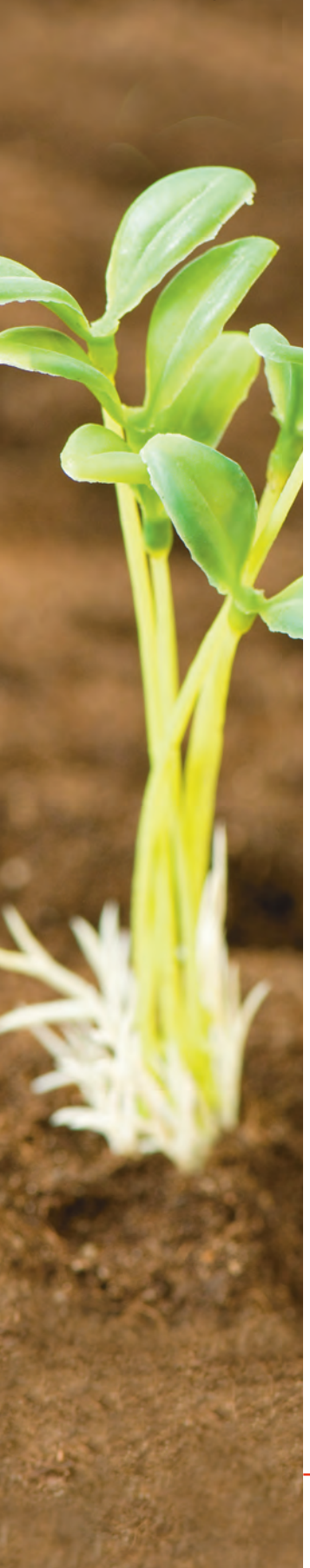
HL7 INTERNATIONAL®

NEWS

MAY 2011

UNLOCKING THE POWER OF HEALTH INFORMATION



greenCDA™ Implementation Guide Now Available

Liora Alschuler

By Liora Alschuler, Co-Chair, HL7 Structured Documents Work Group and Co-Editor, greenCDA

The HL7 greenCDA Implementation Guide has been published by the HL7 Structured Documents Work Group. The HL7 Clinical Document Architecture (CDA®) is at the core of the requirements for Meaningful Use of Electronic Health Records. It supports continuity of care and re-use of clinical data for public health reporting, quality monitoring, patient safety and clinical trials. greenCDA maintains the utility of CDA while making it easier to implement. It is a simplified XML for CDA templates.

"Any developer with basic XML knowledge and a tool that can process simple XML schemas can create green instances. We flattened the hierarchy, focused on variable data versus fixed structural markup, and removed complexities like xsi:type. The result is simple and intuitive," said Rick Geimer, Lantana Group CTO and co-editor of the greenCDA Implementation Guide.

greenCDA features include:

- XML schema validation
- Simple business names
- Tagged data elements in extensible library
- Rapid path to Meaningful Use compliance
  - Modular XML with business names generate JAVA, .NET
  - Single style sheet display, as for all CDA
  - Extensible to physician documentation requirements and quality

The enthusiastic response to the development of greenCDA is driving rapid experimentation and has raised the question of how greenCDA fits into the larger ecosystem of clinical information systems. This trial use and experimentation will help us understand how going green affects ease of use for data capture; management and analysis; when it might be an appropriate wire format for CDA; if there are significant limits on expressivity; and where the cost and benefits may lie.

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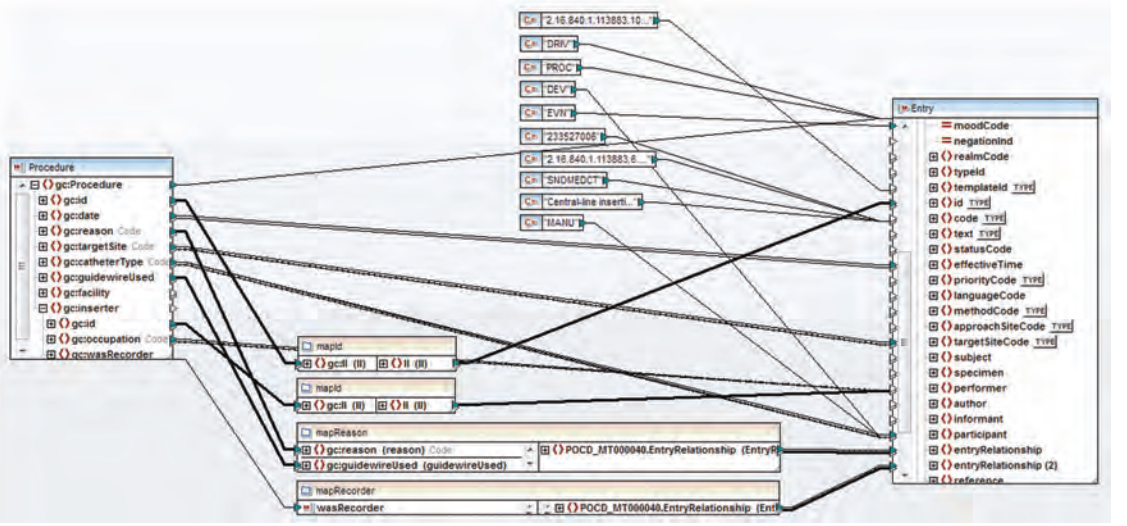
greenCDA™ Implementation Guide, *continued*

The CDC is planning a pilot project with vendors interested in using greenCDA to enable use of their systems for submitting Central Line Insertion Practices (CLIP) data to the National Healthcare Safety Network (NHSN).



greenCDA: Transforming the Essential into the Interoperable

"Use of greenCDA and supporting transformation tools show great promise as an approach for reducing the effort required to implement fully normative CDA," said Daniel A. Pollock, MD, Surveillance Branch, Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention.

HL7 looks forward to a robust and informative discussion with all stakeholders leading to acceleration of the development and adoption of interoperable clinical information systems. We encourage a broad range of experimentation across different use cases and environments and welcome the trial use and the opportunity to review the opportunities, costs and benefits of going green across the spectrum of implementation.

For more information on the greenCDA, visit the greenCDA wiki at http://wiki.hl7.org/index.php?title=GreenCDA_Project.

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Clinical Document Architechture: Spirometry Test Standardization

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Respiratory diseases, especially chronic obstructive pulmonary disease (COPD), lung cancer and tuberculosis, are main causes of mortality that will continue to increase in the coming decades. A spirometer is the medical device mandated to measure the pulmonary volume and capacity, identifying possible alterations. Commonly, all devices have a proprietary data format output. This is a setback for their integration in different environments because when data is stored on a shared repository, it is not interoperable since all of the data does not share the same format nor does it contain structured data.

Driven by "Oficina d'Estàndards i Interoperabilitat de TICSalut" and "Pla de Digitalització de la Imatge Mèdica del Departament de Salut de la Generalitat de Catalunya," a standard has been created based on the HL7 Clinical Document Architecture, Release 2 (CDA® R2). The goal of the standard is to normalize a complete data set, including both data received from spirometers as well as those that come from the test citation provided by the electronic clinical history from a hospital or medical center.

Consequently, this standard creates a spirometry report that contains not only the information related with the spirometry test, but also all the data from the test request, patient identification, and spirometer. This set of data compiled from different sources requires applying a CDA R2 structure, oriented to ease the integration between medical device and the health information system (HIS), and a higher interoperability among hospital information systems.

The data model[1] has been developed by a multidisciplinary scientific team, consisting of pulmonologists, health-tech experts and spirometer manufacturers, thus providing different perspectives about this model. The model is thus enriched by the diversity and vast knowledge of the team.

Two versions of this data model[1] exist. The first version is more detailed and is clearly oriented to a subsequent execution of a data mining system. The second version is more basic and takes into account that not all the centers or hospitals can provide the information required by the detailed version.

After the data model was developed, a set of normative and technological articfacts was generated to facilitate the standard implementation:

continued on next page

This standard creates a spirometry report that contains not only the information related with the spirometry test, but also all the data from the test request, patient identification, and spirometer.

Spirometry Test Standardization *continued from page 3*

INFORME DE ESPIROMETRIA

Paciente:	Manel Domingo Falcón	**Fecha Nacimiento:**	Febrero 1, 1986	**ID paciente:**	38863687N
Prueba realizada el:	Febrero 21, 2011	**Sexo:**	Masculino	**Tipo ID:**	CIP
Edad:	25 años	**Talla:**	1.75 m	**Peso:**	63 Kg
Grupo Etnico:	Caucásica	**Fumador:**	Si	**Médico Solicitante:**	Roberto Esteban Fernandez
Organización responsable del documento:	SAP HOSPITAL CLINIC I PROVINCIAL DE BARCELONA	**Espirometro Autor:**	EasyOne - software EasyWare 2.20.0.0 en HCB	**Organizacion soliticitante:**	HOSPITAL CLINIC I PROVINCIAL DE BARCELONA
Tecnico realizacion prueba:	Rebeca Fernandez Estrada				

RESULTADOS DEL ESTUDIO

Descripción	Unidad	Valor Basal	Valor Referencia	% del V.Ref
Cantidad Maniobras		8		
FVC (L)	L	-3.6819	4.7262	-77.90
FEV1 (L)	L	-3.1544	3.6812	-85.69
FEF25-75	L/s	-3.5394	3.3106	-106.91
PEF	L/s	-6.4481	9.2287	-69.87
Grado de calidad		D no reproducible		

CONTROL CALIDAD

+ RESULTADOS POR MANIOBRA DE LA PRUEBA BASAL

GRÁFICAS

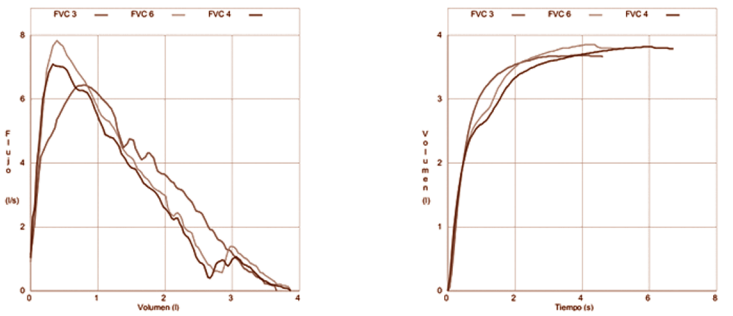

Figure 1. Visualization of spirometry report CDA R2

- **CDA R2 Spirometry Implementation Guide[2]:** This guide contains the norms to follow to implement CDA R2 correctly, including mandatory fields and their content. Two versions of this implementation guide have been created—one for each version of the data model.
- **CDA R2 XML Formatted Templates:** A set of CDA R2 spirometry templates has been created. Templates exist for both versions, basic and detailed.
- **XSL Style Sheet:** This is a file needed to visualize spirometry CDA R2, which follows a standard style sheet for CDA-HL7 presentation.

Using spirometry CDA R2 allows for the resulting reports to be shared through different hospital health information systems, and executes data mining services, that are very important for medical research processes. It is also important to note that the doctor can view the spirometry digitally from his workstation and watch the tests history for each patient.

The first implementation of the CDA R2 spirometry standard was through an open-source integration framework called EI2Med, based on Mirth Connect, in which many tools have been developed to ease generation and integration between standard files and HIS. Manufacturers and spirometry models have been integrated with the integration framework EI2Med.

Public hospitals in Catalonia are currently collaborating on pilot projects to validate the normalization and integration technology of the spirometry tests. There are plans to start the implementation in all health facilities in Catalonia.

References

[1] *T. Salas, M. Domingo, y F. Burgos. Data model of the CDA R2 spirometry standard to the "Departament de Salut de la Generalitat de Catalunya." 2010.*

[2] *M. Domingo, M. Lizana y D. Kaminker. CDA R2 spirometry implementation guide to the "Departament de Salut de la Generalitat de Catalunya." 2010.*

Rene Spronk

Software Implementation of CDA®

By Rene Spronk, Co-Chair, HL7 RIMBAA Work Group; Trainer/Consultant, Ringholm

This article is an abridged version of a RIMBAA whitepaper created by the RIMBAA Work Group. The whitepaper is based on actual HL7 Version 3 implementation experiences. A full version can be found at http://j.mp/gDwZKm.

Introduction

The implementation of the CDA standard and the validation of CDA-conformant XML instances is based on two types of specifications:

1. The CDA class model, a refinement of the HL7 Reference Information Model (RIM). The class model is expressed in MIF (Model Interchange Format), HL7's meta model format.
2. Context-specific constraints (templates) of the generic CDA model, as defined in a CDA implementation guide for specific document type and one specific context. At this point in time templates are mostly defined in textual form. A single CDA implementation guide may define hundreds of templates.

An HL7 MIF definition of the CDA class model is provided with the HL7 Version 3 standard. The CDA MIF file can be transformed into less "rich" expressions such as UML and XML schema. Parts of the requirements as expressed by the MIF are lost during the transformation process.

CDA implementation using XML techniques

The standard requires that all CDA instances validate against a published CDA XML schema. This is the main reason why a lot of CDA implementations are based on the CDA XML schema. The wide availability of XML tools is a definite advantage; however, there are disadvantages as well. The XML schema language is not rich enough by far to express all of the requirements that present in the original CDA class model. A CDA document instance that validates against the XML schema is not guaranteed to be a valid CDA instance – to be a valid CDA instance one has to create XML that conforms to the requirements that are expressed in the CDA class model.

Class generators are commonly used next to other well-known XML techniques such as Xpath and DOM/SAX. JAXB is an example of a class generator: a tool which transforms XML schema to corresponding Java classes.

Model driven CDA implementation

In order to fulfill all requirements as expressed by the CDA class model, the starting point for all CDA implementations would have to be the CDA MIF. MIF, however, has the disadvantage that it is an HL7 specific format that is only supported by a limited number of tools. Because CDA is essentially an information model without any behavioral aspects associated with it, one has the option of creating a very solid mapping from CDA MIF to UML, which in turn allows for the use of UML based tools.

The CDA MIF (or the UML equivalent thereof) can be used by class generators to create a set of classes (in e.g. Java or C#). There are a few freely available class generators that one could consider when implementing CDA:

1. MDHT (http://www.cdatools.org/), a CDA specific class generator. This tool generates Java classes based on a UML representation of the CDA class model and on an OCL representation of applicable templates.
2. MARC-HI Everest (http://everest.marc-hi.ca/), an HL7 Version 3 (not just CDA) MIF-based class generator.
3. Java SIG (http://aurora.regenstrief.org/javasig), an MIF-based toolkit which generates Java classes (unfortunately not recently updated).

Summary

The diagram on page 9 shows the relationships between the various artifacts discussed in this article. A CDA document has to conform to the requirements as defined in a CDA implementation guide. It has to conform to both the formal CDA class model as well as the templates. The

continued on page 9

decision to select another representative at the Orlando meeting in May. Affiliate Chairs are encouraged to nominate themselves or one of their members to that position.

Diego Kaminker, chair of HL7 Argentina and pioneer of the HL7 eLearning program, presented relevant developments focusing on the significant backlog of requests to participate in the program. He noted that this is mainly due to the lack of tutors and the emphasis on comprehensiveness and quality. HL7 India reported its positive experience with running the course, and several other affiliates expressed interest in launching their own programs. The topic raised a lot of discussion as education is one of the primary functions of most countries.

Another important item on the agenda was the revision of the Affiliate Agreement. The Council decided to recommend to the HL7 Board that the existing 2009/2010 agreement be extended to end of 2011 and that during 2011, consultation with the International Council will review issues of concern, such as IP.

In memory of Dr. Yun Sik Kwak

In the afternoon, the "HL7 around the world session" included 24 country reports, all of which are available as part of the minutes on the HL7 International Council. A very touching moment was when Byoung-Kee Yi shared with us the pain and sorrow of Dr. Kwak's premature death. We will all miss his warmth, kindness, and support.

For more information on the activities of the HL7 International Council and its meetings please visit: http://www.hl7.org/Special/committees/international/

Software Implementation of CDA *continued from page 5*

CDA class model can be expressed in either MIF, or in a derived format such as UML or XML schema. Templates can be expressed in Schematron, in OCL, or in MIF with OCL annotations. The actual validation of CDA instances is based on the expressions of the CDA class model and the applicable templates.

A software application will have to be based on the CDA class model if one wishes to ensure that one creates valid CDA instances. Applications that are based on the CDA XML schema can't guarantee that the documents are valid CDA instances. The MDHT tool is currently the best tool available to support the creation of CDA model based application development.