


IT Infrastructure: Profiles for Health Information Exchange

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Support Profiles

“Infrastructure for XDS”



Collection of profiles that support XDS

- Globally Consistent Time (CT profile)
- Patient Management (PIX/PDQ profiles)
- Node Authentication (ATNA profile)
- Audit Logging (ATNA profile)
- Authorization Assertions (XUA profile)
- Notification of Availability (NAV)
- Digital Signature (DSG)



Support Profiles

Consistent Time (CT)



Consistent Time Profile

- XDS describes a distributed system - time synchronization is critical
- Network Time Protocol (NTP) version 3 (RFC 1305) for time synchronization
- Actor must support manual configuration
- Required accuracy: 1 second
- Optionally Secure NTP may be used



Support Profiles

Patient Identifier Cross-referencing (PIX)



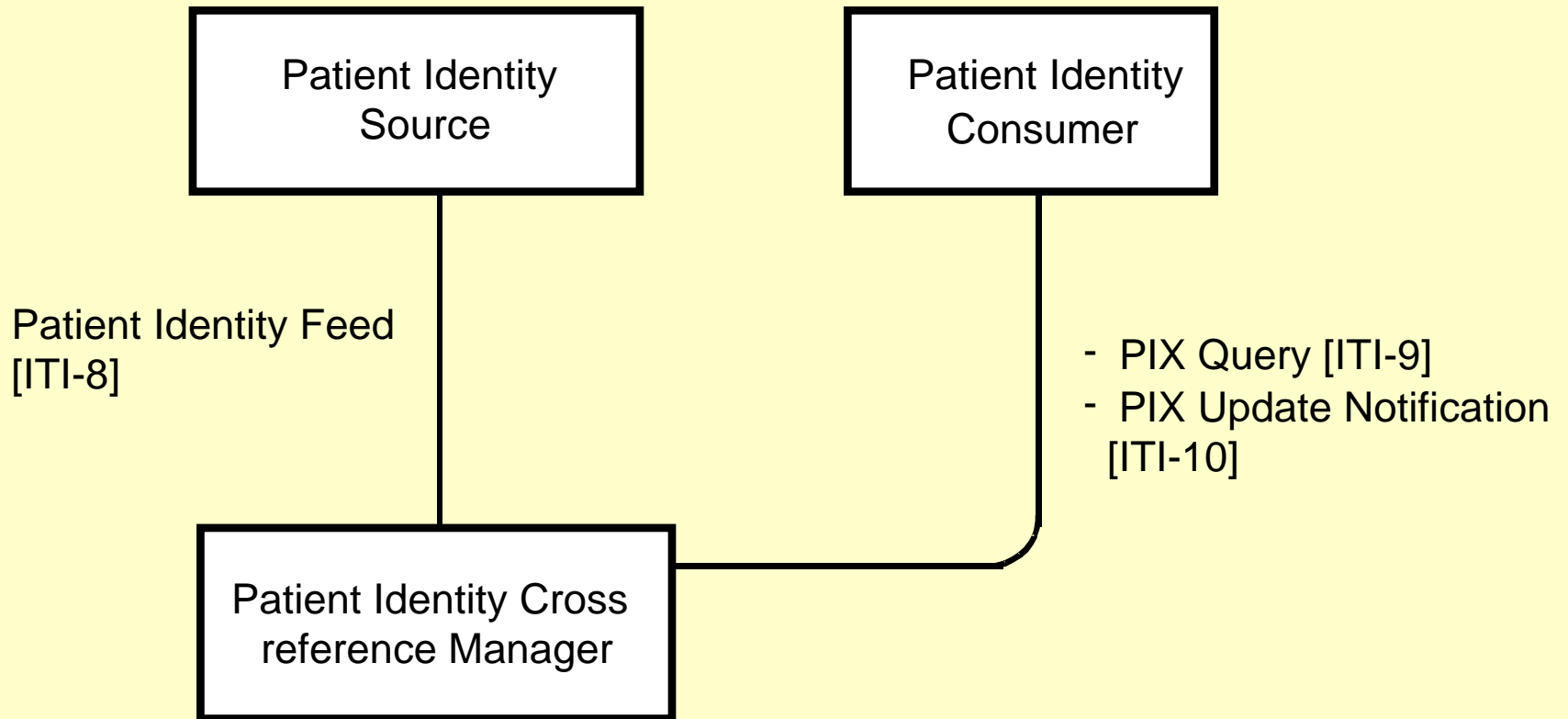
Patient Identifier Cross-referencing (PIX)

- Allow all enterprise participants to register the identifiers they use for patients in their domain
- Participants retain control over their own domain's patient index(es)
- Support domain systems' queries for other systems' identifiers for their patients
- Optionally, notify domain systems when other systems update identifiers for their patients

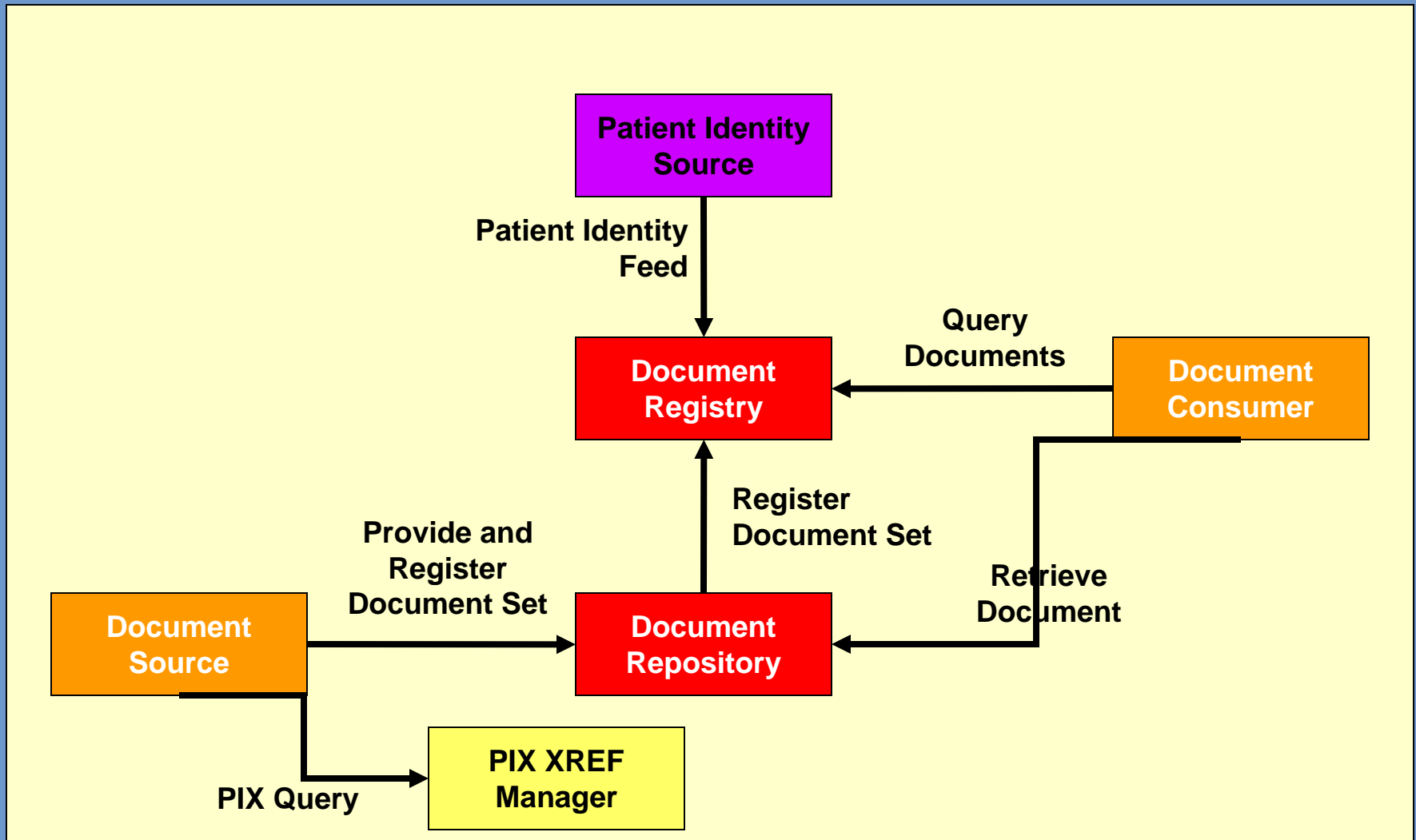
Patient Identifier Cross-referencing (PIX)

- **Maintain all systems' identifiers for a patient in a single location**
- **Use any algorithms (encapsulated) to find matching patients across disparate identifier domains**
- **Lower cost for synchronizing data across systems**
 - **No need to force identifier and format changes onto existing systems**

PIX Transaction Diagram



XDS: PIX integration



- **Patient Identity Source**

- **Definition**

- Assigns patient identities within its own domain
 - Notifies Patient Identifier Cross-reference Manager of all events related to patient identification (creation, merge, etc.)
 - Example: Registration (ADT) Actor in IHE Radiology Scheduled Workflow (SWF) Profile

- **Transaction Supported - Required**

- Patient Identity Feed [ITI-8] (as sender)

- **Patient Identifier Cross-reference Consumer**
 - **Definition**
 - Requires information about patient identifiers in other domains
 - Requests patient identifier information from Patient Identifier Cross-reference Manager
 - **Transaction Supported - Required**
 - PIX Query [ITI-9] (as sender)
 - **Transaction Supported - Optional**
 - PIX Update Notification [ITI-10] (as receiver)

- **Patient Identifier Cross-reference Manager**

- **Definition**

- Serves a well-defined set of Patient Identifier Domains
- Receives patient identifier information from Patient Identity Source Actors
- Manages cross-referencing of identifiers across domains

- **Transactions Supported - Required**

- Patient Identity Feed [ITI-8] (as receiver)
- PIX Query [ITI-9] (as receiver)
- PIX Update Notification [ITI-10] (as sender)

- **HL7 Version 2.5**
 - **ADT Registration and Update Trigger Events**
 - A01: inpatient admission
 - A04: outpatient registration
 - A05: pre-admission
 - A08: patient update
 - A40: merge patient
 - **Queries for Corresponding Identifiers (ADT^Q23/K23)**
 - **Notification of Identifiers Lists Updates (ADT^A31)**

- Patient ID management
- Translation of Patient IDs across Patient ID domains
- Patient ID feed
- Query & Notification of Cross Referencing

PIX as seen from XDS

- NOT a requirement
- XDS Affinity Domain allows only a single Assigning Authority for Patient IDs
- Implication: do your complex Patient ID management outside of the XDS environment
- To 'do' XDS, translate your Patient IDs to the Patient ID Domain (Assigning Authority) defined for the Affinity Domain.

Patient ID Responsibilities

Who must manage?

- Document Source
- Document Consumer
- (known as Edge Systems)

- Registry and Repository only see Assigning Authority defined for Affinity Domain
- (known as Infrastructure Systems)

Must translate local Patient ID to Affinity Domain Patient ID

- Use request to PIX Cross-Reference Manager
 - Translate PID X in local domain
 - To domain Affinity Domain
 - Return is PID in Affinity Domain

- Management of healthcare information always starts with a Patient
- Identified by name and demographics
- PDQ query translates name/demographics to pick-list of matching Patients
- Produces Patient ID in a domain

Registry has two uses for Patient ID

- **What are valid Patient IDs**
 - Consistency check against submitted documents
- **Handle request to Merge two Patient IDs**
- **PIX profile supplies both of these to Registry**



Support Profiles

Patient Demographic Query (PDQ)



Patient Demographics Query (PDQ)

- Allow quick retrieval of a patient list including common patient names, identifiers, contacts, and visit information
- Enable selection of correct patient when full identification data may not be available
- Limits access to only a subset of demographic and visit information

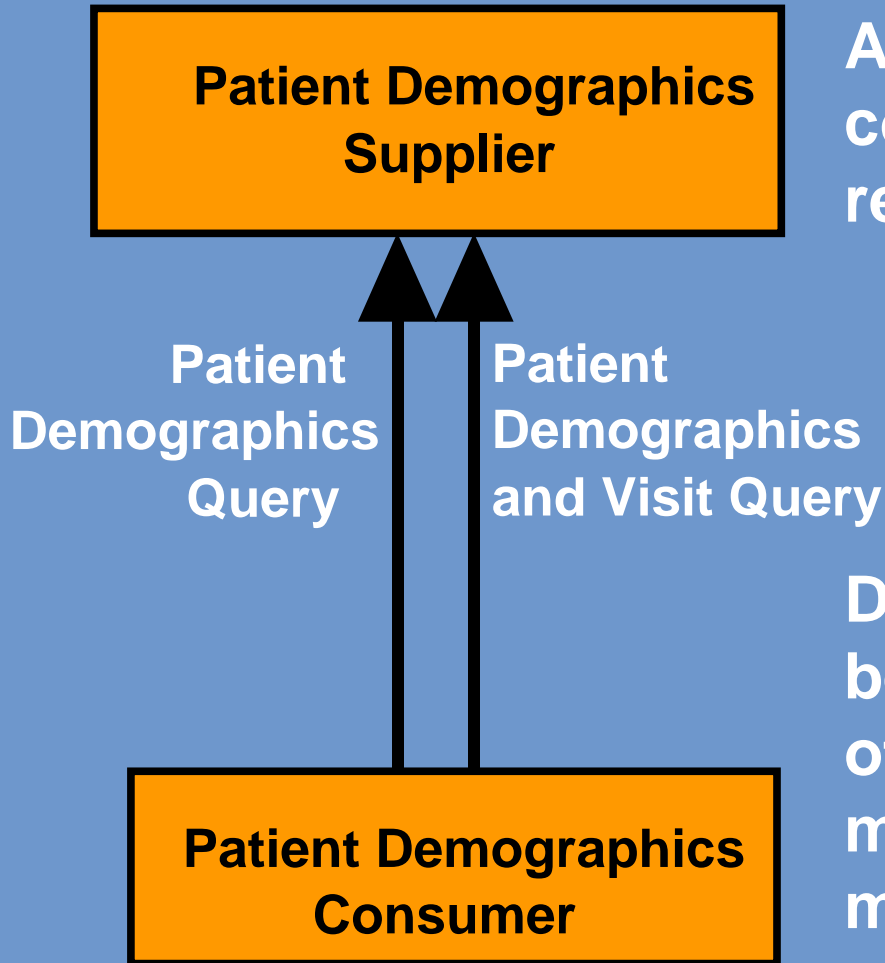
Patient Demographics Query (PDQ)

- Enables access on demand to diverse systems and devices
 - Participants that do not need continual synchronization of patient registration information
 - Devices that cannot participate in monitoring of ADT feeds, e.g.:
 - Small-footprint devices
 - Low-memory devices

Patient Demographics Query (PDQ)

- Allow search on full or partial data
- Retrieve information from any domain to which the client has query access
- Allows use of matching algorithm (e.g., soundex) to find near matches

PDQ Transaction Diagram



A departmental system that is connected on demand to the registration system.

Diverse systems including bedside monitors, physician office systems, lab applications, mobile blood bank registries; might be any system at the point of contact.

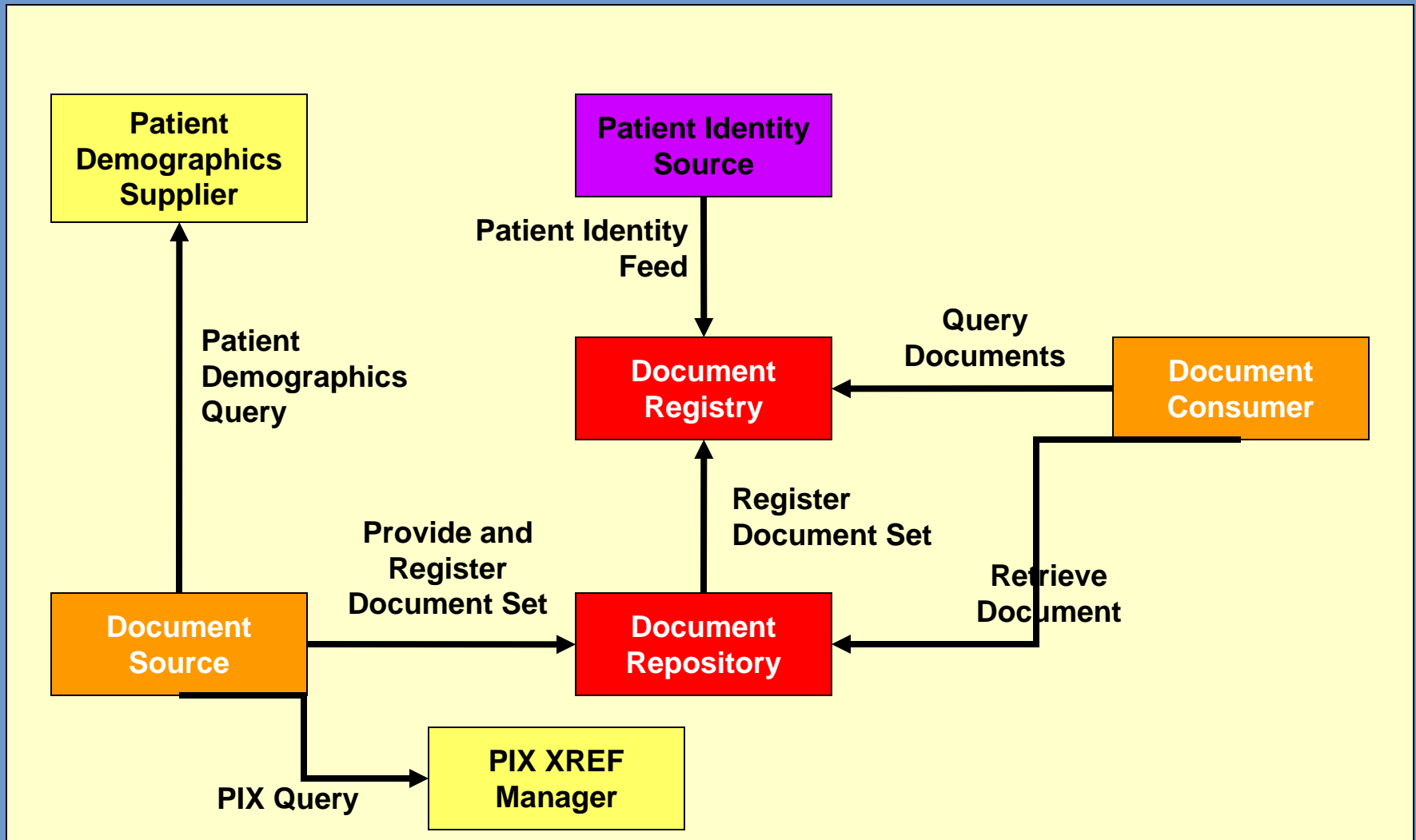
- **Employs HL7 Conformance Based Queries**
 - Defined in HL7 Version 2.5, Chapter 5
 - Profiles Query by Parameter (QBP^Q22) with Segment Pattern Response (RSP^K22)

- **Patient Demographics Consumer**
- **Definition**
 - Requestor of patient demographic (and perhaps current visit) information
 - Allows user to associate information with a patient at the point of care
- **Transaction Supported – Required**
 - Patient Demographics Query (as sender)
- **Transaction Supported – Optional**
 - Patient Demographics and Visit Query (as sender)

- **Patient Demographics Supplier**
- **Definition**
 - Repository of patient information that can be searched on demographic or visit-related fields
- **Transaction Supported – Required**
 - Patient Demographics Query (as receiver)
- **Transaction Supported – Optional**
 - Patient Demographics and Visit Query (as receiver)

- **Patient Demographics Query**
- User enters full or partial demographic information (e.g., partial last name and first initial) for patients of interest
- Application associated with Patient Demographics Consumer sends HL7 QBP^Q22 to Patient Demographics Supplier to find matching information
 - May request specific domains from which to return identifier information

XDS: PIX/PDQ integration





Support Profiles

Audit Trail and Node Authentication (ATNA)



Content Profiles



- XDS defines a mechanism for sharing 'Documents'
- 'Document' defined as a byte stream with a size, hash, and mime type
- Content Profiles are standardized document formats defined within IHE

- The following IHE Domains have defined XDS Content Profiles
- IT Infrastructure (ITI)
- Radiology
- Laboratory
- Patient Care Coordination (PCC)

XDS-SD

- Scanned document
- Stored in PDF format
- Wrapped in CDA/R2

Basic Patient Privacy Consents (BPPC)

- More than a Content Profile
- Includes privacy processing rules enforced by the Document Registry in queries

XDS-I (XDS for Imaging)

- Normal XDS actors plus
 - Image Document Source (extension to XDS Document Source)
 - Image Document Consumer (extension to XDS Document Consumer)
 - Image Document Source stores Radiology images locally in Image Archive
 - Image Manifest Document stored in XDS Repository
 - Manifest (also called Key Object Select - KOS) references specific DICOM content in Image Archive

Retrieving Radiology Content

- Query Registry, receive metadata
 - Metadata describes Image Manifests
- Choose and retrieve Image Manifest(s) from Document Repository
- Decode Manifest and retrieve Image content from Image Archive

- Lab Report

Many, many Clinically oriented Content Profiles

XDR / XDM

Point-to-point transmission
of documents



Cross-Enterprise Document Media Interchange

Big Picture

Documents and XDS Metadata shared
via media

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!

Cross-Enterprise Document Reliable Interchange

Cross-Enterprise Document Reliable Interchange (XDR)

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

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

- Reliable transfer comes from ebMS Messaging Services Specification v2.0

- **Single Submission Set per transfer**
 - More like XDS than XDM
- **Optionally identify intended recipients**

How do XDR and XDM work with XDS?

- XDS Query/Retrieve can feed XDR/XDM transmission
- Point-to-point transfer via XDR/XDM can feed XDS submission



XCA

Cross-Community Access



Big Picture

- XDS defines the operation of an Affinity Domain (single Registry + ...)
- XCA defines interchange between multiple communities. An Affinity Domain is one type of community.

Features of an XCA community

- **Accept Query and Retrieve transactions from other communities**
 - Allows sharing of local documents
- **A community could be an Affinity Domain...or not.**

A few details

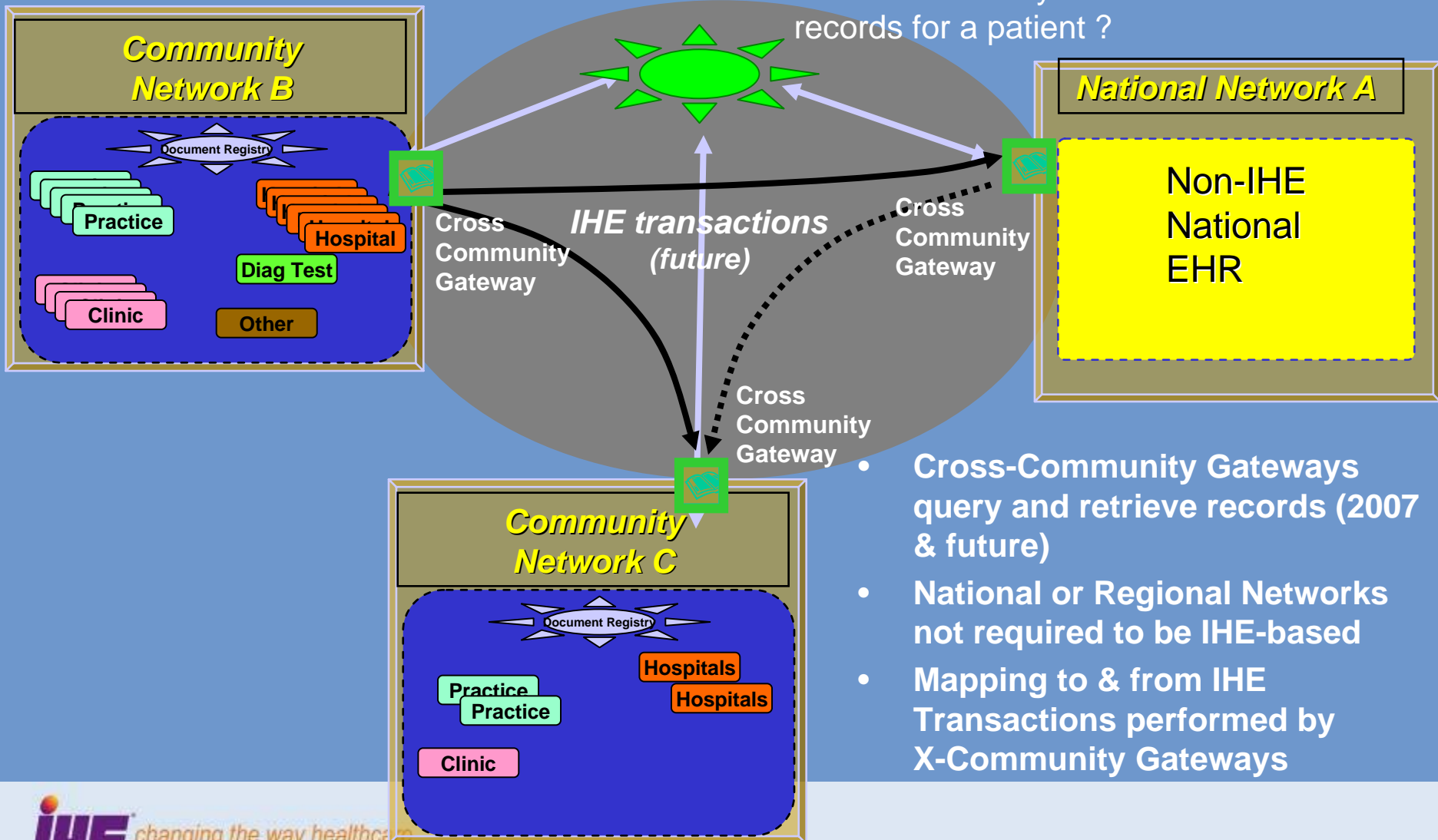
- **Uses Stored Query and XDS.b Retrieve to access foreign community content**
- **A query can be broadcast to multiple communities (document discovery)**
- **Introduces homeCommunityId to identify/address communities**
- **Uses ebRIM/ebRS 3.0 (like XDS.b)**

Tough problems still to be solved

- **Patient ID management**
 - How to manage translation between communities
 - PIX/PDQ provide some of the necessary features
- **Configuration Management**
 - How to translate/manage coding

XDS Cross Community...Access

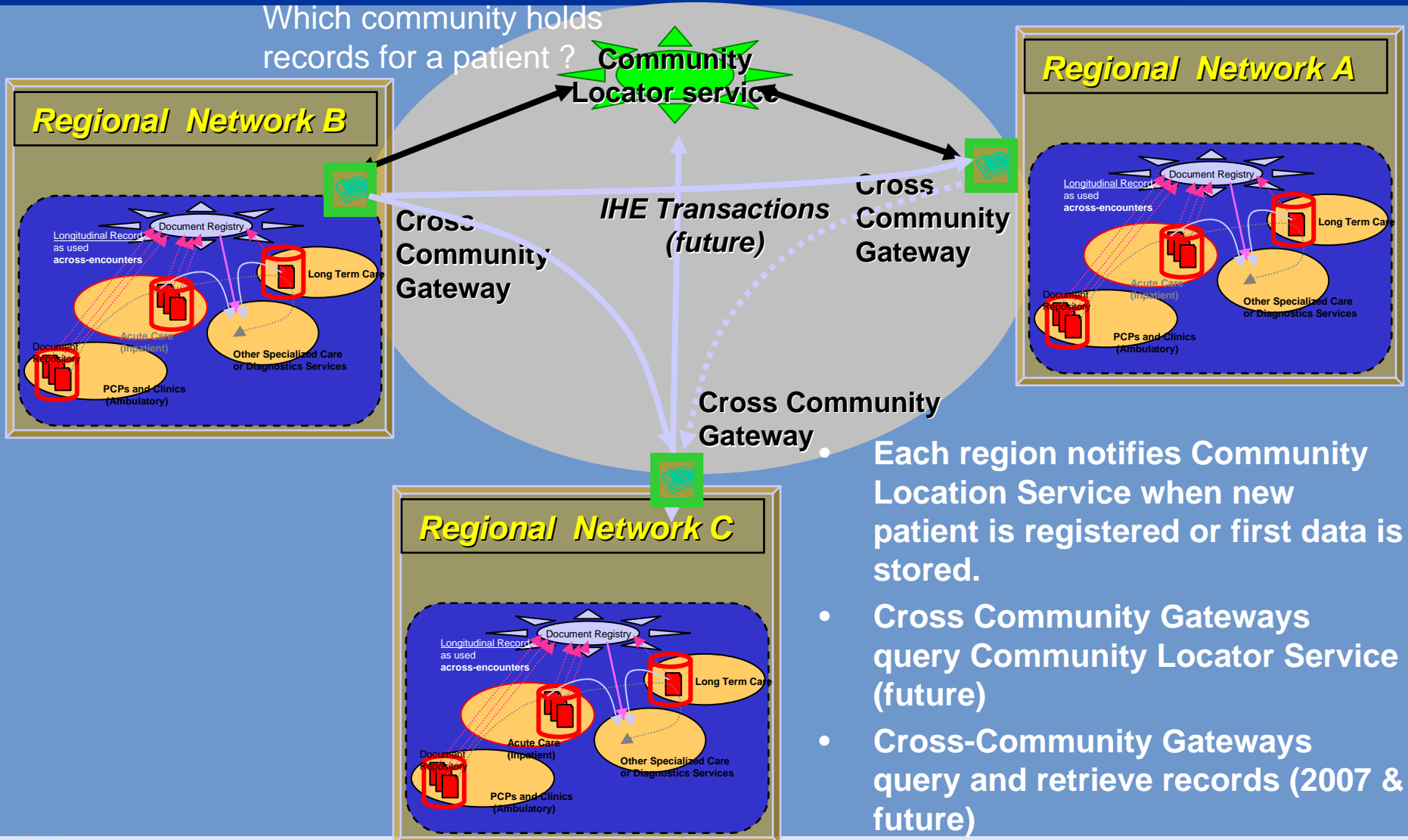
Which community holds records for a patient ?



- Cross-Community Gateways query and retrieve records (2007 & future)
- National or Regional Networks not required to be IHE-based
- Mapping to & from IHE Transactions performed by X-Community Gateways

Cross-Community...Location

Which community holds records for a patient?



Each region notifies Community Location Service when new patient is registered or first data is stored.

- Cross Community Gateways query Community Locator Service (future)
- Cross-Community Gateways query and retrieve records (2007 & future)

Other Cross-community Issues...

- **Management of Patient IDs**
 - Normally managed within Affinity Domain
- **Clinical Coding**
 - Normally managed within Affinity Domain

Cross Community Access: Value Proposition

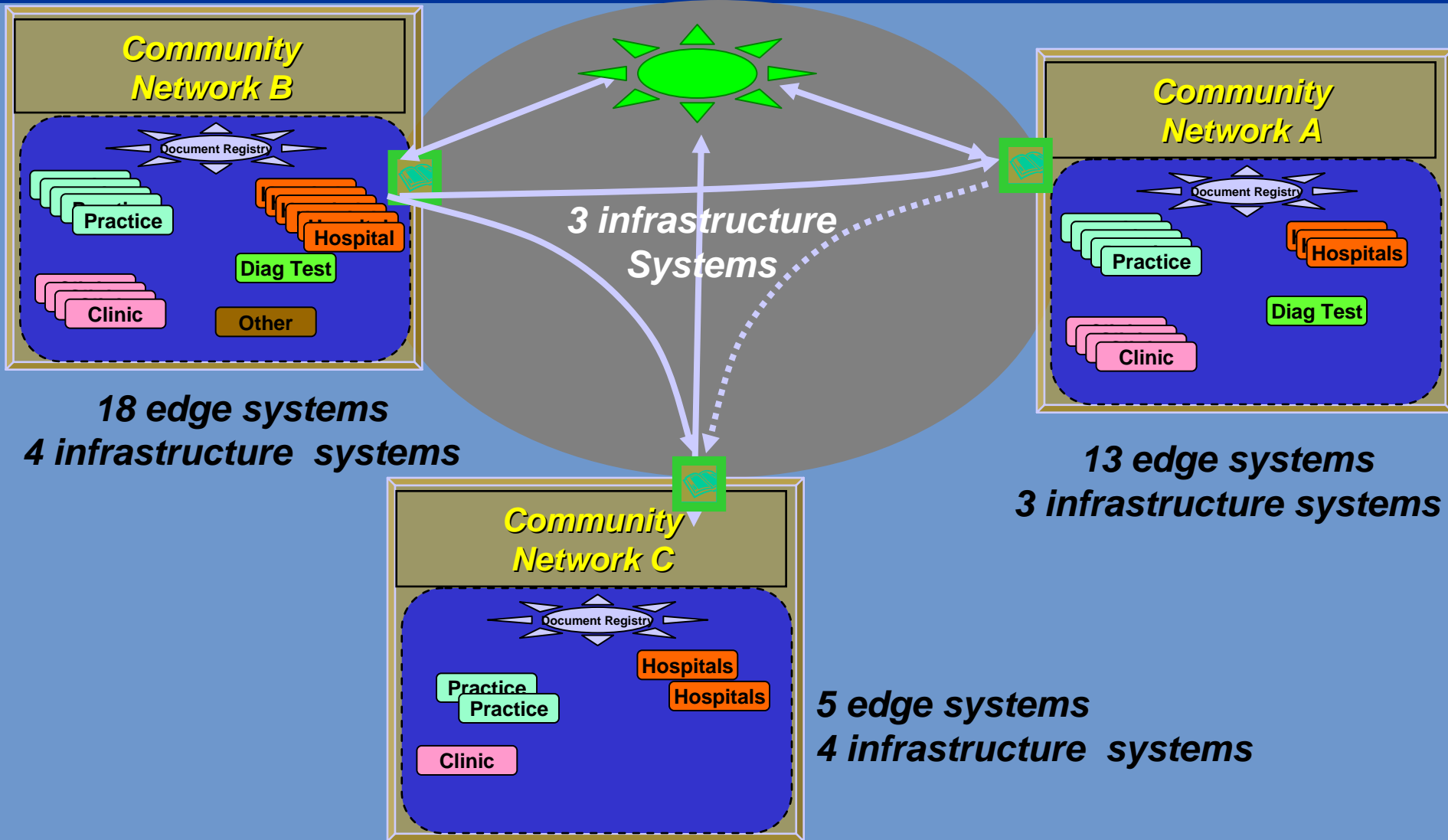
- Sharing of documents beyond the XDS Affinity Domain (community) boundary.
- Part of a larger vision for regional and national sharing – 2006 whitepaper on Cross Community Information Exchange
 - Cross Community Access (2007)
 - Cross Community Location (2008)
- Scoped to document sharing between XDS Affinity Domains. Future goal to define sharing with other types of communities.

Cross Community Access: Technical Solution

- **Cross Community Gateway**
 - A new actor which supports all inter-community communications. Encapsulates in one actor all activities required to communicate outside the community.
 - Every community would have one cross community gateway which would interact with actors within the community and remote cross community gateways.
- **Cross Community Consumer**
 - Initiator of a request for information beyond the community.
- **Technical Issues:**
 - Need for asynchronous transactions in the cross community environment
 - Interaction with existing XDS actors
 - Reliable identification of the patient

HIMSS Interoperability Showcase

The largest multi-vendor prototype ever built !



Patient Information Options

- **PIX Feed to Document Source/Consumer**
- **PDQ queries from Document Source/Consumer**
- **Use of Patient ID Cross-Referencing by Document Source/Consumer**

These are all optional within XDS!

Patient ID Merge



Issues

- Patient Management is an imperfect art
- Documents get assigned to the wrong Patient ID
- Multiple Patient IDs identify single Patient
- Single Patient ID identifies content for multiple Patients

- Merge Supplement starts to offer tools to manage these issues in XDS
- Relies on PIX notification of Patient ID related problem
- Current scope is to merge two Patient IDs that are found to represent same Patient
- Early work ... still evolving



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