SemanticHEALTH: A Roadmap
Towards Semantic Interoperability

- Workshop for validating a research and deployment perspective -

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Abstract. The SemanticHEALTH project develops a roadmap on research and deployment needs for ICT-based solutions to improve the performance of health services, focusing on semantic interoperability issues of eHealth systems and infrastructures. Initial findings and recommendations in the fields of EHR systems, ontologies and terminologies, Public Health as well socio-economic issues will be presented and discussed with the expert community for scrutiny, validation and further refinement.

Keywords. Semantic interoperability, electronic health record, terminology, ontology, multilingualism, public health, roadmap

1. Workshop Introduction

The European Commission supported SemanticHEALTH project develops a European and global roadmap on research and deployment needs for ICT-based solutions to improve the quality and efficiency of health services, focusing on semantic interoperability issues of eHealth systems and infrastructures. The workshop will present preliminary results of this research, and discuss them with the expert community in order to validate major outcomes achieved so far.

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2. Initial Results and Outcomes on Actions Needed

2.1. Electronic Health Record (EHR) systems

Full semantic interoperability (SIOp) is required across heterogeneous EHRs in order to gain fully all benefits of computerised support for reminders, alerts, decision support, workflow management and evidence based health care, i.e. to optimise the effectiveness of health services and reduce risks. However, it is recognised that achieving full SIOp across the entirety of health systems would be a lengthy, expensive and possibly unattainable goal. It is therefore recommended that such a high level of SIOp is initially only sought in specific areas of clinical practice that are known to be of high patient safety relevance, and in priority areas for which the evidence is strongest for a gap to be bridged between current and good practice. The following short and medium term tasks on the road to enable SIOp in the future will be discussed:

a) Areas needing adoption (short term actions):
   • Agree on a generic model for EHR communications: consider seriously the adoption and promotion of EN13606
   • Adopt a standardised approach for representing and sharing of clinical data structure specifications: agree to use archetypes
   • Collaborate on key use cases for shared care and patient safety, and on defining and tidying the corresponding SNOMED-CT sub-sets
   • Develop and share policies on SNOMED CT term co-ordination

b) Areas needing wide-scale evaluations (medium term):
   • Develop good practice in archetype design
   • Establish useful exemplars of SNOMED-CT sub-sets being adopted within EHR systems and delivered in meaningful ways to clinical users

2.2. Ontologies and Terminologies

The primary goal of ontologies and terminologies for interoperability is to enable the faithful exchange of meaning between machines and between machines and people. A second major goal is to make it easier to build systems that successfully exchange meanings. From a more technical perspective, selected initial recommendations are:

• Focus on concrete, immediate needs and real use cases with expected high benefits and lower costs
• Terminologies should have a well defined scope and purpose and be delivered against well defined, realistic time scales
• Separate ontology, language and interface
• Make it multilingual and multicultural
• Focus on Quality Assurance and Reproducibility

From an organisational perspective, these issues need priority attention:

• All actions must aim at long term institutions that can be sustained
• Involve healthcare providers and systems vendors
• The terminologies must be owned by their key end users
• Terminology development must become coordinated with EHR and decision support developments
• Think global; act local, i.e. be multilingual and cross-cultural

Selected recommendations for short and mid-term actions include:

• Support WHO open collaborative development of ICD-11
Workshop description

- Support feasibility study (select subset of ca. 25,000 terms / use case) of reformulation of SNOMED to build reliable hierarchies & relations, develop multilingual support, empirically assess individual, organisational and societal benefits and costs
- Support open tools for terminologies that link up to SNOMED
- Develop language technologies: text extraction to build new terms and encode natural language; text generation to present and for QA.

2.3. Public Health and Re-Use of Data

One of the greatest ‘added-values’ of digitalisation of health information is their combination, aggregation and synthesis at population level. This will allow to compute various indicators, benchmarks and trends on public health issues with respect to a) populations, groups; b) settings, facilities; c) regions, geographic units, and/or d) environmental variables. Key recommendations on the road to achieve this are to:

- Develop common standards that will allow data exchange on predefined key variables from individual health records, conforming to requirements for notification of reportable diseases and public health emergencies of international concern (e.g., international health regulations)
- Develop standards that will allow compilation of content from individual health records, e.g. disease groupings; causes of death statistics
- Enable compilation of data across populations (e.g., number of diabetic patients in a given town); across health care providers (e.g., well treated diabetic patients of a clinic), number of overweight people by geographical location
- Support multilevel ontologies and linking of data and information across multiple care settings and from different sources (e.g. linking genetic, biochemical, sign and symptom data to clinical and laboratory findings and outcomes)
- Enable comparisons of data across regions, time and populations.

2.4. Socio-Economic Issues

SIOP is not a binary variable, but rather a scale reaching from zero to full IOp. Various levels will imply different benefits and costs, and therefore it will be of critical importance to better understand and estimate these relationships to determine optimal levels of IOp. Therefore, it will be necessary to

- Initiate empirical analyses of shape of benefit and costs curves, including size and potential return on investments in various settings and application fields
- Account for the dynamic nature of SIOP
- Investigate issues around legal and regulatory concerns, change management, organisational behaviour, structures, processes and tools to further develop and sustain SIOP.

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