European Patient Summary Guideline and Continuity of Care Document: A Comparison

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HL7 Leads eHealth Standards development since 1987

- **Mission**: build the **best** most widely **used** Health Information Technology standards

- **History**: Since 1987 HL7 grows steadily - demand outstrips capacity, HL7 v2.x, HL7 v3, HL7 CDA, HL7 FHIR, 40+ WGs, 50+ standards products in use; HL7 is supported by over 35 Affiliates and members in over 55 countries

  - **1997**: first national affiliate on board/ IHIC conference
  - **2000**: HL7 CDA r1 release
  - **2005**: HL7 CDA r2 release
  - **2007**: HL7 founding member for the SDO Joint Initiative Council
  - **2009**: HL7 International, USA on the International Council
  - **2010**: HL7 Foundation in Europe established, ePSOS uses HL7 CDA
  - **2012**: 25 years youth celebration with FHIR, HL7 Asia
  - **2013**: HL7 makes standards available under free license
  - **2014**: FHIR appeal in e-/m-Health, CDA growth, PHC-34
Outline of our talk

- **Patient Summaries in the EU and US**
  - EU patient summary guideline
  - Blue Button+
- **The Trillium Bridge project**
  - Use cases
  - Comparing specification
  - Logical Architecture to test technical feasibility
- **Mapping syntax and semantics**
  - Transformer and STS service
- **Where we are now**
  - Our findings on leveraging standards, impl guides and mapping
  - Next steps
- **Stepping back - EU/US MoU roadmap**
  - What do we learn from this exercise?
  - How can we use it towards larger global impact?
HL7 Foundation in Brussels

- European Presence and 18 national affiliates
- Newsletter (annual)
- EU co-funded projects
  - eHGI: eHealth Governance Initiative (2010-Nov 2014)
  - Antilope: testing and certification (2013- Jan 2015)
  - Expand: registry for interoperability assets (2014- Dec 2015)
  - Semantic Healthnet: Patient summaries in Heart Failure (2011-March 2015)
  - ASSESS CT: Assessing the use of SNOMED CT as a clinical terminology
  - OpenMedicine: Solving the Drug identification/Substitute in the EU
  - eStandards: rethinking standards and profiles for large scale eHealth deployment in the EU
- European Bodies
  - European Commission:
  - European Federation of Medical Informatics: Council
  - European Society of Cardiology: eCardiology WG Secretary
eHealth market is demanding!

- **HL7 CDA is a powerful tool for incremental interoperability**
  - Endorsed and adopted by several governments
  - Constrained with Templates and Implementation Guides
    - Developed independently... a cost to interoperability

- **eHealth market calls for agile processes**
  - Interoperability to lower costs
  - plug-n-play interoperability assets

- **Can HIT Standards do better?**
  - Be the safety net that strengthens the fabric of the global ehealth ecosystem
  - Enable Culture of collaboration for creativity, and understanding
  - Make interoperability Affordable, built once, use anywhere, across borders
What is a patient summary?

- **Discharge summary (EU and US)**
  - Summary of a hospital admission

- **Encounter Report (EU) or Clinical Summary (US)**
  - Subjective, objective, assessment, plan

- **Continuity of Care Record / Blue Button (US)**
  - Moving to one physician to another; referral

- **Travelers Record (IMIA/AMIA/EFMI)**
  - Safe while traveling, e.g. a letter from your doctor

- **Patient Summary (EU)**
  - Essential health data that should be communicated in the context of emergency or unplanned care (i.e. allergies, medication, problems, etc)

**How is it created?**
- By the physician or automatically?

**What standards/terminologies does it use?**
- Is it trusted? Up-to-date? Understood?

**How is it used?**
Trillium Bridge Use Cases

One Value proposition:

- When patient needs unplanned care overseas, a EHR summary fit for the purpose of safe and efficient health care is available.
- After the health care encounter, patient receives encounter report in a format and language that can be understood back home.

Two use cases:

- Provider mediated (citizen controlled, provider initiated)
- Patient mediated (citizen initiated, citizen controlled)

Blazing the transatlantic path – constraints and assumptions

- Translation of narrative unstructured content (not in scope)
- Incorporate patient summary elements in EHR or PHR (not in scope)
- Preconditions: citizen empowerment
  - EU Citizens have access to their EU Patient Summary (e.g. epSOS PAC)
  - US Citizens have access to their Clinical Summary in C-CDA/ CCD
The main question for Trillium Bridge..

Is it feasible to convert a patient summary generated in the European Union according to the EU Patient Summary Guideline to one that is fit for use in the United States?

Our Action: Compared clinically, syntactically and semantically the European PS (epSOS) and MU clinical summary (HL7 CCDA/CCD)

- Evidence
  - use specs & examples, carry out tests
- Feasibility study
  - what have we learned and what are the implications?
Patient Summaries in the EU and US
European Patient Summary Guidelines, Nov 2013

Contact Point for Patient Summaries In Country of Treatment

Clinical Records in the Country of treatment

Translated/Transcoded EU Patient Summary

Patient seeks unplanned care where another language is spoken.
EU Patient Summary Guideline

EU patient summary guideline defines patient summary as the “minimum set of information needed to assure healthcare coordination and continuity of care”

Emergency or unplanned care refers to “the range of healthcare services available to people who need medical advice, diagnosis and/or treatment quickly and unexpectedly”

Types of EHR summaries
- Emergency data set
- Continuity of care record
- Encounter report
- Discharge summary
- 2nd opinion
- Clinical patient summary
- Disease specific summaries

Around the world many variants of the same basic types of patient summaries

HL7 Consolidated CDA
- seven document types, seven of which were consolidated in CCDA
US Meaningful Use II: Consolidated-CDA/CCD

§ 170.205 Content exchange standards and implementation specifications for exchanging electronic health information.


170.205(h) CDA Guide for Quality Reporting Document Architecture, Category I

170.205(i) CDA Guide for Reporting to Central Cancer Registries

170.205(k) CDA Guide for Quality Reporting Document Architecture, Category III (QRDA-III)
Clinical patient summary, US Meaningful Use

§ 170.314(b) Care Coordination

- (1) Transitions of care - receive, display, and incorporate transition of care/referral summaries.
  - Incorporate medications, problems, allergies
- (2) Transitions of care - create and transmit transition of care/referral summaries.
  - Create C-CDA
- (4) Clinical information reconciliation.
  - Medications, problems, allergies
- (7) Data portability.

§ 170.314(e) Patient Engagement

- (1) View, download, and transmit to 3rd party clinical summary
  - Patient’s ability to download clinical summary in HL7 C-CDA CCD
- (2) Ambulatory setting only - clinical summary.
  - Patient receives patient summary after encounter
## Blue Button+

### HL7 C-CDA Sections

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Header</td>
<td>Patient information demographics</td>
</tr>
<tr>
<td>Allergies, Adverse Reactions, Alerts</td>
<td>Includes status and severity of each.</td>
</tr>
<tr>
<td>Encounters</td>
<td>Surgeries, ED visits, etc.</td>
</tr>
<tr>
<td>Immunizations</td>
<td>Immunizations and vaccines</td>
</tr>
<tr>
<td>Medications</td>
<td>As prescribed by the provider</td>
</tr>
<tr>
<td>Care Plan</td>
<td>Planned activities and encounters</td>
</tr>
<tr>
<td>Discharge Medications</td>
<td>Part of hospital discharge summary</td>
</tr>
<tr>
<td>Reason for Referral</td>
<td>Written reason for referral</td>
</tr>
<tr>
<td>Problem List</td>
<td>Concerns, complaints, and observations</td>
</tr>
<tr>
<td>Procedures</td>
<td>History of procedures</td>
</tr>
<tr>
<td>Functional &amp; Cognitive Status</td>
<td>List of impairments</td>
</tr>
<tr>
<td>Results</td>
<td>Includes laboratory tests</td>
</tr>
<tr>
<td>Social History</td>
<td>Observations like smoking, drinking, etc.</td>
</tr>
<tr>
<td>Vital Signs</td>
<td>Includes height, weight, blood pressure, etc.</td>
</tr>
<tr>
<td>Discharge Instructions</td>
<td>Written discharge instructions</td>
</tr>
</tbody>
</table>

http://bluebuttontoolkit.healthit.gov/
Trillium Bridge Project: a feasibility study and builder perspective...

The problem

- What can we do to lower the cost of transatlantic business engagement in eHealth?
  - Reduce barriers for transatlantic coordination, health care, trade
  - Decrease standards development and implementation costs
  - Accelerate convergence towards global standards
  - Support right of citizens to their health data and safety

- Well, perhaps we could try building...
  ...a Transatlantic Bridge for EHR summaries!

The Solution

- Pragmatic Feasibility study on the exchange of Patient Summaries across the Atlantic
  - Compare, analyze, and map EU/US patient summaries starting with Meaningful Use 2 C-CDA/CCD and EU patient summaries (epSOS)
  - July 2013 to February 2015
  - Stellar consortium of EU member state provider networks, associations, SDOs

EU/US MoU Roadmap
Trillium Bridge: methodology

Building the Transatlantic bridge for EHR patient summaries

- Complete Gap analysis
  - User stories, use cases, business architecture

- Identify interoperability Assets
  - Established STS terminology service associating EU/US terms, D3.1
  - proof of concept transformer of EHR structure and semantics, D3.2

- Inform and support standardization efforts
  - ground work of an Intl EHR patient summary
  - Aligning infrastructure, D4.1

- Refine assets, work on the puzzle through validation
  - Test with EU countries and US providers, D4.2
  - Set the tone and pace for interoperability in the global eHealth ecosystem, D5.1, 5.2

Attain the vision and aims of EU-US of the eHealth MoU and roadmap!
Provider Mediated Case: Technical Architecture Overview

IHE XCA
IHE XCPD
IHE ATNA (epSOS)

Trillium Bridge Gateway (based on the epSOS Open NCP)

IHE XCA
IHE XCPD
IHE ATNA (eHealth Exchange)

Local Connector & eHealth Exchange Gateway

MU2 C-CDA/ CCD

EU Patient Summary
epSOS pivot document (EN)

Transformer

CTS-2

Terminology Services
- EU epSOS master values (MVC/MTC)
- US core value sets (NLM)

National Contact Point (Italy)
National Contact Point (Spain)
National Contact Point (Portugal)

National Contact Points other interested MS
Lux, Finland, Greece, Slovenia..
Patient Mediated case

1. Martha gets her CCD via bluebutton
2. Request transform...
3. Doctor visualizes patient summary in local language (HCER)
4. Request transform...
5. Paolo receives encounter report in CCDA/CCD
6. Request transform...
7. Get EU patient summary

Terminology Services
- EU epSOS master values (MVC/MTC)
- US core value sets (NLM)

Italian (Lombardy) Portal (epSOS Patient Access)
Spanish Portal (epSOS Patient Access Service)
Portuguese Portal (epSOS Patient Access)
EU MS National Portal (epSOS Patient Access)

References
- OpenNCP Portal
- CTS-2
- Trillium Gateway
- Tethered Personal Health Record, Health App or BlueButton+
Comparison of EHR summaries and the International Patient Summary bottom line

• Same base Standard (HL7 CDA)
• Different philosophy: capture vs continuity of care
• Different IGs: C-CDA/CCD (US realm) vs epSOS IG
• Different technical approach: Open vs Closed Template
Comparison of EHR summaries and the International Patient Summary bottom line

- Same base Standard (HL7 CDA)
- Different philosophy: capture vs continuity of care
- Different IGs: C-CDA/CCD (US realm) vs epSOS IG
- Different approach: Open vs Closed Data Set
### Section Comparison

<table>
<thead>
<tr>
<th>epSOS/EU Directive</th>
<th>EU Patient Guidelines</th>
<th>epSOS PS</th>
<th>CCD</th>
<th>Optionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section</td>
<td>Optionality</td>
<td>Optionality</td>
<td>Optionality</td>
<td>Optionality</td>
</tr>
<tr>
<td>Allergy</td>
<td>R</td>
<td>R</td>
<td>Allergies</td>
<td>R</td>
</tr>
<tr>
<td>List of current medicines</td>
<td>R</td>
<td>R</td>
<td>Medications</td>
<td>R</td>
</tr>
<tr>
<td>List of current problems / diagnoses</td>
<td>R</td>
<td>R</td>
<td>Problem</td>
<td>R</td>
</tr>
<tr>
<td>Surgical Procedures prior to the past six months</td>
<td>R</td>
<td>O</td>
<td>Procedures</td>
<td>O (R only for inpatients)</td>
</tr>
<tr>
<td>Major Surgical Procedures in the past six months</td>
<td>R</td>
<td>R</td>
<td>Procedures</td>
<td>O (R only for inpatients)</td>
</tr>
<tr>
<td>Medical Devices and implants</td>
<td>R</td>
<td>R</td>
<td>Medical Equipment</td>
<td>O</td>
</tr>
<tr>
<td>Vaccinations</td>
<td>O</td>
<td>O</td>
<td>Immunizations</td>
<td>O</td>
</tr>
<tr>
<td>List of resolved, closed or inactive problems</td>
<td>O</td>
<td>O</td>
<td>Problem</td>
<td>R</td>
</tr>
<tr>
<td>Social History Observations</td>
<td>O</td>
<td>O</td>
<td>Social History</td>
<td>O</td>
</tr>
<tr>
<td>Pregnancy history (Expected date of delivery)</td>
<td>O</td>
<td>O</td>
<td>Social History (Pregnancy Observation)</td>
<td>O</td>
</tr>
<tr>
<td>Physical findings (Vital Signs Observations)</td>
<td>O</td>
<td>O</td>
<td>Vital Signs</td>
<td>O</td>
</tr>
<tr>
<td>Diagnostic tests (Blood group)</td>
<td>O</td>
<td>O</td>
<td>Results Section</td>
<td>R</td>
</tr>
<tr>
<td>Treatment Recommendations</td>
<td>R</td>
<td>O</td>
<td>Plan of Care</td>
<td>O</td>
</tr>
<tr>
<td>Autonomy / Invalidity</td>
<td>R</td>
<td>O</td>
<td>Functional Status</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Advance Directives</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Family History</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Payer</td>
<td>O</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Encounters</td>
<td>O</td>
</tr>
</tbody>
</table>

Can be grouped together, only difference is the date

Text only

epSOS: 14 sections, 1 grouped = 13 sections  
CCD: 15 sections, 4 not mapped = 11 sections

4 sections not present in epSOS PS
Syntactic Mapping / Problems

For any mappable concept the transformation rules - epSOS to CCD and CCD to epSOS - have been defined

- Can range from very simple (only changing the template ID) to complex (change template ID, change structure, map from two possible ways of expressing a data element to one or vice versa).
- Syntactical transformations are linked with the value set mappings
- The rules are implemented by the Trillium Transformer

7.1.2.4 Preferred HCP/ Legal Organization Country
7.1.2.4.1 epSOS and CCD XPaths for This Data Element
epSOS:
/ClinicalDocument[templateId/@root="1.3.6.1.4.1.19376.1.5.3.1.2.3"]/participant/associate:
dEntity/addr/country

OR

/ClinicalDocument[templateId/@root="1.3.6.1.4.1.19376.1.5.3.1.2.3"]/participant/associate:
dEntity/scopingOrganization/addr/country

CCD:
/ClinicalDocument[templateId/@root="2.16.840.1.113883.10.20.22.1.2"]/participant/associate:
edEntity/addr/country

7.1.2.4.2 Functional Requirements for the Transformer

FRT07 - The transformation will have to change the template ID and the structure from epSOS to CCD for the data element Country (Preferred HCP/ Legal Organization Country) as per the Xpaths. Please note that there are two possibilities to express the preferred HCP in epSOS as it is seen as point of contact for the patient. They both need to be mapped to the same element in CCD. The mapping providing a common vocabulary for the value of this data element from the CTS2 server is listed in section 7.1.2.8.

FRT08 - The transformation will have to change the template ID and the structure of the CCD to epSOS for the data element Country (Preferred HCP/ Legal Organization Country) as per the Xpaths. Please note that there are two possible ways in which the preferred HCP can be expressed in epSOS as it is seen as point of contact for the patient. The CCD structure needs to map to both way of expression. The mapping providing a common vocabulary for the value of this data element from the CTS2 server is listed in section 7.1.2.8.
Problems

- C-CDA single section for closed and active problem ⇔ 2 distinct sections in epSOS
- Same template structure
- Diagnosis and illnesses:
  - SNOMED CT for C-CDA (less than 50% mapped)
  - ICD-10 2008 for epSOS (less than 20% mapped)
Similar structure of the template, but used in a different way ➔ Syntactical transformation needed

epSOS: allergy type, allergen, type of reaction

There are elements in CCD not available in the EU PS (namely allergy status and severity)

less granularity in epSOS for describing reactions
The C-CDA Medication Section has a wider scope: not all the information are mapped.

No RX-Norm equivalent nomenclature in Europe => products are described providing a set of proprieties, requires specific CDA extensions [Ingredients conveyed as ATC]

Mapping using WHO’s ATC and RxNorm.
## Statistics: Coding Systems and Value Sets

<table>
<thead>
<tr>
<th>22 Code Systems</th>
<th>25 CCD value sets (of 65)</th>
<th>26 epSOS value sets (of 46)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATC</td>
<td>CCD.HitSP Vital Sign Result Type</td>
<td>epSOSActiveIngredient</td>
</tr>
<tr>
<td>CVX</td>
<td>CCD.Administrative Gender (HL7)</td>
<td>epSOSAdministrativeGender</td>
</tr>
<tr>
<td>EDQM Standard Terms</td>
<td>CCD.AgePQ_UCUM</td>
<td>epSOSAdverseEventType</td>
</tr>
<tr>
<td>HL7 AddressUse</td>
<td>CCD.Allergy/Adverse Event Type</td>
<td>epSOSAllergenNoDrugs</td>
</tr>
<tr>
<td>HL7 AdministrativeGender</td>
<td>CCD.CountryValueSet</td>
<td>epSOSBloodGroup</td>
</tr>
<tr>
<td>HL7 Confidentiality</td>
<td>CCD.EntityNamePartQualifier</td>
<td>epSOSBloodPressure</td>
</tr>
<tr>
<td>HL7 EntityNamePartQualifier</td>
<td>CCD.HealthStatus</td>
<td>epSOSCodeProb</td>
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<tr>
<td>HL7 RoleClass</td>
<td>CCD_HITSPProblemStatus</td>
<td>epSOSConfidentiality</td>
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<td>CCD_HL7 BasicConfidentialityKind</td>
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<td>CCD_INDRoleclassCodes</td>
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<td>ICD-10-CM</td>
<td>CCD.Ingredient Name</td>
<td>epSOSEntityNamePartQualifier</td>
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<tr>
<td>ISCO-08</td>
<td>CCD.Language</td>
<td>epSOSHealthcareProfessionalRole</td>
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<td>ISO 3166-1 Country Codes</td>
<td>CCD.Medication Brand Name</td>
<td>epSOSLanguage</td>
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<td>ISO 639-1</td>
<td>CCD.Medication Clinical Drug</td>
<td>epSOSMedicalDevices</td>
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<td>LOINC</td>
<td>CCD.Medication Drug Class</td>
<td>epSOSPersonalRelationship</td>
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<tr>
<td>NCI Thesaurus</td>
<td>CCD.Medication Product Form</td>
<td>epSOSPregnancyInformation</td>
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<tr>
<td>NDF-RT</td>
<td>CCD.Medication Route FDA</td>
<td>epSOSProcedures</td>
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<td>NUCC</td>
<td>CCD.Personal Relationship Role Type</td>
<td>epSOSReactionAllergy</td>
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<td>RxNorm</td>
<td>CCD.Problem</td>
<td>epSOSResolutionOutcome</td>
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<tr>
<td>SNOMED CT</td>
<td>CCD.Problem Type</td>
<td>epSOSRoleClass</td>
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<td>UCUM</td>
<td>CCD.Provider Type</td>
<td>epSOSRoutesofAdministration</td>
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<td>UNII</td>
<td>CCD.Social History Type Set Definition</td>
<td>epSSOCSocialHistory</td>
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<td>CCD_Telecom Use (US Realm Header)</td>
<td>epSOSStatusCode</td>
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<td>CCD_UCUM Units of Measure</td>
<td>epSOSTelecomAddress</td>
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<td>CCD_Vaccine Administered</td>
<td>epSOSUnits</td>
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<td>epSOSVaccine</td>
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<table>
<thead>
<tr>
<th>19 Association or Mappings</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATC_NDF-RT_epSOSActiveIngredient_VS</td>
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<tr>
<td>ATC_RxNorm_epSOSActiveIngredient_VS</td>
</tr>
<tr>
<td>CVX_SNOMED CT_VaccineAdministered_VS</td>
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<tr>
<td>EDQM_NCI_epSOSDoseForm_VS</td>
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<td>EDQM_NCI_epSOSRRoutesofAdministration_VS</td>
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<td>ICD 10 CM_SNOMED CT_epSOSIllnesses_VS</td>
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<td>ICD 10_SNOMED CT_epSOSIllnesses_VS</td>
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<td>ISCO_NUCC_epSOSHealthcareProfessionals_VS</td>
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<td>NCI_EDQM_MedicationRouteFDA_VS</td>
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<td>NUCC_ISCO_ProviderType_VS</td>
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<td>RxNorm_ATC_MedicationBrand_VS</td>
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<tr>
<td>SNOMED CT_CVX_epSOSVaccine_VS</td>
</tr>
<tr>
<td>SNOMED CT_to_ICD 10 CM_CCDClinicalDrug_VS</td>
</tr>
<tr>
<td>SNOMED CT_to_ICD 10_CCDClinicalDrug_VS</td>
</tr>
<tr>
<td>SNOMED CT_UNII_epSOSAllergenNoDrugs_VS</td>
</tr>
<tr>
<td>UNII_to_SNOMED CT_IngredientName_VS</td>
</tr>
</tbody>
</table>
Any non-trivial map within the context of this discussion is unidirectional.

Any non-trivial unidirectional map will be “lossy”, a goodly number of maps are significantly “lossy” - the percentages of codes that don’t map are high enough to cause the general value of the map to be questioned.

Maps need to be examined and maintained on a “per value set” and “usage context” basis.

- Even when official mapping are available it is necessary to have an expert re-examine each individual map whenever codes are added or removed in the underlying value sets.
- Context of use is affecting the mapping, for example ATC is paired with RxNorm to obtain the correct common vocabulary for Medication Clinical Drug and Medication Brand Name, but it is paired with NDF-RF when the focus is on the Medication Drug Class.

(Some) Issues in Mapping:
- Code System Granularity
- Value Set / Map Alignment
- Code System Versions
- Value Set Semantics

Images courtesy of Harold Solbrig, Mayo Clinic
Mapping Considerations

Each mapping have its specific challenges, even when official mapping are available. The «problem list» case (SNOMED CT / ICD-10):

- There are two mappings officially available: one done directly by IHTSDO and one done by NLM. Both have been investigated to see which one provides larger coverage.
  - The mapping from NLM contains the ICD-10-CM, version 2013 and SNOMED CT US extension (77,943 concepts)
  - The mapping from IHTSDO contains the ICD-10 version 2010 and SNOMED CT international release. (43,811 concepts)

- But epSOS uses the version of SNOMED CT July 2009 and ICD-10 version 2008
  - The percentage of concept of the value set epSOSIllnessesandDisorders not present in ICD-10-CM is the 12%.
  - 24 Concepts from the value set epSOSIllnessesandDisorders value set up to 4 characters based on version 2008 not included in version 2010.

- CCD uses a dynamic binding (use the latest version of a value set)

For each update of the code system version or of the value set the mappings have to be re-examined.
Value Sets Mapping: the case of SNOMED CT to ICD-10

- Official mapping in uni-directional (SNOMED CT-ICD10), the reverse does not exist
- The official map was used in reverse to get the mapping ICD-10-SNOMED CT
- Initially we wanted to look at one-to-one, many-to-one and one-to-many mappings
- It quickly became evident that the one-to-many mappings must be excluded as it introduces ambiguity (which term to choose to send? All? If receiving 4 terms, which one is the correct one?)
- Synonyms were counted only once
- Stringent rules were chosen in the mapping of SNOMED CT
Value Sets Mapping: the case of SNOMED CT to ICD-10
## Statistics: coverage of value sets

<table>
<thead>
<tr>
<th>epSOS Value Set</th>
<th>epSOS Code System</th>
<th>concepts with correspondence/concepts present/ (% covered)</th>
<th>CCD Value Set</th>
<th>CCD Code System</th>
<th>concepts with correspondence/concepts present/ (% covered)</th>
</tr>
</thead>
<tbody>
<tr>
<td>epSOSActiveIngredient</td>
<td>ATC</td>
<td>606/5592 (6%)</td>
<td>Medication Drug Class</td>
<td>NDF-RT</td>
<td>1365/10699 (13%)</td>
</tr>
<tr>
<td>epSOSActiveIngredient</td>
<td>ATC</td>
<td>2836/5592 (51%)</td>
<td>Medication Brand Name</td>
<td>RxNorm</td>
<td>3329/13885 (24%)</td>
</tr>
<tr>
<td>epSOSActiveIngredient</td>
<td>ATC</td>
<td>2836/5592 (51%)</td>
<td>Medication Clinical Drug</td>
<td>RxNorm</td>
<td>9642/31214 (31%)</td>
</tr>
<tr>
<td>epSOSAllergenNoDrugs</td>
<td>SNOMED CT</td>
<td>79/112 (71%)</td>
<td>Ingredient Name</td>
<td>UNII</td>
<td>5315/63996 (8%)*</td>
</tr>
<tr>
<td>epSOSRoutesofAdministration</td>
<td>EDQM Standard Terms</td>
<td>55/73 (75%)</td>
<td>Medication Route FDA</td>
<td>NCI Thesaurus</td>
<td>57/118 (48%)</td>
</tr>
<tr>
<td>epSOSDoseForm</td>
<td>EDQM Standard Terms</td>
<td>28/457 (6%)</td>
<td>Medication Product Form</td>
<td>NCI Thesaurus</td>
<td>99/153 (65%)</td>
</tr>
<tr>
<td>epSOSIllnessesandDisorders</td>
<td>ICD-10</td>
<td>1775/9525 (19%) IHTSDO maps</td>
<td>Problem</td>
<td>SNOMED CT</td>
<td>7204/16443 (44%) IHTSDO maps</td>
</tr>
<tr>
<td>epSOSIllnessesandDisorders</td>
<td>ICD-10</td>
<td>1147/9525 (12%) NLM maps</td>
<td>Problem</td>
<td>SNOMED CT</td>
<td>6914/16443 (42%) NLM maps</td>
</tr>
<tr>
<td>epSOSVaccine</td>
<td>SNOMED CT</td>
<td>27/31 (87%)</td>
<td>Vaccine Administered</td>
<td>CVX</td>
<td>87/163 (53%)</td>
</tr>
</tbody>
</table>
Phast CTS2 Server

- All the code systems, value sets and maps defined are available (login required) at http://extension.phast.fr/STS_UI
- The mappings can be called by the transformer, integrated in a general architecture
Trillium Bridge Transformer

Transformation Functions

- `changeTemplateRoots` — remove and/or add template identifiers
- `newid` — generate a new document identifier
- `translateTitle` — translate a section title
- `replaceCode` — remove and/or add a code node (deprecated)
- `replaceValue` — remove and/or add a value node (deprecated)
- `replaceNode` — remove and/or add a generic node
- `translateText` — translate a text section (stub)
- `setStyleSheet` — set the document stylesheet
- `mapLanguage` — map the document language code
- `addDdlRef` — insert a reference to the original document ID
- `mapValueSet` — transform a coded value using CTS2

Package is written in XSLT 2.0
Test Driven Design (TDD) using XSLT Unit Test
(http://www.jenitennison.com/xslt/xspe)
Quality Assurance

- An internal assets review was performed.
- An independent review will be kindly accomplished by Sylvia Thun (IKT im Gesundheitswesen).
- For both the transformation rules and the mappings a wider QA phase should be accomplished. To be evaluate the clinical
  - Accuracy
  - Appropriateness
  - Completeness
Next Steps

A live demonstration involving some EU countries (e.g. Spain) and Kaiser Permanente will be performed at the next HIMSS15 (12-15 April)

The Trillium Gateway will be tested toghether with other epSOS NCPs @ the next IHE-EUR Connectathon (April 2015)

Hopefully, escalate from proof of concept to large scale pilot; enhanhnce the testings, accomplish extended clinicial QA for all the Trilliium Bridge Assets. (beyond trillium)
Conclusions

- HL7 with support from other SDOs focuses on an international patient summary specification
  - Allergies, problems, medication

- Likelihood of convergence towards a single standard for patient summaries is low
  - Manage structure and value sets together: adopt CDA on FHIR
  - Build, maintain, and Quality assure Mappings
  - rethink interoperability and standards: use more tooling

- Europe is heading for large scale eHealth deployment
  - Four projects to support practical eHealth interoperability
  - Hope is that global, European, national, local efforts are convergent to increase the effectiveness and impact of health Information technology

- Time for a globally harmonized patient summary!
The “Trillium” Team:
believers, builders, entrepreneurs
Thank you!