Business Enablers for HL7 Interoperability
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Business demand for HL7 interoperability

- In 2003 Canada has taken the strategic direction to implement health care information system based on HL7 v3 to consistently exchange, manage and integrate data that supports clinical patient care and the management, delivery and evaluation of healthcare services.
- This was explicitly stated in Canadian EHRS Blueprint where HL7 v3 interoperability profiles were introduced.
- However... there are still implementations built on HL7 v2 and other
- In order to effectively manage standards, Infoway’s Standard Collaborative was given mandate for development and maintenance of pan-Canadian health informatics standards and specifications including HL7 v3.
EHRS architecture overview - the need for standard interoperability
HL7 interoperability and integration challenges

- Being an early adopter assumes unpredicted implications in implementation phase.
- Lack of the native support for HL7 V3 in the applications
- Cumbersome and complex model that requires in depth understanding to properly implements.
- Lack of experience and tools to assist with both development and implementation of the HL7 v3 standards.
Risk of not addressing HL7 interoperability needs

- Complexity associated with HL7 v3 model and message structure impacts Canadian EHRS implementation
- Jurisdiction decide to go with other (easier to implement standards)
- Lower than expected adoption rate of the current EHRS infrastructure
- Impacting general interoperability among systems that participate EHRS in Canada
- Others?
How Infoway responded

• It was obvious that complexity of HL7 V3 spec needs to be addressed in order to make it appealing to the implementers of the standard.

• An abstraction in form of suitable business objects (tools, appliances, transform) that effectively obscure complexity of the underlying model, expose only business elements / attributes and ultimately foster HL7 interoperability.

• Address the need for business enablers for
  – Specification development and maintenance
  – Specification implementation
  – Specification conformance testing

• An immediate need to foster the adoption of the EMR systems and integration with EHRS resulted in development and procurement of the interoperability enablers (tools) as part of Infoway’s EMRI program.
Key objectives for interoperability enablers

Provide business objects with interface that exposes business attributes to the end user while running following capabilities “under the hood”:

• Maintain, persist and render business attributes and elements of HL7 specs while seamlessly managing specification content in the background
• Performs validation of the business attributes in the context of given message interaction
• Configure handling of the non-business or unused business attributes in the spec
• Create canonical representation of the HL7 model to manage transformation between HL7 v3 message and business object
HL7 interoperability enablers

Standards implementation support
- Infoway Message Builder (Message Builder) – APIs for solution development
- Infoway Testing Environment – provides platform for standard conformance testing

Standards development and maintenance support
- Infoway Message Remixer – provides the ability to constrain universal / pan Canadian HL7 specs (MIFs)
- Infoway Message Builder Validation – provides the ability to validate message structure and attributes of HL7 interactions
- V3 Generator – provides the ability to consumes the output of MBT and MR and generate standard artefacts
- GPMR – provides the ability to validate the message structure
Interoperability workflow – from specification to a product

Message Sets

Developers use

Generate
Infoway Message Builder
Feature sheet

- Allows developers to focus on the business-aspect of message interaction
- It can be used on both, client (PoS) and server (EHRS) side independently.
- Transform populated objects into HL7v3 and vice versa
- Provides flexibility in configuring and performing terminology-code lookups,
- Provides a capability to configure and populate common message value
- Code-generation algorithms merge identical and similar classes together to simplify the generated API
- Message structure and attribute validation
Supported transport architecture

- Out of the box, the most commonly used message transports are supported:
  - REST
  - SOAP
  - TLI (pan Canadian transport spec)
- Transport mechanisms can be added with a plug-in type architecture
Supported pan Canadian spec versions

- The same business object can support multiple version of the specification by providing individual transformation message set per spec release.
- Up to this point, several releases of pan Canadian HL7 V3 specs are supported:
  - MR2009 (R02.04.02)
  - MR2007 (V02R02)
  - V02R01
  - V01R04.3
Infoway Message Builder - Distribution Model

- Message Builder Runtime will be available under Open Source License (Apache 2.0) - the components available under this license include:
  - MBT core libraries
  - MBT runtime for supported pan Canadian specs release generated by MBT

- Message Builder Generator is not publicly available - Infoway will manage the generation of releases and APIs on behalf of jurisdictions. Should Infoway's mandate come to an end, the Generator will be released under an Open Source license.

- As part of our internationalization plan, Infoway will examine the options for making MB Runtime and MB Generator available outside of Canada
The Message Generator uses pan-Canadian HL7 v3 Specifications (MIF files) to generate a simplified software object interface (Message Sets) for PoS implementers.

- Message Sets are used in runtime to dynamically manage messages produced by different spec release.
Message Builder API Generation

panCandaian Spec
• MR2009 MIFs
• Jurisdictional MIFs
• Legacy MIFs

Generator

Canonical Message Set

consumes

produces

Java API Creator

.NET API Creator

Simple XML Creator

generates

generates

generates

Java API

.NET API

XML API

consumes
Java API
.NET API
XML API
Message Builder Architecture

Clinical Application – EMR, HIS, other POS

MBT API

Java API (Business Objects)

User Interface (Business View)

MBT Core and Runtime

Marshall / Unmarshall

Terminology lookup

Validator

pC spec release runtimes

Client

Class

ABusinessObject
Infoway Testing Environment
Feature sheet

- Enable consistent testing capabilities for solutions that implement health care information exchange standards (HL7 v3)
- Extensible architecture that supports integration of additional system components to enhance testing capabilities
- Integration with live jurisdictional EHR / EMR systems and repositories
- Potentially support specification other than HL7 v3 (v2, CDA, other)
Infoway Test Environment Architecture

Test Environment

- Web Services
- (MBT) Validator
- Assertion Engine
- Dispatcher
- Logger / Test Result
- Response Engine

POS

- Request / Response

Config Client

- Configure Ticket, Download Data
- Navigate Report

SBM

- Ticket Data
- Test Data

Report Engine

- Report Data

DB Storage

- Test Results, Rules

Web Services

- Ticket Data
- Test Data

Report Engine

- Report Data

DB Storage
Infoway Test Environment components

• Serena Business Mashup (SBM) - The user create test scenarios, initiate test tickets and start test runs through the SBM

• Test Harness - The POS under test communicates with the Test Harness. Request to testing harness contains identification of test client and test scenario run number.

• Report Engine - The user view/print/save reports through the Report Engine
Opportunities and exposure to HL7

• Infoway is working on engagement model with other jurisdiction / organization
• Current focus (for the next year, likely) will be on roll-out of the HL7 business enablers (tools) in Canada
• Infoway will continue to update HL7 members regarding activities on interoperability enablers and plans for international access.
• Input and comments by HL7 are highly appreciated
Value proposition

The value which the tools and platforms that act as interoperability enablers for standard solutions provides to the targeted community includes following:

- Increases quality of HL7 standard artefacts
- Simplifies standard maintenance procedures and workflows by provision of tools / capabilities to consistently capture, maintain and render specification content
- Enriched set of capability for consistent conformance testing of solutions that implement HL7 standards
- Accelerate solution development by obscuring the complexity of dealing directly with HL7 model and interactions for the largest community of consumers of HL7 specs, the implementers
- Lowers the implementation cost by reusing those capabilities
Questions and Comments

Thank you!!!