Preface of SWeTI 2018: Semantic Web of Things for Industry 4.0*

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The first edition of SWeTI workshop intended to make a step forward in shaping a community of researchers and practitioners aiming to realize a vision of industry 4.0. We focused on development of techniques and tools using a combination of three technologies including Semantic Web, Internet of Things (IoT) and Industry 4.0. A great potential of combining semantic Web and IoT technologies (commonly referred as Semantic Web of Things) has been already acknowledged and widely discussed by the semantic web community [4]. However, SWeTI workshop is a first attempt to bring together different disciplines to utilize Semantic Web of Things for Industry 4.0 and form an international community to identify major challenges and research directions. We invited original research papers and case studies proposing foundational concepts, sharing techniques and experience, and identifying potential usecases. We accepted three full papers which were presented during the workshop. We also have an invited keynote highlighting the importance of data analytics techniques for industry 4.0. The keynote was presented by Professor Dietrich Rebholz-Schuhmann, who is the director of Insight Centre for Data Analytics, NUI Galway. He is also a Co-PI of Confirm Centre for Smart Manufacturing, which is a Science Foundation Ireland funded project aiming to modernize industrial landscape within Ireland and bringing the local industry closer to the vision of Industry 4.0. During his talk, Prof. Rebholz-Schumann presented ongoing research projects and state of the art for data analytics, IoT and Industry 4.0. He advocated potential of harnessing achievements in semantic web technologies and IoT for Industry 4.0. He presented a vision of smart manufacturing discussing a variety of priority areas, including virtual industrialization, cyber-physical manufacturing systems and self-aware manufacturing systems. A few example usecases of smart products, smart machines, smart production systems and smart supply chains were discussed.

Following the keynote talk, we have 3 papers presentations. Thuluva et al. [3] presented their work on shaping device descriptions to achieve IoT semantic interoperability. This paper aims at achieving semantic interoperability among IoT devices by using the Things Descriptions specified by the W3C Web of Things Working Group. The paper describes a mechanism to define constraints over iotschema capabilities using the SheX language. identified a very good gap in the way device descriptions using

* Joint proceedings are publicly available in [1].

semantics are carried out, in particular the lack of semantics for describing variety and diversity in devices. In order to represent device variants authors propose to extend iot.schema.org Capabilities with RDF Shapes.

Alvanou et al. [2] presented an MTConnect ontology designed for machines' sensors data analytics in the industrial domain. MTConnect is a known standard for representing information related to machines and this paper attempts to convert this existing standard (XML) into a standard ontology. Authors utilized the existing ontologies such SSN, SAREF and and SEM while designing their ontology. A few example queries in SPARQL as a proof of concept for ontology completion were also presented.

Spieldenner et al. [5] presented their work on formalization of the Entity-Component-Attribute (ECA) patterns. Authors described a generic and auto-generated mappings from ECA runtime to W3C linked data platform compliant structure. This paper also explained that how domain experts can declaratively augment the generated structured mapping with domain-specific semantics. This work outlines how linked data client can materialize the application-specific RDF locally or using a remote service.

Finally, we concluded our workshop with an open discussion on key focus areas of research aligned with the workshop theme. The participants of last session identified three key topics for this emerging area of the research including defining ontologies for integration and interoperability between legacy industry standards, use of existing standards and ontologies (e.g. SSN, SAREF and things description) to design solutions for industry 4.0 using sensor data produced by machines, and implementation of example usecase scenarios in real industrial settings.

Acknowledgments

We would like to thank the authors for their contribution and active participation in the workshops, and all the program committee members for reviewing the submissions and provide valuable feedback. We are also grateful to the organizers of the ESWC 2018 conference for their support, and our keynote speaker, Professor Dietrich-Rebholz Schuhmann for his keynote at SWeTI workshop. Prof. Rebholz-Schuhmann is director of Insight Centre for Data Analytics, at National University of Ireland, Galway.

SWeTI workshop organizers are affiliated with Insight Centre for Data Analytics and Confirm Centre for Smart Manufacturing at National University of Ireland, University of Bradford, UK, Fraunhofer USA, and Wright State University, Ohio, USA. The workshop was partially supported by Insight Centre for Data Analytics under grant number SFI/12/RC/2289 and Confirm Centre for Smart Manufacturing funded by Science Foundation Ireland under grant number SFI/16/RC/3918.

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