LDOW2016: 9th Workshop on Linked Data on the Web

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ABSTRACT

The ninth workshop on Linked Data (LDOW2016)[1] on the Web is held in Montreal, Quebec, Canada on April 12, 2016 and co-located with the 25rd International World Wide Web Conference (WWW2016). The Web is developing from a medium for publishing textual documents into a medium for sharing structured data. This trend is fueled on the one hand by the adoption of the Linked Data principles by a growing number of data providers. On the other hand, large numbers of websites have started to semantically mark up the content of their HTML pages and thus also contribute to the wealth of structured data available on the Web. The 9th Workshop on Linked Data on the Web aims to stimulate discussion and further research into the challenges of publishing, consuming, and integrating structured data from the Web as well as mining knowledge from the global Web of Data.

1. INTRODUCTION

The Linked Data Principles[2] were proposed 10 years ago and since then have received ever increasing attention from researchers, developers, companies and governments as a means of data distribution and integration that is consistent with the architecture of the World Wide Web[3].

This last decade has seen an explosion in the availability of data, driven by a range of factors such as *open data* initiatives worldwide, the increasing use of sensors to create a so-called *internet of things*, and by continued interest in the concept of *big data.*

In parallel to these trends, the broader Semantic Web vision has also evolved. While the Semantic Web stack was originally seen as rather monolithic and, at times, inaccessible to developers, the RDF data model now appears a more truly lingua franca of data integration, bridging between dif-

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[1] http://events.linkeddata.org/ldow2016/
[2] http://www.w3.org/DesignIssues/LinkedData.html
[3] https://www.w3.org/TR/webarch/

ferent knowledge representation formalisms, data serializations, conceptualizations and technology ecosystems. For example, there are now bindings of RDF to:

- tabular and relational data with the W3C R2RML[4] and the CSV on the Web[5] standards

- JSON with the W3C JSON-LD standard[6] providing a minimally invasive way of equipping standard JSON document with an RDF mapping preamble

- HTML with RDFa[7] as a mechanism for embedding RDF data into HTML documents.

Linked Data is beneficial where heterogeneous data needs to be exchanged between a variety of distributed systems or stakeholders. The lightweight knowledge representation formalisms propagated by Linked Data have been successfully applied in a number of domains, including:

- *Life Sciences* e.g. the OpenPhacts[8] initiative that integrates commonly used data resources in pharmacology, to support drug discovery

- *Web Commerce, Web Search and Semantic SEO* e.g. with the schema.org[9] initiative supported by major search engines, to help Web publishers embed structured data in their pages and benefit from improved presentation in search engine results pages

- *Digital Libraries* and aggregators such as Europeana and national digital libraries, which aggregate metadata about millions of artefacts using the Europeana Data Model (EDM)[10].

However, there remain a significant number of domains where applying the Linked Data principles would be beneficial, but the concept is still largely unknown, such as:

- *Finance,* where heterogeneous data about governance, risk management, compliance and other regulatory requirements needs to be exchanged between a variety of stakeholders

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[4] https://www.w3.org/TR/r2rml/
[5] https://www.w3.org/2013/csvw/wiki/Main_Page
[6] https://www.w3.org/TR/json-ld/
[7] https://www.w3.org/TR/xhtml-rdfa-primer/
[8] https://www.openphacts.org/
[9] http://schema.org/
[10] http://pro.europeana.eu/page/edm-documentation

- *Manufacturing and production*, which recently gained attention under the various banners of Industry 4.0 (Germany), industrie du futur (France) or Industrial Internet (USA) initiatives

- *Logistics*, where the scale and diversity of actors involved, and the inherently distributed nature of related data, requires a robust mechanism for representing connections between those actors and the data they generate

- *Enterprise Data Integration*, where the challenges of monitoring and integrating corporate data assets create barriers to more efficient commercial operation and innovation.

In order for Linked Data to be successful in the long term it needs to be established as a solution, or at least an alternative, for heterogeneous, distributed data integration in these domains and more. In this regard, the public Web provides an ideal test-bed for application of Linked Data principles, regardless of whether they operate outside or inside the firewall. The 9th Workshop on Linked Data on the Web aims to support progression of the field by stimulating discussion and further research into the challenges of publishing, consuming, and integrating structured data from the Web as well as mining knowledge from the global Web of Data.

2. WORKSHOP OVERVIEW

This years workshop received 24 submissions, each of which was carefully reviewed by at least three members of the LDOW2016 programme committee. Overall, 14 submissions were selected for presentation at the workshop and inclusion in the proceedings, to be published at CEUR-WS.org:

Linked Data Curation

- *Annalist: A practical tool for creating, managing and sharing evolving linked data.* Graham Klyne, Cerys Willoughby and Kevin Page

- *KnowledgeWiki: An OpenSource Tool for Creating Community-Curated Vocabulary, with a Use Case in Materials Science.* Nishita Jaykumar, Pavankalyan Yallamelli, Vinh Nguyen, Sarasi Lalithsena, Krishnaprasad Thirunarayan, Amit Sheth and Clare Pau

Data Publication & Consumption

- *Publish and Subscribe for RDF in Enterprise Value Networks.* Marvin Frommhold, Natanael Arndt, Sebastian Tramp and Niklas Petersen

- *Requirements on Linked Data Consumption Platform.* Jakub Klímek, Petr Skoda and Martin Necasky

- *Structured Feedback: A Distributed Protocol for Feedback and Patches on the Web of Data.* Natanael Arndt, Kurt Junghanns, Roy Meissner, Philipp Frischmuth, Norman Radtke, Marvin Frommhold and Michael Martin

- *Towards a Collaborative Process Platform: Publishing Processes according to the Linked Data Principles.* Tobias Weller and Maria Maleshkova

- *Automated Metadata Generation for Linked Data Generation and Publishing Workflows.* Anastasia Dimou, Tom De Nies, Ruben Verborgh, Erik Mannens and Rik Van de Walle

Data Linking & Integration

- *Complex Schema Mapping and Linking Data: Beyond Binary Predicates.* Jacobo Rouces, Gerard de Melo and Katja Hose

- *Discovering Spatial and Temporal Links among RDF Data.* Panayiotis Smeros and Manolis Koubarakis

- *Improving Link Specifications using Context-Aware Information.* Andrea Cimmino, Carlos R. Rivero and David Ruiz

- *R2RML-F: Towards Sharing and Executing Domain Logic in R2RML Mappings.* Christophe Debruyne and Declan O'Sullivan

Quality Assessment & Data Processing

- *Towards Cache-Enabled, Order-Aware, Ontology-Based Stream Reasoning Framework.* Rui Yan, Brenda Praggastis, William P. Smith and Deborah L. McGuinness

- *Assessing Quantity and Quality of Links Between Link Data Datasets.* Ciro Baron Neto, Dimitris Kontokostas and Sebastian Hellmann

Linked Data Applications

- *Semantic Hadith: Leveraging Linked Data Opportunities for Islamic Knowledge.* Amna Basharat, Bushra Abro, I. Budak Arpinar and Khaled Rasheed

This year's submissions target various aspects of Linked Data management and reuse, with a clear center of gravity in the areas of curation, publication/consumption and integration. Despite their importance for the advancement of the field, papers on mining, analytics, and domain applications were few and should receive more attention in subsequent editions of the workshop.

3. LOOKING FORWARD

In addition to the presentation of accepted papers, and related discussions, the workshop will feature a reflective keynote talk examining the first decade of Linked Data research and applications, as well as directions, priorities and opportunities for the years to come. We expect these to include trends such as:

- an increased focus on the role of, and support for, graph-based data (such as RDF) in popular big data processing frameworks

- mechanisms and incentives for increasing the degree of interlinking in structured data on the Web, especially e.g. schema.org data

- approaches for assessment and improvement of data quality on the Web

- the role of Linked Data in enabling data discovery on the Web, irrespective of data model or serialisation.

4. ACKNOWLEDGMENTS