Enterprise Terminology Service (ETS)

Standards & Terminology Services (STS)

Tooling and Server Development

Requirements Specification Document

Release 1



Department of Veterans Affairs

February 2016

Version 1.0

Revision History

| Date | Version | Description | Author |
| --- | --- | --- | --- |
| 2/03/2016 | 1.0 | Initial Version | Vydehi Alagharu John Asel |

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# Introduction

VA and the Department of Defense (DoD) have failed to meet the goals of interoperability, standardization, and computability as mandated by Congress in the [National Defens](http://www.gpo.gov/fdsys/pkg/CPRT-113HPRT86280/pdf/CPRT-113HPRT86280.pdf)e [Authorization Act (NDAA) for Fiscal Year (FY) 2014](http://www.gpo.gov/fdsys/pkg/CPRT-113HPRT86280/pdf/CPRT-113HPRT86280.pdf), the [Omnibus Spending Bill of 2014](http://docs.house.gov/billsthisweek/20140113/CPRT-113-HPRT-RU00-h3547-hamdt2samdt_xml.pdf), and [House of Representatives (HR) 4486 Military Construction and VA Spending Bill](http://rules.house.gov/bill/113/hr-4486).

At this time, VA does not have an approved and resourced terminology plan that can be successful. Interoperability mandates from Congress and the Office of Management and Budget (OMB) can be met with proper planning and investment. As a result, the quality and timeliness of VA Health and Benefits Services can be transformed by up-to-date, computable clinical data, coded with national standards, to and from DoD, Veterans Benefit Administration (VBA), and Veterans Health Administration (VHA) staff at the point of service.

## Enterprise Terminology Service (ETS)

Knowledge Based Systems (KBS) and Standards and Terminology Services (STS) are working to establish a collaborative Enterprise Terminology Service (ETS) that bridges clinical and technical domains in order to address both the Congressional and Executive mandates for interoperability, standardization, computability, and meaningful use. The ETS will consist of two primary components operating in tandem.

### Clinical Terminology Service (CTS)

First, a robust Clinical Terminology Service (CTS) is necessary to establish and continually improve the VA’s ability to collect and accurately and fully represent healthcare data in the medical record. The CTS will address internal VHA terminology consultation and business ownership needs. These needs have grown tremendously because of the new demands from the Veterans Health Information Systems Technology Architecture (VistA) Evolution, Connected Health, and Compensation and Pension (C&P) and the shift of responsibilities back to VHA from the Interagency Program Office (IPO).

### Technical Terminology Service (TTS)

Secondly, a robust Technical Terminology Service (TTS) is necessary to publish standard terminologies and to ensure their complete integration with VA Health Information Technology (HIT) systems and applications. The TTS will address internal Office of Information and Technology (OI&T) technical needs, including terminology publication and distribution, as well as technical consultation for accessing terminology resources, for example, Service Oriented Architecture (SOA) integration and interoperability. Collectively the ETS is foundational to establishing and maintaining robust interoperability with VA partners, such as DoD and VBA, and addressing longstanding Congressional concerns. Specific business objectives that necessitate stating these requirements include:

1. The safety and life-critical nature of the health data VA encodes and processes. Mistakes in the semantic encoding and/or processing of this health data result in morbidity and mortality to the Veterans we serve.
2. Health data must be ubiquitously standardized to deliver the full promises of HIT systems, including the ability to compare the processes, and quality, of care among national and International health providing organizations. Achieving this ubiquitous standardization requires participation in collaborative and open-source development efforts. We have a variety of existing relationships, and contemplated relationships, that center around particular open-source projects, such as the International Health Terminology Standards Development Organization (IHTSDO) Open Tooling Framework, and the IHTSDO workbench that is currently utilized by the IHTSDO, Denmark, Sweden, the United States National Library of Medicine, Kaiser Permanente, and some internal VA projects. In cases where contributions to, or extension of, these shared projects is a business requirement, we will specify requirements for specific development languages, libraries, developer operations automation frameworks, and database technologies.

## Purpose

The purpose of this document is to describe the business and informatics architecture needs of Enterprise Terminology Service (ETS) and Standards & Terminology Services (STS) Tooling and Server Development. This document provides a foundation for establishing baseline and identifies the capabilities and functionalities in support of ETS & STS Tooling and Server Development.

## Scope

The scope of the RSD includes new ETS and STS Tooling and Server Development functionalities for Release 1.

## References

* [Department of Veterans Affairs Handbook](http://www1.DNS   /vapubs/viewPublication.asp?Pub_ID=50&FType=2) 6500
* Enterprise Terminology Service (ETS) and Standards & Terminology Services (STS) Tooling and Server Development BRD
* Contractor Project Management Plan
* [http://vista.med.va.gov/nsrd/Tab\_GeneralInfoView.asp?RequestID=20100](http://vista.med.DNS   /nsrd/Tab_GeneralInfoView.asp?RequestID=20100904)904
* [http://www.gpo.gov/fdsys/pkg/CPRT-113HPRT86280/pdf/CPRT-113HPR](http://www.gpo.gov/fdsys/pkg/CPRT-113HPRT86280/pdf/CPRT-113HPRT86280.pdf)T86280.pdf
* Consolidated Appropriations Act, 2014 ([http://docs.house.gov/billsthisweek/20140113/CPRT-113-HPRT-RU00-h3547](http://docs.house.gov/billsthisweek/20140113/CPRT-113-HPRT-RU00-h3547-hamdt2samdt_xml.pdf)- [hamdt2samdt\_xml.pdf](http://docs.house.gov/billsthisweek/20140113/CPRT-113-HPRT-RU00-h3547-hamdt2samdt_xml.pdf))
* [http://rules.house.gov/bill/113/hr-](http://rules.house.gov/bill/113/hr-4486)4486
* Standard GUI Compliance
* [http://www.oracle.com/technetwork/java/javase/overview-137531.htm](http://www.oracle.com/technetwork/java/javase/overview-137531.html)l

# Overall Description

The following sections will cover specifications for accessibility, business rules, design constraints, disaster recovery, documentation, functionality, user interface, performance, quality attributes, reliability, scope integration, security, system features, and usability.

## Accessibility Specifications

The accessibility specifications are to be in compliance with relevant guidelines and regulations set forth by Section 508 of the Rehabilitation Act of 1973. Accessibility testing will be done to included compliance with:

* [Americans with Disabilities Act of](http://en.wikipedia.org/wiki/Americans_with_Disabilities_Act_of_1990) 1990
* [Section 508 Amendment to the Rehabilitation Act of](http://en.wikipedia.org/wiki/Section_508_Amendment_to_the_Rehabilitation_Act_of_1973) 1973
* [Web Accessibility Initiative](http://en.wikipedia.org/wiki/Web_Accessibility_Initiative) (WAI) of the [World Wide Web Consortium](http://en.wikipedia.org/wiki/World_Wide_Web_Consortium) (W3C)
* [http://www.Secti](http://www.section508.gov/)on508.gov

## Business Rules Specification

* If the system has to change the Release process, it has to modify the POM file and project sources, and then check those changes into the project’s version control system and then request a project Release.

## Design Constraints Specification

* Must run on UNIX box and be able to run in concert with existing system.
* The default platform for all software development beneath the presentation layer development will be Oracle 64 bit Java 8 SE
* Application is to be built on open-source architecture.
* Must be accessible over the public Internet.
* PRISME will provide a workflow management service that is based on the Business

Process Model and Notation (BPMN) 2.0.

* The workflow management service engine must be able to run embedded in the default Java 8 Standard Edition (Java 8 SE) application platform.
* The default framework for all web application presentation layer development will be done in HTML5 markup, with JavaScript as the Document Object Model (DOM) scripting language, and with support for high-resolution display devices. Scaled Vector Graphics (SVG) images are the preferred means for scalable image representations to support high-resolution display devices. Alternatively, when SVG imagery is not appropriate, developers may use the image-set () CSS capability (<http://dev.w3.org/csswg/css-images-4/>) for raster images.
* The default framework for all Java Rich Internet Application (RIA) development will be JavaFX 8.
* REST is the default architectural style for providing web services.
* Apache Jersey 2.6 ([https://jersey.java.net](https://jersey.java.net/)) is the default framework for implementing web services.
* The Workflow Management Service shall publish workflow processes as Maven artifacts.
* The Artifact Server shall have a complete history of all SNOMED Release files (Systematized Nomenclature of Medicine Clinical Terms [SNOMED CT] is Released biannually, and the data files of the Release are ~1.3 GB, compressible to ~200 MB).
* The rich client tools will support scripting using the Oracle Nashorn JavaScript libraries.
* High-performance stand-alone terminology editing environment, deployed as a [Ja](http://www.oracle.com/technetwork/java/javase/overview-137531.html)va

[WebStart rich internet application](http://www.oracle.com/technetwork/java/javase/overview-137531.html) able to efficiently run on a laptop computer.

* The Stand-alone Terminology Integrated Development Environment must support all the capabilities currently supported by the IHTSDO and ISAAC workbench.
* The system will be able to accept, process, integrate, and version electronic Releases from terminology knowledge sharing partners.

## Disaster Recovery Specification

* The disaster recovery plan must have an accurate call list.
* The disaster recovery should be test and retested to ensure accuracy.
* The members who are responsible should be knowledgeable of their defined role.
* The disaster recovery plan should contain easy to follow steps and directions to reach recovery.
* The disaster recovery plan should be kept up-to-date.
* The disaster recovery plan should have a list of vendor contacts and policies.
* The disaster recovery plan should cover all essential and critical infrastructures.

## Documentation Specifications

System and user documentation for the ETS and STS Tooling and Server Development documentation should include:

* Standard operating procedures; Change Management Process; User manual for software; Documentation for network setup;
* Maintenance agreements/documentation Implementation Guide.

## Functional Specifications

### Functionality and Services

The Project Information System and Management Environment (PRISME) is the underlying software piece that brings all the components together under a development framework to support the following features.

**Table 1: Functionality and Services**

| **Functionality / Services** | **Description** |
| --- | --- |
| Terminology Server | Provide programmatic access to terminology components. The system should also support the integration of all other terminology sources as required to standardize vocabularies for data sharing with the Department of Defense. Host terminology from the following systems:  For Release 1:  SOLOR (SNOMED CT, LOINC, RxNORM) |
| Continuous Integration Server | Provide the ability to manage the developmental workflow by providing an automated process from check-out/check-in of code to release.  Prototypical examples of such continuous integration services include: Apache Continuum, Bamboo, Hudson, Jenkins, and TeamCity. |
| Artifact/Project Repository | Release repository for project dependencies. All project artifacts shall be managed by an Apache Maven compatible repository manager and extend Apache Maven with plugin extensions to manage terminology project processing, quality determination, release, and deployment.  Artifactory Apache Archiva and Sonotype Nexus are prototypical examples of artifact repository services.  Apache Ant is another software build tool that compares to Maven and may be used. |
| Content Management | Provide a continuous workflow in a collaborative environment. |
| Version/ Source Control | Provide a distributed version control system, where developers will have the ability to work on the same code/project at the same time.  Provide version control for all ETS content. Each file will be tracked, any modifications made, additions, deletions, or movement of files will receive a version number upon commit.  Example of this version control service would be Git or Apache Subversion. |
| Issue Tracking | Provide the ability to allow users to enter modification requests for terminology that can be tracked and managed globally.  A prototypical example of a tracker service would be Atlassian’s JIRA tracker. |
| Service Desk | A prototypical example of a service desk would be Atlassian’s Service Desk extension to JIRA. |

#### Project Information System and Management Environment

ETS Tooling and Server Development shall provide Project Information System and Management Environment (PRISME) for use by Developers and Managers to administer the development environment by creating an Integrated Development Environment (IDE). Additional PRISME capabilities will be implemented in Release 2.

Table 2: Project Information System and Management Environment Requirements

| BRD ID | Requirements |
| --- | --- |
| ETS-F-1 | ETS-R-1: The system SHALL enable developers and managers to comprehend the complete state of the development environment in the shortest amount of time.ETS-R-2: The system SHALL make specification and execution of the project build process easy and provide a uniform build system.ETS-R-3: The system SHALL provide quality project information, guidelines for best practices development.ETS-R-4: The system SHALL allow transparent migration to new features. |
| ETS-F-2 | ETS-R-5: The system SHALL show a dashboard displaying the following information:List of PRISME projects  * Summary statistics of the projects * Links showing any detailed information of the projects (including build metrics) * Tracker for each project * Artifacts deployed for each project * Version control system for each project’s sources and generated website |
| ETS-F-3 | ETS-R-6: The system SHALL use declarative specifications of a project’s build, deployment, Release, reporting, and documentation within a version-controlled Project Object Model (POM) file.ETS-R-7: The POM file SHALL contain the Uniform Resource Locator (URL) locations of the version control system which hosts the project’s POM file as well as any configuration files, data files, and source files and shall also specify the project’s dependencies, the developers involved and the roles they play, the defect tracking system, the continuous integration system, the organizations participating in the project, and the licenses associated with artifacts generated by the project. |
| ETS-F-4 | ETS-R-8: The system SHALL provide automated change log documentation created directly from source control. |
| ETS-F-5 | ETS-R-9: The system SHALL ensure reproducibility, accountability, and immutability of all aspects of a project’s Release by ensuring that the Release management process is fully automated, that all sources must be under version control, and all dependencies must be Released, that no manual processes can participate in the Release process, and that any subsequent modifications to Release artifacts can be repudiated. |
| ETS-F-6 | ETS-R-10: The system SHALL integrate with issue tracking systems and will provide automated reports of open issues and resolved issues at any time, and for any Release. |
| ETS-F-7 | ETS-R-11: The system SHALL provide cryptographic (MD5 and SHA1) checksums for all artifacts to ensure their integrity. |

#### Workflow Management Service

PRISME will provide a workflow management service that is based on the **Business Process Model and Notation (BPMN) 2.0** specifications and supports the entire life cycle of the business process (from authoring through execution to monitoring and management). Java Business Process Model (jBPM)[[1]](#footnote-1) is an open-source (Apache 2) prototypical example of such a workflow management service.

The workflow management services features will be implemented in Release 2.

#### Identity and Access Management Service

Additional identity and access management service capabilities will be implemented in Release 2.

Table 3: Identity and Access Management Service Requirements

| BRD ID | Requirements |
| --- | --- |
| ETS-F-23 | ETS-R-12: The Identity and Access Management service SHALL support publication of a terminology system that consists of users and their roles, so that terminology development environments can use those concepts to identify editing actions of users, and to determine roles assigned to individual users.ETS-R-13: The system SHALL allow the user to be assigned to a concept and a role. |
| ETS-F-26 | ETS-R-14: The system SHALL allow stratification of user’s assigned role (e.g., modeler, quality assurance, reviewer, and mentor).ETS-R-15: The system SHALL allow access to particular user functions and work flows may be granted or denied based on user role. |

#### Artifact Repository Service

PRISME will provide an artifact repository service. Artifactory[[2]](#footnote-2) Apache Archiva[[3]](#footnote-3) and Sonotype Nexus[[4]](#footnote-4) are prototypical examples of artifact repository services.

Table 4: Artifact Repository Service Requirements

| BRD ID | Requirements |
| --- | --- |
| ETS-F-27 | ETS-R-16: The system SHALL provide an Artifact Repository Service to which project artifacts are published and from which project dependencies are obtained by developers and/or continuous integration servers. |
| ETS-F-28 | ETS-R-17: The Artifact Repository Service SHALL be able to proxy artifact repositories from other organizations, and shall be able to be proxied by artifact repositories hosted by other organizations. |
| ETS-F-29 | ETS-R-18: The Artifact Repository Service SHALL identify artifacts by:Group IdentifierArtifact IdentifierVersionTypeClassifier (Optional) |
| ETS-F-30 | ETS-R-19: The Artifact Repository Service SHALL classify artifacts with a type that describes the format of a project artifact. An example type, such as “RF2” would indicate that the artifact contained terminology content represented as Systematized Nomenclature of Medicine (SNOMED) Release Format 2 files. The classifier can optionally be used to describe different variations of a file Release such as "Delta" or "Full" |
| ETS-F-31 | ETS-R-20: The Artifact Repository Service SHALL enable users to search the repository via a Graphical User Interface (GUI) for artifacts by:ChecksumGroup idArtifact idClassifierVersionLicense,Full text search of selected project content, minimally including the project POM file. |
| ETS-F-32 | ETS-R-21: The Artifact Repository Service SHALL allow clients to programmatically obtain lists of artifacts filtered by regular expression pattern matching, checksum, group identifier, artifact identifier, classifier, version, license, and by full text search of selected project content, minimally including the project POM file. |
| ETS-F-33 | ETS-R-22: The Artifact Repository Service SHALL provide control over what artifacts are used by PRISME projects.ETS-R-98: The Artifact Repository Service SHALL enable the organization to standardize on a specific version of a dependency, and to enforce this standardization by only providing access to a specific version of an artifact in a repository manager. |
| ETS-F-34 | ETS-R-23: The Artifact Repository Service SHALL provide control over the licenses of artifacts allowed in the repository.ETS-R-99: The system SHALL provide reporting of the licenses used by each artifact currently within the repository. |
| ETS-F-35 | ETS-R-24: The Artifact Repository Service SHALL allow client applications, such as the PRISME Project Creation Application to remotely query the artifact repository, and to remotely download selected artifacts. |
| ETS-F-44 | ETS-R-25: The Artifact Repository Service SHALL have the necessary storage, configuration, and bandwidth to support version control of large textual data sources, such as a complete history of all SNOMED Release files (Systematized Nomenclature of Medicine Clinical Terms [SNOMED CT] is Released biannually, and the data files of the Release are ~1.3 GB, compressible to ~200 MB). |
| ETS-F-45 | ETS-R-26: The Artifact Repository Service SHALL have one master repository for each terminology system or independent module of a terminology system that is used within VA, or are of collaborative importance. These terminology systems include, but are not limited to: SNOMED CT International Edition, SNOMED CT US Extension, SNOMED CT Spanish Edition, Logical Observation Identifiers, Names, and Codes (LOINC), International Classification of Diseases, Ninth Edition, Clinical Modification (ICD-9-CM), ICD-10-CM, RxNorm, National Drug File (NDF), National Drug File-Reference Terminology (NDF-RT), Current Procedural Terminology (CPT), Healthcare Common Procedure Coding System (HCPCS), Diagnosis Related Group (DRG), and VHA Terminology (VHAT). |

#### Tracker Service

The PRISIME environment shall provide a tracker service. A prototypical example of a tracker service would be Atlassian’s JIRA tracker.[[5]](#footnote-5) JIRA is used by Open Source Electronic Health Record Alliance (OSEHRA)[[6]](#footnote-6) and synergism and/or integration with OSEHRA is worth considering.

Table 5: Tracker Service Requirements

| BRD ID | Requirements |
| --- | --- |
| ETS-F-36 | ETS-R-27: The system SHALL provide a Tracker Service for each project. |

#### Service Desk

The PRISME environment shall provide a service desk. A prototypical example of a service desk would be Atlassian’s Service Desk extension to JIRA.[[7]](#footnote-7) JIRA is used by OSEHRA,[[8]](#footnote-8) and synergism and/or integration with OSEHRA is worth considering. Additional service desk capabilities will also be implemented in Release 2.

Table 6: Service Desk Requirements

| BRD ID | Requirements |
| --- | --- |
| ETS-F-37 | ETS-R-28: The system SHALL provide a Service Desk Portal to allow users to log service requests that relate to ETS Tooling and Server Development. |

#### Version Control Service

PRISME shall provide a version control service. A prototypical example of this version control service would be Git[[9]](#footnote-9) or Apache Subversion.[[10]](#footnote-10) Git is used by OSEHRA[[11]](#footnote-11) and synergism and/or integration with OSEHRA is worth considering. Additional version control service capabilities will also be implemented in Release 2.

Table 7: Version Control Requirements

| BRD ID | Requirements |
| --- | --- |
| ETS-F-39 | ETS-R-29: The system SHALL provide a Version Control Service. |

#### Quality Management Platform

PRISME shall provide a quality management platform that will support traditional java-based software projects and can be extended specifically to support terminology quality metrics. A prototypical example of such an open-source (LGPL) quality management platform is SonorQube.[[12]](#footnote-12) Additional quality management platform capabilities will also be implemented in Release 2.

Table 8: Quality Management Requirements

| BRD ID | Requirements |
| --- | --- |
| ETS-F-47 | ETS-R-30: The system SHALL provide a quality management platform that will enable tracking of quality metrics for each project over time. |
| ETS-F-48 | ETS-R-31: The Quality Management Platform SHALL provide trend analysis tools to monitor quality evolution and milestones. |
| ETS-F-50 | ETS-R-32: The Quality Management Platform SHALL be extensible by writing plugins that can support terminology specific metrics. |

#### Continuous Integration Service

PRISME shall provide a continuous integration service capable of building traditional software projects, as well as building terminology projects. Prototypical examples of such continuous integration services include: Apache Continuum[[13]](#footnote-13), Bamboo[[14]](#footnote-14), Hudson[[15]](#footnote-15), Jenkins[[16]](#footnote-16), and TeamCity[[17]](#footnote-17). Additional continuous integration service capabilities will also be implemented in Release 2.

Table 9: Continuous Integration Service

| BRD ID | Requirements |
| --- | --- |
| ETS-F-54 | ETS-R-33: The system SHALL provide a continuous integration service that is able to build and test projects as defined by the project’s POM |
| ETS-F-56 | ETS-R-34: The Continuous Integration Service SHALL be configurable to listen to commit triggers from the Continuous Integration Service, and to enable those triggers to initiate a project build on the continuous integration server. |
| ETS-F-57 | ETS-R-35: The Continuous Integration Service SHALL ensure the integrity of all dependent artifacts used in a project build by verifying the cryptographic checksums of all artifacts. If checksums do not match, the Continuous Integration service must force the build to fail. |

#### Project Creation Application

The project creation application will guide the selection of options necessary to create a project POM and to create the necessary infrastructure components (version control repository, continuous integration server setup, web site deployment location, issue trackers) and to select the proper project options. The goal of the project creation application is to enable technical users to create projects more efficiently and to also enable non-technical project managers to be able to set up their own projects with guidance from the application. Additional project creation application capabilities will also be implemented in Release 2.

Table 10: Quality Management Requirements

| BRD ID | Requirements |
| --- | --- |
| ETS-F-58 | ETS-R-36: The system SHALL provide a Project Creation Application, which will enable a PRISME project administrator to create and deploy new projects. |
| ETS-F-59 | ETS-R-37: The Project Creation Application SHALL automate the creation and initialization of the Version Control Service repository for a project, and check in initial project sources into the Version Control Service. |
| ETS-F-60 | ETS-R-38: The Project Creation Application SHALL automatically configure the Continuous Integration Service to check out the project from the Version Control Service, build the project, and then deploy the project to the Artifact Repository Service. |
| ETS-F-61 | ETS-R-39: The Project Creation Application SHALL allow a project administrator to select filtered project dependencies (such as a version of SNOMED or LOINC) from a list of dependencies of the proper classification (java library, terminology content, etc.) obtained from searching the PRISME Artifact Repository Service in real time. |

### Content Management Capabilities

Content management capabilities are discrete functions that may be aggregated together to form an application. For example, a comprehensive editing environment would have all the content management capabilities available within a single environment. A web application may only use selected content management capabilities to efficiently serve the needs of a single user community with minimal setup and training.

#### Status Time Author Module Path (STAMP) Database

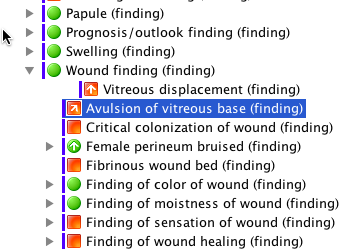
Additional status time author module path (STAMP) database capabilities will also be implemented in Release 2.

Table 11: Time Author Module Path (STAMP) Database Requirement

| BRD ID | Requirements |
| --- | --- |
| ETS-F-66 | ETS-R-40: All ETS content (concepts, definitions, maps, rules, Refsets) SHALL be given immutable component identifiers, and will be version controlled by indicating the Status, Time, Author, Module, and Path of every change to ETS content. |
| ETS-F-67 | ETS-R-107: The system SHALL support an embeddable (runs within the same Java Virtual Machine [JVM] memory space) STAMP versioning component database available under an Apache 2 license. |

#### Taxonomy Viewing

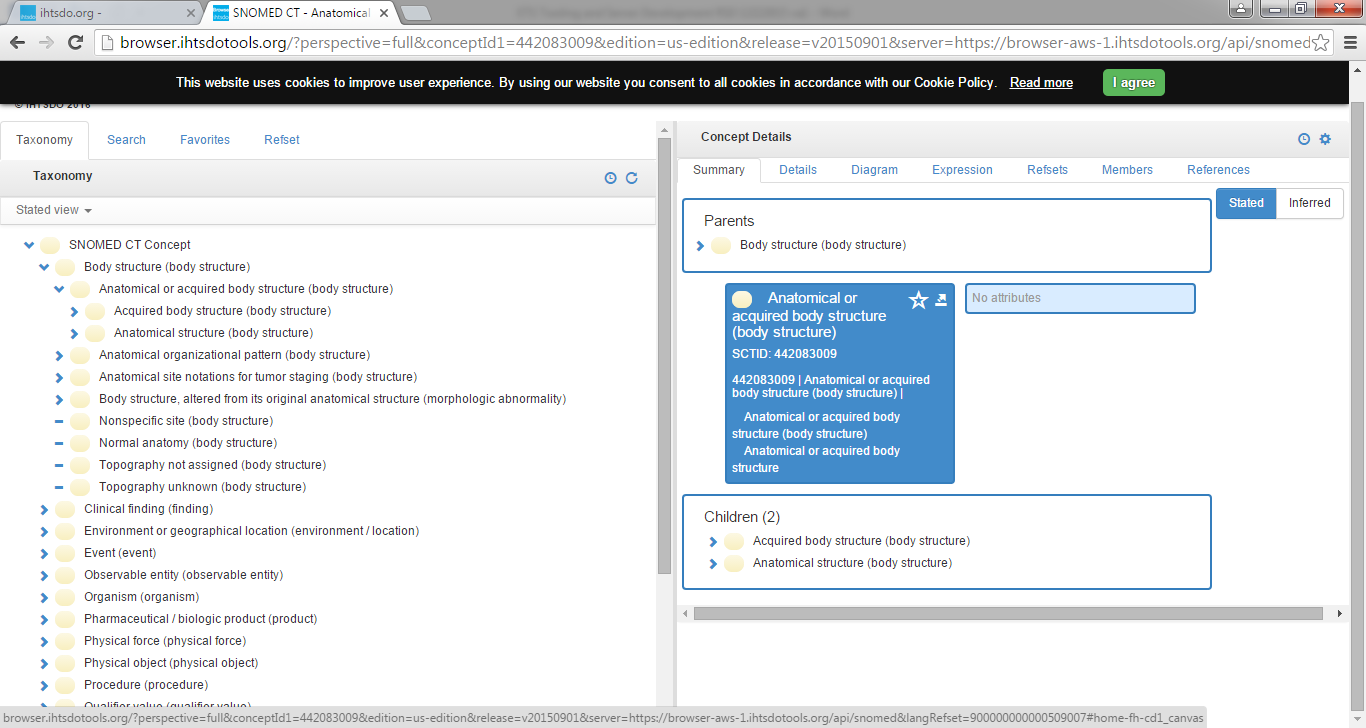
Additional taxonomy viewer capabilities will also be implemented in Release 2.



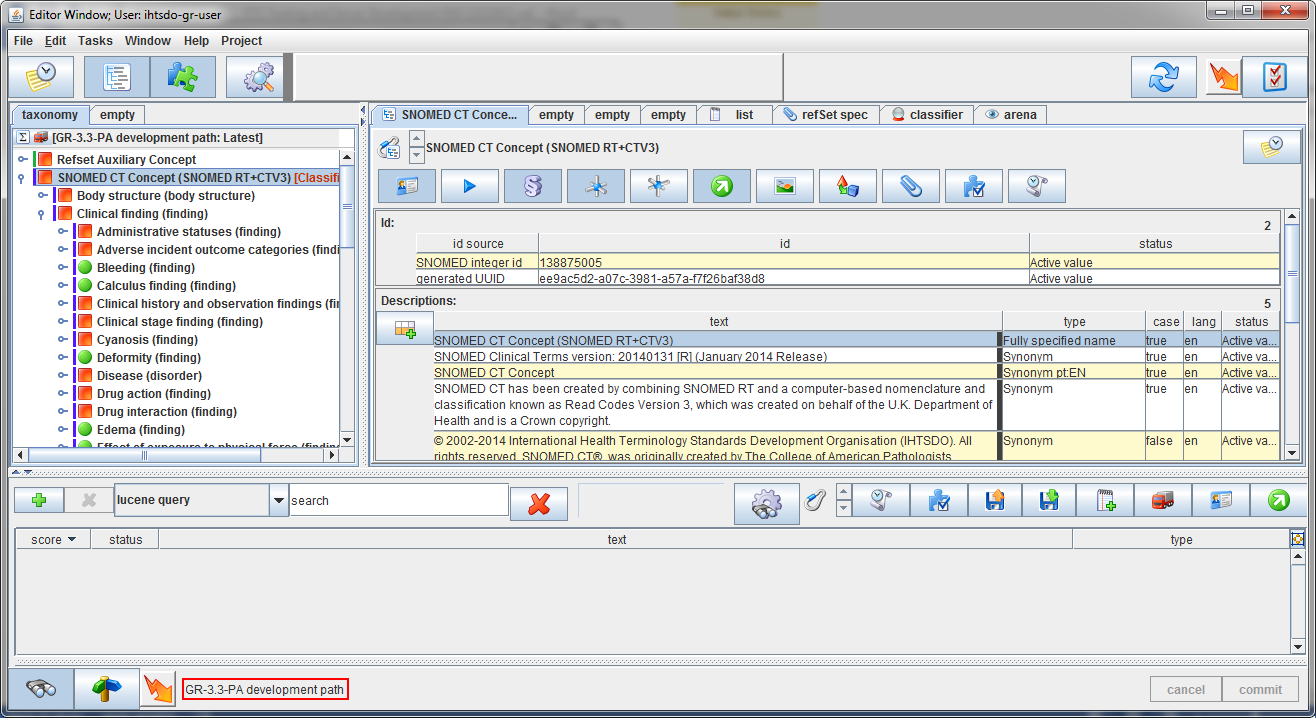
**Figure 1 – Taxonomy Viewer**

Table 12: Taxonomy Requirements

| BRD ID | Requirements |
| --- | --- |
| ETS-F-69 | ETS-R-41: Content management environments SHALL have a taxonomy-viewing component available that can display configurable information to meet the needs of a particular applicationETS-R-42: The taxonomy viewer SHALL support displaying concepts parentage, when more than one parent is present and enabling navigation of the entire parentage and lineage of a concept.ETS-R-43: The taxonomy viewer SHALL show all descendants (immediate and distant subtypes) of a concept.ETS-R-44: The taxonomy viewer SHALL support custom shapes and colors based on different terminology characteristics and colors may display what path or module a component is part of.ETS-R-45: The taxonomy viewer SHALL indicate whether a concept has subtypes through the use of icons (e.g., in the image above, the arrows to the left of some concepts indicate the presence of subtypes). |
| ETS-F-70 | ETS-R-46: The taxonomy viewer SHALL be able to display the preferred, or Fully Specified Name (FSN) in a specified dialect and language. |
| ETS-F-71 | ETS-R-47: The taxonomy viewer SHALL be configurable to display an appropriate icon based on membership of a concept in a reference set. |
| ETS-F-72 | ETS-R-48: The taxonomy viewer SHALL have the ability to show inferred and stated views. Note: Summation view has been removed. Note:  Stated view - Attributes and values of a concept definition are stated by a modeler.  Inferred view - Attributes and values of concept definition are generated by description logic reasoned. |



**Figure 2 – Taxonomy Viewer Concept Details**



**Figure 3 – Taxonomy Viewer SNOMED CT Concept**

#### Component Request Service

The Component Request Service will enable users (such as application developers, re-engineering teams, mapping groups, etc.) to request new components for various applications. These components may be new terms added to one of the SNOMED LOINC and RxNorm (SOLOR) terminologies, new CDS or Knowledge Artifacts, new automation rules for scripting the behavior of an application, new rules for confirming the quality or correctness of an editing action, or batch quality assurance and related components managed as part of the ETS. The component request services will be implemented in Release 2.

#### Query Capabilities

Additional query capabilities will also be implemented in Release 2.

Table 13: Query Capabilities Requirements

| BRD ID | Requirements |
| --- | --- |
| ETS-F-80 | ETS-R-49: The user SHALL be able to construct standard queries using a graphical interface that supports the drag and drop of concept(s) into the query specification, as well as type-ahead completion for selecting concepts for use in the query specification.ETS-R-50: The user SHALL be able to enter words or fragments in any order to retrieve all appropriate results.ETS-R-51: The system SHALL allow the user to search on complete or partial name. |
| ETS-F-82 | ETS-R-52: The system SHALL provide the functionality required for users to be able to save, retrieve, share, browse, and modify queries. |
| ETS-F-167 | ETS-R-53: The system SHALL support the following search-related capabilities:Save/export search resultsSort search results by various criteria such as alphabetical by FSN or by source (SNOMED CT International Release, US Extension, LOINC, Refset content, etc.)Provide numerical counts of search resultsSpecified portion of the hierarchy, in reference sets, or relationship type, and destination. |

#### Refset Capabilities

The refset capabilities will be implemented in Release 2.

#### Document Generation Capabilities

The document generation capabilities will be implemented in Release 2.

#### Scripting Capabilities

The implementation of the scripting capabilities is currently planned for Backlog work.

#### Description Logic

Additional description logic capabilities will also be implemented in Release 2.

Table 14: Description Logic Requirements

| BRD ID | Requirements |
| --- | --- |
| ETS-F-92 | ETS-R-54: The system SHALL support viewing concept definitions using the SNOMED diagramming standard. |
| ETS-F-96 | ETS-R-55: The system SHALL support the OWL 2 EL and the flexibility to add more features of full OWL at a later point - nothing in the design should preclude the addition of other OWL features in the future. |
| ETS-F-171 | ETS-R-56: The system SHALL provide classifier functionality for the SOLOR Terminologies (SNOMED CT, LOINC, and RxNorm), VA Extension content, post-coordinated expressions, and LEGO content. Note: Post-coordination***:***describes representation of a Concept using a combination of two or more codes.  For example:  The color scheme used is as follows – blue sections indicate the ‘starting’ concept, and red sections indicate the modified/additional data resulting from whichever kind of post-coordination is performed. For example, ‘evacuation of hematoma from cerebellum’, suggests the starting concept and post-coordination has been used to modify this concept with a refined ‘method’ of ‘suction evacuation’.  <code code="171474001" displayName="evacuation of hematoma from cerebellum">  <qualifier>  <name code="260686004" displayName="method"/>                          <value code="257818008" displayName="suction evacuation"/>  </qualifier>  </code> |
| ETS-F-172 | ETS-R-57: The system SHALL display incremental changes that have occurred with each classificationETS-R-104: The system SHALL allow the user to sort the results by type of relationship change.ETS-R-105: The system SHALL display the loss or gain of parent and child concepts when this occurs. |
| ETS-F-173 | ETS-R-58: The system SHALL detect and display concepts in equivalency and cycle errors as well as provide a means for the concepts to be transferred to editing panels for error correction. |

#### Mapping Capabilities

Additional mapping capabilities will also be implemented in Release 2.

Table 15: Mapping Capabilities Requirements

| BRD ID | Requirements |
| --- | --- |
| ETS-F-163 | ETS-R-59: The system SHALL support mapping between and among terms and knowledge artifacts. |
| ETS-F-164 | ETS-R-60: The system SHALL support users in creating, maintaining, updating and versioning mappings between and among terms and knowledge artifacts |
| ETS-F-188 | ETS-R-61: The system SHALL support mapping to multiple standardized terminologies, including SNOMED CT, LOINC, and RxNorm and the ability to designate mappings as “exact,” “narrower than,” or “broader than.” |
| ETS-F-189 | ETS-R-62: The system SHALL have a dedicated terminology mapping interface allowing users to visualize both the source and the target standardized terminologies (codes and terms) in the same panel.ETS-R-106: The system SHALL provide drag-and-drop functionality to map the target terminology to the source term. |
| ETS-F-215 | ETS-R-63: The system SHALL allow authors to define the metadata for a map set/value set. Metadata shall include the following:  * Map set name * Map set identifier * Source terminology version * Terminology version * Purpose of the map set * Map set equivalence identifier * Map type that defines if the map is from a standards development organization map, government recognized map or a proprietary/customized map * Map set status * Reason for change |

#### Browse a Set of Approved, Suggested or Similar Models

The implementation of the browse a set of approved, suggested or similar models capabilities is currently planned for Backlog work.

#### Template Based Modeling

The implementation of the template based modeling capabilities is currently planned for Backlog work.

#### Modify Existing

The implementation of modify existing capabilities is currently planned for Backlog work.

#### Specialize From Existing

The implementation of specialize from existing capabilities is currently planned for Backlog work.

#### Steal Pieces and Re-use in a New Model

The implementation of the steal pieces and re-use in a model capabilities is currently planned for Backlog work.

#### Rules Driven Modeling

The implementation of the rules driven modeling capabilities is currently planned for Backlog work.

#### Interview Driven Modeling

The implementation of the interview driven modeling capabilities is currently planned for Backlog work.

#### Rules Driven QA

The rules driven QA capabilities will be implemented in Release 2.

#### Semi-Automated Modeling

The implementation of the semi-automated modeling capabilities is currently planned for Backlog work.

#### Alerts

The alerts capabilities will be implemented in Release 2.

#### Human Consults

The human consults capabilities will be implemented in Release 2.

#### Context-sensitive help

The implementation of the context-sensitive help capabilities is currently planned for Backlog work.

#### Workflow

The workflow capabilities will be implemented in Release 2.

#### Quality Assurance

The quality assurance capabilities will be implemented in Release 2 as well as Backlog work.

#### Concept Management

Additional concept management capabilities will also be implemented in Release 2 as well as Backlog work.

Table 16: Concept Management Requirements

| BRD ID | Requirements |
| --- | --- |
| ETS-F-159 | ETS-R-64: The system SHALL allow the modeler to create new concepts within the SOLOR terminology.ETS-R-100: The New concepts SHALL be created through a semi-automated process (which includes functionality such as pre-populating preferred terms and auto-correction of spelling errors or inadvertent extra spaces). |
| ETS-F-193 | ETS-R-65: The system SHALL allow the modeler to edit existing concepts according to specified editorial policy (e.g., addition or retirement of new descriptions, relationships, etc.).ETS-R-101: The system SHALL be able to auto-correct spelling mistakes, abbreviations, extra spaces on existing concepts. |
| ETS-F-194 | ETS-R-66: The system SHALL allow the user to create child concept. The ability to create a new concept as a child of another.ETS-R-102: The system SHALL allow users to view at least two concepts simultaneously to support comparison, copying, and cloning via drag-and-drop functionality.ETS-R-103: The system SHALL allow the user to clone terminology from another terminology. |

#### Server Requirements

Additional mapping capabilities will also be implemented in Release 2.

Table 17: Server Requirements

| BRD ID | Requirements |
| --- | --- |
| ETS-F-196 | ETS-R-67: The system SHALL have the ability to import full RF2 Releases of SNOMED CT International Edition, extensions (including the US Extension), and translations. |
| ETS-F-198 | ETS-R-68: The system SHALL have the ability to serve all published SNOMED CT content. |
| ETS-F-199 | ETS-R-69: The system SHALL have the ability to support description logic in the OWL 2 EL profile. |
| ETS-F-200 | ETS-R-70: The system SHALL have the ability to classify the terminology (incremental and full) and serve inferred relationships. |
| ETS-F-202 | ETS-R-71: The system SHALL have the ability to deploy for multiple concurrent users in an on-line, real-time, centrally hosted service. |
| ETS-F-205 | ETS-R-72: The system SHALL have the ability to import and serve non-SNOMED CT vocabularies, classifications, and taxonomies (e.g., LOINC and RxNorm). |
| ETS-F-206 | ETS-R-73: The system SHALL have the ability to accommodate client access via a REST API. |

### End User Applications

#### Stand-Alone Terminology Integrated Development Environment

The implementation of the stand-alone terminology integrated development environment capabilities is currently planned for Backlog work.

#### Client-Server Terminology Integrated Development Environment

The implementation of the Client-Server Terminology Integrated Development Environment capabilities is currently planned for Backlog work.

#### Terminology Web Application Environment

Table 18: Terminology Web Application Environment Requirements

| BRD ID | Requirements |
| --- | --- |
| ETS-F-142 | ETS-R-74: Web Application Environment SHALL be configurable to provide selected content management capabilities. |

#### New Concept Request Application

The implementation of the scripting capabilities is currently planned for Release 2.

### Knowledge Types

#### Stratified by Domain

The implementation of the stratified by domain capabilities is currently planned for Backlog work.

#### Stratified by Architectural Level

The implementation of the stratified architecture level capabilities is currently planned for Backlog work.

### Inputs into System

#### Terminology Releases from Standards Development Organizations (SDO)

Additional Terminology Releases from Standards Development Organizations (SDO) capabilities will also be implemented in Release 2 as well as Backlog work.

Table 19: Terminology Releases from SDO Requirements

| BRD ID | Requirements |
| --- | --- |
| ETS-F-147 | ETS-R-75: The system SHALL be able to accept, process, integrate, and version electronic Releases of terminologies from SDO, the NLM and other authoritative sources. For Release 1:  SOLOR (SNOMED CT, LOINC, RxNORM) |
| ETS-F-208 | ETS-R-76: The system SHALL import/represent SNOMED CT so that SNOMED CT is displayed taxonomicallyETS-R-77: The system SHALL incorporate additional extensions into the taxonomy (e.g., the US Extension).ETS-R-78: The system SHALL provide the ability so that SNONED CT can be searched using Lucene and have the search, limit the results to the SNOMED CT taxonomy.ETS-R-79: The system SHALL display all descriptions of a SNOMED CT concept along with appropriate language Refset representation.ETS-R-80: The system SHALL display all relationships of a SNOMED CT concept both in the stated and inferred view, as role groups (where appropriate).ETS-R-81: The system SHALL display the active/inactive and definition status of the concept.ETS-R-82: The system SHALL display all identifiers (concept, description, relationship).ETS-R-83: The system SHALL display the Refset membership status of a given concept, if appropriate. |
| ETS-F-209 | ETS-R-84: The system SHALL import/represent RxNorm such that RxNorm is represented taxonomically.ETS-R-85: The system SHALL provide the ability that RxNorm can be searched using Lucene and have the search, limit the results to RxNorm taxonomy.ETS-R-86: The system SHALL display active ingredients of the product.ETS-R-87: The system SHALL display ingredient strength on dispensable products using concrete domains.ETS-R-88: The system SHALL represent National Drug Code (NDC) codes as searchable Refsets attached to all dispensable products.ETS-R-89: The system SHALL display all appropriate identifiers, including RxCUIs and NDCs, associated with an RxNorm concept.ETS-R-90: The system SHALL display all RxNorm names for a given concept.ETS-R-91: The system SHALL display all RxNorm relationships for a given concept. |
| ETS-F-210 | ETS-R-92: The system SHALL import/represent LOINC such that LOINC is represented taxonomically.ETS-R-93: The system SHALL provide the ability that LOINC can be searched using Lucene and have the search limit the results to the LOINC taxonomy.ETS-R-94: The system SHALL display the fully specified name, short name, and long names, LOINC code for a given LOINC term.ETS-R-95: The system SHALL represent LOINC parts (Component, Property, Time, System, Scale, and Method) as relationships. |
| ETS-F-213 | ETS-R-96: The system SHALL be able to generate a standard module which will digest the Releases of multiple standards (listed below) into a single data resource:The structure of the data resource must match the IHTSDO Workbench standard (i.e., using fully specified names, synonyms/descriptions as appropriate, relationships, and taxonomic representation).The data resource will be a zip artifact in OSEHRA ibdf format (i.e., Maven Artifact, Maven Artifact stored on Archiva)The data resource can be imported into and represented by the OSEHRA ISAAC on demand (i.e., the data source can be imported when needed)The data resource will be structured such that when imported into the Tooling, the standards can be utilized for mapping work (keeping the standards separate) or integration work (making them part of the VA extension).Standards to be incorporated into the data resource: SNOMED CT, LOINC, RxNorm, ICD-9-CM, ICD-10-CM, CVX, CPT, HCPCS, CDC Race and Ethnicity codes, ISO 639-2 alpha-3 language codes, National Uniform Claim Committee (NUCC) taxonomy for provider type codes, Universal Medical Device Nomenclature System (UMDNS). |

#### Terminology Releases from Knowledge Sharing Partners

Table 20: Terminology Releases from Knowledge Sharing Partners Requirements

| BRD ID | Requirements |
| --- | --- |
| ETS-F-148 | ETS-R-97: The system SHALL be able to accept, process, integrate, and version electronic Releases from terminology knowledge sharing partners. At a minimum, this includes SNOMED CT extensions and ref sets. |

#### Clinical Decision Support (CDS) and Knowledge Related Artifacts

The Clinical Decision Support (CDS) and Knowledge Related Artifacts will be implemented in Release 2.

#### XML Transforms

The implementation of the XML Transforms capabilities is currently planned for Backlog work.

### Outputs from System

#### Outputs from the system

The Outputs from the System capabilities will be implemented in Release 2 as well as Backlog work.

## Graphical User Interface (GUI) Specifications

### General GUI Compliance

The ETS and STS Tooling and Server Development shall provide general graphical user interface compliance. Some general GUI compliance including the following specifications:

* A well-defined on-screen indication of the current focus will be provided.
* The on-screen indication moves among interactive interface elements as the input focus changes.
* Focus will be programmatically exposed so that assistive technology can track focus and focus changes.
* Identity, operation, and state of the user interface element, will be available to support assistive technology.
* An image that represents a program element, the information conveyed by the image must also be available in text.
* Textual information will be provided through operating system functions for displaying text.
* Minimum information that will be made available is text content, text input caret location, and text attributes.
* Applications will not override user-selected contrast and color selections and other individual display attributes.
* When electronic forms are used, the form will allow people using assistive technology, to access the information, field elements, and functionality required, for completion and submission of the form, including all directions and cues.2

### GUI Compliance Specific to Compliance Training

The ETS and STS Tooling and Server Development shall provide graphical user interface compliance specific to Terminology Tooling. This specific compliance includes the following specifications:

* Project Information System and Management Environment (PRISME), the Artifact Repository Service will enable users to search the repository via a Graphical User Interface (GUI) for artifacts by checksum, group id, artifact id, classifier, version, license, and by full text search of selected project content, minimally including the project POM file.
* Content management capabilities, re-query capabilities, the user shall be able to construct standard queries using a graphical interface that supports drag and drop of concept into the query specification, as well as type-ahead completion for selecting concepts for use in the query specification. The user shall be able to enter words or fragments in any order to retrieve all appropriate results.
* Content management capabilities, re-use of existing components, the system will allow the modeler to select components of an existing model to be re-used in the creation of a new model. Methods of selection and re-use should be highly useable and easily understood, for example, using graphical elements.
* Terminology tooling shall provide capabilities for users to add and edit QA rules, in a graphical manner, using domain specific languages where appropriate.
* Terminology tooling shall provide graphical user interface components that enhance and simplify editing processes, such as:
* Configurable panels for editing concepts.
* Viewing the taxonomy, refset/mapping development, etc.
* A navigable history of codes/concepts visited.
* The ability to copy/paste identifiers and descriptions, via mouse or keyboard shortcuts.
* Straight-forward, clearly delineated buttons/controls for editing, creating/retiring content etc.

## Multi-divisional Specifications

A robust Technical Terminology Service (TTS) is necessary to publish standard terminologies and to ensure their complete integration with VA Health Information Technology (HIT) systems and applications. Service will utilize a J2EE Platform running on a non-Windows dependent OS.

* The TTS will address internal Office of Information and Technology (OI&T) technical needs, including terminology publication and distribution as well as technical consultation for accessing terminology resources, e.g., Service Oriented Architecture (SOA) integration.
* Establishing and maintaining robust interoperability with VA partners, such as DoD and

VBA.

* Health data must be ubiquitously standardized, including the ability to compare the processes, and quality of care among national and international health providing organizations.
* Must be able to share data with organizations such as the International Health Terminology Standards Development Organization (IHTSDO) Open Tooling Framework, and the IHTSDO workbench that is currently utilized by the IHTSDO, Denmark, Sweden, the United States National Library of Medicine, Kaiser Permanente, and some internal VA projects.
* The rich client tools will support scripting using the Oracle Nashorn JavaScript libraries.
* The terminology tooling shall provide classifier functionality for the SOLOR Terminologies (SNOMED CT, LOINC, and RxNorm), VA Extension content, post- coordinated expressions, and LEGO content.
* The terminology tooling must also be able to support the workflow integration of terminology authors external to the KBS team, and potentially external to the VA.
* The terminology tooling should also support workflow for exporting content to VA partners and for submitting content requests to the United States SNOMED CT Content Request System (USCRS).

## Performance Specifications

* The system shall remain responsive at all times, with no more than 2 second lags between user action, and system response to action.
* Editing environments that support classification must be able to classify the entire terminology in 30 seconds or less, and to incrementally classify additive changes to the terminology in 500 milliseconds or less.
* Refset environments must support Refset computation of a 150,000 member set, and computation of parent Refsets in less than 10 seconds.

Table 21: Performance Specifications

|  |
| --- |
| If this is a system modification, how many users does the current system support? |
| The current system supports 8-10 users (STS and KBS staff). |
| How many users will the new system (or system modification) support? |
| The web application components of the system are expected to support 5,000 registered users, and 600 concurrent users. This includes STS staff, KBS staff, contractors, field staff, etc. |
| What is the predicted annual growth in the number of system users? |
| Annual growth is expected to average 10-15%. Initially, growth may be as high as 20% (specifically related to VistA Evolution and Connected Health initiatives). However, it is expected to plateau. |

## Quality Attributes Specification

The following types of testing will be done to ensure the quality of the ETS and STS Tooling and Server Development application:

* [Graphical user interface](http://en.wikipedia.org/wiki/Graphical_user_interface_testing) testing
* Unit testing
* [Usability](http://en.wikipedia.org/wiki/Usability_testing) testing
* [Software performance testi](http://en.wikipedia.org/wiki/Software_performance_testing)ng
* [Compatibility](http://en.wikipedia.org/wiki/Compatibility_testing) testing
* [Load testi](http://en.wikipedia.org/wiki/Load_testing)ng
* [Volume testi](http://en.wikipedia.org/wiki/Volume_testing)ng
* [Stress testi](http://en.wikipedia.org/wiki/Stress_testing)ng
* [Security testin](http://en.wikipedia.org/wiki/Security_testing)g
* [Smoke testi](http://en.wikipedia.org/wiki/Smoke_testing_(software))ng
* [Ad hoc](http://en.wikipedia.org/wiki/Ad_hoc_testing) testing
* [Regressi](http://en.wikipedia.org/wiki/Regression_testing)on testing
* [Installation testin](http://en.wikipedia.org/wiki/Installation_testing)g
* [Maintenance testi](http://en.wikipedia.org/wiki/Maintenance_testing)ng
* [Recovery testing](http://en.wikipedia.org/wiki/Recovery_testing) and failover testing.
* [Accessibility](http://en.wikipedia.org/wiki/Computer_accessibility) testing, including compliance with:
  + [Section 508 Amendment to the Rehabilitation Ac](http://en.wikipedia.org/wiki/Section_508_Amendment_to_the_Rehabilitation_Act_of_1973)t of 1973

## Scope Integration

The following sections provide ETS and STS Tooling and Server Development known interfaces and related projects or work efforts.

### 2.11.1 Known Interfaces

Known interfaces included, but are not limited to:

* VHA Enterprise Terminology Services (VETS) (includes New Term Rapid Turnaround
* (NTRT)
* Connected Health/Mobile Applications
* Corporate Data Warehouse (CDW)
* Registries
* TDS

| Name of Application | Description of current application | Interface Type | Existing Functionality | Deliverables |
| --- | --- | --- | --- | --- |
| VHA Enterprise Terminology Services (VETS) (includes New Term Rapid Turnaround (NTRT) | Suite of products that deliver standardized terminology content for use across the VA enterprise; including VistA and Clinical /Health Data Repository (CHDR). | Automated | Yes, but not to enterprise requirement’s level | Rapid and accurate issuance of terms, updates of existing terms, and deployment of solutions over a browser to multiple applications. |
| Connected Health/Mobile Applications | Provides mobile access to VA healthcare information | Automated | Limited; applications are being developed | Data would be shared, as needed. |
| Corporate Data Warehouse (CDW) | National data repository that pulls from several VHA clinical and administrative systems, primary VistA. | Automated | Yes | Data would be shared, as needed. |
| Registries | Supports the maintenance of local and national registries for clinical and resource tracking of care for patients with certain clinical conditions. | Automated | Yes | Data would be shared, as needed |

### 2.11.2 Related Projects or Work Efforts

The following are related projects or work efforts:

 **NSR #20120905 Mobile Applications**

[http://vista.med.va.gov/nsrd/Tab\_GeneralInfoView.asp?RequestID=20120](http://vista.med.DNS   /nsrd/Tab_GeneralInfoView.asp?RequestID=20120905)905

The Mobile Development project is focused on the development of simple and complex applications and treats these applications as functions being released to the App Store. This project manages the development of mobile applications and plans for cyclic Release of applications over the course of 4, 6 month increments.

 **NSR #20130905 VistA Evolution (VE)**

[http://vista.med.va.gov/nsrd/Tab\_GeneralInfoView.asp?RequestID=20130](http://vista.med.DNS   /nsrd/Tab_GeneralInfoView.asp?RequestID=20130905)905

The VistA-4 Project will be the first project in the VistA Evolution Program. VistA-4 will focus on syntactic, semantic, and process interoperability, care coordination, the integration of ancillary services, and meaningful use. VistA-4 will rely upon infrastructure components, data models, and services that support an open, modular, extensible EHR platform allowing VA to provide high-quality solutions at increased speed and decreased cost. The resulting system will be flexible and agile –

accommodating new technology advances and achieving optimal results more efficiently.

 **NSR #20140509 VA/DoD Data Standardization**

[http://vista.med.va.gov/nsrd/Tab\_GeneralInfoView.asp?RequestID=20140](http://vista.med.DNS   /nsrd/Tab_GeneralInfoView.asp?RequestID=20140509)509

VA is collaborating with the DoD and the IPO to improve the interoperability of data contained in the VA and DoD health care systems. Data standardization is the key. As

part of the improvement process, this request will provide the framework for expectations related to sharing standardized clinical data between VA and its health care deliver partners (namely DoD).

 **NSR #20080407 Standard Computable Data in Documents**

[http://vista.med.va.gov/nsrd/Tab\_GeneralInfoView.asp?RequestID=20080](http://vista.med.DNS   /nsrd/Tab_GeneralInfoView.asp?RequestID=20080407)407

This request seeks to standardize objects in documents so that they are computable and available for all document types.

 **NSR #20110408 Certification of VistA for Meaningful Use**

[http://vista.med.va.gov/nsrd/Tab\_GeneralInfoView.asp?RequestID=20110](http://vista.med.DNS   /nsrd/Tab_GeneralInfoView.asp?RequestID=20110408)408

This NSR seeks to bring VistA into compliance with the Stage 1 Meaningful Use of EHR Technology certification criteria, enabling VA to meet its commitment to the Meaningful Use objectives. The Health Information Technology for Economic and Clinical Health (HITECH) Act, enacted as part of the American Recovery and Reinvestment Act

(ARRA) of 2009, was signed into law on February 17, 2009, to promote the adoption and meaningful use of certified health information technology. In July of 2010, CMS announced a final rule to implement provisions of ARRA that include criteria for achieving meaningful use of health information technology. This final rule defined meaningful use adoption criteria in stages of adoption. In an effort to further codify the relationship between the aforementioned legislation, OMB issued a memorandum on September 17, 2010, requiring that selected federal agencies, including VA, achieve five HIT Principle Processes by the end of FY12.

## Security Specifications

The VA requires that any enhancement to the ETS and STS Tooling and Server Development application should address standards, procedures, and technical aspects of the solution required to achieve Certification and Accreditation of the system. These should address controls listed in the FIPS PUB 200 Minimum Security Requirements for Federal Information and Information Systems. Additional security specifications include compliance with:

 Standards and regulatory requirements published in VA Handbook and Directive 6500: [Veterans Affairs Directives > VA Handbook and Directive](http://www1.DNS   /vapubs/viewPublication.asp?Pub_ID=50&FType=2) 6500

 FIPS PUB 140-2, Security Requirements for Cryptographic Modules, and for all voice and data traffic encryption: [Computer Security Division > Publications > Federa](http://csrc.nist.gov/publications/fips/fips140-2/fips1402.pdf)l [Information Processing Standards > FIPS PUB 140-2](http://csrc.nist.gov/publications/fips/fips140-2/fips1402.pdf).

In consideration of patient safety considerations, data protection measures such as backup intervals and/or redundancy shall be consistent with systems categorized as critical.

All VA security requirements will be adhered to. Based on Federal Information Processing Standard (FIPS) 199 and National Institute of Standards and Technology (NIST) SP 800-60, recommended Security Categorization is medium.

The Security Categorization will drive the initial set of minimal security controls required for the information system. Minimum security control requirements are addressed in NIST SP 800-53 and VA Handbook 6500. )

Additional Security Specifications capabilities will also be implemented in Release 2 as well as Backlog work.

| Role | Privileges |
| --- | --- |
| Read-Only | * Search terminology, refsets, concepts; * View terminology, concepts, refsets; * Run standard reports; * Track the current stage in workflow. |

Table 22: Role and Privilege table for ETS/STS users:

## System Features

The following table provides a quick summary of all of the components and outlines the functionality/services for each server. The Project Information System and Management Environment (PRISME) is the underlying software piece that brings all the components together under a development framework to support the following features. Additional System Features will also be implemented in Release 2.

Table 23: Functionality/Services for Each Server

| Functionality / Services | Description |
| --- | --- |
| Terminology Server | Provide programmatic access to terminology components. The system should also support the integration of all other terminology sources as required to standardize vocabularies for data sharing with the Department of Defense. Host terminology from the following systems:  For Release 1:  SOLOR (SNOMED CT, LOINC, RxNORM) |
| Continuous Integration Server | Provide the ability to manage the developmental workflow by providing an automated process from check-out/check-in of code to Release.  Prototypical examples of such continuous integration services include: Apache Continuum, Bamboo, Hudson, Jenkins, and TeamCity. |
| Artifact/Project Repository | Release repository for project dependencies. All project artifacts shall be managed by an Apache Maven compatible repository manager and extend Apache Maven with plugin extensions to manage terminology project processing, quality determination, Release, and deployment.  Artifactory Apache Archiva and Sonotype Nexus are prototypical examples of artifact repository services.  Apache Ant is another software build tool that compares to Maven and may be used. |
| Content Management | Provide a continuous workflow in a collaborative environment. |
| Version/ Source Control | Provide a distributed version control system, where developers will have the ability to work on the same code/project at the same time.  Provide version control for all ETS content. Each file will be tracked, any modifications made, additions, deletions, or movement of files will receive a version number upon commit.  Example of this version control service would be Git or Apache Subversion. |
| Issue Tracking | Provide the ability to allow users to enter modification requests for terminology that can be tracked and managed globally.  A prototypical example of a tracker service would be Atlassian’s JIRA tracker. |
| Service Desk | A prototypical example of a service desk would be Atlassian’s Service Desk extension to JIRA. |

## Usability Specifications

Usability is defined as the “extent to which a system, product, or service can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use” (International Organization for Standardization [ISO] 9241:210).[[18]](#footnote-18) For clinical systems, organizations such as the Office of the National Coordinator (ONC) through its regulation - 170.314(g) (3): Safety Enhanced Design certification program[[19]](#footnote-19) and its Health IT Policy Committee[[20]](#footnote-20); as well as the Institute of Medicine (IOM) through its November 2011 report titled ‘‘Health IT and Patient Safety: Building Safe Systems for Better Care,’’[[21]](#footnote-21) call for a focus on improved usability outcomes in conjunction with improved safety, risk management, and safety culture.

### User Centered Design (UCD) Process

A UCD process is a framework aimed at optimizing the usability of a system, product, or service, while at the same time including human factors activities focused on areas impacting patient safety. UCD standards provide alternative frameworks for integrating UCD into the design and development of software systems. Just as software projects can call for similar but slightly different design and/or development approaches to assure a successful system, projects can also call for similar but slightly different UCD processes. Characteristics that might result in one UCD process being used over another UCD process include requirements defining the rigor with which UCD activities must be carried out or the specificity required for traceability from UCD activities to impact on the product.

ISO 9241-210 (Human- Centered Design for Interactive Systems)Aspects of the ISO 9241:210 (Ergonomics of human-system interaction - Human-Centered Design for Interactive Systems) and National Institute of Standards and Technology (NIST) 7741 (Guide to the Processes Approach for Improving the Usability of Electronic Health Records)[[22]](#footnote-22) UCD standards are the foundation for the process described in this document. For regulatory purposes, for example ONC's 170.314(g) (3): Safety Enhanced Design certification, both of these standards as well as other standards are acceptable. The ISO 9241-210 (Human- Centered Design for Interactive Systems) describes four primary activities that are to be carried out in iterative fashion until defined usability objectives are obtained. The National Institute of Standards and Technology Interagency Report (NISTIR) 7741 (NIST Guide to the Processes Approach for Improving the Usability of Electronic Health Records [EHR]) describes activities to be carried out during the development of EHR applications. This standard focuses on methods relating to UCD and usability testing.

### Content Management Capabilities

Content Management capabilities and integration of those capabilities into applications will be done according to the principles of User Centered Design as defined in ISO 9241:210 (Ergonomics of human-system interaction - Human-Centered Design for Interactive Systems) and NIST 7741 (Guide to the Processes Approach for Improving the Usability of Electronic Health Records).[[23]](#footnote-23)

Design of Content Management capabilities and integration of those capabilities will meet ONC's 170.314(g) (3): Safety Enhanced Design certification standards.

# Purchased Components

* JIRA

# Estimation

See Contractor Project Management Plan document for details.

Appendix A: Non Functional Requirements

**Operational Environment Requirements**

N/A

**Documentation Requirements**

* Provide the level of documentation required to support the system and maintain operations and continuity.
* Documentation shall represent minimal programmatic and lifecycle operations support documentation artifacts as defined by VA standards in Propath and as required by the VA Enterprise System Engineering Lifecycle and Release Management office for sustained operations, maintenance, and support (http://DNS eie.DNS /lifecycle/default.aspx) prior to approval by any VA change control board and Release into production.
* Administrator’s and User Manual

**Implementation Requirements**

The Implementation of ETS/STS is divided into three Releases.

1. The implementation of Release 1 must be complete by 25-05-2016.
2. The implementation of Release 2 must be complete by 26-09-2016.
3. The implementation of Release 3 must be complete by 31-03-2017.

Data Protection/Back-up/Archive Requirements

N/A

**Levels for Disaster Recovery**

N/A

**Data Quality/Assurance Requirements**

A monitoring process shall be provided to ensure that data is accurate and up-to-date and provides accurate alerts for malfunctions while minimizing false alarms.

Conceptual Integrity

The artifact server will compute and maintain checksum files for each artifact that is published, and when artifacts are pulled, the checksums are validated before to ensure the integrity of the file.

**Availability**

1. The system shall be 99.9% available Monday-Friday, 6:00 AM ET to 3:00 AM ET. The system shall be 98% available on an annual basis.
2. Build (system implementation) shall be scheduled during off peak hours or in conjunction with relevant maintenance schedules.
3. Maintenance, including maintenance of externally developed software incorporated into the application, shall be scheduled during off peak hours or in conjunction with relevant maintenance schedules. The business owner should provide specific requirements for establishing system maintenance windows when planned service disruptions can occur in support of periodic maintenance.

**Interoperability**

1. Systems must be heterogeneous and agnostic for operating systems and code bases.

2. Provide the ability to securely transfer large files (of 4-8 gigabyte) from an external source to VA systems.

3. Provide access to the system over a remote access solution.

**Manageability**

N/A

**Reliability**

See Availability section

**Supportability**

N/A

# Approval Signatures

Review Date:

Scribe:

Signed:

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Alan Arnold, Integrated Project Team (IPT) Chair and Program Manager Date

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Dr. Steve Brown, Business Sponsor Date

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1. <http://jbpm.jboss.org> [↑](#footnote-ref-1)
2. <http://www.jfrog.com/home/v_artifactory_opensource_overview> [↑](#footnote-ref-2)
3. <http://archiva.apache.org/index.cgi> [↑](#footnote-ref-3)
4. <http://www.sonatype.org/nexus/> [↑](#footnote-ref-4)
5. <https://www.atlassian.com/software/jira> [↑](#footnote-ref-5)
6. <http://issues.osehra.org/secure/Dashboard.jspa> [↑](#footnote-ref-6)
7. <https://www.atlassian.com/software/jira/jsd> [↑](#footnote-ref-7)
8. <http://issues.osehra.org/secure/Dashboard.jspa> [↑](#footnote-ref-8)
9. [http://Git-scm.com](http://git-scm.com) [↑](#footnote-ref-9)
10. <http://subversion.apache.org> [↑](#footnote-ref-10)
11. <http://www.osehra.org/page/osehra-code-repository> [↑](#footnote-ref-11)
12. [www.sonorqube.org](http://www.sonorcube.org) [↑](#footnote-ref-12)
13. <http://continuum.apache.org/> [↑](#footnote-ref-13)
14. <http://www.atlassian.com/software/bamboo/> [↑](#footnote-ref-14)
15. <http://hudson-ci.org> [↑](#footnote-ref-15)
16. <http://jenkins-ci.org> [↑](#footnote-ref-16)
17. <http://www.jetbrains.com/teamcity/> [↑](#footnote-ref-17)
18. ISO 9241:210 (2010).  Ergonomics of human-system interaction - Human-centered design for interactive systems. [↑](#footnote-ref-18)
19. http://www.healthit.gov/policy-researchers-implementers/2014-edition-final-test-method [↑](#footnote-ref-19)
20. Health Information Technology: Standards, Implementation Specifications, and Certification Criteria for Electronic Health Record Technology, 2014 Edition; Revisions to the Permanent Certification Program for Health Information Technology, Final Rule. [↑](#footnote-ref-20)
21. IOM. 2012. Health IT and Patient Safety: Building Safer Systems for Better Care. Washington, DC: The National Academies Press. [↑](#footnote-ref-21)
22. NIST 7741 (2010).  Guide to the Processes Approach for Improving the Usability of Electronic Health Records. [↑](#footnote-ref-22)
23. NIST 7741 (2010).  Guide to the Processes Approach for Improving the Usability of Electronic Health Records. [↑](#footnote-ref-23)