HL7/Healthcare Devices WG  
(Orlando, Florida)

NIST Tooling Activities

National Institute of  
Standards and Technology  
U.S. Department of Commerce

John Garguilo and Sandra Martinez  
16-19 May, 2011
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
HL7 / Healthcare Devices WG  
(Orlando, Florida)

NIST Tooling: HL7 V2.6 Test Tool  
For Cycle 6 (2011-12)

17 May, 2011
Our Team and Project Web Sites...

Contacts

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• Sandra Martinez (sandra.martinez@nist.gov)

Tools and Project Sites

• NIST’s IHE-PCD HL7 V2
• Pre-Connectathon

Coming in August...

• Connectathon Web site: http://xreg2.nist.gov:8080/PCD-HL7WebCon/
• MDC Testing Web site: www.nist.gov/medicaldevices
NIST Supported Test Tools
Overview/Status Update

- HL7 V2 Validation (IHE-PCD)
  - Instance-type Environment (at message level)

- Cycle 6 (2011-12)
  - Isolated-type Environment
  - Scenario based
  - Actor centric
  - One System Under Test (SUT)

- RTMMS – Rosetta Terminology Mapping Management System
  - No version available to public – yet...

- ICSGenerator (ICS = Implementation Conformance Statement)
  - ISO/IEEE 11073 device specialization/profile builder
    - Private Term implementation considerations being added to tool

- What’s still needed
  - Envelope/Message wrappers (WS, SOAP, SAML?) validation
  - Web Services
HL7 v2 Transaction Validation Process

- **HL7 v2 Syntax Validation**
  - Ensure the message structure is valid with respect to the HL7 v2 message definition and the HL7 v2 conformance profile.
  - Ensure that the conformance requirements such as usage, cardinality, data type usage, etc. are valid with respect to the standard and the HL7 v2 conformance profile that constrains the message, in accordance with the IHE technical framework for a given transaction.

- **Value Set Semantic Validation**
  - Ensure that elements that refer to a table are valid with respect to the value set it references. The value set is given by the HL7 v2 standard or as constrained by the IHE technical framework. An example includes confirming that the administrative sex element (PID.8) of the PID segment contains a value that is given in the HL7 v2 Administrative Sex table (HL70001).
  - Identify conformance violations of constraints implied by the IHE Integration Profile. These constraints are captured in a validation context file. An example of such a test includes an element that is fixed in the IHE integration profile (e.g., RCP.1 = I).

- **Terminology (and associated co-constraints) Semantic Validation (see RTM)**

- **Test Case Specific Validation**
  - Verify element content against a validation context file that captures test values as defined in the Pre-Connectathon test cases.

- **NEXT: HL7 v2 MLLP Validation**
  - Ensure the message is valid with respect to the HL7 v2 MLLP specification for wrapping and unwrapping HL7 v2 messages. This is an implied test.
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

*NIST HIT Test Infrastructure*
Conformance Testing of an HL7 V2 Message

Test Artifacts
- Conformance Profile
- HL7 Tables
- ‘Device’ Test Agents
- ISO/IEEE 11073/Rosetta Terminology

Instance System Test Environment
IHE-PCD Pre- and -Connectathon Tool
http://xreg2.nist.gov:8080/PCD-HL7WebCon/

Select the IHE profile, the actor and the transaction corresponding to the message to validate (required)

- **IHE Profile**
  - DEC
  - DEC SPD option
  - PIV
  - ACM
  - IDCO

- **Sending Actor**
  - DOR
  - DOC

- **Transaction**
  - PCD-01 (ORU^R01^ORU_R01)

Select the test case corresponding to the message to validate (required)

- **Connection Test Case**
  - DEC_DOR_DOC_One_Patient
  - NIST_DEC_DOR_Standalone_DOFD

- **Step**
  - 1

- **Test Case Description**
  - **Id:** DEC_DOR_DOC_One_Patient
  - **Title:** DEC DOR DOC One Patient (60001)
  - **Steps:**
    1. DOR sends data for patient in table 2010927
    2. DOC responds with ACK message (MSA-1 = "AA")

Select the message to validate (required)

- **Browse for a message:**
- **Or Paste a message:**
  ```plaintext
  MSH|~\6|NIST-Sender\001221000000000|EUI-64|DOR\NIST-
  Receiver\DOC\20061215111821-0600\ORU\R01\ORU\R01\36|P|2
  .5\1\NE\AL\ASC\EN\English\ISO659\IHE PCD CR-U-R01
  2006\HL7\2.16.840.1.13863.9.n\m\HL7
  PID\1\182009001\\~\NIST\P\1\2\Albert\\~\L\19610101\M\1
  ```
Validation Report (Example)

Test Result: Invalid Message (Errors: 4)

Validation Parameters

<table>
<thead>
<tr>
<th>Profile</th>
<th>DEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actor</td>
<td>DOR</td>
</tr>
<tr>
<td>Transaction</td>
<td>PCD-01(ORU*ORU_R01</td>
</tr>
<tr>
<td>Test Case</td>
<td>DEC_DOR_DOC_One_Patient (Step 1)</td>
</tr>
</tbody>
</table>

IHE Supplement Syntax Validation Report

Summary

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Errors</td>
<td>2</td>
</tr>
<tr>
<td>Warnings</td>
<td>0</td>
</tr>
<tr>
<td>Alerts</td>
<td>0</td>
</tr>
</tbody>
</table>

Validation Errors

<table>
<thead>
<tr>
<th>Error Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Type: Message Structure</td>
</tr>
<tr>
<td>Description: The line &quot; is not a valid segment This is a severe failure and validation has been terminated.</td>
</tr>
<tr>
<td>Location:</td>
</tr>
<tr>
<td>Line: 20</td>
</tr>
<tr>
<td>Column: 1</td>
</tr>
<tr>
<td>2 Type: Message Structure</td>
</tr>
<tr>
<td>Description: The line 'Example 2' is not a valid segment This is a severe failure and validation has been terminated.</td>
</tr>
<tr>
<td>Location:</td>
</tr>
<tr>
<td>Line: 21</td>
</tr>
<tr>
<td>Column: 1</td>
</tr>
</tbody>
</table>
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
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  - 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**

Services

- HL7 V2 Message Validation
- IHE-PCD DOC Test Agent
- IHE-PCD IOC Test Agent
- IHE-PCD AM Test Agent
- IHE-PCD IDCC Test Agent

Test Artifacts

- Conformance Profiles
- HL7 Tables
- Validation Context Files
- Generation Context Files

**IHE-PCD Client Test Scenario**

- IHE-PCD DOR/DOF Test Agent
- IHE-PCD IOR Test Agent
- IHE-PCD AR Test Agent
- IHE-PCD IDCR Test Agent

**Test Execution**

- Test Harness (Java Code)

**Test Management**

- Web Application Client
  - Results HL7 V2 Message Validation Reports

**Router/Logger/Proxy**

- System Under Test

**Vendor**

**Isolated System Test Environment**
Isolated / Scenario Testing

- Demonstration of DOC and DOR Test Agents
Welcome to the Integrating the Healthcare Enterprise (IHE) Patient Care Device (PCD) 2011 Cycle Pre-Connectathon Test Tool.

This tool was developed by the National Institute of Standards and Technology (NIST) to support testing of the IHE PCD Pre-Connectathon Test Cases for Health Level 7 (HL7) Version 2 (v2).

User registration is not required; you can use the tool as a “guest” user. However, registration is required to save and submit test reports to your Pre-Connectathon project manager. Click on “Register” in the upper-right corner of this page for self-registration.
IHE-PCD HL7 V2 Isolated Test Tool
Select Version and Actor
IHE-PCD HL7 V2 Isolated Test Tool
DOR – select test case

Select an actor to view the list of available Test Cases

HL7 Version: v2  Actors: IHE DEC Reporter

Test Cases

- DEC_DOR_DOC_One_Patient_(60001)
- NIST_DEC_DOR_Standalone_DOF_DOC_One_to_One_Communication_(60003)
IHE-PCD HL7 V2 Isolated Test Tool
Test Case and Step Descriptions

**Test Case Information**

**Pre-condition:**
None.

**Description:**
The purpose of this test is to check that your DEC Reporter can send a valid message (ORU^R01).
Information for the patient are taken from table 2010927. Upon receipt of the message, the NIST DEC Consumer validates the message and sends an acknowledgment back to your DEC Reporter.

**Test Steps Description:**
Step 1: PCD-01 (ORU^R01^ORU_R01)
DEC sends data for patient in table 2010927

**Test Steps Information**

<table>
<thead>
<tr>
<th>Order Actor</th>
<th>Description</th>
<th>Example of Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IHE DEC Reporter</td>
<td>Sends a valid message (ORU^R01) to the NIST DEC Consumer</td>
</tr>
</tbody>
</table>
IHE-PCD HL7 V2 Isolated Test Tool Configuration

Select an actor to view the list of available Test Cases.

- HL7 Version: V2
- Actors: NIST DEC Reporter

**Test Case Information**

- **Pre-condition:** None
- **Description:** The purpose of this test is to validate the message.

**Test Steps Description**

- **Step 1:** PCD-01 (ORU^R01)
- **DOR sends data for patient in table 200000**

**Test Steps Information**

<table>
<thead>
<tr>
<th>Order</th>
<th>Actor</th>
<th>Description</th>
<th>Example of Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NIST DEC Reporter</td>
<td>Sends a valid message (ORU^R01) to the NIST DEC Consumer</td>
<td></td>
</tr>
</tbody>
</table>

**NIST Responder Configuration Information**

- **Use the following configuration information:**
- **Application Name:** NISTManager_ADMIN
- **Facility Name:** NIST
- **IP Address:** 128.8.24.143
- **Port Number:** E7 Message (Non Secure: 9080)

**Configuration Information**

- **START TEST**
IHE-PCD HL7 V2 Isolated Test Tool
Waiting for DOR/SUT...
IHE-PCD HL7 V2 Isolated Test Tool
Parse ORU^R01; Send ACK^R01

DEC_DOR_DOC_One_Patient_(60001) Test

Transactions and Results

<table>
<thead>
<tr>
<th>Order</th>
<th>Actor</th>
<th>Description</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IHE DEC Reporter</td>
<td>Sends a valid message (ORU^R01) to the NIST DEC Consumer</td>
<td>Waiting...</td>
</tr>
</tbody>
</table>

Console Log

5/13/11 10:13:24 AM - Test: DEC_DOR_DOC_One_Patient_(60001), Step: 1
5/13/11 10:18:24 AM - Waiting for message...
5/13/11 10:18:43 AM - message received from TF
5/13/11 10:18:43 AM - incoming message received from NIST_DEC_Prober 0012210000000001 EUI-64 / NIST

5/13/11 10:18:50 AM - Html report creation: started
5/13/11 10:18:50 AM - Html report creation: finished
5/13/11 10:18:52 AM - Waiting for message...
5/13/11 10:18:53 AM - message received from TF
5/13/11 10:18:53 AM - incoming message received from NISTManager_ADMIN / NIST
IHE-PCD HL7 V2 Isolated Test Tool

Transaction Processing, with result

Failed with 2 error(s)

Test summary
IHE-PCD HL7 V2 Isolated Test Tool
Test Result Summary

IHE Supplement Syntax Validation Report

Summary

<table>
<thead>
<tr>
<th>Errors</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warnings</td>
<td>0</td>
</tr>
</tbody>
</table>
### IHE Supplement Syntax Validation Report

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usage</td>
<td>\texttt{OBX[1..1] is missing}</td>
<td>Line: 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Column: 41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Path: \texttt{OBX[1..1]}</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Segment: OBX</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Field: Observation Sub-ID</td>
</tr>
</tbody>
</table>

### IHE Supplement Semantic Validation Report

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The specified message element match location does not map to a message element. The data value at the specified match location can't be evaluated. Refine the message element match location. The provided path expression is: \texttt{OBX[8..112]}.</td>
<td></td>
</tr>
</tbody>
</table>

### hRTM Validation Report

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>\texttt{OBX[8..112]} = pump-mode-nominal; pump-mode-drug-dosing; pump-mode-ramp-taper; pump-mode-multi-step; pump-mode-multi-dosing; pump-mode-bolus; pump-mode-loading-dose; pump-mode-multi-channel; pump-mode-pca; pump-mode-continuous; pump-mode-pca-and-continuous; pump-mode-piggyback; pump-mode-concurrent</td>
</tr>
</tbody>
</table>
### hRTM Validation Report

<table>
<thead>
<tr>
<th>Summary</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Errors</td>
<td>0</td>
</tr>
<tr>
<td>Warnings</td>
<td>0</td>
</tr>
<tr>
<td>Alerts</td>
<td>1</td>
</tr>
</tbody>
</table>

#### Validation Alert

<table>
<thead>
<tr>
<th>Alert Details</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Message Validation Context</td>
</tr>
<tr>
<td>Description</td>
<td>The specified message element match location does not map to a message element. The data value at the specified match location cannot be evaluated. Refine the message element match location. The provided path expression is <code>OB[8].5[1]2</code></td>
</tr>
<tr>
<td>Location</td>
<td>Path: <code>OB[8].5[1]2</code></td>
</tr>
<tr>
<td>Assertion</td>
<td><code>OB[8].5[1]2 = pump-mode-nominal; pump-mode-drug-dosing; pump-mode-ramp-taper; pump-mode-multi-step; pump-mode-multi-dosing; pump-mode-bolus; pump-mode-loading-dose; pump-mode-multi-channel; pump-mode-pca; pump-mode-continuous; pump-mode-pca-and-continuous; pump-mode-piggyback; pump-mode-concurrent</code></td>
</tr>
</tbody>
</table>

### Test Case Specific Validation Report

<table>
<thead>
<tr>
<th>Summary</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Errors</td>
<td>1</td>
</tr>
<tr>
<td>Warnings</td>
<td>0</td>
</tr>
<tr>
<td>Alerts</td>
<td>0</td>
</tr>
</tbody>
</table>

#### Validation Errors

<table>
<thead>
<tr>
<th>Error Details</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Data</td>
</tr>
<tr>
<td>Description</td>
<td><code>H02000001; H02000002; H02000003; H02000004; 2010001; 2010002; 2010003; 2010004; H0201001; H0201002; H0201003; H0201004; 201001; 2011001; 2011002; 2011003; 2011004; H0201001; H0201002; H0201003; H0201004; 2012001; 2012002; 2012003; 2012004; 2013001; 2013002; 2013003; 2013004; 2013001 has not been found in the message at the location PID[1].1</code></td>
</tr>
</tbody>
</table>
IHE-PCD HL7 V2 Isolated Test Tool Submit Report (to Test Management)
IHE-PCD HL7 V2 Isolated Test Tool
Test Management – Vendor Dashboard

### Vendors Management

<table>
<thead>
<tr>
<th>Id</th>
<th>Username</th>
<th>First name</th>
<th>Last name</th>
<th>Organization name</th>
<th>Email</th>
<th>Role</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>08</td>
<td>afarid</td>
<td>Afghan</td>
<td>Harold</td>
<td>NIST</td>
<td><a href="mailto:afarid@nist.gov">afarid@nist.gov</a></td>
<td>User</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>bobvendo</td>
<td>Vendor</td>
<td>Bob</td>
<td>Imaginary Systems Inc.</td>
<td><a href="mailto:bob.vendor@imaginary.com">bob.vendor@imaginary.com</a></td>
<td>User</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>caro</td>
<td>Caroline</td>
<td>Rosin</td>
<td>NIST</td>
<td><a href="mailto:caroline.rosin@nist.gov">caroline.rosin@nist.gov</a></td>
<td>User</td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>croxin</td>
<td>Caroline</td>
<td>Rosin</td>
<td>NIST</td>
<td><a href="mailto:caroline.rosin@nist.gov">caroline.rosin@nist.gov</a></td>
<td>User</td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>dummyVend</td>
<td>DummyCaro</td>
<td>DummyCaro</td>
<td>DummyOrg</td>
<td><a href="mailto:rosin@evn.net">rosin@evn.net</a></td>
<td>User</td>
<td></td>
</tr>
<tr>
<td>59</td>
<td>OSYD</td>
<td>Syd</td>
<td>Dammy</td>
<td>NIST</td>
<td><a href="mailto:sydney.bernard@gmail.com">sydney.bernard@gmail.com</a></td>
<td>User</td>
<td></td>
</tr>
<tr>
<td>83</td>
<td>haro</td>
<td>Harold</td>
<td>AFFO</td>
<td>NIST</td>
<td><a href="mailto:affokerold@yahoo.fr">affokerold@yahoo.fr</a></td>
<td>Manager</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>nett</td>
<td>NIST</td>
<td>NIST</td>
<td>NIST</td>
<td><a href="mailto:nett@nist.gov">nett@nist.gov</a></td>
<td>User</td>
<td></td>
</tr>
<tr>
<td>59</td>
<td>NISTRob</td>
<td>Rob</td>
<td>Steven</td>
<td>NIST</td>
<td><a href="mailto:nett@nist.gov">nett@nist.gov</a></td>
<td>User</td>
<td></td>
</tr>
<tr>
<td>53</td>
<td>sarneglia</td>
<td>Cornelia</td>
<td>Susan</td>
<td>Booz Allen</td>
<td><a href="mailto:sarneglia_susan@booz.com">sarneglia_susan@booz.com</a></td>
<td>User</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>sydney</td>
<td>H</td>
<td>Sydney</td>
<td>NIST</td>
<td><a href="mailto:sydney.bernard@nist.gov">sydney.bernard@nist.gov</a></td>
<td>User</td>
<td></td>
</tr>
<tr>
<td>57</td>
<td>test</td>
<td>Linan</td>
<td>Wang</td>
<td>NIST</td>
<td><a href="mailto:linan.wang@nist.gov">linan.wang@nist.gov</a></td>
<td>User</td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>toto11</td>
<td>toto</td>
<td>toto</td>
<td>toto</td>
<td><a href="mailto:toto@yahoo.fr">toto@yahoo.fr</a></td>
<td>User</td>
<td></td>
</tr>
<tr>
<td>56</td>
<td>toto12</td>
<td>toto</td>
<td>toto</td>
<td>toto</td>
<td><a href="mailto:affokerold@yahoo.com">affokerold@yahoo.com</a></td>
<td>User</td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>Vendor</td>
<td>Vendor</td>
<td>Susan</td>
<td>Booz Allen</td>
<td><a href="mailto:susan.sarneglia@gmail.com">susan.sarneglia@gmail.com</a></td>
<td>User</td>
<td></td>
</tr>
</tbody>
</table>

### TestCases Management

- [Load Test Cases]
- [Edit Test From UI]
- [Add Test From UI]
Validation Report for message ORU_R01

### IHE Supplement Syntax Validation Report

<table>
<thead>
<tr>
<th>Summary</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Errors</td>
<td>1</td>
</tr>
<tr>
<td>Warnings</td>
<td>0</td>
</tr>
<tr>
<td>Alerts</td>
<td>0</td>
</tr>
</tbody>
</table>

#### Validation Errors

<table>
<thead>
<tr>
<th>Error Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> Type: Usage</td>
</tr>
<tr>
<td>Description: OBX[1].4[1] is missing</td>
</tr>
<tr>
<td>Location: Line: 4</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

### IHE Supplement Semantic Validation Report

<table>
<thead>
<tr>
<th>Summary</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Errors</td>
<td>0</td>
</tr>
<tr>
<td>Warnings</td>
<td>0</td>
</tr>
<tr>
<td>Alerts</td>
<td>0</td>
</tr>
</tbody>
</table>

### nRTM Validation Report

<table>
<thead>
<tr>
<th>Summary</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Errors</td>
<td>0</td>
</tr>
<tr>
<td>Warnings</td>
<td>0</td>
</tr>
<tr>
<td>Alerts</td>
<td>0</td>
</tr>
</tbody>
</table>

### Validation Alert

<table>
<thead>
<tr>
<th>Alert Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> Type: Message Validation Context</td>
</tr>
<tr>
<td>Description: The specified message element match location does not map to a message element. The data value at the specified match location can't be evaluated. Refine the message element match location. The provided path expression is &quot;OBX[1].2&quot;.</td>
</tr>
<tr>
<td>Location: Path: OBX[1].2</td>
</tr>
</tbody>
</table>
## Validation Report

### IHE-PCD HL7 V2 Isolated Test Tool Validation Report, Cont

**Summary**

<table>
<thead>
<tr>
<th>Errors</th>
<th>Warnings</th>
<th>Alerts</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

**Validation Alert**

<table>
<thead>
<tr>
<th>Alert Details</th>
<th>Message Validation Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Type:</td>
<td>Message Validation Context</td>
</tr>
<tr>
<td>Description:</td>
<td>The specified message element match location does not map to a message element. The data value at the specified match location can't be evaluated. Refine the message element match location. The provided path expression is &quot;OBX[8][1:2].&quot;</td>
</tr>
<tr>
<td>Location:</td>
<td>OBX[8][1:2]</td>
</tr>
</tbody>
</table>

### Test Case Specific Validation Report

**Summary**

<table>
<thead>
<tr>
<th>Errors</th>
<th>Warnings</th>
<th>Alerts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Validation Errors**

<table>
<thead>
<tr>
<th>Error Details</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Type:</td>
<td>Data</td>
</tr>
<tr>
<td>Description:</td>
<td>HO2009001; HO2009002; HO2009003; HO2009004; 2010001; 2010002; 2010003; 2010004; HO2010001; HO2010002; HO2010003; HO2010004; 2011001; 2011002; 2011003; 2011004; 2012001; 2012002; 2012003; HO2012004; 2013001; 2013002; 2013003; 2013004; 2013001; 2013001; 2013001; 2013001; 2013001; 2013001; has not been found in the message at the location &quot;PID[5][1:1].&quot;</td>
</tr>
</tbody>
</table>
IHE-PCD Face-to-Face (Boca Raton, Florida)

“Rosetta Terminology Mapping Management System” (RTMMS)

12 May, 2011
NIST Contacts

- John J. Garguilo
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  john.garguilo@nist.gov

- Sandra Martinez
  301-975-3579
  sandra.martinez@nist.gov

- Isabelle P. Barclay (Guest Researcher)

Project Web site:
www.nist.gov/medicaldevices
Discussion Topics

- Rosetta Terminology Mapping (RTM) Overview
- Rosetta Terminology Mapping Management System (RTMMS) Overview
- RTMMS DEMO
- Issues
  - IEEE copyright issues
    - Against NIST Policy to maintain proprietary data
  - Integration of LOINC Terms
    - We have no documentation on LOINC.
    - Mapping must be provided
  - PHD added new refIds under x73 Alert partition. The term codes assigned to these events are not in within the range specified in the alert block
IHE PCD Profile: RTM Overview

- RTM is an IHE PCD Profile that addresses the problem of medical device semantic interoperability by proposing a mapping to a standard nomenclature.
  - 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

RTMMS Tables

- **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 was developed to support the IHE-PCD Rosetta Terminology Mapping (RTM)

- 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/Appendix.

- 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
RTMMS Users

- **General user**
  - Views Rosetta Tables

- **Reviewer**
  - Participates in discussions

- **Vendor**
  - Modifies Vendor Rosetta Table
  - Suggests new terms

- **SDO (Standard Development Organization)**
  - Modifies Units and Enumerations Table
  - Register new terms

- **Admin**
  - Manages User Accounts

- **Potential IEEE-Member User**
RTMMS Features

- Access to NIST IEEE 11073 Nomenclature database
  - Appendix A terms
  - Appendix B terms
  - IDCO terms
  - PHD terms
- Access to RTM database
- Ability to proposed terms in Rosetta
- hRTM, units and enumeration download in XML format
- User registration
  - Email confirmation, approval...
- Filtering based on regular expressions
- Rosetta validation against hRTM
- Management capabilities for SDO users
RTMMS Updates
(since last F2F in January)

• Integrated PHD nomenclature into the IEEE 11073-10101 NIST Nomenclature database
  – Provided by UL Chair (Jan W.) in January 2011 F2F.
  – PHD nomenclature includes; terms under new PHD partitions, terms already in the nomenclature and new terms under existing x73 nomenclature partitions.
    • New terms under PHD partitions were added to the IEEE 11073-10101 Nomenclature dbase:
      – MDC_PART_PHD_AI (aging independently)
      – MDC_PART_PHD_DM (disease management)
      – MDC_PART_PHD_HF (health and fitness)
    • Terms already in the existing X73 nomenclature partitions
      – Association done using the block and partition id
    • New terms (PHD) under existing X73 nomenclature partitions.
      – These terms are not captured yet we need some clarifications.

  – No association between specialization and terms – RTM dbase and X73 dbase does not handle these associations.
Integrated PHD nomenclature into the IEEE 11073 Nomenclature database (Cont.)

- Need clarification:
  - PHD added new refIds under x73 Alert partition. The term codes assigned to these events are not in within the range specified in the alert block:
    - MDC_PART_EVT
    - MDC_EVT_PEF_MED
    - 21106

<table>
<thead>
<tr>
<th>Description</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alerts/Events(^a)</td>
<td>0000–6600</td>
</tr>
<tr>
<td>Device events</td>
<td>0000–0596</td>
</tr>
<tr>
<td>Pattern events</td>
<td>3072–3294</td>
</tr>
<tr>
<td>Status events</td>
<td>6144–6730</td>
</tr>
<tr>
<td>Private</td>
<td>61440–65535</td>
</tr>
</tbody>
</table>
Ongoing Work

- Implementing Backup cycle

- Developing XML2DB Module
  - Adding Import XML Rosetta Data feature

- Implementing synonym terms
  - Support synonyms in Nomenclature Database
  - Support synonyms in RTM Database

- Adding new data to hRTM table
  - Support Vendor_VMD, and Vendor Description in hRTM
Next Steps

• Update RTMMS database access/update mechanism.
• Add aECG into X73 Nomenclature Dbase.
• Edit hRTM Table
  – Add new entry
  – Edit an entry
  – Deprecate an entry
  – Support multiple versions
  – Ability to set current version to use for validation
• Implement versioning system
• Add logging history capabilities
  – To identify occurred changes, time they were made, users who made them...
Issues

- IEEE copyright issues
  - Against NIST Policy to maintain proprietary data
- Integration of LOINC Terms
  - We have no documentation on LOINC.
  - Mapping must be provided.
IHE-PCD Face-to-Face (Boca Raton, Florida)

“ICSGenerator” (Implementation Conformance Generator)

National Institute of Standards and Technology
U.S. Department of Commerce

12 May, 2011
NIST Contacts

• John J. Garguilo
  301-975-4248
  john.garguilo@nist.gov

• Sandra Martinez
  301-975-3579
  sandra.martinez@nist.gov

• Jing Gao (Guess Researcher)

Project Web site:
  www.nist.gov/medicaldevices
ICSGenerator Overview

ICSGenerator was developed to:

• Support IEEE 11073 Conformance Testing.
  – Generate Implementation Conformance Statements (ICSs)
  – Build Device Profile (XML)
  – Provide validation against DIM Schema
  – Provide high level semantic interoperability

  • Ensures correct containment relationship and terminology at the object class and related attribute, notification, and behavior level
  • Provides access to Rosetta Dbase and X73 dbase
ICSGenerator Next Steps

- Working on the following enhancements:
  - Update ICSGenerator to have access to the latest X73 Nomenclature dbase version (containing IDC, PHD and Appendix B.)
  - Support PHD standards
    - Update specializations with published versions
  - Private Terms support
Private Term Support (Private Term Builder)
Private Term Builder Status

- Developed an initial “Private Term Builder” application (PTB) with the following goals:
  - Capture vendor private terms
  - Associate a private term to an x73 object – facilitating integration to the modeling tool (ICSGenerator)

- Initial PTB application includes the following features:
  - Imbedded database for private term storage.
  - Import/export capabilities in RTM xml formats.
  - Ability to enter vendor ref ids – not in compliance with x73 nomenclature
  - Ability to enter vendor term code – if available, nothing to do with x73 private space.
  - Ability to enter a common name (display name) – vendor name
  - Ability to enter a description for the term

Note: This is a private vendor application, vendor chooses to share terms for harmonization.
## Private Term Builder Status

### Private Terms Builder

<table>
<thead>
<tr>
<th>Group</th>
<th>REFID</th>
<th>Description</th>
<th>Display Name</th>
<th>Vendor ID</th>
<th>Vendor VMD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Refid</td>
<td>Description</td>
<td>Display Name</td>
<td>Vendor ID</td>
<td>Vendor VMD</td>
</tr>
</tbody>
</table>

### Private Term

**Group**

**REFID**

**Description**

**Display Name**

**Vendor ID**

**Vendor VMD**

[OK, Cancel]