

OpenGIS Project Document 00-TBD: Activity Plan for an OGC Interoperability Experiment

Title: OGC/WMO Domain Working Group in Hydrology Interoperability Experiment 2 – Surface Water

Abbreviation: HDWG_IE2

SUMMARY

This interoperability experiment will advance the development of WaterML 2.0 and test its use with various OGC service standards (SOS, WFS, WMS and CSW). It will also contribute to the development of a hydrology domain feature model and vocabularies, which are essential for interoperability in the hydrology domain, although these are not the main focus for the IE.

The use of O&M compliant WaterML 2.0 and OGC web services for data exchange will allow for easier access and interpretation of water data. The ultimate use of the exposed data will depend on the context of participating organizations and their driving requirements. We expect the IE will result in further development of WaterML 2.0, including a schema, example instances, and documentation describing the schema. It will also result in a documented evaluation of the compatibility of WaterML 2.0 with OGC services, which can feed back to OGC. In particular, surface water datasets typically contain a large number of observations at a small number of locations, which will test WaterML 2.0 in new ways. This contrasts and complements HDWG_IE1 in which there are many locations with a comparative small number of observations. We expect that the project will discover issues related transferring large timeseries of observations. New and upgraded web services amongst participants are also expected, increasing the overall availability of water data and the interoperability of water information systems. Development of client applications is a secondary concern; the focus of work is testing information models and service delivery mechanisms.

INITIATOR ORGANIZATIONS

The WMO is supporting the Interoperability Experiment within the scope of the existing MoU between OGC and WMO.

The OGC members that are acting as initiators of the Interoperability Experiment are:

- disy Informationssysteme GmbH
- US Geological Survey (USGS)
- IOW-Sandre
- Commonwealth Scientific and Industrial Research Organisation (CSIRO)
- KISTERS Environmental and Resource Management Software Solutions (KISTERS, DE)
- Service Centre Information Technology of the BMVBS (DLZ-IT BMVBS, DE)

Contact information for these organizations is contained in an Annex.

PARTICIPANT ORGANIZATIONS

The initiator organizations listed previously are participants also, and are not relisted here.

The following organizations in addition to the initiators will be participating in the IE.

- Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI, US)
- 52° North Initiative for Geospatial Open Source Software (52NORTH, DE)

Other organizations and their contributions, as they come on-stream, will be updated in the OGC Web Portal project:

http://portal.opengeospatial.org/index.php?m=projects&a=view&project_id=301&tab=0

DESCRIPTION

Objectives

The aim of this IE is:

- (1) Extend and complement the work already underway in IE 1, with the goal of advancing the development of WaterML 2.0 to the sub domain of surface water observations.
- (2) Test compatibility of WaterML 2.0 with existing IOW-Sandre, DLZ-IT BMVBS, CUAHSI and USGS services and with implementation of the OGC SOS, WFS, WMS standards;
- (3) Advance exchange of surface water data between Germany and France in the cross-border area of the Rhine/Rhin river, such that participants can dynamically and transparently access the data and utilize it with their respective information systems.
- (4) Test compatibility of WaterML 2.0 for use with hydrological forecasting systems.
- (5) Establish a limited surface water feature model and vocabularies suitable for the provision of surface water data using WaterML 2.0.
- (6) The data will be served by all participants using WaterML 2.0 and OGC services (SOS, WFS, WMS).

Background

Members of the OGC Hydrology Domain Working Group are developing WaterML 2.0. WaterML 2.0 will be a data transfer format to be used in conjunction with OGC standards (e.g. Sensor Observation Service [SOS]), and other services, for the transmission of a broad suite of water information. Development of WaterML 2.0 involves the harmonisation of several existing approaches (eg. WaterML (US), WDTF (Aus), Observations & Measurements [O&M], GroundwaterML [GWML], WISE-INSPIRE [EU]), as well as the evaluation of their compatibility with existing web service standards and implementations (e.g. SOS, CUAHSI, USGS, GSC, CSW). This work has already commenced, with good progress being made through the HDWG Interoperability Experiment 1, which is focussing on groundwater aspects. To make further advances and to expand the work into other areas of the domain, we propose this second Interoperability Experiment [IE], focussing on surface water aspects.

Use Cases

The workplan of the IE is developed around three use cases.

1. Cross Border Data Exchange Use Case: The user will discover surface water data from cross border or other regions via web map client and then visualize the time-series via web sparklines or charts. Once the data has been inspected and the user is satisfied that the data is of interest, the user will download the data in an appropriate format.
2. Forecasting Use Case: The user will discover and download data suitable for a streamflow forecast. The user will be able to feed a streamflow forecast model with this data, but the modeling itself is not part of the scope of this IE.
3. Global Runoff Use Case: The goal for this use case is to provide automated monthly and yearly volume calculations from large rivers discharging to the oceans. Candidate locations for the experiment are from the Global Runoff Data Center (GRDC) database. A website is developed from which users can view station locations participating in the experiment. The locations are found by interrogating a federated catalog of stream gages (gage has phenomena discharge for the time period of interest). Once the map is displayed, users can identify a gage of interest and some basic information is displayed in a popup, the watershed (catchment) is delineated and displayed. The user is presented with two buttons and a start and end date form. The user enters a start and end date and chooses either (1) Monthly volumes or (2) Yearly volumes. Once a button is pressed, the client application requests the daily or instantaneous discharge values (in various units) and the website displays a timeseries of monthly or yearly calculated volumes in both m³ and cubic feet. The timeseries is displayed in a table and in a graph with the graph showing gaging station information including name, id and basin size.

The initial set of stations might include the Rhine and the Mississippi Rivers.

Experiments

The IE will attempt to address the following experiments, which are centered on each of the aforementioned use cases.

- Experiment #1: Test WaterML 2.0 with surface water data by disseminating surface water data from Rhin - Rhein - between Germany & France to all participants using OGC SOS, WFS, WMS web services and WaterML 2.0 encoding. This will additionally demonstrate cross border surface water data interoperability.

- Experiment #2: Test WaterML 2.0 for use with hydrological forecasting systems. WaterML 2.0 must support this type of use and these systems require timeseries observations from small number of related stations but with a very high temporal resolution. This experiment will test the performance of the services and the encoding itself to determine if it is suitable for this type of use.
- Experiment #3: Test WaterML 2.0 with features and vocabularies suitable for surface water. This experiment will test querying over observations linked to surface water features using the global runoff use case, with a suitable catalog.

TECHNICAL APPROACH

The Technical Approach for this Interoperability Experiment focuses on leveraging existing OGC Specifications and, as needed, developing Change Requests for these specifications. The following section describes the Technical Approach in detail.

Experimental Methodology

The ongoing development of WaterML 2.0 will be undertaken by the WaterML 2.0 design team, which has been constituted under the Hydro-DWG. Participants in this IE will enlist technology and domain experts from this team as required. The experiences of the participants will be fed into the WaterML 2.0 design team and WaterML 2.0 will be adjusted as required to rectify issues identified as part of the IE. If the issues are raised after the release of WaterML 2.0, the requirements will be fed into the OGC via a change request (CR).

Attention will be paid towards encoding and delivery of surfacewater data and metadata, and integration with common surfacewater vocabularies.

Participants will meet in person at scheduled OGC meetings or other venues, once or twice a year as required, and will otherwise carry out business electronically via email, teleconferencing, and webconferencing.

- **Kisters (Germany):** will provide an SOS Service speaking WaterML 2 as part of the KISTERS Hydrological Information System WISKI 7.x. The SOS Service enables WISKI 7.x to publish but also to consume meta and time series data in WaterML 2.0 Format. This WISKI 7.x System will be implemented at the Service Centre Information Technology of the BMVBS for the purpose of this experiment. Data from the Global Runoff Data Center will also made available through this WISKI 7.x version. KISTERS will also contribute to the implementation of a catalog service. Participants include: Michael Natschke and Stefan Fuest
- **52° North (Germany):** will contribute a SOS implementation supporting WaterML 2.0; through this SOS implementation. This will include:
 - Support for the deployment of this SOS implementation in order to allow other contributors to serve surface water data.
 - Supply of client APIs and components to access SWE services. They can be used to build client applications.Depending on the specific requirements, 52° North can provide a catalogue technology for the discovery of sensors and the look up of observables/phenomena and their semantics. Participants include Simon Jirka and Arne Boering and associates.
- **SDSC/CUAHSI (USA):** will contribute to the development of WaterML 2.0 and potentially aid in the development of web services for the USA data. Participants include Ilya Zaslavsky, David Valentine and associates.
- **International Office for Water – Sandre (France):** will test hydro quantity data exchange using WaterML 2.0 and deploying OGC webservices (WMS, WFS, SOS) on cross-border use case in

the framework of the European cross-border experiment; thus will contribute to the evolution on WaterML 2.0. Potential feedback on the French Water Information System will also be evaluated. Participants include Sylvain Grellet and Associates.

- **USGS (USA):** will deploy SOS services with timeseries daily discharge information for the Mississippi river. Participants include Nate Booth and associates.
- **CSIRO (Australia):** will lead modification of WaterML 2.0 suitable for the surface water use cases. In addition CSIRO will make timeseries discharge data available for the South Esk River in Tasmania using WaterML 2.0. Participants include: Peter Taylor, Peter Fitch, Brad Lee and associates.
- **Service Centre Information Technology of the BMVBS (Germany):** will provide surface water time series data of the German federal hydrometric network (quantity and quality) using SOS and WaterML2.0. Participants include Christian Michl, Dietmar Mothes and associates.
- **Disy Informationssysteme GmbH (Germany):** will provide catalogue implementation for the description and discovery of services. Disy will also coordinate the European cross-border experiment.
- **NOAA/NWS, Deltares-USA (USA):** will consume the surface water data provided by USGS as part of use case 3, and assess its suitability for use in forecasting systems. This will result in change requests for WaterML 2.0. Participants include John Halquist (NOAA/NWS), Peter Gjisbers (Deltares-USA) and associates.

Demonstration Planning

Demonstrations are planned for quarterly OGC TC Hydro-DWG meeting to demonstrate progress. Each quarterly demonstration will illustrate more functionality, with the final demonstration showing complete functionality necessary to support the use cases of the IE.

Specification Development

The primary focus of this IE will be on the development and testing of WaterML 2.0, an O&M compatible encoding for time-indexed water data, and its transmission using OGC web services. Resulting encoding and interface definitions will then be considered for change requests against existing OGC encodings and services. The list of specifications that *may* be affected includes:

- Web Feature Service (WFS)
- Catalog Service (CSW)
- Web Map Service (WMS)
- Sensor Observation Service (SOS)
- Observations & Measurements (O&M)

Component Development

The following components will be developed concurrently by the responsible organization(s), to be completed by the execution end date.

Description	Sponsor / Implementor(s)
O&M compliant WaterML 2.0	CSIRO and CUAHSI
WMS	
WFS	
SOS	52° North, KISTERS
Client (Desktop, Web)	KISTERS
CSW	disy Informationssysteme GmbH

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Other related services/clients that will be included:

Description	Sponsor / Implementor(s)
Operating infrastructure including online data transfer from stations, timeseries DBMS and web service environment	DLZ-IT BMVBS

Testing and Integration

- Testing and integration will largely involve implementation of the use case.
- At least two face-to-face testing and integration sessions will be proposed, once at the beginning of the testing and integration period and once directly prior to the demonstration. Others may occur as required.

DELIVERABLES

The documentation listed below will be considered the deliverable for the project.

Documentation

The following documentation will comprise the deliverables for the project:

- WaterML 2.0 documentation.
- Screen capture video of the cross-border demonstration.
- Change Requests, as needed, for OGC Specifications.

Demonstration

- An Internet demonstration of all functioning components will be made towards the end of the IE.

SCHEDULE (TENTATIVE)

Startup	
Activity Plan submission:	April 2010
Anticipated OGC Review Board approval: Includes posting for 2 weeks for member comments	May 2010
Execution	
Planned kickoff date (execution start date): Includes 30-day Participation Notification period	June 2010
Milestone 1 Services available from KISTERS, USGS, CSIRO, IOW-Sandre, disy Clients and basic testing , KISTERS and 52° North Catalog delivery basic search functionality. Demonstration at Sept OGC TC meeting	September 2010
Milestone 2 Demonstration	December 2010
Milestone 3 Demonstration	March 2011
Testing and bug fixing	March 2011
Milestone 4	June 2011

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Demonstration	
Planned end date:	June 2011
Wrap-up and Reporting	
Technology Demonstration	June 2011
Final report submission	September 2011

RESOURCE PLAN

The Initiative Manager will be Peter Fitch (CSIRO) and the Initiative Technical Lead will be assigned at the kick off meeting.

The OGC Initiative Facilitator will be David Arctur

The following resources will be available.

<i>Staffing</i>	Each initiating and participating organization will provide adequate staff resources to support their defined responsibilities for the duration of the IE.
<i>Hardware</i>	Initiating organizations will provide hardware as needed to support the IE.
<i>Software</i>	Initiating organizations will provide software as needed to support the IE.
<i>Other Resources</i>	Participants in the IE are self-funded. All expenses incurred in carrying out the IE will be borne by the participating agencies within their regular line-of-business.

REQUIREMENTS FOR PARTICIPATION

In order to become a participant in this IE, an organization must be willing make a resource commitment and a substantial contribution in one or more of the following areas:

- An OGC web service component (SOS, WFS, WMS) for surface water data;
- a web client that makes use of service components, OR
- testing of the services/clients, OR
- provision of observation data, OR
- compilation of documentation into one or more of the Interoperability Experiment deliverables (note that all participants must also provide sub-reports for inclusion in the final reports)
- Intellectual property: Intellectual property (IP) brought to the IE will remain with the participants. IP related to advancement of specific agency information systems will also remain with the participants. IP related to the development or advancement of OGC standards (e.g. WaterML 2.0) will rest with the Hydrology Domain Working Group and its joint authorities, the OGC and WMO. Any remaining IP that results from the IE will be jointly owned by all participants. The participants agree to respect the collaborative nature of the experiment with due acknowledgement of the participants and, if appropriate, undertake co-authorship in any ensuing materials.

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