

EU Framework Program for Research and Innovation (WATER-4a-2014 - H2020)



Project Nr: 641821

Applying European market leadership to river basin networks and spreading of innovation on water ICT models, tools and data.

Deliverable D5.2

European water interoperability experiment request for participation

Version 4.1

Due date of deliverable: 31/09/2015

Actual submission date:

Document control page	
Title	D5.2 European water interoperability experiment request for participation
Creator	JM_CREAF
Editor	LP_CREAF, JM_CREAF and CS_52N
Description	Report for the European water interoperability experiment request for participation.
Publisher	WaterInnEU Consortium
Contributors	WaterInnEU Partners
Type	Text
Format	MS-Word
Language	EN-GB
Creation date	16/09/2015
Version number	4.1.
Version date	22/12/2015
Last modified by	LP_CREAF
Rights	Copyright © 2015, WaterInnEU Consortium
Dissemination level	<input type="checkbox"/> CO (confidential, only for members of the consortium)
	<input checked="" type="checkbox"/> PU (public)
	<input type="checkbox"/> PP (restricted to other programme participants)
	<input type="checkbox"/> RE (restricted to a group specified by the consortium)
	When restricted, access granted to:
Nature	<input checked="" type="checkbox"/> R (report)
	<input type="checkbox"/> P (prototype)
	<input type="checkbox"/> D (demonstrator)
	<input type="checkbox"/> O (other)
Review status	<input type="checkbox"/> Draft <i>Where applicable:</i>
	<input checked="" type="checkbox"/> WP leader accepted Accepted by the PTB
	<input type="checkbox"/> PMB quality controlled Accepted by the PTB as public document
	<input checked="" type="checkbox"/> Coordinator accepted
Action requested	to be revised by all WaterInnEU partners
	for approval of the WP leader
	for approval of the PMB
	for approval of the Project Coordinator
	for approval of the PTB
Requested deadline	

Revision history			
Version	Date	Modified by	Comments
1.0	15-07-2015	JM_CREAF	Created the first draft version
1.1	28-08-2015	LP_CREAF	Several general contributions
2.1	16-09-2015	CS_52N	Global revision
2.2	01-10-2015	LP_CREAF	First draft completed
3.1	30-09-2015	JM_CREAF	Small changes
4.1	22-12-2015	LP_CREAF	Last revision

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Title: River BASin Standards interoperability Pilot

Abbreviation: RIBASE

1. Summary

There is a lot of water information and tools in Europe to be applied in the river basin management but fragmentation and a lack of coordination between countries still exists. The European Commission and the member states have financed several research and innovation projects in support of the Water Framework Directive. Only a few of them are using the recently emerging Hydrological standards, such as the OGC WaterML 2.0, and there is a lack of interoperability between tools making the adoption difficult and, as a result, many are rarely used after the end of the project. The purpose of this pilot is to assess the difficulty of applying OGC standards in the water community and to demonstrate their applicability. This pilot will also help in identifying potential gaps in OGC standards. The demonstrated solution will combine different geospatial standards as defined by the Open Geospatial Consortium (e.g., WaterML 2.0, SOS, WPS, WFS, WCS, etc.). The region of interest of this pilot is the Scheldt river basin and the Maritsa river basin in Europe (the two use cases in WaterInnEU project). Deploying non-European products in the mentioned river basins for testing interoperability purposes can also be contemplated. Participants are requested to contribute to this pilot in-kind and will get visibility and recognition in the OGC portal.

2. Initiators organizations

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

- Universitat Autònoma de Barcelona - CREAM
- 52° North GmbH
- Adelphi
- Antea Group

Contact information for initiator organizations is contained in an Annex.

3. Participant Organizations

The following organizations will be participating in the RIBASE Pilot.

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- Universitat Autnoma de Barcelona - CREAM
 - 52°North

A complete list of participating organizations will be added after the 30-day Participation Notification period ends.

Contact information for participant organizations is contained in an Annex. Other organizations and their contributions, as they come onboard, will be updated in the OGC Web Portal project and in the WaterInnEU portal.

The WaterInnEU Horizon 2020 project is providing initial participants to the initiative but the participation of external parties is encouraged. Organizations participating in this interoperability pilot are encouraged to become members of the OGC before the interoperability pilot begins but this is not mandatory. Participants are expected to get visibility of their activities and increase interoperability and plugability of their solutions. In addition participants will get support to integrate their solutions in the WaterInnEU marketplace. The Engineering Report (ER) resulting from this pilot will show their contributions and capacity and will be exposed as a public ER in the OGC website. It will help them to evaluate new technologies. Their participation will be acknowledged at the beginning and at the end of a video demonstration that will be produced showing the results.

4. Description

The primary focus of this pilot is to demonstrate the applicability of OGC standards for the water domain, as follows:

- Applicability of WaterML 2.0 to the Scheldt and/or Maritsa river basin. Use of the SOS 2.0 Hydrology Profile to provide WaterML 2.0 data access.
- Combination of WaterML 2.0 and WPS 2.0 to execute flooding modeling based also on water predictions.
- Download and presentation of Water models results.
- Alert/notification services¹

The desired outcome of this pilot is to:

¹ Even if there has been considerable work done for the definition and testing of Alert/Notification services, there is no OGC official standard that is specifying this yet.

- Successfully demonstrate that OGC standards are applicable in the water domain in Europe and assess the difficulty of migrating current tools to support and generate results in the OGC WaterML 2.0 exchange format. Interoperability test with non-European solutions.
- If areas are identified in the pilot where OGC standards have gaps, attempt to develop a technical solution to resolve the incompatibility and rerun that portion of the pilot to successfully demonstrate the new approach compatibility and support for the areas previously shown not to be supported.
- Move forward in the Service Alert and Notification mechanisms.

4.1. Background

WaterInnEU is a Horizon 2020 project focused on creating a marketplace to enhance the exploitation of EU funded ICT models, tools, protocols and policy briefs related to water and to establish suitable conditions for new market opportunities based on these offerings. Its second primary goal is to assess the level of standardization and interoperability of these outcomes as a mechanism to integrate ICT-based tools, incorporate open data platforms and generate a palette of interchangeable components that are able to use the water data emerging from the recently proposed open data sharing processes and data models stimulated by initiatives such as the INSPIRE directive.

As part of the standardization and interoperability activities in the project, this pilot is designed to demonstrate how current ICT-based tools and water data can work in combination with geospatial web services in the Scheldt river basin. The results of the pilot will be documented in an engineering report and in a video demonstration, and may result in change requests to OGC standards as appropriate. Participants in the pilot are expected to contribute to the interoperability pilot activities, demonstrations and the engineering report. In addition, the artifacts from this pilot will be used as a basis for future deliverables in the WaterInnEU project. These deliverables will be made available to the community. It can also result in some OGC standardization best practice document or a new extension or profile of current OGC standards (e.g. a river basin management profile for WPS 2.0).

4.2. Use Case

The specific use cases we want to test include but are not limited to:

- Extract information from river gauges data in OGC WaterML 2.0 format using SOS services (preferably compliant to the OGC SOS 2.0 Hydrology Profile Best Practice).
- Model floods using a WPS 2.0, WaterML 2.0 data and weather forecast models as input.

- Evaluate the applicability of Sensor Notification Services (interface to be defined) in water emergencies.

4.3. Scenario

An extreme weather situation is forecasted for the Scheldt or in Maritsa river basin. River gauges data is continuously monitored. An increase in water flow is detected and a weather forecast predicts more rain. Flooding models are executed and affected areas are determined. Emergency services are mobilized, lives are saved and affected areas are visualized.

4.4. Data

The following data will be available for the Interoperability pilot:

- Height/flow data from past similar events in the Scheldt or Maritsa river.
- Detailed Digital Elevation Model.
- Inhabited areas, population data, etc.

4.5. Experiments

The pilot will attempt to address the following experiments:

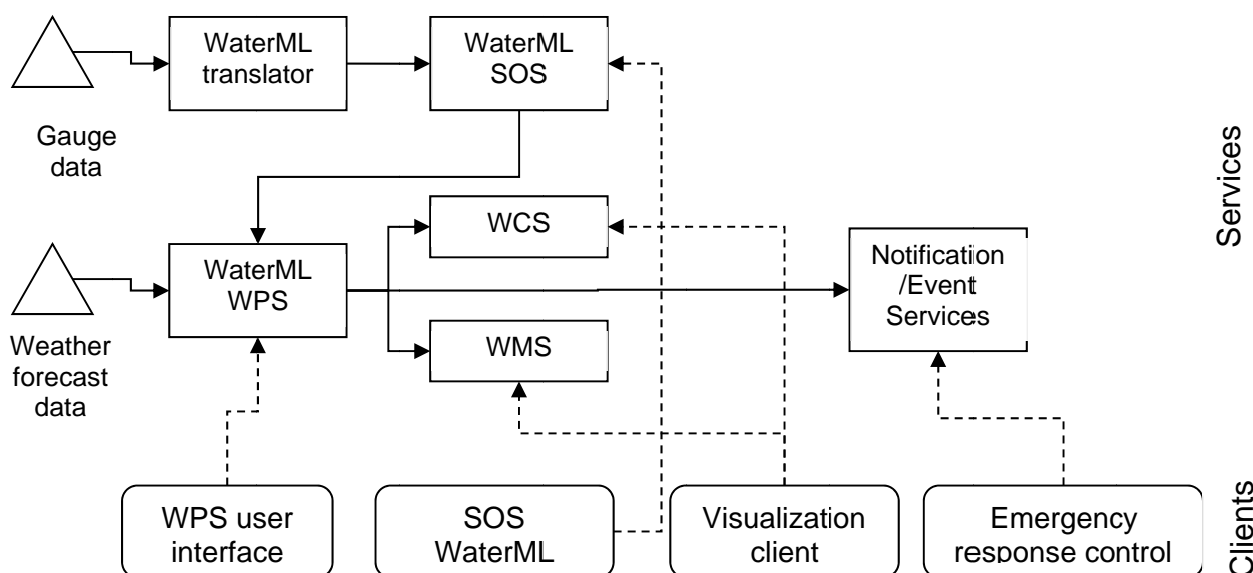
- **Experiment #1:** Extract WaterML 2.0 from the SOS 2.0 Hydrology Profile for the desired area and time.
- **Experiment #2:** If the readings exceed a threshold, start a WPS 2.0 execution with a hydrological model.
- **Experiment #3:** Expose the results of the model using geospatial services to download data suitable for visualization.
- **Experiment #4:** Notify alerts to the relevant emergency services using Sensor Notification Services or similar. This might be more experimental, since there is a lack of official standards. Current work of the OGC Pub/Sub Standards Working Group can be an alternative to take into consideration.

5. Technical approach

The Technical Approach for this Interoperability Pilot focuses on leveraging existing OGC Specifications and, as needed, developing change requests for these specifications and suggest best practices and standard profiles. The following section describes the Technical Approach in detail.

5.1. Experimental Methodology

This is the proposed pilot overview. Changes to this architecture can be agreed at the beginning of the pilot depending on the participant in-kind resources involved.



The architecture will test the combination of Gauge data in a WPS that will be triggered by a meteorological alert. The data will be translated into OGC WaterML 2.0 time series data format and will be ingested in a SOS 2.0. SOS data will be visualized in a SOS Client that is able to handle time series. The meteorological forecast data (with the supervision of an operator manipulating the WPS user interface) will ingested with WaterML 2.0 time series and terrain data that will be input for a flooding modelling algorithm. The WPS will be able to produce flooding datasets in the form of coverages that will be offered to clients via a WCS 2.0 service or a WMS 1.3 service, and downloaded and visualized by the respective clients. The WPS will trigger a notification or an alert that will be monitored from an emergency control response service.

5.2. Specification Development

The primary focus of this pilot will be WaterML and SOS, and a secondary focus will be WPS. Resulting interface definitions will then be considered for change requests against existing OGC standards. The list of specifications that may be affected includes:

- SOS (preferably OGC SOS 2.0 Hydrology Profile)
- WPS (preferably OGC WPS 2.0)
- WaterML 2.0

5.3. Contributed Components

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

Description	Contributor(s)
WaterML 2.0 translator	
SOS compatible with Water ML 2.0 model and implementing the OGC SOS 2.0 Hydrology Profile Best Practice	
WPS 2.0 with WaterML2.0 input	
Sensor Notification Service	
WFS, WMS Server	
SOS Client/viewer	
WPS Client interface	
Visualization client	
Notification client	

Other related services/clients that will be included:

Description	Sponsor / Implementor(s)

5.4. Testing and Integration

This section lists some elements of the methodology for participating in the pilot:

- Establish a distributed virtual testbed environment where applications are hosted by participants with CREAM support if needed.

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- TWiki provided by OGC for collaboration.
 - Regular testing and integration that will be largely focused in implementation of the demonstration use case.
 - Two face-to-face testing and integration sessions will be proposed, one at the beginning of the testing and integration period and one directly prior to the demonstration.
 - During and immediately after the kickoff, establish a test plan and metrics to test objectives and use cases documented in this activity plan as appropriate.
 - Biweekly teleconferences to report on the progress of the activities.
 - Implementation of new services and connectors is not a requirement in this pilot but could be done if needed.

6. Deliverables

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

6.1. Documentation

The following documentation will comprise the deliverables for the project. All artifacts and results associated with the pilot will be made available to OGC members.

- Engineering Report discussing the details and results. The report will include but not be limited to summaries of the activity plan, test plan et al supporting documentation as appropriate.
- Change Requests for OGC Specifications as appropriate.
- Candidate Water OGC Best Practices as appropriate.
- Include change requests for OGC specifications as appropriate.

6.2. Demonstration

- An Internet demonstration of all functioning components will be made towards the end of the pilot.
- This demonstration will be made persistent using the resources of OGC Network.

- A video illustrating the results of the pilot will be produced.

7. Schedule (tentative)

Startup	
Activity Plan submission:	November 30 th , 2015
Definition of the scenarios	December 1 st , 2015
Start of participation request period:	December 15 th , 2015
Execution	
Planned kickoff date:	February 9 th , 2016
Development, testing and bug fixing	February – June 2016
Intermediate presentation in Washington	
DC OGC TC	March 7 th -11 th 2016
Planned end date:	June 30 th , 2016
Wrap-up and Reporting	
Technology Demonstration in a Dublin	
OGC TC	June 20 th -24 th 2016
Final report submission	September 2016

Note: Additional milestone dates will be added at the kickoff meeting.

8. Resource plan

The Initiative Manager will be Joan Masó, and the Initiative Technical Lead will be Lluís Pesquer, CREAM. The OGC Initiative Facilitator will be Bart De Lathouwer.

The following resources will be available.

<i>Staffing</i>	<p>CREAF will provide sufficient resources to ensure the main thread of this pilot is completed in accordance with the requirements of this activity plan and supporting documentation.</p> <p>The other initiators agreed to support this activity to the degree necessary to</p>
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	<p>ensure the completion of this pilot.</p> <p>Participants will provide sufficient resources to ensure completion of their agreed upon area of this pilot in accordance with this activity plan and supporting documentation.</p>
<i>Software</i>	As needed, mainly open-source tools, services, and client applications.
<i>Other Resources</i>	Machine, software and technical resources available at CREAM

9. Requirements for participation

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

- An OGC service component exposing its resources, or
- a consumer application that can use the OGC service to exploit the data, or
- testing of the Services/Clients, or
- a server to house a pilot component, or
- data to support the pilot Demonstration, or
- compilation of documentation into one or more of the pilot deliverables (note that all participants must also provide sub-reports for inclusion in the final reports)

10. Initiator organizations – contact information

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11. Participant organizations - contact information

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12. Acronyms

CR	Change Request
ER	Engineering Report
OGC	Open Geospatial Consortium
AS	Alert Service
ES	Event Service
ICT	Information and Communication Technology
NS	Notification Service
SOS	Sensor Observation Service
WaterML	Water Markup Language
WCS	Web Coverage Service
WMS	Web Map Service
WPS	Web Processing Service