

HEALTH IT  
STANDARDS TESTING INFRASTRUCTURE

# NIST Medical Device Communication Testing

## Semantic interoperability of Medical Devices

*Test Tool Update*

*HL7 Healthcare Devices WG / IEEE x73 Upper Layers*

*John Garguilo*

*National Institute of Standards and Technology*

*7 May, 2013 – Atlanta, GA*

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**NIST**

National Institute of Standards and Technology

## **NIST MDC Testing Staff**

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- Julien Deshayes (Guest Researcher) – HL7 V2 Tools
- Nicolas Crouzier (GR) - RTMMS
- Jing Gao (GR) – ICSGenerator
- Art Griesser + Michael Faughn (Contractor - *Prometheus Computing, LLC*) – DIM Modeling
- Sandra Martinez → working on MU

## Discussion Topics

- *HL7 V2 (2.6) IHE-PCD Validation Tools*
  - Cycle 7 – 2012-13; Fall/Winter Pre-Connectathon [completed] + Virtual Testing, January/February 2013 Connectathon, March 2013 HIMSS13
  - IHE-PCD Pre-Connectathon, “Isolated Environment”
  - IHE-PCD Connectathon, “Instance Environment”
  - Cycle 8 Enhancements
- Rosetta Terminology Mapping Management System (*RTMMS*) Overview
  - RTMMS Deployment Update and service status
    - IEEE Agreement to make available the “Works” + latest numbers...
- ISO/IEEE 11073 ‘*Domain Information Model Editor*’
  - Progress Updates
  - UML Defined x73 DIM, Activity Diagram, Goals

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# HL7 V2.6 Validation Tooling IHE-PCD Pre-Connectathon Cycle 7

## Semantic interoperability of Medical Devices

*Test Tool Update*

*HL7 Healthcare Dev / IEEE WGs*

*National Institute of Standards and Technology*

*7 May, 2013 – Atlanta, GA*

Contact: [john.garguilo@nist.gov](mailto:john.garguilo@nist.gov), 301-975-5248

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# 2012-13 IHE-PCD Pre-Connectathon Status

- IHE-PCD: NIST “Isolated Environment” Test Tools required
  - HL7 V2.6
  - Supports 6 Integration Profiles (number of test cases)
    - DEC – Device Enterprise Communication (9)
      - SPD – Filter (4)
      - POI – Pulse Ox (3)
    - PIV – Patient Infusion Verification (7)
    - IPEC – Infusion Pump Event Communication (6)
    - IDCO – Implantable Device Cardiac Observation (4)
    - ACM – Alarm Communication Management (1)
    - RDQ – Retrospective Data Query (1)
- 28 Test Cases
- 60+ existing User Accounts
  - In total since tool made available

### Pre-Connectathon + Connectathon Status, Continued

- Cycle 8 - Test Cases being reviewed with IHE-PCD Tuesday calls
- IHE-PCD F2F – week of April 15<sup>th</sup> in San Diego at WHI
  - Notable: Alarm Comm Mgmt → Alert Comm Mgmt
- CPs documented and submitted
- Roadmap of activities updated... see PCD wiki
- JG + JR addressing revisions to TF Vol II

# IHE-PCD 2012/13 Pre-Connectathon + Connectathon

## NIST Testing Support

The NIST V2 (2.6) Tools perform the following validation:

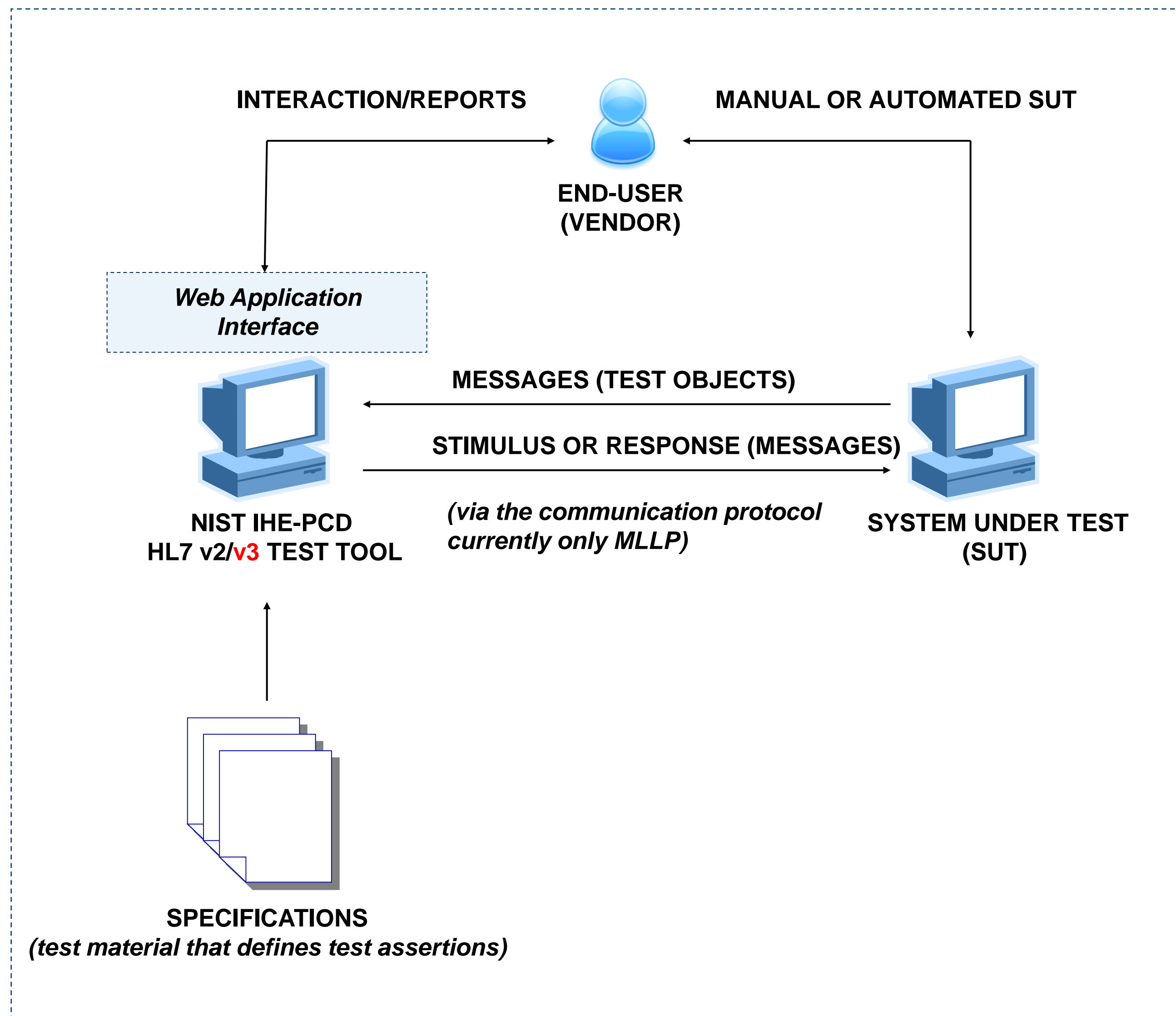
- Syntax and Semantic Content Validation
  - Against IHE-PCD Technical Frameworks/Supplements (e.g., PCD-01, Communicate Device Data)
  - Against HL7 conformance profile
  - Against HL7 and/or user [local] provided tables
    - Example of user provided table is RTM for Ref\_IDs, Units, etc.
  - Against ‘validation context’, including specific values
    - Defined in XML (e.g., specific test case values)

# Testing Environments

- Instance Testing
  - Conformance (e.g., against HL7 2.x or CDA)
    - Test object conforms to specification on which it is based
    - IHE Model: ~*Virtual and Pre-Connectathon*
    - NIST IHE-PCD v2 Message Validation Test Tool
- Isolated System Testing
  - Includes *Instance Testing Activities*
  - Protocol Conformance
  - Functional Behavior Conformance
    - Features and operational behavior correspond to specifications
    - IHE Model: ~*Virtual and Pre-Connectathon*
    - NIST IHE-PCD v2 Test Tool
- Peer-to-Peer System Testing
  - Includes *Isolated System Testing Activities*
  - Interoperability Testing
    - Testing complete application environment
    - May include interacting with Database, using Network Communications, or interacting with other hardware, applications, or systems if appropriate
    - IHE Model: ~*Connectathon*



# NIST V2 HL7 IHE-PCD Test Tool: Operational Process



**V3 – Future Work**

# IHE-PCD Cycle 7 2012-13 Pre-Connectathon Test Result Statistics – Organizations and Tests Executed

- Total Organizations (by User Accounts): 19
  - Total Organizations (by \*unique Company Name): 12
- \*Org No. followed by dash indicates more than one account from same organization in following slide

Registered (stored) at NIST site (over Pre-Con 2012-13 cycle)

- Total number of Tests Executed:82
  - Total Number of Tests Passed: 81
  - Total Number of Tests Failed: 1

Connectathon Test Monitors for IHE-PCD (North America @ Chicago, Jan 2013)

- Garguilo, Martinez, Deshayes, Crouzier

# IHE-PCD Cycle 7 2012-13 Pre-Connectathon Test Result Statistics – by Actor

(does not include supportive role participants – recorded /committed on NIST site)

Organization running DEC Reporter: 16

Organization running DEC Consumer: 1 (1 Test Case) – OZ Systems

Organization running DEC Filter: 1 (1 Test Case) – B Braun

Organization running PIV Programmer: 0

Organization running PIV Consumer: 5

Organization running ACM Reporter: 6

Organization running ACM Manager: 1 (1 Test Case) – Philips Medical

Organization running ACM Archiver: 0 (out of scope 2012-13)

Organization running IDCO Reporter: 0

Organization running IDCO Consumer: 0

Organization running IPEC Reporter: 4

Organization running IPEC Consumer: 0

Organization running RDQ Reporter: 0

Organization running RDQ Consumer: 0

Organizations running DEC Option POI: 1 (3 Test Cases) - Massimo

## HL7 V2 Tool Updates (post cycle 7 test events)

- Version / Release now shown on tool
- Needs to be added (see example slide below)
- Maintain (test management) data from test events
  - E.g., 2012, 2013, etc.
  - Not an executable site (yet!) – just results data + reports
- Documentation Tab (see coming slides)
  - Conformance Profile Tab
  - Patient Demographics
  - IDCO Patient Demographics
  - PIV Drugs
  - Other Drug Libraries tab?
  - Way to upload libraries + demographics (future) – incorporated [automatically] into validation context files used by tooling

# HL7 V2 Tool Updates (post cycle 7 test events)

- Current Version / Release Notes
  - Needs to be added – to be added soon...
  - Example shown from MU Lab Reporting Interface Tool

## ▼ Release Notes

◇Release	◇Date	◇Notes
1.3.0	04/26/2013	<a href="#">LRI_Release_Notes.1.3.0.docx</a>
1.2.0	03/22/2013	<a href="#">LRI_Release_Notes.1.2.0.docx</a>
1.1.0	02/15/2013	<a href="#">LRI_Release_Notes.1.1.0.docx</a>
1.0.0	12/15/2012	Initial Release



### Deployment Information

Update Date: 04/26/2013

Version: 1.3.0

### Browsers Supported

IE 8, IE 9, Firefox 3.x, Chrome

Recommended Browsers: IE 9, Firefox, Chrome

### External Links

[Disclaimer](#)

[Privacy/Policy](#)

[Website Administrator](#)



# HL7 V2 Tool Updates (post cycle 7 test events)

- Documentation Tab
  - Conformance Profiles

The screenshot shows the IHE-PCD Connectathon 2013 Test-Tool website. The main navigation bar includes: Overview, Test Cases Index, Test Cases Validator, Documentation (selected), Profile Viewer, and Contact us. Below this, a secondary navigation bar has: Conformance profiles (selected), Patient Demographics, IDCO Patient Demographic, and PIV Drugs. The main content area contains a text box stating: "The following table contains NIST documentation for the PCD Validation Tool". Below this is a table with two columns: Resource and Link.

Resource	Link
IHE PCD Technical framework	<a href="http://www.ihe.net/Technical_Framework/index.cfm#pcd">http://www.ihe.net/Technical_Framework/index.cfm#pcd</a>
HL7	<a href="http://www.hl7.org">http://www.hl7.org</a>

Below the table is a section titled "PCD v2 Conformance profiles" with a list of profiles:

- [PCD01 ORU R01 / PCD01 ACK R01](#)
- [PCD02 QSB Z02 / PCD02 ACK Z02](#)
- [PCD03 RGV O15 / PCD03 ACK O15](#)
- [PCD03 RRG O16 / PCD03 ACK O16](#)
- [PCD04 ORU R40 / PCD04 ACK R40](#)

# HL7 V2 Tool Updates (post cycle 7 test events)

- Documentation Tab
  - Patient Demographics

## IHE-PCD Connectathon 2013 Test-Tool

Overview Test Cases Index Test Cases Validator Documentation Profile Viewer Contact us

Conformance profiles Patient Demographics IDCO Patient Demographic PIV Drugs

MRN (Namespace)	First Name	Last Name	Sex	DOB	Location (Point of Care, Room-Bed)	Mother's Maiden Name	Address	City	Postal Code
<b>Patients for single PCD system</b>									
HO2009001	Albert	Hon	M	19610101	HO Surgery, OR-1	Adams	15 N Saguaro	Tucson	85701
HO2009002	Charles	Hon	M	19610201	HO Surgery, OR-2	Brooks	3015 E Sagebrush	Tucson	85712
HO2009003	Amy	Hon	F	19610301	HO 3 West ICU, 10-1	Coburn	5615 S Palo Verde	Tucson	85706
HO2009004	Carrie	Hon	F	19610401	HO 3 West ICU, 10-2	Davidson	515 W Cholla	Tucson	85719
2010001	Albert	Smith	M	19610101	Surgery, OR-3	Adams	60 N Saguaro	Tucson	85701
2010002	Charles	Smith	M	19610201	Surgery, OR-4	Brooks	3060 E Sagebrush	Tucson	85712

# HL7 V2 Tool Updates (post cycle 7 test events)

- Documentation Tab
  - IDCO Patient Demographics

**IHE-PCD Connectathon 2013 Test-Tool**

Overview Test Cases Index Test Cases Validator **Documentation** Profile Viewer Contact us

Conformance profiles Patient Demographics **IDCO Patient Demographic** PIV Drugs

Sending System Manufacturer	System Identifier	MRN (Namespace)	First Name	Last Name	Sex	DOB	Patient location	C Phy Phy Nu
Biotronik	REPORTER_BIO_EHR_DataSync	BI2009002	Charles	Biotronika	M	19610301	BI ER, 5-2	He #h
Biotronik	REPORTER_BIO_EHR_DataSync	BI2009003	Amy	Biotronika	F	19610401	Cardiac Clinic LA	He #h
Biotronik	REPORTER_BIO_EHR_DataSync	BI2009004	Carrie	Biotronika	U	not known	Cardiac Clinic LA	He #h
Biotronik	REPORTER_BIO_EHR_DataSync	BI2009005	Franz	Biotronika	M	19610201	Home 1	He



# HL7 V2 Tool Updates (post cycle 7 test events)

- Documentation Tab
  - PIV Drugs

## IHE-PCD Connectathon 2013 Test-Tool

Overview Test Cases Index Test Cases Validator Documentation Profile Viewer Contact us

Conformance profiles

Patient Demographics

IDCO Patient Demographic

PIV Drugs

Drugs	Drug ID	Drug Name	Concentration	Dose/Rate	Dosing Unit	Volume to be Infused(mL)
Drug #1	1111	Dextrose 5%	50 gm/ 1000 mL	500	mL/hr	1000
Drug #2	2222	Dopamine	400 mg / 250 mL	5	mL/hr	250
Drug #3	3333	Heparin	25,000 Units / 500 mL	1200	mL/hr	500
Drug #4	4444	Propofol	1000 mg / 100 mL	50	mL/hr	100
Drug #5	5555	Morphine	100 mg / 100 mL	5	mL/hr	100
Drug #6	6666	Vancomycin	1000 mg / 250 mL	250	mL/hr	200
Drug #7	7777	Nitroglycerin	50 mg / 250 mL	5	mL/hr	250
Drug #8	8888	Ceftriaxone	2 g / 50 mL	100	mL/hr	50

- Profile Viewer

**IHE-PCD Connectathon 2013 Test-Tool**

Overview Test Cases Index Test Cases Validator Documentation **Profile Viewer** Contact us

**G** Group **S** Segment **F** Field **C** Component **S** Subcomponent

Select Profile: PCD-01 (ORU^R01^ORU R01)

Filter by usage: R,RE,C  All usage

Location	Usage	Cardinality	Data Type	Length	Table	Report
▶ <b>S</b> MSH	R	[1,1]				
▼ <b>G</b> PATIENT_RESULT	R	[1,*]				
▼ <b>G</b> ORDER_OBSERVATION	R	[1,*]				
▼ <b>S</b> OBR	R	[1,1]				
▶ <b>F</b> OBR.2 : Placer Order Number	<b>C</b>	<b>[0,1]</b>	<b>EI</b>	<b>427</b>		
▶ <b>F</b> OBR.3 : Filler Order Number	R	[1,1]	EI	427		
▶ <b>F</b> OBR.4 : Universal Service Identifier	R	[1,1]	CWE	705		
▶ <b>F</b> OBR.7 : Observation Date/Time #	RE	[0,1]	DTM	24		
▶ <b>F</b> OBR.8 : Observation End Date/Time #	RE	[0,1]	DTM	24		

- Need to review/update/synch w/ TF Vols. II + III

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# Rosetta Terminology Mapping Management System - RTMMS

## Semantic interoperability of Medical Devices

*Test Tool Update*

*Joint HL7/IEEE 11073 Healthcare Devices Working Group*

*National Institute of Standards and Technology*

*7 May, 2013 – Atlanta, GA*

Contact: [john.garguilo@nist.gov](mailto:john.garguilo@nist.gov), 301-975-5248

**NIST**

National Institute of Standards and Technology

## RTMMS Overview

- A web application\* that allows vendors and reviewers access, retrieval, and reporting of Rosetta Tables over the internet in conformance to IHE-PCD RTM Profile
- An electronic resource/tool providing the capability of saving data in xml format (as defined by RTM Profile)
- Aids the harmonization process by:
  - Identifying missing terms
  - Automatic generation of the “Harmonized Rosetta Table”
  - Providing latest up-to-date view of hRTM table
- Facilitates the proposal of New Terms to IEEE 11073 Nomenclature standard
- Facilitates Conformance Tooling
  - Message verification and conformance (syntax and semantics)
  - Leading to interoperability...
  - \*developed by and currently hosted at NIST
  - Integrated with ICSGenerator Tool (hRTM also imported into DIM Editor)

### Rosetta Terminology Mapping Data Base

- 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

### X73 Nomenclature DB

- Linked to RTMMS

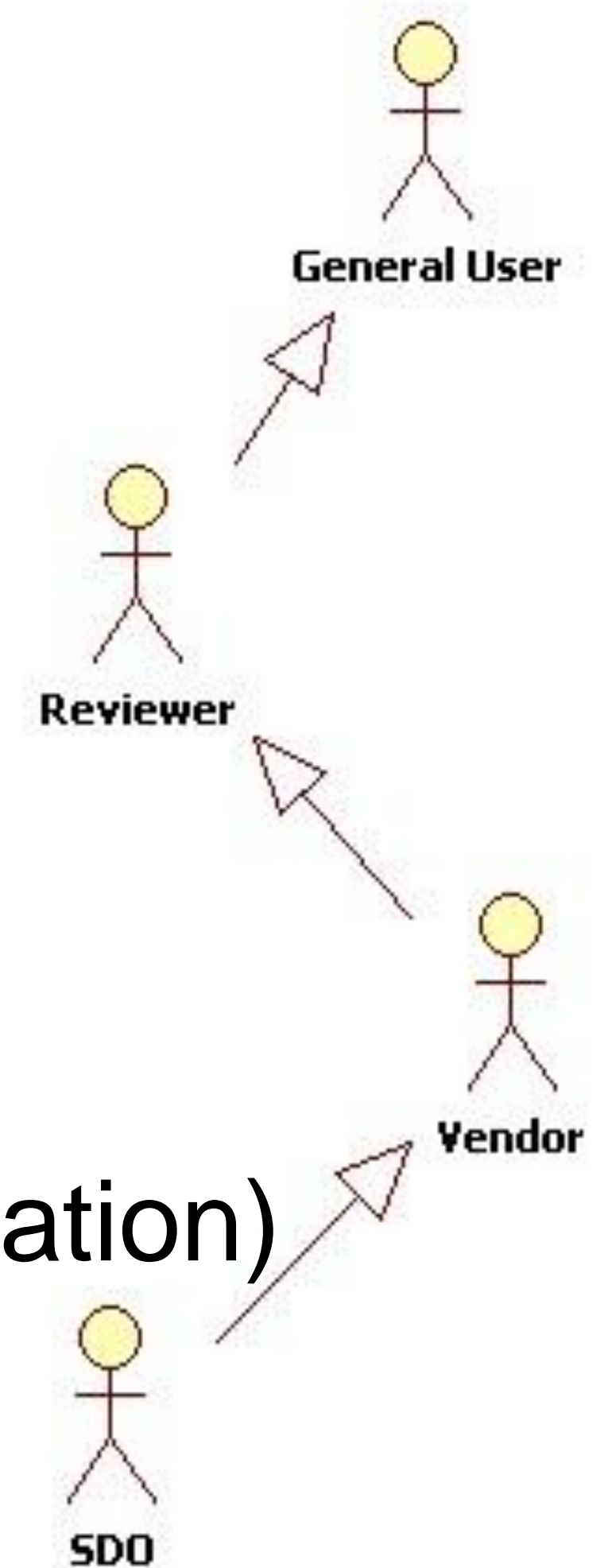
Security DB - Stores users information

## RTMMS Key Features

- Access to NIST IEEE 11073 Nomenclature database
  - Appendix A terms (from ISO/IEEE 11073 10101: Nomenclature)
  - Appendix B terms (from ISO/IEEE 11073 10101: Nomenclature)
  - IDCO terms (ISO/IEEE 11073-10301 – implantable device cardiac)
  - aECG (annotated Electrocardiography)
  - PHD terms (personal health domain)
- Access to RTM database
- Ability to propose terms in Rosetta
- hRTM, units, and enumeration download-able in XML format
- User registration
  - Email confirmation, approval process... controlled through ‘admin’
- Filtering based on regular expressions
- Rosetta validation against hRTM
- Management capabilities for SDO users
- ❖ *Integrated w/ ICSGenerator / exported to ‘DIM Editor’*

# RTMMS Users

- General user
  - Views Rosetta Tables
- Reviewer
  - Participates in discussions
- Contributing Organizations
  - Vendor/Contributer ‘sandbox’
  - Modifies Vendor Rosetta Table
  - Suggests new terms
  - Modifies Units and Enumerations Table
- SDO (Standard Development Organization)
  - Modifies Units and Enumerations Table
  - Register new terms
- Admin
  - Manages User Accounts



# RTMMS (as of 6 May 2013)

- 1587 Rosetta terms
- 644 hRTM terms
- 35 Contributing Organizations now Registered!

Contributing Organization		
<input type="button" value="Edit contributing organization"/> <input type="button" value="+ Add contributing organization"/> <input type="button" value="Delete contributing organization"/> <input type="button" value="Merge two contributing"/>		
CO ID	Suffix	CO Name
DocBox-Inc	DOCBOX	DocBox Inc
Draeger		Draeger-Siemens
Editorial-pss		Editorial additions (Paul Schluter)
Editorial-RTMV		
Elbrys-Networks	ELBRYIS	Elbrys Networks
EPIC	EPIC	EPIC
Eversolve	EVERSOLVE	Eversolve
Fresenius	FRE	Fresenius
GE_Aware	GE	GE (Aware Gateway)
HL7-Hellas	HL7HELLAS	HL7 Hellas
Hospira	HSP	Hospira
IEEE	IEEE	ISO/IEEE 11073-10101 and its extensions
IHE PCD Infusion Pump Work ...	IHEPCDINF	IHE PCD Infusion Pump Work Group
LiveData		LiveData
Mindray	MR	Mindray
Nuvon		Nuvon
OSD_MIL	OSDMIL	OSD MIL
Philips		Philips Healthcare
Shoulders_Corporation	SCO	Shoulders Corporation
Siemens	SI	Siemens
Smiths Medical	SM	Smiths Medical
Spacelabs		Spacelabs Healthcare
STYK		
True Process Inc	TPI	True Process Inc.
VA	VA	Veterans Affairs
VIASYS		Cardinal VIASYS
WelchAllyn		Welch Allyn
West_Health	WH	West Health Institute



# RTMMS Primary Updates

- ✓ Agreement finalized between IEEE and NIST (Dec 2012)
  - Allows users free and public access of terminology attributes that were formally 'pay-for' via the NIST tool
  - The “Works”

## Definition of the “Works” [from IEEE/NIST Agreement]

The following data items within the approved standards , existing and future versions, currently designated as:

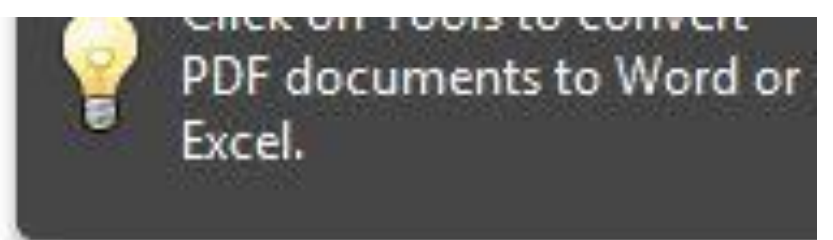
- 1 – IEEE 11073-10xxx
- 2 – IEEE 11073-20xxx

Limited to the following data items within, currently designated as:

- 1 – Ref ID
- 2 – Code
- 3 – Description
- 4 – Systematic Name

- ✓ Revised “term approval” Functionality

# RTMMS Primary Updates – Signed Agreement 12/20/12



For IEEE:  
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WHEREFOR, the signatories below, having signed this License Agreement, attest as to having the authority to enter into this Agreement and, agree to comply with all of the terms and conditions, covenants and obligations contained herein.


## Licensors

  
Signature  
Konstantinos Karachalios  
Name

Managing Director IEEE-SA  
Title

20 Dec 2012  
Date

## Licensee

  
Signature  
Ram D. Sriram  
Name

Division Chief  
Title

12-20-12  
Date

## Revised “term approval” tables/tab

### “New proposed terms” tab (192 rows)

Re-groups all the newly proposed terms with “MDCX\_” prefix

The ‘Assign REFID’ button allows to change the *REFID* from an “MDCX\_” term to a “MDC\_term” (or anything else)

**RTM Management Service**  
In partnership with NIST

sdo (SDO) | User Guide | Preferences | Logout

Home | Contributing Organizations | Rosetta | Rosetta | hRTM | Units | Enumerations | Groups | Contributing Organizations | X73

Term Approval

New proposed terms | Ready to review terms | Mapped terms | Approved terms | Proposed units | Proposed enumerations

Proposed Terms Table

Assign REFID | Download | Search

Group	REFID	CF_COD...	UOM_MDC	UOM_UCUM	CF_UCO...	DIM	Enum_Values
CNS_EVAL_PAIN C...	MDCX_		MDC_DIM_PERCENT	MDC_DIM_D...	% Cel {delta}C...	262688 2...	1 Q Q L3...
GASDLV	MDCX_AIRWAY_PRESS_COMPENSATION_ENA...						TRUE FALSE
CNS_EEG	MDCX_ALARM_LIMIT_EXCEEDED						
GASDLV	MDCX_AUDIO_ALARM_VOLUME_SETTING		MDC_DIM_DECIBEL	dB dB[10.nV]	268576	[Bel]	
GASDLV	MDCX_AUDIO_BATT_VOLUME_SETTING		MDC_DIM_DECIBEL	dB dB[10.nV]	268576	[Bel]	
GASDLV	MDCX_AWAY_CO2_ET_AVG_PERIOD_SETTING		MDC_DIM_BREATH	{breath}	263264	1	
GASDLV	MDCX_BI_PHASE_TIME_HIGH_PSV_SETTING						TRUE FALSE
GASDLV	MDCX_BI_PHASE_TIME_HIGH_SETTING		MDC_DIM_SEC	s	262829		
GASDLV	MDCX_BI_PHASE_TIME_HIGH_TRANS_SYNC...		MDC_DIM_PERCENT	%	262688	1	
GASDLV	MDCX_BI_PHASE_TIME_LOW_SETTING		MDC_DIM_SEC	s	262829		
GASDLV	MDCX_BI_PHASE_TIME_LOW_TRANS_SYNC_P...		MDC_DIM_PERCENT	%	262688	1	

Page 1 of 4 | Displaying terms 1 - 50 of 193

Please select a row to see additional details

# Term Approval, cont.

- “Ready to review terms” tab: 259 rows:
  - Terms with MDC\_ prefix and null or 0 term code
  - The ‘Register’ button allows to register a term (define a Block, partition, code, systematic name etc...) to the x73 database

RTM Management Service  
In partnership with NIST

sdo (SDO) | User Guide | Preferences | Logout

Home | Contributing Organizations | Rosetta | Rosetta | hRTM | Units | Enumerations | Groups | Contributing Organizations | X73

Term Approval

New proposed terms | **Ready to review terms** | Mapped terms | Approved terms | Proposed units | Proposed enumerations

Ready Terms Table

Edit Register Download

Search

REFID	Standard Tbl	Term description	UOM_MDC	UOM_UCUM	CF_UCO...	DIM
IEMO_CALC	A.7.3.1	MDC_ACCELERATION_INDEX				
SYR DS-IP-P...		MDC_ATTR_EVT_COND	Operational eve...			
Γ_WARMER I...	A.7.11.1	MDC_ATTR_PT_WEIGHT_LAST	MDC_DIM_G	g	263872	
ΔN_AR	A.7.4.1	MDC_AWAY_AR	MDC_DIM_PERCENT MDC_DIM_V...	% {vol} kPa m...	262688 2...	1 L3L-3 L...
ΔN_AR	A.7.4.1	MDC_AWAY_AR_EXP	MDC_DIM_PERCENT MDC_DIM_V...	% {vol} kPa m...	262688 2...	1 L3L-3 L...
ΔN_AR	A.7.4.1	MDC_AWAY_AR_INSP	MDC_DIM_PERCENT MDC_DIM_V...	% {vol} kPa m...	262688 2...	1 L3L-3 L...
ΔN_HE	A.7.4.1	MDC_AWAY_HE	MDC_DIM_PERCENT MDC_DIM_V...	% {vol} kPa m...	262688 2...	1 L3L-3 L...
ΔN_HE	A.7.4.1	MDC_AWAY_HE_EXP	MDC_DIM_PERCENT MDC_DIM_V...	% {vol} kPa m...	262688 2...	1 L3L-3 L...
ΔN_HE	A.7.4.1	MDC_AWAY_HE_INSP	MDC_DIM_PERCENT MDC_DIM_V...	% {vol} kPa m...	262688 2...	1 L3L-3 L...
ΔN_N2	A.7.4.1	MDC_AWAY_N2_EXP	MDC_DIM_PERCENT MDC_DIM_V...	% {vol} kPa m...	262688 2...	1 L3L-3 L...
ΔM ΔPT		MDC_BASE_EXCESS_BLD ΔPT INDEX?				

Page 1 of 6 | Displaying terms 1 - 50 of 258

- ✓ These processed terms would become / be added to the harmonized Rosetta terms (hRTM) upon approval by SDO user and balloting

## RTMMS Updates, cont.

- User can now download an HTML version of:
  - “hRTM”
  - “New proposed terms”
  - “New proposed terms” table,
  - Note: hope is users find this version to be easier to work with when working outside the tool
- “Standard Table”
  - A new column “Standard table” is now present in all Rosetta, hRTM and review tables
  - Provides association of the term with corresponding table in the base standard
  - Only the terms given by Jan W. (275) REFIDs are currently linked
  - NIST can add more if community provides the/additional mapped terms.

# Domain Information Model UML / DIM Editor, Progress Update

## Semantic interoperability of Medical Devices

*Test Tool Update – Art Griesser*

*Joint HL7/IEEE 11073 Healthcare Devices Working Group*

*National Institute of Standards and Technology*

*7 May, 2013 – Atlanta, GA*

*Contact: Arthur Griesser, Ph. D. [a.griesser@prometheuscomputing.com](mailto:a.griesser@prometheuscomputing.com), Prometheus Computing, LLC*

- Made UML model from DIM standard
- Made XML Schema from UML model of DIM
- Made web-based editor for DIM data
- Added to DIM UML and web app:
  - RTMMS data
  - Conformance statements
  - Meta-information
- Demonstrated an example (non-DIM) standard derived from a model

- Created interface for DIM section 8
- Finished testing framework document
- Injected additional meta information into UML
  - Encoding values, clause numbers & titles, name binding, registered as, description, update type, attribute id
- Discussed semantics of DIM groups
- Discussed ASN.1 representation of inheritance
- Generated JSON and YAML files of meta-info

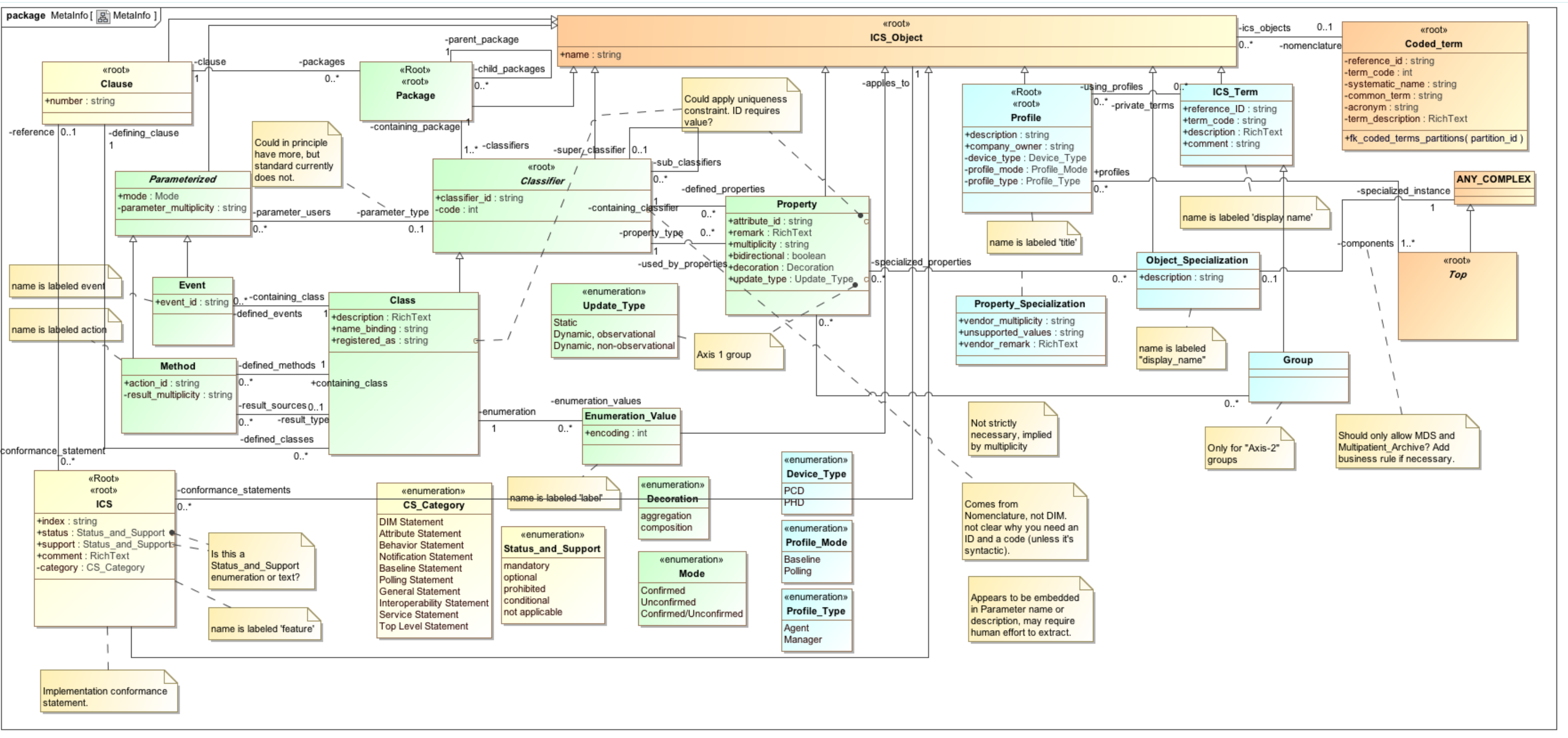


- Created Java code to parse JSON meta-info
- Derived complete ASN.1 schema from UML
- NIST Face-to-Face meeting
  - Created model of goals (next slide)
  - Resolved some questions about UML mappings
- Added tree view of containment to MyDevice
- Reverse engineered UML of NIST XML Schema
- Finished first draft of DIM gap analysis

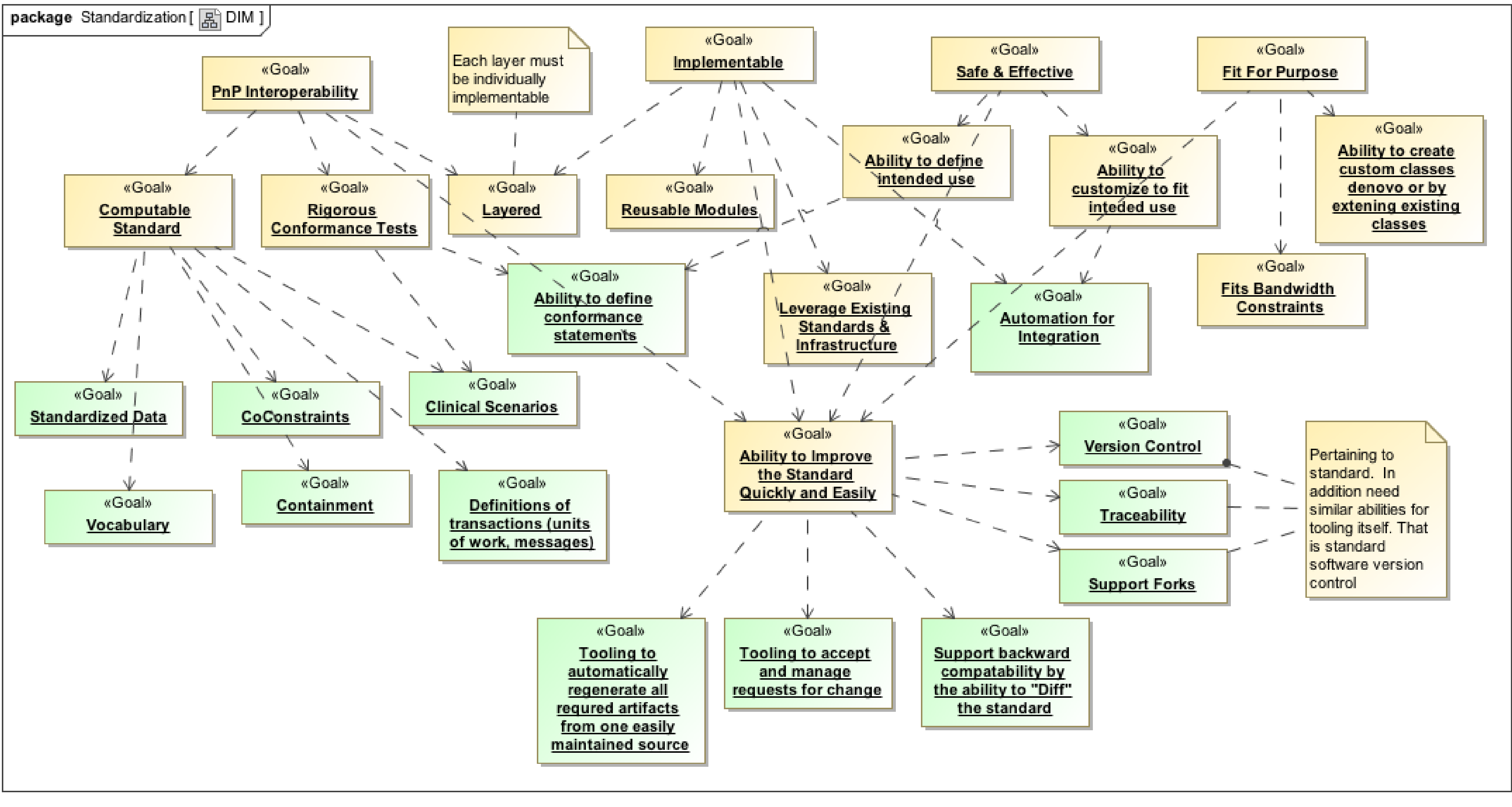
## Progress III

- Determine “Golden Repository”
  - [See Meta Information Management Model](#)
  - [Further progress documentation \(from Jan Wittenber\)](#) in coordination with 11073 work... [discussed earlier @ Spring F2F in April]
- 2-Day F2F Summit at NIST (26-27 March)
  - Project Plan de/revised for DIM work
    - Aimed at scoping logical (and doable tasks based on priorities identified
  - [Summit Outcome Goals](#)
  - [DIM Activity Diagram](#)
- Integrating ICSGenerator into new tooling...
  - Via Cucumber tool / use cases

# Proposed x73 DIM UML (from Art Greisser)



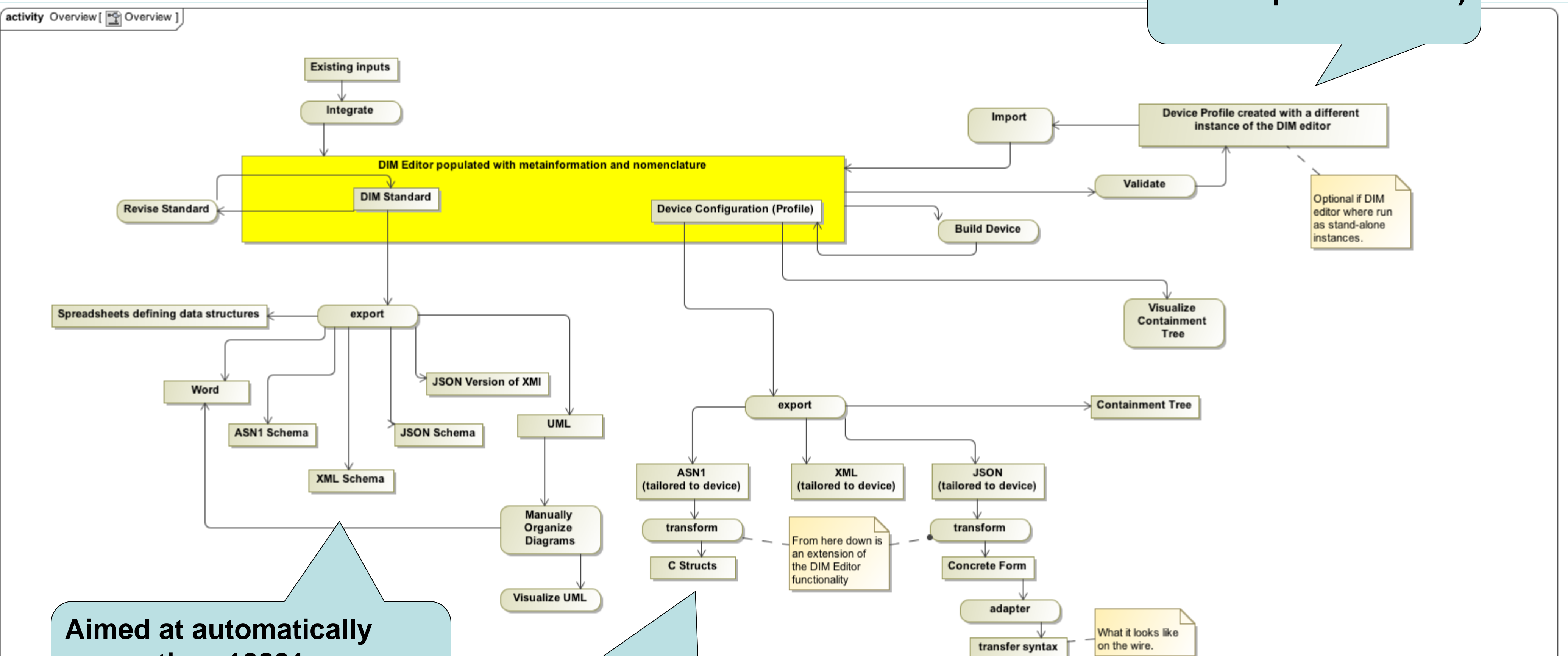
# Goals for DIM – outcome from 2-day Summit @ NIST (March '13)



# Outcomes from 2-day Summit @ NIST (March '13)

- DIM Activity Diagram

Aimed at providing device specializations



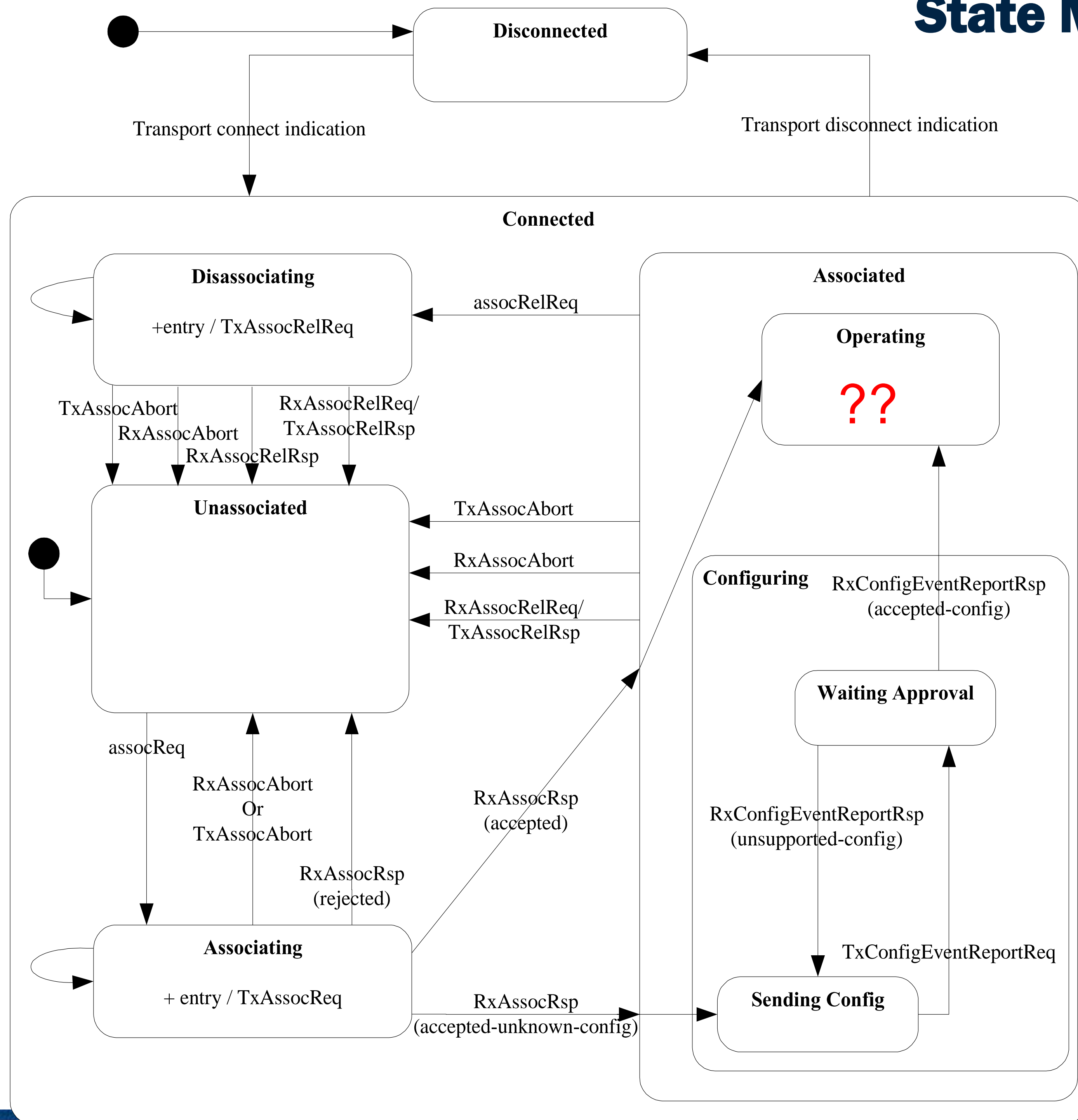
Aimed at automatically generating -10201 + communicating standard

Aimed at providing encodings (directly?) consumable for processing (by device manufactures / vendors)

Aimed at generating messages/PDUs

- Create executable use cases for ICSGenerator
  - Use them to prove MyDevice has all functionality
- Normative text
  - Extract from DIM standard
  - Inject into UML
  - Use to generate next version standard from UML
- Possibility of describing operational state

# State Machine



# Open Questions (from Action item list of January 2013)

From Monday, May 6, 2013:

- Art --> what's the status of DIM UML --> generation of standard 10202?
  - Inject into Word Doc (Todd has example)
  - Tied to IEEE new publications formats as identified
- 10202 (electronic version of DIM): Equivalent XML (withdrawn)
  - New Par: UML + Companion Standards for syntactic representations (e.g., XML, JSON) + automated tooling(?)
  - Jan noted current “open window” w/in IEEE publication (e.g., repository IEEE is looking at to facilitate this kind of publication process...)
- Tiger Team
  - Art work w/ IEEE (Kathryn + Dom Messina(?))
  - Get Todd’s example (word doc infusion)



# **NIST MDC Testing Project Web Sites**

- **Project Web site:** [www.nist.gov/medicaldevices](http://www.nist.gov/medicaldevices)
- **NIST HL7 V2 Test Tooling Web sites:**
  - **IHE-PCD Pre-Connectathon:**  
<http://hit-testing.nist.gov:13100/PCD-HL7WebPreCon/>
  - **IHE-PCD Connectathon:**  
<http://hit-testing.nist.gov:13100/PCD-HL7WebCon/>
- **NIST Medical Device Terminology Service:**
  - **Rosetta Terminology Mapping Management System (RTMMS):**  
<http://hit-testing.nist.gov:13110/rtmms/>
- **NIST Implementation Conformance Statement Generator (ICSGenerator):**
  - [http://hit-testing.nist.gov/medicaldevices/ICSGenerator/ics\\_download.html](http://hit-testing.nist.gov/medicaldevices/ICSGenerator/ics_download.html)