

XDS on FHIR®

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Agenda - Using FHIR[®] to get access to XDS/XCA published Documents

- IHE & HL7 why together?
- Document Sharing – as a given
- FHIR[®] access to Documents
 - MHD → XDS on FHIR[®]
 - Support profiles: IUA, PDQm, PIXm, mCSD
- Decomposed into Elements/Resources
 - mXDE + QEDm
 - Using Provenance – to get back to source documents
- Conclusion
- Experiment

What is IHE?

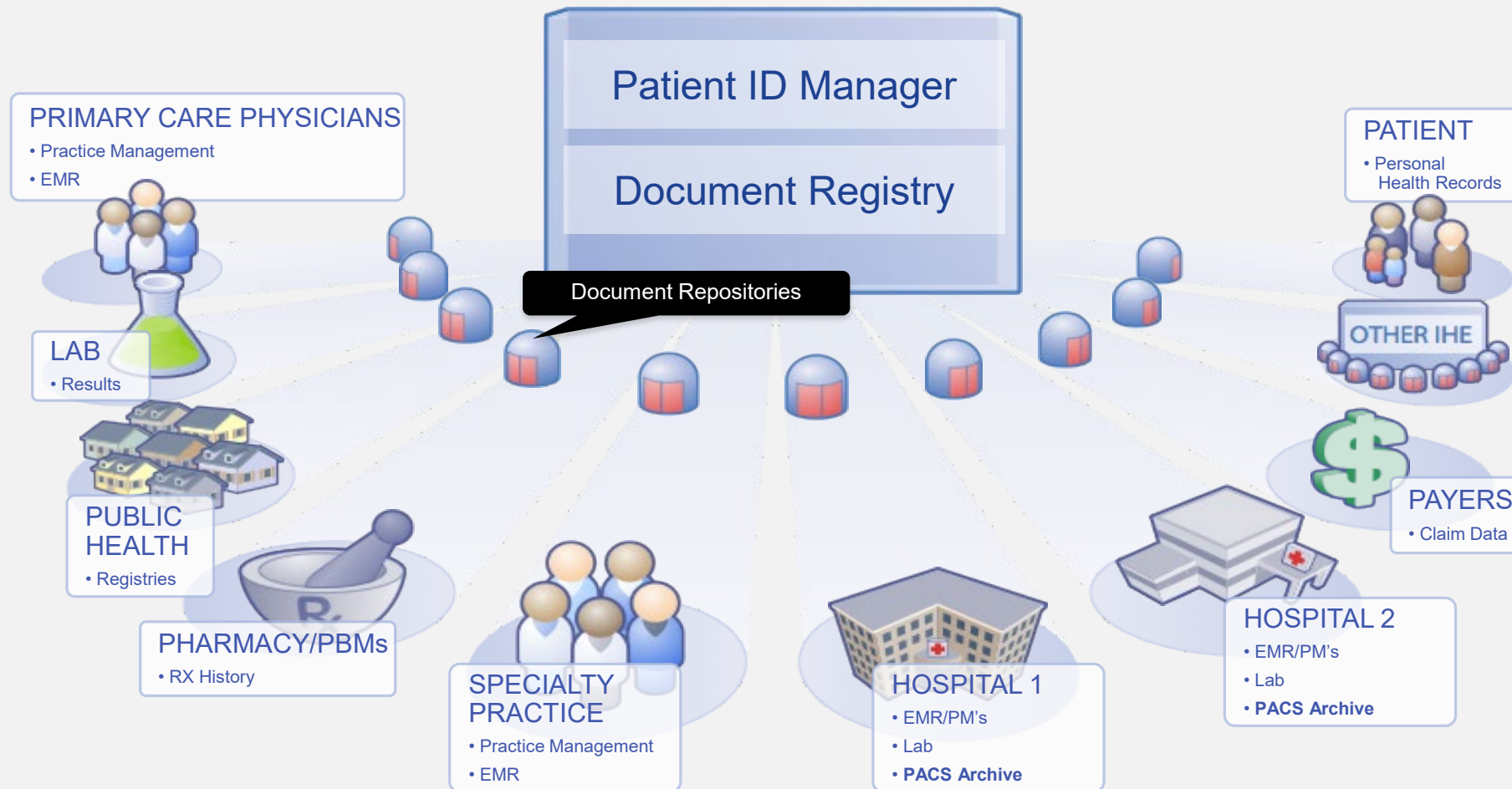
- “Integrating the Healthcare Enterprise” (IHE) is a global not-for-profit initiative with regional and national branches. It provides a pragmatic methodology ensuring interoperability between healthcare IT systems resulting in a body of technical and semantic specifications, which are published by IHE as Technical Framework(s).
- IHE is a joint initiative of users of healthcare IT systems and providers of such systems. IHE is governed by an international board that provides strategic direction and coordinates the technical development activities of IHE. In Europe, IHE is coordinated by IHE-Europe.
- IHE vision: *«Enable seamless and secure access to health information that is usable whenever and wherever needed»*

IHE and HL7[®]

- HL7[®] vision: «A world in which everyone can securely access and use the right health data when and where they need it.»
- Different Mission:
 - **HL7[®]** : «To provide standards that empower global health data interoperability»
 - **IHE**: «To improve healthcare by providing specifications, tools and services for interoperability. IHE engages clinicians, health authorities, industry, and users to develop, test, and implement standards-based solutions to vital health information needs»
- IHE doesn't provide standards, but provides profiles that uses existing standards in order to solve interoperability issues.
- Project GEMINI: IHE and HL7[®] working together on FHIR[®]
 - 5 Areas of collaboration
 - Development and tooling of «FHIR-based IHE profiles»
 - Publication of «FHIR-based IHE profiles»
 - Testing (FHIR-Devdays, FHIR[®] Connectathons, IHE Connectathons)
 - Identification and execution of pilot projects
 - Maintain joint messaging and marketing

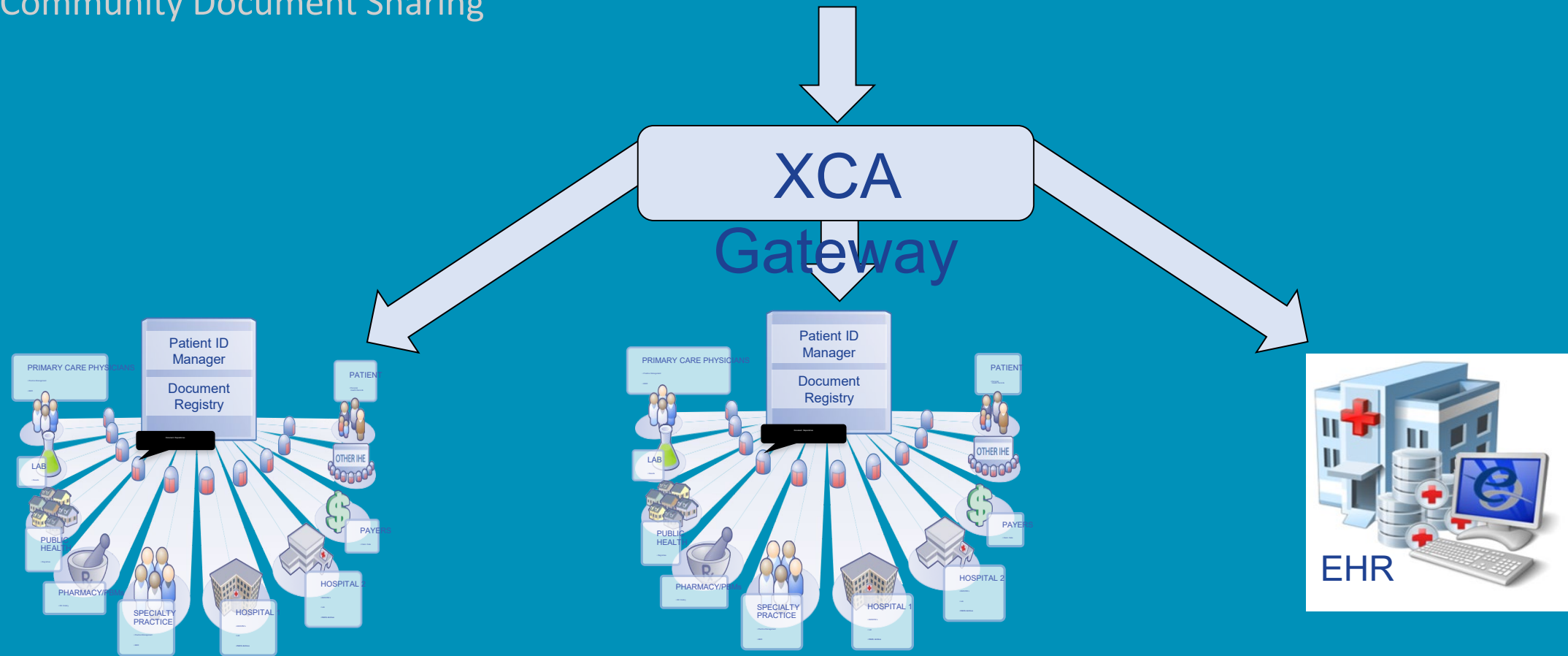
IHE Standards-based HIE (XDS)

Key Components



IHE Standards-based HIE (XCA)

Community Document Sharing

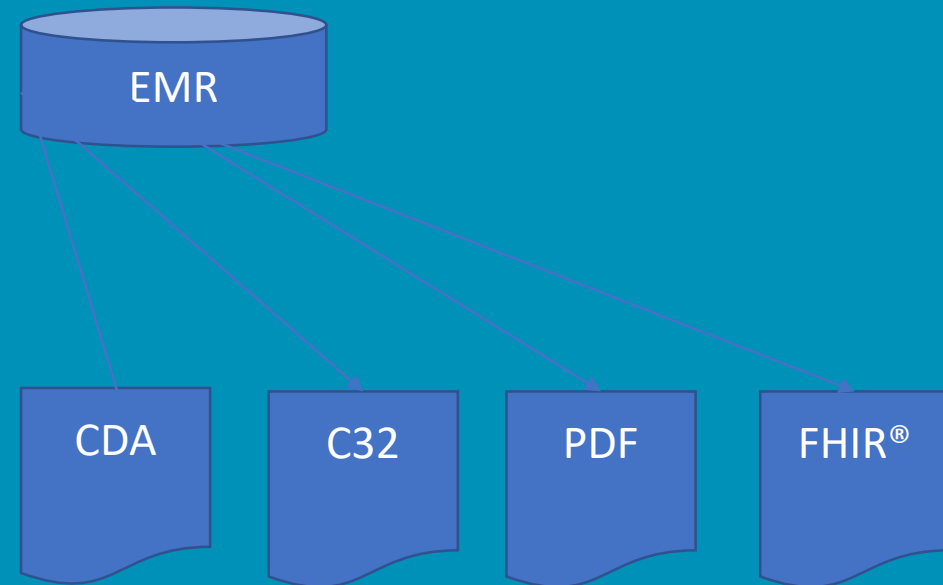


Principles of a Document

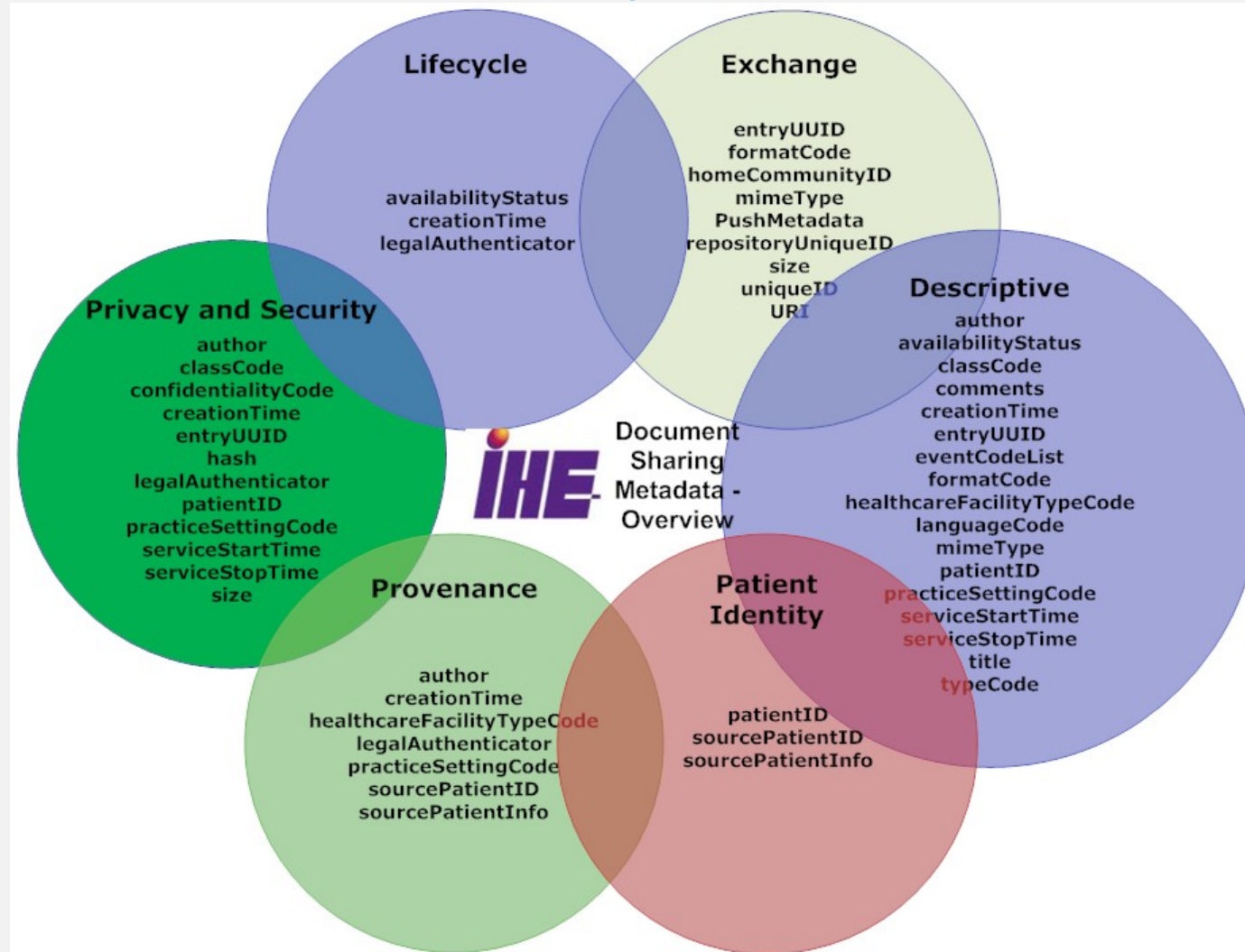
- **Persistence** – A Document continues to exist in an unaltered state, for a time period defined by local and regulatory requirements. Note documents outlive the servers (and often the syntax), on which they are created.
- **Stewardship** –A document is maintained over its lifetime by a custodian, either an organization or a person entrusted with its care.
- **Potential** for authentication - A clinical document is an assemblage of information that is intended to be legally authenticated.
- **Context** - A clinical document establishes the default context for its contents
- **Wholeness** - A document is a whole unit of information. Parts of the document may be created or edited separately, or may also be authenticated or legally authenticated, but the entire document is still to be treated as a whole unit.
- **Human readability** – a document is human readable

Various formats and encodings

- XDS/XCA are content agnostic
- Metadata enable discovery
- CDA, C-CDA, C32, etc
- FHIR® Documents
- DICOM Documents
- PDF/Text
- Graphics (JPEG, MPEG, TIFF...)
- Special (On-Demand, Delayed)



Metadata – enables discovery



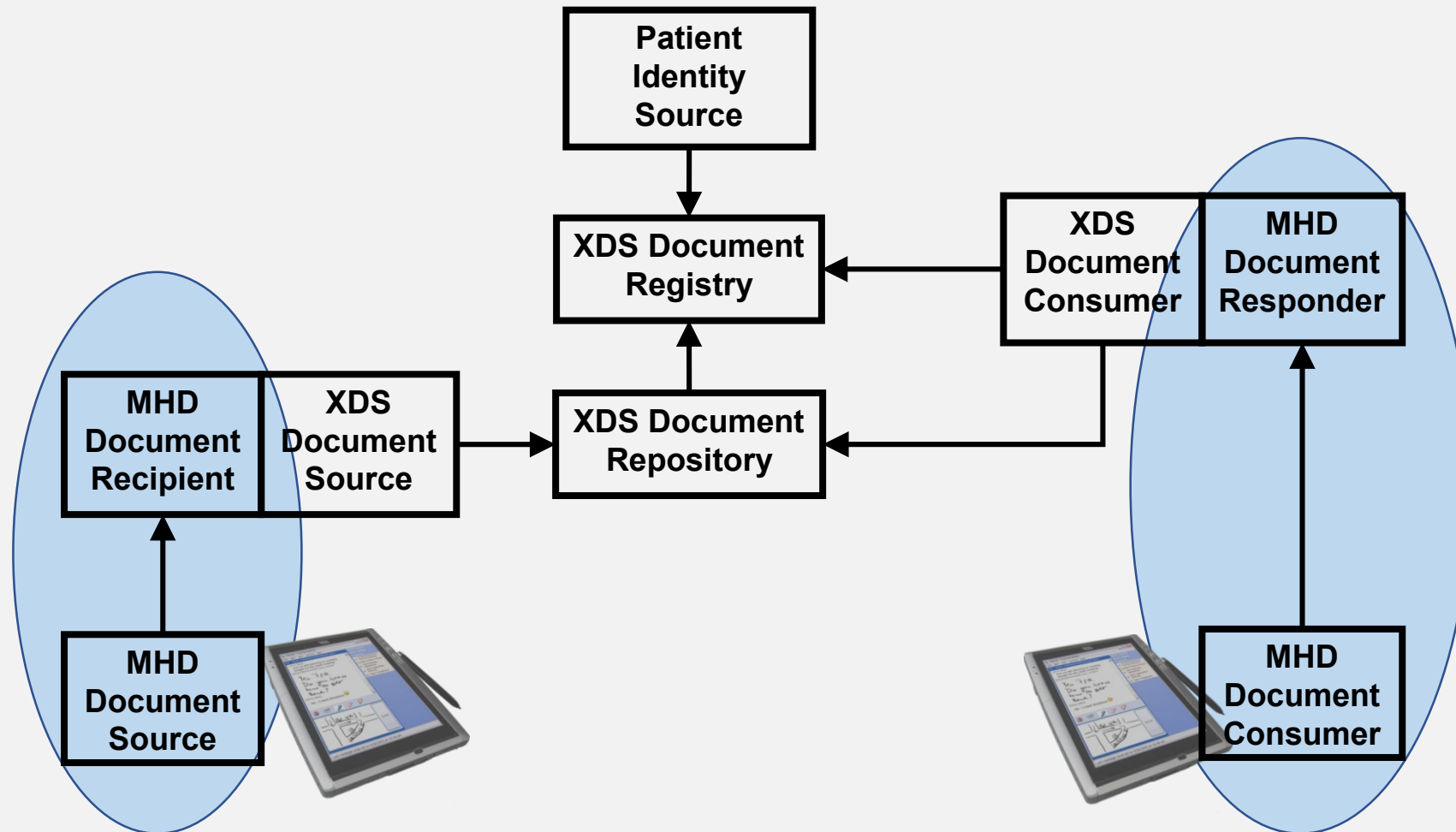
Mobile access to Health Documents (MHD)

Provide FHIR® based methods of publishing and accessing Document Sharing

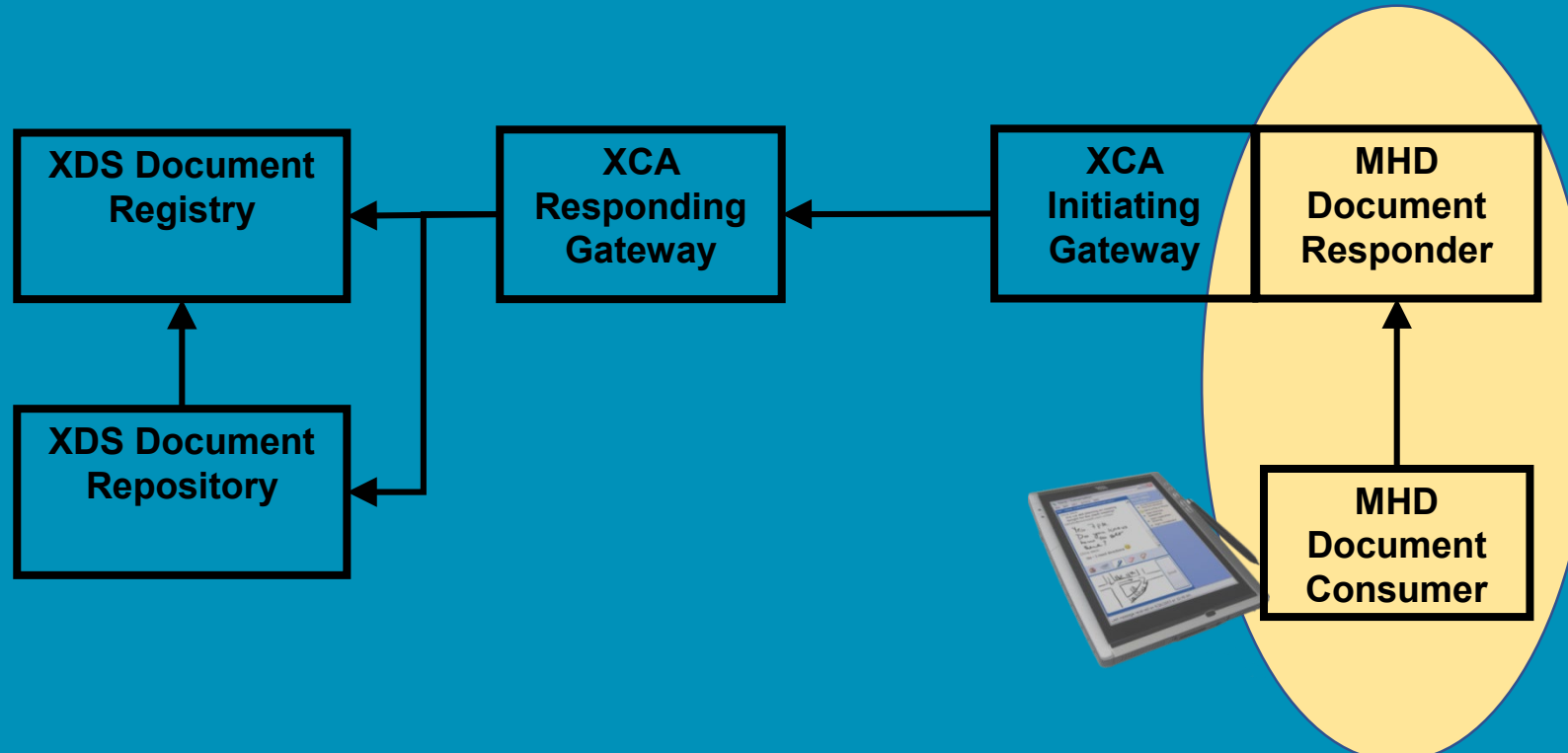
- Enable publication of Documents by Apps
- Enable Discovery of available documents by Apps
- Retrieval of the Document content
- XDS on FHIR®

- Details <https://wiki.ihe.net/index.php/MHD>

MHD as API to XDS



MHD as API to XCA

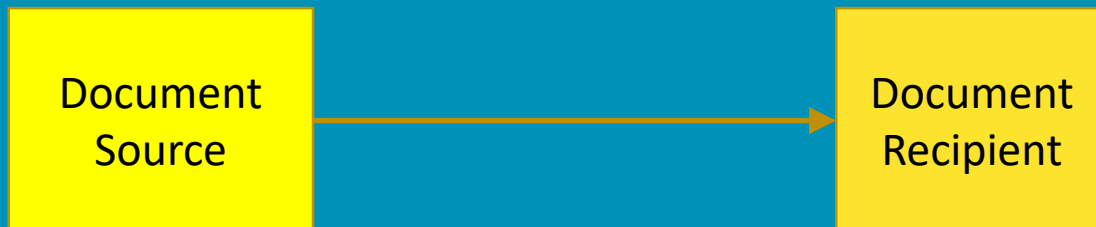


Support Profiles

- PDQm, PIXm – Patient lookup
- IUA – an Oauth profile complementary to SMART-on-FHIR®
- ATNA – secure http specification, and AuditEvent specification
- mCSD – Directory of Provider, Organization, and Health Services

Provide Document Bundle Transaction (Publication request)

- Publish
 - Used mostly with XDS Reg/Rep
 - to publish new documents, or
 - replace old documents with new
- Push
 - Used to send documents



Bundle (Create Transaction)

- DocumentManifest
- DocumentReference
 - Binary
- DocumentReference
 - Binary
- DocumentReference
 - Binary
- List (Folder)
- *Patient*

Query Transactions – simply normal FHIR® queries

DocumentReference

- Patient – required parameter
- classCode, practiceSetting, timeframe
- Others

DocumentManifest

- Patient – required parameter
- classCode, practiceSetting, timeframe
- recipient



Conformance Resources

- [IHE MHD Implementation Guide](#)
 - URI <http://ihe.net/FHIR®/ImplementationGuide/IHE.MHD>
 - [FormatCode CodeSystem](#)
 - URI <http://ihe.net/FHIR®/ValueSet/IHE.FormatCode.codesystem>
 - Identifier <urn:oid:1.3.6.1.4.1.19376.1.2.3>
 - [FormatCode ValueSet](#)
 - URI <http://ihe.net/FHIR®/ValueSet/IHE.formatcode.vs>
 - Identifier <urn:oid:1.3.6.1.4.1.19376.1.2.7.1>
 - Actor Capability Statements
 - [MHD Document Source](#) Actor CapabilityStatement
 - URI <http://www.ihe.net/FHIR®/CapabilityStatement/IHE.MHD.DocumentSource>
 - [MHD Document Recipient](#) Actor CapabilityStatement
 - URI <http://www.ihe.net/FHIR®/CapabilityStatement/IHE.MHD.DocumentRecipient>
 - [MHD Document Responder](#) Actor CapabilityStatement
 - URI <http://www.ihe.net/FHIR®/CapabilityStatement/IHE.MHD.DocumentResponder>
 - [MHD Document Consumer](#) Actor CapabilityStatement
 - URI <http://www.ihe.net/FHIR®/CapabilityStatement/IHE.MHD.DocumentConsumer>
- ## Structure Definitions
- [Document Manifest](#)
 - URI <http://ihe.net/FHIR®/StructureDefinition/IHE.MHD.DocumentManifest>
 - [List \(Folder\)](#)
 - URI <http://ihe.net/FHIR®/StructureDefinition/IHE.MHD.List>
 - [DocumentReference from Query with Comprehensive Metadata](#)
 - URI <http://ihe.net/FHIR®/StructureDefinition/IHE.MHD.Query.Comprehensive.DocumentReference>
 - [DocumentReference from Query with Minimal Metadata](#)
 - URI <http://ihe.net/FHIR®/StructureDefinition/IHE.MHD.Query.Minimal.DocumentReference>
 - [DocumentReference in Provide with Comprehensive Metadata](#)
 - URI <http://ihe.net/FHIR®/StructureDefinition/IHE.MHD.Provide.Comprehensive.DocumentReference>
 - [DocumentReference in Provide with Minimal Metadata](#)
 - URI <http://ihe.net/FHIR®/StructureDefinition/IHE.MHD.Provide.Minimal.DocumentReference>
 - [MHD Provide Document Bundle with Minimal Metadata \(ITI-65\)](#)
 - URI <http://ihe.net/FHIR®/StructureDefinition/IHE.MHD.ProvideDocumentBundle.Minimal>
 - [MHD Provide Document Bundle with Comprehensive Metadata \(ITI-65\)](#)
 - URI <http://ihe.net/FHIR®/StructureDefinition/IHE.MHD.ProvideDocumentBundle.Comprehensive>

Documents are not optimal for FHIR® clients

MHD eliminates the need to understand SOAP and ebXML . It does enable API use of JSON or simple XML.

But Document format not changed

- They are various formats (PDF, DICOM, CDA, CCR, etc)
 - CDA XML is not simple XML
- Apps tend to want summary without duplicates

Yet

- Apps will eventually need to know the integrity and authenticity of the data
- Apps may need to reference the source
- Many CDA today are just EHR data dumps – a Current Medical Summary
- FHIR® provides nice sized chunks

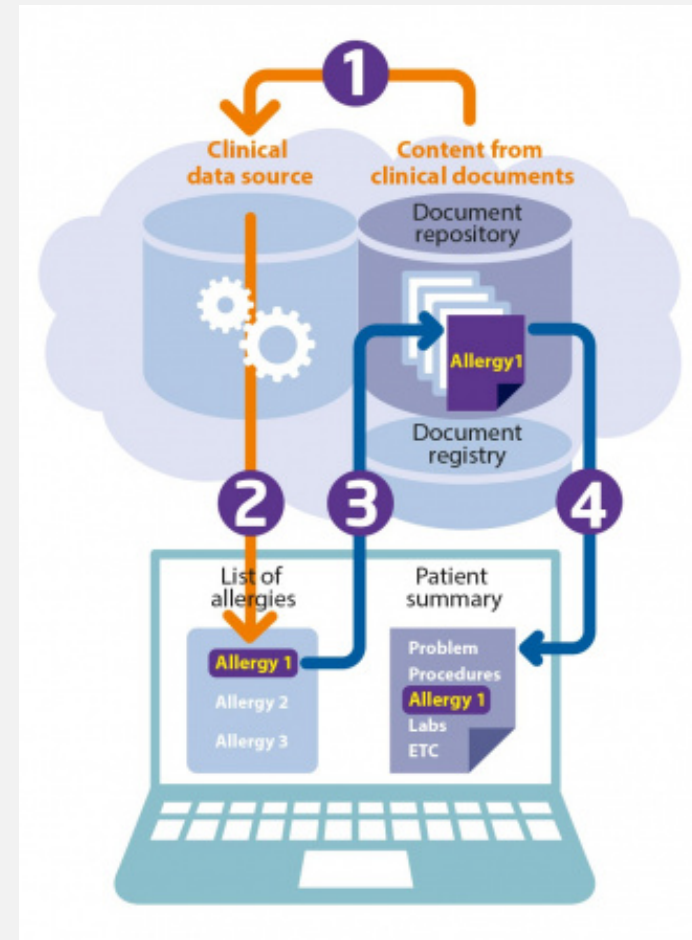
Note: MHD Retrieve Document could support service that converts the original document to FHIR®-Document

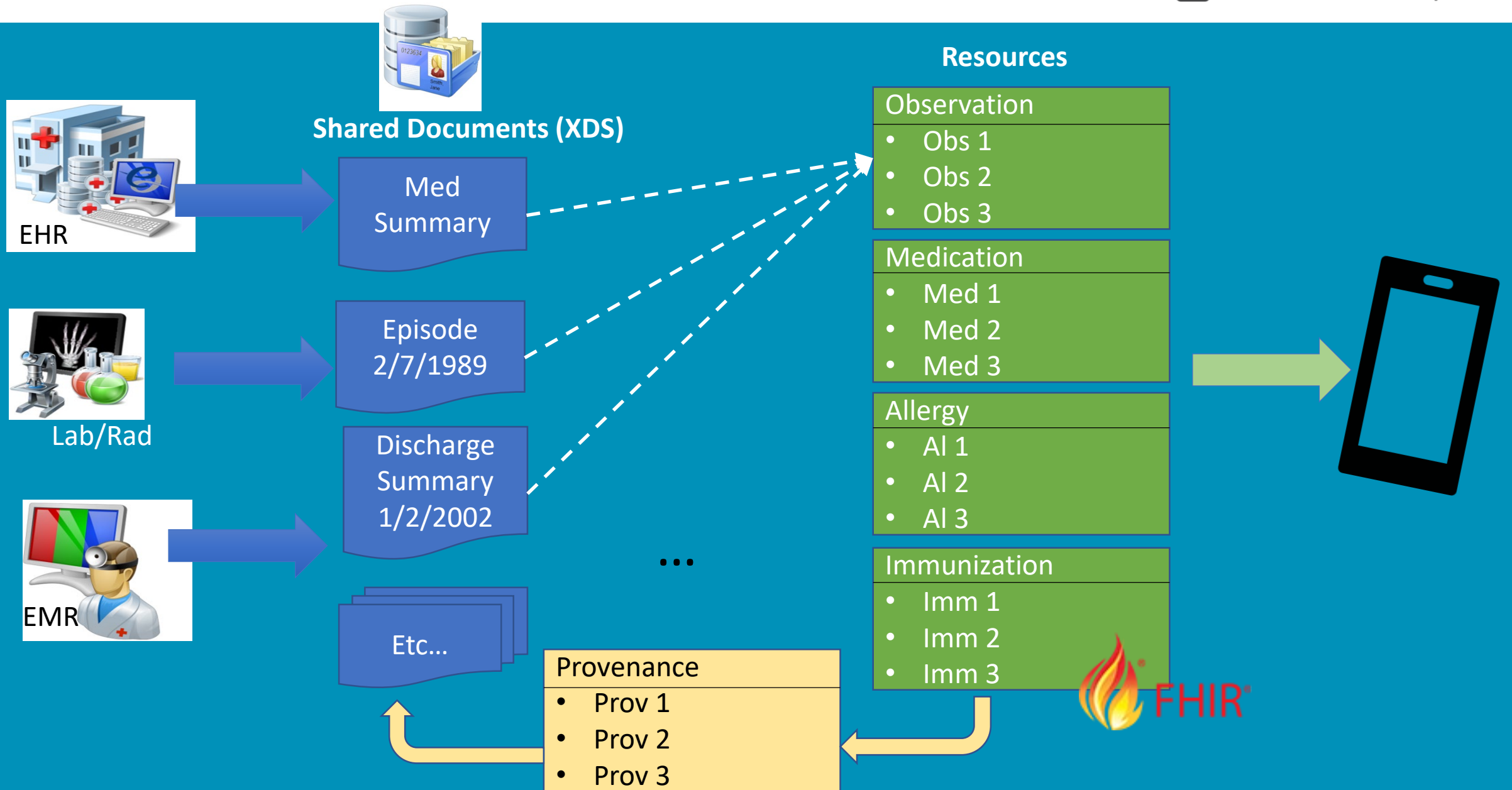
Query for Existing Data for Mobile (QEDm)

- Supports queries for clinical data elements (e.g., observations, allergies, etc.) by making the information widely available to other systems within and across enterprises
 - Aimed at class of systems that are resource- and platform-constrained (e.g., tablets, smartphones, and embedded devices including home-health devices)
- Observation,
 - AllergyIntolerance,
 - Condition,
 - DiagnosticReport,
 - Medication,
 - MedicationStatement,
 - MedicationRequest,
 - Immunization,
 - Procedure,
 - Encounter,
 - Provenance,
 - OperationOutcome,
 - Bundle

Mobile Cross-Enterprise Document Data Element Extraction (mXDE)

- Provides means to access data elements extracted from shared structured documents
- Enables the deployment of health data exchange infrastructures where fine-grained access to health data coexists and complements the sharing of coarse-grained documents and the fine-grained data elements they contain





Using Provenance

- Determine how often the issue is referenced (1 document vs all)
- Determine who has published the issue
- Pull the metadata -- DocumentReference
- Pull the Document
- Model for Provenance
 - One Provenance for each Document
 - Where a data Resource came from many documents, it will have many Provenance.target pointing at it
 - **Provenance.target** → 1..* Resources (the resources that came from this document)
 - **Provenance.recorded** → when the decomposition happened (might inform cache)
 - **Provenance.policy** == “urn:ihe:pcc:qedm:2017:document-provenance-policy”
 - **Provenance.agent** → the software “ASSEMBLER” that decomposed this document into these target Resources
 - **Provenance.entity** → the DocumentReference representing this document

Experiment

- Firely – servers have some DocumentReference given patient XXXX
- IHE-Connectathon tools
 - http://wiki.ihe.net/index.php/IHE_Test_Tool_Information
 - <http://ihe.wustl.edu/gazelle-na/home.seam> (requires you create an account)
- Simplifier published conformance resources
 - <https://wiki.ihe.net/index.php/MHD>

Conclusion

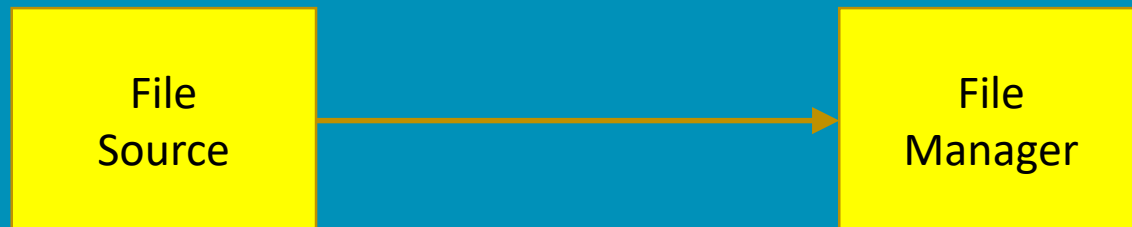
- Enabling technology for FHIR[®] accessibility of Document Sharing
 1. Document Metadata Query
 2. Publication of Documents
 3. Get Decomposed Resources
 4. Get Provenance, so that get source Document

Bonus Track- Non-patient File Sharing (NPFSm)

- XDS/XCA are used to share only documents that contains PHI.
- NPFSm is used to share files (documents that are not related to a patient) such as:
 - Stylesheet
 - Privacy policies
 - Workflow definitions
- NPFSm it's entirely FHIR[®] based. Does not has a Registry/Repository infrastructure behind.

Submit File Transaction

- Used to create a file and its related metadata.
- Or to update a prior file and its related metadata that does not need to be preserved.



Bundle (Create Transaction)

- DocumentReference
- Binary
- Other resources referenced by the DocumentReference resource

Update DocumentReference Transaction

- Used to update file's metadata without changing the file.
- HTTP PUT of the DocumentReference resource.



Search File Transaction

- FHIR query on DocumentReference resource
 - patient:exists=false (required parameter)
 - classCode, practiceSetting, timeframe
 - Others



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