

Preface

I've been meaning to write a book on CDA for at least 3 years. The first time I brought the idea up with possible collaborators, there seemed to be not enough time. There was simply too much work going on developing CDA implementation guides to carve out the time it would take. Those of us working on CDA implementation guides had very little time because our nights and weekends were often taken up by CDA based projects.

I started a blog in the middle of 2008 called Healthcare Standards where I write about the same almost daily. You can find it on the web at <http://motorcycleguy.blogspot.com>, or just follow me on twitter at @motorcycle_guy. The idea behind the blog was to have a place to publish information that I was constantly referring people to. There was some hope that I would be able to use material from the blog to help me create a book on CDA. Several parts of this book draw from material originally published on that blog.

The book came up again in a discussion with a standards colleague at the HL7 Working Group meeting in September of 2008 in Vancouver. She strongly encouraged me to write it, but again I demurred. We discussed it again about a year later in Atlanta and she finally convinced me that I could do it. If you happen to run into Kate Hamilton at an HL7 Working group meeting and enjoyed this book, thank her. Without her, this book might never have been written.

Writing began about a month later on November 14th of 2009, and nearly a year later the book is finished. The original working title was "The Little CDA™ Book", and I had hoped to have it finished by the end of summer. As you can see from the present title and text, it is no longer a little book.

Over the last seven years, I have been learning about CDA, and teaching what I have learned to others. In that process, I have learned a great deal about healthcare and electronic medical records. Quite a bit of that knowledge was freely shared with me by others, and the only way to pay back that kindness is to pay it forward to others.

You, my readers, are the recipients of that payment. You too can pay it forward by applying what you learn. My hope is that together we will create a healthcare system that can share meaningful information about patients their healthcare providers and with those patients who receive care.

Who This Book Is For

This book is for informatics students who want to learn about the HL7 CDA standard and software developers who need to implement it in healthcare information technology products. After reading this book you should know enough about CDA to make use of the CDA Implementation Guides described in the final chapter of this book, and to develop implementation guides on your own.

Prerequisites

This book is too short to cover everything you need to know to develop CDA implementations. You need to have at least a basic understanding of the following technologies to appreciate the content of this book.

Object-Oriented Design (OOD) – The CDA Specification and all HL7 Version 3 specifications use object oriented design principals. You will need to understand the ideas behind OOD including classes, associations, association classes and inheritance.

XML – The CDA Specification is built to use Extensible Markup Language (XML). This book does explain some of the more esoteric topics in that standard, but is not a substitute for experience or training in that standard.

Namespaces for XML – CDA requires the use of namespaces to describe the format of a clinical document. You will need to understand how namespaces work in XML to use this book.

XSLT – XSLT is often used to display CDA documents, validate their content, or to transform other XML formats to CDA documents. XSLT is a pattern based language that makes it very easy to translate one form of XML into another form.

HTML or XHTML – The most common mechanism used to render CDA is to convert it to HTML or XHTML using an XSLT style sheet. The CDA Narrative text model is also very strongly influenced by HTML and its predecessors.

CDA developers will also need to understand a number of other technologies to successfully implement documents. An understanding of these technologies is not necessary to understand this book.

XML Schema – One of the conformance requirements of CDA is that it must validate against the XML schema distributed with the standard.

Schematron – Schematron is a technology that is commonly used to validate the content of a CDA document to ensure that it conforms to the requirements of an implementation guide.

A Note on Key Terms

Standards organizations spend a great deal of time debating the proper terms to use and their definitions. The terms used to describe collections of doctors, nurses, therapists and other personnel employed to provide care to patients are always of particular interest. This book uses the terms in the manner described below:

Clinician – A clinician is a clinically trained and licensed healthcare provider.

Healthcare Provider – A healthcare provider is anyone providing any sort of care to a patient, and may be licensed or unlicensed. Examples of healthcare providers include doctors, nurses, dentists, therapists, and pharmacists.

Provider Organization – A provider organization is a legal entity that engages healthcare providers to provide healthcare goods and services. Examples include a single provider physician or dentist office, a group practice, a hospital, an integrated healthcare delivery network, or a state or local public health office.

The terms are loosely defined on purpose because policies, regulation and law can easily turn one of these entities into another without any regard for the opinions of standards organizations or textbook authors that attempt to rigidly define them.

Editorial Conventions

Quotes from the CDA Standard

Quotes from the CDA standard will be used repeatedly throughout the book. These will appear in this form: [§1.1] to show the origin of the quote.

Quotes from other portions of the standards included in the CDA Normative edition may also appear. These will appear in this form [RIM §1.1]. The abbreviation used will identify the standard in which the quoted text appears. These abbreviations are listed below in

Table 1 Abbreviations for standard references

Abbreviation	Document title
RIM	HL7 Reference Information Model Version
VOC	HL7 Vocabulary Domains
DT	Data Types - Abstract Specification
ITS	XML Implementation Technology Specification - Data Types



Every now and then you will see this symbol on the outer margin. It is used to mark especially *illuminating* text on the standard. The italicized text in that section is a nuance that can help to distinguish one as a CDA expert.

Attributes

The term “attribute” often confuses newcomers to HL7 Version 3 standards. In the context of a class model this term is used to represent members or properties of those classes. For example, a class representing a patient may store the patient’s name, gender and birth date. These would be considered class attributes of the patient in the class model.

An XML attribute however, is a specific kind of markup that appears within the XML representation. The class attributes of the HL7 classes can sometimes appear in XML as an element (another kind of markup in XML) or an XML attribute. To avoid confusion, this book will always use the phrase class attribute when talking about the former, and XML attribute when discussing the latter.

Examples

Examples in figures will appear in fixed font. The Italicized text in these examples represents metasyntactic variables that should be replaced by appropriate values. Elision marks (... or :) will appear where material has been removed for clarity.

```
<Element attribute='metaSyntacticVariable' ... >
:
</Element>
```

Fig. 1 Sample example

Sometimes examples of bad practices or invalid XML will be shown, so that you know what to avoid. These examples will be crossed out so that you will not be tempted to use it in applications.

```
<Element attribute='metaSyntacticVariable' ... >
:
</Element>
```

Fig. 2 A bad example

XML element names in the text will be surrounded with pointy brackets and appear in a fixed font like this: `<ClinicalDocument>`.

Attributes names will appear in a fixed font like this: `classCode`

Namespaces

This book contains many examples of XML which demonstrate how a CDA document is represented, or how other XML specifications can be used with CDA. The XML examples contain XML elements that are associated with different XML Schemas (models).

Namespaces are a feature of XML whereby different parts of an XML document can be modeled using different XML schemas. The schemas of each model are associated with a uniform resource identifier or URI (A URI is a generalization of a URL). The namespace itself can be fairly long so they are associated with a namespace prefix.

This book uses the following namespace prefixes in its examples:

Table 2 Namespace prefixes

Prefix	Namespace URI	Description
cda:	urn:hl7-org:v3	CDA Release 2
sdct:	urn:hl7-org:sdct	Extensions to CDA maintained by the HL7 Structured Documents Workgroup.
xsi:	http://www.w3.org/2001/XMLSchema-instance	The XML Schema language
xsl:	http://www.w3.org/1999/XSL/Transform	The XML Stylesheet language
ext:	(any)	Arbitrary CDA extensions

HL7 Diagrams

HL7 has a diagramming notation that is explained in more detail in Chap. 12. That diagramming notation relies on both color and shape to convey information. This book is not printed in color, so you will have to rely on the halftones used in it to identify the different HL7 model elements. The figure below shows an example of several shapes in the CDA diagram published by HL7. The text beneath the figure describes how this would be rendered in HL7 diagramming tools.

In HL7 diagrams, the downward pointing arrow labeled **component** is a light pink. The box labeled **Section** that it points to would be a light red or dark pink. The two arrows that point off to the left labeled **author** and **informant** are usually displayed with a cyan and white diagonal pattern, which often appears to be a light cyan. The big arrow labeled **subject** pointing off to the left would be colored cyan (or sky blue). The box it points to labeled **RelatedSubject** would be yellow. The box connected to that one by a straight line labeled **SubjectPerson** is a bright green. The box on the top left labeled **organization** is usually colored using a diagonal pattern in bright green and white which usually appears as a light green. The box to its right labeled **AssignedEntity** is usually colored using an alternating yellow and white diagonal pattern which appears light yellow.

At the end of each chapter is a chapter summary which highlights the key points of the chapter. Any references to published material will appear following the summary. At the end of each chapter are two sets of questions you can use to test your knowledge of the content in the chapter. The first set include questions that can be answered by reviewing material in the chapter. The second set are research questions which small or medium sized exercises that will help you in your use of the CDA standard. The harder research questions are identified with an * after the question.

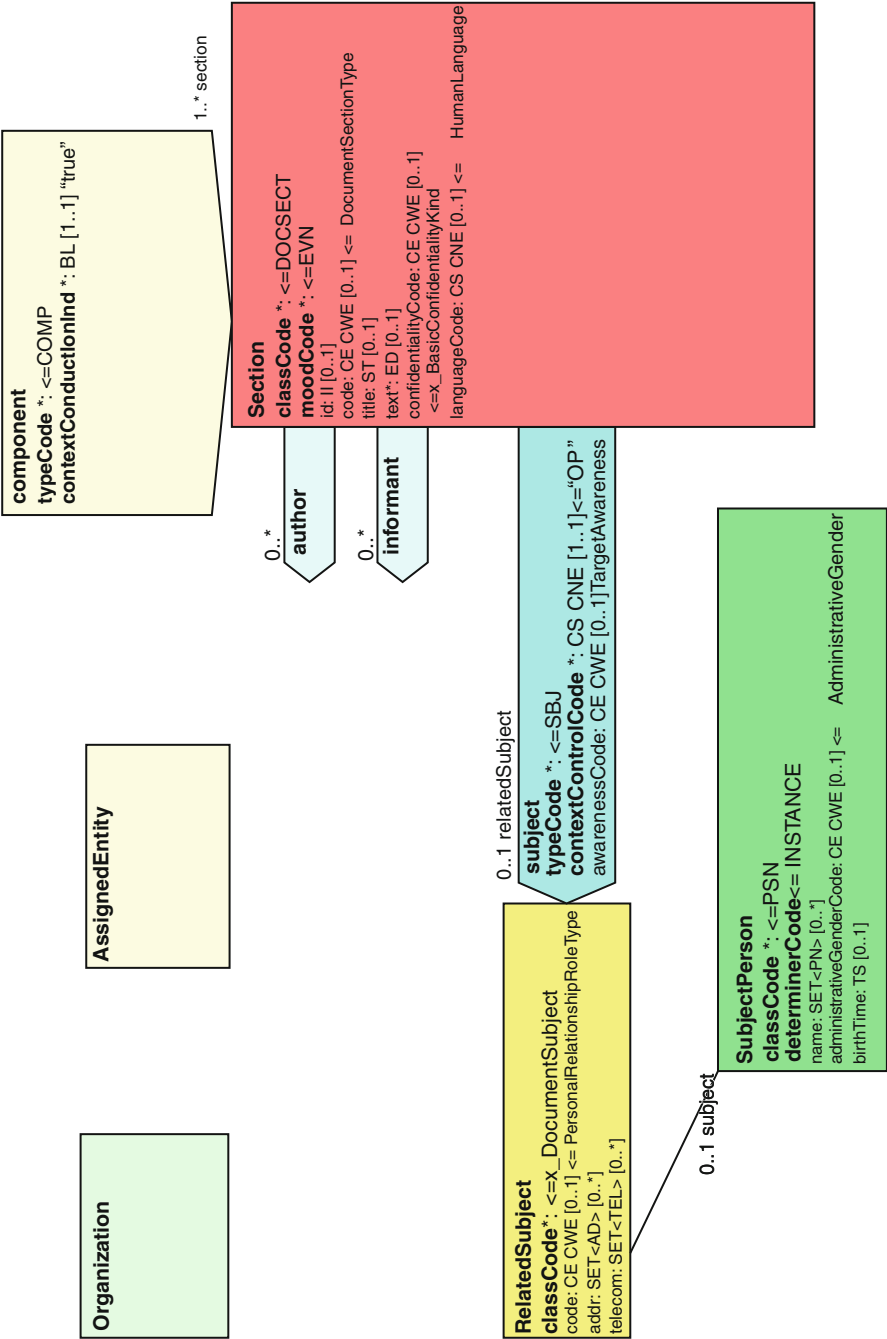


Fig. 3 RIM diagram example

Questions

1. What does HL7 stand for?
2. What does CDA stand for?

Research Questions

1. What is the policy in your region with respect to licensed healthcare providers?
2. How does it differ from policies in nearby regions?*