ART-DECOR
Basics and User Perspective

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9th February 2015, Prague, Czech Republic

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Heitmann Consulting and Services
ART-DECOR expert group
Template WG co-chair,
HL7 International
Past chair HL7 Germany
HL7 Germany / Netherlands
• ART-DECOR – what is it?
• Datasets
• Scenarios and Transactions
• Vocabulary and Terminology
• Associations
• CDA Templates
• Issue Management
• Building Block Repositories

Use Case: Vaccination Certificate Document
What is it?

ART-DECOR
... and a Specification Developer‘s life
... and a Software Developer‘s life
“Life” Cycle

Communication need

Production

Scenarios

* 

Test

Specification

Implementation

ART-DECOR Developer Day part 2 – 02.2015
...is an open-source tool and a methodology for various **multidisciplinary** stakeholders of healthcare information exchange
ART-DECOR in 4 bullets (2)

• ...supports comprehensive collaboration of team members within and between governance groups
• ...allows separation of concerns and different views on one single documentation for different domain experts
• ...supports creation and maintenance data sets, scenarios, HL7 templates (DSTU), value sets, and more
Comprehensive collaboration tool to support governance groups:
- Concept, model, conversion, cooperation, documentation, publication
- User interface, rules, test framework, RESTful services, terminology browser, demo and sandbox applications
One of the main objectives

- Separation of concerns towards a comprehensive specification
- Different views on one single documentation
  - With changing focus on different artifacts
  - For different domain experts

| Healthcare Providers and Medical Experts | Terminologists | Analysts, Modellers and Template Creators | Vendors and Interface Specialists |
## Overview DECOR

### Concept
- Concept Group / Item
- Data type
- Concept list
- Properties

### Scenario
- Actor
- Transaction
- Cardinality
- Conformance
- Test suite

### Rules
- Templates
- Elements
- Attributes
- Constraints
- Validation

### Identifiers
- OID registry
- Summary of IDs

### Codes
- Value Sets
- Terminology Associations
- Coded Concepts

### Issues
- Change Management
- Status
- Assignment

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DECOR

*project*
- name
- descriptions
- authors
- contributors
- versions
- copyrights

*issues*
- description
- status
- trackings
- assignments

*data sets*
- concepts
- value domains

*scenarios*
- use cases
- actors
- transactions

*terminology*
- value sets
- code systems
- terminology associations

*rules*
- instructions
- constraints
- validation
- conditions

*identification*
- OIDs

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Multi-Language Support

- Interface vs. Project Language
- Four supported languages
  - English
  - Dutch
  - German
  - Polish
- Two in preparation
  - French and Spanish
Projects (some of them)

- International projects (mainly in Europe)
  - Austria (ELGA National eHealth programme)
  - Netherlands (national screening programme on bowel cancer)
  - Netherlands (Nictiz, multiple projects)
  - Norway (HL7, regional Health networks)
  - epSOS (European eHealth programme)
  - Germany (HL7, national eHealth programme)
  - HL7 Poland
  - European Templates and Value Set Repository (nascent)
  - IHE Profile and Value Set Repository (in development)
Generating UIs from ART-DECOR

User Interface (forms) for entering data re/ Colon Screening

Transformation using scenario, value set and template definitions (+ a small amount of handling exceptional things)
ART-DECOR @ internet

- art-decor.org
  - Documentation about ART-DECOR
  - International site and international projects host
- decor.nictiz.nl
  - Dutch projects host
  - Documentation, specification
- HL7 Newsletters
ART-DECOR articles

- HL7 EU Newsletter #4: download at hl7.eu
- HL7 International Newsletter September 2014

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Further Developments ...

• ... following the “roadmap”
• Extension of Building Block Repositories
  • e.g. Extend The EU Template Repository
  • IHE Profile Repository
  • C-CDA 2.0
• Extending our Testing Framework
• Extending support for HL7 v2 (xml)
• Support of FHIR resources, profiles and value sets
• Organizational Enhancements
Datasets
Dataset in former times

Excel Spreadsheet Mapping Table

- Healthcare Professional Content
- Mapping to technical artefacts per scenario
- Scenarios with cardinalities

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**ART-DECOR: tasks + definitions**

- **Data sets**
  - Concepts and their properties
  - descriptions, data types, choice lists, ranges, operationalizations, rationale etc.

- **Scenarios**
  - Use Case based
  - Actors
  - Transactions
  - Concepts from Dataset with Cardinalities and Conditions
<table>
<thead>
<tr>
<th>Dataset and scenario</th>
</tr>
</thead>
</table>

**Vaccination Certificates Document - Datasets**

<table>
<thead>
<tr>
<th>Decor</th>
<th>Project</th>
<th>Datasets</th>
<th>Scenarios</th>
<th>Technology</th>
<th>Templates</th>
<th>Issues</th>
</tr>
</thead>
</table>

**Dataset**
- Name: Vaccination Certificates Document Dataset

**Description**

**Search in dataset**

**Concepts**

- **Holder (Person)**
  - Name
  - Family name
  - Given name
  - National Patient identifier
  - Date of birth
  - Gender

- **Vaccination**
  - Date of vaccination
  - Vaccine
  - Vaccine (Name)
  - Vaccine (Code)
  - Lot number
  - Route of Administration
  - Indication
  - Indication (Text)
  - Indication (Code)

**Gender**

- Version: 10/16/2015
- Description: Gender of the holder

- **Usage (1)**
- **History (0)**

**Collection of concepts in a specific domain**

**Navigation**
- ART-DECOR Developer Day part 2 – 02.2015
• Choice of concepts out of data set for a specific use case → scenario
An example: Vaccinations

WHO Document: International Certificates of Vaccination
INTERNATIONAL CERTIFICATE® OF VACCINATION OR PROPHYLAXIS

This is to certify that [name] ........................................
date of birth ................................ sex .....................
nationality ..............................................................
national identification document, if applicable ..................
whose signature follows ...........................................
has on the date indicated been vaccinated or received prophylaxis
against: (name of disease or condition) ..........................
in accordance with the International Health Regulations.

<table>
<thead>
<tr>
<th>Vaccine or prophylaxis</th>
<th>Date</th>
<th>Signature and professional status of supervising clinician</th>
<th>Manufacturer and batch no. of vaccine or prophylaxis</th>
<th>Certificate valid from:</th>
<th>Official stamp of the administering centre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Signature et titre du clinicien responsable</td>
<td>Fabricant du vaccin ou de l'agent prophylactique et numéro du lot</td>
<td></td>
<td>Cachet officiel du centre habilité</td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CERTIFICAT® INTERNATIONAL DE VACCINATION OU DE PROPHYLAXIE

Nous certifions que [nom] ........................................
né(e) le ................................ de sexe ..................
et de nationalité ..................................................
document d'identification national, le cas échéant ...............
dont la signature suit ..........................................
a été vacciné(e) ou a reçu des agents prophylactiques à la date
indiquée contre: (nom de la maladie ou de l'affection) ...............
conformément au Règlement sanitaire international.
DATA "set"

**INTERNATIONAL CERTIFICATE® OF VACCINATION OR PROPHYLAXIS**

This is to certify that [name] .................................................
date of birth ........................................... sex ..........................................
nationality ..........................................................
national identification document, if applicable ........................................
whose signature follows ..........................................................
has on the date indicated been vaccinated or received prophylaxis
against: (name of disease or condition)

in accordance with the International Health Regulations.

<table>
<thead>
<tr>
<th>Vaccine or prophylaxis</th>
<th>Date</th>
<th>Signature and professional status of supervising clinician</th>
<th>Manufacturer and batch no. of vaccine or prophylaxis</th>
<th>Certificate valid from: until:</th>
<th>Official stamp of the administering centre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Signature et titre du clinicien responsable</td>
<td>Fabricant du vaccin ou de l'agent prophylactique et numéro du lot</td>
<td>Certificat valable à partir du : jusqu’au :</td>
<td>Cachet officiel du centre habilité</td>
</tr>
</tbody>
</table>

1.  

2.  

---

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Dataset in ART-DECOR

Vaccination Certificates Document - Datasets

<table>
<thead>
<tr>
<th>Decor</th>
<th>Project</th>
<th>Datasets</th>
<th>Scenarios</th>
<th>Terminology</th>
<th>Templates</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dataset: Vaccination Certificates Document Dataset

Name: Vaccination Certificates Document Dataset

Description: Gender of the person

Gender:

- Version: 10/16/2013
- Status: Draft
- Value Set: AdministrativeGender (dynamic)

Value:

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
<th>Codesystem</th>
</tr>
</thead>
<tbody>
<tr>
<td>male</td>
<td>M</td>
<td>AdministrativeGender</td>
</tr>
<tr>
<td>female</td>
<td>F</td>
<td>AdministrativeGender</td>
</tr>
</tbody>
</table>

Usage:

History:
Dataset in ART-DECOR

- Dataset with concepts and proper descriptions
  - Hierarchical list
  - Properties ~ understood by Healthcare Professionals
- Inheritance, also from foreign Repositories
- Concept and dataset versioning
- Multiple views on datasets, scenarios (and value sets, templates)
Colon Cancer Screening (NL)

Population Screening

Data Exchange Colonoscopy Pathology via HL7 CDA Documents

Quality insurance and data center

Colonoscopy + Pathology

Treatment or Surveillance
Definition of a dataset
Health Care views “par Excel-lence”
Vocabulary and Terminology
ART-DECOR: tasks + definitions

- **Terminology**
  - Document proper terminologies
  - Connect concepts with terminologies
  - Create value sets
  - Link value sets to choice lists
  - Identifier management

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• Dataset concept and choices of concepts

Eye Color
• blue
• brown
• green
• other
Terminology

ART-DECOR: browsers + support when creating Value Sets
Associations
Associations – get more out of your specifications

Template Associations

- Template
  - Template
  - element

Dataset

- Concept
  - Concept
  - Choice list
    - A
    - B

Terminology Associations

- Code + Code System...
- Code + Code System...
- Code + Code System...
- Value Set
  - Code + Code System...
  - Code + Code System...
Overview

Concept
Scenario
Rules
Identifiers
Codes
Issues

HCP
terminologist

ART-DECOR Developer Day part 2 – 02.2015
Templates
ART-DECOR: tasks + definitions

- Analyst, modeler, “templater”
- definitions of items for messages/documents based on data set / scenario
- Links to
  - The right value sets
  - The right message/document specification (template)
- Representing concepts with HL7 v3 templates
Overview

- Concept
- Scenario
- Rules
- Identifiers
- Codes
- Issues

HCP

terminologist

templater

templater
Advantages of “templates”

- Re-usable blocks
- Semantics clear
- Use in many contexts (scenarios) with link to concepts and terminologies
- Make specification and implementation of messages / documents “much easier”
Resources

Stakeholders
- HCP
- Terminologists
- Architects
- Test tooling
- Systems

ART
- HTML

WEB INTERFACE

DECOR
- Data set and scenarios
- Value Sets and identifications
- Templates and schematrons
“Vaccination Certificate”

- Structure of the CDA-Document
  - Section: List of all Vaccinations (human)
  - Entries with Medication Information (computer)

Header
structured and coded

Body
structured content with coded „sections“

Section: Vaccinations
- code
- title
- text (list)

Vaccine#1
Vaccine#2
...with CDA you aren‘t there yet...

Generic models
...need something
...to fill the gap
...to semantic interoperability
• A template is a set of further constraints on top of an underlying model
• Example: patient
  • **Model**: the patient shall have one or more identifications (id)
  • **Template**: our patients shall have exactly one NHS patient identifier
• Documentation of “rules” in HL7’s Templates Exchange Format (DSTU)
Features of ART-DECOR for HL7 / CDA Templates (1)

- Template Viewer based on the Templates DSTU R1 exchange format
- Documentation of templates in ART, as HTML or PDF
- Two Template editors for HL7v3 / CDA Templates
- Terminology Browser for various terminologies
- Value Set Editor
Features of ART-DECOR for HL7 / CDA Templates (2)

- Building Block Repositories with various “standard” templates and value sets, e.g. C-CDA R 1.1 (2.0 to come), CCD 1, epSOS, IHE
- ISO schematron generator, works with open and closed templates
- RESTful services to get various artifacts
- Under investigation: FHIR profile and value sets import/export functions and profile editor
Demo 5: Vital Signs CDA Document Templates

**ART-DECOR Developer Day part 2 – 02.2015**
- Items: elements, attributes, hierarchy
- Data types, cardinalities, conformance, constants, containments

<table>
<thead>
<tr>
<th>Item</th>
<th>Type</th>
<th>Cardinality</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>h17:section</td>
<td></td>
<td>0..*</td>
<td></td>
</tr>
<tr>
<td>@classCode</td>
<td>F</td>
<td>0..1</td>
<td>DOCSECT</td>
</tr>
<tr>
<td>@moodCode</td>
<td>F</td>
<td>0..1</td>
<td>EVN</td>
</tr>
<tr>
<td>h17:templateId</td>
<td>M</td>
<td>1..1</td>
<td></td>
</tr>
<tr>
<td>@root</td>
<td>F</td>
<td>1..1</td>
<td>2.16.840.1.113883.3.1937.98.61.5.10.900207</td>
</tr>
<tr>
<td>h17:code</td>
<td>M</td>
<td>1..1</td>
<td></td>
</tr>
<tr>
<td>@code</td>
<td>F</td>
<td>1..1</td>
<td>11369-6</td>
</tr>
<tr>
<td>@codeSystem</td>
<td>F</td>
<td>1..1</td>
<td>2.16.840.1.113883.6.1</td>
</tr>
<tr>
<td>@displayName</td>
<td>F</td>
<td>1..1</td>
<td>History of Immunization</td>
</tr>
<tr>
<td>h17:title</td>
<td>M</td>
<td>1..1</td>
<td></td>
</tr>
<tr>
<td>h17:text</td>
<td>M</td>
<td>1..1</td>
<td></td>
</tr>
<tr>
<td>h17:entry</td>
<td>O</td>
<td>0..*</td>
<td>contains: ImmunizationActivity CCDA Immunization Activity (dynamic)</td>
</tr>
<tr>
<td>@typeCode</td>
<td>F</td>
<td>0..1</td>
<td>DRIV</td>
</tr>
<tr>
<td>@contextConductionInd</td>
<td>F</td>
<td>0..1</td>
<td>true</td>
</tr>
</tbody>
</table>
Templates

- Document Level Template
- Header Level Templates
- Section Level Template
- Entry Level Templates

From a content perspective, it's not all... but it is a start
Templates

- **Version Management**
- **Id** (=unique identification of the semantic concept)
- **effectiveDate**
- **statusCode**
- **versionLabel** (label ↔ effectiveDate)
• HL7 Templates Standard: Specification and Use of Reusable Information Constraint Templates, Release 1
• September 2014
• HL7 DSTU
ART-DECOR Prototypes and Templates
• **Validation of XML instances**

![Diagram showing the process of validating XML instances using a CDA Document Instance, ISO Schematron Rules, and a Schematron-Processor to generate a report.]

Directly derived from templates
Building Block Repositories
• **Shared repositories** with collection of artifacts
  • Prototypes for Templates
  • Ready-to-use Templates to refer to, to specialize or to adapt → Template Repository & Registry
  • Also all necessary Value Sets etc.

ART-DECOR BBR

List, Get

Reference

My ART-DECOR references BBRs
Issue Management
Issue Management

- Issue Management
- Change Requests
- Incidents
- Request for Information/Education
- For future consideration
- Signal issue associated with an artefact (e.g. a template) or just “as-is”
Issue Management

New Issue

<table>
<thead>
<tr>
<th>Type</th>
<th>Change Request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td></td>
</tr>
<tr>
<td>Priority</td>
<td>Normal</td>
</tr>
<tr>
<td>Description</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Finding:</td>
</tr>
<tr>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Suggestion:</td>
</tr>
<tr>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Further explanation:</td>
</tr>
</tbody>
</table>

Assign To: not-set-

Cancel  Save Issue
Issue Management

- Change Request (vacc-issue-5): Minimum weight too high
  - Status: Open
  - Priority: Normal

- "Holder (Person)" [vacc-dataelement-1] from dataset Vaccination Certificates Document Dataset [vacc-dataset-1]
  - Id: vacc-dataelement-1
  - Status: Draft
  - Description: Holder (Person)

- Search
  - Status: Open, In Progress, Feedback needed, Closed, Rejected, Deferred, Cancelled
  - Type: Incident, Change Request, For future consideration, Request for Information/Education
  - Priority: Highest, High, Normal, Low, Lowest
  - Search Term(s): weight

- Results (1 / 6)
  - Id: 5
  - Issue: Minimum weight too high
  - Status: Open
  - Priority: Normal
  - Type: Change Request
  - Date: 2014-07-12 10:47:14
  - Assigned To:

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Issue Management

- Emails upon new issues

- Publish and Subscribe mechanism
ART-DECOR Benefactors

ART-DECOR is developed with funding by

- Nictiz, Den Haag (NL)
  and
- Heitmann Consulting and Services, Hürth (DE)
- Gerrit Boers, Maastricht (NL)
- HL7 Germany, Köln (DE)

Become a benefactor!