NIST
National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

NIST Collaborations to further Healthcare IT Standards & Interoperability

Lisa Carnahan
Supervisory Computer Scientist,
Information Technology Lab, NIST
lisa.carnahan@nist.gov, 301-975-3362

Health Care as a National Priority

- Its place in the economy
  - 2005: US HC expenditures were $1.98 trillion (16% GDP)
  - 2016: US HC expenditures projected to surpass $4.1 trillion (19.6% GDP)
  - $300 billion – treatments that may not improve health, may be redundant, or may be inappropriate (Wennberg 2002, 2004: Fisher, 2003)
- Beyond the money
  - 44,000 – 98,000: Americans die each year from inpatient medical errors (IOM)

Accurate & timely clinical info delivered to patients and clinicians through standards-based exchange

- National push, Industry action
  - President's agenda is for widespread EHR use by 2014
  - Congressional action in agreement on problem definition
  - Healthcare clinical and IT standards communities have coalesced
    - Unprecedented cooperation
    - Shared focus

NIST Works with Industry

- …promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology [...]
- NIST's Information Technology Lab
  - To improve the quality of IT/software in industry through the development of technology, standards & measurement
    - Concentrate on enabling technologies
    - Get involved early and partner with industry
    - Fill industry void
    - Transfer technology and move on

NIST Healthcare IT Program Focus

- **Electronic Health Record** - Electronic health record standards (EHRs) that provide patients and clinicians with all relevant patient information
  - EHR Conformance
- **Interoperability** - Standards and technologies that support the ability for clinical users to find, access and retrieve all appropriate information available through the NHIN
  - Messaging Conformance
  - Standards Integration & Implementation
  - Medical Device Communication
- **Security & Reliability** - Standards, guidelines and technologies that promote a secure and reliable healthcare environment

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NIST Participation & Collaborations

- ANSI Healthcare Information Technology Standards Panel (HITSP)
- ATA – American Telemedicine Association
- CCHIT – Certification Commission for Health IT
- IEEE 11073 Medical Device Communications
- IHE - Integrating the Health Enterprise – IT Infrastructure, Patient Care Devices
- Markle Foundation's Connecting for Health
- HL7 – Health Level Seven
- OASIS – Organization for the Advancement of Structured Information Standards
- URAC – (not an acronym)
- FHA/CHI – Federal Health Architecture/Consolidated Health Informatics
- HHS/Office of the National Coordinator
- NHIN – Nationwide Health Information Network
- Veterans Health Administration

- NIST participation:
  - Organizational members usually with technical/conformance lead role
  - Technical level collaboration with private-industry member organizations
  - Co-sponsor awareness activities

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NIST Current Efforts

- Message Conformance Validation Tool
- Message Generation Tool
- CDA/CCD Document Validation Tool
- Medical Device Communication Test Tools
- XDS Reference Implementation & Tests Tools
- HIT Testing Web Portal

- Engage constituents
  - Gather requirements
  - Validate our approach through workshops & discussions
- Leadership and participation in standards and conformance efforts
  - Partner with industry standards groups
  - Consultant to federal agencies with healthcare missions
- Development of conformance tests, tools and prototypes
  - Based on industry priorities
  - Prototypes fill in industry gaps
  - Leadership in test/tool development
- No role in operational conformance testing & certification!

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Messaging Conformance

- Messaging - ability to share information among diverse health care (HC) systems
- Health Level Seven (HL7) standards used for the exchange, mgmt and integration of data for clinical care
  - Used or moving to many care settings – hospitals, labs, imaging, pharmacy, long-term care
  - Flexibility of standard is challenging for widespread agreement at implementation level
- NIST Collaborations with HL7
  - Define conformance and measurement definitions for HL7 V2/V3 standards
  - Message Maker V2 Tool
  - HL7 V2 Message validation for SWF in Radiology Domain
  - V3 Lab prototype tool
- Impact
  - Reduce implementation cost/improve quality of HC messaging systems
  - Conformance tools used by other stds orgs incorporating HL7

Partial List of Messaging Areas

Patient Administration	**Admit, Discharge, Transfer, and Demographics.**
Order Entry	Orders for Clinical Services, Pharmacy, Dietary, and Supplies.
Query	**Rules applying to queries and to their responses.**
Financial Management	Patient Accounting and Charges.
Observation Reporting	**Observation Report Messages.**
Scheduling	Appointment Scheduling and Resources.
Patient Referral	**Primary Care Referral Messages.**

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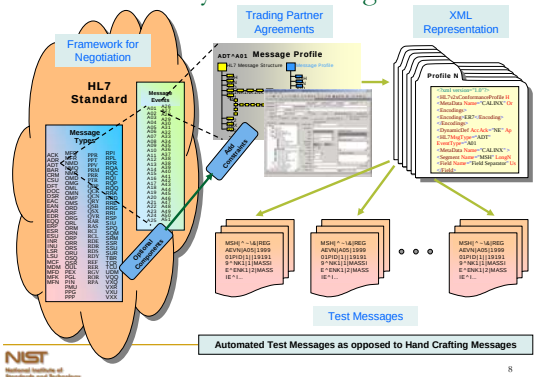
The Need for Dynamic Message Creation



Automated Test Messages as opposed to Hand Crafting Messages

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Message Validation Web

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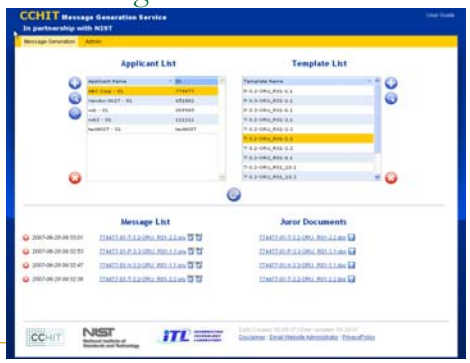
CCHIT Message Generation



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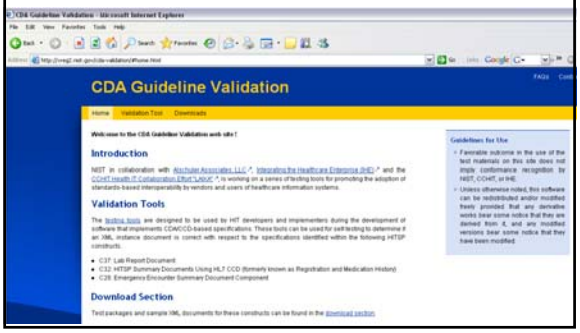
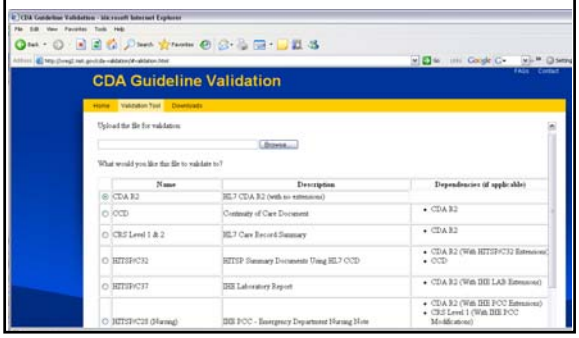
CDA/CCD-based Document Validation Tool

- Tool for vendors & implementers to self-test clinical document generation capability
- Collaborative effort meeting requirements of multiple stakeholder groups



CDA/CCD-based Document Validation Tool

- Component rule-base allowing for testing hierarchy of standards & guidelines
- Focus on HL7Focus on HL7 standards, IHE profiles, HITSP constructs, CCHIT criteria



Medical Device Communication
What role is NIST playing?

- Medical device communication standards (ISO/IEEE 11073) and IHE Patient Care Device Domain (PCD)
  - Real-time plug-and-play interoperability
  - Facilitate the efficient exchange of medical device and vital signs data throughout the HC enterprise

Testing Toolkits

- ICSGenerator
  - Device specialization and comparisons
  - High-level semantic interoperability
- ValidatePDU
  - Message validation
- 11073 DIM XML schema translation

Leveraged by:

- IHE PCD Toolkit
- 11073 Standard, normative chapter

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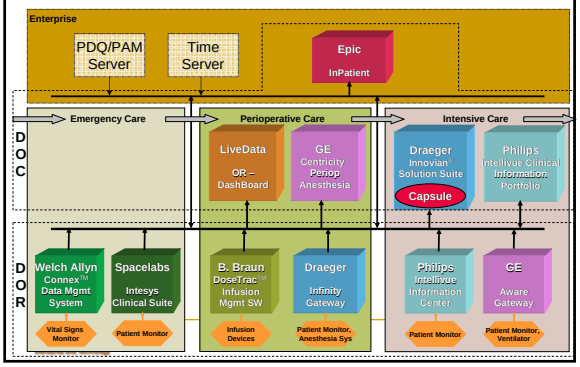
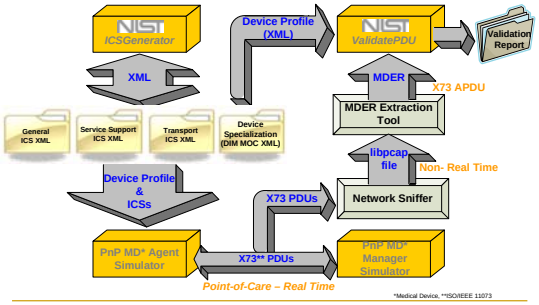
Patient Care Devices
HIMSS Interoperability Showcase 2008



Medical Device Communication Test Tools
Plug-n-Play Point-of-Care Real-Time Profile



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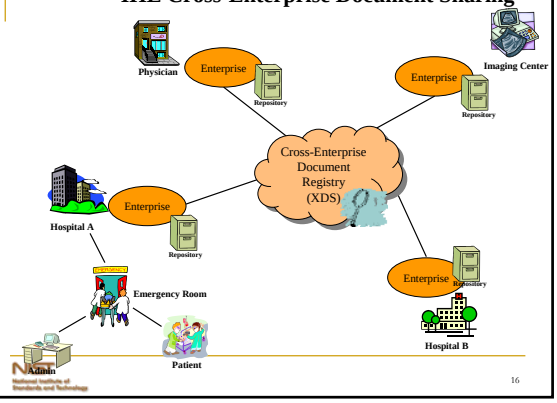
IHE Cross-Enterprise Document Sharing



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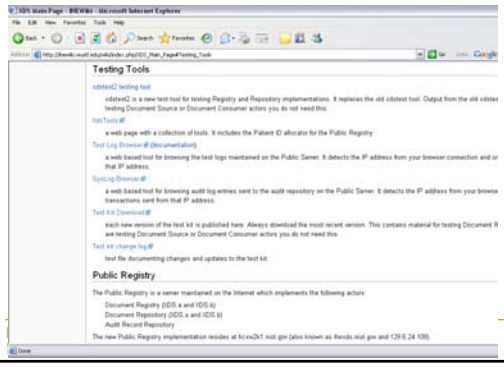
XDS Reference Implementation & Test tools



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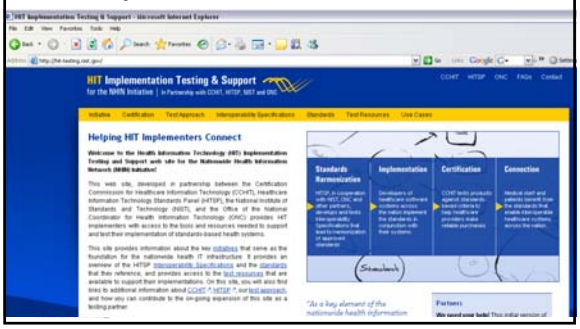
http://hit-testing.nist.gov

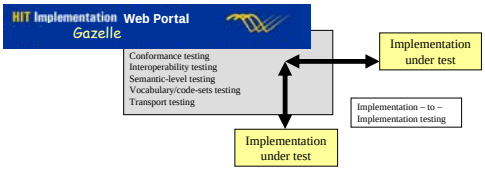
- Collaborative effort with CCHIT, HITSP, and HHS/ONC
- Bread-crumb trail from HITSP ISs through HITSP constructs, base standards and related testing tools



The state of testing

Current state: Test website

End State: A collaborative vision for a dynamically configurable test tool kit



Summary

- *We develop measurements, tools, and prototypes, and contribute to voluntary standards to advance the use of information technologies in healthcare systems and achieve an interconnected electronic health information infrastructure.*
  - Collaborate with industry to develop clear, testable public specifications
  - Based on industry priority we develop conformance test suites to ensure correct, robust interoperable software
  - Develop prototypes of emerging HC standards to fill in the gaps that are identified by industry