

Standards & Terminology Service

**VETS Deployment Services
Production Release**

Technical Manual



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Introduction

Standards & Terminology Services (STS) is charged with the responsibility of organizing, formalizing, and maintaining the terminology of the Veterans Health Administration (VHA). At this time, this terminology is used in the Department of Veterans Affairs (VA) Electronic Medical Record (EMR) system known as Veterans Health Information System and Technology Architecture (VistA). There are many implementations of VistA throughout the world. Each implementation has its own set of reference files that support clinical care of veterans. This reference information is regrettably non-uniform enough, however, as to cause a good deal of confusion when comparing a patient's medical record from one site to another. STS seeks to make many of these files uniform throughout the enterprise, and facilitate semantic and computational interoperability. The process of standardization of this information has led to the creation of the VHA Terminology (VHAT) that encompasses reference information for many clinical domains, including Vital Signs, Allergy, Text Integration Utility (TIU) document titles, Immunizations, and Medication Routes of administration. VHAT is maintained by STS through ongoing evaluation of feedback from domain experts, and by regular updates sent through STS Terminology Deployment Service application to each VistA system. The terminology itself is maintained in a Terminology Deployment Environment (TDE) application.

Authoring VHAT

The process of authoring concepts can be complicated; the best results coming when one can simultaneously think in three different contexts. The first context is the terminology authoring environment (TDE), the second is the Terminology Deployment Services application (TDS), and the third is VistA. Since TDS has been developed with the specific interests of VHAT in mind, it is the most straight-forward representation of how terminology should appear. TDE represents this idealized state well, but there are some aspects of modeling that must be adapted to fit within the constraints of the TDE application. And finally there is the current target for VHAT, which is VistA. VistA shares with TDE the handicap of not natively organizing terminology by the VA Unique Identifier (VUID), but furthermore represents some domains in counter-intuitive ways, particularly the domain of Vital Signs.

This document intends to focus on bridging the gap between the contexts of TDE and VistA. It is not intended to serve as a style guide for naming concepts, nor is it an exhaustive list of all the techniques and traps of terminology practice. We hope rather that this will serve as an adequate primer by which to understand how the ideas that go into making VistA domains run smoothly can be represented by authors in TDE.

Concepts

The concept is the primary, abstract unit of thought. Concepts are not the expressions of thought; those are designations and will be discussed later. Once again, a concept is a unit of thought and not any kind of depiction of that thought. Any such depiction of a thought is a designation of the thought. Naturally we cannot capture units of thought in a terminology (at least not with our current level of technology) so we are forced to agree upon a single best designation of the concept to represent its place within the space of other concepts modeled in the terminology.

A concept is not necessarily an atom of thought -- it can be as simple or complex as necessary in order to stand for any part of the perceivable world. A concept can have relationships with other concepts. Concepts can act as inputs into algorithms used to arrive at other concepts. Concepts can be organized in many different ways according to the needs of an organizing party.

Enumerations of the attributes of Concepts as modeled in TDE are listed in the table below.

Name	The concept name is always followed by a space and then [C] to differentiate it in TDE from a designation. The default case for concept name is uppercase; however, if two concepts have the same name, then title case is used for one of them. For example, refer to ACTIVE [C] and Active [C].
Primitive/Defined	All concepts are primitive. Refer to the TDE documentation for definitions of Primitive and Defined.
Kind	All concepts have kind CONCEPT_KIND.
Code	The code is assigned automatically when a new concept is saved for the first time.
ID	The ID is assigned automatically when a new concept is saved for the first time.
Superconcepts	All concepts are assigned the following superconcept of Concepts. Each concept is also assigned a superconcept equivalent to the subset to which this concept's designation belongs. The allowable values are: DOCUMENT_TYPE [C] DRUG CLASSES [C] DRUG INGREDIENT [C] NATURE OF ORDER [C] ORDER STATUS [C] REACTANTS [C] REACTIONS [C] ROLE [C] SERVICE [C] SETTING [C] SUBJECT MATTER DOMAIN (SMD) [C] TIU STATUS [C] TIU TITLES [C] VITALS QUALIFIER [C] VITALS TYPE [C]
Properties	All properties are assigned to concepts based on the requirements of the domain. See specific domain sections in this document.
Roles	Every concept has one or more roles called has_designation which link it to its associated designation(s). All other roles are assigned to concepts based on the requirements of the domain. See specific domain sections in this document.
Associations	Concepts are never assigned associations.

Designations

Recall that designations are the means by which concepts are expressed. There can be limitless designations for any one concept that can occur in any form, but the designations modeled in VHAT at this time are taken as textual terms. Designations are merely handles for concepts, thus they do not participate in relationships with other designations or concepts, other than the immediate relationship with their own concepts that they represent. Moreover, while there can be many actual designations for a concept of many different forms, VHAT typically contains one designation per concept of the type *Preferred Term*. The designation type is modeled as a property, discussed in more detail in the following table.

The table depicts an enumeration of the attributes of Designations as modeled in TDE:

Name	This is the name of the designation. The default case for designation name is uppercase; however, if two designations have the same name, then title case is used for one of them. In cases where the designation name is the same as the concept name, the designation should use the same case as the concept.
Primitive/Defined	All designations are primitive.
Kind	All concepts have kind DESIGNATION_KIND.
Code	The code is assigned automatically when a new designation is saved for the first time.
ID	The ID is assigned automatically when a new designation is saved for the first time.
Superconcepts	All designations are assigned exactly one superconcept of Designations.
Properties	<p>Every designation is required to have exactly four properties.</p> <ul style="list-style-type: none"> • Designation Text: This is the name that is exported to the .01 field in VistA. It should always be uppercase. It is also the text to which the VUID is assigned. It should always match the concept name and designation name, except in cases where they are not all uppercase or where VistA has a limitation on the number of characters allowed in the .01 field. For example, INCREASED SERUM CREATINE KINASE is truncated to INCREASED SERUM CREATINE KINAS for this property due to the 30 character limit in VistA. • Designation Type: The default value is Preferred Name. The other allowable values are Abbreviation, Synonym, and Fully Specified Name. Only use something besides Preferred Name if the domain specifies it. • Status: The allowable values are Active and Inactive. This designates the status of the designation. • VUID: This value of this property is the VUID. If it already exists (assigned outside of the normal process) then it can be entered here. For new designations, the value of this property is set to -1. This flags the designation for VUID assignment by the Terminology Deployment Server (TDS) during refresh. TDS writes the VUID into

	the TDE database during refresh. It is visible in TDE if you log out and log back in after refresh.
Roles	Designations are never assigned roles.
Associations	Every designation has exactly one association called Associated_Concept that links it to its concept.

Subsets

Subsets are a mechanism by which designations are organized when they are to be deployed to VistA. A designation destined for VistA deployment must be placed in an appropriate Subset. Designations that do not appear in subsets are not deployed to VistA.

The table depicts an enumeration of the attributes of Subsets as modeled in TDE.

Name	This is the name of the subset. In order to create a new subset, a new corresponding subset definition must exist in the Terminology Configuration XML file.
Primitive/Defined	All subsets are primitive.
Kind	All subsets have kind SUBSET_KIND.
Code	The code is assigned automatically when a new subset is saved for the first time.
ID	The ID is assigned automatically when a new subset is saved for the first time.
Superconcepts	All subsets are assigned exactly one superconcept that is associated with the domain that the subset belongs to: Allergy Subsets Immunization Subsets National Drug File Subsets Order Subsets Pharmacy Subsets Text Integration Utility Subsets Vitals Subsets
Properties	Subsets are never assigned properties.
Roles	All subsets have zero to many instances of the role called has_member. This role is used to define the members of the subset and its target is always a designation.
Associations	Subsets are never assigned associations.

Standardized Domains

Each domain has unique set of properties and relationships associated to a concept. The model for designations is generic and is the same for all domains. For reasons that we will explain later in the document, these domains are listed in the order of their implementation, prefaced with some remarks about early approaches to non-standardized terms in standardized files, and the necessary steps to take if these terms need to be reactivated.

Legacy Designations

As the first standardization work was done with the domains of Vital Signs and Allergy, a long list was made of all the terms found throughout VistA. When the first set of standardized terms was determined, these were installed at every VistA system and made active for use. Every other term that was not included in the standardized list was reserved as a *Legacy Designation*, and was made inactive at whichever site contained the term. Each of these legacy designations has a VUID that is consistent throughout every site that contains it. There are occasions when due to changes in practice or expanded clinical need, a legacy designation may be brought forward to take a place in the list of standardized terms, which will then be made active and installed at every site for use.

As implied in their category name, legacy designations exist in VHAT as designations only. Instead of each having a unique concept they are all associated to a single legacy superconcept, both by a having a legacy superconcept parent, and a concept association to the same legacy superconcept. Legacy designations have all the same attributes as designations, with the following exceptions or specifications:

Superconcepts / Associations	The value for both of these is the same. All legacy designations are assigned exactly one superconcept and one association of Associated_Concept for the domain in which it belongs: Legacy Allergy Reactants Legacy Allergy Reactions Legacy Vital Qualifiers Legacy Vital Types
Properties	<ul style="list-style-type: none"> • Status: All legacy designations are Inactive. • Designation_Type: All legacy designations have the type of <i>VistA Name</i>.

Reactivation of Legacy Designations

As mentioned above, legacy terms exist in VHAT as designations only, associated to one of the legacy superconcepts. For one of these terms to be reactivated, it must have its own concept instantiated and have its role removed from its legacy superconcept. This process is undertaken infrequently. The steps to reactivate a legacy designation in TDE are:

1. Copy an existing active concept from the same domain to which the legacy designation is being moved as a template.
2. Give it the name of the legacy designation followed by the concept differentiator [C].
3. Set the new concept's VUID to the unassigned value of -1 and point its has_designation role to the legacy term.
4. Transfer the legacy term to the new concept by updating its Associated_Concept association value and deleting the legacy superconcept.
5. Finish modifying the legacy term by changing its status to Active and changing its Designation_Type to Preferred Name.

Note: Do not change the VUID. The whole point of reactivating this term is so that it keeps its already-assigned VUID.

6. Pull up the legacy superconcept and delete the has_designation role to its former member.
7. Add the changed designation to the appropriate subset, e.g., if this had been a Legacy Allergy Reactant, add the designation to the Reactants subset. Do this by adding a has_member role to the subset.
8. Classify and VWHAT is ready for import.

Vitals

The Vitals Domain consists of three files that cover the wide range of all vital signs recorded in VistA, along with their appropriate modifiers. This domain has always been difficult to understand, however, because its modeling in VistA is not intuitive. Its modeling in TDE is easier to understand as of TDS version 5. In VistA, the central file that organizes the domain is Vitals Qualifiers. Each Qualifier entry links to a couplet of a Vital Type and a Vital Category. To take an example from the domain, the Qualifier ADULT CUFF links to the Type of BLOOD PRESSURE and Category CUFF SIZE. In TDE the Vital Type is taken to be the crux of a vital sign, while Qualifiers modify Types and are organized in Categories. The previous example modeled in TDE then is represented as a BLOOD PRESSURE that has a Qualifier of ADULT CUFF, which happens to be in the Category of CUFF SIZE. The difference between the two can be analogized as asking the questions of either, “What can I do with this Adult Cuff that I have?” or “In what different ways can I take a Blood Pressure?”

The significance of this change in orientation from a Type-centered model to a Qualifier-centered model can hardly be overstated. An intimate relationship between Types and Qualifiers exists, and this must always be kept in mind when dealing with either file. Since these files are so closely intertwined, there has been much confusion regarding how this domain should be represented in TDS, how it should be tested, and how messages should be properly composed to represent the changes that may be made in the domain. For example, it is possible to update a Type concept, see that both Type and Qualifiers are being updated in TDS, observe that the Health Level Seven (HL7) message updates only the Qualifier file, and not be able to use the Discovery tool in TDS to track the change at VistA sites (more about this later). A deep understanding of this domain enables one to understand these nuances, and steps are ever being taken to elucidate the domain further. It is perhaps a relief that the types of updates that could potentially lead to the most confusion in the uninitiated are those that are least likely to occur.

An additional consideration that must factor into understanding this domain is that VistA has established a thorough set of steps following any deployed update. It checks for possible dangling pointers between terms, and breaks links and inactivates terms as necessary. If the modeler of Vitals terms is not careful, it may be that logical changes will be made in VistA that are not thought out and executed in TDE. This will create mismatches between TDE and VistA, which are commonly manifested as checksum mismatches in TDS.

VWHAT Subset Name: Vital Types

VistA File Number: 120.51

VistA File Name: GMRV VITAL TYPE

Vital types cannot be added to VistA without software package changes. Without new code, VistA users are not able to use a new vital type. Fields in 120.51 can be changed, but should not be unless there is agreement with the vitals package developer.

NOTE ABOUT CHANGING THE STATUS OF A TYPE: If a Type is ever inactivated, all the Qualifiers, and possibly Categories, that participate only with the inactivated Type should also be

inactivated. If a Type is ever reactivated, i.e., made active again after first having been inactivated, it may be necessary that each of the Qualifiers that the Type references should be “reset” in VistA, so that the Qualifier-Type links are refreshed there. This can be done by deploying inactivations of the concerned Qualifiers, followed by deploying their reactivations.

Properties

VistA Field	VHAT Property or Role Name	Notes
.01, NAME	Designation_Text	Required, must be 2-50 characters
1, ABBREVIATION	VistA_Short_Name	Required, must be 1-5 characters, must be unique
3, RATE	VistA_Type_Rate	Set of {NO, YES}
4, RATE INPUT TRANSFORM	VistA_Rate_Input_Transform	Mumps code
5, RATE HELP	VistA_Type_Rate_Help	Must be 3-30 characters
7, PCE ABBREVIATION	VistA_PCE_Abbreviation	Must be 1-10 characters, must be unique

Roles

VistA Field	VHAT Role Name	Notes
120.521, .01	has_qualifier	This role is not used for deployment to 120.51. It is used inversely for deployment to 120.52. There should be an instance of this role with a Vital Qualifier target for each Vital Qualifier that can be used with the Vital Type. See 2.4.2.2 Roles for 120.52 for more information.

Superconcepts

Every Vital Type concept has the superconcept of Vital Types.

VHAT Subset: Vital Qualifiers

VistA File Number: 120.52

VistA File Name: GMRV VITAL QUALIFIER

This file is completely controlled by STS through the New Term Rapid Turnaround (NTRT) process including requests from the field via the NTRT Web site.

Properties

VistA Field	VHAT Property or Role Name	Notes
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.01, QUALIFIER	Designation_Text	Required, must be 2-50 characters
.02, SYNONYM	VistA_Short_Name	Must be 1-3 characters, must be unique

Roles

VistA Field	VHAT Role Name	Notes
120.521,.01, VITAL TYPE	has_qualifier (inverse)	An instance of this role (Vital Type as source to Vital Qualifier as target) is required for each Vital Qualifier that can be used with the Vital Type. When constructing the HL7 message, for each Qualifier that is a member of the Vital Qualifier subset, TDS finds all has_qualifier roles where the Qualifier is the target and retrieves the source Vital Type to populate this multiple.
120.521,.02, CATEGORY	has_VistA_category	VistA does not require that there be a one to one relationship between the qualifier and the category, however, VHAT enforces a one to one relationship. Therefore, each Qualifier has exactly one has_VistA_category role and uses it to populate this multiple regardless of the Vital Type it is associated with.

Superconcepts

Each Vital Qualifier has its Vital Category as a superconcept. This creates a hierarchy of Qualifiers according to the Category to which they belong for easier browsing in the Inferred View of the hierarchy tree in TDE.

VHAT Subset Name: Vital Categories

VistA File Number: 120.53

VistA File Name: GMRV VITAL CATEGORY

Vital Categories cannot be added nor can their associated fields be edited without changes to the VHAT model and supporting changes to the Terminology Configuration file. We currently do not support deployment to any of the fields except for .01, CATEGORY. Nothing should be done to a Category without agreement with the Vitals package developer.

Allergy

The Allergy Domain is composed of two standardized files that receive deployments from STS, and two files maintained by the Pharmacy team. The STS-maintained files are Reactants that contains the substances that cause adverse reactions, and Reactions that contains terms describing those adverse reactions. The Pharmacy-maintained National Drug File (NDF) files are Drug Ingredient and Drug Class. While STS does not deploy to these latter two files, relationships are maintained between these NDF files and Reactants so that they may participate in order checking decision support in the Computerized Patient Record System (CPRS), when the Reactant's Allergy Type is in {drug, drug/food}.

VHAT Subset Name: Reactants**VistA File Number: 120.82****VistA File Name: GMR ALLERGIES****Properties**

VistA Field	VHAT Property Name	Notes
.01, NAME	Designation_Text	Required, must be 3 – 30 characters
1, ALLERGY TYPE	Allergy_Type	Required, set of {drug, food, drug/food, other}
120.823, .01 SYNONYM	Search_Term	Must be 2 – 30 characters; there can be multiple Search_Term properties for one reactant

Roles

VistA Field	VHAT Role Name	Notes
4, DRUG INGREDIENTS	has_drug_ingredient	When present this role has as a target a concept in the Drug Ingredients hierarchy, which appears under the National Drug file concept; there can be multiple has_drug_ingredient roles for one reactant.
5, DRUG CLASS	has_drug_class	When present this role has as a target a concept in the Drug Classes hierarchy, which appears under the National Drug file concept; there can be multiple has_drug_class roles for one reactant.

Superconcepts

Every Reactant concept has the superconcept of Reactants. Drug Ingredients and Drug Classes have one additional superconcept besides those required for the reactants concepts. This creates a hierarchy of both drug ingredients and drug classes for easier browsing in the inferred view of the hierarchy tree in TDE.

VHAT Subset Name: Reactions**VistA File Number: 120.83****VistA File Name: SIGNS & SYMPTOMS****Properties**

VistA Field	VHAT Property Name	Notes
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.01, NAME	Designation_Text	Must be 3 – 30 characters
2, SYNONYM	Search_Term	Must be 2 – 30 characters; there can be multiple Search_Term properties for one reaction.

Roles

There are no roles for the VWHAT Subset called Reactions.

Superconcepts

There are no additional superconcepts for the TDE VWHAT Subset called Reactions.

VistA File Number: 50.416

VistA File Name: DRUG INGREDIENTS

All information modeled in TDE must accurately reflect the contents of the DRUG INGREDIENTS file. The Concept Name is taken from the Name field, and for ready recognition has suffixed to it the letters (INGR). For example, a DRUG INGREDIENT entry of CAFFEINE would have the Concept Name of CAFFEINE (INGR) [C]. The Designation Name is then merely the name of the Ingredient, e.g., CAFFEINE. The VUID for the Designation is given in the DRUG INGREDIENT file from the VUID field.

Properties

Drug Ingredient concepts have no properties.

Roles

Drug Ingredient concepts have no roles.

Superconcepts

Every Drug Ingredient concept has the superconcept of Drug Ingredients.

VistA File Number: 50.605

VistA File Name: VA DRUG CLASS

All information modeled in TDE must accurately reflect the contents of the VA DRUG CLASS file. The Concept Name is taken from the Code field, and for ready recognition has suffixed to it the letters (CLASS). For example, a DRUG INGREDIENT entry of CN105 would have the Concept Name of CN105 (CLASS) [C]. The Designation Name is then merely the name of the Ingredient, e.g., CN105. The VUID for the Designation is given in the DRUG INGREDIENT file from the VUID field.

Properties

Drug Class concepts have no properties.

Roles

Drug Class concepts have no roles.

Superconcepts

Every Drug Class concept has the superconcept of Drug Classes.

Clinical Document Titles

The standardized domain of Clinical Document Titles consists of three parts:

- TIU Status (which does not receive NTRT deployments)
- TIU Axis files
- TIU Titles

There are at this time 3 levels of document titles in the VA:

- Local titles
- National titles
- Standard Titles

Both the Local titles and the “National” titles exist on local VistA systems. “National” titles are titles that have been mandated by a VA Central Office or Program Office to have the same wording and exist on every local system throughout the enterprise. Local titles have been created to support local workings, and may contain jargon not easily recognized beyond that system (or sometimes even at other departments within the same system). This is not to say that Local title names may not appear consistently between many individual systems, only that they have not been specifically mandated to be that way. The quotation marks that appear around the term “National” are there because the titles that they describe are often confused with Standard Titles that have been created by Standards & Terminology Services. Standard Titles have been created to be mapping targets for local titles, be they nationally-mandated or not, and to be the primary title currency in the HDR or in messaging to other agencies beyond the VA. Thus it is important to determine from requestors of new Standard Titles whether the desired title actually is meant to live on local systems or in the HDR, and whether the title is meant to conform to the model of Title Standardization or otherwise convey a different level of expressivity.

Each title has essentially two representations:

- A collection of axis terms
- A unique text string that reflects their concatenation in a pre-determined order

The five Document Ontology axes (in their order of listing in a title) are:

- Subject Matter Domain
- Role
- Setting
- Service
- Document Type

The actual term that displays in a title is usually the preferred name of the term, but there are a number of abbreviations for terms that display instead when they exist. For terms that have abbreviations, the abbreviations display as synonyms for the terms in TDE VHAT, but these designations remain undeployed. They only act as points of manual reference for suitable term substitutions within the text of a title.

VHAT Subset Name: TIU Status

VistA File Number: 8925.6

VistA File Name: TIU STATUS FILE

Any additions of TIU Statuses to VistA requires software package changes. Without code changes, VistA users are not able to use a new TIU Status. Authoring changes should not be done on this file without coordinating with the TIU package developer.

Properties

VistA Field	TDE VHAT Property Name	Notes
.01, NAME	Designation_text	Required, must be 3 – 30 characters
.02, SYMBOL	VistA_Abbreviation	Must be 1 – 3 characters
.04, APPLIES TO	VistA_Interaction	Set: TDE values of {document, document definition} correspond to values of {DOCMT, DEF} in VistA
1, DESCRIPTION	VistA_Description	Word processing field

Roles

There are no roles for the TIU Status subset.

Superconcepts

Every TIU Status concept has the superconcept of TIU Status.

VHAT Subset Name: TIU Titles

VistA File Number: 8926.1

VistA File Name: TIU VHA ENTERPRISE STANDARD TITLE

Note: The author must make sure that the target concept for each role is of the proper type, because there is no system check of these constraints, other than later manual review.

Properties

VistA Field	TDE VHAT Property Name	Notes
.01, STANDARD TITLE	Designation_text	Required, must be 3 – 90 characters

Roles

VistA Field	TDE VHAT Role Name	Notes
.04, SUBJECT MATTER DOMAIN	has_SMD	Present 0 to 1 times
.05, ROLE	has_role	Present 0 to 1 times
.06, SETTING	has_setting	Present 0 to 1 times
.07, SERVICE	has_service	Present 0 to 1 times

.08, DOCUMENT TYPE	has_doctype	Present exactly once
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Superconcepts

Every Title concept has the superconcept of TIU Titles.

VHAT Subset Name: TIU SMD

VistA File Number: 8926.2

VistA File Name: TIU LOINC SUBJECT MATTER DOMAIN

Subject Matter Domain terms reflect the subject matter and/or discipline that is relevant to a particular document, e.g. Cardiology, Primary Care, Radiology, etc.

Properties

VistA Field	TDE VHAT Property Name	Notes
.01, SUBJECT MATTER DOMAIN	Designation_text	Required, must be 3 – 90 characters

Roles

There are no roles for the TIU SMD subset.

Superconcepts

Every Subject Matter Domain concept has the superconcept of Subject Matter Domain.

VHAT Subset Name: TIU Role

VistA File Number: 8926.3

VistA File Name: TIU LOINC ROLE

Role terms reflect the clinical role of the author of the document relative to the subject of the document, e.g. Physician, Registered Nurse, Therapist, etc.

Properties

VistA Field	TDE VHAT Property Name	Notes
.01, ROLE	Designation_text	Required, must be 2 – 90 characters

Roles

There are no roles for the TIU Role subset.

Superconcepts

Every Role concept has the superconcept of Role.

VHAT Subset Name: TIU Setting

VistA File Number: 8926.4

VistA File Name: TIU LOINC SETTING

Setting terms reflect the place where the service occurred, e.g. Emergency Department, Critical Care Unit, Residential Facility, etc.

Properties

VistA Field	TDE VHAT Property Name	Notes
.01, SETTING	Designation_text	Required, must be 2 – 90 characters

Roles

There are no roles for the TIU Setting subset.

Superconcepts

Every Setting concept has the superconcept of Setting.

VHAT Subset Name: TIU Service

VistA File Number: 8926.5

VistA File Name: TIU LOINC SERVICE

Service terms reflect the type of service or activity that was provided to the patient or other recipient of the service, e.g. History and Physical, Evaluation and Management, Procedure, etc.

Properties

VistA Field	TDE VHAT Property Name	Notes
.01, SERVICE	Designation_text	Required, must be 2 – 90 characters

Roles

There are no roles for the TIU Service subset.

Superconcepts

Every Service concept has the superconcept of Service.

VHAT Subset Name: TIU Doctype

VistA File Number: 8926.6

VistA File Name: TIU LOINC DOCUMENT TYPE

Document Type terms reflect the type and usage of the document, e.g. Note, Consent, Clinical Warning, etc.

Properties

VistA Field	TDE VHAT Property Name	Notes
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.01, DOCUMENT TYPE	Designation_text	Required, must be 2 – 90 characters
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Roles

There are no roles for the TIU Doctype subset.

Superconcepts

Every Document Type concept has the superconcept of Document Type.

Orders

Two files have been standardized in the Orders Domain, which refers to the orders that clinicians give in the management of patients. Order Status describes the position in clinical workflow that the order currently occupies. The Nature of Order determines the actions that are to be taken based on the origination of the order or a change to the order.

VHAT Subset Name: Order Status

VistA File Number: 100.01

VistA File Name: ORDER STATUS

Note: Any additions of Order Statuses to VistA require software package changes. Without code changes, VistA users are not able to use a new Order Status. Authoring changes should not be done on this file without coordinating with the Orders package developer

Properties

VistA Field	TDE VHAT Property Name	Notes
.01, NAME	Designation_text	Required, must be 3 – 30 characters
.02, SHORT NAME	VistA_Short_Name	Must be 3 – 20 characters
.1, ABBREVIATION	VistA_Abbreviation	Must be 1 – 3 characters
2, DESCRIPTION	VistA_Description	Word processing field

Roles

There are no roles for the Order Status subset.

Superconcepts

Every Order Status concept has the superconcept of Order Status.

VHAT Subset Name: Nature of Order

VistA File Number: 100.02

VistA File Name: NATURE OF ORDER

Any additions of Natures of Order to VistA require software package changes. Without code changes, VistA users are not able to use a new Nature of Order. Authoring changes should not be done on this file without coordinating with the Orders package developer. It is also important to recognize that there are 4 additional fields in this file that are not locked-down for national deployment, but are instead controlled

locally at individual systems via a VistA option (PRINT PARAMETERS FOR NATURE OF ORDER). How these fields can be set must be part of the collaboration with the Orders package developer.

Properties

VistA Field	TDE VWHAT Property Name	Notes
.01, NAME	Designation_text	Required, must be 3 – 30 characters
.02, CODE	VistA_Abbreviation	Required, must be 1 – 3 characters
.03, NON-INTERACTIVE	VistA_Interaction	Set: TDE values of {INTERACTIVE, NON-INTERACTIVE} correspond to same values in VistA
.05, FRONT/BACKDOOR	VistA_Door	Set: TDE values of {frontdoor, backdoor, both} correspond to same values in VistA
.06, DC ONLY	VistA_Discontinued	Set: TDE values of {YES, NO} correspond to same values in VistA
.11, CREATE ACTION	VistA_Create_Action	Set: TDE values of {YES, NO} correspond to same values in VistA
.14, DEFAULT SIGNATURE STATUS	VistA_Signature_Status	Set: TDE values of {ON CHART w/written orders, ELECTRONIC, NOT SIGNED, NOT REQUIRED, ON CHART w/printed orders, NOT REQUIRED due to cancel, SERVICE CORRECTION to signed order} correspond to same values in VistA

Roles

There are no roles for the Nature of Order subset.

Superconcepts

Every Nature of Order concept has the superconcept of Nature of Order.

Medication Routes

The Medication Routes domain consists of a single file that enumerates the many ways that medications can be administered to patients. It also references routes as used by First DataBank. This file is pointed to by both Pharmacy and Radiology packages.

VWHAT Subset Name: Medication Routes

VistA File Number: 51.23

VistA File Name: STANDARD MEDICATION ROUTES

Properties

VistA Field	TDE VHAT Property Name	Notes
.01, NAME	Designation_Text	Required, must be 3-50 characters
1, FIRST DATABANK MED ROUTE	FDB_Med_Route	Must be 3-30 characters

Roles

VistA Field	TDE VHAT Role Name	Notes
99.97, REPLACED BY VHA STANDARD TERM	vista_replaced_by	This field is populated when one Term/Concept replaces another Term/Concept. This field is controlled by standardization and should only be changed by standardization processes. This field contains a pointer to a VHA standard term that replaces this entry.

Superconcepts

Every Medication Route concept has the superconcept of Medication Routes.

Immunization

Immunization standardization is based loosely on CVX codes published by the CDC. Some VistA packages that touch on these files include Pharmacy and Clinical Reminders.

VHAT Subset Name: Immunizations

VistA File Number: 9999999.14

VistA File Name: IMMUNIZATION

Properties

VistA Field	TDE VHAT Property Name	Notes
.01, NAME	Designation_Text	Required, must be 3-150 characters
.02, SHORT NAME	VistA_Short_Name	Required, must be 2-60 characters

Roles

VistA Field	TDE VHAT Role Name	Notes
99.97, REPLACED BY VHA STANDARD TERM	vista_replaced_by	This field is populated when one Term/Concept replaces another Term/Concept. This field is controlled by standardization and should only be changed by standardization processes. This field contains a pointer to a VHA standard term that replaces this entry.

Superconcepts

Every Immunization concept has the superconcept of Immunization Procedure.

VHAT Subset Name: Skin Test

VistA File Number: 9999999.28

VistA File Name: SKIN TEST

Properties

VistA Field	TDE VHAT Property Name	Notes
.01, NAME	Designation_Text	Required, must be 3-10 characters

Roles

VistA Field	TDE VHAT Role Name	Notes
99.97, REPLACED BY VHA STANDARD TERM	vista_replaced_by	This field is populated when one Term/Concept replaces another Term/Concept. This field is controlled by standardization and should only be changed by standardization processes. This field contains a pointer to a VHA standard term that replaces this entry.

Superconcepts

Every Skin Test concept has the superconcept of Skin Test

Other issues related to Authoring VHAT

Since terminology content must pass through several systems, from its authoring in TDE to its updating of files in VistA, some kludges have been put in place in order to avoid damage down the road from seemingly innocent doings early in the line. What follows is advice based on some hard-won experience:

- Within the current TDE application, Ontylog Editor by Apelon, it is sound practice to engage the Classifier prior to saving any updates. This process will detect any circular relationships that may have been created during editing, as well as other possible violations of description logic. This is essential for the health of VistA as the XT utility will fail if cyclical relationships are deployed.
- The Vital Type update trouble referenced earlier occurs when a Type is updated so that the only changes are in its relationships with Qualifiers. The update that occurs in VistA is to the Qualifiers file, while the Type file remains unchanged, while TDS per design appropriately recognizes that the changes have been made to only a Type concept. Thus while the embodied terminology model recognizes a Type change, the message sent to VistA only addresses a Qualifier change. Standing in the middle, TDS indicates that both subsets are being updated, which can be confusing if one neglects to consider the tension between the Type-centric and the Qualifier-centric model. Where this issue currently causes the most difficulties is with the Discovery tool in TDS, for it is at this place where the interplay between the Type and Qualifier files was overlooked. For the time being, it is not possible to receive site data for the Qualifier file that has been updated according to this scenario, as TDS at this point only will allow selection of

Deployments, Candidate Versions, and Versions that contain Type updates, and will thus only calculate file differences based on Type updates, neglecting Qualifier updates. This will be fixed in a future release of TDS.

- When using the TDE role of VistA_replaced_by in appropriate domains (see full enumeration of permissible roles in above domain descriptions), it is important that the appropriate designation of the replacing concept has an active status and has already been sent to VistA before the replaced by concept relationship, and thus its designation, is sent. This can be accomplished in separate messages or even in the same message as long as the replacing designation appears earlier in the message than the update to the replaced by designation. The same-message scenario will work only if the new designation comes alphabetically before the earlier designation.
- Even though TDS has been enabled to allow partial deployment of finalized versions, this function has shown to generate confusing reports of deployment histories. Therefore the best approach at this time is to not make partial deployments of finalized versions.
- It has been noticed that if a user who is logged in to TDS should navigate away from the website and then attempt to get back to it again by pressing the browser **Back** button that there will be no authentication challenge upon returning as the user's session stays active. Even given that this constitutes highly questionable usage of a secure, session-based web application, it pays to state the obvious: When you are not using the application, either log out of it or close the browser in order to preclude unauthorized access to the site.
- When inactivating terms for VistA, the approach has been to inactivate the designation that participates in the appropriate subset. Other ways to accomplish a term inactivation in VistA is to remove the designation from the subset, or to take the additional step of inactivating the concept to which the designation belongs. This latter approach currently may cause a discrepancy from the expected Discovery results for inactive concepts. The current recommendation at this time, therefore, is that concepts not be inactivated when the desired result is that a term be inactivated in VistA.

Issues Specific to VistA

- Be aware of characters that must be escaped in HL7 messages, especially when they are destined for Word Processing fields in VistA files. These characters are typically from this set of four: {~|\&}. As a corollary, since escaped HL7 characters are translated again upon arrival at VistA, be aware of character combinations destined for Word Processing fields, e.g., \E\, \T\, \S\, and \R\. There is no absolute prohibition against such characters, but it is important to recognize when there could be translation errors either to or from HL7 that cause checksum mismatches, and to attempt to model terms away from such issues.
- VistA can accept only 8 bit ASCII characters, so it is very important to make sure that any values, particularly for properties, conform to this set. It can sometimes be difficult to tell when extended ASCII characters are appearing in snippets of text that might otherwise be copied & pasted into TDE, but one way that has been proven effective works as follows:
 - Copy the text destined for VistA into an application like MS Word.
 - Save the text to a text file, and be sure to specify that the character encoding be limited to the 8 bit ASCII set, e.g., by using US-ASCII encoding or MS-DOS encoding, followed by allowing character substitutions upon saving.
 - Close the text-writing application, then open it again by opening the text document.
 - The text that appears should be cleansed of extended characters. Use this for authoring.

- Note that for any updates of Allergy Reactants that have an allergy type including DRUG and have linkages to Drug Ingredients or Drug Classes, patient data in VistA will be updated as the Reactant file is updated.
- Similar to some updates to Allergy Reactants as mentioned immediately above, should one Immunization term be inactivated and replaced by another, any reminder definitions, terms, or dialogs that featured the previous term may be updated upon deployment.
- As of March 2010, VistA does not gracefully handle the re-deployment of TIU Titles. Patch TIU*1*240 was created to fix this issue, but has never obtained sufficient test sites for release.

Standard Code Systems

Enhancements to the VETS infrastructure now permit Standard Code Systems (SCS) data such as SNOMED CT, LOINC, and ICD-9-CM to be imported into VETS repository. SCS data is retrieved from Standard Development Organizations, the authoritative source, and imported in its native format therefore allowing the ability to demonstrate source transparency to its source vocabulary. SCSs data are not deployed to VistA or used by HealthVet services hence they do not go through the same versioning (deployment->candidate version->version) workflow as VWHAT or Map Sets deployments.

Authoring/Creating XML files

SCSs data is constructed into XML files and validated against the SDOData.xsd schema. The xml schema defines the structure and the elements, attributes and data types for standard code systems. Below are some of the behaviors for a few data elements.

- The Designation Type data element is used to define the designation types for a code system such as Fully Specified Name, Preferred Name and synonym. The preferred designation type defines the designation type that is displayed in TDS and the Terminology Browser. For instance, the designation types for ICD-9-CM code system are short and long descriptions with the preferred designation type being set to Long Description. Upon initial import of a standard code system, designation types are required and must be defined in the XML file. Subsequent versions for that standard code system may or may not include the designation types or preferred designation in the import file if there are not any new designation types. The preferred designation type may be changed to an existing designation type as well as a new designation type may be added.
- Standard Code Systems include concepts, designations, properties, and relationships. Concept properties and relationships may be updated. Updates include a new property or relationship to be added, inactivated, or changed. If a change occurs for relationships then the import file will contain the old value and the new value. If a change occurs for properties, the XML file may contain only the new value.
- Subsets may be created from a standard development organization's data. Today there is not a business need however functionality is available when the business case arises. Each subset has a VUID and a status but is only viewable in VTS database.

Import

Upon import of the SCS xml file the system validates the structure against the SDOData.xsd only and does not catch data errors. All data must go through a manual Software Quality Assurance (SQA) process to ensure transparency is achieved to its source vocabulary.

There are two ways to verify the standard code system data has been successfully imported:

- Go to the SCS/Manage and verify the entries imported. The entries imported are derived by counting each coded concept element that has any change to it or one of its children. So it is a count of the concepts in the last import for that version (including appends) that have any type of change to them.
- View the code system in the Terminology Browser and look for a specific change that was imported.
- Each update or new version of a Standard Code Systems will be brought into VETS.

Steps for importing SNOMED CT data

The SNOMED import uses multiple files to import a single version of SNOMED. When importing SNOMED CT baseline January 2006 version and the all_relationships file, we suggest that the person importing should be a local person and copy the file to their local machine.

For the baseline January 2006 version, you must import the baseline_ready_for_import file first, then the all_relationships file. Each file takes some time (between 20 min and 2 hrs) to import.

For subsequent versions, 4 files need to be imported in a predetermined order:

1. Diff_new_concepts_and_status_changes
2. Diff_desig_changes
3. Diff_desig_adds
4. Snomed_Relationship_diff

These imports should not take long compared to the baseline version.

SCS versions may be removed from VETS but only the most recent version and only if there is not a map set dependent on that version of the standard code system. If there is a map set in the system and defines that version of the code system in the map set xml file, then the map set must be removed first before the system will allow the removal of the code system version.

SNOMED CT is comprised of codes, terms and relationships and only the is-a relationship has been brought into VETS, therefore in the Terminology Browser on the Concept Details and History page the headings Properties, Parents, or Children are not shown because no data is available for those headings.

Map Sets

Enhancements to the VETS infrastructure now permit Map Sets such as SNOMED CT to ICD-9-CM to be imported into the VETS repository. Map Sets may be created internally, adopted from a standard development organization, or adopted from another entity. Map Sets may be deployed to VistA hence they go through the same versioning (deployment->candidate version->version) workflow of VHAAT deployments.

Authoring/Creating XML files

Map Sets data is constructed into xml files and must be validated against the CodeMap.xsd schema. The xml schema defines the structure and the elements, attributes and data types for Map Sets. Below are some of the business rules or behaviors of specific data elements

- The source and target code systems and its version specified for that map set must be imported into the system before the map set is imported.
- The code map action type value set contains add, update, or none. Add is used for initial import of that map set, the update is used to update the description, and none is used for subsequent imports.
Note: When the code map description data element is being updated, it should not create a deployment if there are no map entries in the import file.
- Map Entry action type value set contains add or update. Add is used to add new map entries and the update is used to change the status or the map entry order.
- On creation of a new map set xml file, the codemapversion name data element must be unique.

Import

- Any type of deployments should not be a mix of subsets and Map Sets.
- Partial Deployments is not a use case for Map Sets.
- Map Set deployments and candidate version deployments may be removed. If a Map Set deployment is removed AND it has been deployed to VistA the system does not remove the update made to VistA therefore causing a checksum mismatch. To ensure checksums match the user can remove the updates from VistA in the following ways:
 - If a status value was updated the user must capture the MUID for that map entry (s) add the MUID to the Import file if it did not exist on the initial import
 - If a new map entry was introduced the user must capture the MUID for that map entry (s) add the MUID and to the Import file and inactivate . Once the MUIDs have been added to the existing import file then the file can be reimported. This must be done to obtain matching checksums.
- Checksum mismatch may be a result of a new entry to the mapping file in VistA or the deployment. Updates to a Map Set may be the result of:
 - A new version of SNOMED CT was released and the SNOMED CT concept (source code) was changed from an active status.
 - A new version of ICD-9-CM was released and the ICD-9-CM concept (target code) was changed from an active status.
 - A NTRT request for changing a map entry and the status or the map entry order was changed.
- Map Set can be inactivated at the map set level only if all the map entries are inactive first.
- Map Set data can be exported using TDS export functionality. This exports the data into a Comma-Separated Values (CSV) file. If the map set contains data that is from a standard code system that includes decimals in the code then the user must be aware of formatting the data correctly so leading and trailing zeros are not lost.
- Map Set deployments should not be combined in a candidate version.

Configuration Files

Terminology

The purpose of the Terminology configuration file is to provide instructions to the terminology deployment service (TDS). It defines deployable and non-deployable subsets, converts the terminology model entities (subsets, concepts, designations, properties and relationships) into HL7 message, supports new domains, and specifies the deployment order and data validation. In Version 9, subsets can now be deployable or non-deployable subsets. To change a subset to non-deployable a new tag called Active has been added. In deployable subsets the Active tag is set to True and in non-deployable subsets the Active tag is set to False.

Browser

The purpose of the Browser configuration file is to define the number of the results that will be displayed to users after a search has been conducted. The maximum number of results has been set to 1000.