Semantic Interoperability for Health Network of Excellence

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SemanticHealthNet

“SemanticHealthNet will develop a scalable and sustainable pan-European organisational and governance process for the semantic interoperability of clinical and biomedical knowledge, to help ensure that EHR systems are optimised for patient care, public health and clinical research across healthcare systems and institutions.

Through a clinically-driven workplan, exemplified in cardiovascular medicine, SemanticHealthNet will capture the needs for evidence-based, patient-centred integrated care and for public health, encapsulating existing European consensus in the management of chronic heart failure and cardiovascular prevention. Experts in EHR architectures, clinical data structures, terminologies and ontology will combine, tailor and pilot their best-of-breed resources in response to the needs articulated by clinicians and public health physicians. (…) “

http://www.semantichealthnet.eu/
<table>
<thead>
<tr>
<th></th>
<th>Organization/Group</th>
<th>Country</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>(Admin Coordinator)&lt;br&gt;Research in Advanced Medical Informatics and Telematics</td>
<td>RAMIT</td>
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<tr>
<td>2</td>
<td>Imperial College London</td>
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<td>3</td>
<td>University of Hull</td>
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<td>University Hospitals of Geneva</td>
<td>HUG</td>
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<td>The University of Manchester</td>
<td>UoM</td>
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<td>International Health Terminology Standards Development Organisation</td>
<td>IHTSDO</td>
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<td>Institut National de la Santé et la Recherche Médicale</td>
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<td>Ocean Informatics</td>
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<td>Health Level 7 (HL7) International Foundation</td>
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<td>EN13606 Association</td>
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<td>European Coordination Committee of the Radiological, Electromedical and Healthcare IT Industry</td>
<td>COCIR</td>
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<td>Whittington NHS Trust</td>
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<td>17</td>
<td>European Institute for Health Records</td>
<td>EuroRec</td>
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Semantische Interoperabilität

COMMON VOCABULARY

<table>
<thead>
<tr>
<th>C90</th>
<th>Multiple myeloma and malignant plasma cell neoplasm</th>
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<tbody>
<tr>
<td>C90.0</td>
<td>Multiple myeloma</td>
</tr>
<tr>
<td>C90.0</td>
<td>Multiple myeloma</td>
</tr>
<tr>
<td>C90.2</td>
<td>Plasmacytoma, extramedullary</td>
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<tr>
<td>M35.1*</td>
<td>Arthropathy in neoplastic disease (C00-D48+)</td>
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<td>N08.1*</td>
<td>Glomerular disorders in neoplastic diseases</td>
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<td>N16.1*</td>
<td>Renal tubulo-interstitial disorders in neoplastic diseases</td>
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<tr>
<td>M9732/3</td>
<td>Multiple myeloma (C90.0)</td>
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Beispiel 1: Diagnose

Beispiel: Verdacht auf Zervixkarzinom

Heterogenität in Benennung, Syntax, Repräsentation, Struktur
Beispiel 2: Prozedur

Beispiel: Anforderung Röntgen-Thorax

Heterogenität in Benennung, Syntax, Repräsentation, Struktur
Warum ist es so schwierig?

- Gemeinsame Syntax
  - ISO 13606
  - openEHR
  - HL7
  - Legacy systems

- Dateneingabe
  - unterschiedlich

- Gemeinsames Vokabular
  - SNOMED CT
  - LOINC
  - ICD

- Ambiguität
  - Chest X-Ray
  - X-Ray and hasProcedureSite Chest
Grundidee des WP 4
(Leitung MUG-IMI)

• Semantische Annotation aller Inhalte klinischer Informationsmodelle
  – SNOMED CT
  – „Information Model Ontology“
Ontologien

Methode OWL als Ontologiesprache, Protégé als Editor, HermIT als Reasoner, BioTopLite als Upper-Level Ontologie
Beispiel: Formalisierung von:
„Vorläufige Diagnose: Hautkrebs am Rücken“

RecordEntry
  and (denotes only Situation and
    'has participant' some (HumanOrganism and
      ('locus of' some (sct_SkinCancer and
        ('has locus' some sct_Back))))) and
    'has process quality' some (DiagnosisQuality and
      ('quality located' some sct_ProvisionalDiagnosis)))
DIABETES MELLITUS EXCLUDED
(openEHR)

ARCHETYPES USED:
- openEHR-EHR-EVALUATION.exclusion-problem_diagnosis.v1 OR
- openEHR-EHR-EVALUATION.check_list.v1

EVALUATION -- Exclusion statement - Problems and Diagnoses
data/ITEM_TREE
  items/ELEMENT -- No previous history of
    value – 73211009 | diabetes mellitus |

EVALUATION – check list
  data/CLUSTER – Question group
    items/CLUSTER – Question
      items/ELEMENT – answer
        value (Text, BL, …)

  417662000 | past history of clinical finding | : { 246090004 | associated finding | = 73211009 | diabetes mellitus | }
DIABETES MELLITUS EXCLUDED (SNOMED CT)

- **HISTORY:** 422625006 | history of present illness section |
  - **NOT DIABETIC:** 373572006 | clinical finding absent | : { 246090004 | associated finding | = 73211009 | diabetes mellitus | }

FINDING WITH EXPLICIT CONTEXT
ENTRY – Past medical history
items/ELEMENT
value -- False

diabetes mellitus | 408729009 |

ENTRY – Past medical history
items/ELEMENT -- Problem
value -- Coded

373572006 | clinical finding absent | : { 246090004 | associated finding | = 73211009 | diabetes mellitus | }

ENTRY – Past medical history
items/ELEMENT
value -- False
DIABETES MELLITUS EXCLUDED (HL7)
Herausforderungen

- Semantische Interoperabilität zwischen
  - (1) unterschiedlichen Kodier-/ Terminologie- / Ontologiesystemen
  - (2) unterschiedlichen Informationsmodellen
  - Unterschiedlicher Verteilung von Inhalten zwischen 1 und 2

- Möglichkeit eines gemeinsamen Formalismus explorieren, zwischen alternativen Repräsentationen ohne Informationsverlust zu vermitteln

- Motiviert durch klinische und epidemiologische Use Cases (Input durch klinische Partner)

- Demonstration der Machbarkeit einer generalisierbaren und skalierbaren Methodik zur Herstellung semantischer Interoperabilität klinischer Daten
ICBO 2012: 3rd International Conference on Biomedical Ontology
The use of biomedical ontologies in annotation of both clinical and experimental data is now a common technique in integrative translational research. To be maximally effective, such ontologies must work well together. As they become more widely used, the coordination problems become ever more urgent. ICBO 2012 addresses these problems. It will bring together representatives of all major communities involved in ontology use and development in biomedical research, health care, and related areas.

ICBO 2012 Chairs:
Ronald Cornet, Robert Stevens, Melanie Courtot, Ludger Jansen, Trish Whetzel, Janna Hastings

FOIS 2012: 7th International Conference on Formal Ontology in Information Systems
The philosophical discipline of Ontology has become practically relevant with the evolution of complex information systems which rely on robust and coherent representations. Such representations and associated reasoning techniques constitute the modern discipline of formal ontology, which is now applied to artificial intelligence, computational linguistics, bioinformatics, GIS, knowledge engineering, information retrieval, and the Semantic Web. FOIS is intended to explore both theoretical issues and concrete applications.

FOIS 2012 Chairs:
Michael Grüninger, Maureen Donnelly, Giancarlo Guizzardi

Local Organizers
Stefan Schulz
Catalina Martinez
Markus Kreuzthaler

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