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Preface to the special issue "Geospatial Sensor Web - Concepts, Technologies and Applications"

Simon Jirka* and Christoph Stasch

Since the adoption of the first Sensor Web standards in 2007, the number of Sensor Web applications has constantly increased. Implementations in domains such as hydrology [1], ocean sciences [2], or air quality monitoring [3] demonstrate the broad applicability and practical value of Sensor Web components.

Over the last 10 years, a significant evolution of the underlying concepts was achieved. Between 2011 and 2014 this has resulted in a second generation of Sensor Web specifications that reflect the lessons learned from early implementation activities [4]. This has even further increased the acceptance of Sensor Web standards. With the adoption of core Sensor Web standards as part of the INPSIRE Technical Guidance another significant step was achieved in the year 2016 [5, 6].

At the same time there are new, emerging technologies which offer further opportunities to build a new generation of Sensor Web applications. This comprises for example push-based communication patterns that ensure an active and fast delivery of sensor observations as soon as they become available. Also semantic aspects, for example vocabularies, promise a further increase of interoperability between Sensor Web components.

Within this special issue, a selection of articles dealing with specific aspects about ongoing Sensor Web research and developments is presented.

The article "Pilot Implementation of the US EPA Interoperable Watershed Network" contributed by T. Slawecki et al. [7] introduces a Sensor Web pilot implementation in the context of the Interoperable Watersheds Network (IWN) project. This pilot illustrates, from a practical perspective, how standards-based interoperability helps building a national-scale clearinghouse for continuous sensor data streams.

Complementary to this, another article discusses the application of Sensor Web technology in the ocean sciences community. In her article, E. Partescano [8] discusses how (near) real-time open data access to sensor data can be enabled using the OGC Sensor Web Enablement standards. She describes a real-time data management system developed by Italian National Oceanographic Data Center (OGS/NODC) that relies on Sensor Web standards to share data acquired by several different observing platforms.

Thematically related to this is the article of J. Fredericks and M. Botts: "Promoting the Capture of Sensor Data Provenance: A Role-based Approach to Enable Data Quality Assessment and Sensor Management" [9]. In this article the authors describe their ongoing work on the provision of interoperable sensor metadata to enable the assessment of observation data sets by potential users.

Finally, the article "The new OGC Publish/Subscribe 1.0 standard" of L. Bigagli et al. [10] introduces some new developments of the OGC standardisation community to enable push-based sensor data delivery. The authors discuss how the OGC Publish/Subscribe standard can be integrated into the framework of OGC Sensor Web Enablement specifications so that new types of Sensor Web applications can be realised.

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* Correspondence: jirka@52north.org
52°North Initiative for Geospatial Open Source Software GmbH, Münster, Germany

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