Duteau Design Inc.

# C-CDA to FHIR Mapping Phase 2 Report

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# 1   Background

After an initial Proof of Concept project to create a set of mappings between a set of C-CDA templates and their corresponding FHIR resources, HL7 hired Duteau Design Inc to complete the mappings of all section and entry templates in the Discharge Summary and Continuity of Care Document templates.

This document details the mapping work that was done as well as any gaps that were encountered during the project.

# 2   Approach

Mappings were documented in a spreadsheet that listed the C-CDA template attributes in one set of columns and the FHIR resource and attributes in another column.  This spreadsheet can be found at the project's GitHub repository[1].

Only the base FHIR resources were considered for mappings.  Other than an extension for handling C-CDA template IDs and another extension for handling negation of allergies, no mappings were made from C-CDA templates to attributes that did not exist in FHIR or from FHIR attributes that did not have corresponding attributes in a C-CDA template.

## 2.1   Consideration of existing FHIR Profiles

There are two existing FHIR Implementation Guides that define FHIR Profiles that were considered for use in the mappings of this project.  The CCDA-on-FHIR Implementation Guide[2] has defined a number of profiles against the FHIR Composition resource.  Each Consolidated CDA Document template has a corresponding FHIR Composition profile.  As well, there is a general FHIR Composition profile that maps the US Realm Header template.  These profiles make extensive use of the US Core Implementation Guide[3] profiles.

Although the CCDA-on-FHIR profiles were used as input into the produced mappings, it was decided not to map directly to either those profiles or the US Core profiles.  The intent of the project was to create a set of mappings that could be vetted with the appropriate HL7 work groups and to show gaps in existing FHIR resources.  Thus all of the mappings are to the base FHIR resources alone.

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[1] https://github.com/HL7/ccda-to-fhir/blob/master/CDA-to-FHIR_mappings.xlsx
[2] http://build.fhir.org/ig/HL7/ccda-on-fhir/
[3] http://hl7.org/fhir/us/core//index.html

## 3   Mapping Documentation

The Mapping spreadsheet consists of a number of tabs with each tab conveying mappings between C-CDA entry templates and a corresponding FHIR resource.  Each tab contains a related set of entry templates to make it easy to navigate the mappings.  As well, an initial 'Index' tab provides hyperlinks to all of the mapped entry templates.  There are also two special tabs:

- The 'Clinical Document' tab maps the CDA model and the US Realm Header to the FHIR Bundle and Composition resources.
- The 'Assorted' tab maps common CDA data elements to an appropriate FHIR resource, i.e. AssignedEntity to Practitioner, Indication to Condition, etc.

A C-CDA data element that did not need to be mapped due to not conveying any data, i.e. similar to a FHIR BackboneElement, was left with an empty mapping.

A C-CDA data element could not mapped to an attribute in the corresponding FHIR resource is noted with a highlight colour of yellow as well as a notation of 'gap'.

If a mapping occurs to a FHIR attribute that is a resource reference, the specific type of resource being mapped to is indicated by a '=> Reference(xxx)' after the name of the FHIR attribute.

# 4   Gaps

The project team has noted the following gaps in the mappings.

## 4.1   C-CDA Templates with no appropriate FHIR resource

### 4.1.1   Advance Directives Observation

The Advance Directives Observation template has no appropriate FHIR resource to map to. Although there were a number of candidate resources, none of them carried the proper semantics.

### 4.1.2   Planned Immunization Activity

The scope of the FHIR Immunization resource is for immunization events and not planned immunizations.  A mapping was made to the FHIR Medication Request resource which is mostly complete.  There has tended to be a separation between regular medication resources and immunizations, so this might be the appropriate mapping.

### 4.1.3   Handoff Communication Participants

The Handoff Communication Participants template has no appropriate FHIR resource to map to. Although the FHIR Communication or Communication Request resource would be closest in semantics, neither is entirely correct.

### 4.1.4   Plan of Treatment Section – Instruction entry

Although the Instruction entry template was able to be mapped when it was included in other entry templates, there is no adequate to convey this entry when it is conveyed as an entry in the Plan of Treatment section directly.

## 4.2   Gaps in existing resources

Other than an extension for conveying C-CDA template identifiers, all other C-CDA data elements that did not have a corresponding FHIR resource attribute were left as gaps in the mappings.  It is expected that work groups will consider these as attributes to be added to the appropriate resource or that FHIR extensions will be created to convey these data elements.

## 4.3   FHIR Resource to C-CDA Template mappings

Although the project initially considered creating parallel mappings that showed FHIR resource attributes mapped to C-CDA template data elements, it was determined that there was no additional value in doing so.   If a FHIR resource attribute is not listed in the mapping, that indicates that there is no C-CDA template data element to map it to.  The means by which those extra FHIR attributes will be conveyed in a C-CDA document will need to be determined by the HL7 Structured Documents work group as well as the appropriate HL7 domain work group.

# 5 Next Steps

*NOTE: the following section is copied from the initial project's report as It is still valid and bears repeating.*

Over the length of the project and after consultation with the CDA Management Group as well as stakeholders at two C-CDA Implementation-a-Thons, the project team recommends the following next steps for completing the mappings:
1) Create a complete set of mappings between C-CDA templates and FHIR resources
2) Have the mappings vetted by a larger stakeholder community, including the potential balloting of the mappings
3) Develop C-CDA-specific FHIR Profiles
4) Create FHIR Mapping Language files based on the validated mappings

## 5.1 Complete Set of C-CDA to FHIR mappings

Although the focus of this project was on the FHIR Mapping Language files, there was a realization that the underlying mappings held intense value to the HL7 Structured Documents community.  A complete set of mappings between C-CDA and FHIR should be completed and these mappings should be targeted towards a business or Subject Matter Expert audience - and not expressed via FHIR Mapping Language files.  These mappings could then be converted into XSL Transforms, FHIR Mapping Language files, etc.

## 5.2 Develop C-CDA-specific FHIR Profiles

There has been some work in creating C-CDA FHIR Profiles and this work should continue and also be formalized.  Some of the challenges in supporting extra information could potentially be solved by the use of FHIR profiles and it might also enable more succinct FHIR Mapping Language files.

## 5.3 Formalize the Mappings

The delivered mappings are the best efforts at mapping by the project team.  These mappings and any future mappings need to be vetted by a larger stakeholder community.  It is the project team's suggestion that these mappings should also be balloted so that they are considered HL7 Normative artifacts.

## 5.4 Create FHIR Mapping Language files

Only once the mappings have been vetted and balloted, then the official FHIR Mapping Language files can be created.  Although there is some value in creating the files before the mappings have been vetted - similar to a reference implementation - there needs to be recognition that they will be draft and will change until the mappings have been properly vetted.