 2012

/es/ Date: December 16, 2012

/es/ Date:

Note: AERB was unable to complete the review and sign this document by project closure date.

/es/ Date: December 17, 2012

Signed by