



eHealth Exchange™

Document Submission Web

Services Specification - **DRAFT**

Version 3.0

Revision 006

<Date>

An initiative of



Contributors

Name	Organization	Role
Eric Heflin	eHealth Exchange	Author
Joe Lamy	AEGIS.Net	Author

Document Change History

Version	Date	Changed By	Items Changed Since Previous Version
3.0 r001	2020-01-19	Eric Heflin	Initial use case, functional requirements, technical specification and architectural diagrams.
3.0 r002	2020-05-13	Joe Lamy	Initial Draft in new format. Use cases content creation. Updated sequence diagram. Moved and edited prior NwHIN Doc Submission text and concepts. Created aux features matrix (to be incorporated).
3.0 r003	2020-05-20	Eric Heflin	Content changes. Added Security considerations, Auditing, Network-network considerations, eHx Hub considerations, and Sequoia test tool considerations initial text.
3.0 r004	2020-05-28	Joe Lamy	Added example messages, Informative specifications, Roadmap/Backlog, Operational Considerations. replaced HITSP C80 with links to value sets maintained in FHIR® R4. Refined many other sections.
3.0 r005	2020-08-02	Joe Lamy	Completed draft text for initial scope as well as Persistence and Provenance. Added requirements for compatibility with the TECCA QTF. Added potential Hub translations between XCDR and XDR transactions. Added Push Comparison Table.

3.0 r006	2020-TBD	Joe Lamy	Added FHIR mechanisms.

Document Approval

Version	Date	Approved By	Role
TBD	TBD	eHealth Exchange Technical Work Group	Approves all specifications for production use
TBD	TBD	eHealth Exchange Policy and Technical Committee	Approves all specifications for production use
TBD	TBD	eHealth Exchange Coordinating Committee	Approves all specifications for production use

Table of Contents

1	Preface	9
1.1	Introduction	9
1.2	Intended Audience.....	9
1.3	Focus of this Document.....	9
1.4	Scope	10
1.5	Intellectual Property Rights.....	10
1.6	Related Documents.....	10
1.6.1	Normative	10
1.6.2	Informative.....	14
1.7	Relationship to Other eHx Specifications	14
2	High Level Use Case Descriptions	15
2.1	Use Case Purpose.....	15
2.2	Use Case: Public Health Reporting Through Intermediary	16
2.2.1	Assumptions.....	16
2.3	Use Case: Reporting Clinical Events to Patient Home Community	17
3	SOAP Web Services Push API Description.....	18
3.1	Definitions.....	18
3.2	Assumptions.....	19
3.3	Triggers	20
3.4	Transaction Standard	20
3.5	Transaction Options.....	21
3.6	Technical Pre-conditions	22
3.7	Use Case Steps – “Nominal Flow”	22
3.8	Alternate Flows	23
3.8.1	Push to federated system	23
3.8.2	Patient id already obtained.....	23
3.8.3	Patient id is optional	23
3.8.4	No required patient match found.....	23
3.8.5	Patient match returned from different community	24

3.8.6	Multiple patient matches returned	24
3.8.7	Submission references existing metadata	24
3.8.8	Submission returns warning	24
3.9	Exception Flows	25
3.9.1	No compatible transmission option found	25
3.9.2	Incompatible option for Metadata-Limited Document Source	25
3.9.3	Submission returns error	25
3.10	Technical Post-Conditions	25
3.11	QTF Interoperability	25
3.12	Use Case Flow Requirements	26
3.13	Delayed Document Assembly	27
3.14	Deferred Mode	27
3.15	AS4 Asynchronous Web Services Exchange	28
3.15.1	QTF Interoperability	28
3.16	De-identified Documents	28
3.17	Message Requirements: Metadata Elements	28
3.17.1	QTF Interoperability	29
3.17.2	XSDDocumentEntry.sourcePatientId	29
3.17.3	XSDDocumentEntry.sourcePatientInfo	29
3.17.4	XSDDocumentEntry.patientId	29
3.17.5	XSDDocumentEntry.Hash	30
3.17.6	XSDDocumentEntry.Size	30
3.17.7	XDSSubmissionSet.patientId	31
3.17.8	XDSSubmissionSet.sourceId	31
3.17.9	Value Sets For Coded Attributes	31
3.17.10	Referencing Existing Metadata	33
3.18	Message Requirements: Updating Documents	33
3.18.1	Submitting updates to a previously submitted document	33
3.18.2	Submitting updates to a discovered document	34
3.18.3	Reflecting the Update in the Document	34
3.18.4	Reflecting the Update in the Document Metadata	34
3.19	Message Requirements: Other Document Relationships	35
3.20	Message Requirements: Folders	35

3.21	Message Requirements: Routing	36
3.22	Message Requirements: Provenance	36
3.22.1	Updating a document: Appending or replacing from the same source	36
3.22.2	Updating a document: Replacing from a different source	37
3.23	Processing Requirements: Overall Processing	37
3.23.1	QTF Interoperability	38
3.24	Processing Requirements: Patient matching	38
3.25	Processing Requirements: Routing	38
3.26	Processing Requirements: Persists Original Documents option	39
3.27	Processing Requirements: Existing Metadata	39
3.28	Processing Requirements: Document Relationships	40
3.29	Processing Requirements: Conflict Detection and Resolution	41
3.30	Processing Requirements: Folders and Submission Sets	42
3.31	Processing Requirements: Provenance	42
3.32	Processing Requirements: Additional Exception Checking	43
3.32.1	QTF Interoperability	43
4	HL7 FHIR Push API Description	44
4.1	Definitions	44
4.2	Assumptions	45
4.3	Triggers	46
4.4	Transaction Standard	46
4.5	Additional Options	48
4.6	Technical Pre-conditions	49
4.7	FHIR Usage Compared to SOAP/CDA	49
4.8	Use Case Steps – “Nominal Flow”	50
4.9	Alternate Flows	50
4.9.1	Patient already obtained	50
4.9.2	Patient is optional	50
4.9.3	No required patient match found	51
4.9.4	Patient match returned from different community	51
4.9.5	Multiple patient matches returned	51

4.9.6	Submission references existing metadata	51
4.9.7	Submission returns warning	52
4.10	Exception Flows	52
4.10.1	No compatible transmission option found	52
4.10.2	Incompatible option for Metadata-Limited Document Source	52
4.10.3	Submission returns error	52
4.11	Technical Post-Conditions	52
4.12	Use Case Flow Requirements	53
4.13	Message Requirements: Common FHIR Requirements.....	53
4.14	Message Requirements: FHIR External Document Option	54
4.15	Message Requirements: FHIR Documents.....	55
4.16	Message Requirements: Metadata Elements.....	56
4.16.1	DocumentReference.context.sourcePatientInfo	56
4.16.2	DocumentReference.subject	57
4.16.3	DocumentReference.content.attachment.hash	57
4.16.4	DocumentReference.content.attachment.size	57
4.16.5	DocumentManifest.subject	58
4.16.6	DocumentManifest.sourcelid	58
4.16.7	Value Sets For Coded Attributes	58
4.16.8	Referencing Existing Metadata	60
4.17	Message Requirements: Updating Documents.....	60
4.17.1	Submitting updates to a previously submitted document	60
4.17.2	Submitting updates to a discovered document.....	60
4.17.3	Reflecting the Update in the Document	61
4.17.4	Reflecting the Update in the Document Metadata	61
4.18	Message Requirements: Other Document Relationships.....	61
4.19	Message Requirements: Folders.....	62
4.20	Message Requirements: Routing	62
4.21	Message Requirements: Provenance	62
4.21.1	Updating a document: Appending or replacing from the same source	63
4.21.2	Updating a document: Replacing from a different source	63
5	Security Considerations	64

6	Auditing	64
7	Operational Considerations	65
7.1	Directory Settings	65
8	Network-network Considerations	66
9	eHx Hub Considerations	66
9.1	Hub Translation: XDR Initiating Participant to XCDR Receiving Participant	66
9.2	Hub Translation: XCDR Initiating Participant to XDR Receiving Participant	67
10	Sequoia Test Tool Considerations	67
11	Roadmap/Backlog	67
12	Appendices	68
12.1	Validation Plan	68
12.2	Examples	68
12.2.1	Document Submission XDR Request Message	68
12.2.2	Document Submission XDR Response Message	72
12.2.3	Document Submission XCDR Request Message	73
12.2.4	Document Submission XCDR Response Message	73
12.3	Open issues	74
12.4	Closed issues	74
12.5	Push Comparison Table.....	75

1 PREFACE

1.1 Introduction

The eHealth Exchange (eHx) Web Service Interface specifications define the core set of standard services to be implemented by each Participant on the eHx network in order to securely exchange interoperable health information over the public Internet. The eHx consists of Health Information Exchanges, federal, state and county agencies, large Integrated Delivery Networks, Dialysis clinics, pharmacies, practices and more. The eHx also connects to other networks across the United States.

The eHx functional services provide discovery and information exchange capabilities and rest upon a foundational set of messaging, security, and privacy services.

This document presents the eHx Document Submission Web Service Interface specification version 3. The purpose of this service is to allow one Participant on the eHx to securely “push” data for a given patient to another Participant in a manner designed for automated process of interoperable clinical content.

1.2 Intended Audience

The primary audiences for this eHx specification are the individuals responsible for implementing software solutions such as project managers, CTOs, CISOs, software engineers, technical product managers, IT managers, operations staff, and other similar roles.

It’s expected that the reader should have a moderate degree of familiarity with IHE profiles, esp. XCPD, XCDR, XDR, XCA, XDS, ATNA, CT, XUA. The reader should also have awareness of foundational OASIS standards such as WS-Addressing and SAML.

1.3 Focus of this Document

This document defines the eHx Document Submission Web Service Interface Specification. The purpose of this service is to provide the ability to “push” data for a given patient from one Participant to another. This “directed push” is a different model of exchange than subscription (also called “push notifications”), because with directed push, the sender explicitly sends the data to a receiver, while with subscriptions, the receiver is just one of potentially many subscribers. Another potential deployment is that directed push could implement a subscription where the subscription mechanism is managed out-of-band.

1.4 Scope

This specification defines:

1. The ability for one Participant to push data for a patient to another Participant,
2. Conditional persistence and provenance requirements for pushed data,
3. Compatibility requirements for interacting with participants on the TEFCA QTF,
4. eHx Hub behavior to perform translations between different push transactions..

This specification does not define:

1. The ability to push data for multiple patients,
2. The ability to push data for a deidentified patient,
3. The ability to push aggregate data not tied to specific patients,
4. The ability to push data unrelated to patients,
5. The ability to push data in response to a subscription,
6. The ability to push data using means other than web services,
7. eHx Hub behavior to perform these transactions across multiple Participants for the same document (e.g., broadcast delivery).

Note: Provenance information is used to track authorship and identification of entities that have contributed to or changed data. In a Push context, provenance responsibilities can fall on both the Initiating and Receiving Participants. The requirements here do not fully encompass the provenance responsibilities of a system; they only cover the cases of pushing information to or receiving information from an external system. A comprehensive Provenance specification may eventually be written.

1.5 Intellectual Property Rights

This document is copyright© 2020 eHealth Exchange.

HL7®, CDA®, and FHIR® are registered trademarks of Health Level 7, and are used with permission.

1.6 Related Documents

1.6.1 Normative

This interface specification references the following standards for normative requirements. Specific deviations from or constraints upon these standards are identified below.

8. IHE IT Infrastructure Technical Framework

1. Org/SDO: Integrating the Healthcare Enterprise (IHE)

2. Version #: Revision 16.0 (2019-07-12)

3. Links to documents and sections of focus:

1. **[IHE ITI TF-1] Volume 1:**
https://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_TF_Rev16-0_Vol1_FT_2019-07-12.pdf

1. [Section 2.1](#) – Dependencies among Integration Profiles
2. [Section 2.2.15](#) – Cross-Enterprise Document Reliable Interchange (XDR) Brief description
3. [Section 15](#) – XDR Full documentation and use cases

2. **[IHE ITI TF-2b] Volume 2b:**
https://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_TF_Rev16-0_Vol2b_FT_2019-07-12.pdf

1. [Section 3.41](#) – Provide and Register Document Set-b (ITI-41)

3. **[IHE ITI TF-2c] Volume 2c:**

1. Note that Volume 2c has not been published yet. Its content currently exists only in supplements. We reference the XCDR supplement below.
2. Section 3.80 – Cross-Gateway Document Provide (ITI-80)

4. **[IHE ITI TF-2x] Volume 2x:**
https://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_TF_Rev16-0_Vol2x_FT_2019-07-12.pdf

1. [Appendix V](#) – Web Services for IHE Transactions
2. Note that Appendix Z has not been published yet. It's content currently exists only in supplements. We reference the Appendix Z supplement below.

5. **[IHE ITI TF-3] Volume 3:**
https://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_TF_Rev16-0_Vol3_FT_2019-07-12.pdf

1. [Section 4.0](#) – Metadata used in Document Sharing profiles

4. eHx Deviations or Constraints:

1. Only certain types of metadata are normatively adopted. See API Description for details.

5. Underlying Specifications:

1. ebXML 3.0: consists of

1. ebRS 3.0: <http://docs.oasis-open.org/regrep/regrep-rs/v3.0/regrep-rs-3.0-os.pdf>

2. ebRIM 3.0: <http://docs.oasis-open.org/regrep/v3.0/specs/regrep-rim-3.0-os.pdf>
2. MTOM 25 January 2005: <http://www.w3.org/TR/soap12-mtom/>
3. XOP 25 January 2005: <http://www.w3.org/TR/2005/REC-xop10-20050125/>
9. IHE IT Infrastructure Technical Framework Supplement: Cross-Community Document Reliable Interchange (XCDR)
 1. Org/SDO: Integrating the Healthcare Enterprise (IHE)
 2. Version #: Revision 1.4 – Trial Implementation (2017-07-21)
 3. Links to documents and sections of focus:
 1. IHE XCDR Supplement
https://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_Suppl_XCDR_Rev1.4_TI_2017-07-21.pdf
 2. Note: we do not refer to this supplement directly; it describes content to be integrated in the existing ITI Volumes. When we refer to that content in this specification, we use the destination volume, e.g. [IHE ITI TF-2c].
 4. eHx Deviations or Constraints:
 1. Only certain types of metadata are normatively adopted. See API Description for details.
 2. Only ITI-80 from this supplement is supported. The XDR Transmit Home Community Id option on ITI-41 is not supported.
 5. Underlying Specifications: None
10. IHE IT Infrastructure Technical Framework Supplement: Mobile access to Health Documents (MHD) With XDS on FHIR
 1. Org/SDO: Integrating the Healthcare Enterprise (IHE)
 2. Version #: Revision 3.2 – Trial Implementation (2020-08-28)
 3. Links to documents and sections of focus:
 1. IHE MHD Supplement
https://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_Suppl_MHD.pdf
 2. Note: we do not refer to this supplement directly; it describes content to be integrated in the existing ITI Volumes. When we refer to that content in this specification, we use the destination volume, e.g. [IHE ITI TF-2c].
 4. eHx Deviations or Constraints: None
 5. Underlying Specifications: [HL7 FHIR R4]
11. IHE IT Infrastructure Technical Framework Supplement: IHE Appendix on HL7® FHIR®
 1. Org/SDO: Integrating the Healthcare Enterprise (IHE)
 2. Version #: Revision 2.2 – Trial Implementation (2020-08-28)
 3. Links to documents and sections of focus:

1. IHE Appendix Z Supplement
https://www.ihe.net/uploadedFiles/Documents/ITI/IHE_ITI_Suppl_Appx-Z.pdf
2. Note: we do not refer to this supplement directly; it describes content to be integrated in the existing ITI Volumes. When we refer to that content in this specification, we use the destination volume, e.g. [IHE ITI TF-2x].
4. eHx Deviations or Constraints: None
5. Underlying Specifications: [HL7 FHIR R4]
12. **[HL7 FHIR R4]** Fast Healthcare Interoperability Resources (FHIR®)
 1. Org/SDO: Health Level 7 (HL7®)
 2. Version #: R4 (4.0.1): <http://hl7.org/fhir/R4/>
 3. Links to pages of focus:
 1. [Value set binding strengths](#)
 2. [classCode](#) value set
 3. [confidentialityCode](#) value set
 4. [eventCodeList](#) value set
 5. [formatCode](#) value set
 6. [healthcareFacilityTypeCode](#) value set
 7. [practiceSettingCode](#) value set
 8. [typeCode](#) value set
 4. eHx Deviations or Constraints:
 1. Value sets are adopted with conditions. See API Description for details.
 5. Underlying Specifications: These value sets were previously maintained at http://www.hitsp.org/ConstructSet_Details.aspx?&PrefixAlpha=4&PrefixNumeric=80 by HITSP, which is no longer an active standards body.
13. **[HL7 Basic Provenance]** HL7® Guidance: Basic Provenance for C-CDA and FHIR®
 1. Org/SDO: Health Level 7 (HL7®)
 2. Version #: Release 1 - US Realm:
http://www.hl7.org/implement/standards/product_brief.cfm?product_id=531
 3. eHx Deviations or Constraints:
 1. See Provenance sections for details.
 4. Underlying Specifications: [HL7® Data Provenance]
14. **[HL7 Data Provenance]** HL7® CDA® R2 Implementation Guide: Data Provenance
 1. Org/SDO: Health Level 7 (HL7®)
 2. Version #: Release 1 - US Realm:
http://www.hl7.org/implement/standards/product_brief.cfm?product_id=420
 3. eHx Deviations or Constraints:
 1. See Provenance sections for details.
 4. Underlying Specifications: None

15. **[IHE RECON]** IHE Patient Care Coordination Technical Framework Supplement: Reconciliation of Clinical Content and Care Providers (RECON)
 1. Org/SDO: Integrating the Healthcare Enterprise (IHE)
 2. Version #: Rev. 3.2 – Trial Implementation: https://www.ihe.net/uploadedFiles/Documents/PCC/IHE_PCC_Suppl_RECON_Re v3.2_TI_2016-11-11.pdf
 3. eHx Deviations or Constraints:
 1. See Provenance sections for details.
 4. Underlying Specifications: None
16. Trusted Exchange Framework and Common Agreement (TEFCA)
 1. Org/SDO: The Office of the National Coordinator for Health Information Technology (ONC)
 2. Version #: Draft 2 (2019-04-09): <https://www.healthit.gov/sites/default/files/page/2019-04/FINALTEFCAQTF41719508version.pdf>
 3. Sections of focus:
 1. **[TEFCA QTF]** Appendix 3: Qualified Health Information Network (QHIN) Technical Framework, Draft 1

1.6.2 Informative

This interface specification references the following standards for informative guidance:

17. **[HL7 eICR]** HL7® CDA® R2 Implementation Guide: Public Health Case Report, Release 2 - US Realm - the Electronic Initial Case Report (eICR) - referenced by high level use cases
 1. http://www.hl7.org/implement/standards/product_brief.cfm?product_id=436
18. **[HL7 RR]** HL7® CDA® R2 Implementation Guide: Reportability Response, Release 1, STU Release 1.0 - US Realm - referenced by high level use cases
 1. http://www.hl7.org/implement/standards/product_brief.cfm?product_id=470

1.7 Relationship to Other eHx Specifications

This specification is related to other eHx specifications as described below.

The [Messaging Platform](#) specification specifies a base set of messaging standards and web service protocols which must be implemented by each eHx gateway and applies to all transactions. All eHx inter-nodal messages are SOAP messages over HTTP using web services, and must be encrypted and digitally signed.

Informative: The eHx expects to adopt HL7® FHIR®-based transactions in the future.

The [Authorization Framework](#) specification defines the exchange of metadata used to characterize each eHx request. The purpose of that exchange is to provide the responder with the information needed to make an authorization decision for the requested function and to provide high-resolution audit-logging. Each initiating message must convey information regarding end user attributes and authentication using SAML 2.0 assertions.

Together, the Messaging Platform and the Authorization Framework define the foundational messaging, security and privacy mechanisms for the eHx.

The **eHx Directory Specification** defines the API for using the eHx Directory. In this transaction, Initiating Participants look up Receiving Participants in the directory.

The **eHx Hub Specification** defines common behavior of the eHx Hub across all transactions. Hub behavior specific to this transaction is included in this document and referenced by the Hub Specification.

In all cases, the data exchanged between Participants will involve the communication of individually identifiable health information (defined in 45 CFR Parts 160, 162, and 164). When individually identifiable information is exchanged, then each Participant must have a common understanding of the patient's identity. To facilitate a common understanding and prepare two Participants for spontaneous exchange of data that identifies a patient, the Participants may utilize the eHx [Patient Discovery](#) Interface specification to share the identity of patient between the exchanging Participants (see Section 3.17.4 for further details on the use of a patient identifier).

2 HIGH LEVEL USE CASE DESCRIPTIONS

2.1 Use Case Purpose

The focus in these use cases is to identify realistic and needed scenarios that drive specific feature needs from the Push capability, e.g. routing, patient identity, and exception handling. Use cases are a critical component of the specification as they are our benchmark; with use cases we can determine if the associated functional requirements, and the technical implementation specification are sufficient to meet our shared requirements. They also allow us to determine if there are gaps, or are unneeded features. Hence properly defined use cases are critical to the success of this implementation guide.

2.2 Use Case: Public Health Reporting Through Intermediary

A multi-state association of hospitals provides reportable conditions to several state recipients using Electronic Case Reporting (eCR).

A patient presents at a provider with symptoms consistent with COVID-19. The provider performs tests and records a clinical diagnosis in the patient's record. The EHR system evaluates the diagnosis against a set of trigger codes for reportable conditions and finds a match. The EHR system creates and pushes an Electronic Initial Case Report (eICR) [\[HL7 eICR\]](#) document for the patient to a public health reporting service, which acts as an intermediary to state Public Health Agencies (PHAs). The reporting service is a single clearinghouse already known to the EHR system, so no directory lookup is needed at the time of the event.

The reporting service opens the eICR and, based on the state rules for reporting, inspects the codes, patient address, and facility location, and determines the reportability of the condition, as well as the jurisdiction (i.e. which PHAs) to route it to. The reporting service pushes the eICR accordingly. If needed, the reporting service looks up PHAs in a service directory.

The reporting service then creates an HL7 Reportability Response (RR) CDA document [\[HL7 RR\]](#) and pushes it to the appropriate PHAs as well as back to the original EHR system. For this step, the reporting service needs to have retained the identity of the original sending system, which it uses to look that system up in a service directory.

2.2.1 Assumptions

There is no assumption that either the reporting service or any PHAs previously knew the patient. Thus, the sending EHR does not need to match to a known patient at either the reporting service or the agencies. The agencies will identify the patient locally if necessary based on demographics in the eICR. For example, this could be done to prevent duplicate reporting for the same patient event.

The sending EHR does not need to know about routing beyond the reporting service.

The reporting service looks up the "return address" for the RR using the Home Community ID of the sender in the metadata of the Push transaction.

The eICR and RR documents do not need to include full metadata when they are pushed.

The eICR and RR documents are not assumed at any of the destinations to be stored and made available for future queries.

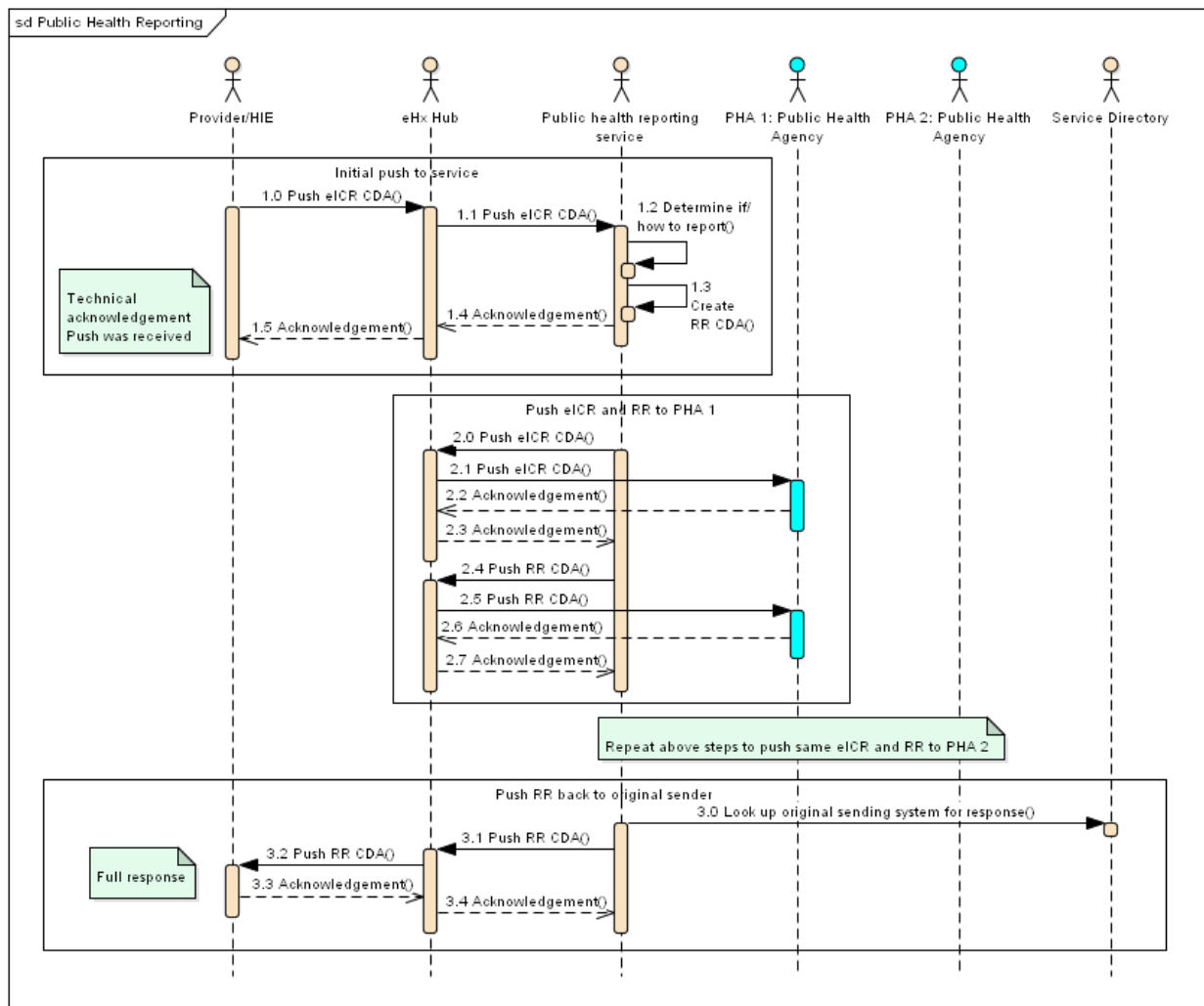


Figure 1 Public Health Reporting Through Intermediary

2.3 Use Case: Reporting Clinical Events to Patient Home Community

There are a number of scenarios whereby a patient obtains care outside of their normal patient home community, and the clinical events should be reported back to the patient home to be incorporated into the patient's record. For example:

1. A diagnosis of a communicable condition such as COVID-19 is confirmed.
2. A nationwide pharmacy has an agreement with a federal agency to report immunizations for that agency's patients to the agency.

For this use case we will detail the immunization reporting example.

Precondition: the nationwide pharmacy has an agreement with a federal agency to report immunizations for that agency's patients to the agency.

A patient gets an immunization at a pharmacy. The patient presents an identification card with their ID as known by the agency. The pharmacy system attempts to match the patient at the agency, passing the agency's patient ID as well as other patient demographics. Note that use of this ID greatly increases the chances of a positive match.

Finding the patient, the pharmacy system creates a document containing the encounter and immunization and pushes it to the agency. The immunization encounter document may include full metadata.

The agency has sufficient information to persist this document in the patient's record and make it available for future queries. Alternatively, the agency may import the clinical content into the patient's record and make available through natively generated documents.

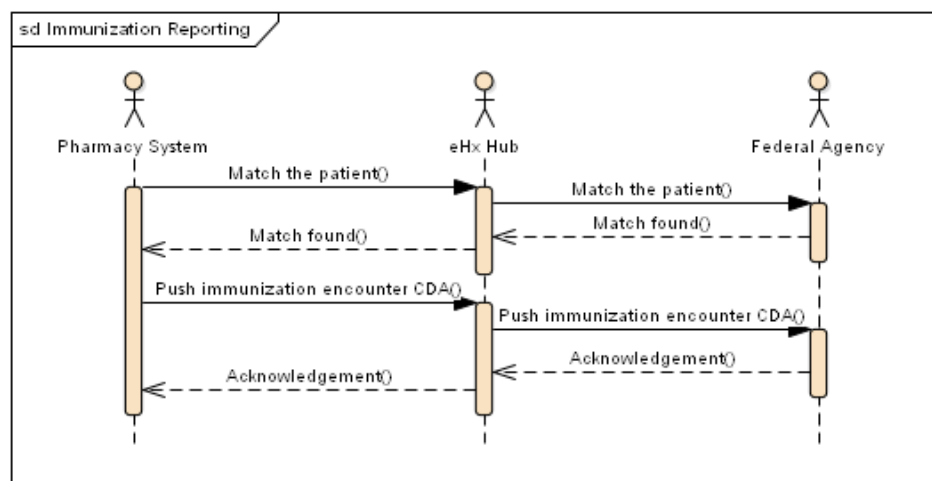


Figure 2 Reporting Immunization Events to Patient Home Community

3 SOAP WEB SERVICES PUSH API DESCRIPTION

3.1 Definitions

In this interface specification, a “document” refers to the format of clinical data as it is transferred between Participants, and not as it is stored within a Participant system or specific electronic health record (EHR) system. A Participant and its participating organizations may store clinical data in whatever format or repository they choose. Specifically, a “document” transferred

between Participants need not meet the criteria for persistence, stewardship, etc., as identified by the HL7 Structured Documents Working Group.

The following terms are defined based on which transaction option of the interface (XDR or XCDR) is implemented:

- The “Document Submission transaction” is a “push” of documents and metadata from an Initiating Participant to a Receiving Participant.
 - **CONF-XXX:** For the XCDR option, Document Submission SHALL correspond to the IHE ITI-80 Cross-Gateway Document Provide transaction.
 - **CONF-XXX:** For the XDR option, Document Submission SHALL correspond to the IHE ITI-41 Provide and Register Document Set-b transaction.
- An “Initiating Participant” initiates a Document Submission transaction for one or more available documents on a particular patient.
 - **CONF-XXX:** For the XCDR option, the Initiating Participant SHALL correspond to the Initiating Gateway actor.
 - Informative: Note that the XDR Metadata-Limited actor is not available for XCDR. Full metadata is required.
 - **CONF-XXX:** For the XDR option, the Initiating Participant SHALL correspond to either the Document Source actor or the Metadata-Limited Document Source actor.
- A “Receiving Participant” receives a Document Submission transaction.
 - **CONF-XXX:** For the XCDR option, the Receiving Participant SHALL correspond to the Responding Gateway actor.
 - **CONF-XXX:** For the XDR option, the Receiving Participant SHALL correspond to the Document Recipient actor.

Where requirements or guidance are identical regardless of the transaction option chosen, the more general Participant term is used. Where requirements or guidance are specific to the transaction option chosen, the IHE profile actor name is used.

CONF-XXX: In the context of the eHx Patient Discovery Interface specification, the Initiating Participant SHALL correspond to the Initiating NHIO, and the Receiving Participant SHALL correspond to the Responding NHIO.

3.2 Assumptions

The following assumptions underlie this interface specification:

- The primary expected use in the context of the eHx is that documents are formatted as XML data following the HL7® Clinical Document Architecture (CDA®) standard (used with permission), but nothing precludes this interface from being used to submit other kinds of documents, such as Adobe Portable Document Format (PDF) files or images.
- The patient to whom the document(s) pertain:
 - Is registered at one or more facilities at the Initiating Participant.
 - Has provided consent to share his or her clinical data, or such consent is not required by the business case under which the Document Submission is occurring; if consent is needed, the mechanism for providing this consent is the subject of the Access Consent Policies specification document.
- How a Participant determines to which other Participant to direct the transaction is not specified.

3.3 Triggers

The Initiating Participant, based on a human decision or an automated workflow, wants to submit document-related information about a patient to a Receiving Participant.

3.4 Transaction Standard

CONF-XXX: The eHx Document Submission transaction is defined with two transaction options:

- XDR Option: This utilizes the IHE ITI-41 Provide and Register Document Set-b transaction for the Cross-Enterprise Document Reliable Interchange (XDR) profile, defined in [\[IHE ITI TF-2b\] 3.41](#).
- XCDR Option: This utilizes the IHE ITI-80 Cross-Gateway Document Provide transaction for the Cross-Community Document Reliable Interchange (XCDR) profile, defined in [\[IHE ITI TF-2c\] 3.80](#).

The locations and versions of these specifications, as well as other foundational standards for this transaction, are listed in Section 1.6, “Related Documents”.

CONF-XXX: A Participant MAY support any combination of transaction options in either direction. Informative: For example, the XCDR option as an Initiating Participant and both options as a Receiving Participant.

CONF-XXX: If a Participant supports both transaction options, it SHALL ensure they function identically except where the transactions inherently differ. Informative: For example, any persistence or error handling implemented for one option must be the same on the other option.

CONF-XXX: Within the transaction options, Participants MAY support the following IHE profile options:

IHE Actor	Supported Options
XDR Document Source	
XDR Metadata-Limited Document Source	
XDR Document Recipient	Accepts Limited Metadata
XCDR Initiating Gateway	
XCDR Responding Gateway	

CONF-XXX: Unless otherwise specified, Participants SHALL follow all requirements for the respective IHE actors.

Informative: This specification does not include in its scope any grouping of the IHE actors except for the required groupings with ATNA and CT. Participants MAY adopt additional IHE groupings, but no expected behaviors are required.

3.5 Transaction Options

This interface specification defines the following additional options. See the Operational Considerations section of this document for Directory considerations.

- Receiving Participant
 - **Patient Id Required** option: A Receiving Participant that declares this option indicates that it requires a patient identifier known to it to be included in document metadata. This is not needed in the XDR transaction option unless the XDR Accepts Limited Metadata option is declared, as patient id is included with full metadata.
 - **Persists Original Documents** option: A Receiving Participant that declares this option indicates that it has the ability to persist the actual documents that are pushed to it, and make them available for subsequent query and retrieval using the eHx Query for Documents and Retrieve Documents transactions. Whether it actually does persist a given document is not specified, as this could be subject to security and privacy considerations (e.g. one author pushes a correction to a document from another author, or patient submits a document).

- **Persists Clinical Items** option: A Receiving Participant that declares this option indicates that it has the ability to parse documents that are pushed to it, extract and persist the clinical items within, and make those clinical items available for subsequent retrieval, e.g. within generated documents, or within FHIR queries. Which document types it can parse, whether it actually does persist items from a given document, and which items it persists, is not specified.

3.6 Technical Pre-conditions

The following technical pre-conditions exist for this interface specification:

- The document(s) being transmitted pertain to a specific, single patient.

3.7 Use Case Steps – “Nominal Flow”

Note: While the entire workflow is described here, the usage of the eHx Directory and the eHx Patient Discovery transaction are not detailed in this specification.

1. This use case begins when the Initiating Participant looks up another Participant that it wishes to push documents to in the eHx Directory.
2. The Initiating Participant obtains the Participant’s endpoints for eHx Patient Discovery and a Document Submission transaction option it supports from the Directory. The Initiating Participant examines the options declared by the Receiving Participant on the Document Submission transaction.
3. The Initiating Participant sends a Patient Discovery request to the Receiving Participant to attempt to match the patient by demographics.
4. The Receiving Participant compares the demographics to its known patients, and returns a Patient Discovery response to the Initiating Participant. The response contains a single patient match, including demographics and patient ID as known by the Receiving Participant.
5. The Initiating Participant sends a Document Submission request to the Receiving Participant. The request MAY include document entries (i.e. the objects containing document metadata) and the corresponding documents. See ITI-41 and ITI-80 as well as Section 3.17 for metadata requirements.
6. The Receiving Participant receives the metadata and the associated document(s), processes them as appropriate, and returns a Document Submission response. See ITI-41 and ITI-80 as well as Sections 3.23 through 3.32 for processing requirements.

3.8 Alternate Flows

3.8.1 Push to federated system

Additional precondition: the Initiating Participant supports the XCDR transaction option.

1. In step 2, the Receiving Participant found in the directory does not have any endpoints for Document Submission. However, the Initiating Participant locates a “parent Participant” in the directory that supports Document Submission with the XCDR transaction option.
2. The use case resumes at step 2, with the following changes:
3. The Parent Participant replaces the original Receiving Participant as the system the Initiating Participant interacts directly with.
4. In step 5, the Initiating Participant includes the Home Community ID for the target (i.e. child) Receiving Participant in the Document Submission request.
5. In step 6, the Parent Participant routes the request to the target Receiving Participant using unspecified mechanisms. The Parent Participant waits until the target Receiving Participant has acknowledged receipt before responding.

3.8.2 Patient id already obtained

1. In step 1, the Initiating Participant already has the patient identifier.
2. In step 2, the Initiating Participant skips obtaining the Patient Discovery endpoint.
3. The use case resumes at step 5.

3.8.3 Patient id is optional

1. In step 1, a patient id is optional (see Section 3.17.4, XDSDocumentEntry.patientId).
2. The Initiating Participant chooses to execute one of the following subflows:
 - a. Skip the patient match: in step 2, the Initiating Participant skips obtaining the Patient Discovery endpoint. The use case resumes at step 5.
 - b. Attempt the patient match anyway. The use case resumes. If the match fails for any reason, the Initiating Participant MAY end the use case or resume at step 5.

3.8.4 No required patient match found

1. In step 4, the Receiving Participant returns no match found, and the patient identifier is required, (see Section 3.17.4, XDSDocumentEntry.patientId).
2. The Initiating Participant may attempt to obtain the patient identifier by manual means.
3. If the patient identifier cannot be obtained, the Initiating Participant chooses to execute one of the following subflows:
 - a. Resume the use case at step 5, passing the value for sourcePatientId in the patientId attribute.

b. End the use case.

3.8.5 Patient match returned from different community

1. In step 4, the Receiving Participant returns a patient match from a different community.
2. The Initiating Participant looks up the Participant for that community in the eHx Directory, and obtains that Participant's endpoint for a Document Submission transaction option it supports. The Initiating Participant examines the options declared on the Document Submission transaction.
3. The use case resumes at step 5, with the following changes:
 - a. The new Receiving Participant replaces the original Receiving Participant.

3.8.6 Multiple patient matches returned

Informative: In eHx, the following are valid cases for multiple matches to be returned, reflecting multiple sources for data about the patient:

- Same HCID, different AAID
 - Different HCID (different community, covered in previous flow)
1. In step 4, the Receiving Participant returns multiple matches found. The Initiating Participant MAY choose to push the content to any or all of the matches. How it determines which is not specified.
 2. The use case resumes at step 5 for each patient match the Initiating Gateway wishes to push to.

3.8.7 Submission references existing metadata

Informative: this flow is used for replacing documents and other purposes.

Additional precondition: the Initiating Participant has knowledge of existing metadata at the Receiving Participant. This may happen in a number of ways - see Section 3.17.10, Referencing Existing Metadata.

1. In step 5, the Initiating Participant includes the new metadata, references to the existing metadata, and associations linking them, in the Document Submission.
2. The use case resumes.

3.8.8 Submission returns warning

1. In step 6, the Receiving Participant returns overall success for the submission, but also one or more warnings.
2. The Initiating Participant takes appropriate actions - these actions are unspecified.
3. The use case ends.

3.9 Exception Flows

3.9.1 No compatible transmission option found

1. In step 1, the Initiating Participant cannot find a compatible transmission option declared by the Receiving Participant.
2. The use case ends.

3.9.2 Incompatible option for Metadata-Limited Document Source

1. In step 1, the Initiating Participant declares itself to be an XDR Metadata-Limited Document Source and the Receiving Participant does not declare the XDR Accepts Limited Metadata option.
2. The use case ends.

3.9.3 Submission returns error

1. In step 6, the Receiving Participant returns overall failure for the submission: this means at least one error, and potentially warnings.
2. The Initiating Participant takes appropriate actions - these actions are unspecified.
3. The use case ends.

3.10 Technical Post-Conditions

The following technical post-conditions will result after the execution of this interface specification:

- Any documents or clinical items that were persisted are available for subsequent query and retrieval using the eHx Query for Documents and Retrieve Documents transactions.
- Audit logs as defined in Section 6 have been recorded.

3.11 QTF Interoperability

Informative: The [\[TEFCA QTF\]](#) will have its own directory. Assuming at this point that the eHx directory will be populated to include QTF entries, and that eHx entries will be pushed to the QTF directory, so that participants can operate as normal. QTF entries in the eHx directory will not have any of the eHx-specific options defined except for the XCDR transaction option. In addition, eHx systems declaring eHx options in the QTF directory will not have those options shown. This should not be a problem, as we have written robust handling requirements.

Further, we don't know at this point how federated systems will show up.

3.12 Use Case Flow Requirements

This table shows the required flows from the Push use case for the Initiating (I) and Receiving (R) Participants.

Rqmt #	Flow	I/R	Required to Support
CONF-XXX	Nominal Flow	I/R	SHALL
CONF-XXX	Push to federated system	I/R	SHALL if supports XCDR transaction option
CONF-XXX	Patient id already obtained	I	MAY
CONF-XXX	Patient id already obtained	R	N/A
CONF-XXX	Patient id is optional	I	SHALL
CONF-XXX	Patient id is optional	R	MAY
CONF-XXX	Patient match returned from different community	I	SHALL
CONF-XXX	Patient match returned from different community	R	MAY
CONF-XXX	Multiple patient matches returned	I	SHALL
CONF-XXX	Multiple patient matches returned	R	MAY
CONF-XXX	Submission references existing metadata	I	SHALL: See Section 3.17.10 for allowable purposes and additional behavior requirements.
CONF-XXX	Submission references existing metadata	R	SHALL: See Sections 3.23 through 3.32 for processing requirements.

CONF-XXX	Submission returns warning	I/R	SHALL
CONF-XXX	No compatible transmission option found	I	SHALL
CONF-XXX	No compatible transmission option found	R	N/A
CONF-XXX	Incompatible option for Metadata-Limited Document Source	I	SHALL if a Metadata-Limited Document Source
CONF-XXX	Incompatible option for Metadata-Limited Document Source	R	N/A
CONF-XXX	No patient match found	I/R	SHALL
CONF-XXX	Submission returns error	I/R	SHALL

3.13 Delayed Document Assembly

CONF-XXX: An Initiating Participant SHALL NOT use the Document Submission transaction to push document entries corresponding to the XDS.b Delayed Document Assembly option.

Informative: These are entries where the size and hash are zero, because the documents are not yet generated.

3.14 Deferred Mode

CONF-XXX: The Deferred mode for Document Submission is deprecated; it SHALL NOT be used.

Informative: prior versions of this specification defined a Deferred mode, but it was not based on an equivalent mechanism in the underlying IHE transaction, and has been deprecated.

3.15 AS4 Asynchronous Web Services Exchange

There is one available flavor of asynchronous messaging available for ITI-41 and ITI-80, and that is the AS4 Asynchronous Web Services Exchange option. This specification does not support this option at this time; it SHALL NOT be used.

3.15.1 QTF Interoperability

Informative: The [\[TEFCA QTF\]](#) adopts XCDR without conditions, which supports AS4 as an option on both sides. This is not anticipated to be a problem at this time, as it is not required on either side.

3.16 De-identified Documents

CONF-XXX: The use of Document Submission to push De-identified Documents is deprecated; it SHALL NOT be used.

Informative: prior versions of this specification defined support for this, but the mechanism would require additional details to be implementable, and a use case has not been presented.

3.17 Message Requirements: Metadata Elements

The metadata passed in this transaction is constrained within this eHx specification based on anticipated use cases as follows.

CONF-XXX: An Initiating Participant SHALL format metadata elements as specified in [IHE ITI TF-3] [4.1](#) and [4.2](#).

CONF-XXX: An Initiating Participant SHALL populate metadata elements as specified in [\[IHE ITI TF-3\] Table 4.3.1-3](#): Sending Actor Metadata Attribute Optionality:

- **CONF-XXX:** If it is using the XCDR transaction option, it SHALL populate according to the “XDR DS” column, except for patientId as described below.
- **CONF-XXX:** If it is using the XDR transaction option and does not declare itself to be a Metadata-Limited Document Source, it SHALL populate according to the “XDR DS” column.
- **CONF-XXX:** If it is using the XDR transaction option and declares itself to be a Metadata-Limited Document Source, it SHALL populate according to the “XDR MS” column.

3.17.1 QTF Interoperability

CONF-XXX: An Initiating Participant, if submitting to a Receiving Participant through the QTF, SHALL populate according to the “XDR MS” column.

Informative: The [\[TEFCA QTF\]](#) adopts XCDR without constraints, which does not allow limited metadata.

Some of the key metadata elements are further described and constrained here:

3.17.2 XDSDocumentEntry.sourcePatientId

CONF-XXX: The Source Patient ID SHALL contain two parts:

- Patient Identity Assigning Authority in the form of an OID
- An identifier in the above Assigning Authority domain

Informative: The Source Patient ID represents the community identifier of the subject of care (i.e. patient) of the document from the Initiating Participant’s Assigning Authority domain.

3.17.3 XDSDocumentEntry.sourcePatientInfo

CONF-XXX: If included, sourcePatientInfo SHOULD specify a minimum of demographics for the patient as known by the Initiating Participant, including first name, last name, date of birth and gender.

Informative: This is an optional element, required if known for the XDR Metadata-Limited Document Source.

3.17.4 XDSDocumentEntry.patientId

CONF-XXX: The Patient ID SHALL contain two parts:

- Patient Identity Assigning Authority in the form of an OID.
- An identifier in the above Assigning Authority domain.

Informative: The Patient ID represents the subject of care of the document (i.e. patient) from the Receiving Participant’s Assigning Authority domain. This value is obtained by the Initiating Participant through some verifiable means, primarily through use of the Patient Discovery Specification.

CONF-XXX: An Initiating Participant utilizing the XCDR transaction option MAY omit the patientId attribute if the Receiving Participant does not declare the eHx Patient Id Required option.

Informative: The base IHE ITI standard has conflicting requirements around the patientId attribute - XCDR requires it to be included by adopting the XDR DS optionality, but [\[IHE ITI TF-2c\]](#)

3.80.4.1.1 allows it to be omitted. The authors of this specification are currently working with the IHE ITI Technical Committee on a Change Proposal to make patientId R2 (required if known). The above requirement is written to anticipate this clarification. This specification may need to be updated following the IHE Change Proposal process.

CONF-XXX: An Initiating Participant utilizing the XDR transaction option SHALL populate the patientId attribute in all of the following cases:

- The Receiving Participant declares the eHx Patient Id Required option.
- The Receiving Participant does not declare the XDR Accepts Limited Metadata option.

CONF-XXX: An Initiating Participant that omits the patientId attribute SHALL meet the conditions in [IHE ITI TF-2c] 3.80.4.1.1.

Informative: The above requirement requires adequate demographics to ensure identification of the patient.

CONF-XXX: An Initiating Participant, if populating the patientId, SHOULD populate with the subject of care of the submission set from the Receiving Participant's Assigning Authority domain.

Informative: The reason the above is a SHOULD is to allow an initiator to still Push if the patient match fails yet the patientId is required. The base IHE specification does not constrain the domain, e.g. allowing the sourcePatientId to be used in this case.

3.17.4.1 QTF Interoperability

CONF-XXX: An Initiating Participant, if submitting to a Receiving Participant through the QTF, SHALL populate the patientId.

Informative: The [\[TEFCA QTF\]](#) adopts XCDR without constraints, which means patient ID will be required, until/unless XCDR accepts our CP to make it R2.

3.17.5 XDSDocumentEntry.Hash

CONF-XXX: An Initiating Participant SHALL populate the Hash with the hash of the document, computed following the SHA-1 algorithm.

3.17.6 XDSDocumentEntry.Size

CONF-XXX: An Initiating Participant SHALL populate the Size with the actual size (in bytes) of the document.

3.17.7 XDSSubmissionSet.patientId

CONF-XXX: An Initiating Participant SHALL populate the Patient ID with the subject of care of the submission set from the Receiving Participant's Assigning Authority domain.

CONF-XXX: The Patient ID SHALL follow the same rules as defined for XDSDocumentEntry.patientId in Section 3.17.4.

3.17.8 XDSSubmissionSet.sourceId

CONF-XXX: An Initiating Participant SHALL populate the Source ID with its homeCommunityId.

Informative: The homeCommunityId is a globally unique identifier for a community used to assist in subsequent transactions for locating the data held by that community. homeCommunityId is structured as an OID limited to 64 characters and specified in URI syntax, for example the homeCommunityId of 2.16.840.1.113883.3.166 would be formatted as urn:oid:2.16.840.1.113883.3.166.

3.17.9 Value Sets For Coded Attributes

CONF-XXX: An Initiating Participant SHALL populate coded metadata attributes according to the following [HL7 FHIR R4] value sets and binding strengths. Binding strengths are defined according to the HL7 FHIR specification: <https://www.hl7.org/fhir/valueset-binding-strength.html>.

CONF-XXX: An Initiating Participant, if populating coded metadata attributes with extended values, SHALL use value sets defined by the eHealth Exchange.

Table 1 Value sets for document metadata

XDS metadata attribute	Value set	Binding strength
DocumentEntry authorRole	http://hl7.org/fhir/R4/valueset-practitioner-role.html	Preferred
DocumentEntry authorSpeciality	http://hl7.org/fhir/R4/valueset-c80-practice-codes.html	Preferred
DocumentEntry classCode	http://hl7.org/fhir/R4/valueset-document-classcodes.html	Extensible

DocumentEntry confidentiality Code	http://hl7.org/fhir/R4/valueset-security-labels.html	Extensible Informative: Note that the latest value set has many more values than historically used in the eHx. This is what FHIR DocumentReference allows.
DocumentEntry eventCodeList	http://hl7.org/fhir/R4/v3/ActCode/vs.html	Example Informative: This specification does not constrain this attribute, as it is very specific to the type of document.
DocumentEntry formatCode	http://hl7.org/fhir/R4/valueset-formatcodes.html	Extensible
DocumentEntry healthcareFacilityTypeCode	http://hl7.org/fhir/R4/valueset-c80-facilitycodes.html	Extensible
DocumentEntry practiceSettingCode	http://hl7.org/fhir/R4/valueset-c80-practice-codes.html	Extensible
DocumentEntry typeCode	http://hl7.org/fhir/R4/valueset-c80-doc-typecodes.html	Extensible
DocumentEntry mimeType	https://www.hl7.org/documentcenter/public/standards/vocabulary/vocabulary_tables/infrastructure/vocabulary/mediaType.html	Required
SubmissionSet contentTypeCode	http://hl7.org/fhir/R4/valueset-practitioner-role.html	Preferred

Informative: The above binding strengths are the same or stronger than the [HL7 FHIR R4] [DocumentReference](#) resource, making them compatible. Also, note that the values for

authorRole and authorSpeciality may be passed as coded values or as simple strings. The example in this specification shows both.

3.17.9.1 QTF Interoperability

Informative: At this point, the [\[TEFCA QTF\]](#) has not adopted any metadata requirements, so our constraints should not be a problem.

3.17.10 Referencing Existing Metadata

CONF-XXX: An Initiating Participant that wishes to reference existing metadata in a Document Submission MAY obtain metadata references using any of the following methods, and SHALL prefer the methods in the order they are listed, unless otherwise specified:

- The Initiating Participant obtains the existing metadata references in a Query for Documents transaction.
- The Initiating Participant had specified the entryUUID for the existing metadata objects in a prior Document Submission.
- The Initiating Participant obtains the existing metadata references in an unspecified way.

Informative: Multiple scenarios, such as replacing a document, typically require the Initiating Participant to reference existing metadata at the Receiving Participant. An existing metadata object such as a Document Entry or a Submission Set is referenced by the entryUUID field, a key that is intended to be unique at the Receiving Participant. Typically this value is generated internally when the object is added, but it may be explicitly supplied by the original submitter.

3.18 Message Requirements: Updating Documents

CONF-XXX: An Initiating Participant MAY attempt to update documents using two methods: document replacement and document appending.

Informative: This specification does not specify the conditions that trigger an Initiating Participant to submit an updated document. Further, there should not be an expectation that the Receiving Participant will always accept the update - it may apply checks and processing before accepting, especially if the source system or author differs.

3.18.1 Submitting updates to a previously submitted document

CONF-XXX: An Initiating Participant that has the capability of submitting corrections to documents it has submitted SHALL specify the entryUUID for documents in all submissions, and persist it for later potential corrections.

CONF-XXX: When updating a previously submitted document, an Initiating Participant SHOULD perform the following workflow:

- For the first attempt, the Initiating Participant specifies as the association target the entryUUID it originally submitted.
- If the first attempt fails due to a version clash (XDSRegistryDeprecatedDocumentError is returned), the Initiating Participant either abandons the update, or queries to determine the latest applicable document and submits updates to that instead. Note that the latest document may have relationships to appendices or transformations.

Informative: There may sometimes be a need to correct or add to a document that was previously submitted (i.e. the submitter of the original and replacement is the same author/owner). The above workflow handles version clashes as well as the flexibility of the Receiving Participant in how it processes or persists the original document.

3.18.2 Submitting updates to a discovered document

CONF-XXX: If an attempt to update a discovered document fails due to a version clash (XDSRegistryDeprecatedDocumentError is returned), the Initiating Participant SHOULD either abandon the update, or query to determine the latest applicable document and submit updates to that instead. Note that the latest document may have relationships to appendices or transformations.

Informative: The term “discovered document” in this context means a document that is discovered through querying the Receiving Participant. Although we do not limit updates to the original author, when performing cross-author updates there are special considerations. See the Message Requirements: Provenance section 3.22 for details.

3.18.3 Reflecting the Update in the Document

CONF-XXX: When replacing an HL7 CDA document, an Initiating Participant that has control over the generation of the new document SHOULD populate the relatedDocument element with a typeCode of “RPLC” and identify the prior document in the header of the new document.

CONF-XXX: When appending to an HL7 CDA document, an Initiating Participant that has control over the generation of the new document SHOULD populate the relatedDocument element with a typeCode of “APND” and identify the prior document in the header of the new document.

3.18.4 Reflecting the Update in the Document Metadata

CONF-XXX: When updating a document, an Initiating Participant SHALL reference existing metadata according to Section 3.17.10, Referencing Existing Metadata.

CONF-XXX: An Initiating Participant SHALL support XDS document relationships of type RPLC and APND.

CONF-XXX: When replacing a document, if a reference to the existing document entry can be obtained, an Initiating Participant SHALL include in the submission a RPLC association as defined in [\[IHE ITI TF-3\] 4.2.2.2.3](#).

CONF-XXX: When appending to a document, if a reference to the existing document entry can be obtained, an Initiating Participant SHALL include in the submission an APND association as defined in [\[IHE ITI TF-3\] 4.2.2.2.1](#).

3.19 Message Requirements: Other Document Relationships

Informative: An Initiating Participant MAY submit document relationships of type XFRM, XFRM_RPLC, or signs, but any expected behavior is undefined unless specified by a higher-level profile or participant agreement. See Processing Requirements, section 3.28.

Informative: An Initiating Participant MAY submit associations linking document entries to existing submission sets, but any expected behavior is undefined unless specified by a higher-level profile or participant agreement. See Processing Requirements, section 3.30.

See Section 3.17.10, Referencing Existing Metadata, for how to obtain and express references.

Informative: These relationships are not included because there has been no use case presented for them. This could change in the future.

CONF-XXX: An Initiating Participant SHALL NOT submit document relationships of type IsSnapshotOf.

Informative: The above requirement has been added because the IsSnapshotOf relationship is only used between an On-Demand Document Entry and a Stable Document Entry for a corresponding document that was generated. There is no reason for one participant to relate these objects for another participant.

3.20 Message Requirements: Folders

Informative: Folder semantics are defined in [\[IHE ITI TF-3\] 4.2.1.3](#).

Informative: An Initiating Participant MAY submit Folders, but any expected behavior is undefined unless specified by a higher-level profile or participant agreement. See Processing Requirements, section 3.30.

See Section 3.17.10, Referencing Existing Metadata, for how to obtain and express references.

Informative: Folders are not included because there has been no use case presented for them. This could change in the future.

3.21 Message Requirements: Routing

Informative: An Initiating Participant that supports the XCDR transaction option passes the Home Community ID of the ultimate recipient in the appropriate fields as specified in [\[IHE ITI TF-2b\] 3.41.4.1.2.2](#).

Informative: An Initiating Participant optionally passes information identifying the intended organization/person recipients as specified in [\[IHE ITI TF-3\] 4.2.3.3.7](#).

3.22 Message Requirements: Provenance

CONF-XXX: The Initiating Participant SHALL populate provenance information in submissions according to this specification, unless overridden by another eHx Provenance specification.

CONF-XXX: The Initiating Participant SHALL populate provenance information in all submitted C-CDA documents according to the rules in [\[HL7 Basic Provenance\]](#), constrained and clarified as follows:

- 3.1 Basic Provenance Practices: only CONF:1000. Informative: while this mentions care providing organizations as authors, we clarify that document content can be authored by other types of entities, e.g. patients, payers, labs, etc.
- 3.2.1 C-CDA Provenance Practices: omitting CONF:1009
- B. Provenance - Author Participation: As is
- C. Provenance - Assembler Participation: As is

3.22.1 Updating a document: Appending or replacing from the same source

Informative: When updating a document, the association between the original and new document is considered an important part of provenance, and is fully specified in other sections of this specification. The following cases for updating a document do not require any additional requirements for conveying provenance:

- Submitting an appendix to a document.
- Submitting a replacement document from the same source as the prior document (same source system, community, and authors).

3.22.2 Updating a document: Replacing from a different source

CONF-XXX: If an Initiating Participant is submitting a replacement to a document originally from another source, defined as a different community or author, and wishes to add or modify only individual entries, it SHALL:

- Use the appropriate document-level template from [\[HL7 Data Provenance\]](#) depending on the kind of author, e.g. Provider Generated Document With Provenance.
- Replace the document-level author, and use the original author for those sections or entries which are not being changed.
- Use the appropriate entry-level template from [\[HL7 Data Provenance\]](#) for any modified entry, e.g. Observation Generated by Provider.

CONF-XXX: If an Initiating Participant is submitting a replacement to a document originally from another source, defined as a different community or author, and wishes to reconcile entire sections, it SHALL:

- Use the appropriate document-level template from [\[HL7 Data Provenance\]](#) depending on the kind of author, e.g. Provider Generated Document With Provenance.
- Replace the document-level author, and use the original author for those sections which are not being changed.
- Use the appropriate entry-level template from [\[HL7 Data Provenance\]](#) for any modified entry, e.g. Observation Generated by Provider.
- Conform to the content requirements in [\[IHE RECON\]](#) 6.3.1.D Reconciliation Content, including a Reconciliation Act in each section that has been reconciled.

Informative: For example: a patient's PCP submits a replacement document for one authored by another physician because it has incorrect information about the patient. We cover two such cases: selective correction and section-level reconciliation. Note that cross-author updates may be treated differently from ordinary submissions by the Receiving Participant, for example, additional security checks may be performed. See the Security Considerations section 5 for details.

3.23 Processing Requirements: Overall Processing

CONF-XXX: If multiple exceptional conditions exist, the Receiving Participant SHALL detect and include each one in the response.

CONF-XXX: The Receiving Participant MAY return a response before processing the entire submission only in the following case: if a document needs to be queued for manual matching to

a patient. In this case, the Receiving Participant SHALL return a DocumentQueued warning code for each document so queued.

Informative: The base IHE transactions require full processing of the submission before returning. However, there is an XDR warning code, DocumentQueued, that appears to permit an exception to this expectation. We clarify that here.

3.23.1 QTF Interoperability

Informative: In general, our behavior requirements simply add more specificity for processing and error handling. As every response or error code we return is defined in Vol 3, we do not anticipate any problems.

3.24 Processing Requirements: Patient matching

CONF-XXX: If the patientId attribute is not included in the submission request, the Receiving Participant SHOULD attempt to determine the local patient to apply the submission to by matching the demographics in the sourcePatientInfo attribute.

CONF-XXX: If the patientId attribute is included in the submission request but is unrecognized, the Receiving Participant SHOULD attempt to determine the local patient to apply the submission to by matching the demographics in the sourcePatientInfo attribute.

CONF-XXX: If no local patient for the submission can be identified, the Receiving Participant MAY return an XDSUnknownPatientId error code.

Informative: We are allowing receivers to be forgiving here - they may not need the idea of a patient id at all.

3.25 Processing Requirements: Routing

CONF-XXX: The Receiving Participant SHOULD return an XDSRepositoryError if the destination Home Community ID is populated in an ITI-41 submission.

CONF-XXX: If the SubmissionSet.intendedRecipient attribute is included, the Receiving Participant SHOULD route the submission to the human and/or organization recipient. The mechanism(s) to do so are unspecified.

Informative: The Receiving Participant that supports the XCDR transaction option receives the Home Community ID of the ultimate recipient in the appropriate fields of the ITI-80 transaction as specified in [\[IHE ITI TF-2b\]](#) 3.41.4.1.2.2, and routes to it (see Use Case Section 3.8.1, Push to

federated system). The Document Submission specification does not use the variant of ITI-41 that includes HCID.

3.26 Processing Requirements: Persists Original Documents option

CONF-XXX: If the Receiving Participant declares the Persists Original Documents option, and determines that this document will be persisted, it SHALL perform equivalent behavior to the XDS Document Repository as specified in [IHE ITI TF-2b] [3.41.4.1.3](#) and [3.41.4.2.1.1](#), with the following exceptions:

- Instead of or in addition to using the Register Document Set-b [ITI-42] transaction to communicate to an XDS Document Registry, it MAY perform equivalent behavior using unspecified mechanisms.
- Instead of or in addition to making received documents available for retrieval via the Retrieve Document Set [ITI-43] transaction, it SHALL make them available for retrieval via the Cross Gateway Retrieve [ITI-39] transaction.
- Instead of or in addition to making received document entries available for query via the Registry Stored Query [ITI-18] transaction, it SHALL make them available for query via the Cross Gateway Query [ITI-38] transaction.
- It SHALL return warnings instead of errors for any nonconformant metadata fields or mime types.
- Other than Append and Replace associations, it MAY choose not to persist Submission Sets, other Associations and/or Folders, and if so, MAY ignore any related requirements.

Informative: The above requirements include enforcing document replacement semantics, deprecating prior versions. Also, note that the sender may explicitly specify entryUUID for objects and expect the receiver will persist them: see [IHE ITI TF-2b] [3.42.4.1.3.7](#).

3.27 Processing Requirements: Existing Metadata

CONF-XXX: The requirements for the Receiving Participant to be able to process the submission without any context (XDR: [\[IHE ITI TF-2b\] 3.41.4.1.3.1](#), XCDR: [\[IHE ITI TF-2c\] 3.80.4.1.3](#)) do not apply when the submission contains references to existing metadata. In these cases, the Receiving Participant SHALL verify and process these references as detailed in this specification.

Informative: Both ITI-41 and ITI-80 state in Expected Actions that the receiver must be able to process the submission without any context. This is misleading, because in some cases context is required. We are submitting an IHE CP to clarify.

3.28 Processing Requirements: Document Relationships

CONF-XXX: A Receiving Participant SHALL accept document relationships of type APND and RPLC.

CONF-XXX: If a Receiving Participant receives but does not support a document relationship of type XFRM, it SHALL ignore that association, process the rest of the submission, and return a PartialTransformNotProcessed warning with the response.

CONF-XXX: If a Receiving Participant receives but does not support a document relationship of type XFRM_RPLC, it SHALL ignore that association, process the rest of the submission, and return a PartialTransformReplaceNotProcessed warning with the response.

CONF-XXX: If a Receiving Participant receives but does not support a document relationship of type “signs”, it SHALL ignore that association, process the rest of the submission, and return a PartialRelationshipContentNotProcessed warning with the response.

Informative: The conditions for returning the “Partial...” warnings are not clear, and we are submitting a CP to IHE to clarify. The above requirements represent our interpretation, which is that these warnings mean that the entire concept is not supported, not that there was a problem with one specific submission.

Informative: A Receiving Participant MAY accept document relationships of type XFRM, XFRM_RPLC or signs, but any expected behavior is undefined unless specified by a higher-level profile or participant agreement.

CONF-XXX: If a Receiving Participant receives a document relationship of type IsSnapshotOf, it SHALL return an XDSRepositoryMetadataError error.

CONF-XXX: If a Receiving Participant receives a document relationship of type RPLC and has persisted any information about the prior document, it SHALL ensure replacement semantics are followed as appropriate, for example:

- If the prior document was stored as a document, mark its availabilityStatus as Deprecated, as well as any transformations or appendices of it.
- If information from the prior document was stored in some other way, remove or mark the information as deprecated.

Informative: the earlier requirements for the Persists Original Documents option cover the case where the exact document being referenced is being replaced. The above requirement covers all other cases where something short of the exact document has been persisted. One example

would be Public Health Reporting, where the only thing persisted was a document id and a record of a condition. In this case, the Receiver would be required to update that record accordingly.

Informative: For the case of cross-author updates, see the Security Considerations section 5 for additional considerations.

3.29 Processing Requirements: Conflict Detection and Resolution

Informative: When submitted documents are persisted as is, conflict detection is straightforward: just check whether the submitted document has been deprecated. This section covers the other case: when submitted documents are persisted in some other way. In this case, submitters don't have a simple way of discovering what information is known by the receiver ahead of time, and may inadvertently submit duplicate or conflicting information. The receiver needs to be able to detect this and return errors.

Example:

- System A submits an encounter for a patient, and the information is persisted in some other way than the exact document pushed.
- System B submits the same encounter for the patient.
- The receiving system needs to be able to detect the “version clash” even though it's not exactly the same thing as a document unique id clash.

Example:

- System A submits to public health an encounter where a patient was identified as positive for COVID-19.
- System B submits to public health a different encounter where the same patient was identified as positive for COVID-19.
- The receiving system needs to be able to detect the “version clash” even though it's not exactly the same thing as a document unique id clash.

CONF-XXX: A Receiving Participant that persists clinical information from submitted documents in some other form SHALL be able to detect duplicate or conflicting information, and return an XDSRepositoryError error if the conflict cannot be resolved successfully.

3.30 Processing Requirements: Folders and Submission Sets

Informative: In addition to document entries and the relationships between them, the full metadata model includes submission sets and folders, which are linked to each other and to document entries by HasMember associations. Receivers are not required to persist them.

CONF-XXX: A Receiving Participant MAY accept Folders, but any expected behavior is undefined unless specified by a higher-level profile or participant agreement.

CONF-XXX: If a Receiving Participant receives but does not support Folders, it SHALL ignore that content, process the rest of the submission, and return a PartialFolderContentNotProcessed warning with the response.

Informative: The conditions for returning the “Partial...” warnings are not clear, and we are submitting a CP to IHE to clarify. The above requirements represent our interpretation, which is that these warnings mean that the entire concept is not supported, not that there was a problem with one specific submission.

CONF-XXX: If a Receiving Participant does not persist submission sets or their associations, it SHALL process the rest of the submission, and SHOULD NOT return any error or warning with the response.

3.31 Processing Requirements: Provenance

CONF-XXX: A Receiving Participant SHALL implement requirement CONF: 1009 in [[HL7 Basic Provenance](#)].

CONF-XXX: If the Receiving Participant declares the Persists Original Documents option, it SHALL implement requirement CONF: 1001 in [[HL7 Basic Provenance](#)].

CONF-XXX: If the Receiving Participant declares the Persists Clinical Items option, it SHALL implement requirements CONF: 1003 and CONF: 1005 in [[HL7 Basic Provenance](#)].

CONF-XXX: If the Receiving Participant declares the Persists Clinical Items option and employs a manual reconciliation workflow on imported data, it SHALL implement the requirement CONF: 1004 in [[HL7 Basic Provenance](#)].

3.32 Processing Requirements: Additional Exception Checking

CONF-XXX: In addition to the warnings and errors specified in [\[IHE ITI TF-2c\]](#) 3.80.4.1.3, an XCDR Responding Gateway SHALL detect and return the additional warnings and errors specified in [\[IHE ITI TF-2b\]](#) 3.41.4.1.3.1 for the XDR Document Recipient.

Informative: There are differences in error checking between XDR and XCDR, which do not have an obvious purpose. We are submitting a CP to IHE to clarify this. The above requirements represent our interpretation, which is that error checking should be as similar as possible.

CONF-XXX: The Receiving Participant SHALL return an XDSPatientIdDoesNotMatch error if objects in a submission set do not have the same patientId as the submission set.

CONF-XXX: The Receiving Participant SHALL return an XDSPatientIdDoesNotMatch error if both DocumentEntry objects referenced by an Association do not have the same patientId.

CONF-XXX: The Receiving Participant SHOULD return an XDSRepositoryMetadataError code with a severity of Warning if a coded value is submitted that is not within the defined value sets in Table 1 Value sets for document metadata.

3.32.1 QTF Interoperability

Informative: At this time, we don't know if the [\[TEFCA QTF\]](#) will adopt any metadata constraints. If a QTF participant submits values that are outside our constraints, because we are returning a warning, not an error, this should not be a problem.

CONF-XXX: The Receiving Participant SHALL detect and return metadata errors as specified in the following sections in [\[IHE ITI TF-2b\]](#), as constrained below:

- [3.42.4.1.3.3.6](#) DocumentEntry.serviceStartTime and DocumentEntry.serviceStopTime
 - Use XDSRepositoryMetadataError with a severity of error
- [3.42.4.1.3.5](#) Document Relationships
 - Excluding the check for patient identity merges
 - Replacing the term “Document Registry” with the equivalent storage mechanism for document entries.
 - Excluding the behavior associated with replacement (“When the Association type is “RPLC” or “XFRM_RPLC”....”) and On-Demand snapshots (“When the Association type is “IsSnapshotOf”....”). Informative: This is persistence related, and we cover it elsewhere.

CONF-XXX: The Receiving Participant SHALL return an XDSRepositoryDuplicateUniqueldInMessage error if a uniqueld value was found to be used more than once within the submission.

CONF-XXX: The Receiving Participant SHALL return an XDSRepositoryMetadataError error if a required metadata field is missing.

CONF-XXX: The Receiving Participant SHOULD return an XDSRepositoryMetadataError error if there is any other violation of formatting rules as specified in [IHE ITI TF-3] [4.1](#) and [4.2](#).

CONF-XXX: The Receiving Participant SHALL return an XDSMissingDocument error if a DocumentEntry exists in the metadata with no corresponding document.

CONF-XXX: The Receiving Participant SHALL return an XDSMissingDocumentMetadata error if a document is included without a corresponding DocumentEntry in the metadata.

Informative: The above requirement was prompted because the error code's description only mentions the MIME part, but this case could also happen with an unoptimized (by MTOM) binary block. We have opened a CP with IHE ITI about this.

CONF-XXX: The Receiving Participant SHALL return an XDSMissingDocumentMetadata error if a MIME part is attached without a corresponding Content-Id header in the metadata.

CONF-XXX: The Receiving Participant MAY return an InvalidDocumentContent error if the document content does not match the DocumentEntry.

CONF-XXX: The Receiving Participant MAY return other error codes as defined in [\[IHE ITI TF-3\] Table 4.2.4.1-2](#).

4 HL7 FHIR PUSH API DESCRIPTION

4.1 Definitions

A “resource” refers to an additional format of clinical data as it is transferred between Participants, and not as it is stored within a Participant system or specific electronic health record (EHR) system.

The following terms are defined based on which transaction option of the interface is implemented:

- The “Clinical Submission transaction” is a “push” of clinical information from an Initiating Participant to a Receiving Participant.
 - **CONF-XXX:** For the FHIR External Document option, Clinical Submission SHALL correspond to the IHE ITI-65 Provide Document Bundle transaction.
 - **CONF-XXX:** For the FHIR Resource option, Clinical Submission SHALL correspond to the HTTP POST method as constrained in [IHE ITI TF-2x] Appendix Z.
- An “Initiating Participant” initiates a Clinical Submission transaction for one or more available documents on a particular patient.
 - **CONF-XXX:** For the FHIR External Document option, the Initiating Participant SHALL correspond to the Document Source actor.
 - **CONF-XXX:** For the FHIR Resource option, the Initiating Participant SHALL correspond to the client actor as constrained in [IHE ITI TF-2x] Appendix Z..
- A “Receiving Participant” receives a Clinical Submission transaction.
 - **CONF-XXX:** For the FHIR External Document option, the Receiving Participant SHALL correspond to the Document Recipient actor.
 - **CONF-XXX:** For the FHIR Resource option, the Receiving Participant SHALL correspond to the server actor as constrained in [IHE ITI TF-2x] Appendix Z..
- **CONF-XXX:** When “Patient Discovery” is referenced in the context of any of the FHIR transaction options, the exact mechanism is currently out of scope, but is defined as the capability of matching a patient and obtaining a URL to a Patient resource. We anticipate the eHx Patient Discovery specification to be enhanced to define this for FHIR.
- **CONF-XXX:** When “Access Consent Policies” is referenced in the context of any of the FHIR transaction options, the exact mechanism is currently out of scope, but is defined as the capability of including a reference to a Consent resource in a FHIR request and obtaining that resource for the purposes of determining access. We anticipate the eHx Access Consent Policies specification to be enhanced to define this for FHIR.
- **CONF-XXX:** When “Query for Documents” is referenced in the context of any of the FHIR transaction options, the exact mechanism is currently out of scope, but is defined as the capability of querying for a DocumentReference resource for a Patient. We anticipate the eHx Query for Documents specification to be enhanced to define this for FHIR.
- **CONF-XXX:** When “Retrieve Documents” is referenced in the context of any of the FHIR transaction options, the exact mechanism is currently out of scope, but is defined as the capability of retrieving a document. We anticipate the eHx Retrieve Documents specification to be enhanced to define this for FHIR.

4.2 Assumptions

The following assumptions underlie this interface specification:

- The primary expected use for the FHIR External Document option is that documents are formatted as XML data following the HL7® Clinical Document Architecture (CDA®) standard (used with permission), but nothing precludes this interface from being used to submit other kinds of documents, such as Adobe Portable Document Format (PDF) files or images.
- The patient to whom the document(s) or resource(s) pertain:
 - Is registered at one or more facilities at the Initiating Participant.
 - Has provided consent to share his or her clinical data, or such consent is not required by the business case under which the Clinical Submission is occurring; if consent is needed, the mechanism for providing this consent is the subject of the Access Consent Policies specification document.
- How an Initiating Participant determines which Receiving Participant to direct the transaction to is not specified.
- This transaction is between one client and one server, and any coordination between servers, for example to [manage shared identities](#), is out of scope.

4.3 Triggers

The Initiating Participant, based on a human decision or an automated workflow, wants to submit clinical information about a patient to a Receiving Participant.

4.4 Transaction Standard

CONF-XXX: The eHx Clinical Submission transaction is defined with three transaction options:

- **FHIR External Document Option:** This utilizes the IHE ITI-65 Provide Document Bundle transaction for the Mobile access to Health Documents (MHD) profile, defined in [IHE ITI TF-2c] 3.65. It supports the submission of documents and related metadata roughly equivalent to XDR.
- **FHIR Document Option:** This utilizes the IHE ITI-65 Provide Document Bundle transaction for the Mobile access to Health Documents (MHD) profile, defined in [IHE ITI TF-2c] 3.65. It requires the FHIR External Document Option, and adds additional requirements and guidance for submitting FHIR Documents.
- **FHIR Resource Option:** This utilizes the base HTTP RESTful POST transaction to submit individual FHIR resources or Bundles.
- **FHIR Messaging Option:** This utilizes FHIR messaging TBD.

The locations and versions of these specifications, as well as other foundational standards for this transaction, are listed in Section 1.6, “Related Documents”.

Informative: Virtually all FHIR usage in practice adopts one or more profiles that are specific to the use case. This specification is intended to complement those and not to conflict with them.

CONF-XXX: A Participant MAY support different combinations of transaction options in either direction. **Informative:** For example, the FHIR External Document option as an Initiating Participant and all options as a Receiving Participant.

CONF-XXX: If a Participant supports multiple transaction options, it SHALL ensure they function identically except where the transactions inherently differ. **Informative:** For example, any persistence or error handling implemented for one option must be the same on the other option.

CONF-XXX: Participants supporting the FHIR External Document Option MAY support the following IHE profile options:

IHE Actor	Supported Options
MHD Document Source	Comprehensive Metadata UnContained Reference
MHD Document Recipient	Comprehensive Metadata XDS on FHIR* UnContained Reference

*The XDS on FHIR Option groups the MHD Document Recipient with an XDS Document Source. While Participants MAY support this option, no expected behaviors are required.

CONF-XXX: Unless otherwise specified, Participants SHALL follow all requirements for the respective IHE actors.

CONF-XXX: An Initiating Participant implementing any FHIR transactions SHALL be grouped with an IHE ATNA Secure Node or Secure Application actor.

CONF-XXX: An Initiating Participant implementing any FHIR transactions SHALL be grouped with an IHE CT Time Client actor.

CONF-XXX: A Receiving Participant implementing any FHIR transactions SHALL be grouped with an IHE ATNA Secure Node actor.

CONF-XXX: A Receiving Participant implementing any FHIR transactions SHALL be grouped with an IHE CT Time Client actor.

Informative: The MHDS profile (TBD link) provides higher level groupings of actors of related IHE FHIR profiles to define an HIE infrastructure. This profile is not required by this specification, but is referenced informationally.

4.5 Additional Options

This interface specification defines the following additional options. See the Operational Considerations section of this document for Directory considerations.

eHx Actor/Transaction Option	Supported eHx Options
Receiving Participant / FHIR External Document Option	Patient Required Persists Original Documents Persists Clinical Items XDR on FHIR
Receiving Participant / FHIR Resource Option	Patient Required Persists Clinical Items

- Patient Required** option: A Receiving Participant that declares this option indicates that it requires a patient resource known to it to be included in the submission. This is not needed with the “Comprehensive Metadata” or “XDS on FHIR” Options, as the patient is included with full metadata.
- Persists Original Documents** option: A Receiving Participant that declares this option indicates that it has the ability to persist the actual documents that are pushed to it, and make them available for subsequent query and retrieval using the eHx Query for Documents and Retrieve Documents transactions. Whether it actually does persist a given document is not specified, as this could be subject to security and privacy considerations (e.g. one author pushes a correction to a document from another author, or patient submits a document).
- Persists Clinical Items** option: A Receiving Participant that declares this option indicates that it has the ability to persist clinical items pushed to it and make those clinical items available for subsequent retrieval, e.g. within generated documents, or within FHIR resources. The key requirement in this option is the proper management of Provenance information. This guide does not specify under which circumstances this capability will be invoked; it could be any or all of the following:
 - Persist submitted FHIR resources.
 - Parse submitted documents, extract and persist the clinical items within.

- **XDR on FHIR option:** A Receiving Participant that declares this option indicates that it is grouped with an XDR Document Source for the purpose of exposing an XDR Document Recipient as an MHD Document Recipient.

4.6 Technical Pre-conditions

The following technical pre-conditions exist for this interface specification:

- The clinical information being transmitted pertains to a specific, single patient.

4.7 FHIR Usage Compared to SOAP/CDA

<This is an idea for a section to introduce FHIR and identify what makes it different from SOAP/CDA>

<Usages that are in both>

- Push an entirely self-contained document
- Push a document that includes references to source information
- Receive a document and store it as is
- Receive a document and store selected information
- Receive a document and use references to source information to create a web of information about a patient
 - But much easier in FHIR
- Receive a document and use references to source information to keep track of updated information about a patient
 - But much easier in FHIR
- Push answers to a questionnaire
 - Retrieve Form for Data Capture (RFD)
 - QRPH Structured Data Capture (SDC)

<Usages that are only in FHIR>

- Push a document that includes resolveable references to source information
- Push a document that includes some information only by reference
- Receive a document and pull referenced information from other sources
- Push related information that pertains to a use case but isn't in the format of a document
 - E.g. a profile over Encounter, or Task
- Build a complex data structure in place on a server

- Doesn't seem as likely for cross community
- Push an individual resource that refers to other resources by local ids
- Push from the context of a SMART-on-FHIR app running in an EHR

Map these usages to existing IGs

4.8 Use Case Steps – “Nominal Flow”

Note: While the entire workflow is described here, the usage of the eHx Directory and the eHx Patient Discovery transaction are not detailed in this specification.

- This use case begins when the Initiating Participant looks up another Participant that it wishes to push clinical information to in the eHx Directory.
- The Initiating Participant obtains the Participant's endpoints for eHx Patient Discovery and a Clinical Submission transaction option it supports from the Directory. The Initiating Participant examines the options declared by the Receiving Participant on the Clinical Submission transaction.
- The Initiating Participant sends a Patient Discovery request to the Receiving Participant to attempt to match the patient by demographics.
- The Receiving Participant compares the demographics to its known patients, and returns a Patient Discovery response to the Initiating Participant. The response contains a single patient match: a patient resource as known by the Receiving Participant.
- The Initiating Participant sends a Clinical Submission request to the Receiving Participant. See Section TBD for message requirements.
- The Receiving Participant receives the metadata and the associated document(s), processes them as appropriate, and returns a Clinical Submission response. See Section TBD for processing requirements.

4.9 Alternate Flows

4.9.1 Patient already obtained

1. In step 1, the Initiating Participant already has the patient resource URI.
2. In step 2, the Initiating Participant skips obtaining the Patient Discovery endpoint.
3. The use case resumes at step 5.

4.9.2 Patient is optional

1. In step 1, a patient resource is optional (see Section TBD, Patient).
2. The Initiating Participant chooses to execute one of the following subflows:

- a. Skip the patient match: in step 2, the Initiating Participant skips obtaining the Patient Discovery endpoint. The use case resumes at step 5.
- b. Attempt the patient match anyway. The use case resumes. If the match fails for any reason, the Initiating Participant MAY end the use case or resume at step 5.

4.9.3 No required patient match found

1. In step 4, the Receiving Participant returns no match found, and the patient resource is required, (see Section TBD, XDSDocumentEntry.patientId).
2. The Initiating Participant may attempt to obtain the patient resource by manual means.
3. If the patient resource cannot be obtained, the Initiating Participant chooses to execute one of the following subflows:
 - a. Resume the use case at step 5, passing the value for sourcePatientId in the patientId attribute.
 - b. End the use case.

4.9.4 Patient match returned from different community

1. In step 4, the Receiving Participant returns a patient match from a different community.
2. The Initiating Participant looks up the Participant for that community in the eHx Directory, and obtains that Participant's endpoint for a Document Submission transaction option it supports. The Initiating Participant examines the options declared on the Document Submission transaction.
3. The use case resumes at step 5, with the following changes:
 - a. The new Receiving Participant replaces the original Receiving Participant.

4.9.5 Multiple patient matches returned

Informative: In eHx, the following are valid cases for multiple matches to be returned, reflecting multiple sources for data about the patient:

- Same HCID, different AAID
- Different HCID (different community, covered in previous flow)

3. In step 4, the Receiving Participant returns multiple matches found. The Initiating Participant MAY choose to push the content to any or all of the matches. How it determines which is not specified.
4. The use case resumes at step 5 for each patient match the Initiating Gateway wishes to push to.

4.9.6 Submission references existing metadata

Informative: this flow is used for replacing documents and other purposes.

Additional precondition: the Initiating Participant has knowledge of existing metadata at the Receiving Participant. This may happen in a number of ways - see Section 3.17.10, Referencing Existing Metadata.

3. In step 5, the Initiating Participant includes the new metadata, references to the existing metadata, and associations linking them, in the Document Submission.
4. The use case resumes.

4.9.7 Submission returns warning

4. In step 6, the Receiving Participant returns overall success for the submission, but also one or more warnings.
5. The Initiating Participant takes appropriate actions - these actions are unspecified.
6. The use case ends.

4.10 Exception Flows

4.10.1 No compatible transmission option found

3. In step 1, the Initiating Participant cannot find a compatible transmission option declared by the Receiving Participant.
4. The use case ends.

4.10.2 Incompatible option for Metadata-Limited Document Source

3. In step 1, the Initiating Participant declares itself to be an XDR Metadata-Limited Document Source and the Receiving Participant does not declare the XDR Accepts Limited Metadata option.
4. The use case ends.

4.10.3 Submission returns error

4. In step 6, the Receiving Participant returns overall failure for the submission: this means at least one error, and potentially warnings.
5. The Initiating Participant takes appropriate actions - these actions are unspecified.
6. The use case ends.

4.11 Technical Post-Conditions

The following technical post-conditions will result after the execution of this interface specification:

- Any documents or clinical items that were persisted are available for subsequent query and retrieval using the eHx Query for Documents and Retrieve Documents transactions.
- Audit logs as defined in Section 6 have been recorded.

- When it refers to “patient id”, this pertains to the patient resource.
- Federation is not supported.

4.12 Use Case Flow Requirements

This table shows the required flows from the Push use case for the Initiating (I) and Receiving (R) Participants.

TBD

4.13 Message Requirements: Common FHIR Requirements

Note: In this section, an Initiating Participant supporting any FHIR-Based transaction option is referred to as a “FHIR Initiating Participant”, and a Responding Participant is similarly referred to as a “FHIR Receiving Participant”

Informative: Appendix Z contains general FHIR requirements and guidance from IHE.

CONF-XXX: Participants SHALL follow requirements and guidance as specified in [IHE ITI TF-2x] Appendix Z.

Informative: While there are many ways to pass or reference resources in FHIR, the general rule is this: the sender must give the receiver enough information to determine the identity and content of the resource. The following requirements ensure this.

CONF-XXX: When passing a resource reference that is a business identifier, a FHIR Initiating Participant SHALL ensure that the identifier is one that could be known or discoverable by the FHIR Receiving Participant, for example:

- A known third-party identifier, e.g. NPI for a practitioner
- A business identifier local to the FHIR Receiving Participant

CONF-XXX: When passing a resource reference that is a REST-style absolute URL, a FHIR Initiating Participant SHALL ensure that the reference is one that could be retrieved by the FHIR Receiving Participant, for example:

- A resolveable resource hosted at the FHIR Receiving Participant
- A resolveable resource hosted at a server listed in the eHealth Exchange directory
- A canonical URL to a publicly available profile

Informative: The above requirement also applies to the `fullUrl` element for entries in Bundles. See <http://hl7.org/fhir/bundle.html#references> for the rules on resolving resource references used within Bundles. What this implies is that if a FHIR Initiating Participant wishes to use an identifier that only resolves within the Bundle:

- This is permitted: a UUID or OID as URN, e.g. “urn:uuid:DCA0BCF9-0814-430D-904A-4B834900B915”.
- This is not permitted: a relative URL that when added to the base URL resolves within the Bundle but doesn't resolve at a server, e.g. “Patient/1” or “Observation/cholesterol”.

4.14 Message Requirements: FHIR External Document Option

CONF-XXX: An Initiating Participant using the FHIR External Document Option SHALL implement the ITI-65 transaction as constrained in this section.

Informative: ITI-65, as described in the MHD profile (TBD link), allows a document to be included directly in the Provide request as a Binary Resource or referenced via an absolute URL to where it is hosted on a server, which could be the sending system or a third party. The Binary flavor is like the SOAP Push mechanism, while the reference flavor has no SOAP counterpart. It could support cases like:

- A lighter push mechanism of just the metadata, where the server can choose to retrieve only the actual documents it wants.
- Pushing a reference to a third party server, for example a consent server.

See an example ITI-65 request here: <http://build.fhir.org/ig/IHE/ITI.MHD/branches/master/iti-65-request-xdstools-adapted.json.html>.

CONF-XXX: An Initiating Participant supporting the FHIR External Document Option SHALL constrain `DocumentReference.content.attachment.url` to be one of the following:

- A URL that resolves to a Binary Resource in the ITI-65 request.

- An absolute URL pointing to a document hosted at a server listed in the eHealth Exchange directory.

4.15 Message Requirements: FHIR Documents

CONF-XXX: An Initiating Participant using the FHIR Document Option SHALL implement the ITI-65 transaction as constrained in this section.

Informative: FHIR documents are described here: <https://www.hl7.org/fhir/documents.html>. An example Discharge Summary is here: <https://www.hl7.org/fhir/document-example-dischargesummary.json.html>. This specification does not constrain documents to be expressed as JSON or XML.

Informative: The FHIR Documents page has one misleading statement: “FHIR documents are for documents that are authored and assembled in FHIR, while the document reference resource is for general references to pre-existing documents.” The two are not mutually exclusive. This specification’s FHIR Document Option uses a document reference to point to a fully assembled FHIR document.

Informative: In the context of a push, a FHIR document must be “an immutable set of resources with a fixed presentation that is authored and/or attested by humans, organizations and devices”, for example, a document type Bundle after calling the Composition \$document operation. This section (<https://www.hl7.org/fhir/documents.html#content>) defines the specific resources referenced within the document that must be included. Other referenced resources may be included or be resolveable only on a server. See the example document at <https://www.hl7.org/fhir/document-example-dischargesummary.json.html>. The net effect of this flexibility is that the sender can choose which, if any, of the resources included in a FHIR document to expose as independently referenceable FHIR resources.

Informative: Although the document and any included entries are an immutable snapshot in time, if the fullURL for an included entry is a resolveable server URL, that is a version-independent resource that the Receiving Participant can choose to cache and keep track of. Consider these possibilities:

1. Included resources are all UUIDs/OIDs: this is closest to pushing a CDA document, as it is fully self-contained.
2. Included resources, use URLs on the source server, the destination server, or a third party server. Example: system A pushes document to system B. In the document is a URL reference to a patient resource at system A. This allows system B to track the patient directly if needed.

Informative: Within a document, resources could have no history information, could have a lastUpdated, or could have full version information. This specification suggests the most information be included.

CONF-XXX: An Initiating Participant using the FHIR Document Option, if it tracks resource versions, SHALL include the versionId for each resource within the document Bundle.

4.16 Message Requirements: Metadata Elements

Informative: The metadata passed in this transaction (contained within the DocumentReference, DocumentManifest, and List resources) are constrained within this eHx specification based on anticipated use cases as follows.

CONF-XXX: An Initiating Participant using the FHIR External Document Option SHALL populate metadata as constrained in this section.

CONF-XXX: An Initiating Participant SHALL populate and format metadata elements as specified in [IHE ITI TF-2c] 3.65.4.1.2 Message Semantics.

Some of the key metadata elements are further described and constrained here:

4.16.1 DocumentReference.context.sourcePatientInfo

CONF-XXX: If included, sourcePatientInfo SHOULD specify a minimum of demographics for the patient as known by the Initiating Participant, including first name, last name, date of birth and gender.

Informative: This is an optional element, required if the Comprehensive Metadata option is supported, required if known otherwise.

CONF-XXX: The business identifier in the sourcePatientInfo Patient Resource SHALL contain:

- type: "MR" for Medical Record Number
- system: Patient Identity Assigning Authority in the form of an OID URN
- value: An identifier in the above Assigning Authority domain

Informative: The business identifier in the sourcePatientInfo Patient Resource represents the community identifier of the subject of care (i.e. patient) of the document from the Initiating Participant's Assigning Authority domain. See [IHE ITI TF-2x] Appendix Z.9.1 Identifier Type for coding.

4.16.2 DocumentReference.subject

CONF-XXX: The business identifier in the subject Patient Resource, if included, SHALL contain:

- type: “MR” for Medical Record Number
- system: Patient Identity Assigning Authority in the form of an OID URN
- value: An identifier in the above Assigning Authority domain

Informative: The subject represents the subject of care of the document (i.e. patient), and is, if possible, hosted at the Receiving Participant’s server. This resource is obtained by the Initiating Participant through some verifiable means, primarily through use of the Patient Discovery Specification. It is constrained to this format to be compatible with patient IDs obtained via XCPD. See [IHE ITI TF-2x] Appendix Z.9.1 Identifier Type.

Informative: The optionality requirements for metadata are the same for the following:

- IHE MHD with the Comprehensive Metadata Option and IHE XDR without the Accepts Limited Metadata option.
- IHE MHD without the Comprehensive Metadata Option and IHE XDR with the Accepts Limited Metadata option.

CONF-XXX: An Initiating Participant utilizing the FHIR External Document transaction option SHALL populate the subject resource in all of the following cases:

- The Receiving Participant declares the eHx Patient Required option.
- The Receiving Participant declares the Comprehensive Metadata option.

CONF-XXX: An Initiating Participant, if populating the subject resource, SHOULD populate with the subject of care of the submission set from the Receiving Participant’s Assigning Authority domain.

Informative: The reason the above is a SHOULD is to allow an initiator to still Push if the patient match fails yet the subject is required.

4.16.3 DocumentReference.content.attachment.hash

CONF-XXX: An Initiating Participant SHALL populate the Hash with the hash of the document, computed following the SHA-1 algorithm.

4.16.4 DocumentReference.content.attachment.size

CONF-XXX: An Initiating Participant SHALL populate the Size with the actual size (in bytes) of the document.

4.16.5 DocumentManifest.subject

CONF-XXX: An Initiating Participant SHOULD populate the subject with the subject of care of the submission set from the Receiving Participant's Assigning Authority domain.

CONF-XXX: The Patient ID SHALL follow the same rules as defined for DocumentReference.subject in Section TBD.

4.16.6 DocumentManifest.sourceld

CONF-XXX: An Initiating Participant SHALL populate the Source ID with its homeCommunityId.

Informative: The homeCommunityId is a globally unique identifier for a community used to assist in subsequent transactions for locating the data held by that community. homeCommunityId is structured as an OID limited to 64 characters and specified in URI syntax, for example the homeCommunityId of 2.16.840.1.113883.3.166 would be formatted as urn:oid:2.16.840.1.113883.3.166.

4.16.7 Value Sets For Coded Attributes

CONF-XXX: An Initiating Participant SHALL populate coded metadata attributes according to the following [HL7 FHIR R4] value sets and binding strengths. Binding strengths are defined according to the HL7 FHIR specification: <https://www.hl7.org/fhir/valueset-binding-strength.html>.

CONF-XXX: An Initiating Participant, if populating coded metadata attributes with extended values, SHALL use value sets defined by the eHealth Exchange.

Table 2 Value sets for document metadata

XDS metadata attribute	Value set	Binding strength
DocumentReference authorRole	http://hl7.org/fhir/R4/valueset-practitioner-role.html	Preferred
DocumentReference authorSpeciality	http://hl7.org/fhir/R4/valueset-c80-practice-codes.html	Preferred
DocumentReference classCode	http://hl7.org/fhir/R4/valueset-document-classcodes.html	Extensible

DocumentReference confidentiality Code	http://hl7.org/fhir/R4/valueset-security-labels.html	Extensible Informative: Note that the latest value set has many more values than historically used in the eHx. This is what FHIR DocumentReference allows.
DocumentReference eventCodeList	http://hl7.org/fhir/R4/v3/ActCode/vs.html	Example Informative: This specification does not constrain this attribute, as it is very specific to the type of document.
DocumentReference formatCode	http://hl7.org/fhir/R4/valueset-formatcodes.html	Extensible
DocumentReference healthcareFacilityTypeCode	http://hl7.org/fhir/R4/valueset-c80-facilitycodes.html	Extensible
DocumentReference practiceSettingCode	http://hl7.org/fhir/R4/valueset-c80-practice-codes.html	Extensible
DocumentReference typeCode	http://hl7.org/fhir/R4/valueset-c80-doc-typecodes.html	Extensible
DocumentReference mimeType	https://www.hl7.org/documentcenter/public/standards/vocabulary/vocabulary_tables/infrastructure/vocabulary/mediaType.html	Required
DocumentManifest contentTypeCode	http://hl7.org/fhir/R4/valueset-practitioner-role.html	Preferred

Informative: The above binding strengths are the same or stronger than the [HL7 FHIR R4] [DocumentReference](#) resource, making them compatible. Also, note that the values for

authorRole and authorSpeciality may be passed as coded values or as simple strings. The example in this specification shows both.

4.16.8 Referencing Existing Metadata

CONF-XXX: An Initiating Participant that wishes to reference existing metadata in a Document Submission MAY obtain metadata references using any of the following methods, and SHALL prefer the methods in the order they are listed, unless otherwise specified:

- The Initiating Participant obtains the existing metadata references in a Query for Documents transaction.
- The Initiating Participant obtains the existing metadata references in an unspecified way.

Informative: Multiple scenarios, such as replacing a document, typically require the Initiating Participant to reference existing metadata at the Receiving Participant. An existing metadata object such as a DocumentReference or a DocumentManifest is referenced by an absolute reference URL, which is unique at the Receiving Participant.

4.17 Message Requirements: Updating Documents

CONF-XXX: An Initiating Participant MAY attempt to update documents using two methods: document replacement and document appending.

Informative: This specification does not specify the conditions that trigger an Initiating Participant to submit an updated document. Further, there should not be an expectation that the Receiving Participant will always accept the update - it may apply checks and processing before accepting, especially if the source system or author differs.

4.17.1 Submitting updates to a previously submitted document

Informative: Note that the only way to update a submitted document in MHD is to obtain a reference URL to the current version. So there is no difference from the client's perspective between updating one's previously submitted document and a document from another source.

4.17.2 Submitting updates to a discovered document

CONF-XXX: If an attempt to update a discovered document fails due to a version clash (XDSRegistryDeprecatedDocumentError is returned), the Initiating Participant SHOULD either abandon the update, or query to determine the latest applicable document and submit updates to that instead. Note that the latest document may have relationships to appendices or transformations.

Informative: The term “discovered document” in this context means a document that is discovered through querying the Receiving Participant. Although we do not limit updates to the original author, when performing cross-author updates there are special considerations. See the Message Requirements: Provenance section 3.22 for details.

4.17.3 Reflecting the Update in the Document

CONF-XXX: When replacing an HL7 CDA document, an Initiating Participant that has control over the generation of the new document SHOULD populate the relatedDocument element with a typeCode of “RPLC” and identify the prior document in the header of the new document.

CONF-XXX: When appending to an HL7 CDA document, an Initiating Participant that has control over the generation of the new document SHOULD populate the relatedDocument element with a typeCode of “APND” and identify the prior document in the header of the new document.

4.17.4 Reflecting the Update in the Document Metadata

CONF-XXX: When updating a document, an Initiating Participant SHALL reference existing metadata according to Section 3.17.10, Referencing Existing Metadata.

CONF-XXX: An Initiating Participant SHALL support XDS document relationships of type RPLC and APND.

CONF-XXX: When replacing a document, if a reference to the existing document entry can be obtained, an Initiating Participant SHALL include in the submission a RPLC association as defined in [\[IHE ITI TF-3\] 4.2.2.2.3](#).

CONF-XXX: When appending to a document, if a reference to the existing document entry can be obtained, an Initiating Participant SHALL include in the submission an APND association as defined in [\[IHE ITI TF-3\] 4.2.2.2.1](#).

4.18 Message Requirements: Other Document Relationships

Informative: An Initiating Participant MAY submit document relationships of type XFRM, XFRM_RPLC, or signs, but any expected behavior is undefined unless specified by a higher-level profile or participant agreement. See Processing Requirements, section 3.28.

Informative: An Initiating Participant MAY submit associations linking document entries to existing submission sets, but any expected behavior is undefined unless specified by a higher-level profile or participant agreement. See Processing Requirements, section 3.30.

See Section 3.17.10, Referencing Existing Metadata, for how to obtain and express references.

Informative: These relationships are not included because there has been no use case presented for them. This could change in the future.

CONF-XXX: An Initiating Participant SHALL NOT submit document relationships of type `IsSnapshotOf`.

Informative: The above requirement has been added because the `IsSnapshotOf` relationship is only used between an On-Demand Document Entry and a Stable Document Entry for a corresponding document that was generated. There is no reason for one participant to relate these objects for another participant.

4.19 Message Requirements: Folders

Informative: Folder semantics are defined in [\[IHE ITI TF-3\] 4.2.1.3](#).

Informative: An Initiating Participant MAY submit Folders, but any expected behavior is undefined unless specified by a higher-level profile or participant agreement. See Processing Requirements, section 3.30.

See Section 3.17.10, Referencing Existing Metadata, for how to obtain and express references.

Informative: Folders are not included because there has been no use case presented for them. This could change in the future.

4.20 Message Requirements: Routing

Informative: An Initiating Participant that supports the XCDR transaction option passes the Home Community ID of the ultimate recipient in the appropriate fields as specified in [\[IHE ITI TF-2b\] 3.41.4.1.2.2](#).

Informative: An Initiating Participant optionally passes information identifying the intended organization/person recipients as specified in [\[IHE ITI TF-3\] 4.2.3.3.7](#).

4.21 Message Requirements: Provenance

CONF-XXX: The Initiating Participant SHALL populate provenance information in submissions according to this specification, unless overridden by another eHx Provenance specification.

CONF-XXX: The Initiating Participant SHALL populate provenance information in all submitted C-CDA documents according to the rules in [\[HL7 Basic Provenance\]](#), constrained and clarified as follows:

- 3.1 Basic Provenance Practices: only CONF:1000. Informative: while this mentions care providing organizations as authors, we clarify that document content can be authored by other types of entities, e.g. patients, payers, labs, etc.
- 3.2.1 C-CDA Provenance Practices: omitting CONF:1009
- B. Provenance - Author Participation: As is
- C. Provenance - Assembler Participation: As is

4.21.1 Updating a document: Appending or replacing from the same source

Informative: When updating a document, the association between the original and new document is considered an important part of provenance, and is fully specified in other sections of this specification. The following cases for updating a document do not require any additional requirements for conveying provenance:

- Submitting an appendix to a document.
- Submitting a replacement document from the same source as the prior document (same source system, community, and authors).

4.21.2 Updating a document: Replacing from a different source

CONF-XXX: If an Initiating Participant is submitting a replacement to a document originally from another source, defined as a different community or author, and wishes to add or modify only individual entries, it SHALL:

- Use the appropriate document-level template from [\[HL7 Data Provenance\]](#) depending on the kind of author, e.g. Provider Generated Document With Provenance.
- Replace the document-level author, and use the original author for those sections or entries which are not being changed.
- Use the appropriate entry-level template from [\[HL7 Data Provenance\]](#) for any modified entry, e.g. Observation Generated by Provider.

CONF-XXX: If an Initiating Participant is submitting a replacement to a document originally from another source, defined as a different community or author, and wishes to reconcile entire sections, it SHALL:

- Use the appropriate document-level template from [\[HL7 Data Provenance\]](#) depending on the kind of author, e.g. Provider Generated Document With Provenance.
- Replace the document-level author, and use the original author for those sections which are not being changed.
- Use the appropriate entry-level template from [\[HL7 Data Provenance\]](#) for any modified entry, e.g. Observation Generated by Provider.

- Conform to the content requirements in [\[IHE RECON\]](#) 6.3.1.D Reconciliation Content, including a Reconciliation Act in each section that has been reconciled.

Informative: For example: a patient's PCP submits a replacement document for one authored by another physician because it has incorrect information about the patient. We cover two such cases: selective correction and section-level reconciliation. Note that cross-author updates may be treated differently from ordinary submissions by the Receiving Participant, for example, additional security checks may be performed. See the Security Considerations section 5 for details.

5 SECURITY CONSIDERATIONS

All messages transacted under this specification SHALL meet or exceed the eHealth Exchange security requirements documented in the Authorization Framework, Messaging Platform, Operational Policies and Procedures, etc. This includes encrypting all messages while at-rest and in-transit, and using 2-way-TLS with mutual authentication.

Implementers are encouraged to read the relevant Security Considerations in the IHE ITI TF, specifically [\[IHE ITI TF-1\] 10.7](#) and [\[IHE ITI TF-2x\] Appendix K](#).

In the case of cross-author update (an author/organization submits an update to the clinical data from another author/organization - see section 3.22.2), we have described additional provenance requirements to ensure that authorship is traced appropriately. But even before such an update is accepted, the Receiving Participant may want to apply additional checks on the sender, including human review. In this case, the DocumentQueued warning MAY be used to notify the sender of the delay, and the codeContext field MAY be used to explain it in more detail.

6 AUDITING

All messages transacted SHALL meet or exceed the IHE ATNA audit logging requirements found in the respective transactions.

7 OPERATIONAL CONSIDERATIONS

The various IHE and eHx options defined in this specification imply some way for eHx participants to advertise what they support, and to discover what others support.

7.1 Directory Settings

CONF-XXX: If a Receiving Participant supports both Transaction Options, it SHALL represent each as its own Endpoint element in the Directory. These endpoints MAY use the same address URL.

CONF-XXX: A Receiving Participant that implements the Document Submission specification SHALL use the following settings for the Endpoint in the Directory:

- Endpoint/name/value: "Document Submission"
- Endpoint/extension/extension[url="Version"]/valueCodeableConcept/coding/value: "3.0"
- If declaring options:
 - Endpoint/extension/extension[url="Option"]/valueCodeableConcept/coding/value: "PatientIdRequired"
 - Endpoint/extension/extension[url="Option"]/valueCodeableConcept/coding/value: "PersistsOriginalDocuments"
 - Endpoint/extension/extension[url="Option"]/valueCodeableConcept/coding/value: "PersistsClinicalItems"

CONF-XXX: A Receiving Participant that implements the Document Submission specification with the XDR Transaction Option SHALL use the following settings for the Endpoint in the Directory:

- Endpoint/connectionType/code/value: "ihe-xdr"
- Endpoint/extension/extension[url="Transaction"]/valueString/value: "XDR ITI-41"
- Endpoint/extension/extension[url="Actor"]/valueCodeableConcept/coding/value: "Document Recipient"
- If declaring options:
 - Endpoint/extension/extension[url="Option"]/valueCodeableConcept/coding/value: "AcceptsLimitedMetadata"

CONF-XXX: A Receiving Participant that implements the Document Submission specification with the XCDR Transaction Option SHALL use the following settings for the Endpoint in the Directory:

- Endpoint/connectionType/code/value: "ihe-xcdr"

- Endpoint/extension/extension[url="Transaction"]/valueString/value: "XCDR ITI-80"
- Endpoint/extension/extension[url="Actor"]/valueCodeableConcept/coding/value: "Responding Gateway"

Informative: The connection types are defined in the HL7 value set: <http://hl7.org/fhir/valueset-endpoint-connection-type.html>. Note that the value "ihe-xcdr" is not yet defined in the HL7 value set referenced by the directory. We will be proposing the additional value.

8 NETWORK-NETWORK CONSIDERATIONS

Some technical gateways as implemented by other networks require that XML-Digital Signatures in the SOAP messages be signed by a PKI private key specific to that network. When such requirements exist, the eHealth Exchange Hub will remove each original XML-Digital Signature and replace it with one compatible with the peer network. Note that this event is audited to preserve the chain of trust from the ultimate sender to the ultimate receiver.

9 EHx HUB CONSIDERATIONS

The Hub may offer the following translation capabilities between the XDR and XCDR flavors. These capabilities will be transparent to Participants.

9.1 Hub Translation: XDR Initiating Participant to XCDR Receiving Participant

In this translation, the following behaviors are performed by the Hub and the Directory:

- For each XCDR Receiving Participant that does not also include an XDR endpoint, eHx staff will create an additional XDR endpoint in the Directory.
- If a request comes in on the added XDR endpoint:
 - If it is an ITI-41 request, the Hub will convert it to an ITI-80 request and forward it to the participant's XCDR endpoint.
 - If the ITI-41 request includes a federated Home Community ID, the Hub will return an error.
 - If it is an ITI-80 request, the Hub will return an error.
- For each child of an XCDR Receiving Participant in the Directory that does not have its own native endpoint, eHx staff will create an additional XDR endpoint in the Directory that includes the HCID in the URL.
- If a request comes in on an added child XDR endpoint:

- If it is an ITI-41 request, the Hub will convert it to an ITI-80 request, extract the HCID from the URL and include it as a federated Home Community ID in the ITI-80 request, and forward it to the participant's XCDR endpoint.
- If the ITI-41 request includes a federated Home Community ID, the Hub will return an error.
- If it is an ITI-80 request, the Hub will return an error.

9.2 Hub Translation: XCDR Initiating Participant to XDR Receiving Participant

In this translation, the following behaviors are performed by the Hub and the Directory:

- For each XDR Receiving Participant that does not also include an XCDR endpoint, eHx staff will create an additional XCDR endpoint in the Directory.
- If a request comes in on the added XCDR endpoint:
 - If it is an ITI-80 request, the Hub will convert it to an ITI-41 request and forward it to the participant's XDR endpoint.
 - If the ITI-80 request includes a federated Home Community ID, the Hub will look for a child organization in the Directory with that HCID and an XDR endpoint. If it can find one, it will convert the request to an ITI-41 request without a federated Home Community ID and forward it to the child's XDR endpoint. If it cannot find one, the Hub will return an error.
 - If it is an ITI-41 request, the Hub will return an error.

For Hub behaviors that mediate cross-network differences, see the above Network-network Considerations Section.

10 SEQUOIA TEST TOOL CONSIDERATIONS

The eHx may leverage the Sequoia Project test platform in the future to provide for semi-automated validation of correct Document Submission transaction sender and/or receiver operations.

11 ROADMAP/BACKLOG

Change	Trigger	Status
Transition period begins	Approval by CC	Not started

<p>New transactions available for trial use by Participants.</p> <p>Participants adopting prior version ensure there are no problems adopting new version.</p>		Not started
Interim test criteria effective	Approval by CC	Not started
Test implementation Changes deployed as provisional	Approval by CC	Not started
<p>Transition period ends.</p> <p>New specification effective.</p> <p>Prior version 1.0 deprecated.</p>	Approval and date identified by CC	Not started
Test implementation changes transitioned to effective	New specification effective	Not started

12 APPENDICES

12.1 Validation Plan

An associated validation plan will confirm the conformance statements in this specification.

12.2 Examples

12.2.1 Document Submission XDR Request Message

```
<?xml version="1.0" encoding="UTF-8"?>
<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope"
  xmlns:a="http://www.w3.org/2005/08/addressing">
  <s:Header>
    <a:Action s:mustUnderstand="1">
      urn:ihe:iti:2007:ProvideAndRegisterDocumentSet-b
    </a:Action>
    <a:MessageID>urn:uuid:6d296e90-e5dc-43d0-b455-7c1f3eb35d83</a:MessageID>
    <a:ReplyTo>
      <a:Address>http://www.w3.org/2005/08/addressing/anonymous</a:Address>
    </a:ReplyTo>
  </s:Header>
  <s:Body>
  </s:Body>
</s:Envelope>
```

```

<a:To s:mustUnderstand="1">https://reportingagency.org/anEndpoint</a:To>
<a:From>http://https://generalhospital.org/anEndpoint</a:From>
<wsse:Security s:mustUnderstand="true">
  <!-- Includes necessary security header information as defined
        in the Messaging Platform Specification -->
</wsse:Security>
</s:Header>
<s:Body>
  <xds:ProvideAndRegisterDocumentSetRequest
    xmlns:xds="urn:ihe:iti:xds-b:2007"
    xmlns:lcm="urn:oasis:names:tc:ebxml-regrep:xsd:lcm:3.0"
    xmlns:rims="urn:oasis:names:tc:ebxml-regrep:xsd:rims:3.0"
    xmlns:rs="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0">
    <lcm:SubmitObjectsRequest>
      <rims:RegistryObjectList>
        <!-- Note that specifying the entryUUID (ExtrinsicObject/@id)
              allows for submitting corrections later -->
        <rims:ExtrinsicObject id="urn:uuid:c9230bcc-818e-40e5-9df8-076c5c5d8af9"
mimeType="text/xml" objectType="urn:uuid:7edca82f-054d-47f2-a032-9b2a5b5186c1">
          <rims:Slot name="creationTime">
            <rims:ValueList>
              <rims:Value>20051224</rims:Value>
            </rims:ValueList>
          </rims:Slot>
          <rims:Slot name="hash">
            <ValueList>
              <Value>3278dd4a5b4710bebbbc68267a642d12b55394697</Value>
            </ValueList>
          </rims:Slot>
          <rims:Slot name="languageCode">
            <ValueList>
              <Value>en-US</Value>
            </ValueList>
          </rims:Slot>
          <rims:Slot name="languageCode">
            <rims:ValueList>
              <rims:Value>en-us</rims:Value>
            </rims:ValueList>
          </rims:Slot>
          <rims:Slot name="serviceStartTime">
            <rims:ValueList>
              <rims:Value>200412230800</rims:Value>
            </rims:ValueList>
          </rims:Slot>
          <rims:Slot name="serviceStopTime">
            <rims:ValueList>
              <rims:Value>200412230801</rims:Value>
            </rims:ValueList>
          </rims:Slot>
          <rims:Slot name="size">
            <ValueList>
              <Value>381072</Value>
            </ValueList>
          </rims:Slot>
          <rims:Slot name="sourcePatientId">
            <rims:ValueList>
              <rims:Value>ST-1000^^^&1.3.6.1.4.1.21367.2003.3.9&ISO</rims:Value>
            </rims:ValueList>
          </rims:Slot>
          <rims:Slot name="sourcePatientInfo">
            <rims:ValueList>
              <rims:Value>PID-3|ST-1000^^^&1.3.6.1.4.1.21367.2003.3.9&ISO</rims:Value>
              <rims:Value>PID-5|Doe^John^^^</rims:Value>
              <rims:Value>PID-7|19560527</rims:Value>
              <rims:Value>PID-8|M</rims:Value>
              <rims:Value>PID-11|100 Main St^Metropolis^I1^44130^USA</rims:Value>
            </rims:ValueList>
          </rims:Slot>
          <rims:Name>

```



```

        <rim:LocalizedString value="Discharge summary"/>
    </rim:Name>
    <rim:Description/>
    <rim:Classification id="c101" classificationScheme="urn:uuid:93606bcf-9494-43ec-9b4e-
a7748d1a838d" classifiedObject="urn:uuid:c9230bcc-818e-40e5-9df8-076c5c5d8af9">
        <rim:Slot name="authorPerson">
            <rim:ValueList>
                <rim:Value>Gerald Smitty</rim:Value>
            </rim:ValueList>
        </rim:Slot>
        <rim:Slot name="authorInstitution">
            <rim:ValueList>
                <rim:Value>Cleveland Clinic</rim:Value>
                <rim:Value>Parma Community</rim:Value>
            </rim:ValueList>
        </rim:Slot>
        <!-- Example of coded value -->
        <rim:Slot name="authorRole">
            <rim:ValueList>
                <rim:Value>PRF^^^&amp;2.16.840.1.113883.5.90&amp;ISO</rim:Value>
            </rim:ValueList>
        </rim:Slot>
        <!-- Example of simple string -->
        <rim:Slot name="authorSpecialty">
            <rim:ValueList>
                <rim:Value>Cardiology</rim:Value>
            </rim:ValueList>
        </rim:Slot>
    </rim:Classification>
    <rim:Classification id="c102" classificationScheme="urn:uuid:41a5887f-8865-4c09-adf7-
e362475b143a" classifiedObject="urn:uuid:c9230bcc-818e-40e5-9df8-076c5c5d8af9"
nodeRepresentation="18842-5">
        <rim:Slot name="codingScheme">
            <rim:ValueList>
                <rim:Value>2.16.840.1.113883.6.1</rim:Value>
            </rim:ValueList>
        </rim:Slot>
    </rim:Name>
    <rim:LocalizedString value="Discharge summary"/>
    </rim:Name>
    </rim:Classification>
    <rim:Classification id="c103" classificationScheme="urn:uuid:f4f85eac-e6cb-4883-b524-
f2705394840f" classifiedObject="urn:uuid:c9230bcc-818e-40e5-9df8-076c5c5d8af9"
nodeRepresentation="N">
        <rim:Slot name="codingScheme">
            <rim:ValueList>
                <rim:Value>2.16.840.1.113883.5.25</rim:Value>
            </rim:ValueList>
        </rim:Slot>
    </rim:Name>
    <rim:LocalizedString value="Normal"/>
    </rim:Name>
    </rim:Classification>
    <rim:Classification id="c104" classificationScheme="urn:uuid:a09d5840-386c-46f2-b5ad-
9c3699a4309d" classifiedObject="urn:uuid:c9230bcc-818e-40e5-9df8-076c5c5d8af9"
nodeRepresentation="urn:hl7-org:sdwg:ccda-structuredBody:2.1">
        <rim:Slot name="codingScheme">
            <rim:ValueList>
                <rim:Value>1.3.6.1.4.1.19376.1.2.3</rim:Value>
            </rim:ValueList>
        </rim:Slot>
    </rim:Name>
    <rim:LocalizedString value="C-CDA 2.1 constraints using a structured body"/>
    </rim:Name>
    </rim:Classification>
    <rim:Classification id="c105" classificationScheme="urn:uuid:f33fb8ac-18af-42cc-ae0e-
ed0b0bdb91e1" classifiedObject="urn:uuid:c9230bcc-818e-40e5-9df8-076c5c5d8af9"
nodeRepresentation="7377003">
        <rim:Slot name="codingScheme">

```

```

        <rim:ValueList>
          <rim:Value>2.16.840.1.113883.6.96</rim:Value>
        </rim:ValueList>
      </rim:Slot>
      <rim:Name>
        <rim:LocalizedString value="Emergency department--hospital"/>
      </rim:Name>
    </rim:Classification>
    <rim:Classification id="c106" classificationScheme="urn:uuid:cccf5598-8b07-4b77-a05e-ae952c785ead" classifiedObject="urn:uuid:c9230bcc-818e-40e5-9df8-076c5c5d8af9" nodeRepresentation="394579002">
      <rim:Slot name="codingScheme">
        <rim:ValueList>
          <rim:Value>2.16.840.1.113883.6.96</rim:Value>
        </rim:ValueList>
      </rim:Slot>
      <rim:Name>
        <rim:LocalizedString value="Cardiology"/>
      </rim:Name>
    </rim:Classification>
    <rim:Classification id="c107" classificationScheme="urn:uuid:f0306f51-975f-434e-a61c-c59651d33983" classifiedObject="urn:uuid:c9230bcc-818e-40e5-9df8-076c5c5d8af9" nodeRepresentation="59258-4">
      <rim:Slot name="codingScheme">
        <rim:ValueList>
          <rim:Value>2.16.840.1.113883.6.1</rim:Value>
        </rim:ValueList>
      </rim:Slot>
      <rim:Name>
        <rim:LocalizedString value="Emergency department Discharge summary"/>
      </rim:Name>
    </rim:Classification>
    <rim:ExternalIdentifier id="ei01" registryObject="urn:uuid:c9230bcc-818e-40e5-9df8-076c5c5d8af9" identificationScheme="urn:uuid:58a6f841-87b3-4a3e-92fd-a8ffefff98427" value="SELF-5^^^&1.3.6.1.4.1.21367.2005.3.7&ISO">
      <rim:Name>
        <rim:LocalizedString value="XSDDocumentEntry.patientId"/>
      </rim:Name>
    </rim:ExternalIdentifier>
    <rim:ExternalIdentifier id="ei02" registryObject="urn:uuid:c9230bcc-818e-40e5-9df8-076c5c5d8af9" identificationScheme="urn:uuid:2e82c1f6-a085-4c72-9da3-8640a32e42ab" value="1.3.6.1.4.1.21367.2005.3.9999.32">
      <rim:Name>
        <rim:LocalizedString value="XSDDocumentEntry.uniqueId"/>
      </rim:Name>
    </rim:ExternalIdentifier>
  </rim:ExtrinsicObject>
  <rim:RegistryPackage id="SubmissionSet01">
    <rim:Slot name="submissionTime">
      <rim:ValueList>
        <rim:Value>20041225235050</rim:Value>
      </rim:ValueList>
    </rim:Slot>
    <rim:Name>
      <rim:LocalizedString value="Hospital Stay"/>
    </rim:Name>
    <rim:Description/>
    <rim:Classification id="c108" classificationScheme="urn:uuid:a7058bb9-b4e4-4307-ba5b-e3f0ab85e12d" classifiedObject="SubmissionSet01">
      <rim:Slot name="authorPerson">
        <rim:ValueList>
          <rim:Value>Sherry Dopplemeyer</rim:Value>
        </rim:ValueList>
      </rim:Slot>
      <rim:Slot name="authorInstitution">
        <rim:ValueList>
          <rim:Value>Cleveland Clinic</rim:Value>
          <rim:Value>Berea Community</rim:Value>
        </rim:ValueList>
      </rim:Slot>
    </rim:Classification>
  </rim:RegistryPackage>

```

```

        </rim:Slot>
        <rim:Slot name="authorRole">
          <rim:ValueList>
            <rim:Value>Primary Surgeon</rim:Value>
          </rim:ValueList>
        </rim:Slot>
        <rim:Slot name="authorSpecialty">
          <rim:ValueList>
            <rim:Value>Orthopedic</rim:Value>
          </rim:ValueList>
        </rim:Slot>
      </rim:Classification>
      <rim:Classification id="c109" classificationScheme="urn:uuid:aa543740-bdda-424e-8c96-
df4873be8500" classifiedObject="SubmissionSet01" nodeRepresentation="EMER">
        <rim:Slot name="codingScheme">
          <rim:ValueList>
            <rim:Value>2.16.840.1.113883.5.4</rim:Value>
          </rim:ValueList>
        </rim:Slot>
        <rim:Name>
          <rim:LocalizedString value="Emergency"/>
        </rim:Name>
      </rim:Classification>
      <rim:ExternalIdentifier id="ei03" registryObject="SubmissionSet01"
identificationScheme="urn:uuid:96fdda7c-d067-4183-912e-bf5ee74998a8"
value="1.3.6.1.4.1.21367.2005.3.9999.33">
        <rim:Name>
          <rim:LocalizedString value="XDSSubmissionSet.uniqueId"/>
        </rim:Name>
      </rim:ExternalIdentifier>
      <rim:ExternalIdentifier id="ei04" registryObject="SubmissionSet01"
identificationScheme="urn:uuid:554ac39e-e3fe-47fe-b233-965d2a147832" value="3670984664">
        <rim:Name>
          <rim:LocalizedString value="XDSSubmissionSet.sourceId"/>
        </rim:Name>
      </rim:ExternalIdentifier>
      <rim:ExternalIdentifier id="ei05" registryObject="SubmissionSet01"
identificationScheme="urn:uuid:6b5ae1a-874d-4603-a4bc-96a0a7b38446" value="SELF-
5^^^&1.3.6.1.4.1.21367.2005.3.7&ISO">
        <rim:Name>
          <rim:LocalizedString value="XDSSubmissionSet.patientId"/>
        </rim:Name>
      </rim:ExternalIdentifier>
    </rim:RegistryPackage>
    <rim:Classification id="c110" classifiedObject="SubmissionSet01"
classificationNode="urn:uuid:a54d6aa5-d40d-43f9-88c5-b4633d873bdd"/>
    <rim:Association id="as01" associationType="HasMember" sourceObject="SubmissionSet01"
targetObject="urn:uuid:c9230bcc-818e-40e5-9df8-076c5c5d8af9">
      <rim:Slot name="SubmissionSetStatus">
        <rim:ValueList>
          <rim:Value>Original</rim:Value>
        </rim:ValueList>
      </rim:Slot>
    </rim:Association>
  </rim:RegistryObjectList>
</lcm:SubmitObjectsRequest>
<xds:Document id="urn:uuid:c9230bcc-818e-40e5-9df8-
076c5c5d8af9">UjBsR09EbGhjZ0dTQUxNQUFBUUNBRU1tQ1p0dU1GUxhEUzhi</xds:Document>
</xds:ProvideAndRegisterDocumentSetRequest>
</s:Body>
</s:Envelope>

```

12.2.2 Document Submission XDR Response Message

```

<?xml version="1.0" encoding="UTF-8"?>
<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope"
  xmlns:a="http://www.w3.org/2005/08/addressing">
  <s:Header>
    <a:Action s:mustUnderstand="1">

```

```

    urn:ihe:iti:2007:ProvideAndRegisterDocumentSet-bResponse
  </a:Action>
  <a:RelatesTo>urn:uuid:6d296e90-e5dc-43d0-b455-7clf3eb35d83</a:RelatesTo>
</s:Header>
<s:Body>
  <rs:RegistryResponse
    status="urn:oasis:names:tc:ebxml-regrep:ResponseStatusType:Success"
    xmlns:rs="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0"/>
  </s:Body>
</s:Envelope>

```

12.2.3 Document Submission XCDR Request Message

```

<?xml version="1.0" encoding="UTF-8"?>
<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope"
  xmlns:a="http://www.w3.org/2005/08/addressing"
  xmlns:xdr="urn:ihe:iti:xdr:2014">
  <s:Header>
    <a:Action s:mustUnderstand="1">
      urn:ihe:iti:2015:CrossGatewayDocumentProvide
    </a:Action>
    <xdr:homeCommunityBlock>
      <xdr:homeCommunityId>urn:oid:1.2.3.4.5.6.2333.23</xdr:homeCommunityId>
    </xdr:homeCommunityBlock>
    <a:MessageID>urn:uuid:6d296e90-e5dc-43d0-b455-7clf3eb35d83</a:MessageID>
    <a:ReplyTo>
      <a:Address>http://www.w3.org/2005/08/addressing/anonymous</a:Address>
    </a:ReplyTo>
    <a:To s:mustUnderstand="1">https://reportingagency.org/anEndpoint</a:To>
    <a:From>http://https://generalhospital.org/anEndpoint</a:From>
    <wsse:Security s:mustUnderstand="true">
      <!-- Includes necessary security header information as defined
        in the Messaging Platform Specification -->
    </wsse:Security>
  </s:Header>
  <s:Body>
    <xds:ProvideAndRegisterDocumentSetRequest
      xmlns:xds="urn:ihe:iti:xds-b:2007"
      xmlns:lcm="urn:oasis:names:tc:ebxml-regrep:xsd:lcm:3.0"
      xmlns:rsm="urn:oasis:names:tc:ebxml-regrep:xsd:rsm:3.0"
      xmlns:rs="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0">
      <lcm:SubmitObjectsRequest>
        <rs:RequestSlotList>
          <rim:Slot name="homeCommunityId">
            <rim:ValueList>
              <rim:Value>urn:oid:1.2.3.4.5.6.2333.23</rim:Value>
            </rim:ValueList>
          </rim:Slot>
        </rs:RequestSlotList>
        <rim:RegistryObjectList>
          <!-- Registry Metadata goes here -->
        </rim:RegistryObjectList>
      </lcm:SubmitObjectsRequest>
      <xds:Document id="urn:uuid:c9230bcc-818e-40e5-9df8-076c5c5d8af9">
        <!-- Document binary goes here -->
      </xds:Document>
    </xds:ProvideAndRegisterDocumentSetRequest>
  </s:Body>
</s:Envelope>

```

12.2.4 Document Submission XCDR Response Message

```

<?xml version="1.0" encoding="UTF-8"?>
<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope"
  xmlns:a="http://www.w3.org/2005/08/addressing">
  <s:Header>
    <a:Action s:mustUnderstand="1">
      urn:ihe:iti:2015:CrossGatewayDocumentProvideResponse
    </a:Action>

```

```

    <a:RelatesTo>urn:uuid:6d296e90-e5dc-43d0-b455-7c1f3eb35d83</a:RelatesTo>
  </s:Header>
  <s:Body>
    <rs:RegistryResponse
      status="urn:oasis:names:tc:ebxml-regrep:ResponseStatusType:Success"
      xmlns:rs="urn:oasis:names:tc:ebxml-regrep:xsd:rs:3.0"
    </s:Body>
</s:Envelope>

```

12.3 Open issues

1.

12.4 Closed issues

1. Which flavors of Push should we adopt: XDR, XCDR, XDM, XDS.b?
 - a. Resolution: Because there was a need to route to federated systems, XCDR was adopted. To maintain backwards compatibility with the prior version of the specification, XDR was adopted. There were no use cases that required XDM or XDS.b, however, both were analyzed, and some of the consistency checking of XDS.b was added.
2. There is no Metadata-Limited Document Source actor or option for the XCDR Initiating Gateway. Is this something we need to add?
 - a. Resolution: No use case for this.
3. Is there a need for asynchronous push? The prior version had a deferred mechanism, but it wasn't based on an IHE mechanism. Only one option in the current IHE ITI TF is available: AS4.
 - a. Resolution: No use case for this.
4. Should we define any persistence requirements?
 - a. Resolution: Yes, added conditional requirements depending on whether and how a system persisted submissions.
5. Should we define any provenance requirements?
 - a. Resolution: Yes, examined provenance in the context of push, and defined specific cases and provenance info that needs to be retained. Leaned heavily on work done by HL7 and IHE.

12.5 Push Comparison Table

The following table was created to assist in the writing of this specification. It is a cross-reference of detailed functionality across the various flavors of push:

- Columns B through E reflect the IHE ITI push profiles in the 2019 Technical Framework, which are being referenced by this specification
- Columns F and G reflect the eHx 2011 Document Submission specification and its underlying specification, the IHE ITI XDR profile in the 2009 Technical Framework
- Column H reflects the decisions made for this specification. Contents will be either specific notes or the following:
 - <conformance word> IHE: this spec applies the IHE requirement implicitly
 - <conformance word> eHx: this spec adds an explicit requirement
 - MAY-UND: this spec does not utilize this functionality, so any behavior is undefined
- Columns I and J trace the functionality to specific sections
- Column K analyzes compatibility of the 2019 IHE XCDR profile with the TECA QTF
- Cells are shaded pink to indicate greater relative importance

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Basic metadata: documents, submission set										
Sender can push documents, document entries conformant to TF 3: 4 (Note there are many "shalls" scattered around)	SHALL	SHALL	SHALL	SHALL	SHALL	SHALL	SHALL IHE	- TF 2b: 3.41.4.1.2 - XCDR: 2b: 3.80.4.1.2 - TF-3: 4	Same	
Sender can push multiple documents in a single submission	MAY	MAY	MAY	MAY	MAY (Multiple Document Submission option included)	MAY if Multiple Document Submission option (this was later removed from XDR)	MAY IHE	- TF-3: 4	- XDR 2009: TF 1: 15	

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Receiver can process documents, document entries conformant to TF 3: 4 (Note there are many "shalls" scattered around)	SHALL	SHALL	SHALL	SHALL if ZIP over Email Response Option; MAY otherwise (i.e. render with browser only)	SHALL	SHALL	SHALL IHE	- XDS.b/XDR: TF 2b: 3.41.4.1.3 - TF-3: 4	Same	
Sender pushes full metadata for each document (see ITI TF 3: Table 4.3.1-3)	SHALL	SHALL if Document Source; MAY if Metadata-Limited Document Source	SHALL. IHE would need a use case to add support for limited metadata in a CP.	MAY	SHALL, but sourcePatientId, sourcePatientInfo and patientId MAY be de-identified	MAY based on agreement	Adopt IHE XDR options, suggest CP to XCDR to allow omitting patientId	- XDR: TF 1: 15 - XDS.b/XDR: TF 2b: 3.41.4.1.2 - All: TF-3: 4.3.1	- TF-3: 4.1	Don't make PID optional on XCDR until ITI CP is accepted by QTF. Further, if we want full compatibility for all pushes, we will have to disallow limited metadata pushes for XDR if they are bound for the QTF. If we do, then the Hub could still convert XDR push to XCDR to go out to QTF.
Receiver handles partial metadata	SHALL NOT	SHALL if Accepts Limited Metadata Option; MAY otherwise	MAY	MAY	Unclear	MAY based on agreement	Adopt IHE XDR options	- TF 2b: 3.41.4.1.3	N/A	Ok for receivers
Receiver adds the repositoryUniqueId	SHALL	MAY	MAY	N/A (MAY)	N/A	N/A	SHALL IHE if persists	- TF 2b: 3.41.4.1.3.2	- TF 2b: 3.41.4.1.3	
Advanced metadata: associations, folders										

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Sender can push advanced XDS content: associations, folders conformant to TF 3: 4 (Note there are many "shalls" scattered around)	SHALL if options declared for each advanced type; MAY if not	MAY. No XDR counterpart to options in 3.41.4.1.2.1.	MAY for Folders or doc replacement	MAY, but references to existing objects can't be resolved without external coordination with receiver	SHALL NOT	MAY	MAY-UND (MAY but behavior undefined unless higher level agreement)	- XDS.b: TF 1: 10.2 - XDS.b: TF 2b: 3.41.4.1.2.1 - All: TF-3: 4	- XDS.b: TF 1: 10.2 - XDS.b: TF 2b: 3.41.4.1.2.1 - All: TF-3: 4	Receiving from QTF source passing these is probably ok, as we require all Partial warnings to be returned.
Receiver can process advanced XDS content conformant to TF 3: 4 (Note there are many "shalls" scattered around)	SHALL	MAY; SHALL return errors for unprocessed - see below	MAY but unclear; SHALL return errors for unprocessed Folders or doc replacement only	MAY, but references to existing objects can't be resolved without external coordination with receiver	MAY		See below	- XDS.b/XDR: TF 2b: 3.41.4.1.3 - TF-3: 4	- XDS.b/XDR: TF 2b: 3.41.4.1.4 - TF-3: 4	Sending to QTF should be ok as well.
Sender pushes a folder	MAY	MAY	MAY	MAY		Unclear. 15.2.3 says MAY for Folders, but closed issue 9 says not supported and recipient has to ignore.	MAY-UND eHx	- TF 3: 4.2.2.1	- TF-3: 4.1.4.2 - TF 3: 4.1.5	
Sender associates a document with a folder	MAY	MAY	MAY	MAY			MAY-UND eHx	- TF 3: 4.2.2.1	- TF-3: 4.1.4.2 - TF 3: 4.1.5	

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Receiver persists folders and associations	SHALL	MAY	MAY	MAY			MAY-UND eHx	- TF 2b: 3.42.4.1.3	- TF 2b: 3.42.4.1.4	
Receiver updates Folder.lastUpdateTime if change to folder	SHALL	MAY	MAY	MAY			MAY-UND IHE	- TF 2b: 3.42.4.1.3.6	- TF 3: Table 4.1-7	
Sender pushes addendum to a document	MAY	MAY	MAY	MAY			SHALL eHx	- TF-3: 4.2.2.2	- TF-3: 4.1.6	
Sender pushes replacement of a document	MAY	MAY	MAY	MAY			SHALL eHx	- TF-3: 4.2.2.2	- TF-3: 4.1.6	
Sender pushes transformation of a document	MAY	MAY	MAY	MAY			MAY-UND eHx	- TF-3: 4.2.2.2	- TF-3: 4.1.6	
Sender pushes transformation and replacement of a document	MAY	MAY	MAY	MAY			MAY-UND eHx	- TF-3: 4.2.2.2	- TF-3: 4.1.6	
Receiver persists document relationship semantics	SHALL	MAY	MAY	MAY			SHALL IHE if persists	- TF 2b: 3.42.4.1.3	- TF 2b: 3.42.4.1.4	
Sender pushes a document containing a digital signature of another document and relates the two	MAY	MAY	MAY	MAY		SHALL NOT. No requirements constrain metadata, but closed issue 8 says lifecycle pushes not supported and recipient "has to send a negative acknowledgment if the action is not a "new document"."	MAY-UND eHx	- TF-3: 4.2.2.2	- TF-3: 4.1.6.2	

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Sender pushes IsSnapshotOf association between Stable and On-Demand DocumentEntry objects	MAY	MAY	MAY	MAY		N/A	SHALL NOT eHx - this makes no sense in a cross-community context	- TF 2b: 3.41.4.1.2	N/A	Unlikely to get one of these from QTF. If so, can return error, persist, etc.
Receiver persists On-Demand snapshot semantics	SHALL	MAY	MAY	MAY		N/A	SHALL NOT eHx	- TF 2b: 3.42.4.1.3	N/A	
Receiver ensures document replacement semantics	SHALL	MAY	MAY	MAY		SHALL NOT. Closed issue 8 says lifecycle pushes not supported.	SHALL IHE if persists; SHALL eHx if any info persisted; MAY otherwise	- XDR: 2b 3.42.4.1.3.5 - XCDR: 2b 3.80.4.1.3	- TF 3: 4.1.6.1	Compatible
Receiver persists SubmissionSets and associations	SHALL	MAY	MAY	MAY		SHALL	MAY-UND eHx	- TF 2b: 3.42.4.1.3	- TF 2b: 3.42.4.1.4	
Sender associates a new SubmissionSet with an existing document, which may be for another patient (use case: mother and child birth records)	MAY	MAY	MAY	MAY		MAY	MAY-UND eHx	- TF 3: 4.2.2.1.1 - https://wiki.ihe.net/index.php/XDS-FAQ_2	- TF 3: 4.1.4.2	
Receiver handles and persists a new SubmissionSet with an existing document	SHALL	MAY	MAY	MAY		SHALL	MAY-UND eHx	- TF 2b: 3.42.4.1.3	- TF 2b: 3.42.4.1.4	

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Receiver returns PartialAppendContentNotProcessed if append semantics included and can't process	N/A	SHALL if can't process	N/A	N/A	N/A	N/A	SHALL IHE	- XDR 2b 3.41.4.1.3.1 - XCDR: 2b 3.80.4.1.3	N/A	
Receiver returns PartialFolderContentNotProcessed if folder semantics included and can't process	N/A	SHALL if can't process	SHALL if can't process	N/A	N/A	N/A	SHALL IHE	- XDR 2b 3.41.4.1.3.1 - XCDR: 2b 3.80.4.1.3	N/A	
Receiver returns PartialRelationshipContentNotProcessed if relationship semantics included and can't process	N/A	SHALL if can't process	N/A	N/A	N/A	N/A	SHALL IHE	- XDR 2b 3.41.4.1.3.1 - XCDR: 2b 3.80.4.1.3	N/A	We might return warning that XCDR IG isn't expecting, but since the error code is defined, shouldn't be a problem.
Receiver returns PartialReplaceContentNotProcessed if document replacement semantics included and can't process	N/A	SHALL if can't process	SHALL if can't process	N/A	N/A	N/A	SHALL IHE	- XDR 2b 3.41.4.1.3.1 - XCDR: 2b 3.80.4.1.3	N/A	

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Receiver returns PartialTransformNotProcessed if transform semantics included and can't process	N/A	SHALL if can't process	N/A	N/A	N/A	N/A	SHALL IHE	- XDR 2b 3.41.4.1.3.1 - XCDR: 2b 3.80.4.1.3	N/A	We might return warning that XCDR IG isn't expecting, but since the error code is defined, shouldn't be a problem.
Receiver returns PartialTransformReplaceNotProcessed if transform&replace semantics included and can't process	N/A	SHALL if can't process	N/A	N/A	N/A	N/A	SHALL IHE	- XDR 2b 3.41.4.1.3.1 - XCDR: 2b 3.80.4.1.3	N/A	We might return warning that XCDR IG isn't expecting, but since the error code is defined, shouldn't be a problem.
Sender pushes ReferenceIdList metadata attribute	MAY	MAY	MAY	MAY	N/A	N/A	MAY-UND unless want to consider encounter persistence	- TF 3: Table 4.3.1-3	N/A	

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Receiver handles ReferenceIdList metadata attribute	MAY	MAY	MAY	MAY	N/A	N/A	MAY-UND unless want to consider encounter persistence	- TF 2b: 3.42.4.1.3.2	N/A	
Sender pushes extra metadata: ebRIM Slots on any DocumentEntry, SubmissionSet, Folder, or Association that are not defined in the Technical Framework	MAY	MAY	MAY	MAY	N/A	N/A	MAY IHE	- TF 3: 4.2.3.1.6	- TF 3: 4.1.14	
Receiver handles extra metadata without returning error	SHALL	SHALL	SHALL	MAY	N/A	N/A	SHALL IHE	- TF 3: 4.2.3.1.6	- TF 3: 4.1.14	
Receiver persists extra metadata	MAY	MAY	MAY	MAY	N/A	N/A	MAY IHE if persists	- TF 2b: 3.42.4.1.3.2	- TF 3: 4.1.14	
Receiver returns XDSEExtraMetadataNotSaved warning if does not persist extra metadata	SHALL	MAY	MAY	N/A	N/A	N/A	SHALL IHE if persists	- TF 2b: 3.42.4.1.3.2 - TF 3: Table 4.2.4.1-2	- TF 3: 4.1.14	
Patient: subject of the push										

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Sender matches patient before push and passes destination PID	SHALL	SHALL if Document Source; MAY if Metadata-Limited Document Source	Unclear: 3.80.4.1.1 implies MAY, 3.80.4.1.2 specifies SHALL through Vol 3 requirements. Will write an ITI CP.	N/A	SHALL, unless pushing de-identified document	SHALL (patientId defined as in registry's domain)	SHALL eHx if receiver requires via options	- XDR: TF 1: 15 - XDS.b/XDR: TF 2b: 3.41.4.1.2 - XCDR: TF 2b: 3.80.4.1 - All: TF-3: 4.3.1	- TF 3: Table 4.1-5	QTF won't have access to our custom directory options, but shouldn't be a problem. Expect XCDR IG to try to match, and we have fallback logic if they can't.
Receiver returns XDSUnknownPatientId if PID included and doesn't match a known patient	SHALL	MAY	MAY	N/A	SHALL	SHALL	MAY eHx	- TF 2b: 3.42.4.1.3.3.2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	
Receiver matches patient based on demographics in metadata or CDA (i.e. not by the PID included in the push)	N/A	MAY implied if Accepts Limited Metadata Option and no PID; N/A otherwise	Unclear: see above	MAY	Unclear: PID and demographics may be pseudonymous; no defined way to tell	N/A	SHOULD eHx if can't match PID (we make XDR match XCDR)	- XDR: TF 1: 15 - TF 2b: 3.41.4.1.3	N/A	
Sender pushes content for more than one patient	SHALL NOT	SHALL NOT	SHALL NOT	MAY	SHALL NOT	SHALL NOT	SHALL NOT IHE	- TF 2b: 3.41.4.1.2	- TF 2b: 3.41.1	

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Receiver can process content for more than one patient	SHALL NOT	N/A (MAY)	SHALL NOT	MAY	SHALL NOT	SHALL NOT	SHALL NOT eHx; error defined below	- TF 2b: 3.42.4.1.3.3.2 - TF 2b: 3.42.4.1.3.5 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	
Routing										
Sender specifies system recipient of the push by HCID (allows routing beyond the immediate recipient)	N/A	SHALL if Transmit Home Community Id Option, N/A otherwise	This is the key feature of XCDR. However, unclear: SHALL implied but no normative requirements. Question for ITI Tech Committee.	N/A	N/A	N/A	SHALL IHE if XCDR, SHALL NOT if XDR eHx	- XDR: TF 2b: 3.41.4.1.2.2 - XCDR: 3.80.1	N/A	TBD - need to know how QTF directory works. Does it include federated communities that don't have endpoints? Who can we ask?
Receiver routes to system recipient if identified	N/A	MAY	MAY	N/A	N/A	N/A	SHALL if XCDR, N/A if XDR eHx	- XDR: TF 2b: 3.41.4.1.3.1 - XCDR: 3.80.1	N/A	
Sender specifies human or organization recipient of the push by: person or org name, phone, email	MAY	SHALL if known	MAY	SHALL if known	MAY	MAY	IHE	- TF 2b: 3.41.4.1.2 - TF-3: 4.3.1	- TF 3: Table 4.1-5	
Receiver routes to human or organization recipient if identified	MAY	MAY	MAY	MAY	MAY	MAY	SHOULD eHx	Implied	Implied	

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
<i>Processing</i>										
Receiver submission processes	SHALL	SHALL	SHALL	SHALL if ZIP over Email Response Option; MAY otherwise (i.e. render with browser only)	SHALL	Unclear. XDR has no Vol 2 content; it just reuses ITI-41 from XDS.b and says "no repository or registry actors are involved". So it could be interpreted to imply equivalent behavior, no behavior at all, or anywhere in between. The Vol 1 content only gives a couple hints. Elsewhere in this column I've made guesses at minimal processing.	SHALL IHE	- XDR: TF 2b: 3.41.4.1.3 - XCDR: TF 2b: 3.80.4.1.3	- TF 1: 15	

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Receiver interprets with no context, such as knowledge of a prior submission	N/A	SHALL, but impossible to meet unless some kinds of pushes are disallowed or constrained. Question for ITI Tech Committee.	SHALL	SHALL implied	N/A	N/A	SHALL IHE, but constrained and clarified by eHx	- XDR: TF 2b: 3.41.4.1.3.1 - XCDR: TF 2b: 3.80.4.1.3	N/A	
Receiver returns response only after full processing	SHALL	SHALL, but response code DocumentQueued (for manual matching) allows patient matching to be deferred.	SHALL but unclear if response code DocumentQueued is allowed	SHALL if ZIP over Email Response Option	SHALL	SHALL	SHALL IHE, except when queueing for later match (eHx)	- TF 2b: 3.41.4.2	Same	We might return this to a QTF IG. Should be ok.
Receiver returns DocumentQueued if queued the document for future manual matching to a patient	SHALL NOT	Unclear, appears to be MAY. See above.	N/A (MAY)	N/A	N/A	N/A	MAY eHx	- TF-3: 4.3.1	N/A	Pending CP to ask if XDR warning can be returned
Receiver replaces symbolic UUIDs with generated	SHALL	MAY	MAY	MAY	MAY	MAY	SHALL IHE if persists	- TF 2b: 3.42.4.1.3.7	- TF-3: 4.1.6.1	

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Receiver sets the availabilityStatus of all objects to Approved	SHALL	Unclear. No normative requirement, but TF 3: 4.2.3.2.2 says "If present in a submission, the submitted value is ignored. It is always set to Approved as a result of the successful submission of new documents." Question for ITI Tech Committee.	MAY	N/A	MAY	MAY	SHALL IHE if persists	- TF 2b: 3.42.4.1.3.3.5	- TF 3: Table 4.1-5	
Receiver persists documents, document entries for future query	SHALL	MAY	MAY	N/A	MAY	MAY	SHALL eHx if persists	- TF 2b: 3.41.4.1.3.2 - TF 2b: 3.42.4.1.3.1	- TF 2b: 3.41.4.1.3 - TF 2b: 3.42.4.1.4	
Receiver terminates processing and returns error in case of error	SHALL	SHALL	SHALL	SHALL if ZIP over Email Response Option	MAY	MAY	SHALL IHE	- XDR: TF 2b: 3.41.4.1.3 - XCDR: TF 2b: 3.80.4.1.3	- TF 2b: 3.41.4.1.3 - TF 2b: 3.42.4.1.4	

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Receiver reverts any changes in case of any error	Doc Repo MAY revert, Doc Reg SHALL revert	MAY	MAY	N/A	SHALL	Implied SHALL: "Metadata and documents not stored"	SHALL IHE if persists	- TF 2b: 3.41.4.1.3.2 - TF 2b: 3.42.4.1.3.1	- TF 2b: 3.41.4.1.3 - TF 2b: 3.42.4.1.4	
Sender supports WS-Addressing Asynchronous mode	MAY by declaring option	N/A	N/A	N/A	N/A	N/A	N/A	- TF 1: 10.2 - TF 2b: 3.41.4.1.2.1 - TF-2x: Appendix V.3	N/A	
Receiver supports WS-Addressing Asynchronous mode	MAY by declaring option	N/A	N/A	N/A	N/A	N/A	N/A	- TF 1: 10.2 - TF 2b: 3.41.4.1.2.1 - TF-2x: Appendix V.3	N/A	
Sender supports AS4 Asynchronous mode	MAY with option	MAY with option	MAY with option	N/A	N/A	N/A	MAY-UND eHx	- XDS.b/XDR: TF 2b: 3.41.4.1.2 - XCDR: TF 1: 40.2.2	N/A	TBD - need to find out if QTF will support this option
Receiver supports AS4 Asynchronous mode	MAY with option	MAY with option	MAY with option	N/A	N/A	N/A	MAY-UND eHx	- XDS.b/XDR: TF 2b: 3.41.4.1.2 - XCDR: TF 1: 40.2.2	N/A	TBD - need to find out if QTF will support this option

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Sender supports Deferred mode	N/A	N/A	N/A	N/A	MAY	N/A	N/A	N/A	- eHx Document Submission 2.0: 3.4 - eHx Messaging Platform 3.0: 3.6	
Receiver supports Deferred mode	N/A	N/A	N/A	N/A	MAY	N/A	N/A	N/A	- eHx Document Submission 2.0: 3.4 - eHx Messaging Platform 3.0: 3.6	
Validating: size and hash										

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Sender includes size and hash of documents	MAY	MAY	MAY	SHALL	SHALL	MAY	SHALL eHx	- TF 2b: 3.41.4.1.2 - TF-3: 4.3.1	- eHx Document Submission 2.0: 3.5 - TF 3: Table 4.1-5	
Receiver adds and persists size and hash if not provided	SHALL	MAY	MAY	N/A	N/A	MAY	SHALL IHE if persists	- TF 2b: 3.41.4.1.3.2	- TF 2b: 3.41.4.1.3	
Receiver returns error XDSRepositoryMetadataError if size and hash if present don't match those calculated from actual document	SHALL	SHALL	MAY, but this may be oversight since this is meant to be like XDR	SHALL detect error and display to user - no error return	SHALL; code not specified	N/A	SHALL IHE; XCDR clarified eHx	- TF 2b: 3.41.4.1.3	- eHx Document Submission 2.0: 2.7	Pending CP

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Receiver returns error XDSNonIdenticalSize/XDSNonIdenticalHash if new document for existing uniqueness, based on checking size and hash if present against existing documents	SHALL, but unclear. Vol 2b says both Doc Repo and Doc Reg check and return, Vol 3 says only Doc Reg returns. Question for ITI Tech Committee.	MAY	MAY	N/A	MAY check but these error codes not available	MAY check but these error codes not available	SHALL IHE if persists	- TF 2b: 3.41.4.1.3.2 - TF 2b: 3.42.4.1.3.3.1 - TF-3: 4.3.1	- TF 2b: 3.41.6.2	
Receiver allows same document for existing uniqueness, based on checking size and hash if present against existing documents	SHALL	MAY	MAY	N/A	MAY	MAY	SHALL IHE if persists	- TF 2b: 3.41.4.1.3.2	- TF 2b: 3.41.6.2	
Validating: documents vs metadata										

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Receiver returns XDSMissingDocument if DocumentEntry exists in metadata with no corresponding attached document	Unclear. No explicit requirement to check and return error, AND explicit requirement NOT to check anything else (added after 2009). Question for ITI Tech Committee.	MAY	MAY	N/A	MAY	MAY	SHALL eHx	- TF 2b: 3.41.4.1.3 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	
Receiver returns XDSMissingDocumentMetadata if MIME part with Content-Id header not found in metadata	to check anything else (added after 2009). Question for ITI Tech Committee.	MAY	MAY	N/A	MAY	MAY	SHALL eHx	- TF 2b: 3.41.4.1.3 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	
Receiver returns InvalidDocumentContent if document content does not match metadata	SHALL	MAY	MAY	N/A	N/A	N/A	MAY	- TF 2b: 3.41.4.1.3	N/A	
Validating: other metadata										

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Receiver returns error if HCID of sending system (sourceId) not permitted	MAY, but error code not specified	MAY, but error code not specified	MAY	N/A	MAY	MAY	MAY IHE	- TF 2b: 3.41.4.1.3	- TF 2b: 3.41.6.2	If we have systems that use this whitelisting, they will need a way to know about larger group of senders from QTF. Same issue in other direction. For now will assume if this is done, it will be by checking the directory, and assuming eHx/QTF directories will be cross-pollinated.

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Receiver returns UnresolvedReferenceException if UUID in request can't be resolved	SHALL	MAY	MAY	N/A	N/A	N/A	SHALL IHE	- TF 2b: 3.42.4.1.3.5 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	
Receiver returns XDSDuplicateUniqueIdInRegistry if new SubmissionSet or Folder for existing uniqueId	SHALL	MAY	MAY	N/A	MAY	MAY	MAY-UND	- TF 2b: 3.42.4.1.3.3 - TF 2b: 3.42.4.1.3.3.7 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Tables 4.1-9, 4.1-10, 4.1-11	
Receiver returns XDSPatientIdDoesNotMatch if objects in a submission set have different patients	SHALL	MAY	MAY	N/A	MAY	MAY	SHALL eHx	- TF 2b: 3.42.4.1.3.3.2 - TF 2b: 3.42.4.1.3.5 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	
Receiver returns XDSPatientIdDoesNotMatch if: - Document has different patient from folder - Associated documents have different patients	SHALL	MAY	MAY	N/A	MAY	MAY	SHALL eHx	- TF 2b: 3.42.4.1.3.3.2 - TF 2b: 3.42.4.1.3.5 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	
Receiver returns XDSRegistryDeprecatedDocumentError - Association referencing a deprecated document.	SHALL	MAY	MAY	N/A	MAY	MAY	SHALL IHE	- TF 2b: 3.42.4.1.3.5 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Receiver returns XDSRegistryDuplicateUniqueInMessage/XDSRepositoryDuplicateUniqueInMessage if uniqueId value was found to be used more than once within the submission	SHALL	MAY	MAY	N/A	MAY	MAY	SHALL eHx	- TF 2b: 3.42.4.1.3.3 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	
Receiver returns XDSReplaceFailed: Error detected by the Document Registry during a document replacement	Deprecated	Deprecated	Deprecated	N/A	MAY	MAY	N/A	N/A - deprecated	- TF 2b: 3.42.4.1.4 - TF 3: 4.1.11	
Receiver returns XDSRegistryMetadataError/XDSRepositoryMetadataError if coded values not in defined value sets	SHALL if XDS Affinity Domain constrains	MAY	MAY	N/A	SHOULD (see wiki discussion http://sequoiat echwg.editme.com/Topic-1537135046658)	MAY	SHOULD eHx and use severity of Warning	- TF 2b: 3.42.4.1.3.3.3 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	Need to know if QTF is disallowing metadata checks or specifying value sets / mime types
Receiver returns XDSRegistryMetadataError/XDSRepositoryMetadataError if mime type not in allowed set	SHALL if XDS Affinity Domain constrains	MAY	MAY	N/A	MAY	MAY	TBD – Discuss whether we should constrain	- TF 2b: 3.42.4.1.3.3.4 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Receiver returns XDSRegistryMetadataError/XDSRepositoryMetadataError if service start time > stop time	SHALL	MAY	MAY	N/A	MAY	MAY	SHALL eHx	- TF 2b: 3.42.4.1.3.3.6 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-8 - TF 3: Table 4.1-11	
Receiver returns XDSRegistryMetadataError/XDSRepositoryMetadataError if adding Document Entry to Folder and both are not Approved	SHALL	MAY	MAY	N/A	MAY	MAY	MAY-UND	- TF 2b: 3.42.4.1.3.4 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: 4.1.11	
Receiver returns XDSRegistryMetadataError/XDSRepositoryMetadataError if IsSnapshotOf Association does not relate a Stable to On-Demand entry	SHALL	MAY	MAY	N/A	N/A	N/A	MAY-UND	- TF 2b: 3.42.4.1.3.5 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	
Receiver returns XDSRegistryMetadataError/XDSRepositoryMetadataError if missing required metadata field	SHALL	MAY	MAY	N/A	MAY	MAY	SHALL eHx	- TF 2b: 3.42.4.1.3.5 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Receiver returns XDSRegistryMetadataError/XDSRepositoryMetadataError if any remaining "shalls" in TF 3: 4 are violated in metadata. Example: 4.2.1.3, folder nested inside another folder.	SHALL implied. These cover the structure and constraints of the metadata, but not all are explicitly required to be checked. Question for ITI Tech Committee.	MAY	MAY	N/A	MAY	MAY	SHOULD eHx	- TF 2b: 3.42.4.1.3.3 - TF 3: 4.1	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	
General/unspecified errors										
Receiver returns XDSRegistryBusy/XDSRepositoryBusy if too much activity	MAY	MAY	MAY	N/A	MAY	MAY	MAY eHx	- TF 2b: 3.41.4.1.3 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	
Receiver returns XDSRegistryError/XDSRepositoryError if internal error	MAY	MAY	MAY	N/A	MAY	MAY	MAY eHx	- TF 2b: 3.41.4.1.3 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	

A: Feature	B: XDS.b 2019	C: XDR 2019	D: XCDR 2019	E: XDM 2019	F: eHx Doc Sub 2011	G: XDR 2009 (no Vol 2, so mostly equal to XDS.b)	H: eHx Doc Sub 2020	I: ITI 2019 refs (XDM omitted)	J: eHx Doc Sub 2011, ITI 2009 refs (if different)	K: Notes on XCDR compatibility with QTF
Receiver returns XDSRegistryNotAvailable if Repository was unable to access the Registry	MAY	MAY	MAY	N/A	MAY	MAY	MAY eHx	- TF 2b: 3.41.4.1.3 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	
Receiver returns XDSRegistryOutOfResources/ XDSRepositoryOutOfResources if resources are low	MAY	MAY	MAY	N/A	MAY	MAY	MAY eHx	- TF 2b: 3.41.4.1.3 - TF 3: Table 4.2.4.1-2	- TF 2b: 3.42.4.1.4 - TF 3: Table 4.1-11	