eHealth
Monthly Focus

The practical relevance of Semantic Interoperability for healthcare

Travelling abroad for pleasure, education, or work has become a natural part of life for European citizens. Products and services can be bought in another Member State when the need arises, but obtaining healthcare there is still problematic for most European citizens.
Imagine, for example, you suffer from a chronic disease where you have to take critical medications every day, but you misplaced your supply while in another state. Even if you have a detailed list of the drugs you must take, the local pharmacist or doctor may not be able to help you because he/she does not understand it - there is no "semantic interoperability" (SIOP) across Union healthcare systems.

But also within a national or regional system, "to support patient safety, quality of care, chronic disease management, extended homecare, patient empowerment - clinical meaning (data, information, knowledge) must be capable of being represented consistently", as was noted by Dipak Kalra of University College London recently at an expert workshop on electronic health records in Brussels**.**

Semantic Interoperability is needed to fully realise the benefits of eHealth

Healthcare services are an essential part of the European social model, and the **right to access high quality healthcare** is at the **essence of European citizenship**. The values of universality, equity, solidarity and quality are shared by all Member States of the Union[1].
Economic and social trends challenge the sustained pursuit of these values. eHealth applications have proven to be key means in support of meeting such challenges; and they can open up even new opportunities for the further development of national and regional health systems. But to meet the policy goals of further improved patient safety, comprehensive chronic disease management or mobile and homecare, the safe, meaningful recording, sharing and combining of patient data, medical knowledge, and recommendations for treat-

ment have become mandatory. In a multi-cultural, multi-language European environment, such requirements pose **tremendous challenges** which must be met to reap the expected benefits from eHealth. *Semantic interoperability*, which will not only allow electronic "machines" to exchange and manipulate patient data, but also all those involved in health services to **understand and act on patient information in a collaborative manner**, will have to play a pivotal role if we want to realise this vision.

Meeting the challenges of *Semantic Interoperability* in Europe

Building on an extensive review of the latest R&D efforts in Europe and around the world, the *SemanticHEALTH* project - a specific support action (SSA) funded by the European Commission within its Framework Programme 6 (FP6) - develops a roadmap for further research and deployment of **workable SIOP solutions in the short and medium term**.
The work of the project has resulted in the drafting of an initial roadmap with identification of four areas of action and corresponding recommendations: (1) electronic health record (EHR) systems, (2) ontologies and terminologies, (3) public health and secondary uses/re-use of data, and finally (4) socio-economic issues.
For example, in the domain of EHRs it is recognised that achieving full SIOP across the entirety of

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health systems would be a lengthy, very expensive and possibly unattainable goal. It is therefore recommended that 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**. Recommended priority use cases for safe shared care include, e.g., new medication prescriptions, care transfers and care co-ordination, medical summaries, long term conditions.

Such a focus on priority use-cases also makes sense from a socio-economic point of view. SIOP is not a binary variable, but rather a scale reaching from zero to full interoperability. **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 interoperability. Further research should therefore focus on issues such as the shape of benefit and costs curves, including size and potential return on investments in various settings and application fields and also legal and regulatory concerns which impact on benefits and costs.

For ontologies and terminologies as means of representing the medical information and knowledge contained in EHRs and other systems - in a manner understandable by machines - it is recommended to **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.

Recommendations for concrete actions in short-, medium- and long-term are proposed, and divided into areas needing investment, wide-scale evaluation, or further research. **Support to open collaborative development of terminologies and classifications**, open tools for terminology binding to EHR (e.g., to archetypes and record structures), tools for quality assurance, is considered particularly relevant. Besides technical aspects such as coordinating the terminology development with EHR and decision support development, important organisational principles are emphasised like engaging healthcare providers and systems vendors, maintenance and sustainability, the international dimension of medical terminologies - "**think global while acting local**" as noted by Alan Rector of University of Manchester.

One of the greatest 'added-values' of digitalisation of health information is their combination, meaningful aggregation and analysis for clinical research and 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.

Recommended actions to realise the vision of "digital public health" include, according to Bedirhan Üstun, World Health Organization, the development of common standards that will allow data exchange on pre-identified variables of an EHR and compilation and comparison of that data across regions, time and populations.

The roadmap also addresses **important issues** such as **multilingual** and **multicultural challenges, legal issues, data protection, and** a variety of **social issues**. The project has established an extensive dialogue with key stakeholders and has started a process of critical reviews of its results by the global scientific community. The final roadmap to become available this fall will serve as a guide for decision makers and institutions committed to harnessing the power of science and technology to the people's concrete health needs.

The wider European context

The roots of the efforts of improving SIOP are grounded in the European eHealth Action Plan of 2004[2] providing a baseline and roadmap towards interoperable eHealth solutions, and are set in a larger European context of ICT-enabled healthcare modernisation as expressed by objective 3: "Supporting dynamic health systems and new technologies" of the EC's new strategic approach to health[3].

The output of the project and its workshops also facilitate and support the actions proposed in the upcoming *European Commission Recommendation on cross border interoperability of Electronic Health Records*.

The European Smart Open Services (S.O.S) Large Scale Pilot Project, to be undertaken by 12 European Member States, their Competent Authorities and about 30 industrial players, will develop and test cross borders interoperable patient summaries and ePrescription solutions. Also here semantic interoperability will be of crucial importance.

Harnessing the power of science and technology to the people's concrete health needs

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[1] Council Conclusions on Common values and principles in European Union Health Systems (2006)

[2] COM(2004) 356(final): e-Health – making healthcare better for European citizens: An action plan for a European e-health area

[3] COM(2007) 630 final, Together for Health: A Strategic Approach for the EU 2008 - 2013

Links:

Project website: Semantic Health www.semantichealth.org
eHealth Projects: http://ec.europa.eu/information_society/activities/health/research/fp6projects/index_en.htm

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