# Split Semantics and Rendering

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## Introduction

CDA ‘s sections and sub-sections are organizing elements that support human readability. Although section types are coded, sections mainly organize the data in a manner appropriate for human viewing, while assuring that the rendered content is faithful to the rendering at the time the document wad legally authenticated. This is an important feature but should be seen as distinct from encoding the information for computational interoperability, decision support or analysis. Regardless of how a set of health condition and allergy information might be broken down across sections and sub-sections, it does not change the actual meaning of the information.

In CDA R3, it is possible to split the semantics representation (i.e., the clinical statements) and rendering representation (i.e., the sections outline). In this ballot, we only seek comments on this possible split and it’s not part of the new spec.

## Challenges of coupling semantics & rendering

The current coupling of semantics and rendering introduces a few challenges:

1. The semantic information must be broken up across the different sections, resulting in the loss of the semantic relationships between data spread across sections (e.g., overall interpretation of various genetic testing results embedded in different sections). To resolve this challenge it is possible to use 'reference' links scattered throughout the semantic portion of the model but it overloads the traversal needed for parsing application to re-constitute the full semantic picture.

2. The need to break information down into sections is a significant barrier to the use of domain models to represent semantic information. These models created by domain committees for prescriptions, lab results, patient summaries, etc. do not require a sections’ outline specification for computer interoperability and therefore do not include it. The lack of such specification prohibits the direct re-use of these models within the CDA standard.

3. Intermingling semantic and rendering information results in the need for a profusion of document specifications. Even if there is a consensus on the appropriate "semantic" modeling for a particular structure, there can be variations in how that data is organized for human presentation. For example, should a document have a single section for all "health conditions", or should allergies and intolerances be split out into their own section? Should allergies and intolerances be split? How about drug vs. non-drug? Severe vs. moderate? Depending on the use-case, any of these degrees of presentation’s granularity could be appropriate. At the document level, there could be different approaches the same document, e.g., a molecular biology testing report can have different outlines depending on whether you choose to use the geneticists, pathologists or molecular diagnostics recommendations (see <http://wiki.hl7.org/index.php?title=Outline_comparison_table>). However, the need to support various outlines might result in replicating the full semantic structure, re-organized according to the way the data is to be rendered. Similar differences might be made for documents intended for exploration on small-display or mobile devices vs. full-size computers.

4. A given document can only be rendered in one manner. If you want to allow multiple renderings, you need to send multiple documents.

## Benefits of the split

Splitting rendering and semantics allows for more robust representation of the structured data, e.g., through clinical statements that span entries rendered/referenced in multiple sections. For example, an overall interpretation of testing results rendered in multiple sections requires a clinical statement that associates the interpretations of observations rendered in those different sections.

Most importantly, separating semantic and presentation structures allows easy re-use of clinical domain structures within CDA documents. A domain model produced by work groups such as Pharmacy, Lab or Clinical Genomics, can easily be leveraged for use in a clinical document by defining a simple structure of labeled sections and sub-sections with references to the portions of the clinical domain model appropriate to each section.

Splitting the model and the rendering information also allows division of labor and helps manage the "standardization" process. You can separate arguments about "what information is needed and how it is represented?" from arguments about "how is this data best rendered to clinicians".

Finally, by splitting the sections outline from the semantic data being expressed in those sections, there is a potential for a single document to be sent with multiple sets of "rendering" instructions, either for different devices or for different types of recipients (e.g., practitioners versus patients, pathologists versus geneticists, etc). However, this benefit is not been realized yet in the technical approach described below.

## The technical approach

To achieve the split of semantics and rendering in CDA R3, it is possible to change the association of the clinical statement structure (represented in R3 by the A\_CdaActStatement CMET) by hanging it off the Document class instead of the Section class. The following figure illustrates the change: the blue rectangle on the left hangs off the Document class and has the association to the CDA Act Statement structure, while the blue rectangle on the right hangs off the Section class and has the reference mechanism to allow XPath references from the section’s narrative to the respective act statements.



Alternative modeling:

1. References to entries  
   Alternatively to the abovementioned reference class hanging off directly of the Section class, it is possible to use the existing CDA R2 narrative 🡨 🡪 entries linkage mechanism that will be preserved in CDA R3. Such links could give higher precision to link specific pieces of the narrative content to the respective entries.
2. Source class for the entries  
   Alternatively to the abovementioned Act Statement hanging off the ClinicalDocument class, entries could hang off the StructuredBody class. This option has been under discussion and is open to comments as well.