HL7 NEWS

AUGUST 2009

THE OFFICIAL PUBLICATION OF HEALTH LEVEL SEVEN, INC.

UNLOCKING THE POWER OF HEALTH INFORMATION

In This Issue...

What's Ahead for HL7

By W. Ed Hammond, PhD, Chair, HL7

W. Ed Hammond, PhD

With a proposal to spend between 19 and 36.5 billion dollars for health information technology in the United States, HL7 has an opportunity and a responsibility to expand its engagement and interactions with a broader community. It is not clear how much of the stimulus package will come directly to HL7, but the board and leadership of HL7 is engaged in making that case. Since the reorganization of HL7 and the hiring of a CEO and a CTO, HL7 has undergone many significant changes. Those changes will continue to occur, in my opinion, at a rapid rate. Key to the survival and growth of HL7 is the understanding of its membership as to why those changes are necessary.

First, HL7 leadership is currently spending a lot of time and energy focusing on the stimulus package and government leaders who will decide how and where that money will be spent. This focus is seen by some as increasing the US centricity of HL7. I view it as an opportunity for HL7 to accelerate its standards-producing activities; more importantly, it can address additional requirements such as tooling, implementation guides, publication, education, paid support for volunteer members, additional professional staff, etc. All of these activities will be a major benefit to all international members of HL7. Furthermore, HL7's long range plans include seeking direct funding from other sources outside the US as well.

Second, a new mixture of paid and volunteer workers will have to be carefully managed and blended into HL7 in such a way as to accelerate productivity without a loss of control and direction by the volunteer community. Please be patient as we learn how to create this balance; understand why it is necessary, and support the transition. Currently, the average time it takes to produce a normative standard is more than two years. The typical time to get ISO approval of an HL7/ANSI-approved standard is approximately four years. Both times are excessive and our stakeholders are criticizing our productivity rate. We need to increase the work at the beginning of the process and produce a new standard by defining the scope and requirements as detailed and complete as possible. Work can be done by professionals, to the total membership judging and balloting the result.

HL7 has also accepted a broader responsibility in working with other groups. HL7's Memoranda of Understanding (MOU) with numerous groups are becoming more than a piece of paper. These MOUs are defining active events and joint or coordinated projects. In many cases, that cooperation is even further advanced with charter agreements such as the agreement with CDISC. HL7 has been a leader in the formation of the international Joint Initiative Council (JIC) and the Joint Working Group, with a goal of producing one standard for one business purpose. The JIC focuses on bringing international Standards Developing Organizations (SDO) together to jointly develop new standards. Current members include ISO, CEN, HL7, CDISC and IHTSDO. Several standards efforts are underway with standards currently in ballot.

The challenges HL7 faces will require all the HL7 community come together.

In the US, HL7 plays a leadership role with the SDO Charter Organizations (SCO), a collaborative of several US SDOs. Working with other groups, including NCPDP, X12, WEDI, ASTM and an increasing number of others, HL7 is sharing ideas and collaborating with these groups to reduce redundancy and confusion in producing standards. Involving another community, HL7 is providing the energy and effort to help establish a clinical group – a group of non-technical organizations that understand what is required of HIT in healthcare without worrying about the technology. This group – now named the Clinical Information Interchange Collaborative – has had one successful meeting and appears to be willing and interested in strongly engaging in this exercise.

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Bridging the Chasm Brings Unprecedented Collaboration to the Clinical Community

By Charles Jaffe, MD, PhD, HL7 CEO

Charles Jaffe, MD, PhD

On a brisk spring day in late April, the climate for change had brewed the perfect storm. The clinical community, so adherent to parochial self-interest, had come together in Washington to be part of that fundamental shift in its perspective. The stage was set. Every indicator of healthcare quality had continued to decline. The Baby Boomers were coming of age and fewer clinicians were prepared to deliver on the promise that had been made decades earlier. Access to care for the uninsured and under-insured was becoming critical. The ARRA legislation had made its way through Congress, with 19 billion dollars earmarked for healthcare IT, which President Obama had made the lynchpin of his healthcare reform program.

In years past, clinicians had clung tightly to their specialty and to the laser-focused devotion to very specific roles and responsibilities. Nurses, or at least nursing organizations, were remiss to communicate with physicians. Physical therapists and physiatrists infrequently debated real patient-care issues with orthopedic surgeons. Pharmacists rarely shared ideas with clinical researchers and almost no one would speak to a chiropractor. They really had so much in common but found little ground to identify those critical issues. The voices of reason were largely silent.

In our conveniently tight world of healthcare IT, we were content to talk to each other. When we spoke with the caregivers, it was jargon-laced and replete with acronyms. Even the concepts we tried to imbue on the helpless clinicians were filled with arcane rhetoric and high-minded scientific principles. We were the masters of the unfathomable. Over the years, our very small audiences were rightfully shrinking.

The lay press caught on. When there was little or no money on the line, the effectiveness of electronic medical records and eHealth more broadly was never questioned. In 1996, the Institute of Medicine published its landmark condemnation of the American healthcare system (Quality Chasm). Not until 2008, however, did they begin to take note of the unintended consequences of healthcare IT. Physicians and nurses were caught in the spiral of the electronic era, with confusing interfaces and a technology that was in direct conflict with traditional workflow and best practices.

Gradually, many leaders began to recognize the need to reinvigorate the disenfranchised caregivers in the process of making eHealth more valuable. After all, it was supposed to improve quality and reduce the staggering escalation of costs. Within HL7, Dr. Ed Hammond was one such voice. The Agency for Healthcare Research and Quality (AHRQ) understood the message all too well and was willing to fund an experiment to bring those caregivers to the process. It was the intent of this face-to-face meeting "to make the clinical community aware of the importance of their direct involvement in and commitment to the applications of Information Technology to health and healthcare."

The goal of this initiative was to find the common elements in the workflow, vocabulary, and processes of all caregivers, rather than focus on the unique requirements of any discipline or specialty. AHRQ agreed that HL7 was the natural choice for an environment to enable that interaction. More than one hundred professional organizations and specialty societies were invited to take part in this experiment in human interaction, devoid of technology and techno-speak. Representatives of these societies, all practitioners rather than technicians, caregivers not computer scientists, paid their own way to Washington.

Like any social experiment, the event, which was called Bridging the Chasm, was best viewed from the perspective of the attendees. The roll call of participants was like an unembellished catalog of healthcare professionals. More importantly, for two days, they spoke with one another about those things they had in common rather than focusing on their unique requirements. While many of the presenters were distinguished leaders in healthcare IT, not a bit of jargon or a single acronym was uttered. An important step was taken in building the bridge between the clinical professionals and the healthcare IT community.

Presentations covered areas of common relevance, such as achieving quality and measuring the process for getting there. It was about big ideas, like evidence-based medicine, and how that might be enabled by decision support at the point of care. Practitioners spoke of reusing information and about more rapidly and effectively integrating the knowledge gained in basic and clinical research into the process of patient care. Perhaps most significantly, there were discussions about making the patient the center of the decision tree and raising the bar for healthcare literacy.

Following the event, there was very little of the typical decline in interest. The buzz persisted. A new organization was chartered to enable many of the objectives that were enunciated by the participants. Named by the participants, it has been christened the Clinical Information Interchange Collaborative (CIIC). The charter itself calls for the endorsement of the mission by the professional organizations and societies. That mission is "to enable the voice of the caregiver community in defining the form, composition, content and functionality of information technology for healthcare delivery."

Perhaps more importantly, the vision of the new organization is "to create an environment that enables capturing the needs of the clinical community and provides a forum for ongoing dialog with the information technology professionals who serve this community." To date, a growing number of organizations have signed the charter and committed to fostering these ideals. Details of the Bridging the Chasm conference, the CIIC documentation, and the charter can be reached through a link on the HL7 home page. In cooperation with the Office of the National Coordinator, we hope to leverage the resources of the CIIC to foster the objectives of the HITECH provisions of the recovery legislation.

Over the coming three months, the pace of activities will accelerate. Two webinars are scheduled for July and September. During the webinars, the leadership will further explain the charter, expound on the scope and opportunities of the organization, and call for volunteers and additional resources. Moreover, plans are underway for a second face-to-face meeting in Washington, to include the original and additional societies, and to further develop strategies and programs to promote many of these ambitious goals.

International representation at the April meeting was significant, but efforts are now under way in Europe, South America and the Asia-Pacific communities to expand participation. At some level, there has been an interest expressed by the government agencies responsible for healthcare IT in HL7 affiliate countries. Coordination within HL7 at the level of the Clinical Interoperability Council and other work groups is critical to our success. We have also reached out to other standards development organizations and healthcare IT societies to broaden our scope. We encourage all of you with an interest in the mission of the CIIC to take an active role in this vital work.

Unlocking the Power of Health Information

Monday, September 21, 2009
Sheraton Atlanta Hotel, Atlanta, Georgia

PROGRAM AGENDA

8:30 – 8:45 am	***Welcoming Comments*** *Charles Jaffe, MD, PhD* Chief Executive Officer Health Level Seven, Inc.
8:45 – 9:30 am	**Keynote Session 1:** **Response from the Clinical Community** *John Tooker, MD, FACP* Executive Vice President/Chief Executive Officer American College of Physicians
9:35 – 10:20 am	**Keynote Session 2:** **Mandate 403 - The European Union's EHR Initiative** *Jeremy Thorp* Director of Business Requirements NHS Connecting for Health
10:20 – 10:50 am	**Break**
10:55 – 11:40 am	**Keynote Session 3:** **The Role for Quality Measures** *Janet Corrigan, PhD* President and Chief Executive Officer The National Quality Forum
11:45 – 12:30 pm	**Keynote Session 4:** **The Role of the Office of the National Coordinator in Streamlining Standards Development** *David Blumenthal, MD* National Coordinator for Health Information Technology, Office of the National Coordinator for Healthcare IT (ONC), U.S. Department of Health and Human Services

HL7 NEWS

is the official publication of: Health Level Seven, Inc. • 3300 Washtenaw Avenue, Suite 227 Ann Arbor, MI • 48104-4261 USA
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Mark McDougall

Update from Headquarters

HL7 Meeting Attendees Warmly Welcomed in Kyoto, Japan

By Mark McDougall, HL7 Executive Director

HL7 convened our recent May Working Group Meeting at the world famous International Convention Center in Kyoto, Japan. This venue hosted the United Nations Framework Convention on Climate Change in December 1997, where an international treaty was negotiated that committed nations to tackling the issues of global warming and reducing greenhouse gas emissions.

While the meeting was mostly business-as-usual with our 20+ tutorials and dozens of work group meetings each day, we encountered some very memorable activities too.

H1N1 Flu Hurdle

Getting to Kyoto was a challenge for some HL7 travelers due to concerns about the "swine flu", or the H1N1 flu. In fact, the plane that I and Karen Van Hentenryck were on included Japan's first confirmed cases of individuals with the H1N1 flu. Because these infected passengers sat near Karen, she and her son were among the approximately 47 passengers that were quarantined for seven days. For additional precautions, most HL7 attendees from North America were contacted and asked to record and report body temperatures twice per day. Given the circumstances facing Karen, Michio Kimura, MD, PhD, was very helpful in providing Karen and her son with treats and supplies to help ease the challenges of being isolated in a foreign country. I am pleased to report that neither Karen nor her son contracted the H1N1 flu, nor did any other HL7 Working Group Meeting attendee.

Networking Reception

Our Wednesday evening networking reception featured a very memorable form of entertainment including traditional Maiko dances, followed by Maiko-sans greeting HL7 attendees and posing for photographs. The lucky attendees were also recipients of sake being poured by the Maiko-sans. Be sure to see the photos on the next page for a glimpse into a very memorable HL7 networking reception.

Aoi Matsuri Festival

Another highlight of our meeting was attendance at the very special Aoi Matsuri Festival that dates back to the seventh century. During the May 15 festival, emissaries leave the Kyoto Imperial Palace and proceed to the Shimogamo Shrine and then to Kamigamo Shrine. It was a ritual that began to gain the favor of the deities of the Shimogamo and Kamigamo shrines to ensure a good harvest. The name of the Aoi Festival originated from the tradition of offering geraniums (aoi) to the gods, and decorating the temple, attendees and ox carriages with geranium leaves. Wearing elegant costumes of the Ocho era, the refined charm of the envoy and public servants parading through the city represents old-style Kyoto. The ritual has survived through the centuries and has become one of the most celebrated festivals in Japan. HL7 attendees were very fortunate to have the opportunity to witness this special event.

Scenes from the Aoi Matsuri Festival

Kyoto WGM Meeting Sponsors

The following organizations sponsored functions or publications at our recent Working Group Meeting in Kyoto, Japan. We are grateful for their additional support and are pleased to recognize these organizations:

- Gordon Point Informatics
- Interfaceware
- Japanese Association of Healthcare Systems Industry (JAHIS)
- LINKMED
- Michio Kimura, MD, PhD

Meeting Sponsors

I would like to recognize the following organizations that sponsored key components of our recent January Working Group meeting in Orlando:

- Gordon Point Informatics – Lanyards
- LINKMED – Morning Coffee Breaks

The additional sponsorship support provided by these organizations contributes heavily to HL7's meeting budget and is much appreciated.

Special Thanks

There are three individuals whom I would like to extend a special thank you to for their role in producing our May Working Group Meeting in Kyoto: Michio Kimura,MD, PhD, Masayuki Ebina, and Lillian Bigham.

First, I would like to extend a very warm thank you to Dr. Michio Kimura, MD, PhD. Not only does Sensei Kimura serve as the Chair of HL7 Japan, but he was also the IHIC 2009 President who helped produce the 10th Annual International HL7 Interoperability Conference that preceded the HL7 WGM in Kyoto. Sensei Kimura also played an incredibly important role in the planning stages for this Kyoto WGM. For this I extend a sincere thank you to Sensei Kimura for all of his valuable guidance in planning and producing the May 2009 HL7 WGM in Kyoto.

Scenic view at the Kyoto International Convention Center

I would also like to recognize Masayuki Ebina for his help in planning many aspects of our meeting, such as the networking reception. He serves as the assistant to the secretary of HL7 Japan and provided Lillian, Dr. Kimura and myself with much help throughout all stages of the planning of this HL7 meeting. I am pleased to extend a warm thank you to Masayuki Ebina for his valuable assistance.

Finally, as you can imagine, planning a meeting from afar is not easy. However, Lillian Bigham, HL7's Director of Meetings, once again produced an outstanding HL7 Working Group Meeting. Her attention to detail and kind professionalism sets a high standard and is certainly much appreciated by all.

Plenary Meeting in Atlanta

Our 23rd Annual Plenary and Working Group meeting will convene September 20-25, 2009 at the Sheraton Atlanta Hotel. We are pleased to report that Monday's Plenary meeting will feature the following impressive set of four keynote presentations:

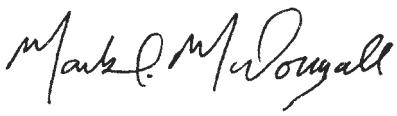
Response from the Clinical Community
John Tooker, MD, FACP, Executive Vice President/Chief Executive Officer
American College of Physicians

Mandate 403 - The European Union's EHR Initiative
Jeremy Thorp, Director of Business Requirements
NHS Connecting for Health

The Role for Quality Measures
Janet Corrigan, PhD, President and Chief Executive Officer
The National Quality Forum

The HITECH Legislation and its Impact on Standards Development
David Blumenthal, MD, National Coordinator for Health Information Technology, Office of the National Coordinator for Healthcare IT (ONC), U.S. Department of Health and Human Services

More information on the plenary meeting, our approximately 25 tutorials, and the work group meetings is available at www.HL7.org. We hope to see you at our 23rd Annual Plenary and Working Group Meeting in Atlanta in September. Take care and best wishes!



Scenes from the Kyoto WGM Wednesday Evening Networking Reception

Let's Be Clear

By Charlie McCay, Chair, HL7 Technical Steering Committee

What are we doing? Why are we doing it? What will we do? These are questions that need to be answered at every level of the HL7 organization. The TSC plays a vital role in ensuring that as we develop specifications, each project and work group has clear answers to these questions. Such clarity will make HL7 even more useful and effective.

The TSC has been focused on what the collective HL7 working group is doing, and what we are producing. We now must add what the users and stakeholders of HL7 need from the organization to this clarity. Beyond that, we need clarity as to how we will meet those needs—by maintaining plans at all levels of the organization, from individual projects and work groups all the way up to the board.

What are we doing? The TSC has been working for the last 18 months to get better visibility for the work that is done by HL7. An early step was to establish a process for reviewing and approving new projects, so that all co-chairs are aware of project proposals, and that each new project is actively reviewed by the TSC members. As a result of this process, overlaps have surfaced and can now be addressed before they became conflicts. With the help of the Project Services Committee and all the active members of HL7 that have contributed, we now have a project directory that can be accessed from the home page of the HL7 website and that provides a complete list of the activities being undertaken by the work groups.

We are now progressing in a similar way with products and work groups. We want to ensure that for each standard HL7 publishes there is a single webpage that provides a portal for that standard, with links to the supporting information to help those evaluating, implementing and maintaining the specification. Likewise, for each work group we want to ensure that it is easy to see the scope and activity of the workgroup.

Charlie McCay

Why are we doing it? The widespread use of HL7 specifications and implementation guides testify to the fact that we are meeting many needs; however, we have not been good at articulating what those needs are. At the level of the individual specification both the HDF (HL7 Development Framework) and the SAEAF (Services Aware Enterprise Architecture Framework) documentation emphasize the importance of documenting the requirements that the specifications are designed to meet. With the project list giving us visibility of what we are doing, there is now work to be done to get real clarity as to why we are doing it, and what the scope of HL7's responsibility is. Is it really enough to publish balloted specifications? Do we need to also promote and track their adoption? Who are the customers and users of our products? The board is looking at these questions from an overall organization perspective, but each project and work group also needs to understand and provide answers for the products they are developing. The better we can understand the value of what we are doing, the better we can deliver and increase that value.

What will we do? The board is maintaining the Roadmap as documentation for the strategic direction of the organization. At a more detailed level, the Project Management Office and Project Services Committee will be providing more active tracking of projects. This will allow everyone to see where projects are delivering well and help to identify at-risk projects so that corrective action can be taken and timely communication can be provided to those affected. This light-weight additional visibility will help give confidence in the plans that HL7 publishes, and increase our ability to predict what will be delivered in the future. We all know that standards development is not a fully predictable activity, which is why making progress information available is so important. We are aware that this must be done in a way that makes life easier for those working on the specifications, and so will make the best use of existing information.

What's New for HL7 Continued from page 1

Finally, the focus in the US, largely from requirements from the stimulus funding, is on meaningful use of the Electronic Health Record. Although this issue is US-driven, this topic is of international interest. Many groups are attempting to define "meaningful use", with each definition biased by the interests of the group. For HL7, the questions are: "What does the response to this question mean to HL7? What gaps in the current standards landscape exist that prevents meaningful use? What new standards must HL7 address?" The impetus of stimulus money has clearly attracted more groups into the arena of HIT. Many are doing new things with HL7 standards and are discovering what our standards don't address. Can we respond quickly to those gaps? What new areas are being explored that will require HL7 standards? One such area is the use of mobile devices for health-related communications, knowledge distribution, decision support, and other activities. The number of applications is spreading rapidly, with the need of moving data from one application to another. HL7 needs to move rapidly to fill this need. Why HL7? Because mobile devices are only one step away from the EHR and PHR data collection functionality.

The challenges HL7 faces will require all the HL7 community to come together. It will also require the ability to change and to compromise. As the community expands, so do the rewards.

Enabling eHealth Strategies through Architecture Driven Health IT Standards Development

By Marc Koehn, B.Sc., MBA, Project Manager, HL7 Enterprise Architecture Implementation Project, Gordon Point Informatics, Ltd.

Marc Koehn

There appears to be a common policy focus among developed countries these days. Yes, I know you are thinking it's the economy since surely that is squarely on many a citizen and policy maker's minds. However, I am referring to the more enduring theme of healthcare renewal as response to the perfect storm of aging populations, chronic disease challenges, rising costs, and projected shortages of healthcare professionals. A key component of the response, certainly across the developed world, has been the push towards Electronic Health Records (EHR) through the establishment of system-wide eHealth strategies. At the core of these strategies is the basic notion that the availability of up-to-date and pertinent patient information at the right time and place, subject to the needed privacy constraints, will help improve the ability of clinicians to provide care and will yield better outcomes for patients. Given the broadly distributed nature of most health systems (i.e. the health delivery infrastructure AND the associated IT systems), this demands not only the establishment of common standards but standards that scale up to the needs of health system-wide deployment. Such standards require effective consensus building processes as well as leading edge specification frameworks and methodologies that help drive overall quality and consistency across the full standards portfolio.

HL7 has been at the core of establishing specification systems for the development of health information standards and a home for stakeholder consensus building for more than 22 years. Over the past decade, in partial response to the requirements for more inter-organizational data interchange and improved semantic interoperability, HL7 introduced the HL7 Reference Information Model (RIM) that became an ANSI normative standard in 2003 and today supports three interoperability paradigms: Messages, Documents, and Services. More recently, HL7 has established a roadmap (http://www.hl7.org/documentcomments/index.cfm) to outline a series of strategic initiatives designed to ensure that its products and services remain pertinent to its stakeholders and responsive to the growing eHealth push.

One of these initiatives is the development of an Enterprise Architecture Framework – through the Services Aware Enterprise Architecture Framework (SAEAF) project – and the subsequent, planned refinement of HL7's own internal Enterprise Architecture in order to make the SAEAF operational. The development of the framework was in direct response to the HL7 Board of Directors' commitment to the following three-part premise:

- HL7 produces specifications to enable Computable Semantic Interoperability (CSI) between users of systems implementing those specifications.
- Instances of CSI between two or more HL7-based systems may cross department, enterprise, and/or national boundaries.
- An HL7 Enterprise Architecture Specification (EAS) is required if HL7 is to produce durable specifications that enable CSI in an effective, efficient, and scalable manner.

Under the direction of HL7's Chief Technology Officer (CTO), the HL7 Architectural review Board (ArB) has worked over the past 16 months to establish a core foundation for the architecture framework. Drawing on key industry frameworks such as the Reference Model for Open Distributed Processing (RM-ODP), among others, the architecture framework has established a model for HL7 specifications that recognizes the importance of separating various views of the specification (e.g. Enterprise view, Information view, Computational view, Engineering view and Technology view) so as to ensure that business needs can be expressed in a consistent manner and then appropriately and consistently reflected in various specification artifacts across the full spectrum of established interoperability paradigms (i.e. **messaging, document exchange** and **services**). By providing a model that harmonizes specifications across these paradigms, the framework should begin not only to shape HL7 specifications towards consistency and ever more scalability, but also to provide a common lingo for expressing requirements in the areas of specification tooling, decision making, etc.

In addition to a consistent overall specification structure, the framework has also begun to devise the following key components:

- A more rigorous Behavioral Framework to express interaction semantics;
- A layered Conformance/Compliance Framework to support service integration and run-time assessment of CSI; and
- A Governance Framework to oversee the development and implementation of HL7 Interoperability specifications.

A significant milestone for this roadmap initiative is the fact that the framework is now sufficiently completed (See http://wiki.hl7.org/index.php?title=Architecture_Board) to allow HL7 to begin using it in "alpha" mode. This "alpha" use is intended to meet two core objectives: (1) To exercise the framework and, in so doing, to refine and elaborate it, and (2) To enable "alpha" projects to reap the benefits of following a broader, architectural approach in the development of their specifications.

In parallel to such test driving of the framework, HL7 will also review and refine its decision making practices and processes to begin to establish the "architecture governance" elements of the framework. This will also draw heavily on the experience generated by the "alpha" projects.

Several key HL7 projects and work groups, including the Privacy, Access and Security Services (PASS) project, the Common Terminology Services 2 (CTS2) project and the Structured Documents Work Group are presently evaluating their readiness to engage as "alpha" projects with a goal to initiating the needed activities prior to the 23rd Annual Plenary & Working Group Meeting this September in Atlanta, Georgia.

As these and other projects apply and evolve the Enterprise Architecture Framework, and as this framework begins to visibly impact HL7 based specifications development, HL7 should be progressively better positioned to support national, regional, or hospital-group wide eHealth strategies and to continue to play its part in the renewal of health systems globally as the "SDO" for health information interchange.

HL7 Tooling: The Case for a New Tool Strategy

By John Quinn, HL7 CTO

Since its inception, HL7 has turned to computer software programs that we generally refer to as "tools" to assist in performing tasks that:

1. Are so complex in nature that it would take an impractical amount of training for all but the best experts to perform;
2. Involve extremely repetitive looped iterations over hundreds (if not thousands) of similar operations in order to produce the needed results;
3. Include some combination of these two general categories.

Historically, HL7's reliance on tooling became significant as our first products started to grow larger than a single human could reliably handle. These problems began to appear during the early 1990s when HL7 started to produce usable Version 2 messaging standards of several hundred pages. The source materials that made up this standard was developed at the time by six to eight small working groups and their output needed to all "fit together," while also being consistent in both their content and format. At this point, HL7 started to develop internal databases and publishing tools to make the process of publishing more manageable and accurate.

Shortly after this time, HL7 started its first work on the HL7 Reference Information Model. The work of defining an information model that encompassed all of human healthcare rapidly grew in size and complexity. This work also quickly exceeded human capabilities to record and manage. It even outstripped the capabilities of easy to obtain off-the-shelf tools in common use at the time such as Visio, Microsoft Access and the formal Object Oriented modeling tools of the time. As a means of dealing with this problem, adjustments were made to the underlying modeling methodology to accommodate the extremely large number of entities and relationships. In turn, this all dictated the need for custom tooling to support HL7 modeling and many of these tools have evolved and are still in use today.

Since that time, HL7's products have become larger and more complex. Fortunately, off-the-shelf tooling has also vastly increased in capabilities. XML, UML and off-the-shelf modeling and development tools such as IBM's "Rational" products are now a possible alternative to our historic tools and methods. HL7 is now rapidly moving to adopt these and make routine use of them as quickly and as safely as we can.

HL7 as an organization and its users individually make use of three broad categories of tools:

1. Publishing and Balloting Tools:

These software programs have a basic purpose of aiding HL7 standards developers (i.e., the members of the HL7 working groups) write, ballot and publish our work products. Some of these tools are very particular to these processes (e.g., the balloting workbench) and some have broader use in other tooling categories (e.g., the static R-MIM modeler which is also used by HL7 Version 3 and CDA users as they create implementation specifications for specific use of HL7 Version 3 products).

John Quinn

If you look closely at the annually published HL7 Version 3 products you will notice that thousands of interrelated files (actual count of the 2008 Version 3 Normative Edition is 6,452 files) are produced by the publishing process. These files and their content must be verified against each other before Version 3 can be released. It is not humanly possible for the few individuals involved in this work to reliably accomplish this publishing task without the assistance of some very specific tools.

2. User Implementation Specification Tools:

Users of HL7 products create implementation specifications (sometimes also called implementation guides or profiles) that conform to an HL7 standard. It is sometimes important to remember that HL7 standards must be applied to a defined problem that constrains that standard to a specific use case (i.e., application process) and terminologies. In other words, the standard supports a wide scope of possible uses of that standard. The user developed implementation specification is the unambiguous set of directions that tells the systems integrator exactly how the communicating applications are allowed to interoperate.

Some users of HL7 (e.g., the UK's National Health Services (NHS) and Canada's Health Infoway (CHI)) have created extensive implementation specifications. (A sample version of the NHS's Messaging Implementation Manual (MIM) is available on the HL7 website in the standards download area). They have also created their own set of tooling to create and test their implementation specifications. At this time, the NHS and CHI have told HL7 that they are placing their specific implementation tools in the Open Health Tools (OHT) website's database for Open Source use. These tools are all based on the Eclipse Platform.

HL7 has also identified tools that it and some of its users have created, or are currently developing that could also be useful to other HL7 users. All tools created by HL7 will be made available in OHT in source form for general use by HL7 users.

3. HL7 Ballot Validation and Testing Tools:

HL7 also has many smaller tools that are used to verify elements of our standards at various steps during the balloting and publishing processes and when we share them with other standards

Continued on next page

HL7 Tooling, cont. from page 9

organizations such as ISO. Examples of these tools are:

- A tool that validates that all hyperlinks are correct references with an existing target object;
- A tool that validates that the XML schemas that we specify meets W3C's requirements for valid XML.

The above tooling does not test device interoperability and HL7 does not attempt to create "certification" or "conformance testing tools". There is another class of tool that has been created by CHI and the NHS that perform these functions for their countries. In the US the ARRA legislation assigns that role to NIST. These testing tools validate the ability of applications to properly interoperate with their related IT infrastructures as required in their published implementation specifications. At this time, CHI has indicated that they plan to put their conformance testing tools for applications that connect through Version 3 services to a CHI "HIAL" into the OHT website database. The NHS has also indicated that they have interest in similarly doing the same with their validation tools that are used for applications that must attach to their "Spine" Version 3 message based infrastructure. It is HL7's intention to make the limited tools that we have in this category also available to our members.

The important message is that tooling is vital to HL7 for two broad and very important reasons:

1. Tooling is vital if we are to continue publishing new content in our standards products. It is vital to the creation of the content, the publishing of our ballots and the continued publishing of our standards products themselves. **Without reliable and maintained tooling, we face difficulties meeting our basic mission to write and publish healthcare interoperability standards.**

2. **Tooling is also vital to our users (i.e., our customers) if they are to make use of our standards.** This is especially true to the users of our Version 3 family of standards that are based on a model-based methodology and all users of our standards with structured terminologies. A lack of good, well-documented and easy-to-use implementation tooling is, in my opinion, the biggest challenge facing HL7 today. If our users cannot use our standards with reasonable effort and a high degree of success, they will look to use something else.

The NHS in the UK, CHI in Canada and the VHA in the US have all made some investments in HL7 tooling to create implementation guides and deploy them in their respective environments. **HL7 will work to leverage these experiences, knowledge and, whenever possible, the tools themselves and will work with these organizations (and others as they become involved) to make these capabilities available, when possible, to all our users.**

In our next issue, I will give you more details of our proposed strategy and give you an idea of the tooling challenge that we face in the next few years.

News from the PMO

By Dave Hamill, Director, HL7 Project Management Office

Dave Hamill

Electronic Ballot Charts

The Project Services Work Group has created a helpful document that will provide co-chairs a quick reference to information related to each level of HL7 electronic balloting, including:

- Review Ballot – Comment Only
- Review Ballot – Informative Document
- Review Ballot – Draft Standard for Trial Use (DSTU)
- Normative Ballot

Each of the four charts contain detailed information on ballot intent, ballot use, levels of approval, milestones, and how to handle ballot results. The charts also provide direct links to key HL7 ballot schedules, documents, and manuals to assist in ballot preparation, submission, and reconciliation.

The charts will be included in the next release of the Co-Chair Handbook. Until then, you can view the document at: http://HL7projects.HL7.nscee.edu/docman/view.php/55/3350/HL7%20PS%20-%20Electronic%20Ballot%20Chart%20-%20Final.pdf

Project Review and Cleanup

Over the past few months, work group co-chairs, project leaders, steering division project facilitators and volunteers from the Project Services Work Group have been working hard on the HL7 Project Review and Cleanup.

HL7 work groups reviewed their projects that resided in Project Insight and identified the project's current status based on project statuses defined by the Project Services Work Group. Active projects were updated with the most current information. Inactive projects and projects 'on hold' will be reported on separately. Additionally, the Project Scope Statement Template and Project Insight have been modified to provide better project tracking and management.

HL7 projects are viewable via the 'Search Current Projects' link located in the Resources section on the homepage of www.HL7.org (the direct URL is http://www.HL7.org/special/Committees/projman/searchableProjectIndex.cfm).

A listing of HL7 projects is also available as an Excel spreadsheet in GForge via the TSC's File tab (the direct URL is http://HL7projects.HL7.nscee.edu/frs/?group_id=52).

Multi-Stage CDA Validation

By Rick Geimer, Alschuler Associates, LLC
Email: rick@alschulerassociates.com

Rick Geimer

Most CDA implementation guides (IGs) balloted through HL7's Structured Documents Work Group assume that all documents a) are conformant to the base CDA specification and b) will also be conformant to the additional constraints in the IG itself. These additional constraints are often expressed using the Schematron schema language. This article provides an overview of the Schematron language for those unfamiliar with it and describes an approach for using XML Schema and Schematron in a multi-stage validation pipeline. Examples reference the March 2009 publication of HL7 Implementation Guide for CDA Release 2: NHSN Healthcare Associated Infection (HAI) Reports, Draft Standard for Trial Use, Release 2.

Multi-stage CDA validation verifies conformance to multiple, layered specifications: e.g., conformance to the base CDA specification as well as conformance to templates defined in an implementation guide that constrains CDA. Thus, multi-stage validation is a good fit for templated CDA.

The approach for handling multistage validation described in this article uses a validation pipeline. First, an XML Schema processor validates the input document against the CDA.xsd schema. If the document passes, it is assumed to be a valid CDA document; if it fails, then any errors are reported. Next, a Schematron processor (often just an XSLT engine) validates the input document against an implementation-guide specific Schematron file. If the document passes, it is assumed to be compliant against the IG specification (for example, hai.sch for HAI reports); if not, then errors are reported again.

Schematron Overview

Schematron is an ISO standard for validating XML documents. It operates by finding patterns in the parsed document using XPath statements, which is a very different approach from the grammar-based XML Schema language. While it is possible to build a Schematron schema that validates all rules for the entire document tree, a more common use is to check a restricted set of constraints. This makes Schematron ideal for validating IG constraints; there is no need to redefine CDA from the ground up.

A Schematron schema consists of a series of patterns. Patterns contain rules, which set the context. Rules then contain assertions, which represent the actual tests themselves. An example Schematron fragment is shown below. This fragment first checks if the 2.16.840.1.113883.10.20.5.5.1 templateId is present (the context for the rule), and, if so, it asserts that a code element is present containing the LOINC code for an HAI Risk Factors section.

Figure 1: HAI Schematron Example

```
<sch:pattern id="p-2.16.840.1.113883.10.20.5.5.1-errors">
<sch:rule context="cda:section[cda:templateId/@root='2.16.840.1.113883.10.20.5.5.1']">
<sch:assert
test="cda:code[@code='51898-5'][@codeSystem='2.16.840.1.113883.6.1']">
CONF-70:A code element SHALL be present where the value of @code is 51898-5 Risk Factors Section
2.16.840.1.113883.6.1 LOINC STATIC.
</sch:assert>
…
</sch:rule>
</sch:pattern>
```

Multi-Stage Validation

The first stage validates a CDA.xml instance against the CDA.xsd XML Schema file. This schema checks the base requirements of the CDA specification itself, such as the requirement that all CDA documents have a document ID, a document type code, etc. It also validates the structure of the document itself, verifying that each element in the document contains any required child elements and does not contain invalid elements.

continued on next page

New HL7 Website Launched!

By Mike Kingery, HL7 Director of Technical Services

Mike Kingery

July saw the release of the HL7.org website. We hope you'll find the new layout to be cleaner, more consistently organized, and easier to navigate. Reviews from the site have been very positive. Please don't hesitate to send your thoughts to webmaster@HL7.org. If you have enough room, you can also add this to the bottom of the article:

What's on the Horizon? Coming up later this year we'll see the rollout of new membership, events and store modules. Some new features will include:

- Tighter integration with the HL7 website providing instant and automatic updates to member information
- A greater level of control over your membership information such as the ability to add and change voting members through the website interface
- Ability to edit your meeting registration and print a receipt
- Store items available for instant download after purchase

Multi-Stage CDA Validation, continued from pg. 11

Rarely does the CDA.xsd file constrain the content itself, such as which coding systems are used for any particular codes (an

exception to this would be when a particular field is coded with no exceptions, aka CNE). This is because CDA is designed to be generic and applicable to the full range of CDA implementations. Many tools exist to perform XML Schema validation. Almost all XML integrated development environments (IDEs) support XML Schema, and nearly all programming languages provide a way to programmatically validate XML instances using XML Schema. A common cross-platform parser that supports XML Schema is Apache Xerces.

Subsequent validation stages are usually performed using a Schematron schema specific to a set of constraints such as those detailed in a CDA implementation guide. The Schematron schema typically does not attempt to validate the base constraints of CDA. For example, the hai.sch file has no rule checking that the Clinical Document element contains an ID child, because this is a base requirement of CDA and, thus, is already handled by the CDA.xsd file. Rather, the Schematron schema checks only those constraints that are specified in a particular implementation guide.

There is a general correspondence between IG conformance statements and Schematron assertions. This is not to say that for every conformance statement there is always one corresponding assertion in the Schematron schema, but this is typically the case. On occasion a single conformance statement might map to multiple assertions, or, in some cases, a conformance statement constraint might not be expressible in XPath and, because Schematron relies on XPath, the statement could not be implemented in Schematron. For example, a conformance statement requiring that a section title should be a language-insensitive string containing the words "Medical Equipment" is impractical to validate in Schematron since there is no effective way to do dynamic human language translations in Schematron.

The examples below show some HAI conformance statements and a corresponding Schematron fragment:

Figure 2: HAI Conformance Statement Example

CONF-303: An Infection-type Observation SHALL be represented by an observation element where the value of @classCode is OBS and the value of @moodCode is EVN.
CONF-304: A templateId element SHALL be present where the value of @root is 2.16.840.1.113883.10.20.5.6.23.
CONF-305: An id element SHALL be present.
CONF-306: The value of code/@code SHALL be ASSERTION and code/@codeSystem SHALL be 2.16.840.1.113883.5.4 HL7 ActCode Complete STATIC 20080130.
CONF-307: A statusCode element SHALL be present where the value of @code is completed.
CONF-308: An effectiveTime element SHALL be present recording the date of infection.
CONF-309: A value element SHALL be present where the value of @xsi:type is CD and the value of @code is selected from Value Set 2.16.840.1.113883.13.20 NHSNInfectionTypeCode DYNAMIC.
…

Figure 3: HAI Schematron Equivalent

```
<sch:rule context="cda:observation[cda:templateId/@root='2.16.840.1.113883.10.20.5.6.23']">
<sch:assert test="@classCode='OBS' and @moodCode='EVN'">CONF-303:An Infection-type Observation
shall be represented by an observation element where the value of @classCode is OBS and the value of @
moodCode is EVN.</sch:assert>
<sch:assert test="cda:id">CONF-305:An id element shall be present.</sch:assert>
<sch:assert test="cda:code[@code='ASSERTION'][@codeSystem='2.16.840.1.113883.5.4'
]">CONF-306:The value of code/@code shall be ASSERTION and code/@codesystem shall be
2.16.840.1.113883.5.4 HL7 ActCode Complete static 20080130.</sch:assert>
<sch:assert test="cda:statusCode/@code='completed'">CONF-307:A statusCode element shall be present
where the value of @code is completed.</sch:assert>
<sch:assert test="cda:effectiveTime">CONF-308:An effectiveTime element shall be present recording the
date of infection.</sch:assert>
<sch:assert test="cda:value[@xsi:type='CD'][@codeSystem='2.16.840.1.113883.6.96' or @codeSystem
='2.16.840.1.113883.6.268']">CONF-309:A value element shall be present where the value of @xsi:type
is CD and the value of @code is selected from Value Set 2.16.840.1.113883.13.20 NHSNInfectionTypeCode
DYNAMIC.</sch:assert>
…
</sch:rule>
```

The example below shows a web application that implements a multi-stage CDA validation process. The CDA Validator (http://www.alschulerassociates.com/validator/) allows users to upload CDA documents and select a variety of validation options, one of them being CDA + HAI validation. Valid documents show zero errors for both XSD and Schematron validation. Invalid documents contain one or more errors against the CDA.xsd or hai.sch file.

Summary

A multi-stage CDA validation pipeline provides an effective tool for leveraging existing CDA validation artifacts while providing a relatively easy method for validating the additional constraints layered on top of CDA by templated CDA implementation guides. Using separate schema languages provides the additional benefit that the two can complement each other; i.e., one language can make up for limitations in the other. There are also some constraints that simply cannot be expressed in XML Schema language. An example would be a requirement that an id element have either a root or nullFlavor attribute. The best XML Schema can do is make them both optional.

However, some downsides exist. Many developers are unfamiliar with Schematron and the reasons for its use. Also, many developer IDEs do not support Schematron directly, which is an additional barrier to use. However, the reference implementation of Schematron compiles a .sch schema into an XSLT transform, which can be run against a CDA instance to generate a validation report. Since almost all programming languages support XSLT, it is trivial to add Schematron support into a production workflow.
Also, there are some issues with speed and scale. XSLT is typically executed as an interpreted language, thus users of the reference implementation of Schematron often report performance and memory issues. Fortunately, much of this can be alleviated by using either native Schematron processors or XSLT pre-compilation tools such as XSLT-C from the Apache Xalan project.

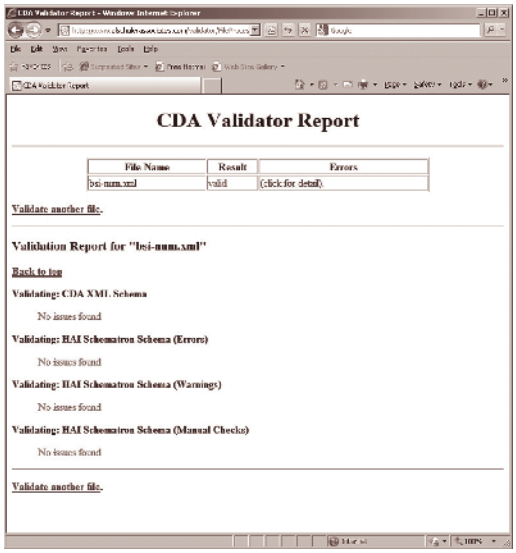
To date, the multi-stage validation approach has been adopted for nealy all of the CDA implemenation guides balloted through HL7 as well as the CDA-based IHE content profiles from IHE and HITSP. Validation can be performed using many diffferent techniques; multi-stage Schematron validation is a useful complement to templated CDA.

References

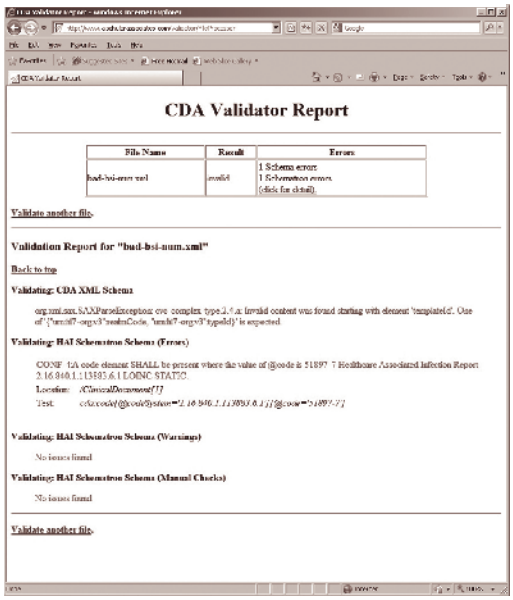
- XML Schema.
- W3C Schematron
- ISO HL7 Implementation Guide for CDA Release 2 - Level 3: Healthcare Associated Infection Reports, Release 2 (US Realm) NHSN HAI

Figure 4: Valid/Invalid Examples

Valid Result



Invalid Result



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September 20 – 25, 2009

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Sheraton Atlanta Hotel
Atlanta, GA

January 17 – 22, 2010

Working Group Meeting

Pointe Hilton at Squaw Peak Resort
Phoenix, AZ

May 16 – 21, 2010

Working Group Meeting

Windsor Barra Hotel & Congressos
Rio de Janeiro, Brazil

October 3 – 8, 2010

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Hyatt Regency Cambridge,
Cambridge, MA

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For more information, please visit
http://www.hl7.org.uk/hl7ukconferencesite/2010.asp

Catherine Chronaki

Kai Heitmann, MD

IHIC 2009 "Show Me Your CDA!" HL7 CDA Interoperability Forum: The winners

By Catherine Chronaki, Affiliate Director, HL7 Board of Directors; Co-Chair, HL7 Affiliates Council; HL7 Hellas, FORTH-Institute of Computer Science; and Kai Heitmann, MD; HL7 Germany

At IHIC 2009, the Show Me Your CDA! interoperability forum was held on May 9, 2009 in Kyoto, Japan. This year's Show Me Your CDA! highlighted CDA tools and methodology, as well as sustainable long term use of HL7 CDA. Seven case studies were presented from Japan, Argentina, New Zealand, Austria, UK, Germany, and the US. The presented cases addressed the following areas: personalized referral, electronic nursing summary, telehealth, eMedication, laboratory reports, associated health infections reports, and structured documents for Electronic Health Records (EHRs). Presented tools included a structured document editor, template management, and conformance testing of CDA documents.

The opening speech was given by Kai Heitmann, MD, who reminded the audience of the history of CDA conferences going back to 2002 bringing together the worldwide community of HL7 CDA implementers. He went on to emphasize that "documents are the most natural way to convey health status. The management of clinical documents, however, unveils a number of interoperability facets including storage, context driven analysis, and reusability."

HL7 CDA has been the flagship HL7 Version 3 projects based on XML technology that is conceptually attractive and safeguards human readability. It facilitates incremental interoperability by gradually introducing common information models and terminology, while implementing harmonized business processes. Kai then revisited the main issues raised in last year's Show Me Your CDA! forum, namely: document type classification, OID management and interoperable international registries, template registry for reusable document fragments, realm-specific verses international balloting and the exchange of CDA documents.

The Show Me Your CDA! interoperability forum was well-attended and the audience participated very actively not only in the discussion, but also in rating the presented CDA-case studies according to following criteria:

- Vision: Is this CDA case study part of a project strategy with future enhancements, which are of potential growth?
- Clarity: Has this HL7 CDA case study been clearly presented?
- Maturity: How were the technical/programming aspects been dealt with?
- Novelty: Does this case study contain new ideas as new workflows, input for CDA release 3, etc?
- Interoperability: How do you rate the interoperability of this CDA case study?
- Reference Case: Would you recommend this HL7 CDA implementation project to others?

The winners were selected based on the average evaluation score as rated (1 (best) – 5 (worst)) by the participants of the Show Me Your CDA! forum on the above criteria. There turned out to be quite a competition for the first place prize.

First Prize

The first prize was shared between Rick Geimer of the United States (Figure 1) who presented his method for Multi-stage Validation of CDA documents and Alexander Mense of HL7 Austria, who presented a comprehensive approach for the development of CDA laboratory reports in ELGA, the National Electronic Health Record (EHR) Project in Austria.

Figure 1: Rick Geimer received first place for Multi-stage validation of HL7 CDA documents.

Multi-stage CDA validation, as Rick explained, is when you want to verify conformance to multiple specifications e.g. the base CDA specification as well as conformance to various Implementation Guides (IGs) as seen in Figure 2. Validation is supported for most of the CDA implementation guides developed by the Structured Documents Work Group. The validator is based on Schematron, an ISO standard (ISO/IEC 19757-3:2006) to create patterns from IGs and other possibly template-related constraints that a CDA document is expected to conform to. Users may freely validate their CDAs by uploading a CDA document and selecting one of the available validation options. Rick pointed out that, in the future, "it would nice to generate Schematron on demand by processing the CDA instance to extract the list of relevant templates; a capability that requires the existence of a template repository." For more information on this case study, please see the article on page 11.

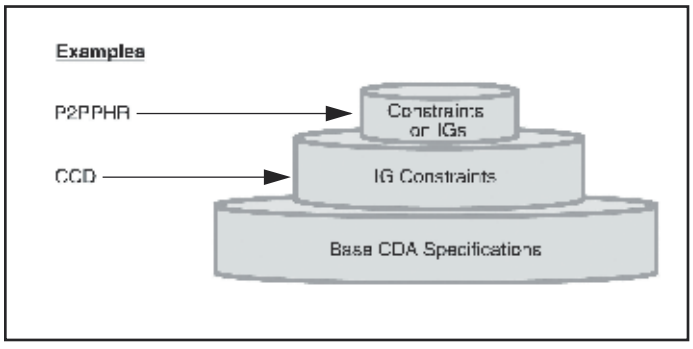

Figure 2: The concept of multistage HL7 CDA validation and example Implementation Guides and constraints.

Figure 3: Alexander Mense from HL7 Austria presented an IG for laboratory reports that won the first place prize at the Show Me Your CDA! forum.

Alexander Mense from HL7 Austria (Figure 3), presented an IG for CDA Laboratory Reports in ELGA, the national EHR system in Austria. The case study presented by HL7 Austria received the highest score for maturity and vision.

Austria is an EU member country located in central Europe. According to Alexander, Austria's approximately 250 hospitals are using hospital information systems from various vendors, while at least 15-25 different systems are deployed in the laboratories. It is the vision of ELGA that all laboratories use harmonized reports. ELGA has the center stage in the Austrian national eHealth strategy. The architecture of ELGA builds on international standards and is based on an IHE profiles, HL7 CDA Release 2, DICOM (WADO), and LOINC. HL7 CDA Release 2 is used for Discharge Summary, e-Report for Radiology, e-Report for Laboratory and e-Medication (see Figure 4).

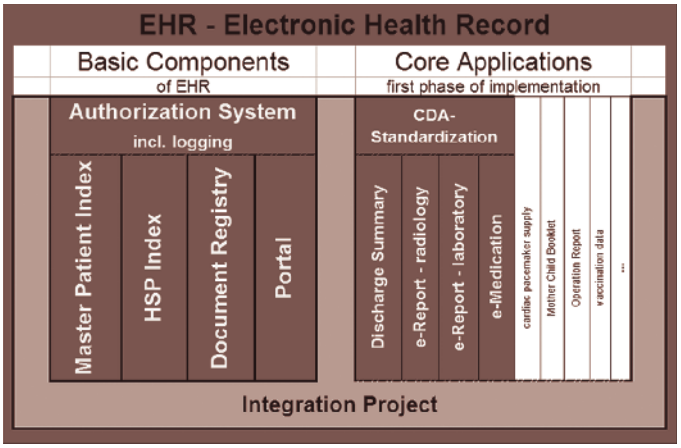

Figure 4: ELGA: The national EHR system in Austria-example Implementation Guides and constraints.

According to Alexander the development of the IG for the laboratory report was based on the IHE Laboratory Framework Volume 3 (LAB TF-3) and includes HL7 CDA reports for laboratory and microbiological standards. The development of the IG proceeded in two stages. The first stage took place from February 2008 to March 2009 and focused on the definition of the medical content by a work group comprising about 50 specialists in laboratory medicine, based on defaults provided by the Austrian Society for Laboratory Medicine and Clinical Chemistry. During the second stage, IT and HL7 experts engaged in harmonizing the medical content. In this process, the IHE XDLab was enhanced to include chief complaint or medical diagnosis, reference range, subcontracting laboratory, structured comments, and further constraints on Level 2. The main problems encountered are related to vocabularies and the coding of reference ranges an issue, which will hopefully be addressed in HL7 CDA Release 3.

Second Prize

Figure 5: Diego Kaminker, Chair of HL7 Argentina, received second place for a structured report editor widely used in the HIBA Multimedia EHR

The second prize was awarded to Diego Kaminker (Figure 5) and Fernando Campos from HL7 Argentina, located in South America, for their case study "Structured Report Editor for the HIBA Multimedia EHR." This case study received the highest score for novelty and reference case.

The Hospital Italiano de Buenos Aires (HIBA) has 650 beds and 3000 visits per month. Beginning in 2007, HIBA initiated the HIBA Multimedia EHR project, which involved extending the hospital EHR to include images, movies, and waveforms, complementing the textual report with a controlled vocabulary, while improving the medical workflow making available previous studies, diagnoses, and medical problems, starting with the diagnostic imaging department. To achieve these objectives, a CDA editor application was developed supporting report and template authoring as well as maintenance of a knowledge dictionary (see Figure 6). Stored CDA reports are used not only in clinical practice but also as a source of epidemiological information.

The editor was integrated with the RIS, PACS, and EHR of the hospital and has been running in production since September

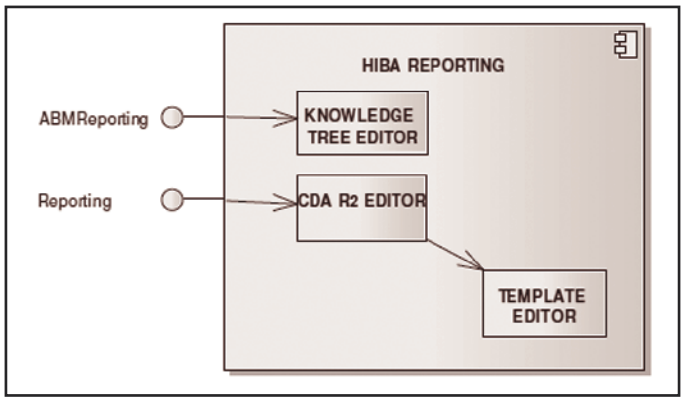

Figure 6: The HIBA reporting applications combines reusability with a knowledge editor.

2008. It is used by more than 100 radiologists and produces approximately 35,000 CDA Release 2 reports each month. According to Diego, these improvements in the workflow have resulted in a 50% reduction (from >96 hours to <48 hours) of the time from study to report.

Third Prize

Figure 7: Brett Marquard, of the United States, won third prize for a case study using CDA templates.

Brett Marquard (Figure 7) of the United States received the third prize for his work "CDA

Development Using Templates," which presented the use of templates in two projects: the Health Care Associated Infections (HAI) and Health Story. This case study received the highest score for Clarity, Interoperability, and Reference Case.

The National Healthcare Safety Network (NHSN) undertook the HAI project to support CDA-compliant submissions for certain types of Healthcare Associated Infections, involving two pilots. The pilots took place during the summers of 2007 and 2008. The Health Story project (formally known as CDA4CDT) began in 2006 with the vision for "comprehensive electronic clinical records that tell a patient's complete health story."

Both HAI and Health Story followed a template-approach which resulted in the deployment of the first two HAI CDA-compliant forms in just three months, while more than ten new types of HAI-related CDA reports were created in the following 12 months. The Health Story project demonstrated similar success with the creation of several IGs (i.e. Consultation, History, Physical, Operative, and Diagnostic Imaging reports), in just 18 months. In both projects, Template Ids facilitate use of consistent header across all guides, while constraints referenced in History or Physical IGs are referenced in others IGs.

Brett concluded that "CDA design based on templates allows for reusable, consistent and timely development, as demonstrated by the NHSN HAI and Health Story projects. Future CDA efforts should consider templates as a central part of the development process, while the HL7 Structured Documents Work Group should consider development of template databases to facilitate validation."

Concluding Remarks

It was apparent from this Show Me Your CDA! forum that HL7 CDA is widely implemented. In several of the presented case studies, health professionals' societies were actively involved in the definition of clinical content. Moreover, many steps beyond "first" experiences with CDA and towards sustainable long-term use of CDA, the challenges of tooling, templates and consistent approaches to implementation guides were stressed.

For more information, please visit www.showmeyourcda.net.

What's New Below Sea Level? Status of Nictiz Version 3 Projects in the Netherlands

By Tom de Jong, Nictiz lead HL7 architect

Tom DeJong

Some of you might know that the Netherlands (or Holland, if you like) is one of the countries where the government has chosen HL7 Version 3 as the exchange format within its healthcare infrastructure. To support this choice, the National IT institute for Healthcare (Nictiz) has been a benefactor to the HL7 organization since 2004. Nictiz coordinates most of the Version 3 projects taking place in the Netherlands, which are essential in the step-wise implementation of nationwide, distributed EHR functionality.

At the forefront of the Nictiz program is the Electronic Medication Record, which will result in access to information about current and historic medication of patients to authorized medical professionals. Initially, this was limited to retrieving dispense data from pharmacies, but it now also covers e-prescribing, with a digital signature to abide by Dutch law. Also included are medication intolerances and other contra-indications, for optimal support of medication safety in the prescribing process.

There are many other projects getting ready for implementation, including the following:

- General practitioner (GP) data: record summaries and locum reports
- e-Diabetes, to facilitate sharing all relevant data among care providers
- e-Emergency, to exchange information between ambulance, ER and GP
- e-Lab, for the workflow from lab orders to results and all steps in between
- Perinatology, for the data exchange surrounding pregnancies and newborns
- Preventive youth healthcare, with a specialized data set and record exchange
- e-Pathology, for the retrieval of pathology reports in the form of CDA documents
- And many more in preparation.

An important feature of the national program is the fact that every citizen has the right to be excluded from the exchange of their healthcare data, either completely or for specific types of information. Also, every Dutch citizen will soon be able to check which care providers have either provided or accessed data via the national infrastructure. The next step in this 'patient access' feature is to provide summarized content from the EHR, or linking it with personal health records.

National legislation is almost in place, and nationwide implementation of the national EHR is about to begin. Even though there have been quite a few technical and political challenges, Nictiz has finally reached the point where nearly all relevant IT vendors have prepared their software for integration with the healthcare infrastructure, and regional pilot projects are gearing up to a national level.

There are telling signs that HL7 Version 3 is becoming the obvious choice for data exchange in Dutch healthcare. Typical of this is the fact that another national program (DBC Grouper), focused on the adjudication of diagnosis related groups for billing purposes, has also chosen HL7 Version 3 for the interface with the central service. Implementation for these interfaces is progressing quickly, building on the groundwork laid by Nictiz. Although these two programs are completely distinct in scope (medical vs. financial data), from an HL7 perspective the synergy is clear: we're putting the Version 3 standard to use!

Structured Report Editor for the HIBA Multimedia EHR

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Diego Kaminker

Background

The Hospital Italiano de Buenos Aires (HIBA) is one of the founding members of HL7 Argentina, and has used HL7 standards since 1999. Framed by the process of integrating the information systems for the EHR, Ancillary Services and Patient Services, the Hospital Information Department of the Hospital Italiano de Buenos Aires developed a document repository for clinical documents and reports from ancillary services, using HL7 Version 2.x messaging and Clinical Document Architecture (CDA documents to achieve full system interoperability.

In this context, employing HL7 as our messaging standard allowed us to continue using already functional independent departmental systems without being restrained to a particular platform. The only problem with the use of messaging for observations as a transfer scheme to the EHR was that Version 2 messages could present temporary and partial information, and are not usually signed digitally from the sender. Coping with the EHR needs for signed documents, the hospital information system (HIS) information department asked the technical staff to find a transfer and storage standard with some intrinsic properties: authenticable, non-reputable, independent from the generating applications, and flexible. Bringing further integration while leveraging the existing platform, the Hospital Italiano de Buenos Aires used CDA Release 2 documents digitally signed using the XML signature standard to store a fully authenticated history of each patient in a central document repository. The previous generation of our CDA Release 2 reporting tools for radiologists generated plain text reports without sections, entries, or linked DICOM references. The reports were generated by transcriptionists after dictation. This fact gave our workflow an almost 24-hour delay and was a possible source of transcription errors.

The project's user community includes:

- all radiologists use the report editor,
- all physicians inside the hospital and its associated sites have access to the reports,
- patients can see their reports in the HIBA PHR
- and the structured entries are leveraged to generate clinical statistics by the Biostatistics section of the HIBA.

Solution

The reporting application consists of:

- Report authoring component, with some extra integrated capabilities (show previous reports, show previous images, send additional images to the PACS, etc.)
- Template authoring component.
- Knowledge tree maintenance component.

Any of these components can be integrated with a calling system through a specific URL using a set of parameters in the form of an XML instance. The interface for the Reporting component is a CDA Release 2 compliant document with information about the context and existing narrative text of the report, and an additional element for editor specific behavior information.

The CDA Release 2 document used for input can also contain coded entries for the findings, so this editor achieves partial report capabilities without loosing previously selected entries. We based the CDA Release 2 design on the HIBA CDA Release 2 Implementation Guide (IG) and the Imaging Integration Basic Imaging Reports in CDA IG.

Each finding selected in the knowledge tree of the editor automatically generates the corresponding entries and its derived narrative text. Each entry has a code and a value, allowing translations to SNOMED CT or RadLex-if available-through HIBA CTS (bridge between interface and standardized terminology).

The CDA Release 2 instances are reused in many ways: as a partial report, as a final report for clinical use among all the HIBA clinicians, as part of the EHR of each patient, and as a source of epidemiological information for biostatistics.

Benefits (project's goals and assessment)

1. Integration of the structured report to the EHR.
Each report is automatically sent as a CDA Release 2 document to the EHR repository.

2. Inclusion of links to the DICOM associated images - especially KINs: a few (5-50) remarkable images selected by the radiologist for the referring physician.

Our radiologists select key images for all complex studies, and the link in the CDA Release 2 points to that restricted set of images in the DICOM server / The referring physician also can see the complete study if needed.

3. Seamless integration with the RIS, without losing componentization of the editor
The editor is a plug-and-play component for our Radiology Information System (RIS), integrated invisibly.

4. Changes of the reporting workflow including direct reporting by the radiologists, reduction of transcriptionist staff, and less turnaround time.

The use of this tool combined with the implementation of UDIAT's Picture Archiving and Communication System (PACS) dramatically changed the workflow of the imaging department, lowering the TAT of routine ambulatory radiology reports from 96 hours to less than 48 hours average, with partial reports generated online, authored by the responsible radiologists.

5. Immediate availability of images for the EHR.
As soon as the image is available a new CDA Release 2 containing a fixed text and a link to the image is sent to the EHR, enabling the referring physician to see the images within the patient history context.

6. Ability of the radiologist to customize the report templates
The same editor tool acts as a template authoring tool.

CDA Release 2 is all we needed for our report structure including narrative text, coded entries, and links to the images.

CDA Release 2 also proved its capabilities enabling evolutionary semantic interoperability: we were able to add more information into our reports without changing our repository or the standard used or our tooling: we essentially leveraged all our previous efforts.

This CDA Release 2 editor allowed us to combine narrative text, coded entries and links the images from the PACS in the same digitally signed document, improving workflow, bringing uniformity and structure to the reports and allowing future reuse of the coded entries for statistical purposes.

IHIC 2009 and May Working Group Meeting in Kyoto, Japan

Michio Kimura, MD, PhD, Chair, HL7 Japan; Hamamatsu University, School of Medicine

Michio Kimura, MD, PhD

In May 2009, two meetings were held in Kyoto, Japan. The International HL7 Interoperability Conference (IHIC) on May 8-9 and the HL7 May Working Group Meeting on May 10-15. The venue was the Kyoto International Convention Center (see Figure 1), located on a hill in the northern section of Kyoto and surrounded by greens and lake. This hill has been kept as a national forest for security reasons since it is located just behind the former Royal Palace (794-1869 AD), This is why there is such a rural environment so easily accessible from downtown.

Figure 1: The venue in Kyoto

IHIC 2009 attracted 120 people from 15 countries. The highlight panel was "National EHR Projects Across the World." This panel had seven presentations and gave the best opportunity to learn about the current situations of top-line projects, as no EHR project is carried on without HL7 standards (See Figure 2). IHIC 2009 also included keynote speeches by HL7 Chair W. Ed Hammond, PhD, and ISO TC215 chair Prof. Yun Sik Kwak, MD, as well as a special vocabulary session, IHE workshop, and 17 submitted papers. The "Show Me Your CDA" session was also held, following a successful showcase in IHIC 2008 at Crete, which welcomed many newcomers. We served Sushi on a conveyer at the reception, a typical method of Japanese catering, which now you can find all over the world (see Figure 3). Some slides of IHIC presentations are posted at HL7 Japan IHIC home page at http://www.hl7.jp/ihic2009/index.html.

The HL7 May Working Group Meeting followed IHIC 2009. Though the participant count was low compared to other Working Group Meetings, we welcomed many country participants from around the world including Australia, Hong Kong, India, Israel, Japan, Korea, New Zealand, Pakistan, Taiwan, and Thailand. The total number of countries participating was 25. Therefore, the international affiliates meeting, and the affiliate chair meeting had the highest number of delegate countries ever (see Figure 4). The Wednesday evening Networking Reception was visited by three Maiko dancers, who carry long heritage of Kyoto culture (See Figure 5). After the dance, they served Sake, a Japanese rice wine, to participants (see Figure 6).

HL7 Japan offered a free half-day tour of Kyoto, bookable at each participant's convenience, as well as small group dinner tours. The places we visited included Yudofu (vegetarian tofu pot), Izakaya (Japanese pub), Karaoke (a proud Japanese invention), etc. The farewell day, May 15, also happened to be the Aoi Festival day, one of the three great traditional festivals in Kyoto. It is basically a message from the Royal Palace to two Royal Shrines, whose messenger is followed by guards, callers, and logisticians. The festival includes more than 500 participants, 36 horses, and four cows drawing two trolleys (see Figure 7). We secured 120 seats for HL7 participants.

As a host of these meetings, I thank you very much for all the people who came from all over the world, despite economic hardship and the new type of influenza. I hope you support future HL7 meetings outside the United States in order for HL7 to be the real worldwide standard.

Figure 2: IHIC theme panel

Figure 3: IHIC reception, with sushi conveyer

Figure 4: May Working Group Meeting international affiliates meeting

Figure 5: Maiko dancers, whose experience can be distinguished by the length of sleeve

Figure 6: Chairman, W. Ed Hammond, PhD, goes for Maiko

Figure 7: Aoi festival parade

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