HL7 and DICOM: Complementary Standards, Collaborating Organizations

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Topics

- History of HL7 and DICOM
- Complementary domains of responsibility
- Collaborative organization
- Cross-standard integration
  - Imaging Workflow
  - Reporting
  - Image Access
  - Web Services
Parallel development

1983: ACR-NEMA committee
1985: ACR-NEMA Standard 300
1988: ACR-NEMA 300 v2
1993: DICOM
1995: Modality Worklist

1984: ASTM E31.11 committee
1987: HL7 committee; HL7 v1
1988: ASTM E1238
1989: HL7 v2.0
1990: HL7 v2.1 (included E1238)
1999: HL7 v2.3.1

2000: DICOM-HL7 Memorandum of Understanding

2000: Structured Reporting
2004: Web Services (WADO)
2010: SR Transcoding to CDA
2013: RESTful Web Services

2001: CDA r1
2005: CDA r2
2009: CDA Basic Imaging Report
2014: FHIR DSTU

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Domains of responsibility

• Workflow inside the imaging department
  – Radiology, Cardiology, Radiation Therapy
• Image data formats
• Image analysis result data
• Radiation dose data
• Image and related data exchange

• Interdepartmental workflow
  – Patient management, orders, results, scheduling, billing, master files
• Clinical Lab device automation
• Patient Care
  – Medication management
• Clinical Documents
• Vocabulary management
DICOM WG-20 ≈ HL7 Imaging Integration WG

- Officially separate bodies, but …
- Meet in joint sessions
- Have the same members (mostly)
- Have the same chairmen
- All motions must pass by rules of both HL7 and DICOM
- … in effect, a single joint committee
Cross-standard integration: Scheduled Workflow

- Registration
- Orders Placed
- patient information
- Orders Filled
- examination orders
- RIS
- HIS
- HL7
- PACS
- DICOM
- Acquisition
- Modality
- Image Manager & Archive
- Film Folder
- Film Lightbox
- Diagnostic Workstation

- Report Repository
- report
- report
- images retrieved
- images stored
- images printed
- images completed
- acquisition completed
- modality worklist
- procedure scheduled
- Prefetch any relevant prior studies

- Prefetch any relevant prior studies
- film
- folder
- report
- repository
- diagnostic workstation
- film
- Image Manager & Archive
- Film Folder
- Film Lightbox
- Diagnostic Workstation
- PACS
- HL7
- HIS
- RIS
- Orders Placed
- Orders Filled
- examination orders
- registration
- patient information
Cross-standard integration: Scheduled Workflow

**HL7** – Message exchanges for patient, order, and result management

**DICOM** – Services for procedure, image, reading management

**IHE** – Specification of workflow and integration details, e.g.:

- Constraining HL7 and DICOM messages in workflow contexts
- Mapping HL7 message fields to DICOM data elements
Cross-standard integration:
Reporting – DICOM View

- Imaging device
- Technologist
- Administrator
- Health Info Exchange

- Interpreting physician
- Referring physician
- Data mining
- Decision support
- Computer Aided Detection

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Clinical Document Architecture (CDA)

HL7 standard for clinical documents for exchange, supporting advancing use cases

- Encoded in Extensible Markup Language (XML)
  - Uses HL7v3 Reference Information Model (RIM) standard XML constructs
- Includes standard **header** and a content-specific **body**
  - **Header** allows consistent management of all documents – doc type, patient, provider, encounter, authentication, etc.
  - **Body** contains document narrative text and multi-media, plus optional coded equivalents
• DICOM supports CDA encapsulated in DICOM object, and references to CDA documents

• DICOM Part 20 is a specification for transforming DICOM SR reports (“Template 2000”) to CDA (2010)

• DICOM collaborated with HL7 in defining a CDA Implementation Guide for Basic Imaging Reports (2009)
  ▪ Including DICOM object references

• Current work (DICOM Supplement 155) for more advanced imaging reports in CDA
Cross-standard integration: Image Access

- HL7 generally does not attempt to transfer images, defers to DICOM
  - HL7v2 OBX RP (Reference Pointer) data type
  - FHIR ImagingStudy resource links to WADO
- DICOM defines web access mechanisms
  - WADO-URL, WADO-WS, WADO-RS
Cross-standard integration: Web Services

Fast Health Interoperable Resources
HL7 next generation web-based standard

- FHIR defines “Resources” – a set of modular data entities in healthcare, based on HL7v2, v3, and CDA
- Resources are accessible using RESTful web services, or “packaged” into messages or documents
- Focus on implementation – fast and easy to implement
- Standard resources cover ~80% of use cases … built-in, standard mechanism for extensions … no longer second-class citizen!
Cross-standard integration: Web Services

• In emerging web services area, DICOM will rely on HL7 FHIR for common resources (patient, order, schedule, etc.)

• DICOM will define compatible imaging resources
Summary

• DICOM and HL7 - Similar history
• Complementary domains of responsibility
• Collaborative approach to imaging department needs, and enterprise needs for imaging
• Effective interworking
Thank you for your attention!