

**IHE-PCD , HL7 Dev WG,  
ISO/IEEE 11073,  
*and*  
NIST**

*NIST MDC Test Tooling*

IHE-PCD/HL7/IEEE WG Meetings

January 2011

# Tooling Status/Next Steps

## *ICSGenerator*

- Status
  - Continue improving the user interface.
    - Menu, toolbar and status bar
  - Enumeration values are now accessible from hRTM.
  - Device specializations available as “Dev. Specs.”
    - These are IEEE 11073 or 10xxx published device specializations.
    - NIST will make them available in tool for users to build private device profiles.
    - General users are not allow to change these files.
  - Developed ASN.1 database to enhance the java ASN.1 library.
    - Facilitate debugging and accessibility.
  - Added the capability to select ASN.1 types for private attributes.
  - Added the capability of customize and save a profile unit table.

# Tooling Status/Next Steps

## *ICSGenerator*

- Status
  - Improved management capabilities.
    - ICSGenerator files are now saved in a profile compress file “zip” including;
      - X73 MD xml file (in conformance with the DIM XSchema)
      - Project Information xml File – this file contains project description and additional device information such as units an enumerations.
      - Conformance table files
      - UML diagrams PDF files.
  - Added a device overview panel to capture general device information such as device owner, description, etc.
  - Continue code improvement and enhancement.
    - Major code rewritten in most cases.
    - Project modularization to facilitate future web application and maintenance

# Tooling Status

## ICSGenerator

• User Interface – Version 3.4

• User Interface – Version 3.5

ICS Generator - Baseline Agent: Open Baxter/Colleague

File DIM PHD Tools Help

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

Add Remove Configure Import

General Attribute Behavior Notification

General Information

Object Class(OID-TYPE): MDC\_MOC\_IVMO\_METRIC\_IU Term Code: 6

Object Name: Numeric

Reference: clause 7.3.5

Object Type ID(TYPE): MDC\_CONC\_DRUG Term Code: 26688

Label: Primary Source Fluid Delivery Rate

Edit Unit table Remove selected Unit

DIM	UOM_MDC	UOM_UCUM	Term Code
ML-3	MDC_DIM_MICRO_G_PER_ML	ug/mL	2163
ML-3	MDC_DIM_MILLI_G_PER_ML	mg/mL	2162
ML-3	MDC_DIM_G_PER_ML	g/mL	2144
[U]-3	MDC_DIM_INTL_UNIT_PER_ML	[U]/mL	5600
ML-3	MDC_DIM_MILLI_EQUIV_PER_ML	meq/mL	4882

Support

Restrictions:

Support:  CREATE Service Support  DELETE Service Support

Comments

*It indicates the rate at which infusate is being supplied to the delivery channel by the primary source channel.  
The Context Scanner (static attributes group) and Episodic Scanner (dynamic attributes) provide reporting for object attribute values*

ICS Generator - Device Specialization Help

File Device Specialization Help

Builder Overview Conformance Statements Database UML Diagram Comparison

Add Remove

General Attribute Behavior Notification

General Information

Object Class(OID-TYPE): MDC\_MOC\_IVMO\_METRIC\_IU Term Code: 6

Object Name: Numeric

Reference: clause 7.3.5

Object Type ID(TYPE): MDC\_CONC\_DRUG Term Code: 26688

Label: Primary Source Fluid Delivery Rate

Edit Profile Units List Remove Profile Units

DIM	UOM_MDC	UOM_UCUM	Term Code
ML-3	MDC_DIM_MICRO_G_PER_ML	ug/mL	2163
ML-3	MDC_DIM_MILLI_G_PER_ML	mg/mL	2162
ML-3	MDC_DIM_G_PER_ML	g/mL	2144
[U]-3	MDC_DIM_INTL_UNIT_PER_ML	[U]/mL	5600
ML-3	MDC_DIM_MILLI_EQUIV_PER_ML	meq/mL	4882
ML-3	MDC_DIM_NANO_G_PER_ML	ng/mL	2164
ML-3	MDC_DIM_MILLI_MOLE_PER_ML	mmol/mL	4754
[U]-3	MDC_DIM_MILLI_INTL_UNIT_PER_ML	m[U]/mL	5618
[U]-3	MDC_DIM_MEGA_INTL_UNIT_PER_ML	M[U]/mL	5604

Support

Restrictions:

# Tooling Status

## ICSGenerator

*“Enum Values accessible from hRTM”*

ICS Generator - PCD Agent - Baxter-Colleague

File Device Specialization Help

Builder Overview Conformance Statements Database UML Diagram Comparison

Add Remove

General Attribute Behavior Notification

General Information

Object Class(OID-TYPE): MDC\_MOC\_VMO\_METRIC\_ENUM Term Code: 5

Object Name: Enumeration

Reference: clause 7.3.10

Object Type ID(TYPE): MDC\_PUMP\_STAT Term Code: 53436

Label: Delivery Channel Operational Status

Edit Profile Enumerations List Remove Profile Enumerations

Enum Values

- pump-status-ready**
- pump-status-infusing
- pump-status-paused
- pump-status-kvo
- pump-status-delayed
- pump-status-standby
- pump-status-vtbi-complete
- pump-status-off
- pump-status-priming

Support

Restrictions:

DIM
 

- Infusion Pump [Hydra\_MDS]
  - Alert\_Monitor
  - Alert\_Scanner
  - Clock
  - Context\_Scanner
  - EpiCfgScanner
  - PeriCfgScanner
- Infusion Pump [VMD]
  - Primary Source [Channel]
    - Primary Source Drug Label [Enumeration]
    - Primary Source Fluid Delivery Rate [Numeric]
    - Primary Source VTBI Remaining [Numeric]
    - Primary Source Duration Remaining [Numeric]
    - Primary Source Drug Dose Rate [Numeric]
    - Primary Source Volume Infused [Numeric]
  - Secondary Source [Channel]
    - Secondary Source Drug Label [Enumeration]
    - Secondary Source Fluid Delivery Rate [Numeric]
    - Secondary Source VTBI Remaining [Numeric]
    - Secondary Source Duration Remaining [Numeric]
    - Secondary Source Drug Dose Rate [Numeric]
    - Secondary Source Volume Infused [Numeric]
  - Delivery [Channel]
    - Delivery Channel Operational Status [Enumeration]**
    - Delivery Channel Operational Mode [Enumeration]
    - Delivery Channel Total Current Fluid Rate [Numeric]
    - Delivery Channel Total Volume Infused [Numeric]
    - Delivery Channel Fluid Occlusion Level [Numeric]
  - Alert

# Tooling Status

## ICSGenerator

### “Device specializations Tab”

The screenshot displays the ICS Generator application window titled "ICS Generator - PCD Agent - Baxter-Colleague". The "Device Specialization" tab is active, showing a menu on the left with a tree view of device specializations. The tree view includes categories like "Secondary Source" and "Delivery", with "Delivery Channel Operational Status [Enumeration]" selected. The central panel has tabs for "General", "Attribute", "Behavior", and "Notification". The "General Information" section contains the following fields:

- Object Class(OID-TYPE): MDC\_MOC\_VMO\_METRIC\_ENUM Term Code: 5
- Object Name: Enumeration
- Reference: clause 7.3.10
- Object Type ID(TYPE): MDC\_PUMP\_STAT Term Code: 53436
- Label: Delivery Channel Operational Status

Below the "General Information" section, there are buttons for "Edit Profile Enumerations List" and "Remove Profile Enumerations". The "Enum Values" section lists the following values:

- pump-status-ready
- pump-status-infusing
- pump-status-paused
- pump-status-kvo
- pump-status-delayed
- pump-status-standby
- pump-status-vtbi-complete
- pump-status-off
- pump-status-priming

At the bottom, there is a "Support" section with a "Restrictions:" label.

# Tooling Status

## ICSGenerator

### "Private Attributes – ASN.1 data types"

ICS Generator - PCD Agent - Baxter-Colleague

File Device Specialization Help

Builder Overview Conformance Statements Database UML Diagram Comparison

Add Remove

General Attribute Behavior Notification

+ Add Private Attribute Edit Attribute List Remove Attribute

Attribute name	Attribute ID	term code	qualifier	reference
Handle	MDC_ATTR_ID_HANDLE	2337	Mandatory	clause 7.3.1.1
Metric-Specification	MDC_ATTR_METRIC_SPECN	2367	Mandatory	clause 7.3.4.1
Metric-Status	MDC_ATTR_METRIC_STAT	2368	Optional	clause 7.3.4.1
				clause 7.3.5.1
				clause 7.3.1.1

**Add Private Attribute**

Attribute

Attribute ID:  Term Code:

Attribute Name:

Reference:

Qualifier:

Attribute Type:

Valid Values: ANY, AVA-Type, **AareApdu**, AarqApdu, Abort-reason, AbrtApdu, AbsTimeRange

Value Range :

Min:

Max:

Restrictions:

Comments:

ER  CR-ER

OK Cancel

# Tooling Status

## *ICSGenerator*

### "Profile Unit Table"

ICS Generator - PCD Agent - Baxter-Colleague

File Device Specialization Help

Builder Overview Conformance Statements Database UML Diagram Comparison

Add Remove

- DIM

- Infusion Pump [Hydra\_MDS]
  - Alert\_Monitor
  - Alert\_Scanner
  - Clock
  - Context\_Scanner
  - EpiCfgScanner
  - PeriCfgScanner
- Infusion Pump [VMD]
  - Primary Source [Channel]
    - Primary Source Drug Label [Enumeration]
    - Primary Source Fluid Delivery Rate [Numeric]
    - Primary Source VTBI Remaining [Numeric]
    - Primary Source Duration Remaining [Numeric]
    - Primary Source Drug Dose Rate [Numeric]
    - Primary Source Volume Infused [Numeric]
  - Secondary Source [Channel]
    - Secondary Source Drug Label [Enumeration]
    - Secondary Source Fluid Delivery Rate [Numeric]

General Attribute Behavior Notification

General Information

Object Class(OID-TYPE): MDC\_MOC\_VMO\_METRIC\_NU Term Code: 6

Object Name: Numeric

Reference: clause 7.3.5

Object Type ID(TYPE): MDC\_CONC\_DRUG Term Code: 26688

Label: Primary Source Fluid Delivery Rate

Edit Profile Units List Remove Profile Units

DIM	UOM_MDC	UOM_UCUM	Term Code
ML-3	MDC_DIM_MICRO_G_PER_ML	ug/mL	2163
ML-3	MDC_DIM_MILLI_G_PER_ML	mg/mL	2162
	MDC_DIM_G_PER_ML	g/mL	2144
	MDC_DIM_INTL_UNIT_PER_ML	[IU]/mL	5600
	MDC_DIM_MILLI_EQUIV_PER_ML	meq/mL	4882
	MDC_DIM_NANO_G_PER_ML	ng/mL	2164
	MDC_DIM_MILLI_MOLE_PER_ML	mmol/mL	4754
	MDC_DIM_MILLI_INTL_UNIT_PER_ML	m[IU]/mL	5618
	MDC_DIM_MEGA_INTL_UNIT_PER_ML	M[IU]/mL	5604

Edit Profile Units List

Available Profile Units

Profile Units Selected

- MDC\_DIM\_MICRO\_G\_PER\_ML
- MDC\_DIM\_MILLI\_G\_PER\_ML
- MDC\_DIM\_G\_PER\_ML
- MDC\_DIM\_INTL\_UNIT\_PER\_ML
- MDC\_DIM\_MILLI\_EQUIV\_PER\_ML
- MDC\_DIM\_NANO\_G\_PER\_ML
- MDC\_DIM\_MILLI\_MOLE\_PER\_ML
- MDC\_DIM\_MILLI\_INTL\_UNIT\_PER\_ML
- MDC\_DIM\_MEGA\_INTL\_UNIT\_PER\_ML



# Tooling Status

## *ICSGenerator*

### Device overview panel

ICS Generator - PCD Agent - Baxter-Colleague

File Device Specialization Help

Builder Overview Conformance Statements Database UML Diagram Comparison

[-] Profile Overview

Profile Title : Baxter-Colleague

Profile Description

[http://xw2k.nist.gov/medicaldevices/ICSGenerator/ics\\_index.html](http://xw2k.nist.gov/medicaldevices/ICSGenerator/ics_index.html)

Author : MDC Group

Company : NIST

Device Type : PCD

Profile Mode : Baseline

Profile Type : Agent

# Tooling Status/Next Steps

## *ICSGenerator*

- Next Steps
  - Continue work on private attributes interface.
  - Continue work on ASN.1 database.
  - Update PHD DIM XSchema and specialization profiles with published versions.
  - Make ICSGenerator available as a web application.
  - Add hRTM database update capability.
    - RTMMS data access path
  - Develop a “Message Generator” using ICS device profile to support IHE-PCD HL7 testing and future X73 message testing.