IHE Gazelle *ObjectsChecker* : Concepts, Benefits, Demonstration and Access

**IHIC 2015**

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Abderrazek Boufahja

- IHE-Europe software developer/consultant on gazelle team since 2009
- Participation at 8 European and North American Connectathon
- Certified HL7 CDA / HL7 V3 Specialist
- Experienced with national and international CDA implementations
- Main designer of IHE Gazelle *ObjectsChecker*
- Created more than 30 CDA validators based on the *ObjectsChecker* Methodology for multiple projects: IHE / epSOS / ASIP santé / etc
Context

- **IHE / IHE-Europe**
  - IHE is an initiative by healthcare professionals and industry to improve interoperability between healthcare IS
  - A non-for-profit association attached to IHE
  - Develop Test tools and organize European Connectathon

- **Connectathon**
  - A meeting between healthcare systems developers in order to test the interoperability between their systems/devices => next one : Luxembourg

- **Gazelle**
  - an open source test-bed platform that provides a wide set of tools to validate information exchange between healthcare system => for more details visit the website : [http://gazelle.ihe.net](http://gazelle.ihe.net)

- **IHE CDA content profiles**
  - A list of profiles restricting the CDA standards with specific requirements
Outline

- IHE Gazelle *ObjectsChecker* : Principles and advantages
- Gazelle Validation of CDA documents
- Combined use of Art-decor and IHE Gazelle *ObjectsChecker*
IHE Gazelle *ObjectsChecker*: Principles and advantages

Gazelle Validation of CDA documents

Combined use of Art-decor and IHE Gazelle *ObjectsChecker*
A methodology to describe informal requirements in healthcare IT specifications based on CDA standard, into a formal description

An architecture that allows:

- The validation of the conformance of any kind of XML requirements
- Provide metrics and documentary features
- Improve the coupling between rules and requirements
- Support the validation of inheritance between healthcare standards

Source: eHealth Suisse, Format d’échange, Rapports de laboratoire soumis à déclaration en Suisse (Projet)
Automatic and thorough Testing Requirements Entry

- Standards (HL7, etc)
- IHE TF
- eHealth Spec

UML models OCL constraints → OCL Processor (DresdenOCL)

OCL Processor (DresdenOCL)

M2T Processor (Acceleo)

XML

Java XML Binding

JAVA Validator

Java Unit Testing

Validator Documentation

OASIS TAML Requirements

Description of the structure of the XML doc. Injection of rules and requirements into the model → OCL constraints

Scripts that extract information from UML models and generate structured texts related to these models
Multiple CDA validators (each testing one “content profile” specification) were developed and used by IHE and multiple national projects around the world:

- 14 IHE validators
- 11 epSOS validators
- 15 CDA validators for different national projects

30,000 CDA documents validated against Gazelle ObjectsChecker generated validators

Heavily used during European and North American Connectathon and epSOS Projectathon

Easily integrated into third party repositories as a front end validation tool
Gazelle ObjectsChecker
Advantages

- Requirement coverage capability
  - support of complex requirements (complex algorithm, etc)
  - conditional /iterations validation
  - XML elements type verification
  - Data types requirements checking

- Runtime access to coded value sets from a repository of terminologies

- Easier to maintain than hand written schematrons

- Validation is faster than schematrons

- Linking between the rules tested and the requirements from the specifications
How does IHE Gazelle ObjectsChecker compares to Schematron

- Schematrons are useful but have inherent limitations in term of coverage. Requirements generally not covered:
  - CDA R2 base standards requirements:
    - Generic data types requirements
    - Complex requirements between CDA elements
    - XML elements type checking
  - Typical Content Profile/implementation Guides requirements
    - Complex attributes specifications (like the person identifiers structure/algorithm, telecom structures, etc)
    - Complex Conditional requirements between sections or entries
    - Specific data types requirements
  - Relationships consistency with other document content and metadata
- Elements based on the paper to be presented on Tuesday at IHIC conference: “Model-based Analysis of HL7 CDA R2 Conformance and Requirements Coverage”
  - Coverage of CDA R2 requirements improvements: typically from 50-60% to 100%. For details see above paper.
IHE Gazelle *ObjectsChecker*: Principles and advantages

Gazelle Validation of CDA documents

Combined use of Art-decor and IHE Gazelle *ObjectsChecker*
**EVSClient** : a front end to the conformance validation services used by the Gazelle Platform ([http://gazelle.ihe.net/EVSClient](http://gazelle.ihe.net/EVSClient))
EVSClient demonstration for CDA validation
EVSClient installations

Venice Region (Italy)
eSanté (Luxembourg)
epSOS (EU Cross-border)
Kanta (Finland)
Outline

- IHE Gazelle ObjectsChecker: Principles and advantages
- Gazelle Validation of CDA documents
- Combined use of Art-decor and IHE Gazelle ObjectsChecker
Advantages of coupling ObjectsChecker with art-decor

- Art-decor moves rigor at point of Content Profiles/Impl.
  Guides documentation and avoid discovery of issues/gaps at the time ObjectsChecker input is created.
- Reduces gaps and misunderstanding of CDA specifications
- Automate the generation of formal OCL description avoiding test tool manual entry
Art-decor and Gazelle ObjectsChecker coupling

**Art-Decor**
- Standards (HL7, etc)
- IHE TF
- eHealth Spec

**Requirements Entry**
- UML models
- OCL constraints
- OASIS TAML Requirements

**ObjectsChecker**
- OCL Processor (DresdenOCL)
- M2T Processor (Acceleo)

**Outputs**
- M2T templates
- Java XML Binding
- JAVA Validator
- Java Unit Testing
- Validation Documentation
More details : tomorrow paper “Model-based Analysis of HL7 CDA R2 Conformance and Requirements Coverage”

Visit our web site : http://gazelle.ihe.net

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Any question?
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