Integrating the Healthcare Enterprise

IHE IT Infrastructure
Technical Framework Supplement

Cross-Enterprise Document Workflow Extension
for Cross-Community Environment

Trial Implementation

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Foreword

This is a supplement to the IHE IT Infrastructure Technical Framework V11.0. Each supplement
30   undergoes a process of public comment and trial implementation before being incorporated into
the volumes of the Technical Frameworks.

This supplement is published on August 31, 2015 for trial implementation and may be available
for testing at subsequent IHE Connectathons. The supplement may be amended based on the
results of testing. Following successful testing it will be incorporated into the IT Infrastructure
35   Technical Framework. Comments are invited and may be submitted at
http://www.ihe.net/ITI_Public_Comments.

This supplement describes changes to the existing technical framework documents.

"Boxed" instructions like the sample below indicate to the Volume Editor how to integrate the
relevant section(s) into the relevant Technical Framework volume.

40   *Amend Section X.X by the following:*

Where the amendment adds text, make the added text **bold underline**. Where the amendment
removes text, make the removed text **~~bold strikethrough~~**. When entire new sections are added,
introduce with editor's instructions to "add new text" or similar, which for readability are not
bolded or underlined.

45

General information about IHE can be found at: http://www.ihe.net.

Information about the IHE IT Infrastructure domain can be found at:
http://www.ihe.net/IHE_Domains.

Information about the structure of IHE Technical Frameworks and Supplements can be found at:
50   http://www.ihe.net/IHE_Process and http://www.ihe.net/Profiles.

The current version of the IHE Technical Framework can be found at:
http://www.ihe.net/Technical_Frameworks.

55 **CONTENTS**

85

Introduction to this Supplement

90 This supplement extends the XDW Profile with a number of additions to enable the support of
the Cross-Enterprise Workflow Document (XDW) Profile in Cross-community environments
where the XCA and XCDR profiles are used.

This supplement includes two major parts that are interrelated.

1. The first part extends Cross-Enterprise Document Workflow (XDW) Profile by defining
95 new options defining groupings with XDR, XCA and XCDR which enable Cross-
Community workflows.

2. The second part describes a number of deployment models where multiple communities
are interconnected and collaborate to perform Cross-Enterprise Document Workflow.

These two parts are depicted in the figure below:
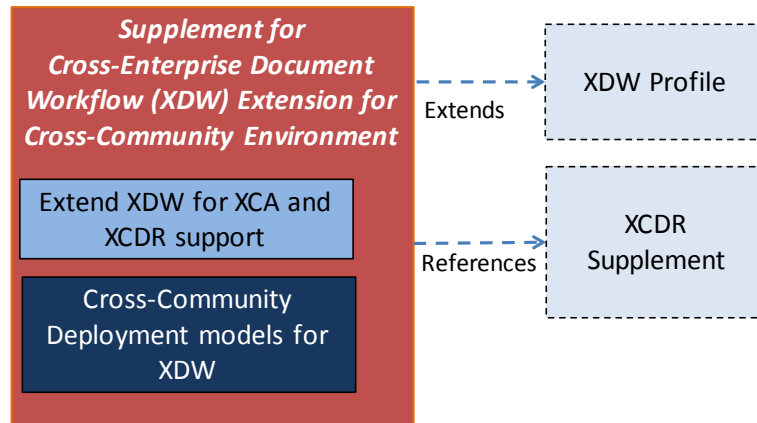
100

Figure 1: XDW Supplement with XCA and XCDR support

General Approach

The figure below depicts an example of cross-community workflow using the XDW Profile. This
105 is one of the deployment models where the XDW document is created in a community A. It is
accessed and updated from a remote Community B.

```
┌─────────────────────────────────┐          ┌─────────────────────────────────┐
│ Community A                     │          │ Community B                     │
│                                 │          │                                 │
│ A workflow is initiated with    │          │                                 │
│ an XDW Document created         │   XCA    │                                 │
│                                 │          │ The workflow document           │
│         ┌──────────┐            │          │ is discovered, retrieved and    │
│         │  XDW     │            │          │ updated                         │
│         │ Document │            │          │ and stored back in              │
│         │          │            │          │ Community A                     │
│         │          │            │          │                                 │
│         └──────────┘            │          │                                 │
│ The XDW                         │   XCDR   │                                 │
│ document is replaced            │          │                                 │
└─────────────────────────────────┘          └─────────────────────────────────┘
```
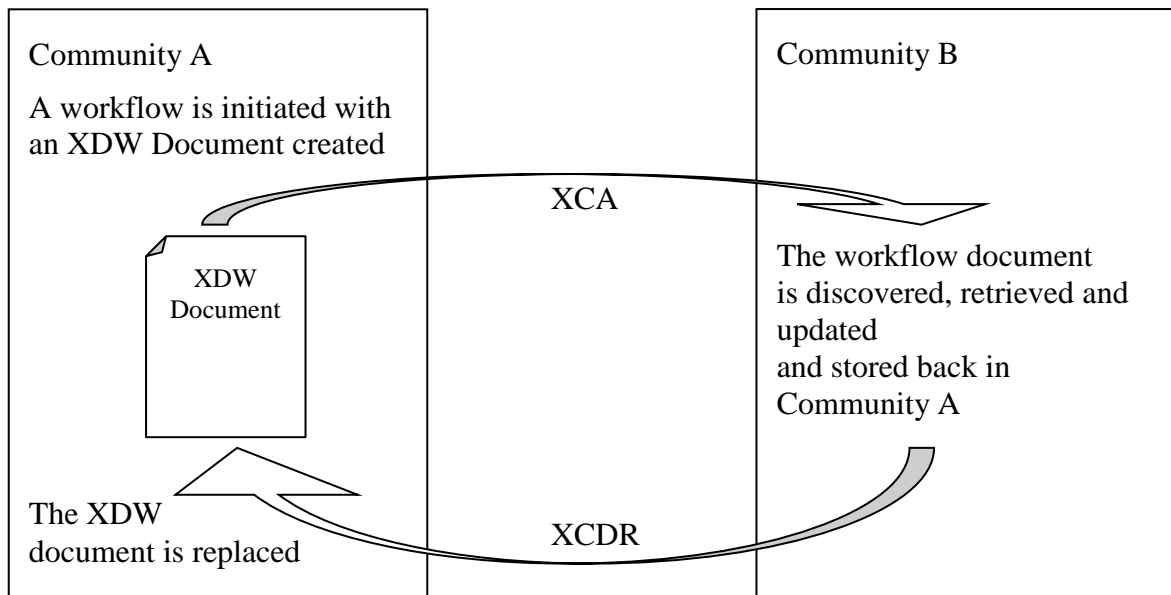
Open Issues and Questions

110   None

Closed Issues

Deployment models: A number of deployment models have been considered. CLOSED: After
analysis, two of them appeared as the two most viable alternatives:

- The deployment model where XDW Workflow Documents are stored and updated in the
115   community where they have been initially created (see ITI TF-1: Appendix E.11.4.1)

- The deployment model where all XDW Documents are stored and updated in a dedicated
community distinct from the community where they were initially created (see ITI TF-1:
Appendix E.11.4.2)

Cross-Community with XDR and *Cross-Community with XCDR* **Options**: The use of two
120   options was analyzed and selected for its clarity. Two distinct options providing the ability to
support cross-community alone, without the ability to operate within an XDS Community, was
seen as an acceptable flexibility.

Status of Deployment Models: Should the actor roles within the deployment models be
considered "informative" or "normative" in nature? They have been made informative with a
125   note warning the reader that these deployment models are those for which this extension to
operate XDW in cross-community models has been intended.

Volume 1 – XDW Profile

Update the option Table 30.2-1 of the IHE XDW Supplement in Volume 1 as shown:

30.2 Cross-Enterprise Document Workflow Profile Options

Options that may be selected for this Profile are listed in the Table 30.2-1 along with the Actors
to which they apply.

Table 30.2-1: XDW - Actors and Options

Actor	Options	Vol. & Section
Content Creator	***Cross-Community with XDR Option***	**ITI TF-1: 30.2.3**
	Cross-Community with XCDR Option	**ITI TF-1: 30.2.4**
Content Consumer	*View Option (Note 1)*	ITI TF-1: 30.2.1
	Document Import Option (Note 1)	ITI TF-1: 30.2.2
Content Updater	*View Option (Note 1)*	ITI TF-1: 30.2.1
	Document Import Option (Note 1)	ITI TF-1: 30.2.2
	Cross-Community with XDR Option	**ITI TF-1: 30.2.3**
	Cross-Community with XCDR Option	**ITI TF-1: 30.2.4**

Note 1: The Actor shall support at least one of these options

Add two new sections 30.2.3 and 30.2.4 in the IHE XDW Supplement in Volume 1:

30.2.3 Cross-Community with XDR Option

This option is used to send XDW Workflow documents in a cross-community environment. The
Provide and Register Document Set-b [ITI-41] transaction is used to send XDW Workflow
Documents to a target XDR Document Recipient. The target XDR Document Recipient is
expected to be grouped with an XCDR Initiating Gateway in order to forward the document to a
remote community using its XCDR Responding Gateway. See ITI TF-1: Appendix E.11.4.1 and
E.11.4.2 for deployment models.

A Content Creator or a Content Updater that supports the Cross-Community with XDR Option
shall be able to be grouped with an XDR Document Source supporting the Transmit Home
Community ID Option.

1. For a Content Creator, the homeCommunityId used by the (grouped) XDR Document
Source shall be configurable and set to the Community storing XDW Workflow
150   Documents.

2. For a Content Updater, the homeCommunityId value used by the (grouped) XDR
Document Source shall be the homeCommunityId of the community from which the
XDW Workflow Document was retrieved before being updated.

30.2.4 Cross-Community with XCDR Option

155 This option is used to send XDW Workflow Documents in a cross-community environment. The
XCDR Cross-Gateway Document Provide [ITI-80] transaction is used to send XDW Workflow
Documents to a target XCDR Responding Gateway. This Responding Gateway may or may not
be serving a community that is using XDS internally (see ITI TF-1: Appendix E.11.4.1 and 4.2
for deployment models that take advantage of this option).

160 A Content Creator or a Content Updater that supports the Cross-Community with XCDR Option
shall be able to be grouped with an XCDR Initiating Gateway.

1. For a Content Creator, the homeCommunityId value used by the (grouped) XCDR
Initiating Gateway shall be configurable and set to the Community storing XDW
Workflow Documents.

165   2. For a Content Updater, the homeCommunityId value used by the (grouped) XCDR
Initiating Gateway shall be the homeCommunityId of the community from which the
XDW Workflow Document was retrieved before being updated.

Modify the XDW Supplement, Volume 1, Section 30.3 as follows:

170 ## 30.3 XDW Actor Grouping and Profile Interactions

A XDW Content Creator, Content Updater and Content Consumer shall be grouped with
appropriate actors from the XDS, XDM, ~~and~~ XDR, **XCA or XCDR** Profile**s** to exchange XDW
Workflow Documents. The metadata used for document entries in document sharing or
interchange has specific relationships or dependencies (which we call bindings, see ITI TF-3:
175 5.4.6) to the content of the clinical document – a XDW Workflow Document.

**The reader should be familiar with the various deployment models that may be used for
XDW. These are discussed in ITI TF-1: Appendix E.11.**

30.3.1 Grouping with XDS

180 When XDW is used in conjunction with XDS:

- an XDW Content Creator shall be grouped with:
  - an XDS Document Source;

7

- an XDW Content Updater shall be grouped with:

  - an XDS Document Source with the Document Replacement Option;

185
  - an XDS Document Consumer;

- an XDW Content Consumer shall be grouped with:

  - an XDS Document Consumer.

30.3.2 Grouping with XDR

190   When XDW is used in conjunction with XDR:

- an XDW Content Creator shall be grouped with:

  - an XDR Document Source

- an XDW Content Updater shall be grouped with:

  - an XDR Document Source

195
  - an XDR Document Recipient

- an XDW Content Consumer shall be grouped with:

  - an XDR Document Recipient.

30.3.3 Grouping with XDM

200   When XDW is used in conjunction with XDM:

- an XDW Content Creator shall be grouped with:

  - an XDM Portable Media Creator

- an XDW Content Updater shall be grouped with:

  - an XDM Portable Media Creator

205
  - an XDM Portable Media Importer

- an XDW Content Consumer shall be grouped with:

  - an XDM Portable Media Importer.

Note: The support of Workflow spanning XDS, XDR and XDM environments is not explicitly addressed.

30.3.4 Grouping with XCA and XCDR

210

**When XDW is used in conjunction with XCA and XCDR, the Content Creator and
Content Updater Actors shall support the cross-community options as specified below. See**

ITI TF-1: Appendix E.11.4 for the corresponding deployment models that may be used for XDW in cross-community environments.

215

When the Content Creator Actor supports the Cross-Community with XDR Option:

- **This enables the support of the deployment model described in ITI TF-1: Appendix E.11.4.2**

- **The Content Creator shall be grouped with an XDR Document Source with the**
220 **Transmit Home Community ID Option**

Newly created XDW Documents are sent by the grouped Content Creator/Document Source to an XDR Document Recipient grouped with the XCDR Initiating Gateway of its community

- **Any documents referenced by newly created XDW Documents shall be available for**
225 **query and retrieve from an XCA Responding Gateway.**

  Note: There are no restrictions regarding which communities the documents referenced by XDW Document are stored.

  Note: It is expected that most implementations of XDW Content Creators would also support an XDS Document Source to operate both within a community (See Section 30.3.1) and across
230 **federated communities in the deployment model described in ITI TF-1: Appendix E.11 .4.2.**

When a Content Updater supports the Cross-Community with XDR Option:

- **This enables the support of both deployment models described in ITI TF-1: Appendix E.11.4.1 and ITI TF-1: Appendix E.11.4.2**

235 - **The Content Updater shall be grouped with an XDR Document Source with the Transmit Home Community ID Option**

Updated XDW Documents are sent by the grouped Content Updater/Document Source to an XDR Document Recipient grouped with the XCDR Initiating Gateway of the community

240 - **Any documents referenced by updated XDW documents shall be available for query and retrieve from an XCA Responding Gateway.**

  Note: There are no restrictions regarding which communities the documents referenced by XDW Document are stored.

  Note: It is expected that most implementations of XDW Content Updaters would also support an XDS
245 **Document Source to operate both within a community (See Section 30.3.1) and across federated communities in the deployment model described in ITI TF-1: Appendix E 11.4.1.**

When a Content Creator supports the Cross-Community with XCDR Option,

- **This enables the support of the deployment model described in ITI TF-1: Appendix**
250 **E.11.4.2**

9

- **The XDW Content Creator shall be grouped with an XCDR Initiating Gateway.**

- **Any documents referenced by newly created XDW documents shall be available for query and retrieve through an XCA Responding Gateway.**

  Note: There are no restrictions regarding which communities the documents referenced by XDW Document are stored.

255

When a Content Updater supports the Cross-Community with XCDR Option:

- **This enables the support the deployment models described in ITI TF-1: Appendix E.11.4.1 and ITI TF-1: Appendix E.11.4.2.**

260 - **The Content Updater shall be grouped with an XCDR Initiating Gateway.**

- **Any documents referenced by updated XDW documents shall be available for query and retrieve through an XCA Responding Gateway.**

  Note: There are no restrictions regarding which communities the documents referenced by XDW Documents are stored.

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Appendix E – Cross Profile Considerations

Add this new section to the end of ITI TF-1: Appendix E

Editor should note that if Section E.11 is already assigned and number needs to be changed, all references in this supplement need to be updated.
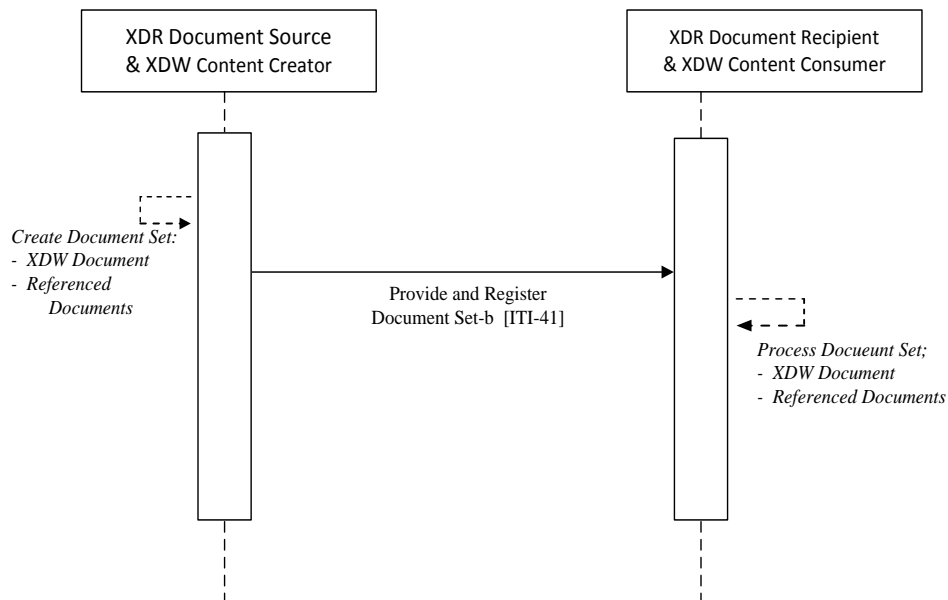
270 ## E.11 Deployment Models for XDW

The Cross-Enterprise Document Workflow (XDW) Profile is a content profile that may be deployed over many diverse document sharing environments supported by a variety of XDR, XDM, XDS, XCDR and XCA profiles. Each one of these environments varies in complexity, and they may be combined in a variety of architectures. Several of these environments are

275 analyzed in this Appendix to allow the reader to better understand deployment models where XDW actors and actors from the underlying profiles are combined to support an architectural goal.

This section is normative. The reader should note that the deployment models using an XDS Affinity Domain and the two for a Cross-Community environment using XCA and XCDR are

280 those for which the support of XDW was specifically designed.

E.11.1 Deployment Model for XDW used in an XDR environment

In this deployment model, the XDW Workflow Document is communicated to the Content Consumer along with the input and output documents referenced in the Workflow Document.

285

Figure E.11.1-1: XDW Workflow in an XDR environment

E.11.2 Deployment Model for XDW used in an XDM environment

In this deployment model, the XDW Workflow Document is communicated to the Content
Consumer along with the input and output documents referenced in the Workflow Document as
290 an XDM Zip Package. This deployment model does not address any of the rules needed to
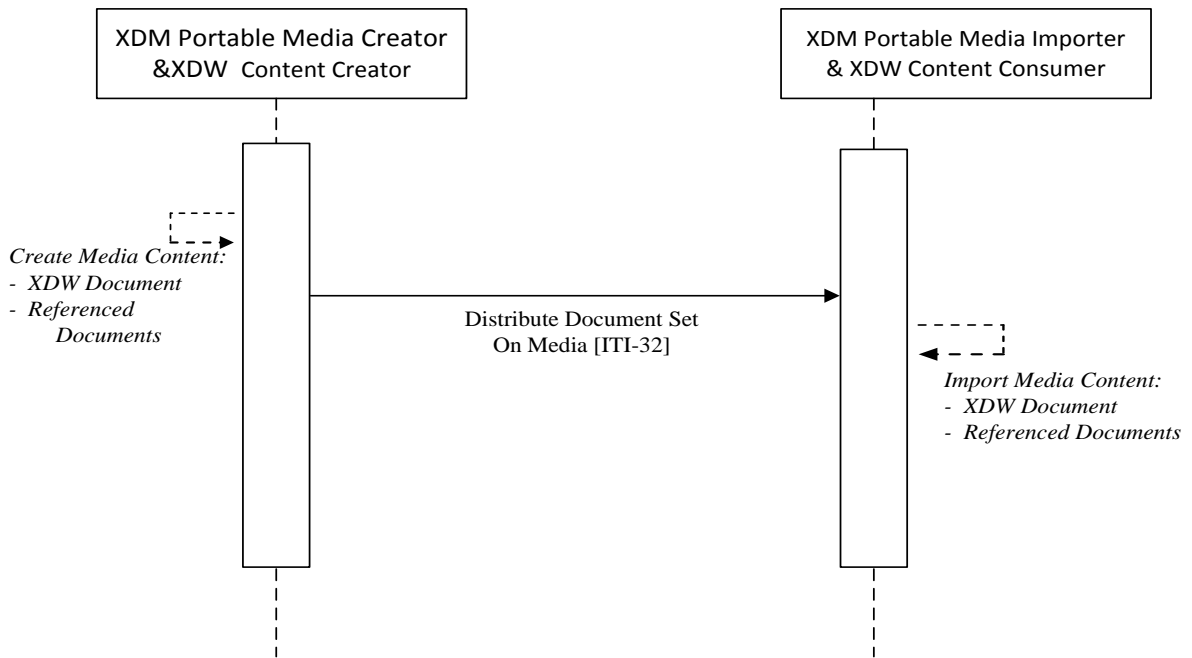ensure a robust deployment.

Figure E.11.2-1: XDW Workflow in an XDM environment

295

E.11.3 Deployment Model for XDW used in an XDS environment

In this deployment model, the XDW Document Creator or Updater Actor is grouped with an
XDS Document Source to share the XDW Workflow Document, along with the referenced input
and output documents, by storing them in an XDS Document Repository and indexing them in
300 the XDS Document Registry.
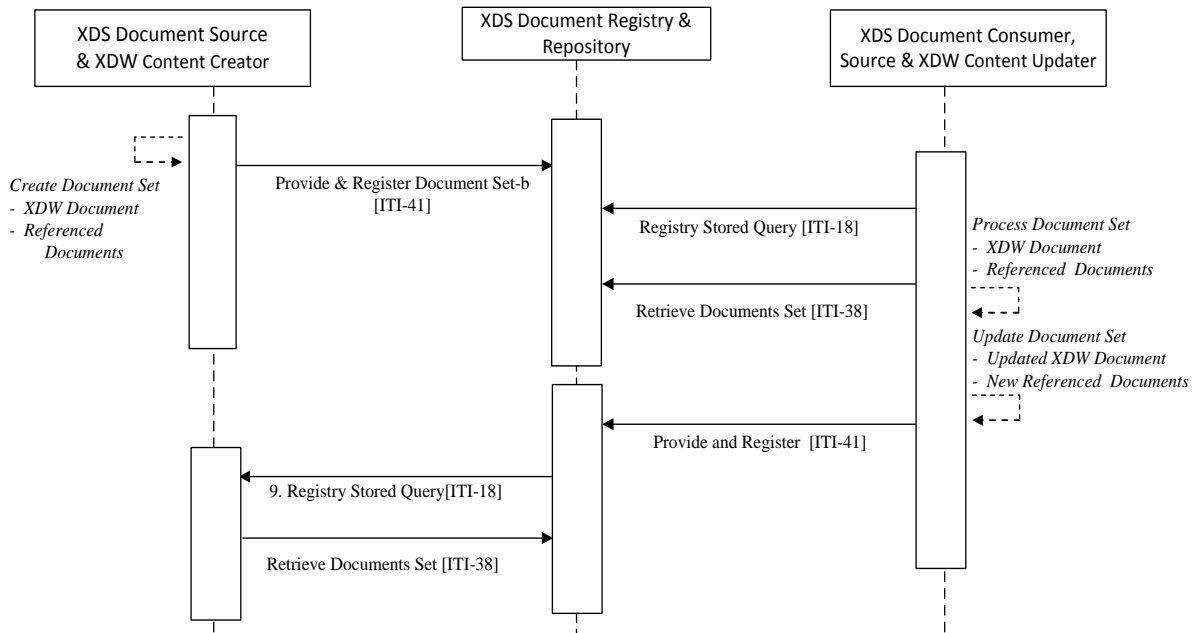
Figure E.11.3-1: XDW Workflow in an XDS environment

Also, XDW Content Consumer or Content Updaters may query and retrieve Workflow
305 Documents along with the input and output documents referenced. The workflow may be
updated and the corresponding updated Workflow Document, along with new referenced input
or output documents, may be stored in the XDS Repository and Registry.

Finally, another XDW Document Consumer may query and retrieve Workflow Documents along
with the input and output documents referenced.

310 **E.11.4 Two Deployment Models for XDW used in a Cross-Community environment
using XCA and XCDR**

In these deployment models the XDW Document Creator or Updater Actors are grouped with an
Actor that enables submission and/or access across communities. The two deployments models
differ in the approach to the storage location of XDW Workflow Documents:

315 • XDW Workflow Documents are stored and updated in the community where they have
been initially created (see Section E.11.4.1).

• All XDW Workflow Documents are stored and updated in a single community different
than the communities where they were initially created (see Section E.11.4.2).

Both of these models are described below. Although not discussed in detail in this Appendix,
320 these two models may be combined. At the time of configuration and deployment the XDW
Actors are set up to support the chosen deployment model (see Section E.11.4.3).
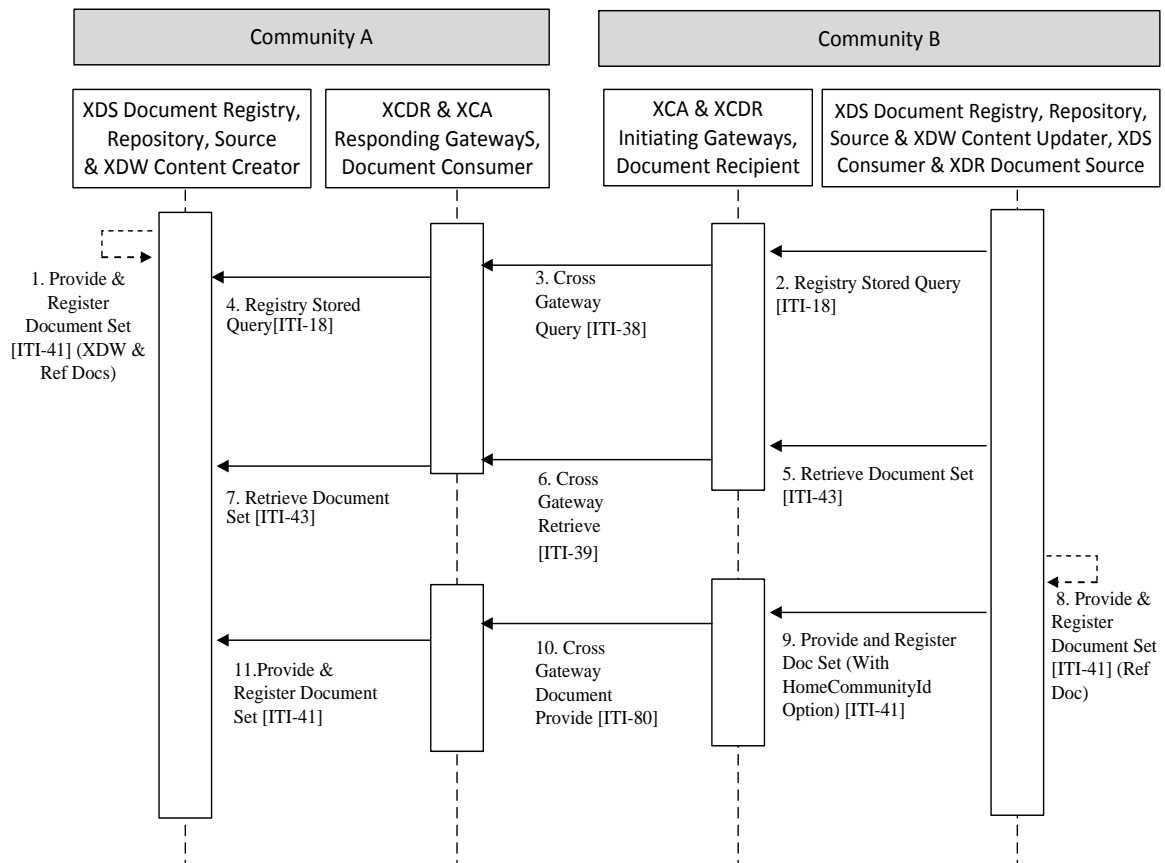

E.11.4.1 XDW Workflow Documents are stored and updated in the community where initially created

In this deployment model:

325
- XDW Workflow Documents are stored and updated in the community where they have been initially created (Community A in Figure E.11.4.1-1).

- If participants from another community (Community B in Figure E.11.4.1-1) desire to engage in the workflow, their systems need the cross-community ability, from B to A, to replace and deprecate the Workflow Document in Community A where they have been
330   initially created.

The example workflow described below is depicted in Figure E.11.4.1-1.

- When a Workflow Document is initially created in Community A (along with referenced input and output documents), the Workflow Document remains under the control of a single XDS Registry in that community for its entire life-cycle (replacement, folder if
335   used, race condition detection).

- The participant in Community B, as an XDS Document Consumer, discovers and retrieves the workflow of interest through the XCA Profile (steps 1 through 7 in the figure below). The Document Consumer may also access referenced documents using XCA.

340
- The participant in Community B may create a new input or output documents related to the workflow (8) and store them, as an XDS Document Source, in its local XDS Repository/Registry. These documents will be referenced in an updated XDW document.

- The participant in Community B, as an XDW Content Updater, updates the Workflow Document and replaces (9) the previous Workflow Document in Community A using the
345   XCDR Cross-Gateway Document Provide (10 and 11).

- An XDW Workflow Document may reference documents that have been created, stored and registered in any community. These may be documents that have been stored and registered in the same community as the one where the Workflow Document was initially created (A in Figure E.11.4.1-1), or from another community where systems supporting
350   workflow participants from another community have engaged in the workflow (B in Figure E.11.4.1-1). Access to such documents is performed through the Cross Community Access Profile (XCA).

Figure E.11.4.1-1: XDW Workflow Documents are accessed from a community different than where initially created and stored

Transaction 10 relies on the Cross-Community Document Reliable Interchanges (XCDR) Profile. The XCDR Profile extends the Provide and Register Document Set-b [ITI-41], to a Cross-Community environment. The inclusion of the homeCommunityId in Transaction 9 (pointing at XDS Affinity Domain A) allows the Initiating Gateway to route the request via the XCDR Profile to the correct XCDR Responding Gateway in order for the storage and registration in the Community A of the updated XDW Workflow Document.

It is important to note that an XDW Content Updater Actor in a community such as community B has to be grouped with both:

- an XDR Document Source (with the Transmit Home Community ID Option) as shown by the transactions from the above Figure E.11.4.1-1 to update XDW Document created in other communities,

- an XDS Document Source to update documents created in its own XDS Affinity Domain.

370 These groupings are not exposed in Figure E.11.4.1-1 where the XDW Content Updater and the
XDR Document Source, XDS Document Source and other actors are collapsed in a single swim
lane.

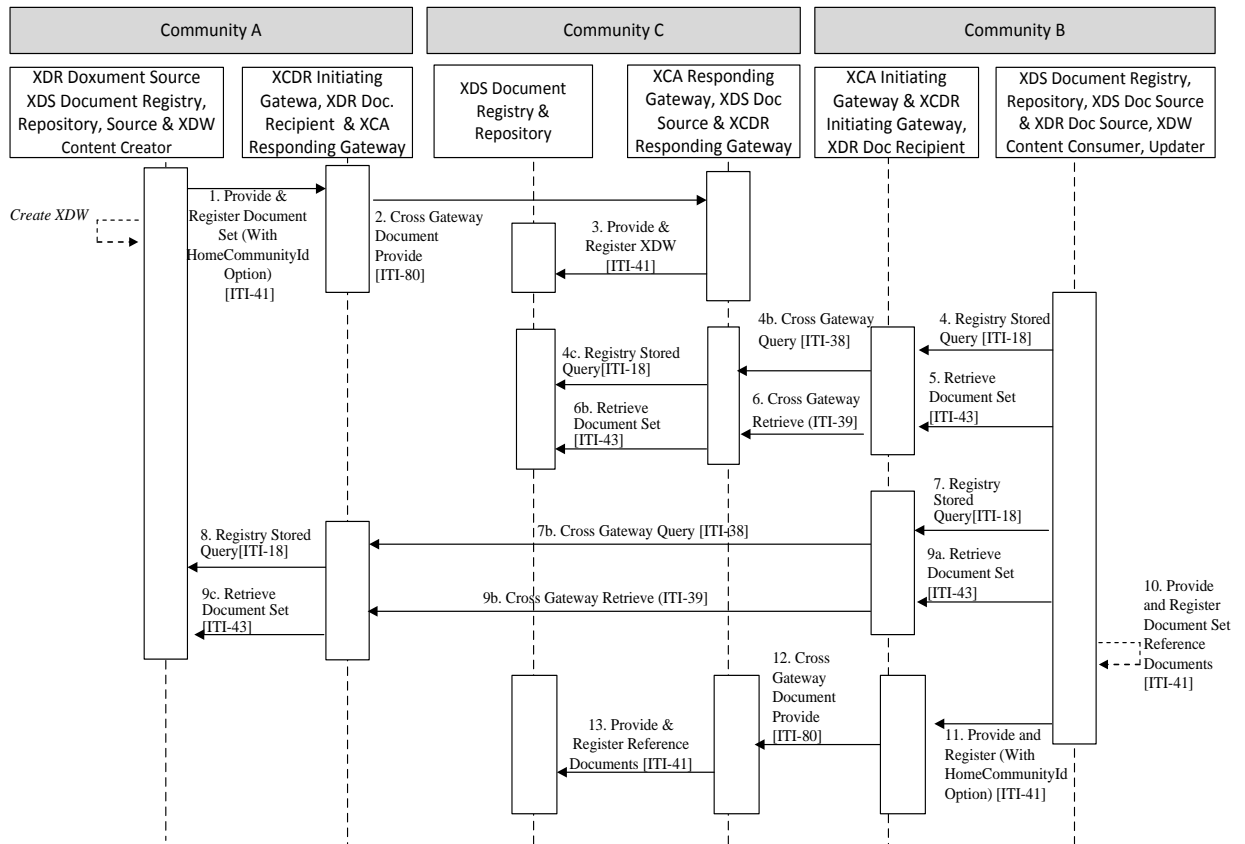### E.11.4.2 XDW Workflow Document are stored and updated in a dedicated community

375 In this deployment model, XDW Workflow Documents are stored and updated in a dedicated
community (XDS Affinity Domain Community C in Figure E.11.4.2-1) distinct from the
community where they were initially created (Communities A & B in Figure E.11.4.2-1). All
systems supporting workflow participants in other communities need the cross-community
ability to replace and deprecate the Workflow Document in the community where it has been
initially created.

380 Workflow Documents are created (1, 2 and 3) and updated (11, 12 and 13) using the Cross
Gateway Document Provide transaction of the XCDR Profile.

These Workflow Documents are queried (4, 4b, 4c) and retrieved (5, 6, 6b) from XDS Affinity
Domain C along with the referenced documents (7, 7b, 8, 9a, 9b and 9c).

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**Figure E.11.4.2-1: XDW Documents are stored and updated in a dedicated community
distinct from the community where they were initially created**

390

Transactions (1) and (11) rely on XDR, and transactions (2) and (12) rely on XCDR.

Transaction (1) and (11) include the homeCommunityId (pointing at XDS Affinity Domain C),
allowing the XCDR Initiating Gateway to route the Workflow Document to the correct XCDR
Responding Gateway for the storage and registration in the Community C.

395 ## E.11.4.3 Using Configuration to support multiple deployment models

The requirements discussed in the above two sections have been structured to enable a single
implementation to be configured to support any of three deployment models:

- XDW within a single XDS Affinity Domain (Section E.11.3) – by configuring the XDS
  Document Source to create or update Workflow Documents in the local XDS Affinity
400   Domain.

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- XDW with XCA and XCDR saving in the community of creation (Section E.11.4.1) – by configuring the XDR Document Source to update Workflow Documents in the community where they were created

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- XDW with XCA and XCDR saving in the dedicated community (Section E.11.4.2) - by configuring the XDR Document Source to create or update Workflow Documents in the dedicated community