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WaterML2.0: Harmonising standards for water observations data

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Our ability to share and understand water information from various sources is currently limited by the use of incompatible information management and publication technologies. Water resource managers, hydro-power generators, meteorologists and other interested stakeholders all monitor water resources and store their data using a wide array of technologies.

Standards are multi-party agreements that provide a common ground on which people can share information by minimising ambiguity and sharing definitions for domain concepts. They are most effective when surrounded by an active community who, along with taking part in defining such concepts, develop supporting tools that allow for easy transmission and interpretation of data sets.

Existing standards for water observations only exist within organisations or countries; there are no internationally agreed upon standards for encoding such data. Groups such as the Consortium of Universities for the Advancement of Hydrological Sciences, the Australian Bureau of Meteorology, and others, have developed standards for national exchange of water information, such as WaterML1.1 and the Water Data Transfer Format; other standards such as Xhydro have been developed at the sub national level.

An initial analysis of existing standards (including WaterML1.1, WDTF, XHydro and the UK EA format) found sufficient commonality to suggest a role for an international standard. Such a standard would reduce the load on organisations developing their own standards. The commonalities exist in the way in which measurements and observations are made and described, such as time series data produced from automated sensors commonly used for hydrological monitoring.

The Observations and Measurements (O&M) standard, developed by the Open Geospatial Consortium (OGC), is capable of describing measurements made by sensors and humans in a common way, involving both remote and in-situ sensing. O&M is generic, in that it does not define the concepts for a particular domain such as hydrology, but rather the abstract components that are needed when making observations: features, observed properties of features, observation procedures and results.

By making use of the O&M standard and specialising it with harmonised definitions of water observation concepts, it is proposed that a domain-level standard, WaterML2.0, be developed. It would be capable of precisely describing the relevant aspects of hydrological observations. Re-using existing standards suites, such as OGC, allows the development to focus on capturing domain specific concepts without redefining common types such as spatial types, standard data structures and so on. The development will be done by involving key stakeholders who have developed existing standards and understand hydrological observational practices.

Through the Hydrology Domain Working Group within OGC, jointly chaired by the OGC and the World Meteorological Organization (WMO), WaterML2.0 will be developed as an OGC standard. It may then be leveraged by existing web services, such as the OGC's Sensor Observation Service (SOS), to query and extract water information across the Internet using common tools. This will allow water information to be shared - and most importantly understood – by a much wider audience.