2015-12

Applying Two-Level Modelling to Remote Sensor Systems Design to Enable Future Knowledge Generation

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APPLYING TWO-LEVEL MODELLING TO REMOTE SENSOR SYSTEMS DESIGN TO ENABLE FUTURE KNOWLEDGE GENERATION

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Topic: Analysis Techniques – Data Analysis and Modelling, Information Extraction

Geographical Information Scientists have a need to combine data from many sources and in various ways to synthesize new understanding, producing new knowledge [1]. Remote sensor deployments, monitoring environmental phenomena, are a huge provider of valuable data. Often, observation systems are built in isolation, and the data representations are not adequately designed for re-use and higher order knowledge generation. There are many standards that allow syntactic interoperability and sharing of remote sensor systems observational data, such as the OGC's suite of standards [2]. However, semantic interoperability remains a work in progress [3] [4].

This paper describes how system design techniques used in the health informatics domain [5] to tackle similar problems of how data, information and knowledge concepts are modelled and managed can be applied to remote sensing applications. Much like the health domain, remotely sensed data is traditionally modelled from a computer science perspective. Traditional object-oriented techniques typically used to model complex data are insufficient in a geographical data context, as they are too stringent during the early stages of knowledge acquisition. Standards such as O&M on their own precipitate a codifying effect as systems are developed, constraining rapidly evolving information [6].

The authors have investigated the OGC's O&M standard as a reference model to underpin a two-level modelling approach. An augmented O&M model has been developed and is presented along with a worked example of how a two-level modelling approach using O&M as the reference model can be applied to modelling a marine data buoy.

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