HL7 LATAM NEWS
2014, SEPTEMBER

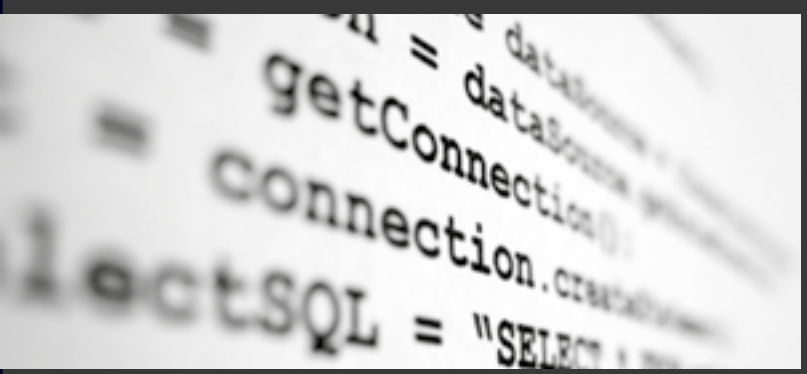
INFOLAC 2014

INFOLAC is the IMIA LAC Medical Informatics Conference.

The official member of IMIA in Uruguay is SUIS (Uruguayan Health Informatics Association), which has joined forces with SUEIIDISS (Uruguayan Society of Health Standards) to organize this event.

LOINC

LOINC is the terminology standard originally developed for clinical laboratories and now also provides clinical terms.



First Latin American FHIR

The first Latin American FHIR Connectathon was held Sept. 3, 2014, at the University of Palermo, Buenos Aires during CAIS 2014.

EDITORIAL NOTE

This is the fourth year of HL7LATAM and we continue working to disseminate the HL7 standard in Latin America and support the development of regional HL7 chapters.

Last year we redid the trilingual website (Spanish, Portuguese and English) in order to reach as many people as possible; it was not feasible to do so with the newsletter which was published last year in Spanish and English.

The goal of producing an English edition is to spread the word about our activities to other regions outside Latin America.

This year we obtained the resources to publish the newsletter in Portuguese, Spanish and English. In addition, our plans are to put out three issues in 2014; to accomplish this we expect to receive contributions of articles from the various societies that constitute HL7 Latin America.

Medical informatics is closely related to improving both patient care and the health of our region. Not only does the use of information technology represent advantages in the administrative and statistical areas, but its application in the clinical sphere brings clear improvements in quality of care.

The application of information technology in the health care area requires us to consider interoperability and establish standards so that systems can exchange information, thereby avoiding task redundancy and loss of information. In this sense the role of a standard such as HL7 is essential to achieve interoperability, but a standard is useless if it is not disseminated and made known to as many people as possible.

It is essential that the various developers and users of health informatics be aware of its scope and also be able to make their own contributions. The Latin American region has its own set of characteristics and issues, different from those of other regions, so it is important to have tools for defining our issues and making them more widely known.

Our newsletter is published on the Web site www.hl7latam.org and is available via various regional HL7 sites as well as on forums of social networks like Facebook, Twitter, LinkedIn, Yahoo and Google.

We hope more and more people will join this initiative and that standards and interoperability of health systems continue to be developed vigorously in the region.

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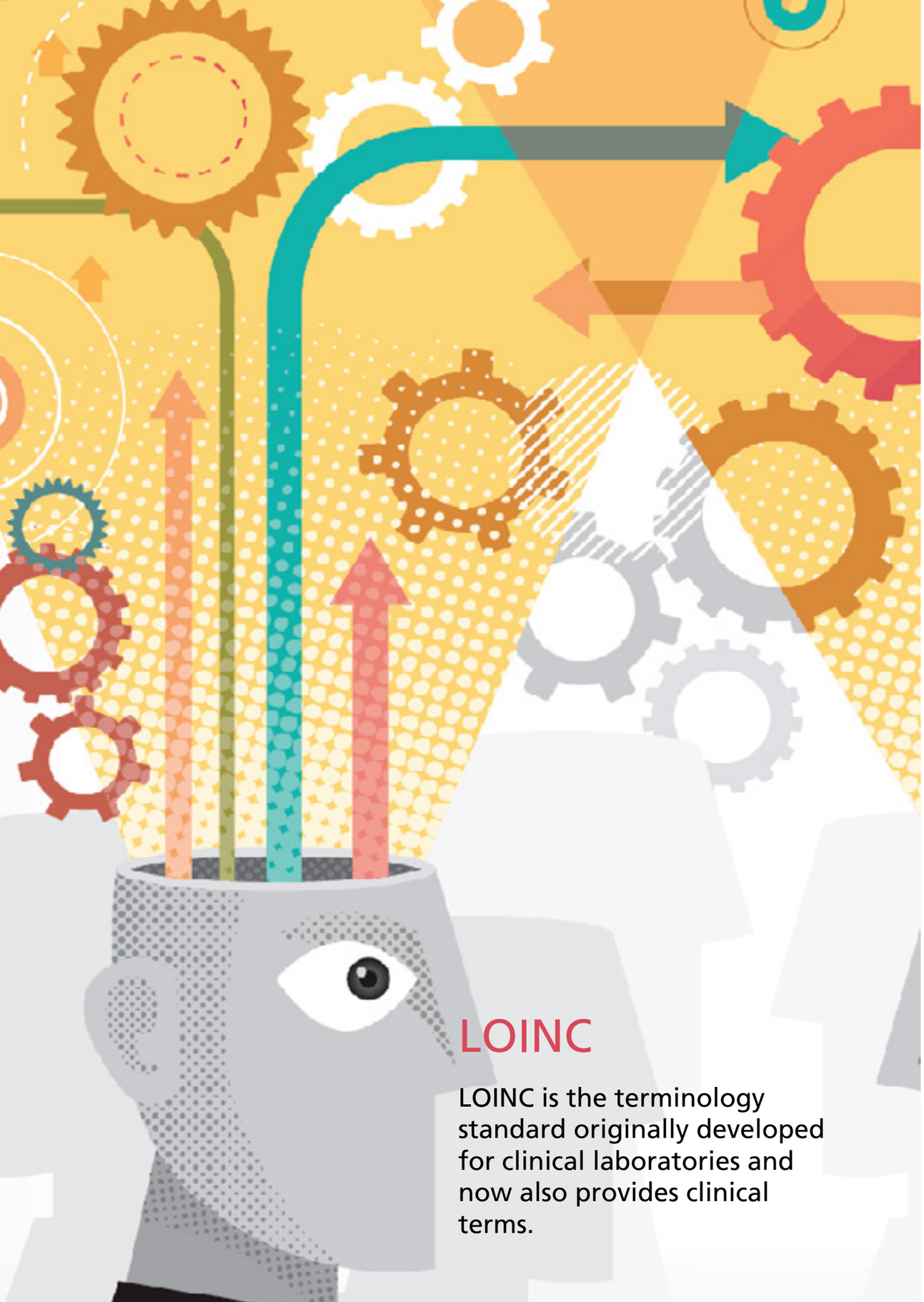

LOINC

LOINC is the terminology standard originally developed for clinical laboratories and now also provides clinical terms.

LOINC

LOINC is the terminology standard originally developed for clinical laboratories and now also provides clinical terms. It is the standard that best fulfills the terminology and coding requirements for laboratory tests and is increasingly widely accepted.

The purpose of LOINC is to assist in the electronic exchange and gathering of clinical results (such as laboratory tests, clinical observations, outcomes management and research).

LOINC has two main parts: laboratory LOINC and clinical LOINC.

Clinical LOINC contains a Document Ontology subdomain that includes the types of clinical reports and documents.

The acronym LOINC stands for Logical Observation Identifiers Names and Codes, and as the name implies, it is an observation-oriented coding.

If we consider the diagnosis as a result and the test as a question, terminologies like LOINC are on the question side and other encodings such as SNOMED and ICD-10 are on the answer side.

There are more than 20,000 official LOINC users in 160 countries around the world.

AVAILABLE LANGUAGES

LLOINC is available in various languages, and distributions can be downloaded at https://loinc.org/international.

Chinese (China), Dutch (Netherlands), Estonian (Estonia), English (United States - this is the official release of LOINC), French (Canada), French (France), French (Switzerland), German (Germany), German (Switzerland), Greek (Greece), Italian (Italy), Italian (Switzerland), Korean (Republic of Korea), Portuguese (Brazil), Russian (Russian Federation), Turkish (Turkey).

For Spanish versions, there are three official distributions.

Linguistic variation translated by the laboratory committee of the Extremeño Health Service with support from BITAC MAP.

Linguistic variation translated by the Mexican Social Security Institute, or IMSS.

Linguistic variation translated by Guillermo Reynoso, MD, MBA, of the International Medical Terminology Research Center in Argentina.
These can be downloaded from https://loinc.org/international/spanish

Since its inception LOINC has been offered for use without license cost worldwide in perpetuity, making it one of the most used standards. Licensing is free of charge for all purposes. It can be used, copied and distributed without restriction. However, the use of LOINC to develop or promulgate any other terminology standard is prohibited

International interest in LOINC continues to grow. Since January 2009, RELMA (the Regenstrief LOINC Mapping Assistant) has been available in separate downloads containing an index of words in Spanish, Simplified Chinese and Korean, which allows searching in these languages in addition to English.

In collaborative efforts, work to link LOINC and SNOMED CT began in 2012.

LOINC represents the codes and names of logical observation identifiers. LOINC is a universal standard for identifying laboratory observations that was developed by the LOINC Regenstrief Institute Inc., an internationally recognized nonprofit medical research organization created in 1994 in response to the demand for an electronic database for clinical care and management. It is freely available to all and has been endorsed by the American Clinical Laboratory Association and the

College of American Pathologists. The real purpose of the LOINC database is the exchange and sharing of various results of blood tests -- chemistry, hematology, serology, microbiology (including parasitology and virology) and toxicology -- as well as types of drugs and cell counts, analysis of reports, management of vital signs results (ECG, etc.) and also for research.

LOINC is likely to become a HIPAA (Health Insurance Portability and Accountability Act) standard for some segments of the claims attachment transaction.

Several standards, such as IHE and HL7, use LOINC to electronically transfer the results of different information systems to the appropriate health networks. However, the enclosed health information is identified by a multiplicity of code values which may vary according to the entity that produced the results. This has obvious disadvantages for health networks, which may have to adopt different codes to access and manage information from multiple sources. Managed care providers, for example, often have negotiated contracts that reimburse care episodes and unique coding to trigger an automated payment claim. Mapping each entity-specific code to its corresponding universal code can represent a significant investment of human and financial resources.

A universal code system will allow facilities and departments around the world to receive and send their results for comparison and consultation and can contribute to a larger initiative to improve public health clinical outcomes and quality of care.

Format

In the LOINC code, each test or observation identity term has 6 parts.

The database currently has over 71,000 observation terms that can be accessed and understood universally.

Each record in the database includes six fields for the specification of each test, observation or measurement

Component-what is measured, evaluated, or observed (e.g. blood glucose)

Type of property - the characteristics of what is measured, such as length, mass, volume, date and time, etc.

Time aspect - the time interval during which the observation or measurement was made

System - the context or specimen type within which the observation was made (such as blood or urine)

Type of scale -the scale of measurement. The scale may be quantitative, ordinal, nominal or narrative

Type of method - the procedure used for the measurement or observation

Each code is unique and has a check digit for reducing the possibility of data entry errors. Other database fields include status and mapping information for database change management, synonyms, related terms, substance information (e.g. molar mass, CAS registry number), choices of answers for nominal scales, translations.

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FIRST LATIN AMERICAN FHIR CONNECTATHON

The first Latin American FHIR Connectathon was held Sept. 3, 2014, at the University of Palermo, Buenos Aires during CAIS 2014.

The Connectathon had 25 participants at three levels:

0 - Observer: only took the classes and observed the interactions that generated the other participants.
1 - Basic FHIR: Creations, deletions, modifications and patient searches using REST clients.
2 - Advanced search for patients and their lab results using an application developed by the participants.

The Connectathon began with a two-hour class for all participants, including the different types of REST APIs, the basic concepts of FHIR, and a practical introduction to FHIR (how to access resources using a REST client).

A router and a FHIR server were installed in the classroom (to avoid Internet issues) and all participants connected to a database containing 8,500 patients and 850 clinical lab test results. Two weeks ahead of the Connectathon, two preparatory conferences were held for Level 2 participants to discuss the goals and the content of the resources.

Level 2 participant Adolfo Carpio (adolfo.carpio@safehis.com) has graciously provided the source code for the JavaScript solution that was developed.

It is available at https://github.com/asklepio/fhir-ejemplo.

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CDA R2 WITH ART-DECOR FOR MAIS
(ARGENTINE HEALTHCARE INTEROPERABILITY FRAMEWORK)

Currently in Argentina there is no regulation for the standardized exchange of healthcare information in terms of billing and/or subsequent debits in electronic format, or for attached information or documentation (discharge summaries, lab reports, imaging reports, etc.).

Information systems that are able to exchange information with other systems do so via plain text files, spreadsheets or comma-separated text, which creates the need for human interaction and ad-hoc interfaces for processing, storage, receipt and interpretation of this documentation.Current information exchanges are point to point; that is, they require a specific implementation for each recipient. In the absence of a standard or canonical form of data:

1. Analysis of information is delayed, causing a lag in triggers for timely alerts and decisions.

2. Information is repeatedly entered manually by the various organizations, generating errors and unnecessary workload systemwide.

3. Patients or payer affiliates do not have all their information in one place, wasting an opportunity to create a single portal to serve as a repository of all their available clinical information.

Remedying these shortcomings in the timeliness and quality of information calls for the best use of available digital technologies. Although the use of electronic medical records and software implementation in healthcare organizations has made progress in recent years and in some cases international standards or local ad-hoc standards are being used, the general rule is that each funder defines its own format for the exchange of billing data and there is no consensus on which document attachment types and formats can be used, or their composition.

Various actors in the healthcare sector have seen the need for a change of approach in the exchange of medical information to one that specifies interoperability via technical documents based on open and international standards irrespective of any state regulation.

To this end, USUARIA (www.usuaria.org.ar), via its forum specifically dedicated to health informatics (Forum IT Salud or Health IT Forum, www.itsalud.org.ar), with the support of the participating institutions (Hospital Alemán de Buenos Aires, Hospital Italiano de Buenos Aires, OSDE, Medicus, Swiss Medical and OMINT, among others) and HL7 Argentina (www.hl7argentina.org.ar), decided to create a specification for both the electronic billing format and the attachments.

The idea was introduced on Thursday, June 5, 2014, at the meeting of the Health IT Forum 2014 with this presentation: http://usuaria.org.ar/documentos/alternativa-de-implementaci%C3%B3n-de-un-est%C3%A1ndar (Spanish), and the project officially began in September 2014.

The project consists of several stages (preliminary definitions; definition of document types and content; definition of alternatives for transmission, security and legal aspects) and will require stakeholder meetings that will be held during the last quarter of 2014.

For the format of attachments to be defined in the early stages, the CDA R2 standard of HL7 International HL7 , which is also ISO/HL7 standard 27932:2008, was selected and is being translated into Spanish by IRAM, the Argentine Normalization and Certification Institute (see Note in Information Technology http://iram.com.ar/UserFiles/Nota%20IT.pdf).

Initially the document types to define are:

- Hospitalization discharge report
- Admission process (document set)
- Surgery report
- Outpatient visit report
- Clinical laboratory report
- Microbiology report
- Imaging Reports
- Pathology report
- Other diagnostic reports

For the documentation of this project, a modern open-source tool developed by a group of European HL7 members (Germany, Netherlands and Austria) called ART-DECOR was selected.
The user interface of ART-DECOR is currently in English, German and Dutch, but is being translated into Spanish to facilitate collaboration in Spanish-speaking countries.

The acronym ART stands for Advanced Requirements Tooling, a functionality that allows users with general management or medical knowledge to help design the content of clinical documents.

Starting with these definitions, the work will be done in DECOR: Data Elements, Codes, OIDs and Rules. These definitions can generate both the implementation guide in text format and templates and open-source libraries in widely used programming languages (C#, VB.Net, Java), tools for the generation, validation and clinical use of these documents.

ART-DECOR contains a library of reusable blocks (BBR in Spanish) pre-generated to create templates for clinical documents based on all documented implementations nationwide.

The tool allows versioning and status (initial draft, rejected, final) of all documentation generated.
It allows expression of the decisions reached from the beginning of the project, including scenarios, minimum concepts, data sets, templates and vocabularies (code sets).

Data available in ART-DECOR

Project: Description, copyright, version information, self-defined identifiers, community.

Data sets: Description in everyday (not technical) language of the requested information, defined as "concepts." Reusable in different documents and settings. Includes a minimal notion of data type and a cross-reference to the scenarios and document templates that include it.
Scenarios: Explanation of the use cases for the generation of different document types, and the possible actors involved. Includes the relationship of the concepts included for each scenario and their cardinality (repetitive elements, optional or mandatory). Permits the description of trigger events and dependencies for each scenario.

Terminology: Coding systems and value sets defined by the project (codes for document types, sections, gender, medical specialties, nomenclatures, etc.).

Templates: Permit the definition and expression, explicitly (in XML) and graphically (via UML diagram), of the elements to be included in documents based on data sets through explicit data set mapping.

Problems: Issues to be resolved in the project, including start date, priority, status, etc.

The MAIS ART-DECOR repository is currently located in the public repository http://art-decor.org/art-decor/decor-project--mais-

References

More information about the tool: http://www.art-decor.org/mediawiki/index.php/TV

(Especially recommended: video of Dr. Kai Heitman at MEDINFO Istanbul 2014, in English)

ART-DECOR fact sheet (English): http://art-decor.org/mediawiki/images/f/f8/ART-DECOR_factsheet_EN.pdf

Article on ART-DECOR in HL7 Europe newsletter (English): http://www.hl7.eu/download/eun-04-v2014.pdf, p 24-30.

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Terminological problems in health sector interoperability

INTRODUCTION

Interoperability has been in use in the health sector in Argentina for several years. It frequently is used to solve the problem of authorization of services between payers and medical providers. The majority of current implementations in our country use the HL7 messaging standard to interoperate in the health sector. However, a number of technological problems exist due to the lack of an up-to-date consensus standard for medical procedures.

There is general agreement on the terminology to be used, such as ICD9 or ICD10, to represent diseases in computerized systems. In the case of drugs, each has a barcode or coupon code that serve as unique identifiers. While there are better systems for coding diseases and drugs, the fact that there is consensus on the use of coding of diagnoses and medications aids in the interoperability of software systems; unfortunately, this is not the case with medical procedures.

The big problem with terminology comes when trying to implement interoperability of medical services. Although there is a national master table -- the National Medical Benefits Nomenclature -- it has not been updated in recent years, and it requires that actors create their own codes to define new procedures not contained in it. Interoperability between systems requires the creation of transcoding tables (data dictionaries), commonly known as approval practices among providers and payers.

The purpose of this study is to determine the impact on costs of creating and maintaining transcoding tables for medical services among the various actors so that systems can interoperate.

The lack of terminology standards increases costs and errors in system interoperability processes. It is important to understand that the problem of terminology in interoperability is beyond the scope of individual institutions, and that the only way to solve it is by consensus or de facto through the State convening the organizations of prepaid medical companies, provincial public health officials, biochemistry federations, diagnostic institutions, etc., so that the country's institutions, both public and private, can use the terminology standard for medical services (National Benefits Nomenclature) and can interact smoothly (1).

Letting each institution individually solve the problem of coding practices not only represents a futile effort but also complicates interoperability. The interconnection of heterogeneous healthcare applications must follow a standard terminology (4).

When all possible relationships between payers and providers are considered, the situation becomes critical because the number of relationships multiplies exponentially and the problem of terminology balloons due to the number of tables that need to be maintained.

MATERIAL and METHODS

Unit of analysis:
For this study we analyzed the following data sources:

1. BIOCOM System database of nomenclated and non-nomenclated medical services.
2. Data dictionaries or transcoding tables for interoperation between providers and payers.
3. TRADITUM's online registration and approval system for medical services, containing service authorization data practices; payer has approximately 600,000 members and a 640-member network of providers connected via systems integration.
The following studies were conducted on the different units of analysis:

1. Master list of nomenclated and non-nomenclated services. Its composition was analyzed by calculating the proportion of nomenclated and non-nomenclated services in the following four sectors:
Clinical
Surgical
Studies associated with imaging
Laboratory
2. Transcoding tables are tables with two fields: a provider's own code and the code of the company with which it has to transact. These tables contain as many records as there are different codes in systems that wish to interoperate. If a clinic wants to interoperate with Payer X, it has to send the code that will be understood by Payer X's system, and if Payer X sends a code, it has to be translated into the code the clinic will understand (see Figure 1).

3. The database of requests for authorization of care for 600,000 Health Services patients was studied:

RESULTS

Results of the Analysis of Master list of nomenclated and non-nomenclated services. In the master table of services we found the following:

Clinical laboratory: More than 70% of current services and codes are not standard in the nomenclature.
Imaging studies: More than 40% of the services currently provided are not in the nomenclature.
Surgical care: More than 30% are non-nomenclated.
Clinical care: More than 20% are non-nomenclated.
(See chart 1)

Results of analysis of transcoding tables: We found in our database of studies that the average number of entries in data dictionaries was about 500 codes that needed transcoding, with up to 1,500 and a minimum of 100. This task of coordination requires 10 days' full-time online validation by the company, someone in the medical center's benefits department and three days' review by the payers.

The average number of work hours for a programmer with the company providing the HIS to create these tables, with the data available, is 10 hours and accounts for 50% of the time required to implement a bidirectional interface between a provider and a payer. As for the average number of hours per month required to maintain an interface, the lack of a standard increases it by an average of 5 hours: 80% of the time is taken up with resolving errors that occur in transactions on the order of 10% and with adding the new codes for interchanges/interoperation between systems. These tasks would not be necessary if there were a standard terminology. Each link between a medical center and a funder requires maintaining a transcoding table in order to operate.

Own Code	Description	Payer X Code	Description Payer X
42.01.01	Office Visit	344234	IN-OFFICE CONSULTATION
34.02.04	Computed Tomography of Thoracic Aorta	{}900503	COMPUTED ANGIOTOMOGRAPHY OF THORACIC AORTA WITH 3-D ARTERIAL AND/OR VENOUS RECONSTRUCTION

Figure 1

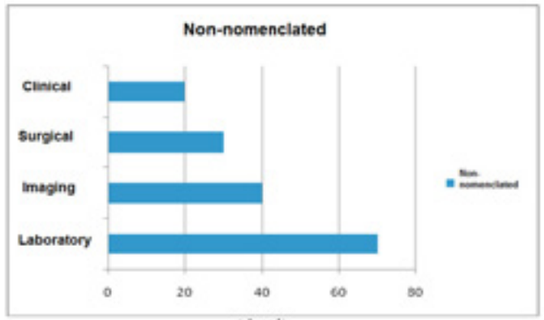
The critical calculation of the cardinality relationships between providers and payers was performed with data from a payer that has a base of about 600,000 patients and between 9,000 and 10,000 providers nationwide. In turn, each center serves an average of 10 payers. This situation is observed in the provincial capitals where the supply of health services is concentrated among few providers and each of them may care for members of up to 20 payers/benefits providers. This study excludes health centers that depend on the state sector, both national and provincial, regional or municipal.

In Chart 2 each arrow represents a data dictionary for the tables that need to be maintained under this interoperability structure and which must be constantly updated. In our case study, having 640 suppliers and 10 payers means maintaining 6,400 dictionaries. (See Table 1 and Chart 2). This scheme is multiplied exponentially when interoperability involves several providers and payers. In our case study, the number of hours needed to sustain the integration is 64,000 and the hours required for maintenance amount to 32,000. This could be avoided if there is an agreed-upon standard terminology for use in interoperability.

DISCUSSION

The healthcare system must recognize that interoperability is a current reality and that different information systems are increasingly needing to interoperate. Having a messaging standard is not enough -- we must also reach a consensus on the standards used to resolve terminology issues.

An updated Practices Nomenclature used by everyone is urgently needed. The absence of such an agreement has a heavy impact on system costs and also generates a high percentage of errors. Currently in Argentina more than 50% of me-



(chart 1)

dical practices are assigned codes in an anarchic system, and this hinders interoperability.

CONCLUSIONS

Today health care cannot be properly managed at any level without the help of computer systems. Information processing requires standards, consensus and uniform criteria. If health officials understood the impact of the terminology problem, there could be a chance of solving it.

At present, the existing anarchy with respect to coding of services leads to the investment of a significant amount of resources (basically person-hours and money) that could be devoted to more productive tasks that add value and simplicity to the provision of data for statistics, prevention campaigns, cost analysis of pathology, etc.

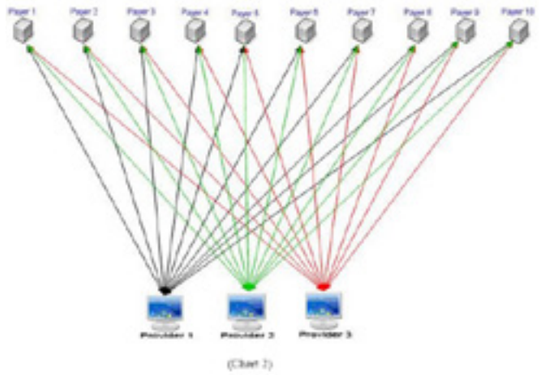
To process information and obtain serious health statistics for application in preventive policies, standards, order, consensus and then uniform criteria are needed.

Understanding this problem that is so clearly avoidable would substantially reduce the costs and errors of interoperability. If that happened, the construction and maintenance of data dictionaries that are expensive to create, maintain and update would not be necessary.

In this paper we studied the impact on the cost of implementation and maintenance of systems that need to interoperate via messaging. Argentina had developed a standard service master list called the National Nomenclature that was used for many years by service providers and payers to exchange information, define payment methods and establish agreements and terms of use. Unfortunately, updates to this Nomenclature have not been made for more than a decade, and more than 50% of the services currently provi-

Medical providers	Payers	Possible interrelationships
640	10	6400

(Table I)



(Chart 2)

ded are not in the standard, requiring that each actor invent the missing codes and causing the problem to worsen rapidly. We hope that this work will make a contribution to the understanding and scope of the problem. Ontologies are a resource for working informatically with the conceptualiziation of meaning and avoiding the limitation imposed by standard terms.

Note

In Latin America, health-care payers, insurers and prepaid care companies always make reference to those responsible for funding the cost of care of members, policyholders, associates or affiliates of a health care system, whether private, governmental at any level or mixed.

Referencias

[1] Michael P. Gallaher, Alan C. O'Connor, John L. Dettbarn, Jr., and Linda T. Gilday, Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities Industry , NIST GCR 04-867 http://www.bfrl.nist.gov/oae/publications/gcrs/04867.pdf

[2] EHR IMPACT European Commission, DG INFSO & Media, The socio-economic impact of interoperable electronic health record (EHR) and ePrescribing systems in Europe and beyond.
http://www.ehr-impact.eu/downloads/documents/EHRI_final_report_2009.pdf

[3] Spil, Katsma, Stegwee, (2007): Information systems and healthcare XXIII: Exploring interoperability of electronic health records by studying demand and supply in the Netherlands. In: Communication of the Association for Information System. Vol. 20, p. 996-
1008. ´

[4] Standardized terminological services enabling semantic interoperability between distributed and heterogeneous systems
International Journal of Medical Informatics, Volume 64, Issue 2, Pages 223-240 J.Ingenerf

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The Unified File Format for HL7 Electronic Documents – DUFF

Abstract— Interoperability through document-based meaningful exchange of Personal Health Records and Electronic Health Records has to be supported by portable document formats. For HL7 structured documents, XML offers an encoding syntax which guarantees interoperability. However, portability is not guaranteed when other files and related documents have to be attached to the structured documents, as it might be necessary to know in advance (or modify) the location (path) of the referenced objects. The objective of the paper is to propose a standard file format for electronic health documents which improves their portability, human readability, and usability. The proposed DUFF HL7 specification complements the HL7 v3 structured document standards, encapsulating the content and information attached to the electronic health documents in a single file.

Keywords-Portability; Encapsulation, HL7 CDA; HL7 SDA

INTRODUCTION

Portability of software products is defined as their capability to be transferred from one platform to another [1]. The Extensible Markup Language (XML) is a W3C standard created to support the development of portable, open, human-legible, flexible web applications [2]. HL7 makes use of XML as a technology to represent instances of their Version 3 message specifications, as well as Clinical Document Architecture (CDA) and Structured Document Architecture (SDA) specifications.

XML provides HL7 structured documents with an encoding syntax which guarantees interoperability. However, portability and usability is not guaranteed when other files and related documents have to be attached to the structured documents, as it might be necessary to know in advance (or modify) the paths to the included objects.

Currently some storage formats for electronic documents using XML syntax do exist which allow to encapsulate in a single file different related documents, e.g., standards such as the ISO/IEC 26300 OpenDocument [3] and the ECMA-388 Open XML Paper [4]. However, specific file formats for electronic health documents do not exist.

A Special Interest Group (SIG) in HL7 Colombia identified the need for such a format and decided to work on the design and implementation of a specification named DUFF HL7 (HL7 electronic Unified Document File Format).

OBJETIVES

The objective of the paper is to propose a standard file format for electronic health documents which has the following properties:

1. Provide an electronic file format that facilitates the portability, usability and human legibility.
2. Present electronic health documents as a composite information unit. It integrates different instances of HL7 structured document specifications (CDA, CCD, SPL, Order Sets, and other structured documents) in one single unified format.
3. Include other contextual information (e.g.

images, video, PDF, etc) in the encapsulated computer file.
4. Guarantee the aforementioned features, without altering the characteristics of HL7 electronic documents, or limiting their interoperability. performance attributes, and processing capabilities in software applications and devices.

The Unified File Format for HL7 Electronic Documents – DUFF

The Unified File Format for HL7 electronic documents – HL7 DUFF is a standard file format for storing electronic health documents which complements the Structured Document Architecture (HL7 V3 SDA, R1) and Clinical Document Architecture (HL7 CDA R2; ISO/HL7 27932:2008) specifications which are part of HL7 v3.
DUFF HL7 stores, and supports the exchange, of electronic health documents as a single information unit which includes not only the XML instances of HL7 structured documents, but also contextual information associated to the document in other formats (DICOM, jpeg, gif, png, pdf, etc). HL7 DUFF is a compressed ZIP file which uses the extension .hl7 and contains a set of files and folders as described in Figure 1. Following, the main files in HL7 DUFF are described:

content.xml: This file stores the main content of the structured document and uses XML syntax. Its structure supports HL7 v3 structured documents (CDA, CCD, SPL, etc).

meta.xml: This file contains the metadata of the electronic document, e.g., type of template, type of structure, document ID, date and time of creation, author, target record, etc.

Structure of an HL7 DUFF

mimetype: This file encodes information as MIME (Multipurpose Internet Mail Extensions) for sending the content by e-mail.
settings.xml: This file contains properties for document processing and reading for specific software applications (optional).
Styles/styles.xsl: This file contains information about the document´s display style, using the W3C Extensible Stylesheet Language (XSL).
META-INF/manifest.xml: It contains a list of all files in the .hl7 file.
The included folders are dedicated to:
Images/: Stores image files (jpeg, jpg, gif, png, bmp, svg, etc) associated with the document.
Objectn/: Stores the related files in the main document (other structured documents, DICOM, pdf, odt, doc, docx, etc).
META-INF/: Stores the manifest.xml file.
Styles/: Stores the styles.xsl file, the cascading style sheets (css) and all other files necessary for displaying a document.
Thumbnails/: Stores an image of a document preview (optional).

It is clear that HL7 DUFF offers a clear separation of the electronic document itself, its metadata and visualization information (style), nevertheless storing all information in a single file.

In order to demonstrate how an HL7 DUFF file could be displayed, prototype plug-ins for Firefox and Google Chrome have been developed. The plug-ins provide free and simple mechanisms for document presentation. Figure 3 shows a HL7 DUFF displayed in Firefox.

DISCUSSION AND CONCLUSION

The file format proposed in HL7 DUFF is based on widely used standard formats for electronic documents such as the OpenDocument and Open XML Paper specifications. HL7 DUFF is a complementary approach to HL7 Self Displaying CDA (DSTU), facilitating the inclusion of additional multimedia content and other related files. When exchange of structured documents between offline applications (using media such as CD, DVD, USB-memory, etc) is required, HL7 DUFF can be used in conjunction with the ISO 9660 removable storage media R1 specification. For this occasion, it is necessary to relate the HL7 DUFF artifacts in the HL7DIR.xml file and store it in the HL7/ folder. As the information is encapsulated in the HL7-DUFF format, it is not necessary to use non-HL7 directories to store the document attachments.

In conclusion, HL7 DUFF improves portability, usability (displaying) and human readability of electronic health documents. HL7 DUFF complements the HL7 structured document standards, encapsulating the content and information attached to electronic health documents in a single file. If accepted, HL7 DUFF would be the first HL7 v3 specification proposed by HL7 community members in Latin America.

ACKNOWLEDGMENT

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REFERENCES

ISO/IEC 9126: Software Engineering -- Product Quality, part 1. 2001.
World Wide Web Consortium (W3C). http://www.w3.org
ISO/ IEC 26300. Information technology--Open Document Format for Office Applications (OpenDocument) v1.0, 2006
ECMA-388. Open XML Paper Specification, European Computer Manufacturers Association, 2009
ISO/IEC DIS 9660: File System Specification, 1999

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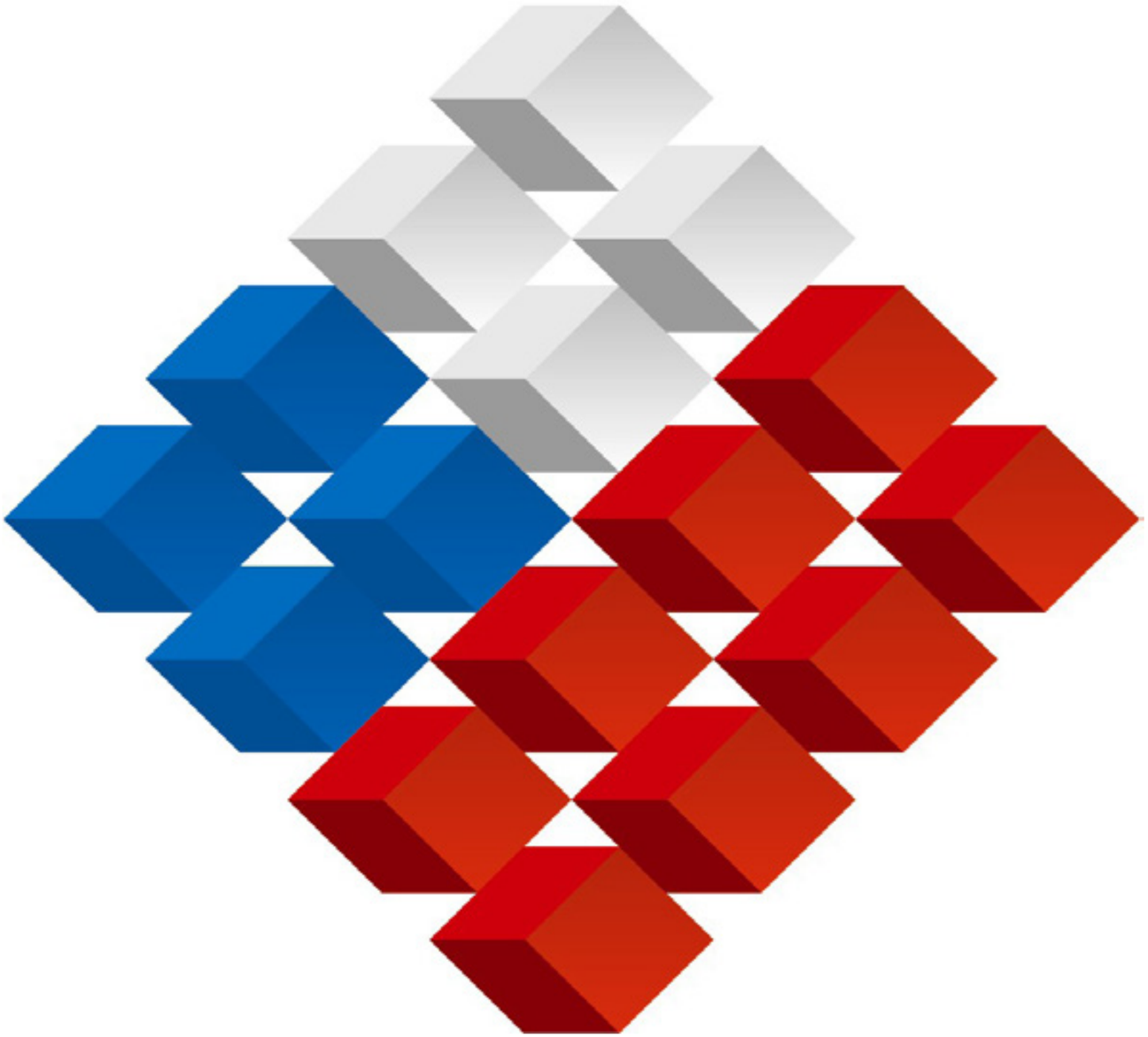

IHE Training sessions

At the Third International Healthcare Meeting in Chile, the University of Valparaiso and FISA offered a special session for industry professionals. Here is a summary of the ten key questions by Fernando Campos.

1) What are the advantages, the benefits of standardized technological integration of systems and applications in healthcare, and the need for it in order to improve the quality of care for users?

The advantages are numerous. Today in most Latin American countries a patient's medical record means a stack of papers, either handwritten by the doctor, or printouts of one or more electronic records in a variety of undeterminable formats. Historically, medical records were on paper, and this form of storage has many problems related to availability and access, format and content, which are totally fragmented. Additionally, the information is captured by applications with different purposes. It is generated by one or more laboratories, each of the attending physicians, the hospital(s) involved, the nurses providing treatment or giving medication, the pharmacies, the diagnostic imaging center, etc.

The advent of new technologies brought a new way to store, retrieve and display the information contained in a medical record, by switching to an electronic format. The inclusion of structured information and the use of standards comes from the need to share information and for the information to be understandable to the other systems. This is the cornerstone of a single medical record for each Chilean citizen, with accompanying benefits in all aspects. Patients have a centralized medical record that contains all their information and no longer need to keep track of what medications they are taking or what the other healthcare center told them to do. It benefits the professionals who treat them because they have much more information with which to make a correct decision, and there are countless benefits for healthcare management and oversight.

2) How does the HL7 process work?

HL7 is a "Standards Development Organization" (SDO) for the field of healthcare. Founded in 1987 as a non-profit, it operates internationally with the mission of providing global standards for the clinical, patient care, administrative and logistics domains in order to achieve true interoperability between different healthcare information systems. It currently has about 1,300 corporate members, 2,500 associates, 57 international affiliates and 95% of healthcare software vendors worldwide.

Like all ANSI-accredited SDOs, HL7 has a strict and well-defined set of operating procedures that ensure consensus, transparency and balance of interests.

HL7 members are known collectively as the Working Group, which is organized into technical committees and special interest groups. The technical committees are directly responsible for the content of the standards. The special interest groups serve to develop information and tests for the exploration of new areas of coverage for the standards published by HL7.

A list of technical committees and special interest groups, and their missions, scopes and coordinators, is available on the HL7 website.

3) Are there successful case studies? Scientific evidence.

As far as single medical records using IHE, there are lots. I can give you three examples with different scopes -- continental, national and regional -- of medical record sharing of documents and information, and the same software is not used everywhere.

The European Patient - Smart Open Services (epSOS) Project aims to provide an electronic medical record summary so professionals can quickly see essential information for patients who need care outside their country of origin. It includes electronic prescription functionality to allow patients to receive medication regardless of the

country in which it was prescribed and the country they are in when it is dispensed.
The epSOS Project has a continental scope, having been tested with 11 countries: Austria, Czech Republic, Denmark, France, Greece, Italy, Netherlands, Norway, Slovakia, Spain and Switzerland. A total of 23 countries are participating, with an investment of more than USD $50 million. The project began in 2008, spurred by the desire to provide interoperability between countries mainly because of the movement of people within Europe (short distances).

It is coordinated by the Association of Local Authorities and Regions (SALAR) of Sweden, and education for patients and providers is delivered via the project website. It also has an education and certification project for software developers with open access to the documentation. The structuring of the documents is standardized and their contents use national global identifiers except for the vocabulary and data set determined by the project. The consumption of each document has the problem of language; epSOS provides translation from Spanish into French through a proprietary vocabulary and semantic services. Some of the sections that are interchanged in the patient summary are: allergies, medications, vaccines, previous diseases, procedures, vital signs, test results and treatment plans. The terminology used is proprietary since they are responsible for translating the original document to the language required.

Another major implementation, this one at the national level, is Australia's PCEHR project (Personally Controlled EHR), whose goal is to address the country's fragmentation of information, giving everyone simpler access to their medical data and making access more secure for care providers. It is national in scope, implemented across Australia. As of November 2012 it had 18,214 registered users, with a goal of 500,000 users at the present time. It has an investment of more than USD $466 million and 243 participating organizations. By law it is administered by the Department of Health and Aging. It was mainly developed by the agency NEHTA (the National E-Health Transition Authority) and has an education center and web sites to train providers and patients. Software developers can access all the specifications, examples and seminars, although there is no product certification yet.

As for the content of each document, they have a national healthcare identifier and use unique global healthcare identifiers for patient, providers (doctors, specialists, etc.) and organizations. Implementation guides explain how to consume each document and how to present it to the user. Specifications establish the structure of the hospitalization discharge letter, medical record summary, administration of drugs, consultations or referrals, visit summary and advance directives. Each guide specifies its vocabulary and code sets. SNOMED CT and LOINC are used for document types and some Australia-specific codes for sex, name, cause of death, mental state, etc.

Finally, a project with a regional scope, of which many in Spain stand out, but one of the most important is HC3 - Shared Medical Record of Catalonia. Its aim is to establish the electronic record with a set of documents containing the relevant information about the status and progress of patients during their care.It is accessed an average of 74,000 times per month and has 468 participating organizations. As of February 2013 there were 11 HC3-compatible software applications and more than 51 million published documents.

It is administered by TicSalut, the Catalonian Department of Health, which provides services to those providers who cannot connect their own products, including those that require an interlayer or interface. The generation of these documents by suppliers is mandatory, and joining the project is optional for patients. Under the infrastructure, patients have an identity card (Tarjeta de Catalunya CIP), although the documents support two more identifiers, national and European.

The storage strategy is a central repository and local repositories. The file of each document is centralized. Document transport is through Web Services, SOAP/IHE/ or dedicated web services. Documents are digitally signed and have support for all DICOM objects.

As for content, documents have unique global healthcare identifiers for patients, providers (doctors, specialists, etc.) and local vocabulary administered by TicSalud. Documents are consumed through a specific portal or through the medical record if they have that functionality. The specifications of document types, templates, text and structure are defined by Spanish law.

4) What are the problems affecting the public healthcare system?

I'm not the best person to discuss the Chilean public healthcare system, but with respect to interoperability, I'm not aware of any implementations instituted by the public healthcare system at the regional or national level. I believe promoting the use of standards in implementable form is one of its objectives. With a goal of providing a quality healthcare service for patients, it is advisable to have at least national policies, or better yet policies that are international in scope, defining the interoperability framework.

5) In your experience, what results could be obtained by putting HL7 into practice in our country?

Adopting standards like HL7, and others that have different objectives, like DICOM for images or SNOMED CT for terminology, serves to achieve comparability, consistency of information and interoperability between information systems. This is important for exchanging information between different systems, both among service providers and between them and other stakeholders such as suppliers and governments. Interoperability becomes all the more critical the more profound and widely distributed computerization projects for healthcare organizations are. This represents an essential infrastructure for the integration of information related to the health of the population in a timely and reliable manner.

A key aspect is the continuity and integration of information. All the stored medical information generated by the various healthcare systems can be consulted at any point of care. Early detection of disease outbreaks or health problems is no small benefit since the availability of high-quality information in real time means rules can be enacted for the monitoring and detection of outbreaks or emerging problems. With little effort, this permits permanent passive surveillance and anticipation of emerging health problems. From a governmental standpoint, it can effect integration with these systems and the surveillance system will enable development of active policies within the health system and compliance with the regulations, guidelines and recommendations of the Ministry of Health.

6) What are the benefits to patients of the implementation of this standard?

The most significant outcome for the patient is starting down the road towards the adoption of a single medical record. These promote a greater increase in access to other medical opinions and allow access to personal records to facilitate decision-making about health. They often prevent repeating expensive and invasive tests and certainly increase the feeling that care is effective and safe.

7) Can you cite any other experiences in other countries? In which countries; in public hospitals and/or private health centers?

I have already mentioned a few success stories. There are many more. In Spain almost every region has its single medical record. There are very good adoption rates in Australia, the Netherlands, the UK, New Zealand and the Nordic coun-

tries. In the United States, a country with highly advanced technology, the adoption rate is not as high as you would think, although in the wake of policies put in place by the Obama administration it has risen slightly thanks to tax incentives, part of his government's policies, that are awarded according to criteria for meaningful use of EHR functionalities. Closer to home, on the other side of the Andes, the Hospital Italiano de Buenos Aires first implemented HL7 more than 14 years ago and it has been growing ever since; in the next few months it will integrate mHealth services with this standard from its mobile portal.

8) How long after starting to apply this standard does it take to obtain concrete results?

Results are seen as soon as implementation of the standard begins. Patients start to see their information at different care centers, doctors see the most comprehensive medical records and managers receive information they can analyze, and it's like magic to them because they really don't significantly change the way they use the system. Information flows between systems transparently to them. The biggest problem is initiating the implementation. There are a lot of policies to define, implementation guidelines to adopt and then it has to be put into practice, incorporated into the flow of each application. I don't know of any cases in which such solutions have been implemented in less than 12 months, although today there are tools that allow rapid deployment of solutions that were inconceivable in the past or took a lot of work, such as message generators or terminology servers.

9) What are the international standards?

International healthcare standards are numerous. I would say that they have to be classified by their objectives. For example, in clinical information messaging, HL7 is undoubtedly the most widely implemented. For financial data and transactions, X12N. For diagnostic imaging, definitely DICOM, and for drug prescriptions NCPDP (National Council for Prescription Drug Programs). In the category of terminology and reference vocabulary, for diagnoses ICD10, for clinical SNOMED CT and for laboratory identifications and other clinical identifications LOINC.

The point is that when it comes to standardization, there are many standards available and even ones with the same function, there are different levels at which they should be applied and they also complement each other. It is absolutely necessary to analyze them in order to choose the right one and develop a scalable and sustainable interoperability project. This is the principle that IHE uses. It is not a standard in itself, but uses the most appropriate standard to solve a specific need and defines and documents how to do it.

10) What can you tell us about these interoperability training sessions? What level of training does this conference provide?

The goal is to pass on all my knowledge and experience so that participants take away the main ideas on how to get systems to exchange and reuse information. The idea is to give them the knowledge of each of the aspects necessary to interoperate, that they get all their questions on the subject answered and they receive all the tools available to start the process.

If you have more questions about IHE or interoperability and standards training sessions, you can ask by email: info@hl7.org.ar or fernando.campos@gmail.com.

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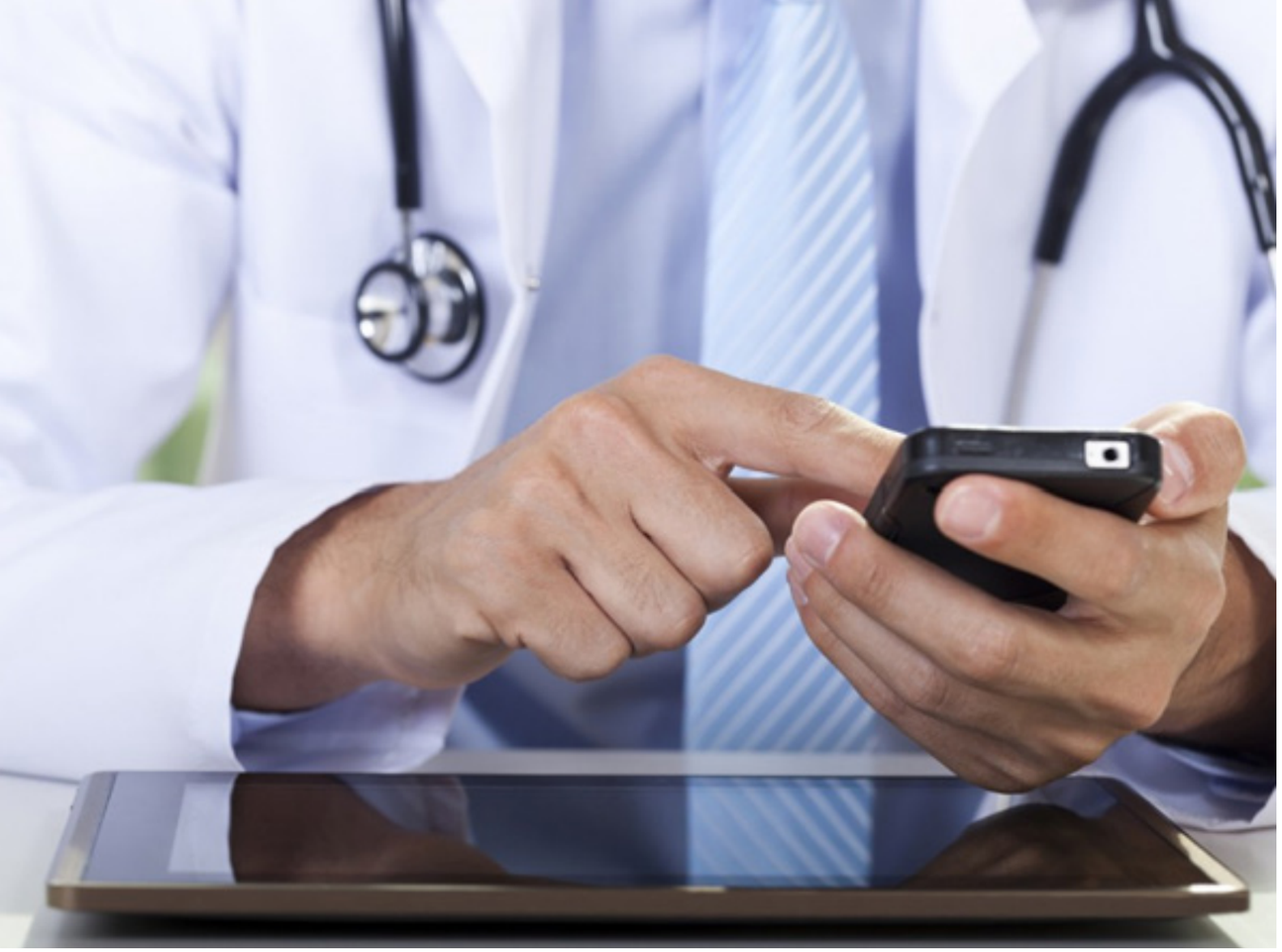

INFOLAC 2014

It is with great pleasure and pride that we invite you to Montevideo for INFOLAC 2014, to be held this October.

Before we go into details, here are some definitions:
INFOLAC is the IMIA LAC Medical Informatics Conference.

IMIA LAC is the Latin American chapter of IMIA and IMIA is the World Association of Medical Informatics.

The official member of IMIA in Uruguay is SUIS (Uruguayan Health Informatics Association), which has joined forces with SUEIIDISS (Uruguayan Society of Health Standards) to organize this event.

Our purpose is to help others learn about this discipline to which we have devoted so many years and so much effort. We believe medical IT professionals must be key players in the development and sustainability of informatics systems in health-care environments. A familiarity with the needs and working requirements of health professionals and technicians, an understanding and vision of the strengths of applied ICTs and a thorough knowledge of health-care systems form the basis of this discipline.

The challenges in Latin America are numerous and it will take the joint efforts of the scientific community to meet them successfully.

Achieving properly trained human resources, getting technology projects incorporated into the institutional budgets and political definitions of our countries, interacting with the industry in ways that generate shared projects -- these are some of the challenges to be faced in the next few years as we work together to bring our health-care systems into the 21st century.

So, we invite you to come to Montevideo in October. The idea is to present experiences, discuss, listen. If we communicate, if we join forces, if we share knowledge and experiences, we will be creating the space we need to further our own development.

INFOLAC will be held Oct. 16 and 17 in the Conference Center of the Municipality of Montevideo (IMM).

The name of the conference is e- health 2.0 Hyperconnected.

The official topics are interoperable HCE and mobile health, but of course all topics relating to medical informatics have a place at INFOLAC.
We will have the full program shortly and will make it available online.

Some relevant data:

Web page
www.infolac2014.org

Scientific Committee
*International
Diego Kaminker
Lincoln Moura
Fernán Quiros
Fernando Portilla
Alan March
Javier Carnicero

*National
Guillermo Rodríguez
Julio Leivas
Gustavo Pérez
Selene Indarte

Important dates
Papers:
Submission dates: May 1 to July 31, 2014
Return date by the Scientific Committee: August 31, 2014
To submit papers, at least one of the authors must be registered for the congress.

For the Organizing Committee
Selene Indarte

Por Selene Indarte, Comité Organizador
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Salud.uy Technical Conferences

Strategy for the adoption of standards in an HCEN draft.

The project and its history

Salud.uy is the National Electronic Health Record (HCEN in Spanish) project in Uruguay. As a nationwide project it has the support of the state, which has led the way in its development and management; at the same time, Salud.uy is employing a strategy of openness that involves different actors and stakeholders in the sector.

And this could be the first major milestone for the project, to garner positive general acceptance, and project from it the national vision of a unified HCEN.

This first phase of the Salud.uy project has been framed in the definitions, which involves the specification of standards for data exchange. Uruguay has been interested for some time in gaining familiarity with medical informatics standards, and SUEIIDISS [the Uruguayan Society for the Standardization, Exchange and Integration of Health Services Data and Information] has created an important space for learning and openness.

Similarly, AGESIC, as the country's e-government agency, has made significant progress in the processes of interoperability, and has placed at the project's disposition the government's interoperability framework definitions. Incidentally but still important to mention is that thanks to the efforts of recent years, the latest United Nations e-government ranking shows Uruguay as the leader in the region.

Meanwhile, Salud.uy in early 2013 resumed the push to make progress in localizing health standards and specifications, in order to begin nationwide adoption within the proposed HCEN, and to this end it developed the first guidelines and technical documents.

Origin of the Technical Conferences

It was important to create opportunities to publicize the technical definitions that were being developed. Therefore, it was necessary to generate a strategy for sharing content developed through the program with the various stakeholders.

Thus were born the Technical Conferences, as a response to the need to communicate the guidelines generated by the program, so that they would be made known to and adopted by the actors of Uruguay's medical community. The Technical Conferences made available the localized definitions of healthcare standards long awaited by providers and suppliers who had taken up the issue of standards. And for those new to the subject, the Conferences have played a role in imparting the different concepts included in this topic.

Format of the Technical Conferences

Thematic focus:
Each conference has a focus and a purpose. To date seven technical conferences have been held with different themes, which have presented content sequentially within a framework of continuity of the process.

The topics of the conferences were:
Definition of OID for the HCEN project
Person model
Minimum elements of an HL7 CDA document
SNOMED CT
Electronic signature and HL7 CDA documents
Interoperability platform: EMPI, XDS.b, Mirth
HL7 CDA laboratory documents and scanned HL7 CDA documents

Dissemination of Technical Guidelines:
Each conference is accompanied by a technical document developed and prepared in advance by the Salud.uy executive team. The document provides instructions for localizing the standard and is the guide for institutions to begin to fine-tune their implementations.

Thematic experts:
There are at least three different facilitators at each conference: a guest expert on the immediate topic, a topic-specific local experience and the presentation of the technical guide. Inviting guest specialists creates an introductory context for the topic.

Participants:
The conferences are open and free of charge; advance registration is requested only so that those who attend can receive a certificate of participation. The target attendees are IT specialists with healthcare institutions and providers of health informatics applications. University professors, doctors and health professionals also attend.

Frequency:
The conferences are held regularly, at least once every two months. At one point we were holding one a month, but because of the program's other activities, they have spread out a bit.

Results of the Technical Conferences

Adoption of standards: The guidelines generated by the conferences are the tools that provide practical support to organizations preparing their applications for the processes of interoperability.

Average participation: The first conference was attended by about 50 people. The most recent ones have an average participation of 80 people. One even drew 120 participants, indicating significant acceptance.
Formation of a community: Starting with the first conference, an interest group was formed on LinkedIn that now has grown to more than

200 members. This gives members a space to voice concerns, make recommendations and communicate directly with IT contacts at Uruguay's medical institutions, as well as providers, among others.

Interaction with experts: In person and through video conferencing, experts from Spain and Argentina, as well as local figures, have participated, sharing their insight and knowledge to enrich the conferences' subject matter.

Practical experiences: The space set aside in the Conferences for healthcare institutions to present their experiences in adopting the Guidelines has played an important role. First, it validates the usefulness of the work done, and second, it motivates other institutions to make progress.

Evaluation: At every Conference, the attendees evaluate the content and dynamics of the conference itself. This information is analyzed by the team. The grade received has been positive in most cases, although there are undeniably points involving all of us that could be improved.

What's next...

The next six months will be busy ones for Salud.uy. Two more conferences are scheduled for this year, as there are other events intended for homogeneous audiences: the presentation of the results of a survey of medical ICT in Uruguay and the start-up of the Tele-Imaging Pilot Application, milestones that will generate calls about the projects. Additionally, in October Montevideo hosts INFOLAC, another event that captures the attention of the community interested in healthcare and medical informatics standards.

The Conferences strategy is demonstrating that participatory and open processes generate positive adherence; on July 22 the medical group composed of health professionals and academics and organized by Salud.uy oversaw the inauguration of the Medical Conference, an event created to present the results of their past months' work focusing on the Urgent Care Minimum Data Set; the Medical Conference activities were be based on the Technical Conferences model. The event drew the participation of nearly 200 people, and the country's physicians began to discuss the information that needs to be available in an HCEN, an experience which we found completely successful.

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