Semantic Interoperability
for Medical Device Data Interchange

Paul Schluter, Ph.D., GE Healthcare
FDA Workshop on Medical Device Interoperability
January 26, 2010

IHE

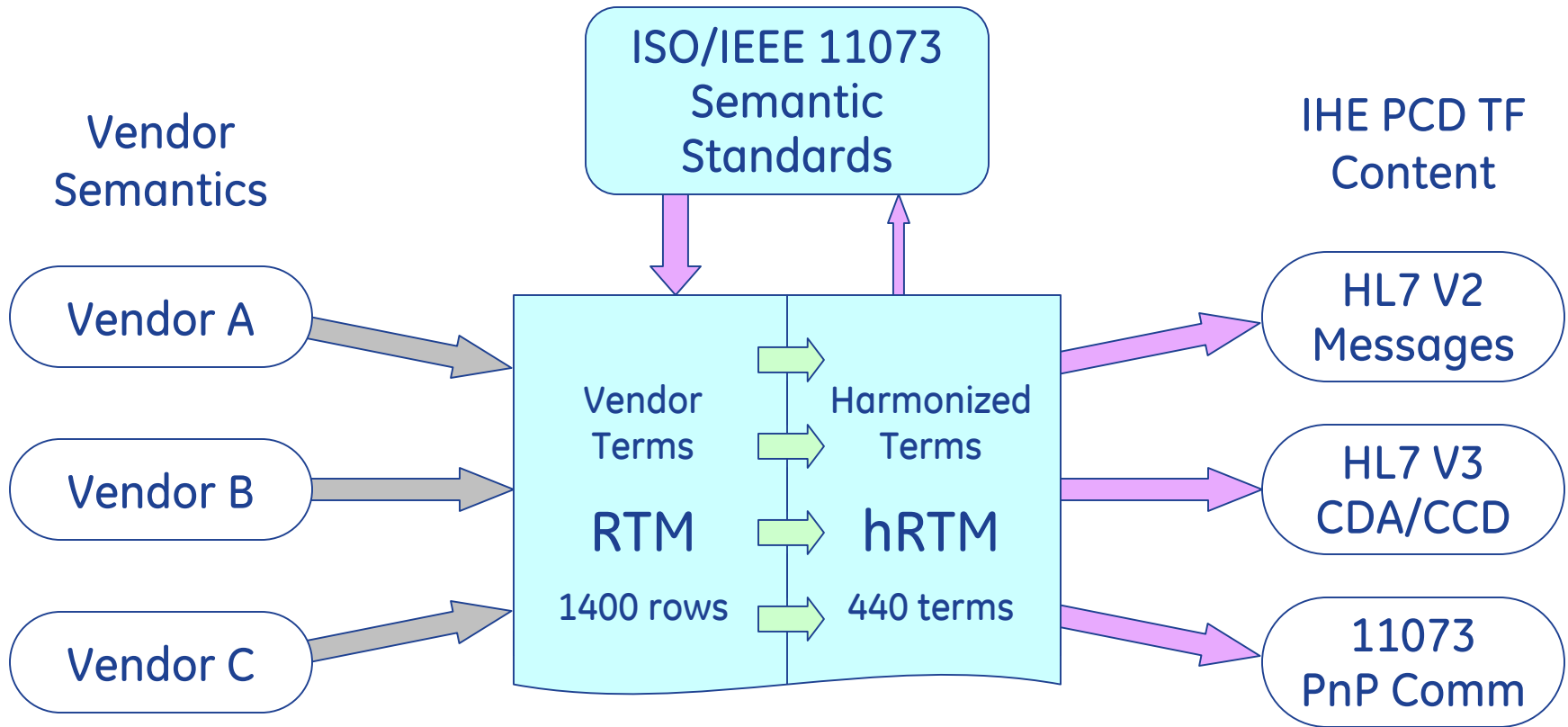# Semantic Interoperability

Scenario:

Convey near real-time medical device data
- from device to device or system
- from device to enterprise using a gateway
- enterprise document exchange

Objective:

Communicate medical device data using a single **unified nomenclature** and **semantic model** that can be **rigorously defined** and **enforced** to facilitate safe and effective plug-and-play interoperability.

IHE
changing the way healthcare
www.ihe.net
connects

IHE PCD Rosetta Terminology Management

Vendor Semantics

ISO/IEEE 11073 Semantic Standards

IHE PCD TF Content

Vendor A

Vendor B

Vendor C

Vendor Terms

RTM

1400 rows

Harmonized Terms

hRTM

440 terms

HL7 V2 Messages

HL7 V3 CDA/CCD

11073 PnP Comm

- Open consensus process
- Observation identifiers *and* co-constraints
- New terms incorporated into standards
- hRTM used for conformance testing

Harmonized Rosetta (hRTM)

Specifies for each IEEE 11073 REFID observation identifier:

- the 11073 MDC and UCUM units-of-measure
    - includes dimensional analysis to ensure correct 'units-math'

- enumerated values and measurement sites

- numeric codes, where appropriate

An extract from the hRTM is shown below:

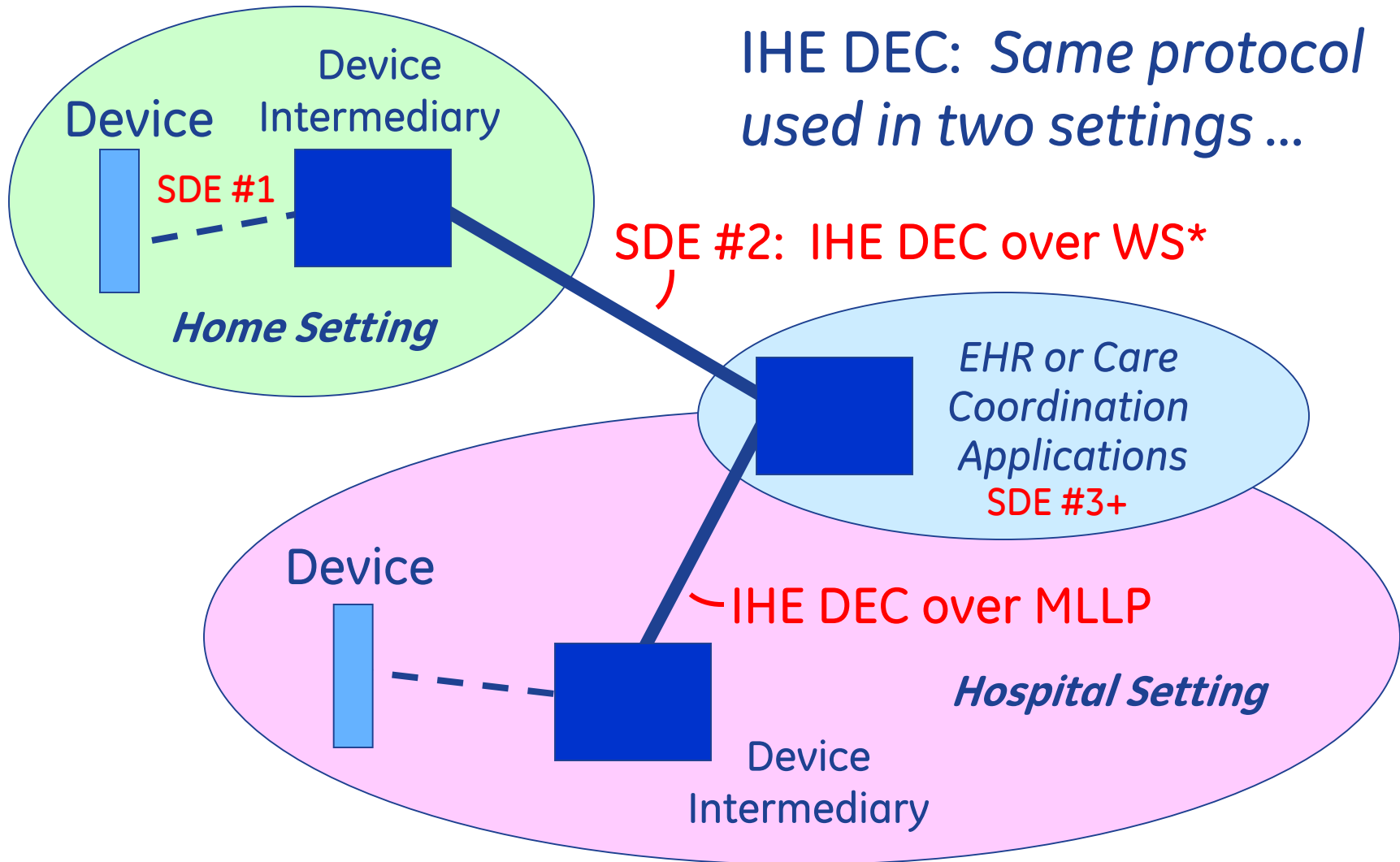| Group	REFID	DIM	UOM_MDC	UOM_UCUM
CVS_ECG_HR	MDC_ECG_HEART_RATE	T-1	MDC_DIM_BEAT_PER_MIN	{beat}/min {beats}/min 1/min /min
CVS_ECG_ST	MDC_ECG_AMPL_ST_I	ML2I-1T-3 ML2I-1T-3	MDC_DIM_MILLI_VOLT MDC_DIM_MICRO_VOLT MDC_DIM_MILLI_M#	mV uV *(added by scripting rule)* mm# *(voted "off-the-island")*
GASMON_AA_ENFL	MDC_CONC_DESFL_ET	L3L-3 LMT-2L-2 LMT-2L-2	MDC_DIM_VOL_PERCENT MDC_DIM_KILO_PASCAL MDC_DIM_MMHG	%{vol} kPa mm[Hg]

Available at http://wiki.ihe.net/index.php?title=PCD_Profile_Rosetta_Terminology_Mapping

Related RTM and hRTM Initiatives

- Respiratory and Ventilation extensions (current)
  - An informal collaboration between IHE PCD and 11073 MDC and members of ASTM F2761 (ICE), IEC SC62A WG5, ISO IHTSDO, ISO TC215 WG7, and HL7 HCD.

    See http://wiki.ihe.net/index.php?title=PCD_RTM_Ventilator

- XML publication format for 11073 nomenclature extensions
  - 11073-10102 Annotated ECG (aECG)
  - 11073-10103 Implanted Device Cardiac (IDC)

- Joint IHE and Continua WAN interface
  - RTM and RCH (Rosetta Containment Hierarchy) for IEEE Std 11073-20601 and personal health devices, as Continua deliverables for HITSP RMON SDE#2.

- NIST HL7 V2 and IEEE 11073 Message Conformance Testing

IHE and Continua WAN (HITSP RMON SDE #2)

IHE DEC: *Same protocol used in two settings ...*

Device
Device Intermediary
SDE #1
Home Setting

SDE #2: IHE DEC over WS*

EHR or Care Coordination Applications
SDE #3+

Device
IHE DEC over MLLP
Device Intermediary
Hospital Setting

IHE
changing the way healthcare **connects**
www.ihe.net

Discussion

- Unified semantics and semantic model are essential prerequisites for safe and effective interoperability between devices and systems.

- The hRTM is based on the ISO/IEEE 11073 standards and leverages and extends that work by using an open consensus process.

- For each observation identifier, the hRTM specifies the units-of-measure, enumerated values, measurement sites and other co-constraints.

- The hRTM rigorously defines what may be sent and informs recipients of what they may expect to receive.

- The hRTM supports message conformance testing frameworks that can be used for both clinical and personal health devices.