How Should Interfaces Specify Application Behaviors?

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Introduction

- Standard of care for 21st century health record
  - Patient-centric
  - Multi-enterprise
  - Both longitudinal and real-time orientations
  - Patient safety considerations
- Interface specification requirements
  - Static (what is known)
  - Dynamic (what is to be done)

Introduction

- Progress from last-generation interface specifications
  - Must work across enterprises
  - Must constrain interface contents
  - Must constrain application behavior
  - Quality of integration must be designed in, not retrofitted

Standards and the interoperable clinical record

- EHR models derived in part from early interface standards
  - LIS05-A (aka ASTM 1238)
  - HL7
  - DICOM
  - Vocabulary standards (SNOMED, etc.)
- Business requirements <u>not</u> generally addressed

Standards and the interoperable clinical record

- Privacy and trust issues
- Patient safety issues
  - Patient identification
  - Synchronization of systems
  - Correction of errors
  - Acknowledgment of messages received from other systems
- Health information management rules
- Custody requirements and the role of “system(s) of record”

Early commercial interfaces were minimally constraining

Characteristic	Description
Elements	Usually well-understood, sometimes proprietary
Transaction(s)	Few reporting-type ("generator") transactions
Controlled vocabularies	Frequently proprietary, some standard (*e.g.*, CPT4 for billing codes)
Acceptable identifier domains	Implementation-specific
Acknowledgment responsibilities	Often undefined for either sender or receiver
Receiver behavioral responsibilities	Storage: often minimally defined Application behavior: often undefined

IHE-based interfaces provide for greater and more explicit constraint...

Characteristic	Description
Elements	Always standardized
Transaction(s)	Both reporting-type ("generator") and order-type ("placer/filler" transactions
Controlled vocabularies	Can be proprietary or standard depending on element
Acceptable identifier domains	Depends on the standard being used
Acknowledgment responsibilities	Can be rigorously constrained
Receiver behavioral responsibilities	Can be rigorously constrained

... but behavioral requirements are needed too

- Example: Data storage requirement

ADT Message Received – ICN Not Found

When PACS receives an ADT registration message for a patient for which it does not find an Integration Control Number in its system, PACS will create a new patient record. It will extract the Basic Patient Data Set and the Basic Visit Data Set from the HL7 message, and will store this information in its system.

Requirements issuance process at USDVA

- Need orders and ADT interface between integrated in-house system
- Compiled and reviewed a set of fully constrained requirements, including behavioral specifications, based on:
  - normative HL7 conformance template
  - IHE Radiology Scheduled Workflow (SWF) profile
- Published requirements on web
- Developed and reviewed test suite
- Mutually agreed-on results

Testing and lessons learned

- Scheduled validation testing between any requesting PACS vendor and ex-firewall USDVA validation system
- Commercial products don't always meet requirements
  - Common issues: Error reporting, patient sensitivity
- Revisions and clarifications to interface requirements document

Conclusions

- Interface requirements <u>must</u> include behavioral constraints for standard of care
- Standards and IHE are essential bases
- Cross-enterprise behavioral requirements are in our sights
  - *e.g.,* to facilitate XDS-based implementations of wide-area repositories and registries

Literature and contact

- Literature cited
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