



5 **IHE Patient Care Coordination Technical
Framework Supplement**

10 **Reconciliation of Clinical Content and Care
Providers
(RECON)**

15 **Draft for Public Comment**

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25 **Please verify you have the most recent version of this document. See [here](#) for Trial
Implementation and Final Text versions and [here](#) for Public Comment versions.**

Foreword

30 This is a supplement to the IHE PCC Technical Framework V9.0. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

This supplement is published on June 6, 2014 for public comment. Comments are invited and may be submitted at http://www.ihe.net/PCC_Public_Comments. In order to be considered in development of the trial implementation version of the supplement, comments must be received 35 by July 5, 2014

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.

<i>Amend Section X.X by the following:</i>
--

40 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://ihe.net>.

Information about the IHE Patient Care Coordination domain can be found at: http://ihe.net/IHE_Domains.

Information about the organization of IHE Technical Frameworks and Supplements and the process used to create them can be found at: http://ihe.net/IHE_Process and 50 <http://ihe.net/Profiles>.

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

55

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Introduction to this Supplement

180 Reconciliation of electronic clinical information from multiple data sources is a difficult task. It involves managing lists of clinical information that are often larger than most people can keep in working memory. This profile enables information contained in Health Information Systems and Exchanges to be used to support automation of these reconciliation tasks and clinical workflows. This profile explains what information can help reconciliation, and how it can be used to assist healthcare providers to automate this complex task.

Open Issues and Questions

- 185 1. (04/08/2014) Profile authors seek comments regarding Twinlist approach to reconciliation. Twinlist existing work describes steps taken to perform medication reconciliation that can be examined as a means of automating this process. Silva et al Twinlist Project defined a process in which a reconciliation algorithm is used. The algorithm includes string comparison of the medications being reconciled; parsing of the
190 medication components by using a set of predefined regular expressions built from physical drug forms with common administration idioms resulting in measurable match scores that can be used to determine the acceptable percentage of matching ingredients; use of RxNorm for brand to generic drug matching; attempt to match drugs by their therapeutic intention computing the conditions the drug is used to treat and then
195 comparing the conditions rather than the drugs¹. Twinlist approach to reconciliation uses a first pass matching on the entire string. Should this profile attempt to include string matching in the reconciliation process?

Closed Issues

- 200 1. (Closed 04/30/2014) How will this newer profile relate to the current Reconciliation of Diagnosis, Allergies and Medications Profile? Will the newer profile supersede the current Reconciliation of Diagnosis, Allergies and Medications Profile? How will we handle things that are different in the current Reconciliation of Diagnosis, Allergies and Medications Profile?
- 205 Discussion: Reconciliation of Diagnosis, Allergies and Medications Profile is currently in trial implementation, not yet final text. Need to make changes to Reconciliation of Diagnosis, Allergies and Medications Profile and put it back out for public comment.
2. (Closed 04/29/2014) Need a way to maintain the original or initial identity of an item. RECON states – “When reconciling information from an external system, the reconciling

¹ Silva, P. B., Bernstam, E., Markowitz, E., Johnson, T., Zhang, J., & Herskovic, J. (2013, October 1). Automated medication reconciliation and complexity of care transitions. GitHub. Retrieved April 1, 2014, from <https://github.com/jherskovic/MedRec>

210 application **SHALL** maintain the first identifier provided for the item as the original identifier”. Is this a viable approach or is there another way to do this?

215 Discussion: One of the issues with RECON uptake is the output of the reconciliation information. When the data element comes from a document, the ID of the document is used as the source. When the data element is the result of a query (such as QED), the query ID is the source. When the data comes directly from a system, providence will be lost because there is not a source ID from the system. This is a gap. To fix this, the goal is to start broad and add the “provenance” option (source of the data).

220 Within a system, when there are multiple identifiers, the first one is the source system ID. Within a system, when creating (source ID is created) and updating (instance ID is modified) data, Source ID and Instance ID are both captured. Need to provide guidance on how to handle for the purpose of reconciliation.

1. Both IDs are exported
2. The ID that doesn’t change has to be the first listed. This would be the source ID
3. Need to ensure the receiver knows what to do when modifications are made to the imported data.
- 225 4. Need to consider what would happen if the list is used by others
5. Need to discuss the following to support –
 - Import match
 - Identity Change
 - Export stable identity

230 Discussed further at April F2F and review of section X.4.1.1 completed

3. (Closed 04/29/2014) Would reconciliation of providers be treated differently than reconciliation of entries in sections? Will we be able to associate the reconciliation act with the provider when reconciliation occurs?

235 Discussion: This is part of volume 2. One option would be to create a section that holds the entry which provides the reconciliation action. The section could contain text stating who the provider is, when the provider cared for the patient, provider role, etc. Another option may be not to list the subject – instead may reference the subject in some way.

240 Resolution: Left providers and participants in the header as is. Adding an optional entry to coded care plan section and provided ability to state that the providers and participants listed has been reconciled.

4. (Closed 04/29/2014) 6.3.4.E.8 Care Providers Reconciliation ACT (see #3 above)

245 Suggestion to create a new care team members section that will contain care providers. Advantage would have a way to “collect” and “reconcile” care providers. Answer: Decision was not the do this because will provide another place for providers and participants which are already defined in the header.

250 What is the end of result of performers that are reconciled - are we reconciling to make them into care team members? Answer: Place and optional reconciliation act in coded care plan section to state that the listed provider and participants in the header have been reconciled.

255 Why would we want to tag reconciled care team members when we send a document to someone else? Answer: Will assist in providing a longitudinal view of the patient care providers.

260 April F2F Discussion and final solution: Use the providers and participants in the header as is today. Do not add anything to them. When reconciliation occurs, provide an entry in the care plan section (CCDA v1 Plan of Care) which will be the reconciliation act. Provide a reference to text in that entry to document that the providers and participants have been reconciled and the person doing the reconciliation.

5. (Closed 02/12/2014) Change the profile title of Reconciliation of Diagnosis, Allergies and Medications to Reconciliation of Clinical Content and Care Provider. Did not change the acronym (RECON).

265 6. (Closed 02/12/2014) Source of truth (provenance) – who owns the reconciled data? Is this something that should be addressed with this profile?

Resolution: Local policy determines this. This is not a question this profile can answer. Note that the person performing the reconciliation act takes the same function as author. Reconciliation act uses the responsible party as the participant.

270 7. (Closed 02/12/2014) Reconciliation as a service Vs. Reconciliation at the document level. Does reconciliation have to occur from documents only?

275 Resolution: Reconciliation agent does the reconciliation work and has the responsibility to do a share content transaction. The key is to be able to identify what did the reconciliation so that this is testable. This is similar to consistent presentation of images and how display is accessible. The goal is to be able to pull information from two sources (one of which can be itself) and present it to the user. As an interoperable profile, there can be input from multiple systems. Need to maintain the original identification of the element so there can be convergence to one identifier.

280 8. (Closed 03/14/2014) Reconciliation of structured templates (templates with entries) – IHE goal template is text only. Can we utilize null flavors and point to the text from the recon Act? Resolution: Utilizing IHE Observation request template (templateID: 1.3.6.1.4.1.19376.1.5.3.1.1.20.3.1) which is a structured template with the moodCode of GOL.

285 9. (Closed 03/31/2014) Review Twinlist doc and compare differences between their reconciliation process and RECON. Twinlist reviewed and added Open issue #1 seeking public comment about Twinlist approach.

- 290
10. (Closed 04/29/2014) 6.3.4.E.10 Reconciliation Clinical Data Sources need technical revision of this section.
- a. If reconciling from a document, will know who the custodian is. However, if importing from outside of a document, will not know who the source is. How will we handle provenance? Answer: the reference is used to get to the source of the reconciled information.
 - b. There are a lot of “SHALL”- need to add some “SHOULD” or COULD or MAY
Resolution: conformance revised.
 - c. What goes in the xml structure? See example in Volume 3, appendix A.
- 295
11. (Closed 04/29/2014) What happens after reconciliation of the first list and the same list is received again (i.e., Re-reconciliation): Answer: See 6.3.4.3 – re-reconciling should not occur. The Most recently reconciled list is always retained.

General Introduction

300 *Update the following Appendices to the General Introduction as indicated below. Note that these are not appendices to Volume 1.*

Appendix A - Actor Summary Definitions

Add the following actors to the IHE Technical Frameworks General Introduction list of Actors:

No new actors

Appendix B - Transaction Summary Definitions

Add the following transactions to the IHE Technical Frameworks General Introduction list of Transactions:

No new transactions.

Glossary

310 *Add the following glossary terms to the IHE Technical Frameworks General Introduction Glossary:*

Glossary Term	Definition
Accountable Care Organization (ACO)	Health care entity which supports an organization of health care providers that agrees to be accountable for improving the health and experience of care for individuals and improving the health of populations while reducing the rate of growth in health care spending ² .

² Available on the web at https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharesavingsprogram/Downloads/ACO_Summary_Factsheet_ICN907404.pdf

Volume 1 – Profiles

Copyright Licenses

315

Add the following to the IHE Technical Frameworks General Introduction Copyright section:

Not applicable

Domain-specific additions

Not applicable

320

Add Section X

X Reconciliation of Clinical Content and Care Providers (RECON) Profile

325 The challenge is that clinical capture or documentation of care information can originate or
reside from within a single health care facility or from two or more facilities, and can arise from
multiple disciplines. The information can span multiple periods of time and different clinical or
social/family events. Multiple pieces of information can be confusing, conflicting, and lead to
patient safety issue. The process of reconciling and consolidating clinical data/information and
330 associated metadata from multiple sources can be daunting.

World Health Organization (WHO) World Alliance for Patient Safety and Collaborating Centre
identifies the problems, impact, issues and suggested action for reconciliation accuracy at
transitions of care³. In the United States, clinical information reconciliation is needed as a
component of Health Information Technology: Standards, Implementation Specifications, and
335 Certification Criteria for Electronic Health Record Technology, 2014 Edition final rule⁴.
Australia Department of Health Victoria (Australia) Quality Use of Medicine includes
reconciliation of medication as a key patient safety effort⁵. Nationally, some regulatory and
accrediting organizations require healthcare institutions to reconcile clinical information during
every transfer of care, discharge or admission

340 HL7 Electronic Health Record System Functional Model (EHR-S FM), R2 IN.5 Standards-based
Interoperability function supports the ability for certain information to be shared among EHR
systems (including information that resides in regional, national, or international information
exchanges). This promotes timely and efficient information capture, use, and re-use, reducing the
cumulative workload of the broad set of stakeholders. EHR-S FM Care Provision Section
345 identifies functions and supporting conformance criteria required to provide direct care to a
specific patient and enable hands-on delivery of healthcare⁶. Care provision supports the
management of patient clinical history, clinical documentation, orders, results, treatment
administration, future care, patient education and communication.

350 During the process of collaborative care, the results of reconciliation need to be communicated to
support the longitudinal paradigm needed for safe patient care. This profile provides the ability

³ WHO Collaborating Centre for Patient Safety Solutions. World Health Organization.
http://www.who.int/patientsafety/solutions/patientsafety/collaborating_centre/en/. Accessed April 30, 2014.

⁴ Standards and Certification Regulations 2014 Edition. Health IT Regulations, HIT.gov.
<http://www.healthit.gov/policy-researchers-implementers/standards-and-certification-regulations> . Accessed April
30, 2014.

⁵ Standard 4: Medication Safety, Safety and Quality Improvement Guide. Australian Commission on Safety and
Quality in Health Care, October 2012. [http://www.safetyandquality.gov.au/wp-
content/uploads/2012/10/Standard4_Oct_2012.rtf](http://www.safetyandquality.gov.au/wp-content/uploads/2012/10/Standard4_Oct_2012.rtf) . Accessed April 30, 2014.

⁶ Section 4: EHR Profiles. HL7 Electronic Health Record-System (EHR-S) Functional Model (FM), Release 1.
http://www.hl7.org/implement/standards/product_brief.cfm?product_id=18 . Accessed April 30, 2014

355 to communicate lists of clinical data that was reconciled, when it was reconciled and who did the reconciliation. Figure X-1 shows a medication section with the list of reconciled medications, when they were reconciled and who did the reconciliation. **Reconciliation of clinical content and care providers can be accomplished with any CDA constructed list regardless of implementation guide.**

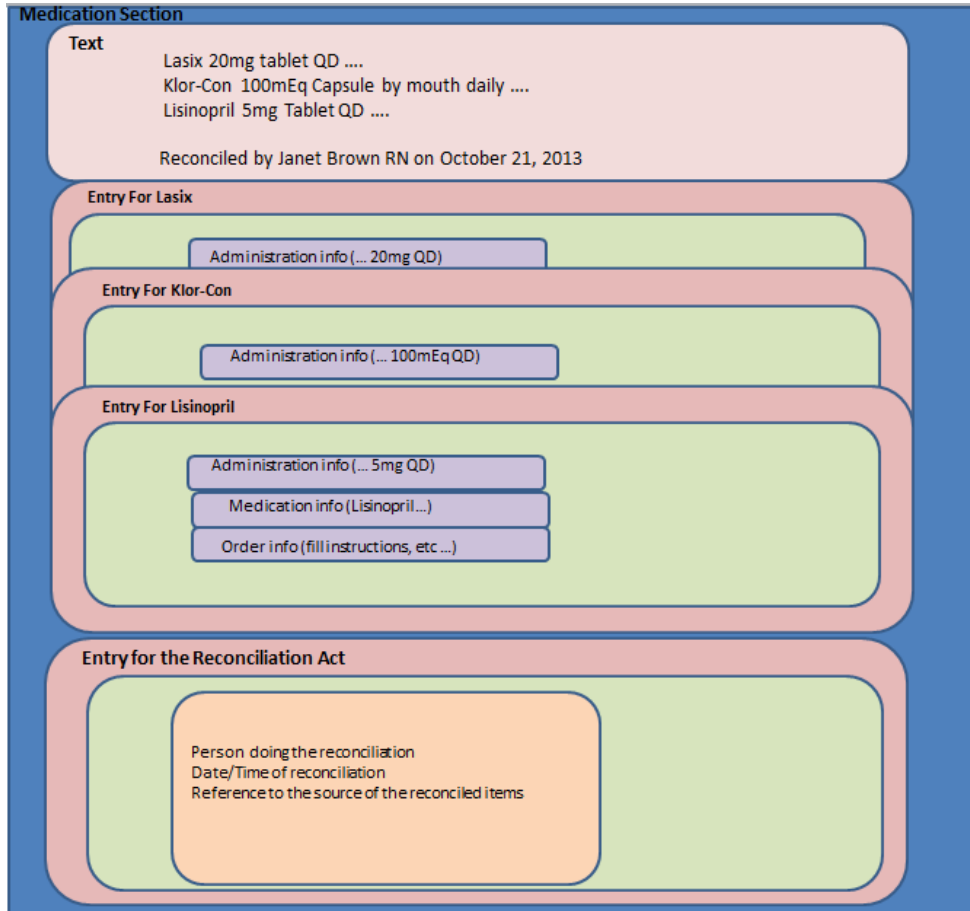


Figure X-1: Example of a Reconciled Medication List

360 As data is exchanged, the ability to maintain the support of care provision is needed. As an attempt to support the management of care provision, Reconciliation of Clinical Content and Care Providers Profile (RECON) will identify and examine heuristics that can be used to facilitate identification of duplicated, overlapping, conflicting or superseded entries that may be introduced as a result of semantic interoperability. This will be accomplished by classifying clinical information into the following categories for the purpose of determining the heuristics that will be used for the purpose of reconciliation.

365

Common observations

370 These are collection of simple measurements or reported values that can be determined by using simple measuring devices (e.g., vital signs, assessment scales, etc.) or which can be reported by the patient (date of last menstrual period, personal goal, etc.) or care provider (patient goals, interventions, medical equipment, etc.).

Diagnostic Results

These are a collection of observations made or performed using laboratory testing equipment, imaging procedures, visual examinations, etc.

Concerns and Allergies

375 These are a collection of diagnoses, clinical findings, allergies, or other risk factors that are recorded for the patient. The information may be obtained from patient reports, or through clinical decision making. It also includes such information as would be found in social and family history sections of clinical reports. This classification can be further subdivided into three groups.

- 380
- **Conditions** - This is a collection of disease conditions for the patient.
 - **Intolerances** - This is a collection of the patient's allergies and other intolerances.
 - **Risk Factors** - This is a collection of the patients significant risk factors, as might be established based on a review of family history, social history, occupational exposures, et cetera. By themselves, they may not be indicative of a disease condition, but could
- 385 contribute to one.

Medications

This is a collection of the medications that a patient is or has been taking for treatment of one or more conditions.

Immunizations

390 This is a collection of immunizations that have been given or not given due to a reason, or which are planned to be given to the patient.

Professional Services

395 This is a collection of procedures and/or encounters which the patient has participated in, or is expected to participate in. This also includes care team members who provide professional services.

Reconciliation of the following is needed:

Concerns and Allergies -

- **Risk factors**
 - Patient History lists - social and family history, etc.

- 400
- *Intolerances*
 - Allergy, Intolerance, and Adverse Reaction list
 - *Conditions*
 - Problem Lists – e.g., conditions, diagnosis, discharge diagnosis, etc.

Medication

- 405
- Medication Lists – e.g., medication, discharge medication, admission medication, administered medications, etc.

Immunizations

- Immunization Lists – e.g., immunization administered, not administered, etc.

Common Observations

- 410
- Medical equipment, Prosthetic/Orthotic, Device lists – e.g., implanted, external devices, supplies, etc.
 - Orders/interventions – e.g., performables, orderables, etc.
 - Observations – e.g., vital signs, measurements used for trending, etc.
 - Procedures

Goals

- Goals for the patient set by the provider as well as goals set by the patient.

Diagnostic Results

- Results – e.g., lab results, diagnostic results, etc.

Professional Services

- 420
- Encounters – e.g., planned encounters, historical encounters, scheduled tests, etc.
 - Providers – e.g., care team members

Part of the reconciling process includes identifying performers of the reconciliation process, and clinical data and sources used.

X.1 RECON Actors, Transactions, and Content Modules

- 425
- This section defines the actors, transactions, and/or content modules in this profile. General definitions of actors are given in the Technical Frameworks General Introduction Appendix A at http://www.ihe.net/Technical_Frameworks (a works in progress).

Figure X.1-1 shows the actors directly involved in the Reconciliation Integration Profile and the relevant transactions between them. Other actors that may be indirectly involved due to their

430 participation in Query for Existing Data or PCC Content Profiles are shaded in the diagram below.

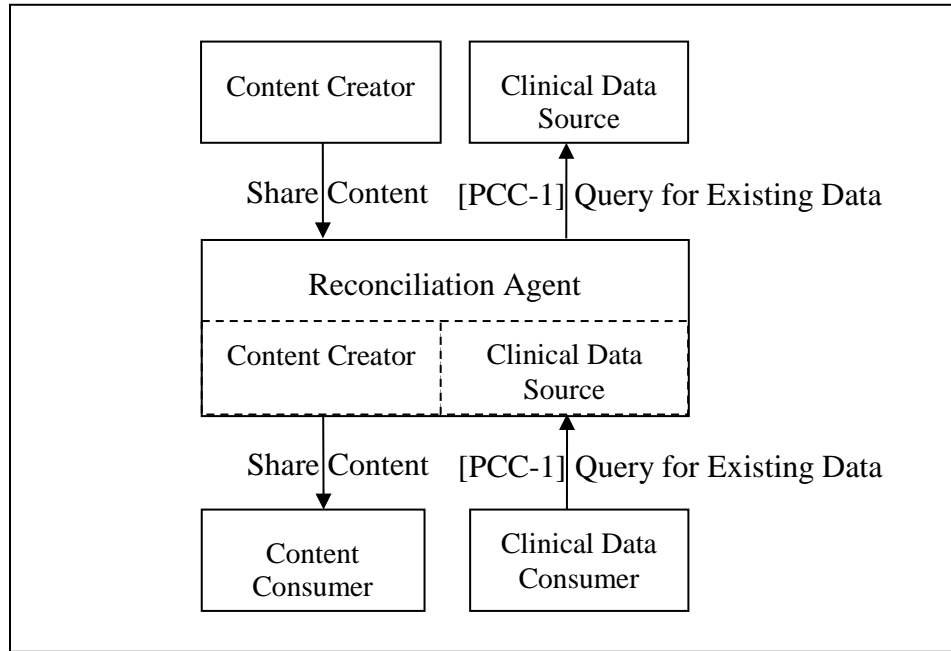


Figure X.1-1: Reconciliation Actor Diagram

435

Table X.1-1 lists the transactions for each actor directly involved in the Reconciliation Profile. In order to claim support of this Integration Profile, an implementation must perform the required transactions (labeled “R”). Transactions labeled “O” are optional. A complete list of options defined by this Profile and that implementations may choose to support is listed in Volume 1, Section X.2.

440

Table X.1-1: Reconciliation Integration Profile - Actors and Transactions

Actors	Transactions	Optionality	Section in TF
Reconciliation Agent	Share Content	R	PCC TF-1 :2.1
	Query Existing Data [PCC-1]	O	QED :3.1
Content Creator	Share Content	R	PCC TF-1 :2.1
Content Consumer	Share Content	R	PCC TF-1 :2.1
Clinical Data Source	Query Existing Data [PCC-1]	R	QED :3.1
Clinical Data Consumer	Query Existing Data [PCC-1]	R	QED :3.1

X.1.1 Actor Descriptions and Actor Profile Requirements

445 Most requirements are documented in Transactions (Volume 2) and Content Modules (Volume 3). This section documents any additional requirements on profile's actors.

X.1.1.1 Reconciliation Agent

450 The Reconciliation Agent Actor accesses clinical information in structured form. It automatically identifies potentially duplicated, overlapping, conflicting, or superseded information based upon application knowledge and provides that information for presentation to a clinician to complete the reconciliation process.

1. It SHALL present the demographics used to identify the patient provided by each separate source of clinical information to the end user.
- 455 2. It SHALL highlight inconsistencies found during the automated reconciliation process and provides the clinician with mechanisms to adjust or correct the input.
3. It SHALL provide a mechanism for a clinician to add new information to the reconciled results.
4. It SHALL authenticate the clinician prior to storage of the reconciled data (this step may be combined with other authentication steps used to finalize the record).
- 460 5. It SHALL store the resulting data for future use by other actors as described below.

X.1.1.2 Content Consumer

The Content Consumer Actor in this profile is similar to content consumers defined in other IHE profiles. It has one requirement, which is that it must be able to consume clinical content and providers as defined in the PCC Technical Framework.

- 465 1. The Content Consumer Actor SHALL implement a content profile supporting a Medical Summary as defined in PCC TF-2:6.3.1.2 Medical Summary.

X.1.1.3 Content Creator

470 The Content Creator Actor in this profile is similar to content creators defined in other IHE profiles. It has one requirement, which is that it must be able to create content containing common observations, diagnostic results, problems and allergies, medications, immunizations or professional services as defined in the PCC Technical Framework. This actor should support the Reconciliation Content Option.

1. The Content Creator Actor SHALL create content conforming to a profile supporting a Medical Summary as defined in PCC TF-2:6.3.1.2 Medical Summary.
- 475 2. The Content Creator Actor SHOULD support the Reconciliation Content Option.

X.1.1.4 Clinical Data Source

The Clinical Data Source Actor in this profile is an implementation of the Clinical Data Source Actor in the QED Profile. It has the additional requirement that it must be able to create content containing common observations, diagnostic results, problems and allergies, medications, immunizations or professional services as defined in the Query for Existing Data Profile. This actor should support the Reconciliation Content Option..

1. The Clinical Data Source SHALL implement either the Common Observations, Diagnostic Results, Problems and Allergies, Medications, Immunizations, Professional Services Options described in IHE PCC Sup-QED: 3.4 or both.
2. The Clinical Data Source SHOULD support the Reconciliation Content Option.

X.1.1.5 Clinical Data Consumer

The Clinical Data Consumer Actor in this profile is an implementation of the Clinical Data Consumer Actor in the QED Profile. It has the additional requirement that it must be able to query for content containing common observations, diagnostic results, problems and allergies, medications, immunizations or professional services as defined in the Query for Existing Data Profile.

1. The Clinical Data Consumer SHALL implement either the Common Observations, Diagnostic Results, Problems and Allergies, Medications, Immunizations, Professional Services options described in IHE PCC Sup-QED: 3.4

X.1.2 Content Modules

Table X.1.2-1 lists the content module(s) defined in the RECON Profile. To claim support with this profile, an actor shall support all required content modules (labeled “R”) and may support optional content modules (labeled “O”).

Table X.1.2-1: RECON Summary Content Modules

Content Modules	Optionality	PCC Template ID
Reconciliation act	R ^{See Note 1}	1.3.6.1.4.1.19376.1.5.3.1.1.24.3.1
Reconciliation clinical data source	R ^{See Note 1}	1.3.6.1.4.1.19376.1.5.3.1.1.24.3.3
Reconciliation performer	R ^{See Note 1}	1.3.6.1.4.1.19376.1.5.3.1.1.24.3.5.1

Note 1: At least one of the list Content Modules shall be implemented for reconciliation Agent

X.2 RECON Actor Options

Options that may be selected for this Profile are listed in the Table X.2-1 along with the Actors to which they apply. Dependencies between options when applicable are specified in notes.

Table X.2-1: RECON - Actors and Options

Actor	Option Name	Reference
Reconciliation Agent	Clinical Data Option	PCC TF-1:X.4.1
Content Creator	Reconciliation Content Option	PCC TF-1:X.4.2
Content Consumer	None	N/A
Clinical Data Source	Reconciliation Content Option	PCC TF-1:X.4.2
Clinical Data Consumer	None	N/A

X.2.1 Clinical Data Option

510 A reconciliation agent implementing the Clinical Data Option SHALL support the PCC-1 Query for Existing Data Transaction to query one or more Clinical Data Source Actors and to respond to queries from Clinical Data Consumer Actors.

X.2.2 Reconciliation Content Option

515 A Content Creator or Clinical Data Source supporting the Reconciliation Content Option must include Reconciliation Content (see Section 6.3.1.D) in the document created or query result returned.

X.3 RECON Required Actor Groupings

An actor from this profile (Column 1) shall implement all of the required transactions and/or content modules in this profile in addition to all of the transactions required for the grouped actor (Column 2).

520 If this is a content profile, and actors from this profile are grouped with actors from a workflow or transport profile, the Content Bindings reference column references any specifications for mapping data from the content module into data elements from the workflow or transport transactions.

525 In some cases, required groupings are defined as at least one of an enumerated set of possible actors; this is designated by merging column one into a single cell spanning multiple potential grouped actors. Notes are used to highlight this situation.

Section X.5 describes some optional groupings that may be of interest for security considerations and section X.6 describes some optional groupings in other related profiles.

X.3.1 Content Consumer

530 The Reconciliation Agent Actor must be grouped with an eligible Content Consumer Actor supporting the Discrete Data Import Option to obtain data about common observations, diagnostic results, concerns and allergies, medications, immunizations, and professional services that may be obtained from clinical documents. Eligible Content Consumer Actors are those that support content containing common observations, diagnostic results, concerns and allergies,

535 medications, immunizations, and professional services. Any content profile that derives from the IHE Medical Summary template qualifies. Other content profiles may also qualify. The content used for Basic Patient Privacy Consents, and for Sharing of Laboratory Reports does not qualify.

X.3.2 Clinical Data Consumer

540 A Reconciliation Agent Actor implementing the Clinical Data Option must be grouped with a Clinical Data Consumer Actor that supports the simple observations, diagnostic results, concerns and allergies, medications, immunizations, and Professional Services Option and the option defined in the IHE PCC Query for Existing Data (QED) Profile. This actor is used to obtain information about simple observations,, diagnostic results, concerns and allergies, medications, immunizations, and professional services from one or more clinical data sources.

545 **X.3.3 Content Creator**

The Reconciliation Agent must be grouped with at least one other Content Creator Actor from another IHE Content Profile. That actor may implement the Reconciliation Content Option.

X.3.4 Clinical Data Source

550 The Reconciliation Agent may be grouped with a Clinical Data Source Actor from the IHE PCC QED Profile. That actor may implement the Reconciliation Content Option.

Table X.3.4-1: RECON - Required Actor Groupings

RECON Actor	Actor to be grouped with	Reference	Content Bindings Reference
Reconciliation Agent Actor	Content Creator Actor	PCC TF- 1:3.3	None
	Clinical Data Source Actor <small>See Note 1</small>	IHE PCC Sup-QED: 3.3	None

Note 1: Required when the Clinical Data Option is implemented

X.4 RECON Overview

555 IHE PCC RECON Profile supports reconciliation of clinical data such as common observations, allergy and intolerances, problems, medications, immunizations, diagnostic results, procedures, encounters, and care providers. A wide variety of systems will need to reconcile clinical data as information is exchanged, stored and maintained in EMR system or other clinical data repository. Reconciled information can prevent information redundancy and can be used to support clinical care, quality reporting, financial transactions, public health reporting, clinical trials, drug interaction checking, and patient qualification for various protocols.

560

This profile builds upon the clinical content templates developed in this IHE PCC Technical Framework. However, it has been designed to work with other clinical content templates

565 developed for producing clinical documents (e.g., the CCDA in the US, and epSOS templates in Europe).

In the Magic Number Seven, Plus or Minus Two⁷, George Miller argues that the average human memory can hold seven plus or minus two units of information. Subsequent studies reduce this figure when the units of information are words. Numerous research studies indicate that the average number of medications taken by high risk populations (elders, patients with chronic conditions, et cetera) approaches or exceeds seven. For complex cases, the task would then exceed the average capacity of human working memory.

570 RECON Profile enables information contained in Health Information Systems and Exchanges to be used to support automation of reconciliation tasks and clinical workflows. It explains what information can help reconciliation, and how it can be used to assist healthcare providers to automate this complex task.

X.4.1 Concepts

There are five steps to the reconciliation process. The numbered steps below correspond to the numbered steps in the diagram that follows.

1. The first step is to gather the information that needs to be reconciled.
 - 580 a. The data in this first step can come from clinical documents created for the patient, including discharge summaries, referral summaries, the history and physical, consultation notes, and Care Plans/Plan of Care documents, et cetera.
 - b. Data may also come from clinical summaries available from the patients' personal health record or a Health Information Exchange (HIE).
 - 585 c. Data can also be obtained as discrete data from various other clinical data sources, including clinical data repositories, electronic health records and personal health records
 - d. Data might also appear in pharmacy benefit records, and disease/condition specific information registries (e.g., a cancer registry, vaccination repository).
- 590 2. The second step automates the identification of any information that has been duplicated, overlaps, conflicts, or has been superseded. This second step identifies and/or produces candidate entries to appear into the list of reconciled data that is presented to the healthcare provider as a single merged data stream. The primary purpose of this step is to organize and reduce the quantity of information needing human intervention which includes the consideration of data that is identical, unique or similar. This step is completed by analyzing similarities between the data using clinical knowledge and an understanding of the coding systems and structures used to capture this data.
- 595

⁷ Available on the web at <http://psychclassics.yorku.ca/Miller/>

- 600
3. The third step involves an interaction with a healthcare provider who confirms, corrects and updates the reconciled list. In this step, the application displays the collection of reconciled data; highlighting issues that need provider attention (e.g., to address ambiguities in interpretation, for example, related but not identical diagnoses, et cetera). At this stage, additional data may be obtained from the patient or their representative to help disambiguate issues identified during the automated process, and add any newly available information.
 - 605 4. The healthcare provider interacts with the application to produce a set of reconciled data that will then be stored for subsequent use.
 5. The resulting lists produced from this process are stored in an EHR or other Healthcare Information System.

610 It is important to note that during the process of reconciliation, **normalization** may be needed. However, this is out of scope for this profile and provides opportunity for future IHE PCC work.

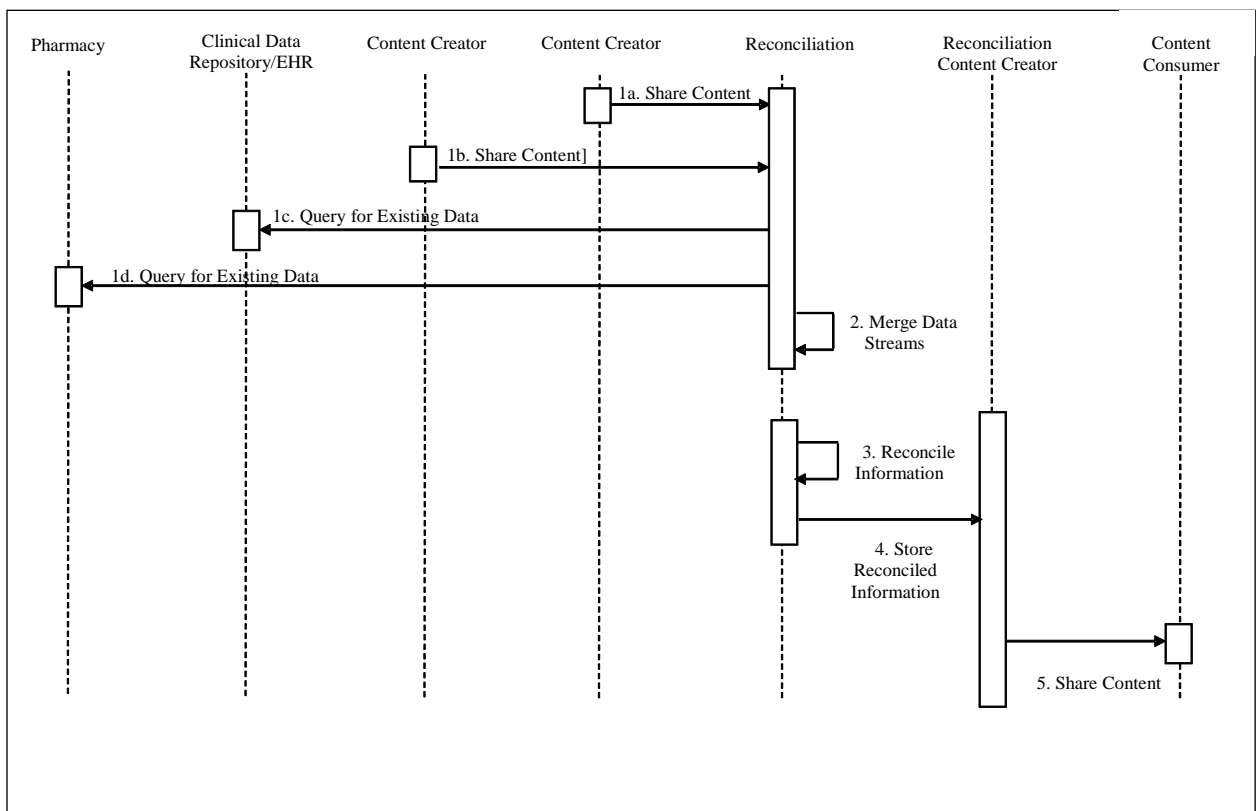


Figure X.4.1-1: Reconciliation Process Flow

615 The purpose of this profile is to Identify and examine heuristics that can be used by an application performing reconciliation to facilitate identification of duplicated, overlapping, conflicting or superseded entries.

RECON provides the ability to reconcile clinical content and care providers that are commonly shared in lists. Clinical content are listed according to things that are of concern (e.g., problem, 620 social history, allergy/reaction, etc.), interventions to address concerns (e.g., medication, plan of care, procedure, encounters, etc.), outcomes of the interventions (e.g., results, goals, etc.) and providers that addresses concerns and/or provide interventions (e.g., care team members, pharmacy, etc.).

RECON automatic reconciliation process should be viewed as an implementation of a clinical 625 decision support service. There are a number of heuristics that can be used to facilitate identification of entries. These are described in further detail below.

The purpose of this profile is not to describe the specific mechanism or algorithm by which the application performing reconciliation identifies duplicated, overlapping, conflicting or 630 superseded entries. The heuristics described below are provided to make developers aware of the issues and opportunities available within the clinical data provided in IHE profiles to assist in the automation of the reconciliation process. The same can also be applied to implementation guides using CDA constructs.

There are a few cases where the RECON Profile mandates a particular behavior of the system implementing the actor. These are described in each of the following sections as numbered 635 conformance requirements in the sections below.

X.4.1.1 Identity

Each entry appearing in a CDA implementation guide or an IHE content profile in the PCC Technical Framework has a universally unique identifier which is typically required. The 640 identifiers are distinct from the codes which indicate the type of entry. The identifier represents that instance of the event and no other, whereas the same code could be applied to two different occurrences of the same event. For example, each prescription ordered for a patient has a universally unique identifier. If two entries for a prescription for penicillin contain the same identifier, according to the rules of the standards used, they must represent the same prescription event. That equivalence cannot be assumed when they contain the same drug code (e.g., 645 penicillin).

The identity concept may be approached in multiple ways depending on the source of the data itself. For example should a CDA document be used as the source the document identifier may be used in conjunction with the universally unique identifier to represent the instance of the data element. In the case of a QED query the QED query identifier may be used in conjunction with 650 the universally unique identifier to achieve the same end effect. This profile recommends such an approach but no explicit requirements are placed as this will be dependent on each implementation.

X.4.1.1.1 Maintenance and Verification of Original Identity

655 Universally unique identifiers are the only mechanism by which duplicated entries can be reliably located. However, experience has shown that systems cannot rely on the identity alone to ensure consistency. Some cross checks are required.

1. When matching two entries by universally unique identifier, the reconciling application **SHALL** verify that other details of the reconciled entries are consistent.
- 660 2. More specifically, a reconciling application **SHALL** demonstrate the ability to identify cases where two entries with the same identifier are about the same event, and when they are not, to report it.

665 The best way to ensure consistency when reconciling data across systems is to maintain the identity of entries when they are imported into information systems, and to reproduce those identifiers when the entries are exported. This ensures that the identifiers used to identify entries are maintained as information transitions between information systems.

1. When reconciling information from an external system, the reconciling application **SHALL** maintain the first identifier provided for the item as the original identifier. It **MAY** provide its own identifiers for the data as well.
- 670 2. When exporting information that came from an external source through reconciliation, the reconciliation application **SHALL** report the original identifier as the first identifier reported for the item.
3. Subsequent identifiers after the first **SHOULD** be retained and reported but are not required by this profile.

675 Significant differences between two recorded events that should have the same meaning point to an error in implementation somewhere in the systems which contain clinical data for the patient.

1. The reconciling application **SHALL** report these inconsistencies in some way. Reports of these conditions **MAY** be to someone other than the user of the system (e.g., the system administrator, or other appropriate party).
- 680 2. The reconciling application **MAY** require manual reconciliation of the inconsistent entries. It **SHALL** assign a new identifier to each entry containing inconsistent data. The rationale for this requirement is to avoid persisting the conflicting identifiers.

X.4.1.1.2 Transitions in Identity

To ensure identity is maintained, the reconciling system must properly manage the identity of data items. Changes to an existing data item fall into four general categories:

- 685
 - Status updates to the data item.
 - Addition of new or previously unknown data or relationships to other data items.
 - Changes in contextual meaning.

- Correction of the data item due to it being reported in error.

X.4.1.1.2.1 Status Updates

690 Transitions in identity are often accompanied by changes in the status of a data item. These are recorded in the `statusCode` and `moodCode` elements. Table X.4.1.1.2.1-1 below shows the meaning of these different status values from the HL7 `actStatus` vocabulary. Table X.4.1.1.2.1-2 shows the meaning of the `moodCode` values from HL7 `Act MoodCode` vocabulary.

695 Status updates are changes such as “this medication has been discontinued”, or “this problem is now resolved” or “this planned item has occurred”. Status updates change the identity of the data item whose status is being updated, but it does not change the facts associated with the items as they were reported at a previous point in time. Status updates report on the normal evolution of a data item over time. Status can be represented as an observation value

700 Implementers of the Reconciliation Agent Actor will need to examine the `statusCode` to determine if the statuses of two data items are different. The `statusCode` must be reconciled if there are differences.

Table X.4.1.1.2.1-1: ActStatus values

ActStatus	Description
active	The activity represented by the data item is currently active.
completed	The activity represented by the data item transitioned to a normal state of completion.
suspended	The activity represented by the data item was put on hold after it was initiated.
aborted	The activity represented by the data item was terminated prior to the normal completion.
obsolete	The activity represented by the data item has been replaced by a new data item.
nullified	The activity represented by the data item was incorrectly reported.
Cancelled	The activity has been abandoned before activation
New	The activity is in the preparatory stages and may not yet be acted upon.
Held	The activity is still in the preparatory stages and may not be acted upon

705 Implementers of the Reconciliation Agent Actor will also need to examine the `moodCode` to determine if the `moodCode` of the data items being reconciled are the same or different. According to HL7, changing the `moodCode` of an element always result in the change in identity. A planned encounter will have a `moodCode` of intent (INT) or appointment (APT). When the encounter occurs or when it is in the process of occurring, the `moodCode` changes to EVN.

710 While in the planned state, the identifier may be different than when the appointment occurs.

Table X.4.1.1.2.1-2: Act moodCode values

Act moodCode	Description
EVN (event)	The entry defines an actual occurrence of an event.

Act moodCode	Description
INT (intent)	The entry is intended or planned.
APT (appointment)	The entry is planned for a specific time and place.
ARQ (appointment request)	The entry is a request for the booking of an appointment.
PRMS (promise)	A commitment to perform the stated entry
PRP (proposal)	A proposal that the stated entry be performed.
RQO (request)	A request or order to perform the stated entry.

X.4.1.1.2.2 Addition of New or Previously Unknown Data or Relationships

715 When additional pieces of a data item become known, adding these pieces of data to the original data item does not change its identity. For example, if the dates of a prior illness were previously reported as being unknown, adding those dates does not create a new data item, it simply updates the previous item. Similarly, if codes for a data item recording a diagnosis were previously unreported, but are now added, the data item does not change its identity.

720 Similarly, when a new data item becomes known, it may be related to a pre-existing data item. These relationships may be added without changing the identity of the data item. Thus, a diagnosis that is previously untreated may have a relationship added (using an `entryRelationship` element) to indicate what the new treatment is for that item without changing the identity of the data item. An intervention that is previously intended may have a relationship added to indicate what the new indication is for that item without changing the identity of the data item. The addition of a new manifestation of an allergy will not change the identity of the previously described allergy. However, the manifestation itself is a new data item with a new identity.

730 Implementers of the Reconciliation Agent Actor should compare data items to determine if there are differences in new or unknown data, or relationships, and must reconcile discrepancies. In cases where one data item simply has more data or relationships, the new data is often just merged because it does not alter the identity of the original data.

735 Disease progression may also result in new facts and relationships. For example, in the case where a patient started with a diagnosis of “flu”, it is possible for the disease to progress to “Pneumonia”. In this case, the new diagnosis is an additional fact. The previous diagnosis is still true, and is retained. The act representing the concern is also retained, and is related to the new diagnosis.

740 When a new data item conflicts with a pre-existing data item, this results in a different type of transition. In this case, the new data item might represent a different diagnosis for a concern (e.g., “Lung Cancer” rather than “Bronchitis”). This case is described in the following section.

X.4.1.2 Changes in Treatment, Diagnosis or Related Information

Changes in previously reported content create new “facts” that supplant or replace previous data items. The new data item has new identity, and the old data item is retained (although its status may be changed).

745 Perhaps the most common example is a change in dose for a particular medication, or substitution of a different medication for an existing medication that is being discontinued. In these cases, the new content is a new data item with a new identity, and the previous data item is marked as being `aborted` (stopped before a normal termination).

750 Refinements or changes in judgment can also occur, often as a result of new data. An example of refinement is when an initial intervention of low sodium diet is replaced by a more specific intervention of 2 gm sodium diet. Both statements are true. One is simply a refinement of the other. In another case, what was once bed rest is subsequently changed to activity ad lib. In this case, the previous activity is now superseded. However, it was still correctly recorded at the time, and is not subject to the rules about correction below. This is perhaps the best explanation
755 of why a change in content is not treated as a correction. The fact that a patient activity needs changed is correct, and was correctly recorded.

Another example of refinement is when an initial diagnosis of ankle sprain is replaced by a more specific diagnosis of a sprain of the deltoid ligament. Both statements are true; one is simply a refinement of the other. Similarly, what was once thought to be “Bronchitis” is subsequently
760 diagnosed as “Lung Cancer”. In this case, the previous diagnosis was incorrect. However, it was still correctly recorded as the diagnosis, and is not subject to the rules about correction below. This is perhaps the best explanation of why a change in diagnosis is not treated as a correction. Thus, the fact that a patient was diagnosed with a particular illness is correct, and was correctly recorded.

765 In the above cases, the new content is retained with a new identity, and the old content is marked as `obsolete`. The new data item can indicate that it replaces the old data item through the addition of an `entryRelationship` element showing the replacement.

770 Corrections to data correctly recorded, but incorrectly reported are treated in the same fashion. If a patient indicated in one visit that they are allergic to penicillin, only to later come back and report that they are actually allergic to amoxicillin and not allergic to penicillin, this is a change in reporting, not in recording. The same would occur if a patient reports that they exercise five times a week and later reports that they do not do any form of exercise at all.

X.4.1.3 Corrections to previously reported Treatment or Diagnosis

775 It is only when data item was incorrectly recorded that this section applies. Data items that were reported inaccurately, but recorded correctly should be treated as a change, rather than a correction.

One example of a recording error is when hypotension is incorrectly entered instead into the record, rather than hypertension, which was what was intended. Another example of a recording error is when a data item is recorded on the wrong patient's chart.

780 In these cases, the data item was not a true statement. However, it may have been acted on and should be retained for audit purposes. The previous data item is marked as being nullified. If there is a new data item, it may be replaced by the data item that contains the corrected data.

The new data item in all cases has a new identity.

- 785 1. When a data item that was added to the system through reconciliation is changed in a way that alters its identity, a new identity **SHALL** be assigned to it.
2. The reconciling application **SHOULD** report the association of the new data item with the reconciled data items that have been superseded since the last reconciliation.

X.4.1.4 Codes

790 To facilitate interoperability and avoid loss of data, this profile recommends that codes in imported entries be preserved and any mappings to new coding systems be recorded as translations on export. This is a recommendation and not a requirement because many EHR systems do not have the capability to store or validate codes from external coding systems. Also, many regional and national interoperability specifications have requirements to use specific coding systems for recording codes for different entries, and may not permit the transmission of alternate codes.

795 Another issue to consider is that not all entries will be coded. The PCC Technical Framework requires the presence of the <code> element, but permits the code to be null (not present). The entry will always have text that is associated with that element, whether a code is present or not. That text may also be mapped to a code using a number of different well-known techniques, including simple index lookup, string matching, natural language processing, et cetera.

800 The various entries use codes from a variety of different coding systems to identify *what is represented*. Two entries using the same code are often, but not necessarily referencing the same event. For example, a SNOMED CT code could identify an entry that represents the diagnosis of an ankle sprain. It is very likely that two instances of ankle sprain in a 24 hour time period (or even longer) are referring to the same event. More data could help clarify. If both instances of ankle sprain had the same start date, and both referred to the left ankle, then the reconciling application could suggest these two separate instances as being about the same diagnosis/condition.

810 Different conditions require different information to disambiguate or suggest identity. If the diagnosis in both entries above had instead been Diabetes Type II, the application could have confirmed these two cases to be the same instance, because it is not possible for a patient to have two different instances of this condition. This is often the case in chronic conditions where the anatomical site is either unique or not applicable.

815 Coding systems provide different levels of detail in describing things. A diagnosis such as
Diabetes Type II described above could also be classified more generally as Diabetes in the
hierarchy of the coding system. These relationships appear in coding systems like ICD and
SNOMED and can be accessed and navigated by applications which use those coding systems.
So two entries in which one reported that a patient had a certain condition (e.g., Diabetes) and
another reported a more specific instance of that disease (e.g., Diabetes Type II with insulin or
820 uncontrolled Type II) could be classified as Diabetes. However, traversing too many levels of a
hierarchy could lead to cases where one concept (e.g., Disease of the Endocrinology System) is
far too general to assert any sort of equality with a more specialized case (e.g., Diabetes). This
clinical knowledge will often need to be separately represented by the reconciling application.
While algorithms can be developed, there are few easy answers that can be used in these cases.

825 Care is also needed in determining what code should be used as the most accurate representation
of the diagnosis. In the example described above, the best code to report might very well be the
more specific one, because it would ensure better clinical treatment. But other cases might
demand that the more general code be used. For example, if one provider reports that a patient is
allergic to Penicillin, and another provider reports the more general or broad allergy to **β-Lactam**
830 **antibiotics**, patient safety might demand that the more general code be identified as the
candidate for the reconciled result.

When dealing with data from multiple systems, entries for the same event may be coded in
different coding systems. In these cases, crosswalks might be used to enable comparison.
However, crosswalks between coding systems may be incomplete, costly to produce, and may
835 become outdated. In many cases, the mapping may be inexact or worse. A code in one system
may map to multiple codes in another system, or vice versa, or may have no mapping at all.

Codes are also used to convey additional meaning such as why an immunization was not
administered or which family member had the disorder when capturing a family history element.
These codes also need to be considered during the reconciliation process.

840 **X.4.1.5 Timing**

Timing can often be used to help disambiguate between different events, but this also requires
clinical knowledge to be used effectively. Different occurrences of things are often resolved
within a specific time period (e.g., flu within a few weeks, tests completed within a few hours,
etc.), so an assumption can be made when sufficient time has passed, that instances of the
845 occurrence being referred to be distinct. In some cases, time can be instant, or short in duration
but in other cases can be much longer. In some cases, time doesn't really apply. For example,
chronic diseases such as an instance of Diabetes Type II, in one year are likely the same
diagnosis as a separate instance reported even decades later. Or an appendectomy performed
today, may be the same surgical history item instance reported later.

850 **X.4.1.6 Anatomical Site**

Anatomical site can often be used both in conjunction with timing, and without reference to
timing to assist in disambiguation. If two conditions are reported as being in different anatomical

855 sites, then they are likely different. However, anatomic site also has the same issues of hierarchy as other coded data. A diagnosis reported in one place as a sprain of the left ankle and in another as a sprain of the left ankle deltoid ligament at the same time is likely the same diagnosis. The difference is in the specificity of the anatomical site.

X.4.1.7 Source of Information

860 The source of the information is another datum that may be used when disambiguating items in the reconciled list. The disambiguation process may give more or less weight to information depending upon the source and type of information provided. This may depend upon the information source’s relationship with the patient, their specialty and degree of medical and nursing training, the area of diagnosis, et cetera.

865 Care should be taken when reconciling diagnoses when a second opinion or consultation has been provided. The reconciling physician may keep the first diagnosis, or the diagnosis resulting from a second opinion, or both diagnoses may be recorded.

870 The accuracy of any information depends upon education and skills of the source and motivation for providing the information (e.g., drug seeking behavior). Patient sourced information is one area where special consideration is needed during the reconciliation process. Applying generalizations about patient’s knowledge of their diagnoses, allergies and medications will not apply equally. Some patients will be quite educated about their conditions, while others may have only very limited knowledge.

875 Information from Personal Health Records may not always be sourced by the patient. For example, a patient’s discharge summary may be sent to the patient’s PHR. The reconciliation content profile does provide specific guidance about how sources of information should be recorded to assist in the reconciliation process.

X.4.1.8 Degree of Clinical Judgment

880 Two entries that are otherwise similar but with different degrees of clinical judgment need to reconcile the level of clinical judgment associated with the entry. Clinical judgment is anything used to further explain or define the main concept. Examples of degree of clinical judgment include type of problem, indication for a medication, physical location of a procedure where a procedure was performed, etc.

X.4.1.9 Severity

885 When two concepts are merged, there may be “conflicting” reports of the severity of the concept. Severity can change over time, and so this result is to be expected. The reconciling application should account for this and select the appropriate value (e.g., the most recently recorded concept) during the merging process. In addition, the method of attaching a clinical severity to reconciled concept may be considered by the reconciliation application in the presentation layer.

X.4.1.10 Merging of Information

890 When two entries describing a concept are merged, they may contain multiple attributes, which may also be duplicated, overlapping, conflicted, or superseded. The reconciling application should merge the two sets of attributes. Examples include multiple adverse reactions associated with an allergen or multiple reactions to a medication.

X.4.1.11 Negation and Null

895 Negation and null attribute in CDA is used to convey something that did not occur or that isn't present (e.g., the patient did not receive an immunization, or the patient is not reaching a goal, procedure was not done, etc.). In order to avoid misinterpreting things that did happen from things that did not occur, negation and null should be taken into consideration during the reconciliation process.

X.4.1.12 Data Creation and Update Time

900 Time of data creation and update is represented as author date/time of clinical data in CDA documents. It should be included in the reconciliation process. Author date/time provides the ability to determine if the associated data is newer or older than the existing information it is being reconciled with. After other data attributes are considered and a possible duplicate of data may exist, consideration of the author date/time will ascertain which data element is more recent.
905 The data element with the more recent date/time should be considered as the more updated data element.

X.4.1.13 Allergy Specific Reconciliation

This section describes reconciliation heuristics that are applicable only to allergies and adverse reactions.

910 X. 4.1.13.1 Allergic Condition and/or allergen

The allergies and intolerances may be represented in one or both of two ways: Either by identifying a clinical condition (e.g., allergy to penicillin), or by identification of the agent (e.g., penicillin) that causes the allergy or intolerance. These two methods for coding allergic condition and/or allergens cover two different domains of clinical knowledge, one being the set of allergic
915 conditions, and the other being the set of medications or immunizations (or other substances) that could cause an adverse reaction.

Allergies are required to be identified in PCC-TF 2:6.3.4.15 Allergies and Intolerances, and allows the allergen to be identified but does not require it. The allergy may be described by a code, or it may just contain text describing the allergic condition.

920 Some coding systems that provide codes to record allergies, such as SNOMED CT, also provide the ability to navigate to the code for the causative agent. This provides a limited means by which mapping from allergy to allergen can be accomplished for systems which use that vocabulary.

925 Other coding systems (e.g., ICD-9-CM) do not provide such navigational capabilities, and so mapping from allergy to allergen must be provided by auxiliary clinical knowledge.

X. 4.1.13.2 Allergy/Non Allergy Intolerance/Intolerance

PCC-TF 2:6.3.4.15.4 requires that some indication be given as to whether the entry reports an allergic condition, a non-allergy intolerance, or an adverse reaction otherwise unknown as to whether the allergic reaction results from an allergic condition or non-allergic intolerance.

930 During the reconciliation process, different systems may report different statuses with respect to the unknown classification of the allergy. The reconciling application **shall** provide some logic to recommend an appropriate value during the reconciliation process, and **shall** highlight this inconsistency when found.

X. 4.1.13.3 Intolerance to Medication/Food/Environment

935 PCC-TF 2:6.3.4.15.4 requires that some indication be given as to whether the entry describes intolerance to a medication (including vaccines), food, or an environmental agent. During the reconciliation process, different systems may report different statuses with respect to this classification of the allergy. The reconciling application **shall** provide some logic to recommend an appropriate value during the reconciliation process, and **shall** highlight this inconsistency

940 when found.

X. 4.1.13.4 Adverse Reactions

When two entries describing an allergy are merged, they may contain multiple adverse reactions, which may also be duplicated, overlapping, conflicted, or superseded. The reconciling application should merge the two sets of adverse reactions.

X.4.1.14 Medication Specific Reconciliation

945 Medications are perhaps the most challenging entries to deal with in this profile, and that is due to the wide variety of information encompassed in medication codes, dosing and frequency information, and the number of different ways the same clinical intent can be met with similar formulations. The first challenge is that the distinction between different brands or suppliers of a medication may not be relevant, but that there may not be a direct relationship between branded

950 drugs and their formulations in some coding systems. Many coding systems (e.g., National Drug Code (NDC) and RxNorm) used to describe medications provide different codes for different brands of the same formulation. NDC doesn't link them by formulation, while RxNorm does.

The second challenge is even more complex. Certain changes in dosing or frequency with the same active ingredients will achieve a similar treatment effect (e.g., take one 60mg tablet once a day, or three 20mg tablets once a day, or one 20mg tablet 3 times a day). These will require more

955 complicated algorithms to determine duplicated, overlapping or conflicting entries.

There may be situations where units of measure for a medication or similar observation (e.g., result, vital sign) may differ in a reconciliation scenario. This profile does not provide explicit

960 guidance on how to handle. If the software is not capable of reconciling such data then the

recommended approach would be to store as separate observations. However, if the software is capable of handling such a scenario then this profile does not prevent taking such actions.

965 Medication events are further complicated by the fact that many systems are not able to communicate detailed information about the dose and frequency in a structured fashion. This is certainly true in ePrescribing scenarios in the US where the use of a structured medication dosing directions (“sig.”) is not required in the electronic prescription. Systems obtaining data from ePrescribing systems would not be able to compute with these results.

970 These facts would seem to make it difficult to match medication fulfilment events with the original intent of the prescription event when a substitution occurs. The PCC Technical Framework assumes that fulfilment activities occur with knowledge of the original intent of the prescription, and requires that fulfilment events to be recorded in a <supply> entry that appears inside the original <substanceAdministration> intent. So, matching of fulfilment activity with the original prescribers’ intent is possible even in cases where substitutions occur.

X.4.1.15 Care Provider Specific Reconciliation

975 When reconciling care providers, it is important to identify who the provider is. Providers can be a person or an organization. Identification of a provider includes the provider ID as well as the name and location of the provider. The type of provider also needs to be considered. Provider type includes defining the provider role in relation to the patient. Provider specialty may need to be defined.

X.4.1.16 Immunization Specific Reconciliation

980 Immunization reconciliation is similar to medication reconciliation thus inherits some of the specification that applies to medication reconciliation. When reconciling immunization, consideration should be given to immunizations that have actually occurred or are intended to occur. Immunization that has not occurred as well as the reason it did not occur should also be considered. Immunization series number is needed to provide tracking of immunization history. Local policies may require that Immunization lot number is captured. Information such as reaction to the immunization, route or delivery method, administration site as well as dose also need to be considered during reconciliation.

X.4.1.17 Goals Specific Reconciliation

990 A goal is a defined outcome or condition to be achieved in the process of patient care. Goals include patient-defined goals (e.g., alleviation of health concerns, positive outcomes from interventions, longevity, function, symptom management, comfort) and clinician-specific goals to achieve desired and agreed upon outcomes.

995 When reconciling goals it is important to take into consideration if a goal has been met, is being achieve or is planned. Goals can have related components such as concerns, encounters, observations, procedures, substance administration, supplies or acts. Goals can also have components consisting of other goals that demonstrate milestones. These are represented through entryRelationships.

X.4.1.18 Results Specific Reconciliation

1000 When reconciling results it is important to maintain the identifier that comes with the result and if exporting, send the identifier out. The identifier can be used for matching the incoming result with existing result. The importing EHR need to manage identifiers appropriately when result attributes changes

X.4.2 Use Cases

1005 Mr. Jonathan Allan is a 77 year old male ‘snowbird’. He lives in Michigan during the summer and in Florida the rest of the year. He has diabetes and has also undergone multiple open heart surgeries to correct irregular heartbeats and other ailments related to the heart. He is currently planning his return to Michigan. He makes an appointment with his Cardiologist in Michigan. His Cardiologist practice sets up an initial visit with the patient and obtains information about the patient from his care providers in Florida as well as from the Florida State HIE. The Cardiologist would like to reconcile pertinent clinical information and import it into his EHR so he can have updated information about his patient so he can effectively care for his patient.

1010

X.4.2.1 Use Case: Transfer of content with no variances

1015 The first use case demonstrates reconciliation between two care provider systems where no conflicts are identified during the automated reconciliation.

Preconditions:

Mr. Allan has the following data in his PCP EHR.

- Hypercholesterolemia SNOMED 13644009; Status Active
- Diabetes – SNOMED 11530004; ICD9 250.42; Status Active
- 1020 • Low cholesterol diet education provided February 12, 2013 – SNOMED 183062005
- HgbA1c 6.2 on December 10, 2013– LOINC 55454-3
- Goal is to exercise three to five times a week

Use Case

1025 Reconciliation from PCP to Specialist EHR: Mr. Allan’s Michigan Cardiologist (Dr. Hart) office intake nurse is reconciling clinical content per practice protocol. His pre-existing records are examined and reconciled against this list. Since there are no conflicting entries, the newer list is automatically reconciled and presented to the intake nurse performing the reconciliation. She accepts the reconciled data into the specialist record.

X.4.2.2 Use Case: Transfer of content with variances

1030 The second use case demonstrates reconciliation of clinical content from a state HIE being performed by a PCP EHR. In this case there are issues identified during the reconciliation of clinical content because the PCP EHR is out of date.

Preconditions:

Mr. Allan’s medical records from the state HIE include the following information:

- 1035
 - Blood pressure readings (systolic and diastolic) – LOINC 8480-6, 8462-4 collected during 2013 encounters
 - Inderal - RxNorm 151890 prescribed October 19, 2012 status –active; Lopressor RxNorm 218072 prescribed December 10, 2013, status – active)
 - Pneumococcal Vaccine – CVX 133 Administered on December 10, 2013
- 1040
 - Flu Vaccine – CVX 140 Not Administered on December 10, 2013 due to medical precautions
 - Diabetic care instructions – SNOMED 385805005 planned December 10, 2013
 - Social History, Smoking history ½ pack per day started smoking four months ago (August 2013)
- 1045
 - Cardiac rehab therapy declined – SNOMED 413756001; status - cancelled December 10, 2013

Use Case

Mr. Allan has returned from Florida and is at his Michigan PCP (Dr. Carey) office for a sick visit. He’s complaining of weakness and generalized tiredness with episodes of dizziness and decreased appetite. Mr. Allan informs Dr. Carey that he returned from Florida a month ago and had a visit with Dr. Hart, his cardiologist two weeks ago. Dr. Carey is aware that Mr. Allan’s providers in Florida participate in Florida State HIE. He would like to reconcile his records with Mr. Allan’s clinical information from the state HIE. The following information is in Dr. Carey’s record:

- 1055
 - Blood pressure readings (systolic and diastolic) – LOINC 8480-6, 8462-4 collected during 2012 encounters
 - Inderal - RxNorm 151890 prescribed October 19, 2012 status –active;
 - Flu Vaccine – CVX 140 Administered October 2012
 - Diabetic care instructions – SNOMED 385805005 completed October 2012
- 1060
 - Social history, Non-smoker
 - Cardiac rehab therapy– SNOMED 313395003; status - new October 2012

Dr. Carey performs reconciliation and updates his EHR. He adds the updated blood pressure readings so that he is better able to track vital signs trends. Dr. Carey notices that Mr. Allan’s blood pressure medication was changed from Inderal to Lopressor. He reconciles this information to reflect his agreement with the plan and updates his record with the newer blood pressure medication. He notes that Mr. Allan did not receive a flu vaccine during the last flu season and plans for Mr. Allan to get the flu vaccine during the upcoming season. He updates

1070 Mr. Allan’s social history and provides smoking cessation counseling with Mr. Allan. Dr. Carey also notices that there were previous plans for Mr. Allan to participate in a cardiac rehabilitation program that was later cancelled by another of Mr. Allan’s providers. He discusses the reasons for the cancellation with Mr. Allan. With Mr. Allan permission, he schedules Mr. Allan for cardiac rehab.

X.4.2.3 Use Case: Transfer of content with overlapping interpretations

1075 In the third use case, information from care providers EHRs are collected showing variations in information which are detected and reconciled.

Preconditions:

The clinical EHRs contain the following provider information:

- Dr. Carey role as primary care provider (in Detroit); Provider type, internal medicine
- Dr. Hart role as consulting provider (in Detroit); provider type, cardiology
- 1080 • Dr. Payne role as consulting provider (in Detroit); provider type, cardiology
- Dr. Seven role as primary care provider (in Florida); provider type, family practice
- Dr. Roberts role as consulting provider (in Florida); provider type, cardiology
- Dr. Smyth role as consulting provider (in Florida); provider type, podiatry

1085 The clinical EHRs contain the following encounter information:

- Two encounters with Dr. Carey; type of encounter; Dates of encounter
- Two encounters with Dr. Hart; type of encounter; Dates of encounter
- One encounter with Dr. Seven; type of encounter; Dates of encounter
- Two encounters with Dr. Roberts; type of encounter; Dates of encounter
- 1090 • One encounter with Dr. Smyth; type of encounter; Dates of encounter

Use Case

1095 Mr. Allan participates in a care coordination program which includes an Accountable Care Organization (ACO) supported by his providers and payer. Mr. Allan’s care is being managed by a care manager who would like to ensure that he is receiving appropriate and timely care due to his chronic disease history. The care manager EHR receives a list of providers and encounters from the various EHRs and HIE containing Mr. Allan’s clinical information. During reconciliation of care providers and encounters there are issues identified due to multiple entries of the same type of care providers as well as care providers who have not provided care. The care manager is also able to determine if Mr. Allan is receiving care from the right types of

1100 providers and if the frequency of his interactions with the health care system is adequate to meet his care needs per care protocol..

X.5 RECON Security Considerations

Risks specific to reconciliation:

1105 There are two risks that require consideration in systems which identify and merge information. If two different systems report the same event and they are not appropriately merged, systems might wind up recording duplicated diagnoses and treatments. In the case of medications, this can result in subsequent over-flagging of the duplicated treatment in the EHR. Negative consequences of over flagging including:

- Overuse of the provider’s time to correct these errors
- 1110 • Alert fatigue
- Low morale
- System distrust or minimization of confidence in results of the system
- Implementation of “workarounds” that short-circuit the reconciliation process to avoid consequences.

1115 These consequences could lead to the same kinds medical errors that this profile is meant to mitigate.

1120 A second risk is simply the reverse problem. If the system identifies two events as being the same event when they are in fact different, this can result in missed diagnoses or allergies, and failure to identify duplicated treatments which increased toxicity leading to other health complications for the patient.

To avoid these risks, we require that systems import the identifiers used in entries, and export these identifiers on output. Using preexisting identifiers consistently enables information systems to identify data that has migrated across systems.

1125

Appendices

No new appendices

Volume 2 – Transactions

Add Section ...

1130 No new transactions

Appendices

None

Volume 2 Namespace Additions

<i>Add the following terms to the IHE General Introduction Appendix G:</i>
--

1135 None

Volume 3 – Content Modules

5 Namespaces and Vocabularies

1140 5.1.2 IHEActCode Vocabulary

Add to section 5.1.2 IHE ActCode Vocabulary

Code	Description
CLINCONREC	Use this code to indicate that entries pertinent to any common observation activity have been reconciled.
MEDREC	Use this code to indicate that entries pertinent to medication activity have been reconciled.
DIAGREC	Use this code to indicate that entries pertinent to problem activity have been reconciled.
ALGREC	Use this code to indicate that entries pertinent to allergies and adverse reactions activity have been reconciled.
IMMREC	Use this code to indicate that entries pertinent to immunization activity have been reconciled.
GOALREC	Use this code to indicate that entries pertinent to goal activity have been reconciled.
PROVREC	Use this code to indicate that entries pertinent to care providers and caregiver have been reconciled.

6 Content Modules

1145 The Reconciliation content profile defines content modules that must be included in Common Observations, Diagnostic Results, Problems, Allergies, Medications, Immunizations, and Professional Services List sections of a CDA Document or in response to queries for common observations, diagnostic results, problems, allergies, medications, immunizations, or professional services lists using the QED Profile.

6.3 HL7 Version 3.0 Content Modules

1150 6.3.1 CDA Document Content Modules

Add to section 6.3.1.D Document Content Modules

1155 This profile applies to clinical documents created using the IHE PCC Technical Framework. The content of a `ClinicalDocument` or `QUPC_IN043100UV` element conforming to this profile will assert conformance to the profile.

6.3.1.D Reconciliation Content

6.3.1.D.1 <ClinicalDocument xmlns='urn:hl7-org:v3'>

1160 Clinical Documents or Messages conforming to this template make use of the Reconciliation Profile (PCC TF-1: X) to report data that has been reconciled with one or more information sources

1. A `ClinicalDocument` or `QUPC_IN043100UV` SHALL contain `templateId/@root` containing the value **1.3.6.1.4.1.19376.1.5.3.1.1.24.1** to assert conformance to this template.
2. The `ClinicalDocument` SHALL also conform to the Medical Documents (PCC TF-2:6.3.1.1) template (`templateId: 1.3.6.1.4.1.19376.1.5.3.1.1.1`).

```
1170 <ClinicalDocument xmlns='urn:hl7-org:v3' > <templateId root="1.3.6.1.4.1.19376.1.5.3.1.1.24.1"/>
  < templateId root="1.3.6.1.4.1.19376.1.5.3.1.1.1"/>
  ...
</ClinicalDocument>
-- OR --
1175 <QUPC_IN043100UV xmlns='urn:hl7-org:v3'>
  <templateId root="1.3.6.1.4.1.19376.1.5.3.1.1.24.1"/>
  < templateId root="1.3.6.1.4.1.19376.1.5.3.1.1.1"/>
  ...
</QUPC_IN043100UV>
```

3. This profile applies to clinical documents created using the IHE PCC Technical Framework. The content of a `ClinicalDocument` or `QUPC_IN043100UV` element conforming to this profile will assert conformance to the profile. It must include a

- 1180 reconciliation act for each section containing common observations, diagnostic results,
problems, allergies, medications, immunizations, and professional services; or in sections
referring to care providers and caregivers. Note, this means that at a minimum, at least
1185 one section containing any of these data elements must be reconciled according to the
requirements of this profile. Narrative content in document sections containing
reconciliation acts SHALL contain a narrative indication of who reconciled the reported
information in the section and when.
- a. The narrative SHALL appear in the `text` element of the `section` in which the
reconciled data appears.
 - b. This narrative SHALL be referenced by the reconciliation act as described in
1190 section 6.3.4.E.1 below.
4. Reconciliation acts for care providers or caregivers SHALL appear in the `text` element of
the `Care Plan section`

For example:

Information in this section reconciled by Doctor Smith on September 15, 2013.

1195

```
<section>
  ...
  <text>
    ...
    <content ID='recon-1'>
      Information in this section reconciled by Doctor Smith on
      September 15, 2013.</content>
    ...
  </text>
  ...
</section>
```

1200

1205

Figure 6.3.1.D.1-1: Reconciled Narrative Example

For example:

Care providers and caregivers reconciled by Doctor Smith on September 15, 2013.

1210

1215

```
<section>
  ...
  <text>
    ...
    <content ID='recon-1'>
      Care providers and caregivers reconciled by Doctor Smith on
      September 15, 2013.</content>
    ...
  </text>
  ...
</section>
```

1220

Figure 6.3.1.D.1-2: Reconciled Narrative Example for Care Provider and Caregiver

6.3.4 CDA Entry Content Modules

1225 The `ClinicalDocument` or `QUPC_IN043100UV` element SHALL contain at least one [1..*] Reconciliation Act (6.3.4.D) template (templateId: 1.3.6.1.4.1.19376.1.5.3.1.1.24.3.1) to indicate where common observations, diagnostic results, problems, allergies, medications, immunizations, and professional services entries have been reconciled.

6.3.4.E Reconciliation Acts

1230

Add to section 6.3.4.E Entry Content Modules

6.3.4.E.1 Reconciliation Act Entry Content Module

1235 The reconciliation act template is the template used to represent the process of reconciling clinical data. A reconciliation act must identify the performers of the reconciliation process, and the clinical data and sources that were used in that process. A reconciliation act appears in the container (e.g., a section in a clinical document) whose content has been reconciled. Skeletal xml is in this example and a complete xml example is in Volume 3, Appendix A.

```
1240 <act classCode="ACT" moodCode="EVN">
  <templateId root="1.3.6.1.4.1.19376.1.5.3.1.1.24.3.1"/>
  <id root="..." extension="..." />
  <code code="MEDREC|ALGREC|DIAGREC|CLINCONREC|IMMREC|GOALREC|PROVREC"
    displayName="(Medications|Alleries|Diagnoses|Common Observation|Immunizations|Goals|Care
1245 Providers) Reconciliation"
    codeSystem="1.3.5.1.4.1.19376.1.5.3.2" codeSystemName="IHEActionCode" />
  <text><reference value='...' /></text>
  <statusCode code="completed"/>
  <effectiveTime value=""/>
  <performer typeCode="PRF">
    ...
1250 </performer>
  <reference typeCode="XCRPT">
    ...
1255 </reference>
</act>
```

6.3.4.E.1.1 <act classCode="ACT" moodCode="EVN">

An `<act>` element is used to represent the reconciliation act. This is an act that has already occurred.

- 1260
1. The reconciliation template SHALL only be used in `act` elements.
 2. The `@classCode` attribute SHALL be **ACT**.
 3. The `@moodCode` attribute SHALL be **EVN**.

6.3.4.E.1.2 <templateId root="1.3.6.1.4.1.19376.1.5.3.1.1.24.3.1"/>

- 1265 1. The `act` SHALL contain `templateId/@root` containing the value `1.3.6.1.4.1.19376.1.5.3.1.1.24.3.1` to assert conformance to this template.

6.3.4.E.1.3 <id root="..." extension="..." />

1270 Each reconciliation act will be uniquely identified. Additional constraints on the cardinality of the `<id>` element ensure that two reconciliation acts will always use the same `id` if they are representing the same act.

1. The `act` SHALL contain only one `[1..1]` `id` element.
2. The `id` element SHALL not contain an `@nullFlavor` attribute.

6.3.4.E.1.4 <code

1275 `code="MEDREC|ALGREC|DIAGREC|CLINCONREC|IMMREC|GOALREC|PROVREC"`
`displayName="..."`
`codeSystem="1.3.5.1.4.1.19376.1.5.3.2" codeSystemName="IHEActCode"/>`

A reconciliation act is coded to indicate the type of reconciliation performed.

- 1280 1. The `act` SHALL contain only one `[1..1]` `code` element.
2. The `code/@code` attribute SHALL be valued (no nulls allowed).
 3. The `code/@codeSystem` attribute SHALL be `1.3.5.1.4.1.19376.1.5.3.2`.
 4. The `code/@codeSystemName` attribute SHOULD be `IHEActCode`.

6.3.4.E.1.5 <text><reference value='...'/></text>

1285 The entry will link to the narrative text in the section indicating that the information was reconciled.

1. The reconciliation act SHALL contain a link to the narrative text indicating that the information in this section was reconciled.

6.3.4.E.1.6 <statusCode code="completed"/>

1290 The reconciliation act is deemed to be completed at the time it is documented in the clinical document.

1. The `act` SHALL contain only one `[1..1]` `statusCode` element.
2. The `@code` attribute of the `statusCode` element SHALL have a value of `completed`.

6.3.4.E.1.7 <effectiveTime value="..."/>

1295 The clinically effective time is the time at when the information was reconciled by the provider. This information will be reported and should be precise to at least the day.

1. The `act` SHALL contain only one [1..1] `effectiveTime` element.
2. The `effectiveTime` element SHALL NOT use the `@nullFlavor` element.
3. The `effectiveTime/@value` attribute SHALL be precise to at least the day.

6.3.4.E.1.8 <performer typeCode="PRF">

1300 The reconciliation act records the person who performed the reconciliation activity. This represents the performers of the reconciliation process.

1. The `act` SHALL contain at least [1..*] `performer` element conforming to the reconciliation performer (6.3.4.E.2) template (templateId: 1.3.6.1.4.1.19376.1.5.3.1.1.24.3.5.1).

1305 6.3.4.E.1.9 <reference typeCode="XCRPT">

The reconciliation act records references to all clinical data sources from which data was reconciled. This allows applications to use the information to determine what data may not have yet been reconciled for the patient, and to enable subsequent verification that the reconciliation was performed appropriately where necessary. Only pointers to the data used for reconciliation are required, not the complete set of data used during the reconciliation.

1310

1. The `act` SHALL contain at least one [1..*] `reference` element conforming to the Reconciliation Clinical Data Source (6.3.4.E.3) template (templateId: 1.3.6.1.4.1.19376.1.5.3.1.1.24.3.6).
2. The `reference/@typeCode` attribute SHALL contain the value `XCRPT`.

1315 6.3.4.E.2 Reconciliation Clinical Data Sources

Skeletal xml is in this example and a complete xml example is in Volume 3, appendix A

1320

```
<reference typeCode="XCRPT">
  <templateId root='1.3.6.1.4.1.19376.1.5.3.1.1.24.3.6' />
  <externalAct classCode="ACT" moodCode="EVN">
    <id root="" extension="" />
    <code code="" displayName="" codeSystem="" codeSystemName="" />
  </externalAct>
</reference>
```

1325

Every clinical document, query, or individual data elements from other sources that are examined as a source of information during the reconciliation process must be traceable. This data is made available so that systems examining the reconciled results can determine what data elements have already been reconciled.

Support to identify individual data elements is provided to enable data elements that are imported into a system supporting the Discrete Data Import Option (PCC TF-2:3.1.4 Discrete Data

1330 Import). When a Reconciliation Agent Actor performs reconciliation against a data element that was imported via Discrete Data Import, it shall not record the document as the data source against which reconciliation was performed. In this case, it is only the imported data element, not the entire document which was reconciled.

1335 Recording of data elements and/or their data sources (documents or queries) in the reconciliation act allows subsequent reconciliations to avoid “re-reconciling” data elements which were previously reconciled. The use of this Entry in the RECON Profile does not require the Reconciliation Agent Actor to use this information during the reconciliation process, but does require it to make it be made available for downstream use.

6.3.4.E.2.1 <reference typeCode="XCRPT">

1340 The information that was used during the reconciliation process is identified using the Excerpt relationship.

1. The reference element SHALL contain only one [1..1] @typeCode attribute whose value is XCRPT.

6.3.4.E.2.2 <templateId root='1.3.6.1.4.1.19376.1.5.3.1.1.24.3.6'/>

1345 The reference element will assert conformance to the Reconciliation Clinical Data Sources template.

1. The reference SHALL contain a templateId/@root attribute containing the value 1.3.6.1.4.1.19376.1.5.3.1.1.24.3.3 to assert conformance to this template.

6.3.4.E.2.3 <externalAct classCode="ACT" moodCode="EVN">

The data being reconciled is identified in an externalAct element.

For each data element being reconciled:

1. Their SHALL be at least one [1..*] reference element where:
 - a. There is exactly one [1..1] externalAct element where:
 - 1355 i. The externalAct SHALL contain exactly one [1..1] @classCode attribute whose value is ACT.
 - ii. The externalAct SHALL contain exactly one [1..1] @moodCode attribute whose value is EVN.
 - b. The externalAct SHALL contain at exactly one [1..1] id element
 - 1360 c. The externalAct/id SHALL NOT contain an @nullFlavor attribute.
 - d. The externalAct SHALL contain exactly one [1..1] code element.
 - e. The externalAct/code SHALL NOT contain an @nullFlavor attribute.

- f. If the data element came from a document,
- 1365 i. When the external document is a CDA document, `externalAct/id = /ClinicalDocument/id`. *The value of `externalAct/id` provides the identifier of the external document.*
 - ii. The value of `externalAct/code/@code` SHALL be DOCCLIN.
 - 1370 ~~iii.~~ The value of `externalAct/code/@codeSystem` shall be 2.16.840.1.113883.5.6
 - iv. *The value of `externalAct/code` describes the content of the document.*
- g. If the data element was returned as a result of a query,
- 1375 i. The value of `externalAct/id` shall be the identifier of the query that produced the result.
 - 1. When the query is a CDA query, `externalAct/id = /QUPC_IN043100UV/id` (see PCC TF-2: 3.1.4.3 Transmission Wrapper found in the QED supplement).
 - ii. The value of `externalAct/code/@code` SHALL be CACT.
 - 1380 iii. The value of `externalAct/code/@codeSystem` shall be 2.16.840.1.113883.5.6
- h. If the data element is stored internally in the EHR performing reconciliation,
- 1385 i. The value of `externalAct/id` SHALL be the identifier of data element.
 - ii. The value of `externalAct/code` SHALL be the code associated with the data element.
 - iii. The value of `externalAct/code/@code` SHALL be ACT.
 - iv. The value of `externalAct/code/@codeSystem` shall be 1.3.6.1.4.1.19376.1.5.3.1.4.4.1

6.3.4.E.3 Performer

- 1390 The performer template is used to identify the healthcare provider who was the primary performer of an act. The provider name, address, contact information and identifier are provided to ensure that the performer of the act can be contacted in case there are any questions about the act.

```
1395 <performer typeCode="PRF">
      <templateId root="1.3.6.1.4.1.19376.1.5.3.1.1.24.3.5"/>
      <assignedEntity classCode="ASSIGNED">
        <id root="" extension=""/>
        <addr></addr>
        <telecom></telecom>
1400 <assignedPerson>
          <name></name>
        </assignedPerson>
        <representedOrganization>
          <name></name>
1405 <addr></addr>
          <telecom></telecom>
        </representedOrganization>
      </assignedEntity>
    </performer>
```

6.3.4.E.3.1 <performer typeCode="PRF">

1410 The `performer` element identifies a healthcare provider that performed any activity. A performer is distinct from an author, as the performer is the one who does the work, whereas the author is the person who documented or created it.

1. This template SHALL be used only in `performer` elements inside any CDA (V3) act.
2. The `@typeCode` attribute of the `performer` element SHALL use the value **PRF**.

1415 **6.3.4.E.3.2 <templateId root="1.3.6.1.4.1.19376.1.5.3.1.1.24.3.5"/>**

The `performer` element asserts conformance to the Performer template.

1. The `performer` SHALL contain a `templateId/@root` attribute containing the value **1.3.6.1.4.1.19376.1.5.3.1.1.24.3.5** to assert conformance to this template.

1420 **6.3.4.E.3.3 <assignedEntity classCode="ASSIGNED">**

An `assignedEntity` element appears to identify the performer.

1. The `performer` SHALL contain only one **[1..1]** `assignedEntity` element.
2. The `assignedEntity/@classCode` value in the `performer` element SHALL be **ASSIGNED**.

1425 **6.3.4.E.3.4 <id root="" extension=""/>**

The identifier of the healthcare provider performing the act should be present.

1. The `performer` element SHALL contain at least one **[1..*]** `id` element.
2. The `id` element MAY use the `@nullFlavor` attribute when the information is unknown. (clarify that there SHOULD be an `id/@root`).

1430 **6.3.4.E.3.5 <addr></addr>**

The mailing address of the healthcare provider performing the act should be present to enable the provider to be contacted.

1. The `performer` element SHALL contain at least one `[1..*]` `addr` element.
2. The `addr` element MAY use `@nullFlavor` if the information is unknown.

1435 **6.3.4.E.3.6 <telecom></telecom>**

The provider telephone number should be provided to enable the performer of the reconciliation to be contacted.

1. The `performer` element SHALL contain at least one `[1..1]` `telecom` element.
2. The `telecom` element MAY use `@nullFlavor` to indicate that information is unknown.

1440

6.3.4.E.3.7 <assignedPerson>

1. The `performer` element SHALL contain only one `[1..1]` `assignedPerson` elements further identifying the person.

6.3.4.E.3.8 <name></name>

1445 The name of the provider performing the act should be provided.

1. The `performer` SHALL contain at least one `[1..*]` `assignedPerson/name` element.
2. The `name` element MAY use `@nullFlavor` to indicate that the information is unknown.

6.3.4.E.3.9 <representedOrganization>

The name and identifier of the organization represented by the performer should be provided.

- 1450
1. The `performer` SHALL contain only one `[1..1]` `representedOrganization` element.

6.3.4.E.3.10 <id root='...' extension='...'/>

The identifier of the organization represented must appear.

- 1455
1. The `representedOrganization` element SHALL contain at least one `[1..*]` `representedOrganization/id` element.
 2. The `id` element MAY use `@nullFlavor` to indicate that the identifier is unknown.

6.3.4.E.3.11 <name></name>

The name of the organization represented must appear.

- 1460
1. The `representedOrganization` element SHALL contain at least one [1..*] `representedOrganization/name` element.
 2. The `name` element SHALL NOT use `@nullFlavor` to indicate that information is unknown.

6.3.4.E.3.12 <addr></addr>

1465 The mailing address of the represented organization should be present to allow the organization to be contacted when the performer is not available.

1. The `performer` element shall contain at least one [1..*] `representedOrganization/addr` element.
2. The `addr` element MAY use `@nullFlavor` attribute to indicate that information is unknown.

1470 6.3.4.E.3.13 <telecom></telecom>

The telephone number of the represented organization should be present to allow the organization to be contacted when the performer is not available.

1. The `performer` element SHALL contain at least one [1..*] `telecom` element.
 2. The `telecom` element MAY use `@nullFlavor` to indicate that the information is unknown.
- 1475

6.3.4.E.4 Reconciliation Performer

1480 The reconciliation performer template is used to identify the healthcare provider who was the primary performer of the reconciliation act. The provider name, address, contact information and identifier are provided to ensure that the performer of reconciliation can be contacted in case there are any questions about the act. Unlike the performer template in 6.3.4.E.3 which allows certain details of the performer to be omitted when unknown, the Reconciliation Performer requires those details to be provided.

Skeletal xml is in this example and a complete xml example is in Volume 3, appendix A.

```
1485 <performer typeCode="PRF">
      <templateId root="1.3.6.1.4.1.19376.1.5.3.1.1.24.3.5"/>
      <templateId root="1.3.6.1.4.1.19376.1.5.3.1.1.24.3.5.1"/>
      <assignedEntity classCode="ASSIGNED">
1490         <id root="" extension=""/>
         <addr></addr>
         <telecom></telecom>
         <assignedPerson>
1495             <name></name>
         </assignedPerson>
         <representedOrganization>
             <name></name>
             <addr></addr>
             <telecom></telecom>
         </representedOrganization>
1500     </assignedEntity>
</performer>
```

6.3.4.E.4.1 <performer typeCode="PRF">

The `performer` element identifies a healthcare provider that performed the reconciliation. The performer is distinct from an author, as the performer is the one who does the work, whereas the author is the person who documented or created it.

- 1505 1. At least one [1..*] `performer` element SHALL be present.

6.3.4.E.4.2 <templateId root="1.3.6.1.4.1.19376.1.5.3.1.1.24.3.5.1"/>

The `performer` element asserts conformance to the Reconciliation Performer template and also conforms to the performer template (templateId: 1.3.6.1.4.1.19376.1.5.3.1.1.24.3.5) defined in section 6.3.4.H above.

- 1510 1. The `performer` SHALL contain a `templateId/@root` attribute containing the value **1.3.6.1.4.1.19376.1.5.3.1.1.24.3.5.1** to assert conformance to this template.
2. The `performer` SHALL contain a `templateId/@root` attribute containing the value **1.3.6.1.4.1.19376.1.5.3.1.1.24.3.5** to assert conformance to the performer template.
- 1515

6.3.4.E.4.3 <id root="" extension=""/>

The identifier of the healthcare provider performing the act shall be present.

1. At least one [1..*] `id` element SHALL be present.
2. The `id` element SHALL NOT use the `@nullFlavor` attribute.

1520 6.3.4.E.4.4 <addr></addr>

The mailing address of the healthcare provider performing the act shall be present to enable the provider to be contacted.

1. At least one [1..*] `addr` element SHALL be present.

2. The `addr` element SHALL NOT use `@nullFlavor`.

1525 **6.3.4.E.4.5 <telecom></telecom>**

The provider telephone number shall be provided to enable the performer of the reconciliation to be contacted.

1. At least one `[1..*]` `telecom` element SHALL be present.
2. The `telecom` element SHALL NOT use `@nullFlavor`.

1530 **6.3.4.E.4.6 <name></name>**

The name of the provider performing the act will be provided.

1. At least one `[1..*]` `name` element SHALL be present.
2. The `name` element SHALL NOT use `@nullFlavor`.

Appendices

1535 Appendix A – Example XML structure of a Reconciled Medication List

```
1540 <?xml version="1.0" encoding="UTF-8"?>
1541 <!-- this example shows a reconciled medication list with 3 medications -->
1542 <component>
1543   <section>
1544     <templateId root="2.16.840.1.113883.10.20.22.2.1.1"/>
1545     <code code="10160-0" codeSystem="2.16.840.1.113883.6.1"
1546     codeSystemName="LOINC" displayName="History of medication use"/>
1547     <title>Medications</title>
1548     <text>
1549       <table>
1550         <thead>
1551           <tr>
1552             <th>Name</th>
1553             <th>Dates</th>
1554             <th>Details</th>
1555           </tr>
1556         </thead>
1557         <tbody>
1558           <tr ID="ID0ECIACA">
1559             <td>Cephalexin 500 MG Oral Tablet; 1 TABLET FOUR TIMES DAILY FOR 10 DAYS</td>
1560             <td> Started 20-Sep-2012</td>
1561             <td>Generic substitution allowed</td>
1562           </tr>
1563           <tr ID="ID0EBIACA">
1564             <td>Fluoxetine 40 MG Oral Capsule; 1 TABLET once daily As Directed</td>
1565             <td>Started 20-Nov-2011</td>
1566             <td/>
1567           </tr>
1568           <tr ID="ID0EAIACA">
1569             <td>Levothyroxine Sodium 0.05 MG Oral Tablet; 1 TABLET once daily As Directed</td>
1570             <td>Started 15-Apr-2010</td>
1571             <td/>
1572           </tr>
1573         </tbody>
1574       </table>
1575       <paragraph ID="KT0ECIACA">The medication list was reconciled on 4/28/2014 by Dr
1576       Who</paragraph>
1577     </text>
```

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```

1580     <entry>
1585       <substanceAdministration classCode="SBADM" moodCode="INT">
1590         <templateId root="2.16.840.1.113883.10.20.22.4.16"/>
1595         <id extension="659122500005" root="1.3.6.1.4.1.22812.3.99930.3.4.9"/>
1600         <id extension="659122500007" root="1.3.6.1.4.1.22812.3.99930.3.4.9"/>
1605         <text>
1610           <reference value="#ID0ECIACA"/>
1615         </text>
1620         <statusCode code="completed"/>
1625         <effectiveTime xsi:type="IVL_TS">
1630           <low value="20120920"/>
1635           <high nullFlavor="UNK"/>
1640         </effectiveTime>
1645         <effectiveTime xsi:type="PIVL_TS" institutionSpecified="true" operator="A">
1650           <period value="6" unit="h"/>
1655         </effectiveTime>
1660         <doseQuantity value="1"/>
1665         <administrationUnitCode codeSystemName="NCI Thesaurus"
1670         codeSystem="2.16.840.1.113883.3.26.1.1" code="C42998" displayName="TABLET"/>
1675         <consumable typeCode="CSM">
1680           <manufacturedProduct classCode="MANU">
1685             <templateId root="2.16.840.1.113883.10.20.22.4.23"/>
1690             <manufacturedMaterial>
1695               <code code="309114" codeSystem="2.16.840.1.113883.6.88"
1700               codeSystemName="RxNorm" displayName="Cephalexin 500 MG Oral Tablet">
1705                 <originalText>
1710                   <reference value="#ID0EFCIACA"/>
1715                 </originalText>
1720               </code>
1725               <name>Cephalexin</name>
1730             </manufacturedMaterial>
1735           </manufacturedProduct>
1740         </consumable>
1745         <entryRelationship typeCode="SUBJ" inversionInd="true">
1750           <act classCode="ACT" moodCode="INT">
1755             <templateId root="2.16.840.1.113883.10.20.22.4.20"/>
1760             <code code="423564006" displayName="Provider instructions for treatment"
1765             codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT"/>
1770             <text>
1775               <reference value="#ID0EDCIACA"/>
1780             </text>
1785             <statusCode code="completed"/>
1790           </act>
1795         </entryRelationship>
1800         <entryRelationship typeCode="REFR">
1805           <observation classCode="OBS" moodCode="EVN">
1810             <templateId root="2.16.840.1.113883.10.20.1.57"/>
1815             <templateId root="2.16.840.1.113883.10.20.1.47"/>
1820             <code code="33999-4" displayName="Status" codeSystem="2.16.840.1.113883.6.1"
1825             codeSystemName="LOINC"/>
1830             <statusCode code="completed"/>
1835             <value xsi:type="CE" codeSystem="2.16.840.1.113883.6.96"
1840             codeSystemName="SNOMED CT" code="55561003" displayName="Active"/>
1845           </observation>
1850         </entryRelationship>
1855         <entryRelationship typeCode="REFR">
1860           <supply classCode="SPLY" moodCode="INT">
1865             <templateId root="2.16.840.1.113883.10.20.22.4.17"/>
1870             <id nullFlavor="UNK"/>
1875             <statusCode code="completed"/>
1880           <product>
1885             <manufacturedProduct classCode="MANU">
1890               <templateId root="2.16.840.1.113883.10.20.22.4.23"/>
1895             <manufacturedMaterial>

```


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```

        <code code="309114" codeSystem="2.16.840.1.113883.6.88"
codeSystemName="RxNorm" displayName="Cephalexin 500 MG Oral Tablet">
        <originalText>
        <reference value="#ID0EFCIACA"/>
        </originalText>
        </code>
        <name>Cephalexin</name>
        </manufacturedMaterial>
        </manufacturedProduct>
    </product>
    <entryRelationship typeCode="SUBJ" inversionInd="true">
        <act classCode="ACT" moodCode="INT">
        <templateId root="2.16.840.1.113883.10.20.22.4.20"/>
        <code code="423564006" displayName="Provider instructions for
treatment" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT"/>
        <text>
        <reference value="#ID0ECCIACA"/>
        </text>
        <statusCode code="completed"/>
        </act>
    </entryRelationship>
</supply>
</entryRelationship>
<entryRelationship typeCode="SUBJ">
    <encounter classCode="ENC" moodCode="EVN">
        <id extension="5283815" root="1.3.6.1.4.1.22812.3.99930.3.3.4"/>
    </encounter>
</entryRelationship>
</substanceAdministration>
</entry>
<entry>
    <substanceAdministration classCode="SBADM" moodCode="INT">
    <templateId root="2.16.840.1.113883.10.20.22.4.16"/>
    <id extension="637032200035" root="1.3.6.1.4.1.22812.3.99930.3.4.9"/>
    <id extension="665471900013" root="1.3.6.1.4.1.22812.3.99930.3.4.9"/>
    <text>
        <reference value="#ID0EBIACA"/>
    </text>
    <statusCode code="completed"/>
    <effectiveTime xsi:type="IVL_TS">
        <low value="20111120154300"/>
        <high nullFlavor="UNK"/>
    </effectiveTime>
    <effectiveTime xsi:type="PIVL_TS" institutionSpecified="true" operator="A">
        <period value="24" unit="h"/>
    </effectiveTime>
    <routeCode codeSystem="2.16.840.1.113883.3.26.1.1" codeSystemName="NCI Thesaurus"
code="C38288" displayName="ORAL"/>
    <doseQuantity value="1"/>
    <administrationUnitCode codeSystemName="NCI Thesaurus"
codeSystem="2.16.840.1.113883.3.26.1.1" code="C25158" displayName="CAPSULE"/>
    <consumable typeCode="CSM">
        <manufacturedProduct classCode="MANU">
            <templateId root="2.16.840.1.113883.10.20.22.4.23"/>
            <manufacturedMaterial>
                <code code="313989" codeSystem="2.16.840.1.113883.6.88"
codeSystemName="RxNorm" displayName="Fluoxetine">
                <originalText>
                <reference value="#ID0EBBIACA"/>
                </originalText>
                </code>
                <name>Fluoxetine</name>
            </manufacturedMaterial>
        </manufacturedProduct>
    </consumable>

```

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```

1710     <author>
1715         <time value="20111110000000-0500"/>
1720         <assignedAuthor>
1725             <id nullFlavor="UNK"/>
1730             <addr nullFlavor="UNK">
1735                 <streetAddressLine nullFlavor="UNK"/>
1740                 <city nullFlavor="UNK"/>
1745                 <state nullFlavor="UNK"/>
1750                 <postalCode nullFlavor="UNK"/>
1755                 <country nullFlavor="UNK"/>
1760             </addr>
1765             <telecom nullFlavor="UNK"/>
1770             <assignedPerson>
1775                 <name nullFlavor="UNK"/>
1780             </assignedPerson>
1785         </assignedAuthor>
1790     </author>
1795     <entryRelationship typeCode="REFR">
1800         <observation classCode="OBS" moodCode="EVN">
1805             <templateId root="2.16.840.1.113883.10.20.1.57"/>
1810             <templateId root="2.16.840.1.113883.10.20.1.47"/>
1815             <code code="33999-4" displayName="Status" codeSystem="2.16.840.1.113883.6.1"
1820 codeSystemName="LOINC"/>
1825             <statusCode code="completed"/>
1830             <value xsi:type="CE" codeSystem="2.16.840.1.113883.6.96"
1835 codeSystemName="SNOMED CT" code="55561003" displayName="Active"/>
1840         </observation>
1845     </entryRelationship>
1850 </substanceAdministration>
1855 </entry>
1860 <entry>
1865     <substanceAdministration classCode="SBADM" moodCode="INT">
1870         <templateId root="2.16.840.1.113883.10.20.22.4.16"/>
1875         <id extension="637032200039" root="1.3.6.14.1.22812.3.99930.3.4.9"/>
1880         <id extension="665471900019" root="1.3.6.1.4.1.22812.3.99930.3.4.9"/>
1885         <text>
1890             <reference value="#ID0EAIACA"/>
1895         </text>
1900         <statusCode code="completed"/>
1905         <effectiveTime xsi:type="IVL_TS">
1910             <low value="20100415154300"/>
1915             <high nullFlavor="UNK"/>
1920         </effectiveTime>
1925         <effectiveTime xsi:type="PIVL_TS" institutionSpecified="true" operator="A">
1930             <period value="24" unit="h"/>
1935         </effectiveTime>
1940         <routeCode codeSystem="2.16.840.1.113883.3.26.1.1" codeSystemName="NCI Thesaurus"
1945 code="C38288" displayName="ORAL"/>
1950         <doseQuantity value="1"/>
1955         <administrationUnitCode codeSystemName="NCI Thesaurus"
1960 codeSystem="2.16.840.1.113883.3.26.1.1" code="C42998" displayName="TABLET"/>
1965         <consumable typeCode="CSM">
1970             <manufacturedProduct classCode="MANU">
1975                 <templateId root="2.16.840.1.113883.10.20.22.4.23"/>
1980                 <manufacturedMaterial>
1985                     <code code="966247" codeSystem="2.16.840.1.113883.6.88"
1990 codeSystemName="RxNorm" displayName="Levothyroxine Sodium">
1995                         <originalText>
2000                             <reference value="#ID0EBAIACA"/>
2005                         </originalText>
2010                     </code>
2015                     <name>Synthroid</name>
2020                 </manufacturedMaterial>
2025             </manufacturedProduct>
2030         </consumable>

```

IHE Patient Care Coordination Technical Framework Supplement – Reconciliation of Clinical Content and Care Providers (RECON)

```
1775     <author>
1780       <time value="20100415010000-0400"/>
1785       <assignedAuthor>
1790         <id nullFlavor="UNK"/>
1795         <addr nullFlavor="UNK">
1800           <streetAddressLine nullFlavor="UNK"/>
1805           <city nullFlavor="UNK"/>
1810           <state nullFlavor="UNK"/>
1815           <postalCode nullFlavor="UNK"/>
1820           <country nullFlavor="UNK"/>
1825         </addr>
1830         <telecom nullFlavor="UNK"/>
1835         <assignedPerson>
1840           <name nullFlavor="UNK"/>
1845         </assignedPerson>
1850       </assignedAuthor>
1855     </author>
1860     <entryRelationship typeCode="REFR">
1865       <observation classCode="OBS" moodCode="EVN">
1870         <templateId root="2.16.840.1.113883.10.20.1.57"/>
1875         <templateId root="2.16.840.1.113883.10.20.1.47"/>
1880         <code code="33999-4" displayName="Status" codeSystem="2.16.840.1.113883.6.1"
1885         codeSystemName="LOINC"/>
1890         <statusCode code="completed"/>
1895         <value xsi:type="CE" codeSystem="2.16.840.1.113883.6.96"
1900         codeSystemName="SNOMED CT" code="55561003" displayName="Active"/>
1905       </observation>
1910     </entryRelationship>
1915   </substanceAdministration>
1920 </entry>
1925 <!-- a reconciliation act for the medication reconciled list of meds -->
1930 <entry>
1935   <act classCode="ACT" moodCode="EVN">
1940     <templateId root="1.3.6.1.4.1.19376.1.5.3.1.1.24.3.1"/>
1945     <templateId root="1.3.6.1.4.1.19376.1.5.3.1.1.24.3.4"/>
1950     <!-- the act needs an id -->
1955     <id root="1" extension="2"/>
1960     <!-- the code tells us that this reconciliation act is a medications
1965     reconciliation -->
1970     <text>
1975       <reference value="#KT0ECIACA"/>
1980     </text>
1985     <code code="MEDREC" displayName="Medications Reconciliation"
1990     codeSystem="1.3.5.1.4.1.19376.1.5.3.2" codeSystemName="IHEActCode"/>
1995     <statusCode code="completed"/>
2000     <!-- the time when the reconciliation took place -->
2005     <effectiveTime value="20140428151500-0600"/>
2010     <!-- the performer of the reconciliation -->
2015     <performer typeCode="PRF">
2020       <templateId root="1.3.6.1.4.1.19376.1.5.3.1.1.24.3.5"/>
2025       <assignedEntity classCode="ASSIGNED">
2030         <id root="1" extension="3"/>
2035         <addr nullFlavor="UNK"/>
2040         <telecom value="tel:+1(816)276-6909" use="HP"/>
2045         <assignedPerson>
2050           <name>Dr Who</name>
2055         </assignedPerson>
2060         <representedOrganization>
2065           <name>Where From</name>
2070           <telecom value="tel:+1(816)276-6909" use="HP"/>
2075           <addr nullFlavor="UNK"/>
2080         </representedOrganization>
2085       </assignedEntity>
2090     </performer>
2095   </act>
2100 <!-- reconciliation data source(s) -->
```

1840

```
<!-- this example shows using a CCDA document as the source -->
<reference typeCode="XCRPT">
  <templateId root="1.3.6.1.4.1.19376.1.5.3.1.1.24.3.6"/>
  <externalAct classCode="ACT" moodCode="EVN">
    <id extension="someTTCCDA" root="1.1.1.1.1.1.1.1"/>
    <code codeSystem="2.16.840.1.113883.5.6" code="DOCCLIN"/>
  </externalAct>
</reference>
```

1845

```
<!-- this example shows using a QED query as the source-->
<reference typeCode="XCRPT">
  <templateId root="1.3.6.1.4.1.19376.1.5.3.1.1.24.3.6"/>
  <externalAct classCode="ACT" moodCode="EVN">
    <id extension="QUPC_IN043100UV.1" root="1.1.1.1.1.1.1.1"/>
    <code codeSystem="2.16.840.1.113883.5.6" code="CACT"/>
  </externalAct>
</reference>
```

1850

```
<!-- this example shows using an internal content as the source -->
<reference typeCode="XCRPT">
  <templateId root="1.3.6.1.4.1.19376.1.5.3.1.1.24.3.6"/>
  <externalAct classCode="ACT" moodCode="EVN">
    <id extension="555" root="1.3.3.3.3.3.3.3.3.3"/>
    <code codeSystem="2.16.840.1.113883.5.6" code="ACT"/>
  </externalAct>
</reference>
```

1855

1860

```
</act>
</entry>
</section>
</component>
```

1865 Volume 3 Namespace Additions

Add the following terms to the IHE Namespace:

None

Volume 4 – National Extensions

Add appropriate country section

1870 **4 National Extensions**

Not applicable