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

**T**itle**:** 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 contain a large number of observations at a small number of locations, which will test WaterML2.0 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 OGC members that are acting as initiators of the Interoperability Experiment are:

* disy Informationssysteme GmbH
* US Geological Survey (USGS)
* IOW-Sandre
* WMO
* Commonwealth Scientific and Industrial Research Organisation (CSIRO)

Contact information for these organizations is contained in an Annex.

# Participant ORGANIZATIONS

The following organizations will be participating in the IE.

* International Office for Water - Sandre (FR)
* Dienstleistungszentrum Informationstechnik (DLZ-IT, DE)
* US Geological Survey (USGS, US)
* Commonwealth Scientific and Industrial Research Organisation (CSIRO, AU)
* Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI, AU)
* 52°North Initiative for Geospatial Open Source Software (52North, DE)
* KISTERS Environmental and Resource Management Software Solutions (KISTERS, 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, BAW – Federal Waterways and Engineering Institute, 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 WaterML2.0 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 WaterML2.0.

(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.

## 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.

1. 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.

## 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 m^3 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 WaterML2.0 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 WaterML2.0 encoding. This will additionally demonstrate cross border surface water data interoperability.
* Experiment #2: Test WaterML2.0 for use with hydrological forecasting systems. WaterML2.0 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 WaterML2.0 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 WaterML2.0 will be undertaken by the WaterML2.0 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 WaterML2.0 design team and WaterML2.0 will be adjusted as required to rectify issues identified as part of the IE. If the issues are raised after the release of WaterML2.0, 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):** Make available CSW catalog and SOS client for use in the IE. Participants include: Michael Natschke,…
* **52°North (Germany):** will contribute a SOS implementation supporting WaterML2.0; 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 WaterML2.0 and deploying OGC webservices (WMS, WFS, SOS) on national and cross-border use cases; thus will contribute to the evolution on WaterML2.0. Potential feedback on 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 WaterML2.0 suitable for the surface water use cases. In addition CSIRO will make timeseries discharge data available for the South Esk river in Tasmania using WaterML2.0. Participants include: Peter Taylor, Peter Fitch, Brad Lee and associates.
* **Federal Waterways Engineering and Research Institute** (Germany): will provide surface water timeseries data of the German federal hydrometric network (quantity and quality) using SOS and WaterML2.0. Participants include Carsten Heidmann, Chris Michl and associates.
* **NWS (USA):**
* **Deltares-USA (USA):**

## 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 |
| CSW | Kisters, disy |
| WMS |  |
| WFS |  |
| SOS | 52 North |
| Client | Kisters |
|  |  |

Other related services/clients that will be included:

|  |  |
| --- | --- |
| Description | Sponsor / Implementor(s) |
|  |  |
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## 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)

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

# RESOURCE PLAN

The Initiative Manager will be Peter Fitch (CSIRO) and xx and the Initiative Technical Lead will be xx The OGC Initiative Facilitator will be David Arctur

The following resources will be available.

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| *Staffing* | Each initiating and participating organization will provide adequate staff resources to support their defined responsibilities for the duration of the IE.  |
| *Hardware* | Initiating organizations will provide hardware as needed to support the IE. |
| *Software* | Initiating organizations will provide software as needed to support the IE. |
| *Other Resources* | 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 surfacewater data;
* a web client that makes use of service components, OR
* testing of the Services/Clients, 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.

# INITIATOR ORGANIZATIONS – Contact Information

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