NIST
National Institute of Standards and Technology

ISO/IEEE 11073, HL7 Medical Devices WG *and* NIST

NIST Medical Device Connectivity Test Tooling
Semantic Interoperability of Medical Devices

HL7/IEEE WG Meetings
(Healthcare Devices WG @ Cambridge, Mass)
October 5, 2010

Software and Systems Division

INFORMATION TECHNOLOGY LABORATORY

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- GRs: Jing Gao, Julien Deshayes, Isabelle Barclay

Project Web site:

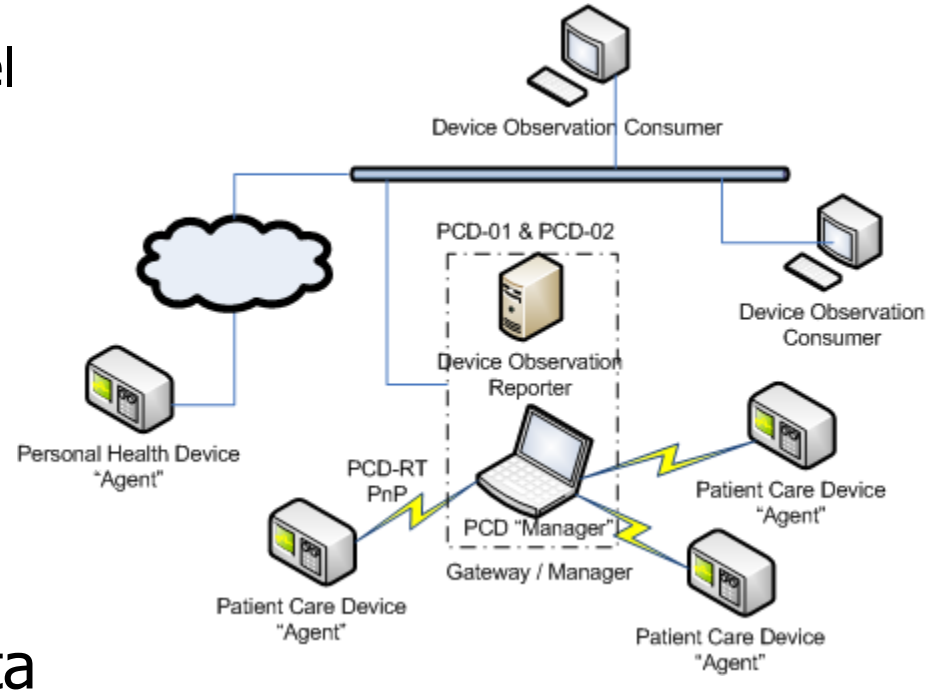
www.nist.gov/medicaldevices

Topics

- Areas being addressed by Test Tooling Effort
- HIT Test Infrastructure
  - Conformance testing across various test environments
  - IHE-PCD HL7 Message Verification
    - Using Profiles (constraints → assertions)
- IHE-PCD Tooling (2010-11 cycle 5) & going forward…(2011-12 cycle 6)
- ISO/IEEE 11073 Tooling
  - ICSGenerator (Sandra)
  - RTMMS (Maria)

NIST Test Effort

- Medical Device Standards Work
  - Device and Enterprise-level
- Integrating Health Enterprise - Patient Care Devices (IHE-PCD)
  - Enterprise-level
- Personal Health Devices
  - Personal Tele-health-level
- Facilitate the efficient exchange of medical device and vital signs data throughout the HC enterprise
  - Test Research Methods
  - Conformance → Interoperability (based on Standards)
  - Ultimately: Real-time plug-and-play interoperability



Medical Device Communication

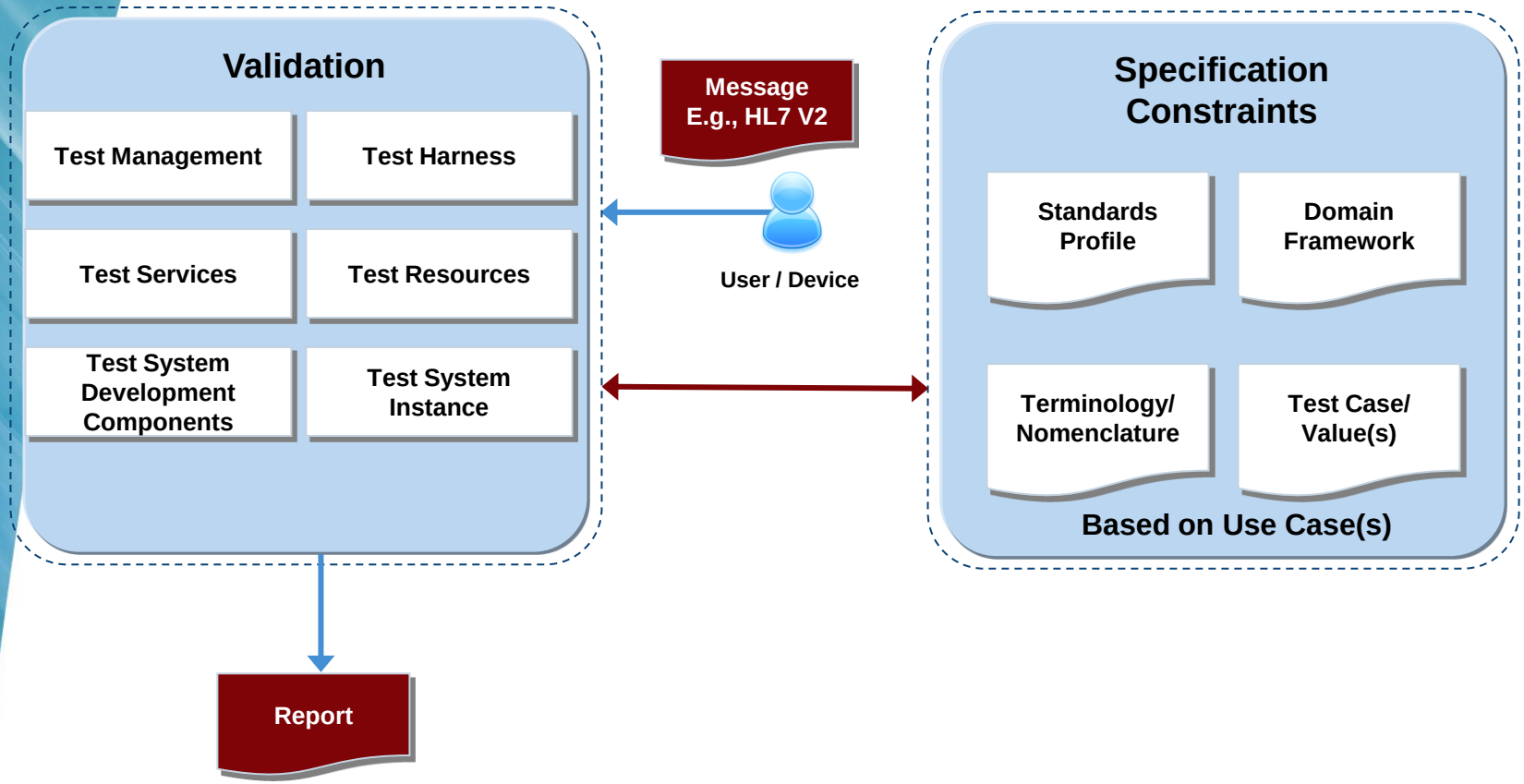
IHE-PCD Testing – Key Objectives

- Increase test comprehensiveness & quality
- Support both conformance & interoperability testing
- Support for pre- & virtual- connectathons, actual connectathon & enable year round testing
- Remain in alignment with IHE-PCD integration profile development road map and underlying standards (e.g. HL7,x73)
- Establish single framework for PCD covering increasing complexity and technologies over next 5 years
- Coordinate with IHE "Gazelle Project" and NIST's HIT Test Infrastructure
- Generate work products that companies can use in their regulatory submissions or help in product evaluation

IHE-PCD Testing – Key Ingredients

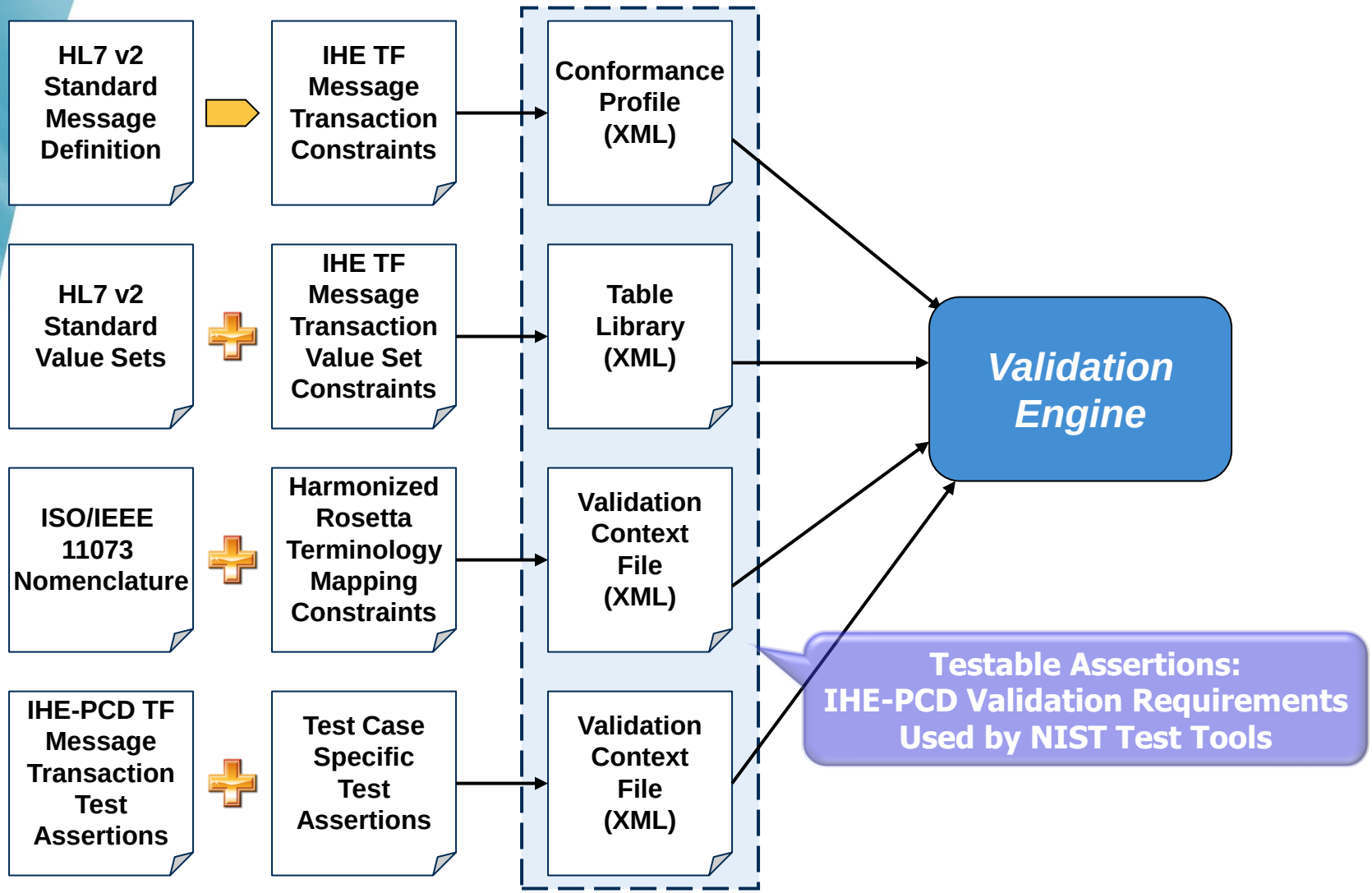
- Well Defined Integration Profiles
  - Technical Framework
  - Supplements
- Unambiguous Standards
- Implementation Guides
- Test Plans
  - Test Scenarios, Actors, Transactions, Validation Criteria
- Test Artifacts, including:
  - HL7 Profile(s) (*and eventually x73 Device Specializations?*)
  - Repositories
  - Nomenclature (e.g., RTM)
  - Value Tables (e.g., HL7, units, local, etc.), Default and Sample Values
- Test Cases

Conformance Testing: Using 'Profiles' to Advance Rigorous Testing



Patient Care Devices (PCD)

Validation Operational Process: Origin of Test Assertions



Patient Care Devices (PCD)

NIST V2 Testing Tools and Services
Testing Validation Types

- Validation against '*failure types*':
  - **VERSION*:** The version in the message and in the profile should match.
  - **MESSAGE_STRUCTURE_ID*:** The message type (MSH.9 element) in the profile and in the message should match.
  - **MESSAGE_STRUCTURE:** The message should have a valid message structure (correct usage, correct cardinality, and correct element name).
  - **USAGE:** R elements should be present; X elements should not be present in the message.
  - **CARDINALITY:** Elements should be present at least the minimum times and at most the maximum times specified in the profile. It should also take into account the usage of the element (X element with a minimum of 4 should not be present in the message).
  - **LENGTH:** The value of the element should have a length equal or less than the value specified in the profile.
  - **DATATYPE:** For the datatype NM, DT, DTM, SI and TM, the value of the element should match the regular expression defined in the standard.
  - **DATA:** The value of the element should match a constant specified in the profile, a value set specified in a table, a value or a regular expression specified in the message validation context.
  - **MESSAGE_VALIDATION_CONTEXT*:** This is a user input error when the location specified in the message validation context can't be found in the message.
  - **TABLE_NOT_FOUND*:** This is a user input when a table can't be found in the table files (TableProfileDocument).
  - **AMBIGUOUS_PROFILE*:** The profile should not be ambiguous.

Test Environment Message Validation
NIST V2 Testing Tools: IHE-PCD

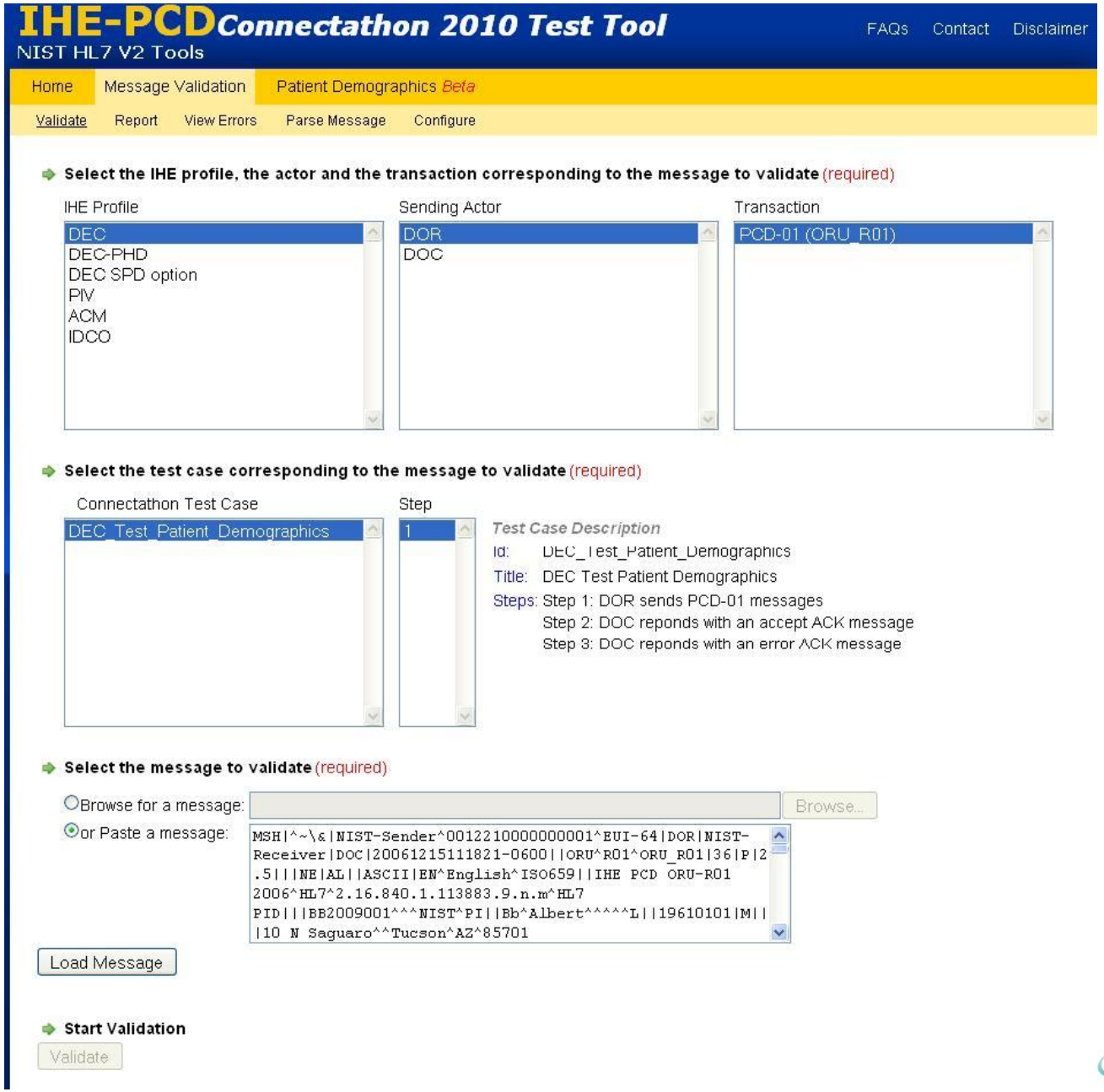
- Validation of IHE-PCD message(s) and corresponding HL7 Profile(s)
- Syntax and Semantic Content Validation
  - Against HL7 V2 message (e.g., PCD-01)
    - Message structure (e.g., MSH,PID,PV1,OBR,NTE,{{OBX},OBX,OBX,OBX,…})
  - Against HL7 profile
    - (Msg_type^Event_type^ e.g., ORU^R01^…)
  - Against HL7 and/or user provided tables
    - Example of user provided table is RTM for Ref_IDs, Units, etc.
  - Against 'validation context', including specific values
    - Defined in XML (e.g., specific test case values)

NIST Test Tool: Test Cases

	IHE Profile	Test Case Title	Description		
1	DEC	NIST DEC DOR DOF DOC Patient Demographics Table2010927	**Step 1**	PCD-01 (ORU^R01^ORU_R01)	DOR sends data for patient in table 2010927
			Step 2	ACK (ACK^R01^ACK)	DOC responds with ACK message (MSA-1 = "AA")
2	DEC	NIST DEC DOR DOF DOC One to One Communication	**Step 1**	PCD-01 (ORU^R01^ORU_R01)	DOR sends data for patient Albert Hon (MRN: HO2009001, DOB: Jan.1 1961, Location: HO Surgery, OR-1, Sex: M, Mother's Maiden Name: Adams). At least 4 parameters for each type of device are sent. Patient's data is not validated
			Step 2	ACK (ACK^R01^ACK)	DOC responds with ACK message (MSA-1 = "AA")
			Step 3	PCD-01 (ORU^R01^ORU_R01)	DOR sends data for patient Charles Hon (MRN: HO2009002, DOB: Feb.1 1961, Location: HO Surgery, OR-2, Sex: M, Mother's Maiden Name: Brooks). At least 4 parameters for each type of device are sent. Patient's data is validated
			Step 4	ACK (ACK^R01^ACK)	DOC responds with ACK message (MSA-1 = "AA")
3	DEC SPD Option	NIST DEC SPD By Location	**Step 1**	PCD-02 (QSB^Z02^QSB_Q16)	DOC sends subscription to DOF requesting patients in the ICU
			Step 2	ACK (ACK^Q16^ACK)	DOF sends ACK to DOC
			Step 3	PCD-01 (ORU^R01^ORU_R01)	DOR sends data for patient Amy Hon (MRN HO2009003) in ICU to DOF
			Step 4	ACK (ORU^R01^ORU_R01)	DOF sends ACK to DOR
			Step 5	PCD-01 (ORU^R01^ORU_R01)	DOF sends received data for patient Amy Hon to DOC
			Step 6	ACK (ORU^R01^ORU_R01)	DOC sends ACK to DOF
			Step 7	PCD-01 (ORU^R01^ORU_R01)	DOR sends data for patient Albert Hon (MRN HO2009001) in OR to DOF
			Step 8	ACK (ORU^R01^ORU_R01)	DOF sends ACK to DOR. DOF does not forward the message to DOC.

IHE-PCD Pre- and -Connectathon Tool

http://xreg2.nist.gov:8080/PCD-HL7WebCon/



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Validation Report (Example)

Validation Parameters

Description	Profile	DEC
	Acrtor	DOR
	Transaction	PCD-01(ORU_R01)
	Test Case	DEC_Test_Patient_Demographics (Step 1)
Message	Type	er7
	File	
	Text	MSH|^~\&|PAT_DEVICE_WELCHALLYN^001AFA000001^EUI-64|WELCHALLYN||20101001134808|ORU PID||2010001^^^WEPA^MR|Generic^Albert^^^^^L|19610101|M||60°N°Saguaro^^Tucson^AZ^85701^^M||E^I PV1||I|Surgery^OR^1||||||||V10008^^^WEPA^VN||||||||||||||||20051115123507¶ OBR|1|WELCHALLYN^PAT_DEVICE_WELCHALLYN^001AFA000001^EUI-64|WELCHALLYN^PAT_DEV OBX|1|CE|67974^MDC_ATTR_SYS_TYPE^MDC|1.0.0.0|||||X|||||20070903735^Spot°Vital°Signs°LXi°-°45NT0 OBX|2|CE|67887^MDC_ATTR_ID_TYPE^MDC|1.1.0.0|||||X¶ OBX|3|CE|67887^MDC_ATTR_ID_TYPE^MDC|1.1.1.0|||||X¶ OBX|4|NM|150022^MDC_PRESS_BLD_NONINV_DIA^MDC|1.1.1.2|81|mm[Hg]^mm[Hg]^UCUM|10-235|||F|| OBX|5|NM|150021^MDC_PRESS_BLD_NONINV_SYS^MDC|1.1.1.1|121|mm[Hg]^mm[Hg]^UCUM|25-260|||F

Structure Validation Report

	Summary
Errors	1
Warnings	0
Alerts	0

Validation Errors

Error Details			
1	Type:	Unknow Assertion Type	
	Description:	PV1[1].44[1] is present whereas it is an X-Usage element	
	Location:	**Line:**	3
		Column:	77
		Path:	PV1[1].44[1]
		Segment:	PV1
		Field:	Admit Date/Time

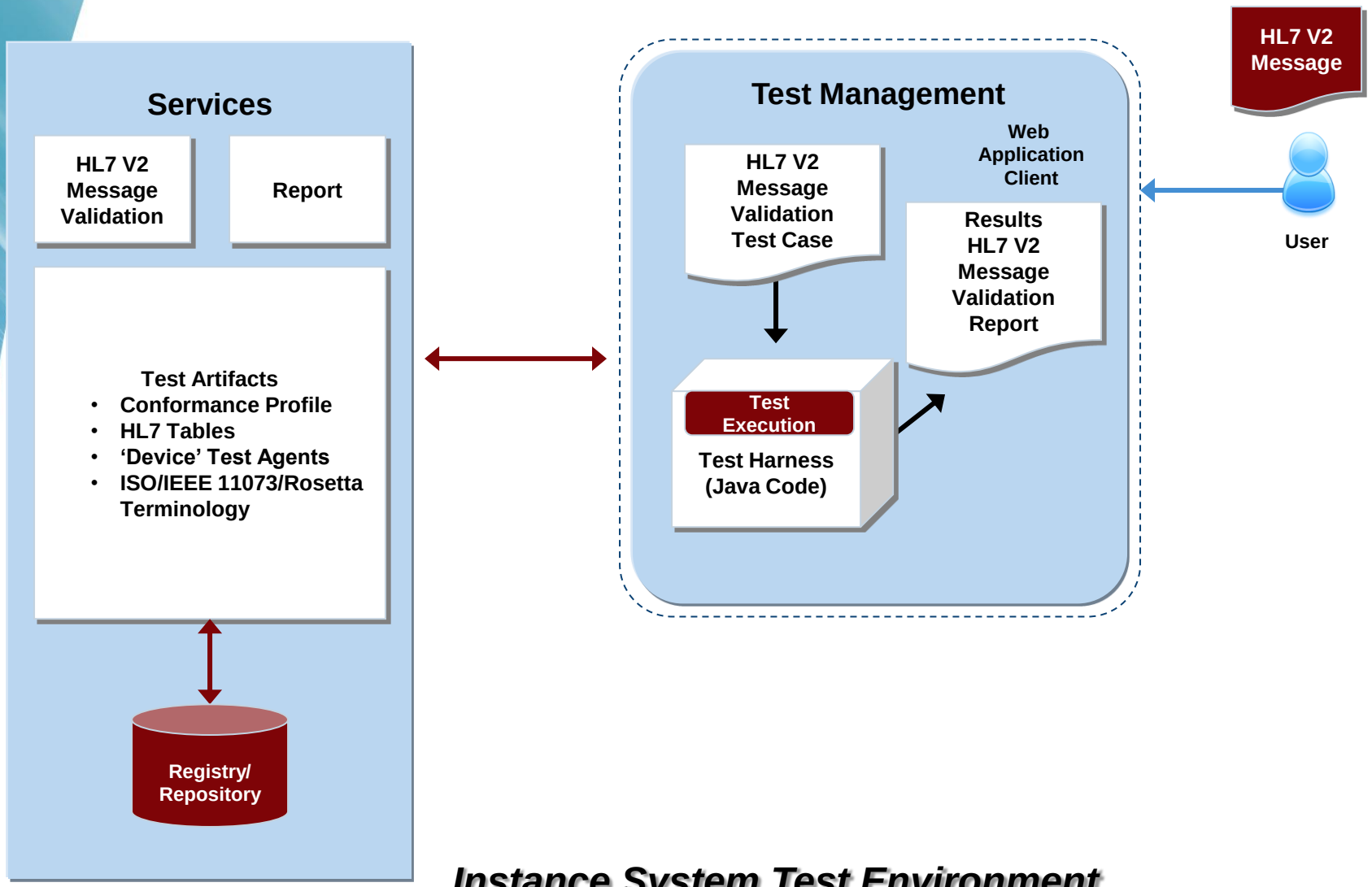
IHE Supplement Validation Report

	Summary
Errors	0
Warnings	0
Alerts	0

Test Environments

- Instance Testing
  - Conformance (e.g., against HL7 V2.x or CDA)
    - Implementation conforms to Spec. on which it is based
- Isolated System Testing
  - Includes *Instance Testing* Activities
  - Protocol Conformance
  - Functional Behavior Conformance
    - Features and Operational behavior correspond to Specs.
- Peer-to-Peer System Testing
  - Includes *Isolated System Testing* Activities
  - Interoperability Testing
    - Testing complete application environment
    - May include interacting w/ Database, using Network Communications, or interacting w/ other hardware, apps, or systems if appropriate

Conformance Testing of an HL7 V2 Message



Instance System Test Environment

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Test Environments

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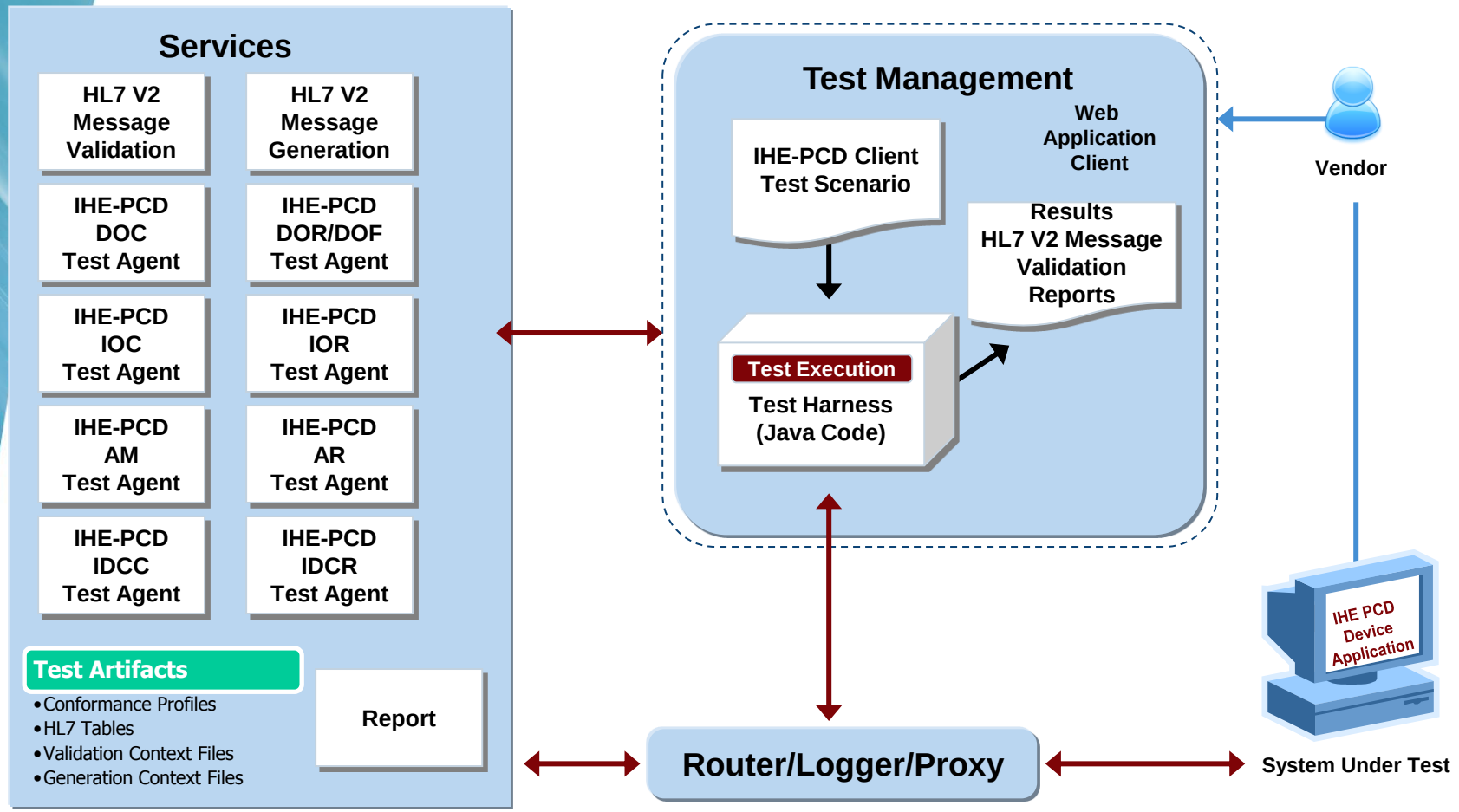
- Isolated System Testing
  - Includes *Instance Testing* Activities
  - Protocol Conformance
  - Functional Behavior Conformance
    - Features and Operational behavior correspond to Specs.
- Peer-to-Peer System Testing
  - Includes *Isolated System Testing* Activities
  - Interoperability Testing
    - Testing complete application environment
    - May include interacting w/ Database, using Network Communications, or interacting w/ other hardware, apps, or systems if appropriate

IHE-PCD Testing using a Web Application Client



Isolated System Test Environment

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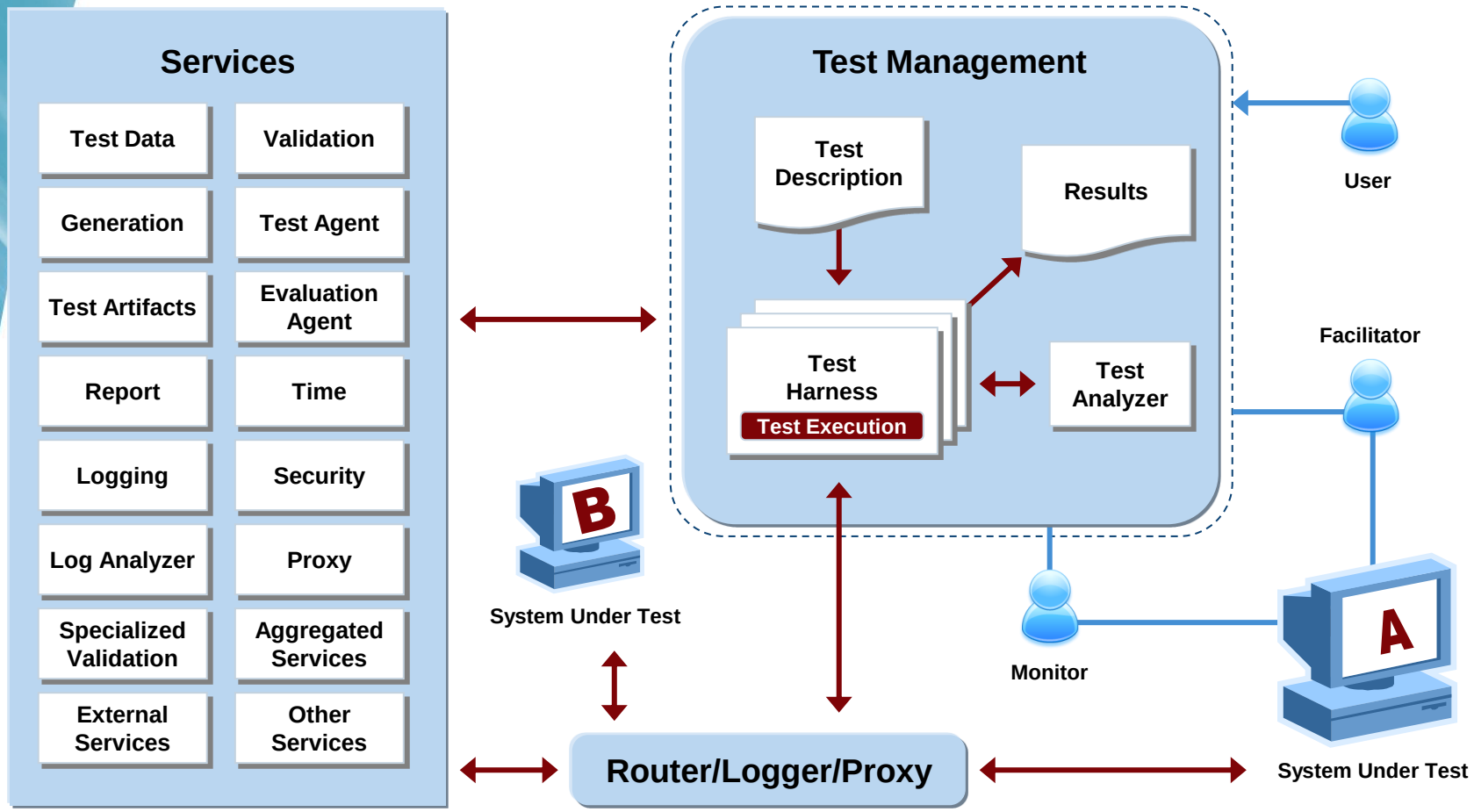
Test Environments

- Instance Testing
  - Conformance (e.g., against HL7 V2.x or CDA)
    - Implementation conforms to Spec. on which it is based
- Isolated System Testing
  - Includes *Instance Testing* Activities
  - Protocol Conformance
  - Functional Behavior Conformance
    - Features and Operational behavior correspond to Specs.
- Peer-to-Peer System Testing
  - Includes *Isolated System Testing* Activities
  - Interoperability Testing
    - Testing complete application environment
    - May include interacting w/ Database, using Network Communications, or interacting w/ other hardware, apps, or systems if appropriate

A Framework for Building Test Systems—an SOA Approach



Peer-to-Peer Test Environment

ISO/IEEE 11073 – How Are We Involved?

- MDC Standards development
  - ISO/IEEE 11073 Point-of-care Medical Device Communication
  - Co-chair new normative chapter - addition provides NIST developed electronic information model
  - Assist development of more complete and correct specifications prior to balloting
  - Work with SDOs (testing perspective), clinicians, clinical engineers
- Device Communication Test Tooling
  - XML Schema of the ISO/IEEE 11073 Domain Information Model
  - ICSGenerator Tool
    - Produces standard-compliant device profiles and specializations
    - Generates Implementation Conformance Statements
  - 'Rosetta' Terminology Management System
    - Standardized terminology across MD manufacturers
  - ValidatePDU Tool
    - Provides message syntax and semantic validation
  - Java Class Library (of standard's syntax notation)
    - Implementable-code of abstract types defined in standard
    - Coder (encodes and decodes APDUs/messages)

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NIST Test Tool: *"ICSGenerator"*

National Institute of Standards and Technology
(NIST)

SANDRA MARTINEZ,
John Garguilo
5 October 2010

INFORMATION TECHNOLOGY LABORATORY

ICSGenerator: Status Update (since last meeting)

- Incorporated hRTM Database (latest version – 3M)
  - unit code
- Enhanced hRTM and x73 Nomenclature database display with group and keyword searching
- Added a profile unit display table
- Added ability to change parameter cardinality
- Improve application interface to increase usability.
  - Private attribute now available from the attribute table display.
  - Ability to edit and remove attributes from the attribute table display.
  - Added drop down menu for unit code on a Nu-obs-Value.
    - Profile specific - from the profile unit table.
  - Enhanced object Type Id drop down menu providing RefId search capability with term code and term code description.
- Reviewed and enhanced the ANS.1 library.
- Develop ventilator setting profile in support of "ICE-PAC Rapid Device Configuration " project.

Tooling Status

ICSGenerator

- hRTM and x73 Nomenclature database display with keyword searching.

File DIM PHD Tools Help

XML Profile | UML Diagram | Validation Errors | Compare Devices | HL7 OBX Messages | Rosetta Containment Hierarchy

HRosetta 3m.2010-05-28T15 Unit Table

Group	REFID	CF_CODE10	DIM	UOM_MDC	UOM_UCUM	CF_UCODE10
BLD_CHM	MDC_BASE_EXCESS_FLUID_EXTRACE...		NL-3	MDC_DIM_MILLI_MOLE_PER_L	mmol/L	266866
BLD_CHM	MDC_PRESS_BAROMETRIC		LMT-2L-2	MDC_DIM_MMHG	mm[Hg]	266016
BLD_CHM_ART	MDC_BASE_EXCESS_BLD_ART		NL-3	MDC_DIM_MILLI_MOLE_PER_L	mmol/L	266866
BLD_CHM_ART	MDC_BASE_EXCESS_BLD_ART		NL-3	MDC_DIM_MILLI_EQUIV_PER_L	meq/L	266994
BLD_CHM_ART	MDC_CONC_CA_ART	159792	NL-3	MDC_DIM_MILLI_MOLE_PER_L	mmol/L	266866
BLD_CHM_ART	MDC_CONC_CA_PH_NORMALIZED_ART		NL-3	MDC_DIM_MILLI_MOLE_PER_L	mmol/L	266866
BLD_CHM_GLU	MDC_CONC_GLU_GEN	160020	NL-3	MDC_DIM_MILLI_MOLE_PER_L	mmol/L	266866
BLD_CHM_GLU	MDC_CONC_GLU_GEN	160020	ML-3	MDC_DIM_MILLI_G_PER_DL	mg/dL	264274
BLD_CHM_GLU	MDC_CONC_GLU_GEN	160020	ML-3	MDC_DIM_G_PER_L	g/L	264192
BLD_CHM_HB_ART	MDC_CONC_HB_ART	159764	ML-3	MDC_DIM_G_PER_DL	g/dL	264256
BLD_CHM_HB_ART	MDC_CONC_HB_ART	159764	ML-3	MDC_DIM_G_PER_L	g/L	264192
BLD_CHM_HB_ART	MDC_CONC_HB_ART	159764	NL-3	MDC_DIM_MILLI_MOLE_PER_L	mmol/L	266866
BLD_CHM_HCT_ART	MDC_CONC_HCT_ART	160068	1	MDC_DIM_PERCENT	%	262688
BLD_CHM_HCT_GEN	MDC_CONC_HCT_GEN	160132	1	MDC_DIM_PCT_PCV	%{pcv}	263392
BLD_CHM_HCT_GEN	MDC_CONC_HCT_GEN	160132	1	MDC_DIM_PERCENT	%	262688
BLD_CHM_K_GEN	MDC_CONC_K_GEN	160016	NL-3	MDC_DIM_MILLI_MOLE_PER_L	mmol/L	266866
BLD_CHM_K_GEN	MDC_CONC_K_GEN	160016	ML-3	MDC_DIM_MILLI_G_PER_DL	mg/dL	264274
BLD_CHM_NA_GEN	MDC_CONC_NA_GEN	160012	NL-3	MDC_DIM_MILLI_MOLE_PER_L	mmol/L	266866
BLD_CHM_NA_GEN	MDC_CONC_NA_GEN	160012	NL-3	MDC_DIM_MILLI_EQUIV_PER_L	meq/L	266994

Group searching | Update

ISO/IEEE 11073 Nomenclature Termcode Table

REFID	Term Code	Common Term	Term Description
MDC_DEV_ANALY	4100	Generic analyzer	Instrument that analyzes acquired patient information.
MDC_DEV_ANALY_SAT_O2	4104	SpO2 monitor	Instrument that derives the % of arterial O2 and pulse rate parameters (bloo...
MDC_DEV_ANALY_SAT_O2	4104	SpO2 monitor	Instrument that derives the % of arterial O2 and pulse rate parameters (bloo...
MDC_DEV_ANALY_CONC_GAS_IDENT	4108	Multigas identifier	Instrument for the direct measurement of the concentration of airway chemic...
MDC_DEV_ANALY_CONC_GAS_MULTI_PARAM	4112	Multigas analyzer	Instrument that derives airway gas parameters, e.g., EtCO2, iCO2, iO2.
MDC_DEV_ANALY_ELEC_POTL_BRAIN	4120	EEG analyzer	Instrument that derives brain activity parameters.
MDC_DEV_ANALY_ELEC_POTL_BRAIN	4120	EEG analyzer	Instrument that derives brain activity parameters.
MDC_DEV_ANALY_ELEC_POTL_HEART_ACTIV	4124	Heart activity analyzer	Instrument that derives Heart/haemo activity parameters, e.g., cardiotach, a...
MDC_DEV_ANALY_FLOW_AWAY	4128	Airway flow analyzer	Instrument that derives airway flow parameters.
MDC_DEV_ANALY_CARD_OUTPUT	4132	Heart output device	Instrument that derives heart output from direct measurement of blood flow.
MDC_DEV_ANALY_FLOW_LUNG	4136	Lung flow analyzer	Instrument that derives lung flow parameters.
MDC_DEV_ANALY_FLOW_URINE	4140	Urine flow analyzer	Instrument that derives urine flow rate.
MDC_DEV_ANALY_AWAY_MULTI_PARAM	4144	Spirometer	Instrument for analysis and derivation of airway parameters.
MDC_DEV_ANALY_BLD_CHEM_MULTI_PARAM	4148	Blood chemistry analyzer	Instrument for analysis and derivation of blood chemistry parameters.
MDC_DEV_ANALY_LUNG	4152	Lung analyzer	Instrument for analysis and derivation of Lung function parameters.
MDC_DEV_ANALY_MUSCL	4156	Muscle analyzer	Instrument for analysis and derivation of muscle parameters.
MDC_DEV_ANALY_PT_PHYSIO	4160	Patient analyzer	Instrument that analyses and derives data from multiple or unspecified body ...
MDC_DEV_ANALY_SKIN_MULTI_PARAM	4164	Skin analyzer	Instrument for analysis and derivation of skin-related parameters.
MDC_DEV_ANALY_PRESS_AWAY	4168	Spirometry analyzer	Instrument that derives airway parameters.

REFID searching | Update

Tooling Status

ICSGenerator

- hRTM group searching

File DIM PHD Tools Help

XML Profile | UML Diagram | Validation Errors | Compare Devices | HL7 OBX Messages | Rosetta Containment Hierarchy

HRosetta 3m.2010-05-28T15 Unit Table

Group	REFID	CF_CODE10	DIM	UOM_MDC	UOM_UCUM	CF_UCODE10
INFUS	MDC_ATTR_AL_COND					
INFUS	MDC_CONC_DRUG	157760	ML-3	MDC_DIM_MICRO_G_PER_ML	ug/mL	264307
INFUS	MDC_CONC_DRUG	157760	ML-3	MDC_DIM_MILLI_G_PER_ML	mg/mL	264306
INFUS	MDC_CONC_DRUG	157760	ML-3	MDC_DIM_G_PER_ML	g/mL	264288
INFUS	MDC_CONC_DRUG	157760	[iU]L-3	MDC_DIM_INTL_UNIT_PER_ML	[iU]/mL	267744
INFUS	MDC_CONC_DRUG	157760	NL-3	MDC_DIM_MILLI_EQUIV_PER_ML	meq/mL	267026
INFUS	MDC_CONC_DRUG	157760	ML-3	MDC_DIM_NANO_G_PER_ML	ng/mL	264308
INFUS	MDC_CONC_DRUG	157760	NL-3	MDC_DIM_MILLI_MOLE_PER_ML	mmol/mL	266898
INFUS	MDC_CONC_DRUG	157760	[iU]L-3	MDC_DIM_MILLI_INTL_UNIT_PER_ML	m[iU]/mL	267762
INFUS	MDC_CONC_DRUG	157760	[iU]L-3	MDC_DIM_MEGA_INTL_UNIT_PER_ML	M[iU]/mL	267748
INFUS	MDC_DRUG_NAME_TYPE	184330				
INFUS	MDC_FLOW_DRUG_DELIV	157804	L3T-1	MDC_DIM_MILLI_L_PER_HR	mL/h	265266
INFUS	MDC_FLOW_FLUID_PUMP	157784	L3T-1	MDC_DIM_MILLI_L_PER_HR	mL/h	265266
INFUS	MDC_INFUS_DOSE_DELIV		MM-1	MDC_DIM_G_PER_KG	g/kg	262976
INFUS	MDC_INFUS_DOSE_DELIV		MM-1	MDC_DIM_MILLI_G_PER_KG	mg/kg	262994
INFUS	MDC_INFUS_DOSE_DELIV		MM-1	MDC_DIM_MICRO_G_PER_KG	ug/kg	262995
INFUS	MDC_INFUS_DOSE_DELIV		MM-1	MDC_DIM_NANO_G_PER_KG	ng/kg	262996
INFUS	MDC_INFUS_DOSE_DELIV		M	MDC_DIM_G	g	263872
INFUS	MDC_INFUS_DOSE_DELIV		M	MDC_DIM_MILLI_G	mg	263890

Group searching: INfu

INFUS

Update

ISO/IEEE 11073 Nomenclature Terr

REFID			
MDC_DEV_ANALY			
MDC_DEV_ANALY_SAT_O2			
MDC_DEV_ANALY_SAT_O2			
MDC_DEV_ANALY_CONC_GAS_IDE			
MDC_DEV_ANALY_CONC_GAS_MU			
MDC_DEV_ANALY_ELEC_POTL_BRA			
MDC_DEV_ANALY_ELEC_POTL_BRAIN	4120	EEG analyzer	Instrument that derives brain activity parameters.
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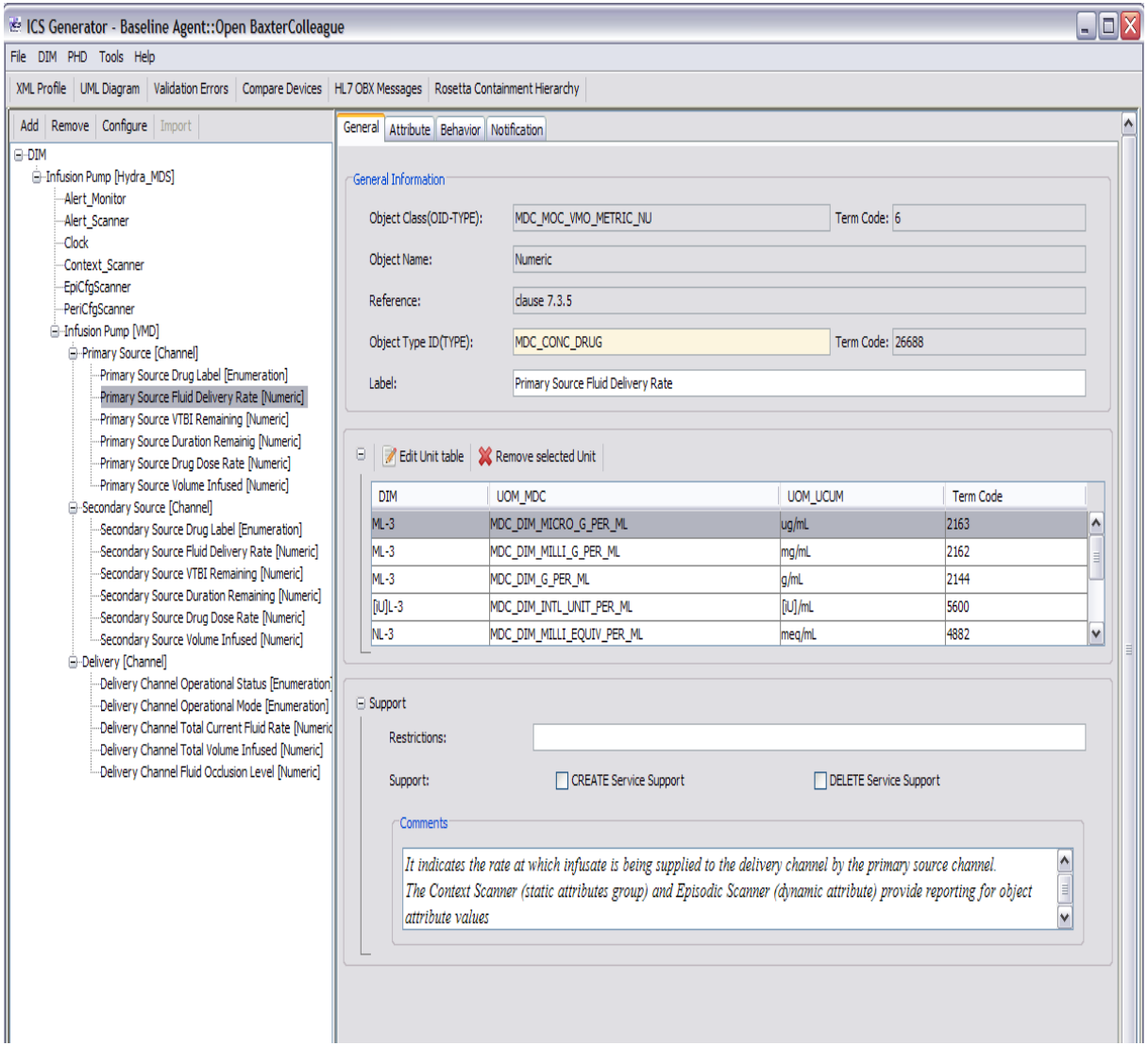
REFID searching

Update

Tooling Status

ICSGenerator

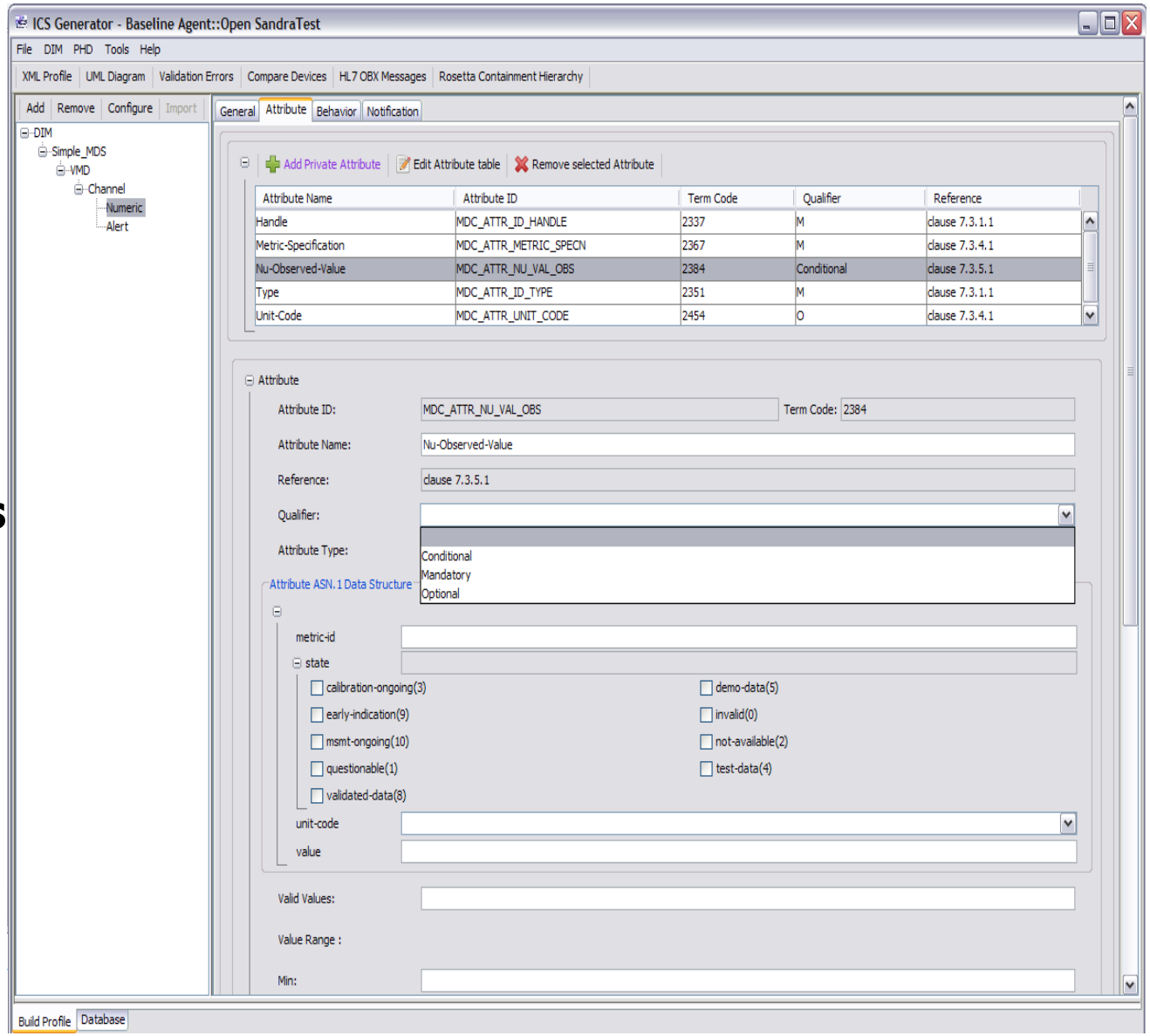
- Unit code drop down from hRTM Database



Tooling Status

ICSGenerator

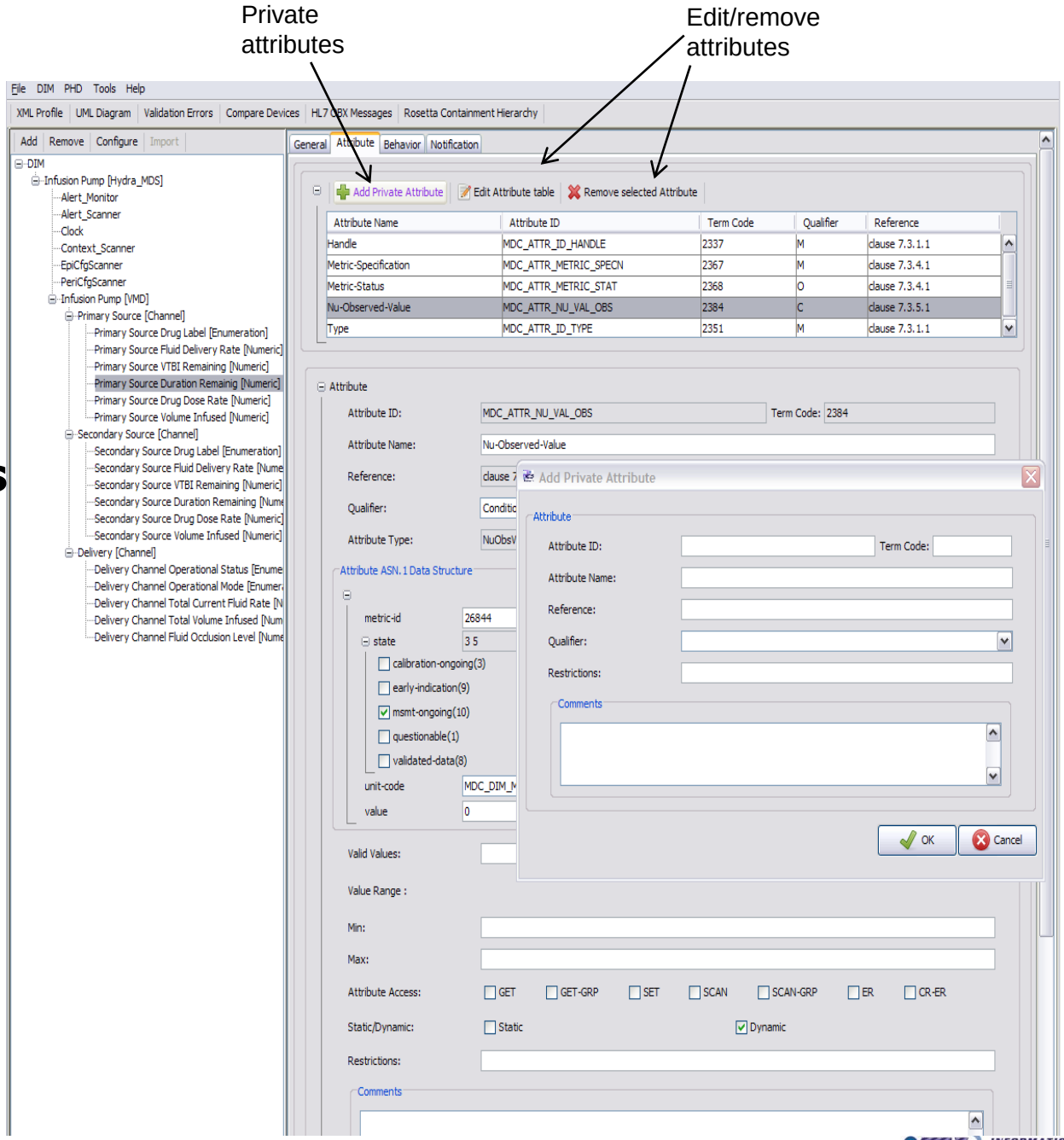
- Changing parameter cardinality



Tooling Status

ICSGenerator

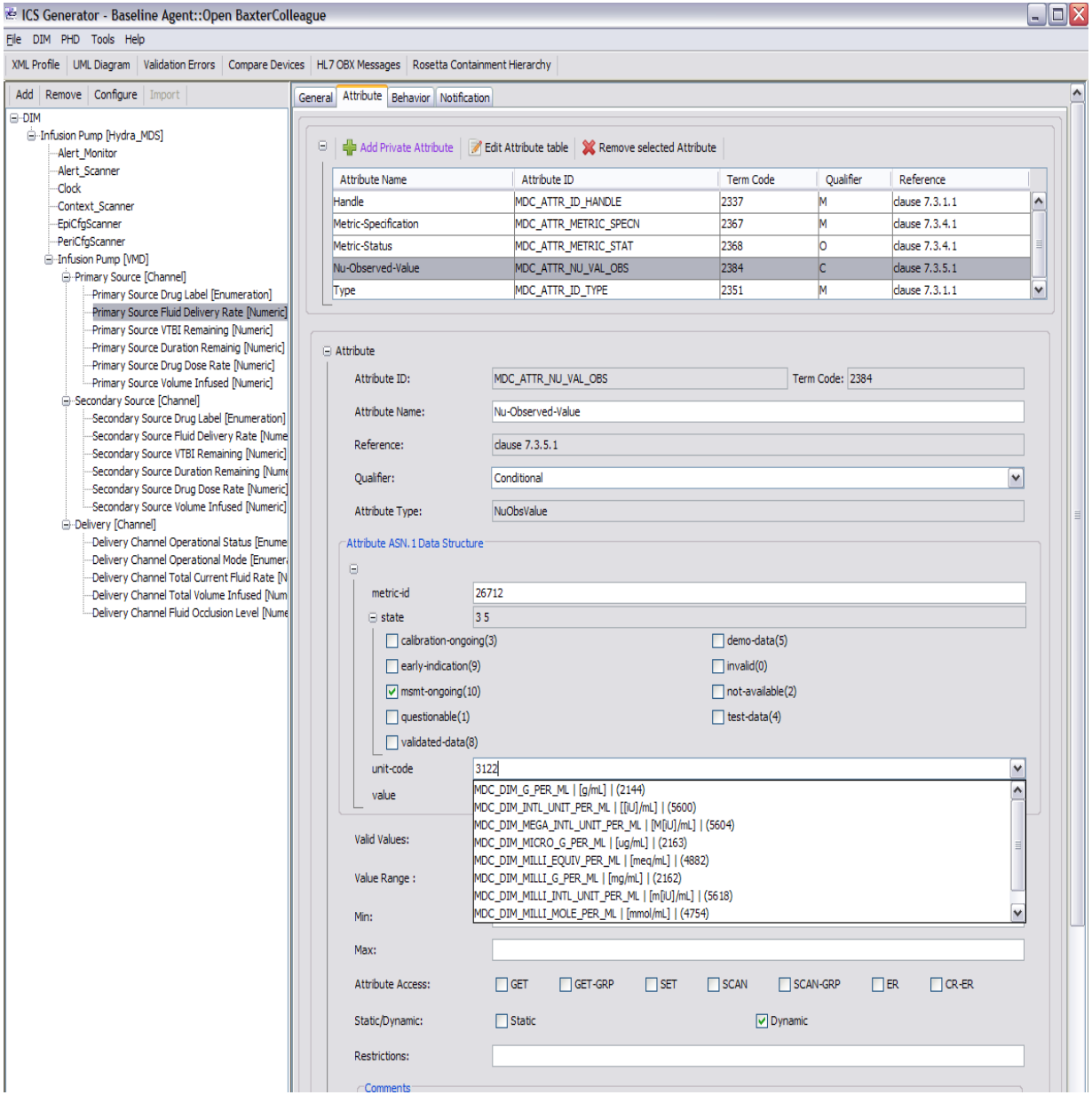
- Private attribute available from the attribute table display.



Tooling Status

ICSGenerator

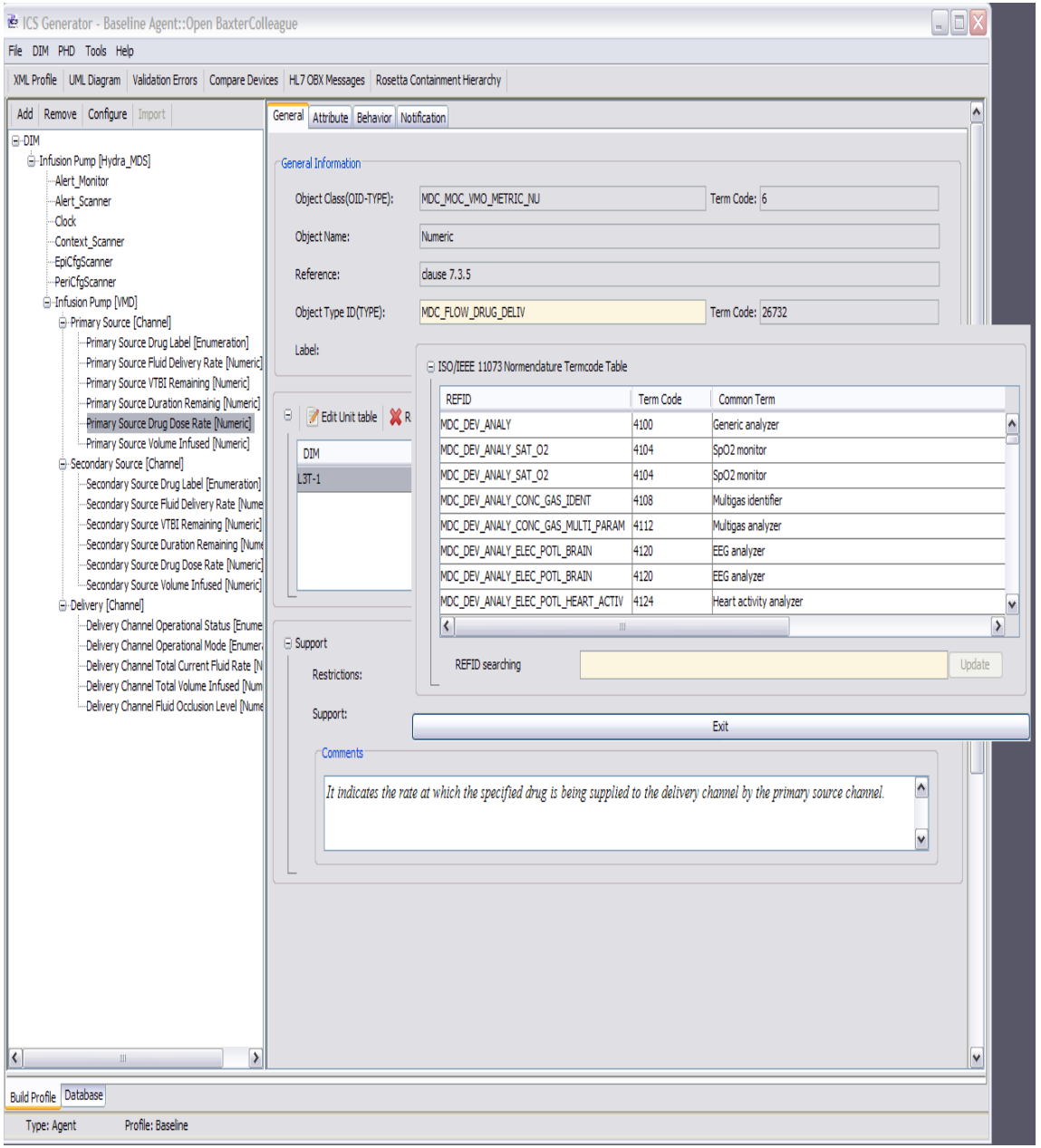
- Drop down menu for unit code on a Nu-obs-Value



Tooling Status

ICSGenerator

- Object Type Id drop down menu and RefId search capability including term code and term code description.



ICSGenerator : Next Steps

- Add hRTM database update capability
- Add Enumeration values from hRTM
- Work on profile template capability
- Add capability to select ASN.1 types for private attributes.
- Add the capability of customize and save a profile unit table
- Finalize implementation of RCH, (expecting guidance…)
  - Implementing OBXV and derived OBX-4
- Update PHD DIM and specialization profiles
- Working on delivering an ICSGenerator web application
- Developing an ICSGenerator launching program to:
  - Synchronize/update required packages automatically
  - E.g., the hRTM database
- Continue code improvement and enhancement.

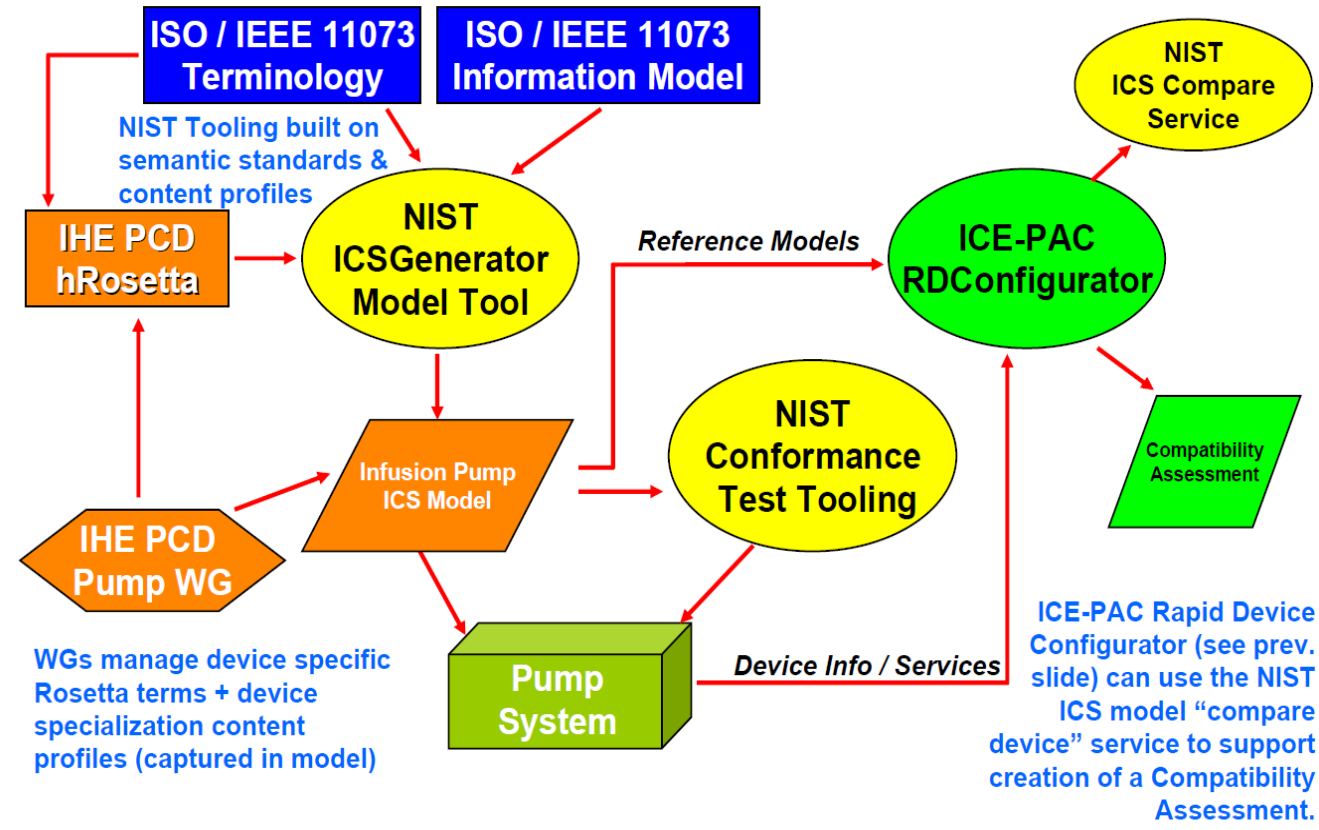
ICSGenerator: Issues

Discussion Points

- Valid values and value range…
- Object template capability…
- Profile Template - use case…

ICSGenerator: Leveraging the Tool

- To support IHE-PCD device specializations (e.g., MEM, DPI)
- In support of ICE-PAC Rapid Device Configuration
  - For the generation of compatibility assessments.



National Institute of Standards and Technology

Software and Systems Division

NIST Tool:
"*Rosetta Terminology Mapping Management System*"
(RTMMS)
(*Championed by Paul Schluter [GE Healthcare])

National Institute of Standards and Technology (NIST)

MARIA CHERKAOUI,
John Garguilo, Sandra Martinez

5 October 2010

INFORMATION TECHNOLOGY LABORATORY

IHE PCD Profile: RTM

Rosetta Terminology Mapping

- Identifies the core set of semantics appropriate for medical devices
- Maps vendors terminology to standard terminology
- Maps numeric parameters to their associated units-of-measure and enumerated values

- ftp://ftp.ihe.net/Patient_Care_Devices/TechnicalFrameworkforTrialImplementation/IHE_PCD_TF_Supplement_Rosetta_Terminology_Mapping_RTM_TI_2008-08-22.pdf

IHE PCD Profile: RTM

Goals:

- Identify terms that are missing from the standard nomenclature
- Ensure correct and consistent use of units-of-measure
- Ensure correct and consistent use of enumerated values

IHE PCD Profile: RTM

- Rosetta Table
  - Maps vendor supported observations, units and enumerations to ISO/IEEE x73 nomenclature
- Units Table
  - Defines allowed units-of-measure
  - Defines groups of related units-of-measure
- Enumerations Table
  - Defines groups of enumerated values
- hRTM Table
  - Generated from the original Rosetta

RTMMS Overview

- A web application that allows vendors and reviewers:
  - access, retrieval, and reporting of Rosetta Tables over the internet in conformance to IHE RTM Profile.
  - saving the data in the xml format as defined by RTM Profile.

- Aids in The harmonization process by:
  - Identifying missing terms.
  - Automatic generation of the "Harmonized Rosetta Table"
  - Viewing and downloading latest hRTM table.

- Facilitates the proposal of New Terms to x73 Nomenclature

Features Added Since Last Meeting

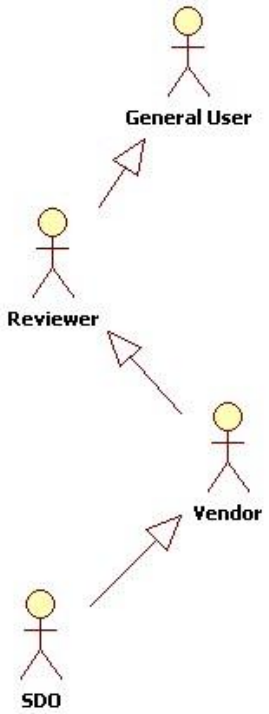
- Enhanced NIST x73 Nomenclature database
  - Included Terms in both annexes A and B.
  - Included IDC Nomenclature
- Highlighted Proposed Terms in Rosetta, Units and Enumerations Tables
- Implemented Interface to:
  - lookup REFID from x73 Nomenclature database
  - propose New Terms to the standard
- Implemented "Proposed Terms" management features for SDO users
- Enhanced registration process
  - Email confirmation, approval…
- Added Admin Type of users

Features Added (continued)

- Added ranking capabilities to assess probability of valid terms in the Rosetta table
  - Scale from 1 to 10
- Included column filtering based on regular expressions
- Implemented Rosetta validation against hRTM
- Added XML Units and Enumerations Download
- Added "Enumerations" management capabilities
  - Edit/Add Enumeration
  - Deprecate Enumeration
  - Edit/Add Enumeration Group
  - Deprecate Enumeration Group

RTMMS Users

- General user
  - Views Rosetta Tables
- Reviewer
  - Participates in discussions
- Vendor
  - Modifies Vendor Rosetta Table
  - Suggests new terms
- SDO
  - Modifies Units and Enumerations Table
  - Register new terms
- Admin
  - Manages User Accounts

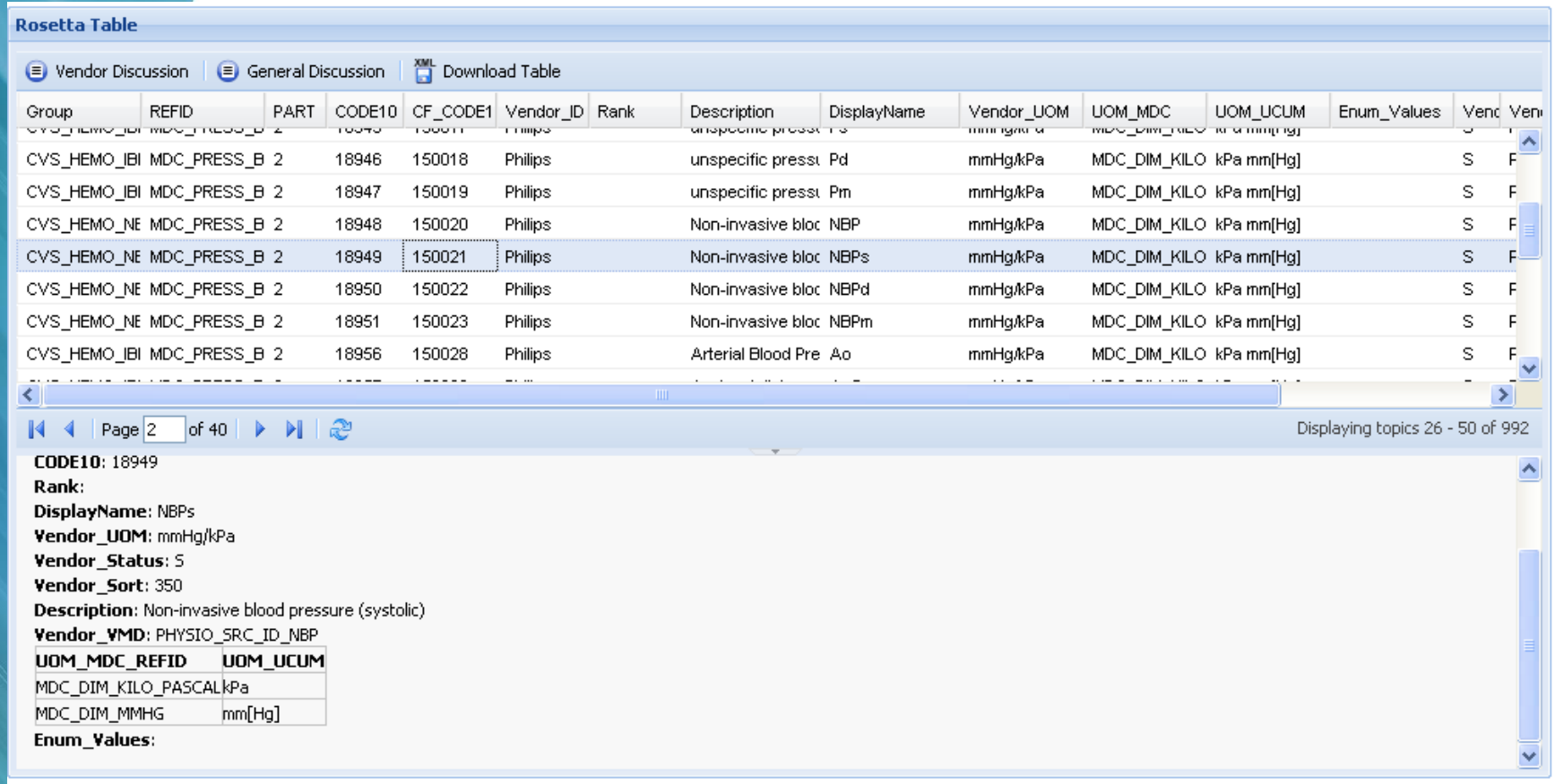


RTMMS Scenario

'General' Type User Capabilities

- View/Download Rosetta Table
- View/Download Units Table
- View/Download Enumerations Table

Rosetta Table



Rosetta Table

Vendor Discussion | General Discussion | Download Table

Group	REFID	PART	CODE10	CF_CODE1	Vendor_ID	Rank	Description	DisplayName	Vendor_UOM	UOM_MDC	UOM_UCUM	Enum_Values	Vend	Vend
CVS_HEMO_IBI	MDC_PRESS_B	2	18946	150018	Philips		unspecific pressu	Pd	mmHg/kPa	MDC_DIM_KILO	kPa mm[Hg]		S	P
CVS_HEMO_IBI	MDC_PRESS_B	2	18947	150019	Philips		unspecific pressu	Pm	mmHg/kPa	MDC_DIM_KILO	kPa mm[Hg]		S	P
CVS_HEMO_NI	MDC_PRESS_B	2	18948	150020	Philips		Non-invasive bloc	NBP	mmHg/kPa	MDC_DIM_KILO	kPa mm[Hg]		S	P
CVS_HEMO_NI	MDC_PRESS_B	2	18949	150021	Philips		Non-invasive bloc	NBPs	mmHg/kPa	MDC_DIM_KILO	kPa mm[Hg]		S	P
CVS_HEMO_NI	MDC_PRESS_B	2	18950	150022	Philips		Non-invasive bloc	NBPd	mmHg/kPa	MDC_DIM_KILO	kPa mm[Hg]		S	P
CVS_HEMO_NI	MDC_PRESS_B	2	18951	150023	Philips		Non-invasive bloc	NBPm	mmHg/kPa	MDC_DIM_KILO	kPa mm[Hg]		S	P
CVS_HEMO_IBI	MDC_PRESS_B	2	18956	150028	Philips		Arterial Blood Pre	Ao	mmHg/kPa	MDC_DIM_KILO	kPa mm[Hg]		S	P

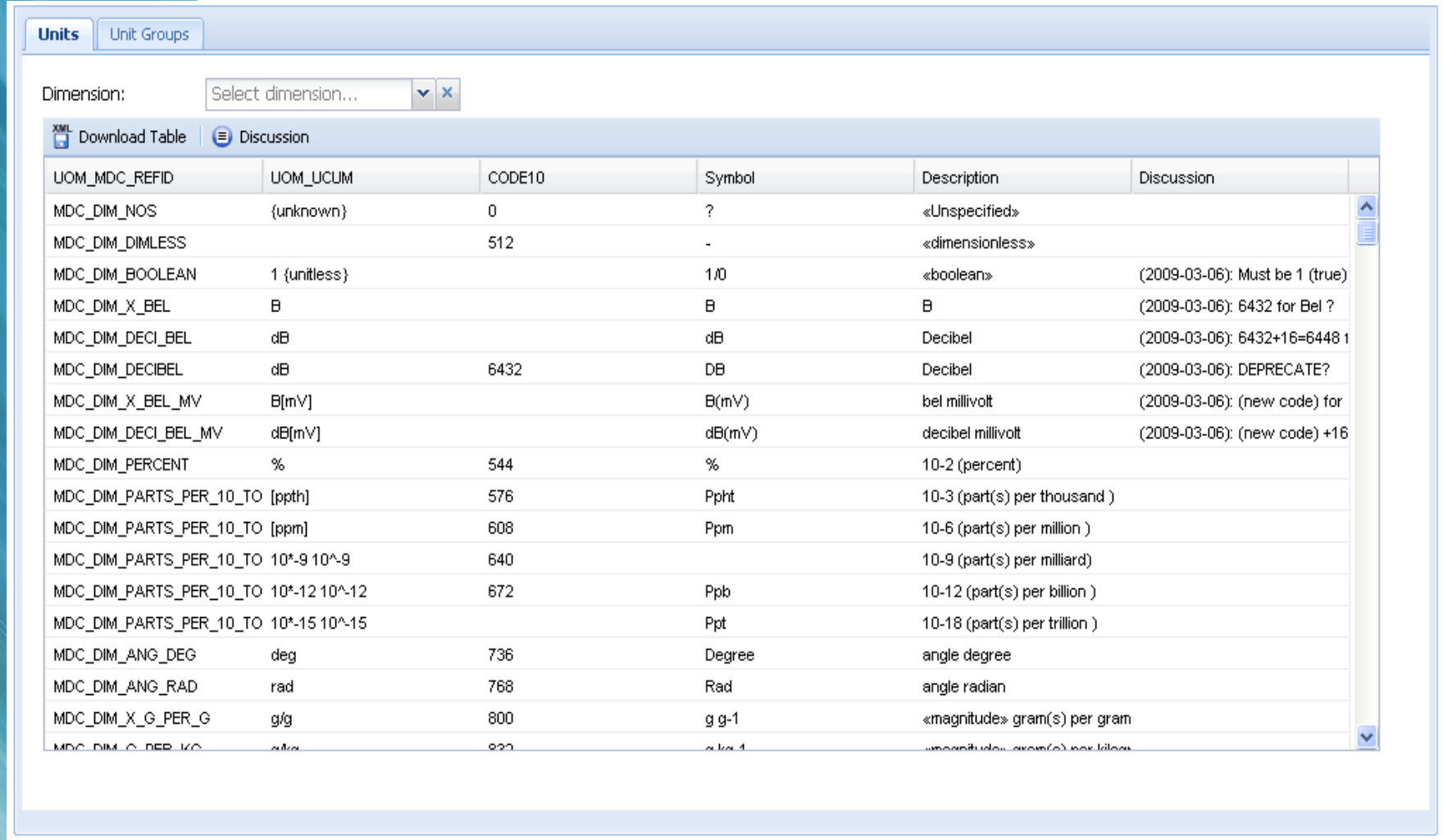
Page 2 of 40 | Displaying topics 26 - 50 of 992

CODE10: 18949
Rank:
DisplayName: NBPs
Vendor_UOM: mmHg/kPa
Vendor_Status: S
Vendor_Sort: 350
Description: Non-invasive blood pressure (systolic)
Vendor_VMD: PHYSIO_SRC_ID_NBP

UOM_MDC_REFID	UOM_UCUM
MDC_DIM_KILO_PASCAL	kPa
MDC_DIM_MMHG	mm[Hg]

Enum_Values:

Units Table



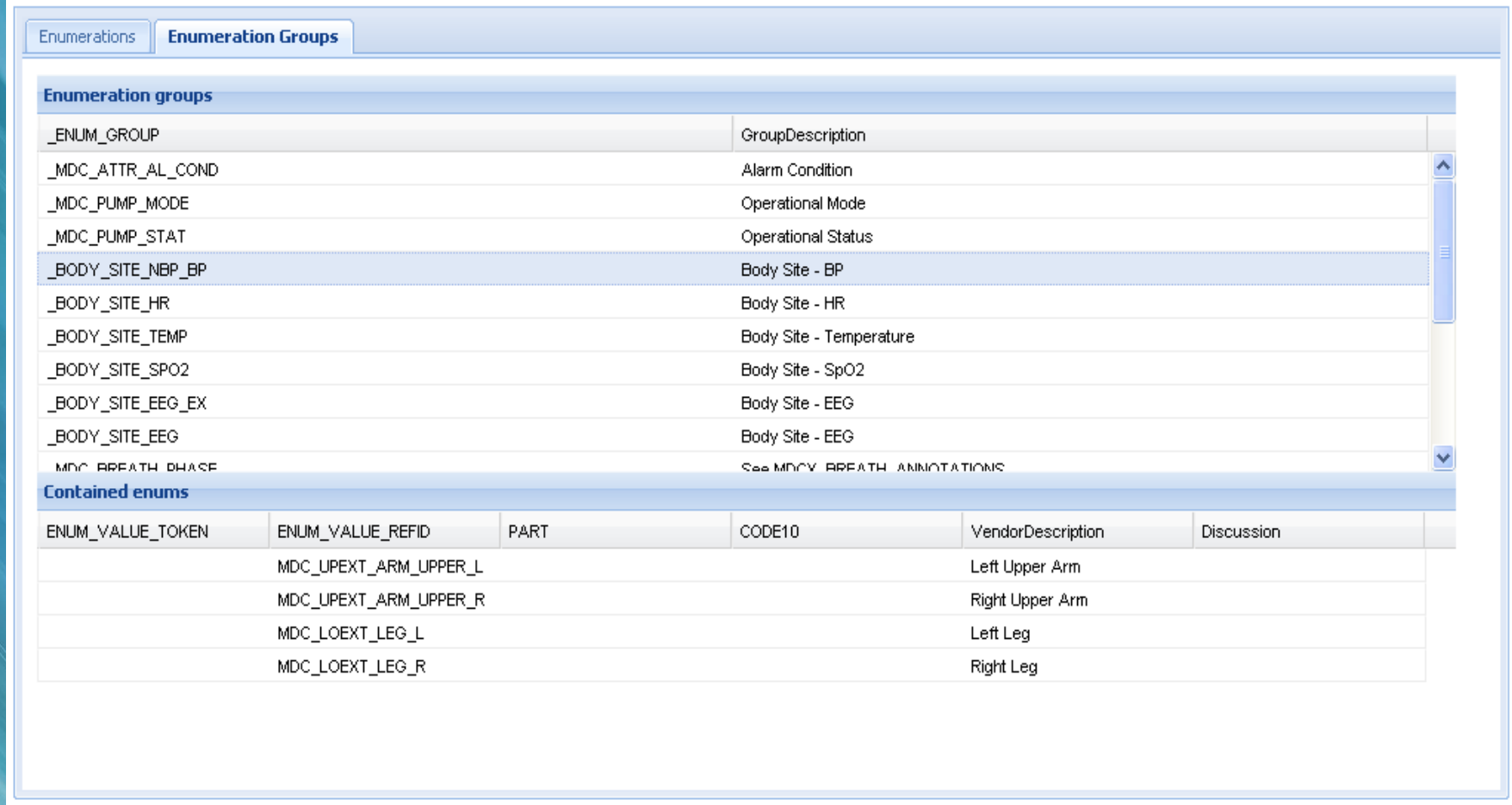
Units | Unit Groups

Dimension: Select dimension...

Download Table | Discussion

UOM_MDC_REFID	UOM_UCUM	CODE10	Symbol	Description	Discussion
MDC_DIM_NOS	{unknown}	0	?	«Unspecified»	
MDC_DIM_DIMLESS		512	-	«dimensionless»	
MDC_DIM_BOOLEAN	1 {unitless}		1/0	«boolean»	(2009-03-06): Must be 1 (true)
MDC_DIM_X_BEL	B		B	B	(2009-03-06): 6432 for Bel ?
MDC_DIM_DECI_BEL	dB		dB	Decibel	(2009-03-06): 6432+16=6448 1
MDC_DIM_DECIBEL	dB	6432	DB	Decibel	(2009-03-06): DEPRECATE?
MDC_DIM_X_BEL_MV	B[mV]		B(mV)	bel millivolt	(2009-03-06): (new code) for
MDC_DIM_DECI_BEL_MV	dB[mV]		dB(mV)	decibel millivolt	(2009-03-06): (new code) +16
MDC_DIM_PERCENT	%	544	%	10-2 (percent)	
MDC_DIM_PARTS_PER_10_TO	[ppth]	576	Ppht	10-3 (part(s) per thousand)	
MDC_DIM_PARTS_PER_10_TO	[ppm]	608	Ppm	10-6 (part(s) per million)	
MDC_DIM_PARTS_PER_10_TO	10*-9 10^-9	640		10-9 (part(s) per milliard)	
MDC_DIM_PARTS_PER_10_TO	10*-12 10^-12	672	Ppb	10-12 (part(s) per billion)	
MDC_DIM_PARTS_PER_10_TO	10*-15 10^-15		Ppt	10-18 (part(s) per trillion)	
MDC_DIM_ANG_DEG	deg	736	Degree	angle degree	
MDC_DIM_ANG_RAD	rad	768	Rad	angle radian	
MDC_DIM_X_G_PER_G	g/g	800	g g-1	«magnitude» gram(s) per gram	

Enumeration Group Table



Enumerations | Enumeration Groups

Enumeration groups

_ENUM_GROUP	GroupDescription
_MDC_ATTR_AL_COND	Alarm Condition
_MDC_PUMP_MODE	Operational Mode
_MDC_PUMP_STAT	Operational Status
_BODY_SITE_NBP_BP	Body Site - BP
_BODY_SITE_HR	Body Site - HR
_BODY_SITE_TEMP	Body Site - Temperature
_BODY_SITE_SPO2	Body Site - SpO2
_BODY_SITE_EEG_EX	Body Site - EEG
_BODY_SITE_EEG	Body Site - EEG
_MDC_BREATH_PHASE	See MDCX_BREATH_ANNOTATIONS

Contained enums

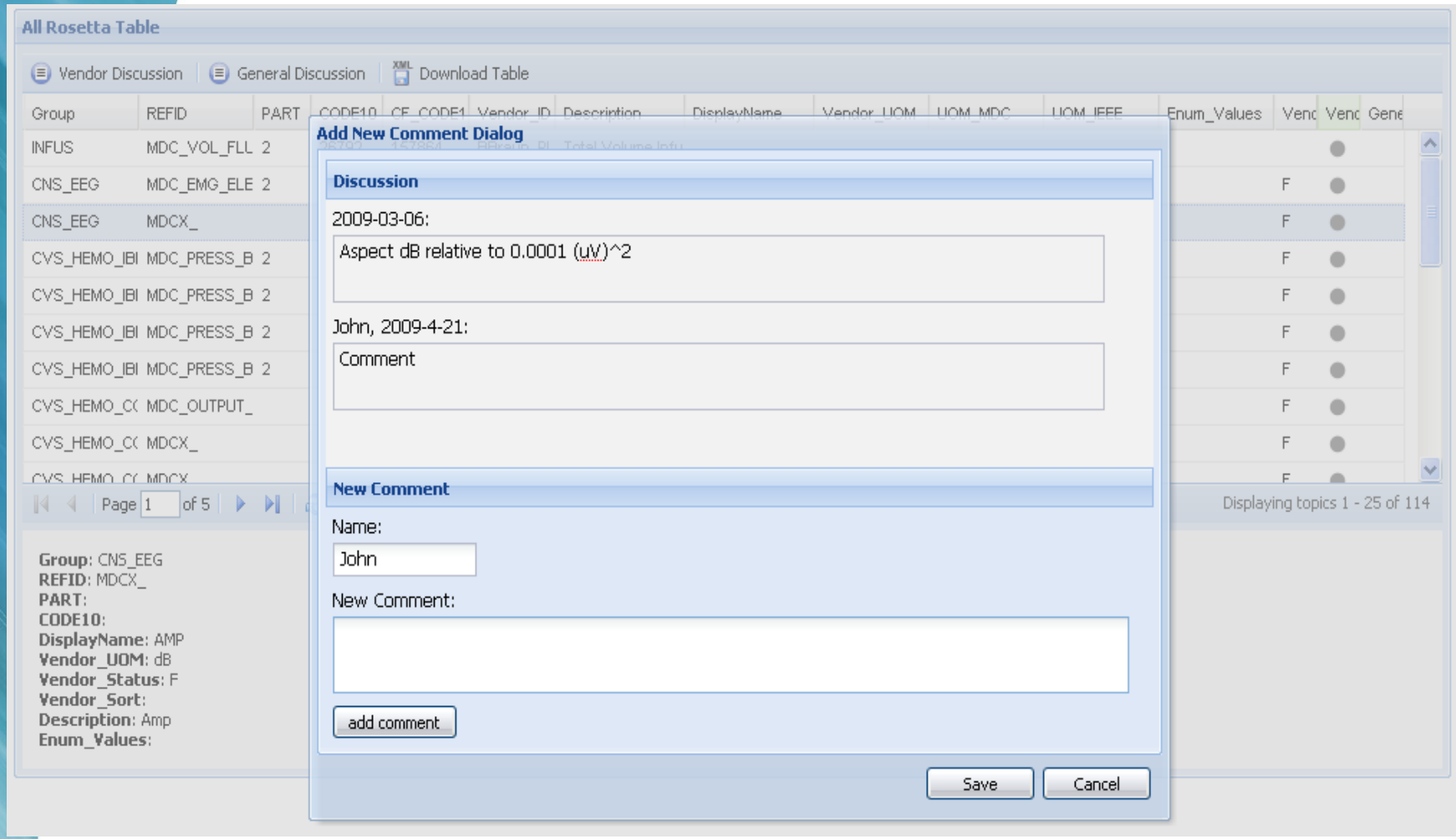
ENUM_VALUE_TOKEN	ENUM_VALUE_REFID	PART	CODE10	VendorDescription	Discussion
	MDC_UPEXT_ARM_UPPER_L			Left Upper Arm	
	MDC_UPEXT_ARM_UPPER_R			Right Upper Arm	
	MDC_LOEXT_LEG_L			Left Leg	
	MDC_LOEXT_LEG_R			Right Leg	

RTMMS Scenario

'Reviewer' Type User Capabilities

- Filter Rosetta Table
  - By Vendor ID (Philips)…
  - Using Regular Expressions (MDCX_.*)
  - Viewing Discussed Entries
- Contribute to Discussions
  - Adding Comments

Comment Dialog

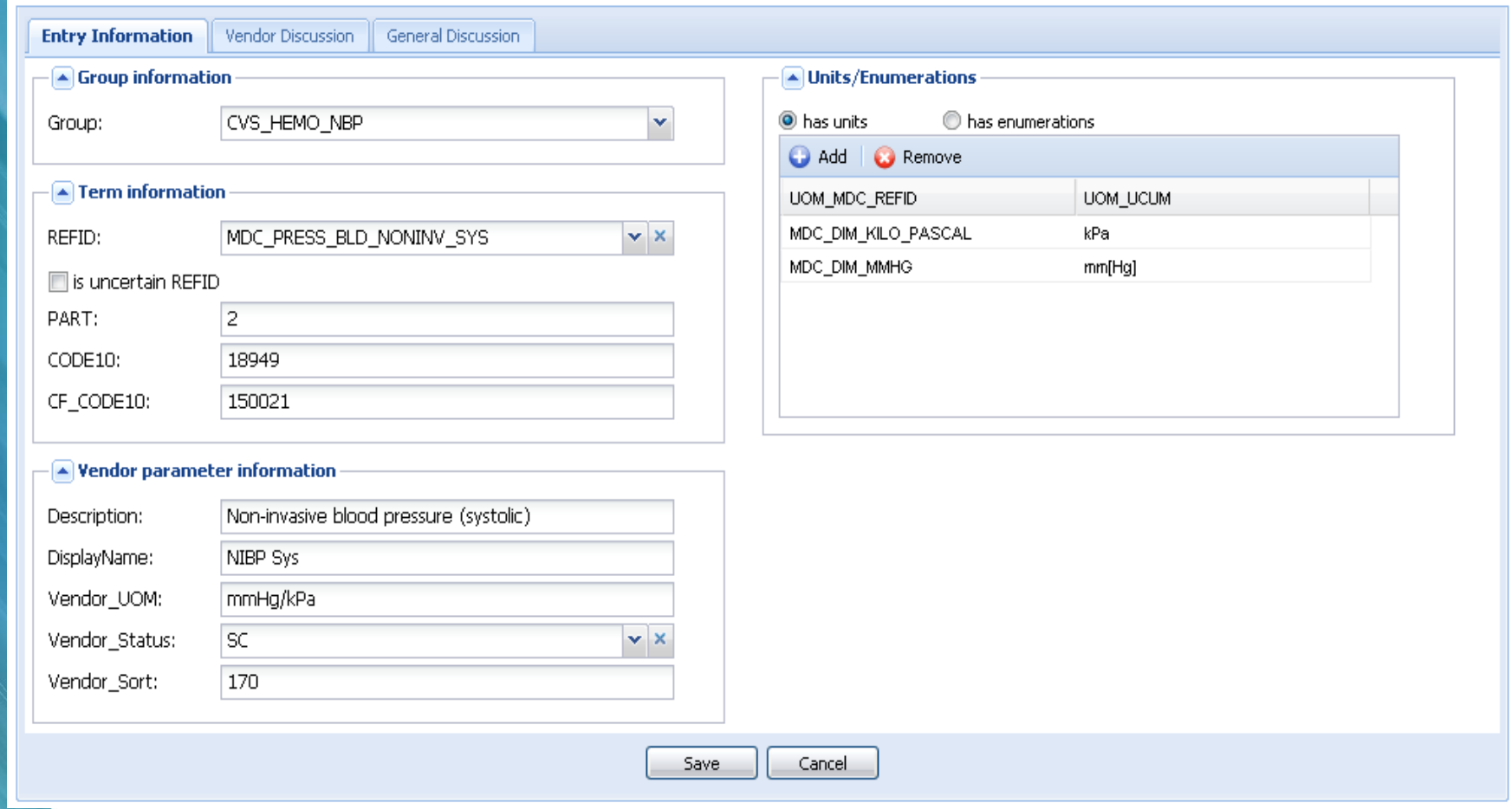


RTMMS Scenario

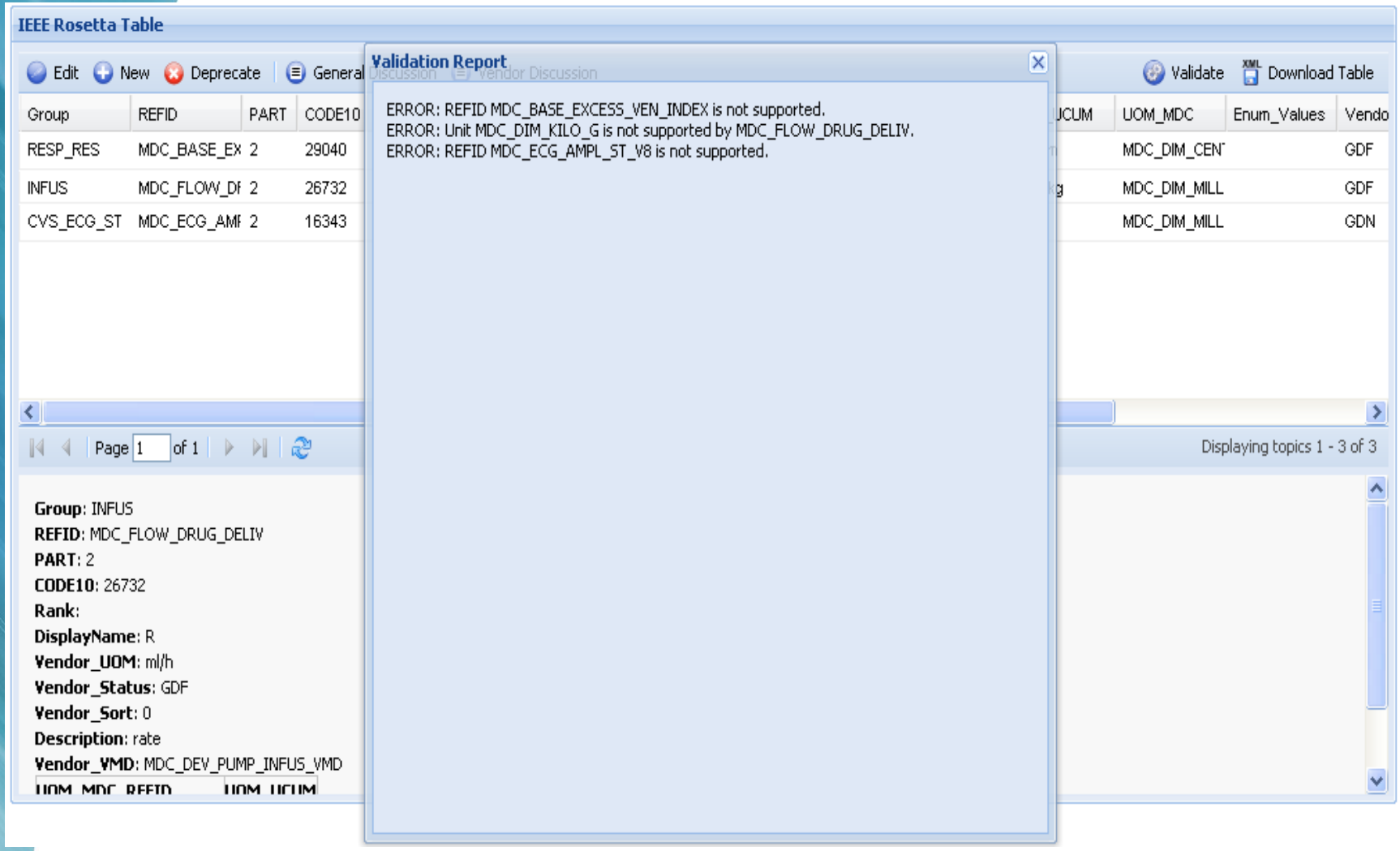
'Vendor' Type User Capabilities

- Add a new Rosetta entry
  - REFIDs lookup from x73 Nomenclature
  - Group lookup from RTM tables
  - Units/Unit Groups and Enumerations/Enumeration Groups lookup from RTM tables
  - Term codes completion from x73 Nomenclature
  - Suggesting new terms to the standard
  - Validating Required fields
- Edit a Rosetta entry
- Deprecate a Rosetta entry
- Validate Rosetta Entries against current hRTM Table

Edit Entry


Entry Information
Vendor Discussion
General Discussion
Group information
Group:
CVS_HEMO_NBP
Term information
REFID:
MDC_PRESS_BLD_NONINV_SYS
is uncertain REFID
PART:
2
CODE10:
18949
CF_CODE10:
150021
Vendor parameter information
Description:
Non-invasive blood pressure (systolic)
DisplayName:
NIBP Sys
Vendor_UOM:
mmHg/kPa
Vendor_Status:
SC
Vendor_Sort:
170
Units/Enumerations
has units
has enumerations
Add
Remove
UOM_MDC_REFID
UOM_UCUM
MDC_DIM_KILO_PASCAL
kPa
MDC_DIM_MMHG
mm[Hg]
Save
Cancel

Validation Report

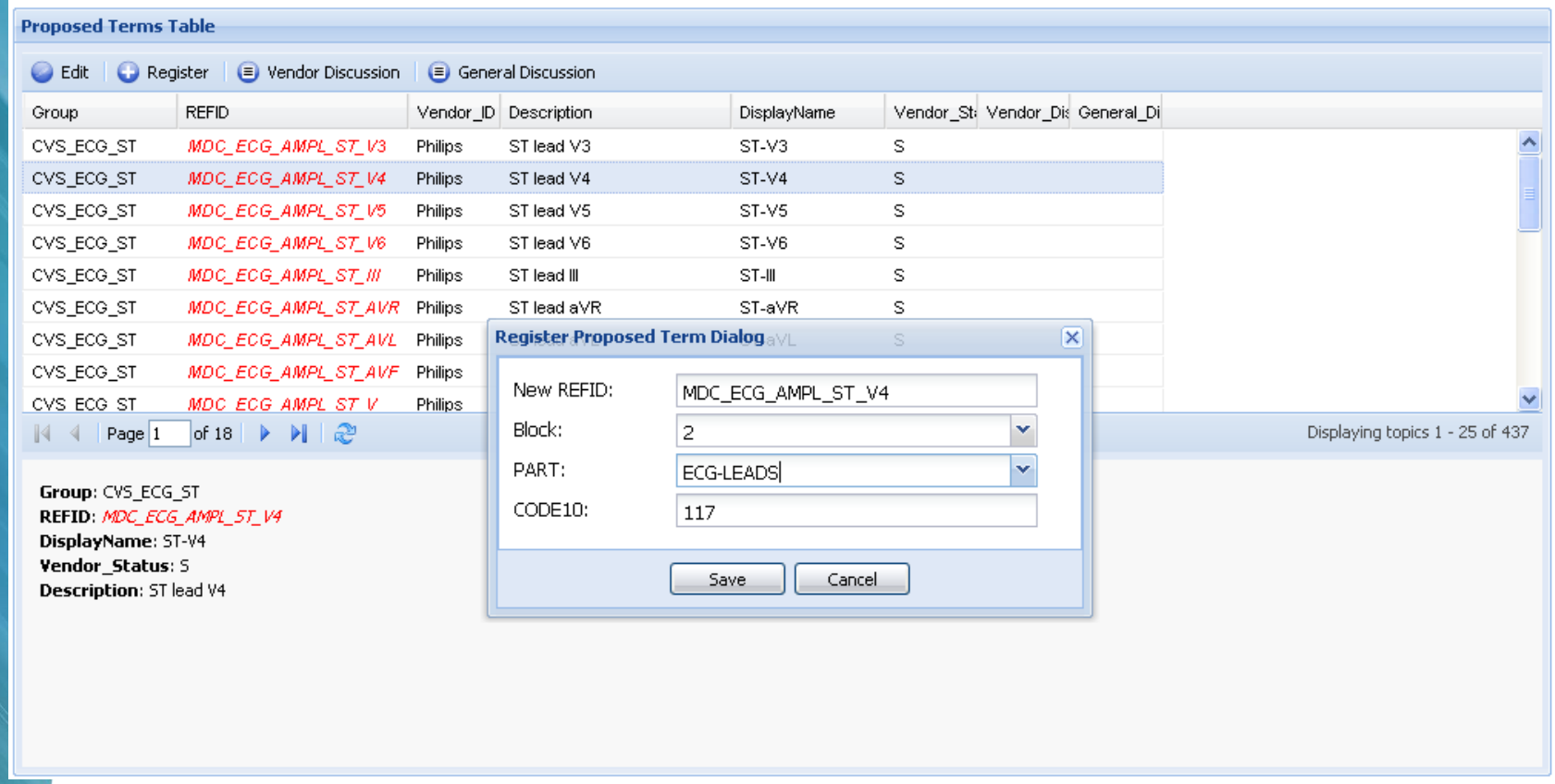


RTMMS Scenario

‘SDO’ Type User Capabilities

- Review Proposed Terms
- Register a Proposed Term
  - Assigning term code
  - Automatically updating Vendor tables

Register Proposed Term



Next Steps

- Import XML Rosetta Data
- Implement Containment Hierarchy
- Edit hRTM Table
- Implement Backup cycle
- Implement versioning system
- Add logging history capabilities
  - To identify occurred changes, time they were made, users who made them…
- Automatic generation of hRTM

- RTMMS Release scheduled for May 2011
  - NIST Suggested/estimated time frame

Issues

- Should Vendors see other Vendors information?
- IEEE copyright issues
  - Against NIST Policy to maintain proprietary data
- Integration of SNOMED CT Terms
- Requirements needed for:
  - hRTM Automatic Generation
    - Currently all done by (and only by) Paul Schluter (GE)
  - Containment Hierarchy

Summary / Discussion

- Update/Continue work on Test Plans / Conformance Guide
- Developing Test Agents across Integration Profile Actors
  - Continue work on TF and Supplements
  - Further define 'scenarios' (message transaction sequences)
- RTMMS
  - Continue discussion of approving and adding normalized terminology to IEEE x73
  - Build on Today's Discussion (w/ Jan, Paul, Melvin, Todd, John R, others?)
  - Add two columns to support mapping to ITSDO work (w/ Jan) or others (perhaps Clem McDonald?) for SNOMED CD; LOINC?
- ICSGenerator
  - Start developing IHE-PCD Device 'specializations' for devices across various IHE-PCD Integration Profiles
- Explore OHT work (w/ Ioana, David Carlson)
  - http://mdht.projects.openhealthtools.org
- Questions? / Discussion…
- Thank-you!