



# Cross-Enterprise Document Sharing (XDS)

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- **Big Picture**
- **Transactions and Actors**
- **Metadata**
- **How it integrates with PIX/PDQ**
- **How it integrates with ATNA**
- **Content Profiles**

# Cross-Enterprise Document Sharing (XDS)

## *Big Picture*

- Provide support for document-based patient EHR
- Support for document storage within existing products
- Provide support for indexing of patient documents
- Support query and retrieval of patient documents
- Scalable architecture

# Cross-Enterprise Document Sharing (XDS)

## *Big Picture*

### Points of view

- **EHR-CR : Care-delivery Record**
  - Patient information
  - Managed by a Care Delivery Organization
- **EHR-LR : Longitudinal Record**
  - Documents shared by EHR-CR(s)
  - A Patient's long term health history
  - Tracked by Registry
- **Clinical Affinity Domain :**
  - Group of healthcare enterprises (EHR-CR)
  - Common set of policies
  - Share a single registry
- **Archival**

# Cross-Enterprise Document Sharing (XDS) *Big Picture*

**Foundation for Health IT Infrastructures: Shared Electronic Health Record, in a community, region, etc.**

**Effective means to contribute and access: clinical documents across health enterprises.**

**Scalable sharing of documents: between private physicians, clinics, long term care, pharmacy, acute care with different clinical IT systems.**

**Easy access: Care providers are offered means to query and retrieve clinical documents of interest.**

# Cross-Enterprise Document Sharing (XDS)

## *Big Picture*

**Distributed:** Each Care delivery organization “publishes” clinical information for others. Actual documents may remain in the source system.

**Cross-Enterprise:** A Registry provides an index for published documents that can be queried!

**Document Centric:** Published clinical data is organized into “clinical documents”. using agreed standard document types (HL7-CDA/CCD, PDF, DICOM, etc.)

# Cross-Enterprise Document Sharing (XDS) *Big Picture*

**Document Content Neutral:** Document content is processed only by source and consumer systems. Infrastructure is generic.

**Standardized Registry Attributes:** Documents are described by standardized set of attributes. Standardized queries supported by all vendors.

# XDS Actors

- Document Source
- Document Repository
- Document Registry
- Document Consumer

# Document Source

- Has document to store
- Creates description (metadata) for document
- Submits

# Document Repository

- Accepts document and metadata from Document Source
- Stores document
- Forwards metadata to Document Registry
  
- Later, reproduces document on request (allows retrieval)

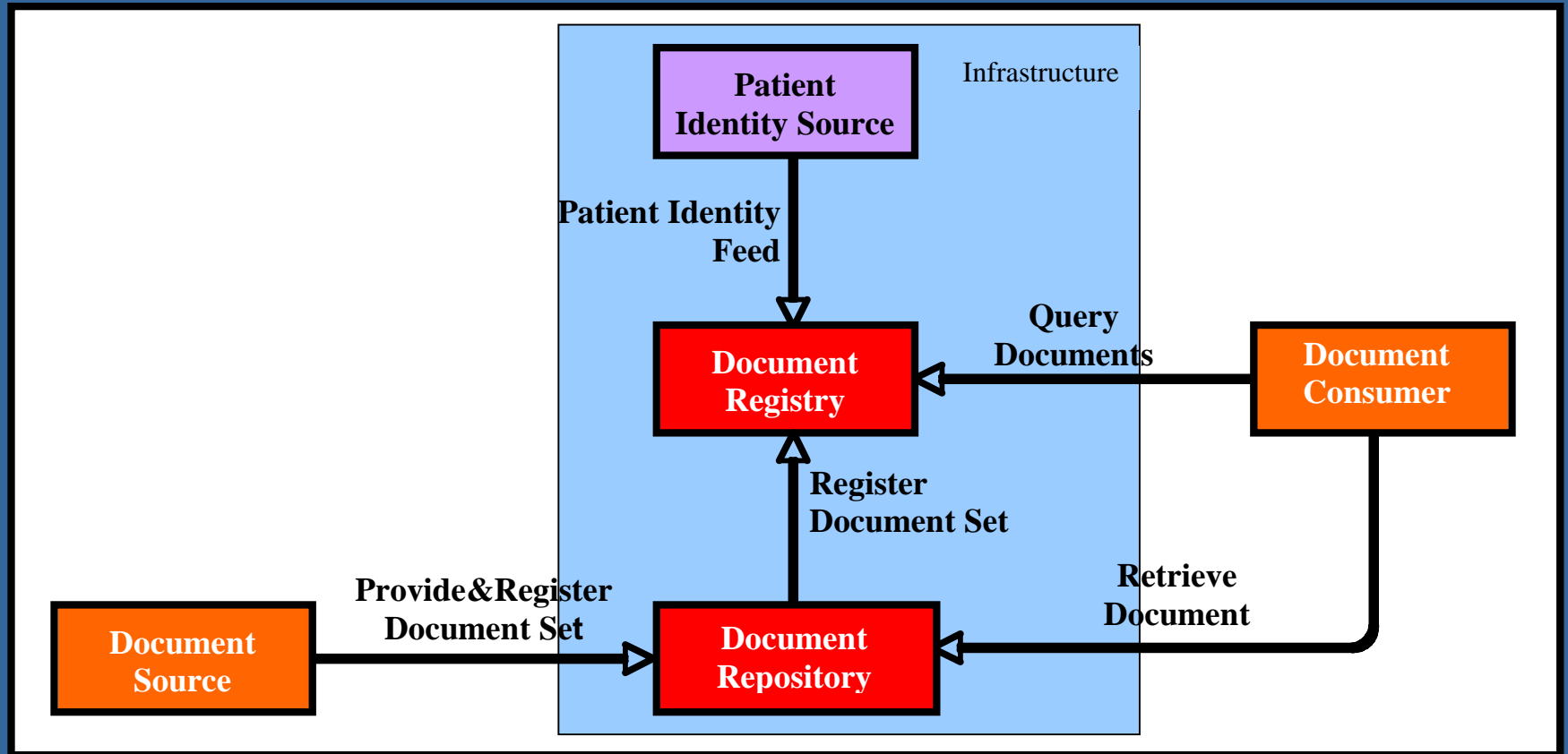
# Document Registry

- **Accepts metadata from Repository**
- **Stored metadata**
  
- **Accepts queries about metadata**
- **Returns metadata matching queries**

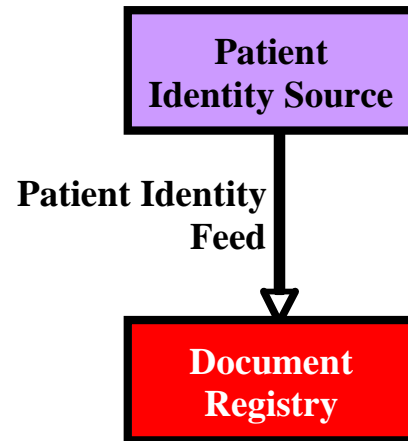
# Document Consumer

- **Generates queries to Registry**
- **Accepts metadata back from Registry**
- **Displays list of documents for user to choose from (probably)**
- **When user selects document from list, retrieves and displays document**

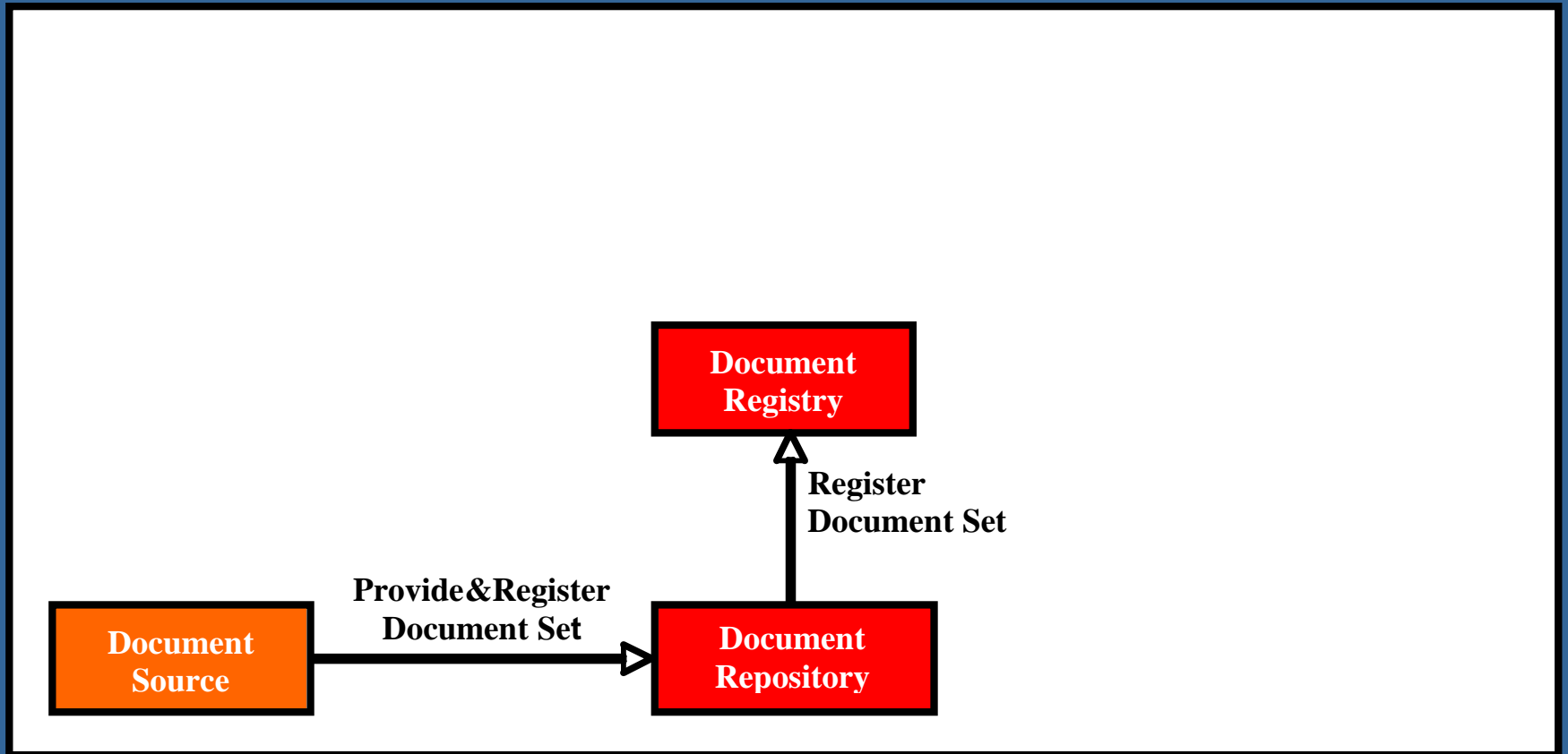
# Cross-Enterprise Document Sharing (XDS) Transaction Diagram



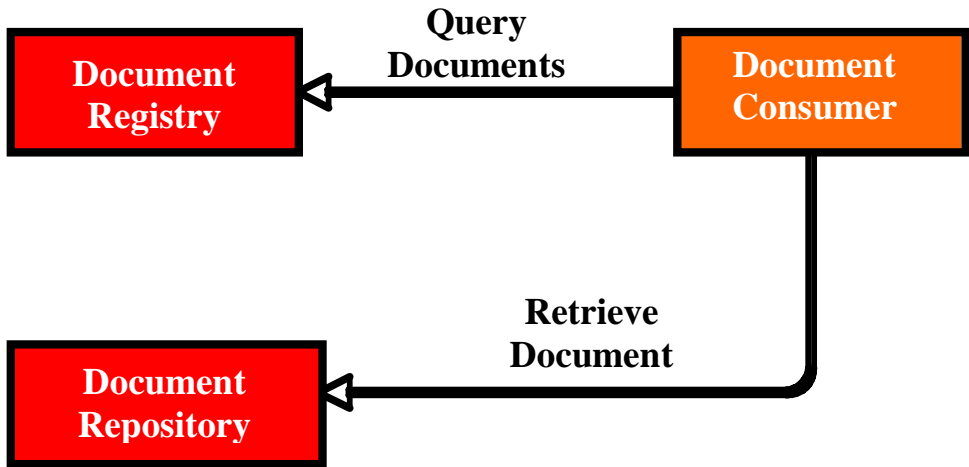
# Patient Registration



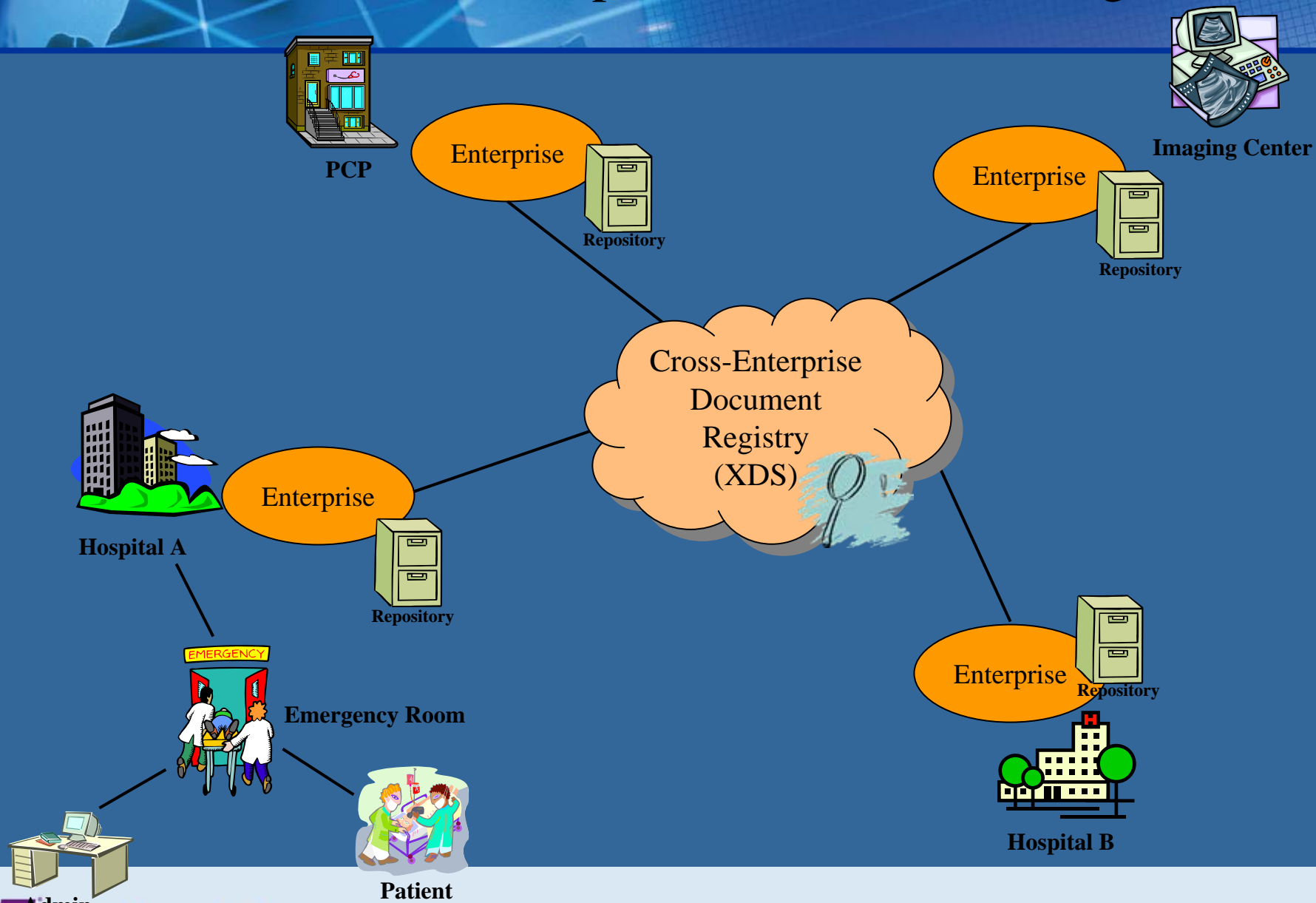
# Document Submission



# Query and Retrieve



# Cross-Enterprise Document Sharing



# Cross-Enterprise Document Sharing (XDS) *Actors*

## Document Source

Source of documents and metadata about documents

## Document Repository

Stores documents, requests indexing in Document Registry, supports retrieval

## Document Registry

Indexes documents, supports search

## Patient Identity Source

Feeds identity of known patients to Document Registry

## Document Consumer

Initiates search and retrieval for consumer of documents

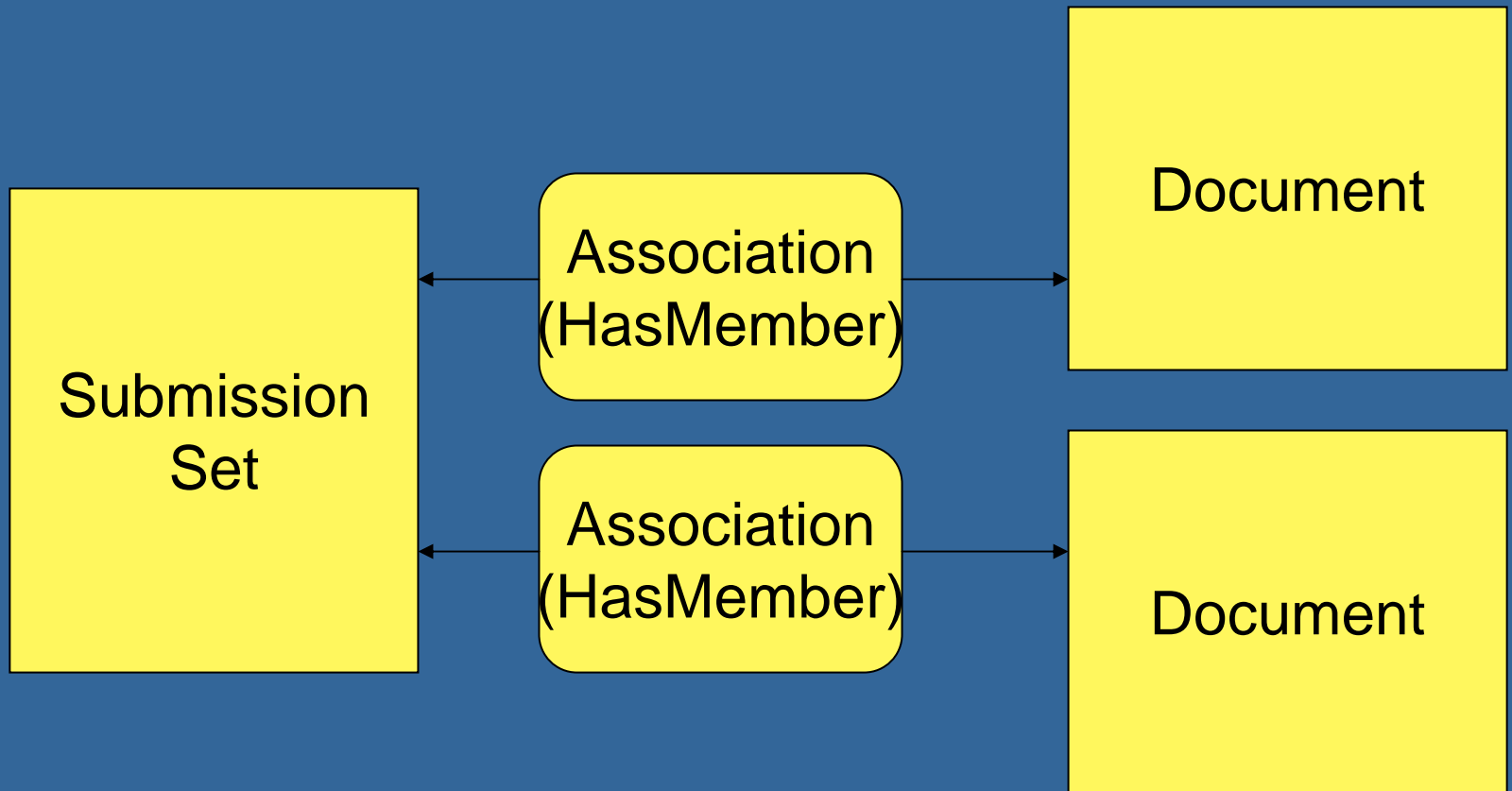
# Metadata Objects

- **Metadata is data stored in the Registry**
- **Document - represents a real document**
- **Submission Set - included in all submissions to document the submitted “package”**
- **Folder - for grouping documents (directory metaphor)**
- **Association - Links other objects together**

# Object Structure

- Each Metadata Object has internal structure
- ebRIM standard coding used (XML)

# Document Submission



# Submission Set Attributes

- **Author**
  - person, role, specialty, institution
- **Title, comments, submission time**
- **Availability Status**
  - Submitted or Approved
- **Coded elements**
  - contentType (type of clinical activity)
- **Identifiers**
  - Patient ID, Source ID, Unique ID, UUID

# Document Attributes

- **Author**
  - Person, role, specialty, institution
- **Legal Authenticator**
- **Title, comments, creation time, service start/stop time**
- **Availability Status**
  - Submitted, Approved, Deprecated
- **Identifiers**
  - Patient ID, Unique ID, UUID
- **Demographics**
  - Source Patient ID, Patient Demographics

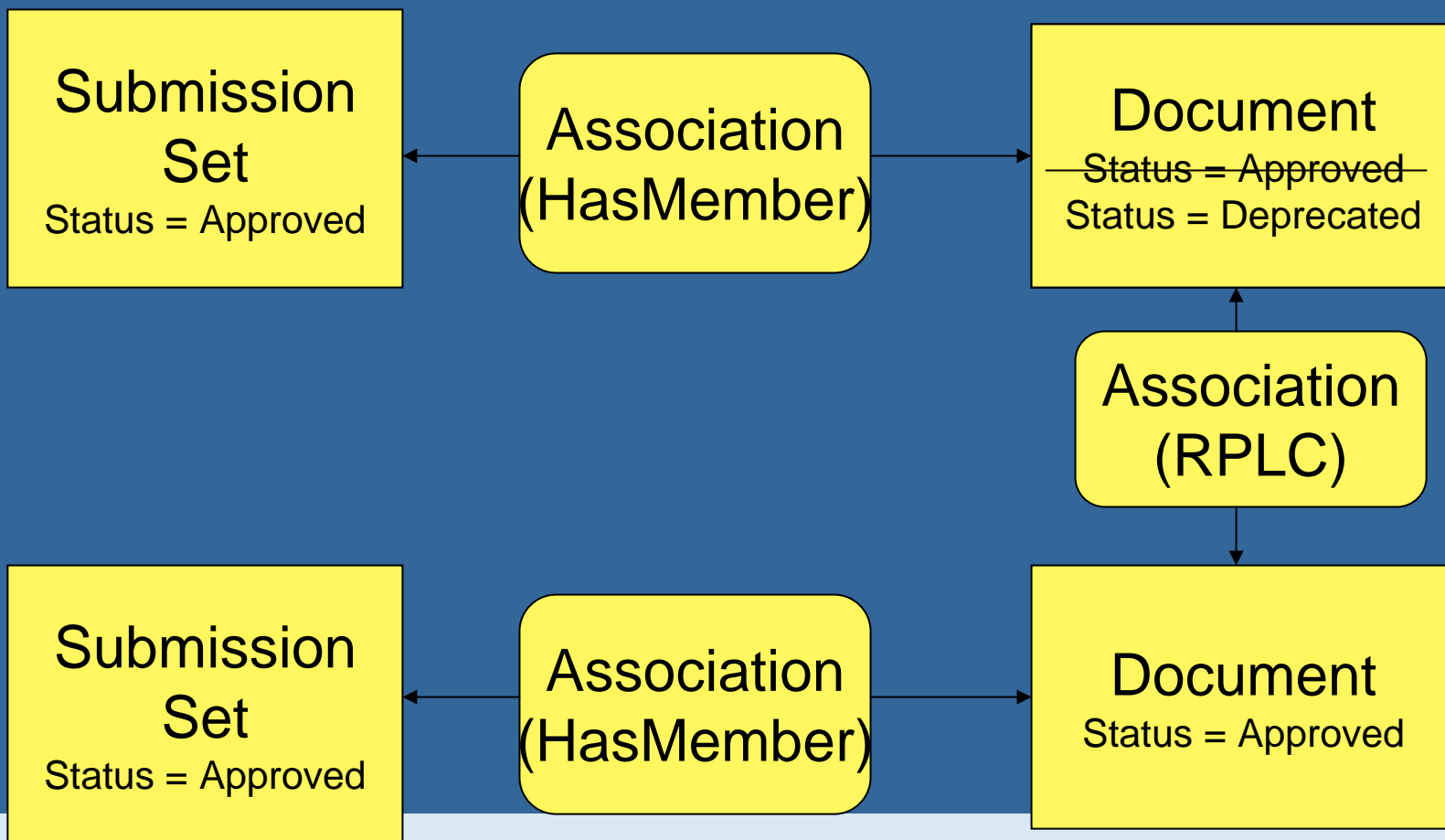
# Document Attributes (cont)

- **Coded Values**
  - **Kind of Document**
    - **Class Code** (general category)
    - **Type Code** (more detail)
  - **Event Code** (main clinical event)
  - **Healthcare Facility Type**
  - **Practice Setting Type**
  - **Confidentiality Code**
- **Technical Details**
  - **MIME Type**
  - **Format Code** (more detail)
  - **Size**
  - **Hash**
  - **URI**
  - **Language**

# Association Attributes

- **Type**
  - HasMember
  - RPLC (Replace)
  - APND (Appends)
  - XFRM (Transformation)
  - Signs
- **SubmissionSetStatus**
  - Original or Reference
- **Pointers**
  - sourceObject, targetObject

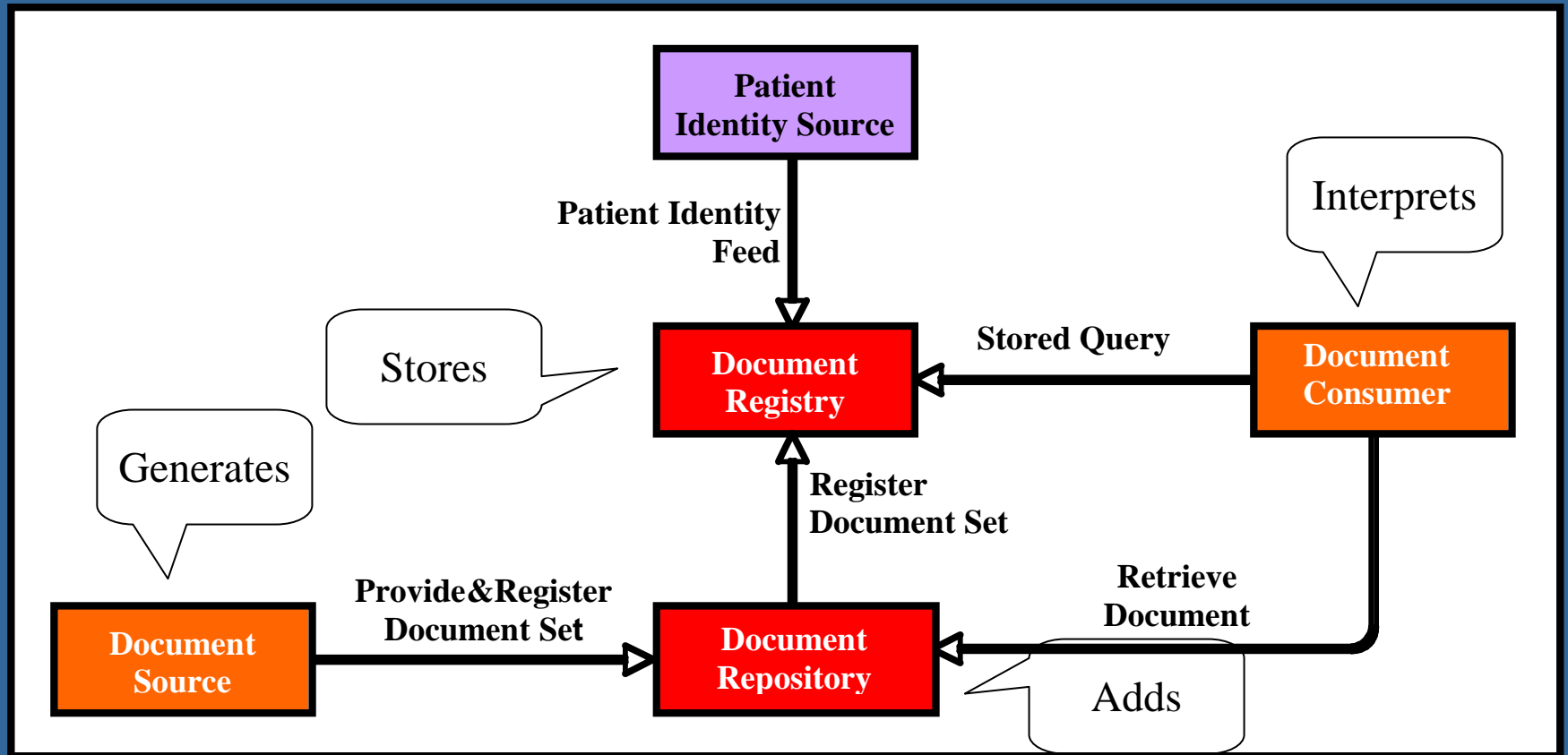
# Document Replacement



# Digital Signature

- **Clinical Document Stored in Repository**
  - Indexed in Registry
- **Digital Signature (Document) Stored in Repository**
  - Indexed in Registry
- **How is Signature “attached” to Clinical Document?**

# Cross-Enterprise Document Sharing (XDS) Metadata handling



# Affinity Domain

- **Set of organizations/systems organized around a single Registry**
- **Common set of Codes**
- **Single Patient ID Domain**
- **Involves business and legal agreements**
- **Security model/agreements**

# Cross-Enterprise Document Sharing (XDS) *Standards Used*

*Electronic Business  
Standards*  
ebXML, SOAP ...

*Internet Standards*  
HTML, HTTP,  
ISO, PDF, JPEG ...

*Healthcare  
Content Standards*  
HL7 CDA, CEN EHRcom  
HL7, ASTM CCR  
DICOM ...

## XDS Infrastructure Standards

- OASIS/ebXML
  - Registry Information Model v2.0
    - Basis of XDS Registry Information Model
  - Registry Services Specifications v2.0
    - Registry Services
  - Messaging Services Specifications v2.0
    - Offline protocols
- ISO/IEC 9075 Database Language SQL
  - Registry Query Language
- SOAP with Attachments
  - Protocol for communication with XDS Registries and Repositories
- SHA-1 [FIPS 180-1]
  - Document Hashes

# Cross-Enterprise Document Sharing (XDS) *Standards Used*

## XDS Infrastructure Standards (cont)

- **HL7 Version 2.3.1**
  - Messages for Patient Identity Management
- **HL7 Version 2.5**
  - Datatypes for XDS Registry Attribute values
- **HL7 CDA Release 1**
  - XDS Document concept definition
  - Source of XDS Document Entry Attributes
- **DICOM, ASTM CCR, HL7 CDA Release 2, CEN EHRcom**
  - Sources of XDS Document Entry Attributes

# XDS Infrastructure Standards (cont)

- **HTTP**
  - Protocol for Retrieve Document
  - Online SOAP bindings
- **SMTP**
  - Offline ebMS bindings
- **IETF**
  - Language Identifiers
- **MIME**
  - Document Type codes
- **UTF-8**
  - Encoding of Registry Attributes

# Cross-Enterprise Document Sharing (XDS) *Standards Used*

Two “categories” of standards used

XDS Content

XDS Infrastructure

# Cross-Enterprise Document Sharing (XDS) *Content Profiles*

- **Outside scope of XDS; layer on top of XDS**
- ***Content Profiles***
  - Document use cases and translation of document content into registry metadata
  - Publishable separately
  - Generated (mostly) by other committees (PCC, Radiology, Lab etc)
- **Of concern only to Document Source and Document Consumer actors**
- **Base standards for Content Profiles include: HL7 CDA, DICOM, ASTM CCR**

# Cross-Enterprise Document Sharing (XDS) *Options*

Options center around Document Source actor

Basic operations

- Submit single document
- Replace existing document

Optional features

- Off-line mode
- Multi-document submission
- Document life-cycle management
  - Submit addendum or transformation of document
- Folder management
  - Create folder, add to folder

# Cross-Enterprise Document Sharing (XDS) *Related Infrastructure Profiles*

## Notification of Availability (NAV)

Send notification that documents are available

## Digital Signature (DSG)

Signing of documents in repository/registry

## Stored Query (transaction)

New query transaction for XDS

## Cross-Enterprise Document Media Interchange (XDM)

XDS content on media (CD etc)

## Cross-Enterprise Document Reliable Interchange (XDR)

XDS content over point-to-point connection



XDR/XDM

Point to point transmission of  
Shared Documents





# Cross-Enterprise Document Media Interchange (XDM)



## Options

- USB
- CD-R
- ZIP over email

## Imposes File/Directory structure on the media

- Transport Multiple XDS Submission Sets
- Each Submission Set has
  - Metadata describing documents
  - Documents
- Protocol structure of XDS imposed on file/directory organization

## Uses

- Release of documents to patient
- Manual (in pocket or email) transfer of documents
- Local display after receipt
  - Index.htm file required to support display
- These are manual operations!

# XDS Family of Profiles

- **XDS - the base**
- **XDM - exchange of XDS metadata and documents on Media**
- **XDR - exchange of XDS metadata and documents over reliable protocols**
- **XD\* - refers to XDS, XDM, XDR together**



# Cross-Enterprise Document Reliable Interchange (XDR)



# XDR

- Point-to-point transmission of XDS content over reliable communications
- Uses Provide and Register transaction [ITI-15] (Same as XDS)
- A new profile but really just documents how to use ITI-15 to perform point-to-point transfers.

## Reliable asynchronous point-to-point transfer of XDS metadata and documents

- **Online vs Offline**
  - Online = over direct TCP connection
  - Offline = over SMTP
- **XDS**
  - Online mode require
  - Offline mode optional
- **XDR**
  - Online mode optional
  - Offline mode required

- Receiver can forward metadata and documents to XDS
- Single Submission Set per transfer
  - More like XDS than XDM
- Optionally identify intended recipients