

Editorial Preface

Semantic Web Technologies in Health Information Management

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The Special Issue on semantic web technologies in health information management aimed at gathering research contributions from the Semantic Web multidisciplinary community to address the issues posed by the Information Systems in life sciences, medicine and health care. The special issue welcomed research, software and review papers dealing with topics falling in the following areas:

- Semantic representation of Electronic Health Records (EHRs), patient data and clinical trial data
- Ontology based data access in health-care
- Knowledge representation in Life Sciences
- Ontology Integration in Life Sciences
- Semantically enabled tools for Health Information Management
- Tools to exploit the Semantic data in health care
- Semantic technologies for precision medicine
- Semantic solutions to address the privacy issue in Health Information Management
- Ethical issues and (semantic) data governance in health-care

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INSIDE THE ISSUE

The paper “Towards Semantic Interoperability in Health Data Management Facilitating Process Mining” compares healthcare data models, which facilitate process mining, on a conceptual basis and analyzes their ability to describe clinical and patient pathways. More specifically the paper compares the (proprietary) healthcare reference model (HRM), the HL7 Fast Healthcare Interoperability Resources (FHIR) and the HL7 Clinical Document Architecture (CDA). All three models - HRM, CDA and FHIR – allow the modelling of clinical pathways. HRM and FHIR have specific features for this, and CDA contains metadata that allows the reconstruction of such pathways. HRM partially

supports the ETL process, with the exception of data extraction. FHIR, and CDA through the use of IHE (Integrating the Healthcare Enterprise) Profiles, support the full ETL process. FHIR and CDA contain enough information to enable automatic semantic interoperability. This is not provided by HRM.

In the paper “A Framework for IT Support of Clinical Laboratory Standards”, the authors present SmartSOP, the framework for IT support of clinical laboratory standards. The framework consists of the ontology OCL-SOP, the translation engine, and the mobile application. OCL-SOP is a knowledge model that standardises terminology used in clinical laboratory protocols. The translation engine converts SOPs from free text to machine-readable format and also can be used for the semi-automatic acquisition of new terms for OCL-SOP. The mobile application utilises the output of the translation engine for the visualisation of SOPs, semantic search, and recording of clinical test results. OCL-SOP captures the descriptions of typical laboratory experimental actions, biochemical entities involved, equipment used, input and output data, and also the data processing actions. OCL-SOP mostly covers terminology for Standards for Microbiology Investigations (SMI) developed by the Nation Institute for Health and Care Excellence (NICE), but it also reused terms and definitions from other relevant ontologies (e.g. EXACT and OBI).

The paper “Fujitsu HIKARI, a Healthcare Decision Support System based on Biomedical Knowledge” presents Fujitsu HIKARI, a Decision Support System that relies on a Knowledge Base (KB) called Biomedical Knowledge. HIKARI Biomedical Knowledge combines (1) theoretical knowledge extracted from scientific literature, domain experts, and health standards with (2) empirical knowledge extracted from the real patient Electronic Health Records (EHRs); and helps to assess potential patient health risks. Specifically, Fujitsu HIKARI estimates the risk of a patient of committing suicide and having an abuse of different substances such as alcohol, cocaine or cannabis. Fujitsu HIKARI is being developed in the context of a joint collaboration project between Fujitsu Laboratories of Europe and *Hospital Clínico San Carlos*.

The paper “A Next Generation of IT: A Health Record Example with Terminology Binding” describes a prototype to bind medical terminology by using a semantic media wiki installation. Authors also present a motivating use case and explore and discuss different solutions. The proof-of-concept prototype supports the idea that a Semantic MediaWiki is a feasible (open data) platform for implementing an EHR with binding to terminology which is loaded onto the platform. Semantic annotation is powerful enough to implement an EHR without recourse to traditional programming languages. The binding from a health record element to a term in a terminology is facilitated using closure mechanism in a Semantic Web environment.

REGULAR PAPER

The paper “Information and Communication Technologies in the Healthcare: Future Trends for Project Success” aimed at studying the pattern of ICT implementations in healthcare units, using articles published in academic health management journals. The documents were retrieved based on a literature review undertaken using the keywords ‘ICT in Healthcare’ and ‘ICT in Hospitals’, available in a number of sources. The final set of selected articles resulted from the comparison between the documents collected and the objectives of the study.

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