



WMO-UNEP-UNESCO-WHO-OGC co-organized Workshop Series on Water Quality Monitoring hosted under the banner of the World Water Quality Alliance (WWQA)

Opening Workshop

29, 30 & 31 March 2022

Workshop Report (Day 3)



April 2022



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Workshop Day 3: Water Quality Data Interoperability Experiment

Opening

Tony Boston (Chair of the OGC-WMO Hydrology Domain Working Group) opened the third day of the workshop by delivering his welcoming remarks. He highlighted the fact that the OGC-WMO Hydrology Domain Working Group (HDWG) would like to identify how to further develop the WaterML2 suite of standards with the goal of endorsing a new international standard for water quality data exchange. Further, he introduced the main topic of the day, the Water Quality Interoperability Experiment, and highlighted the need to create a roadmap for it.

Introduction

Silvano Pecora (Vice-President of the WMO Infrastructure Commission) introduced the workshop by giving a presentation on “Water quality is known”, which is one of the eight long-term ambitions that guide WMO activities related to water. Mr Pecora further spoke about the work of the OGC-WMO HDWG, and the development and adoption of the WaterML2.0 standards.

The presentation is available [here](#).

Water quality data in practice

- Philipp Saile (UNEP GEMS/Water Data Centre) started this session by giving a presentation on water quality data in practice, focusing on the work of UNEP GEMS/Water and its water quality information system. The presentation is available [here](#).
- Dwane Young (U.S. Environmental Protection Agency) gave a presentation on the U.S. Water Quality data monitoring and sharing, Water Quality Exchange approach and Water Quality Portal. The presentation is available [here](#).
- Sylvain Grellet (BRGM) gave an overview of Water Quality Data Exchange in France and in Europe, focusing on the French Water Information System, its structure, purpose, and projects. The presentation is available [here](#).

WHOS & Discovery and Access Broker (DAB) technology

- Igor Chernov (WMO HydroHub) opened this session with a presentation on the WMO Hydrological Observing System (WHOS) and its brokering and standardization approaches, highlighting the importance of data interoperability. The presentation is available [here](#).
- Enrico Boldrini (National Research Council of Italy) gave a presentation on the Discovery and Access Broker (DAB) technology, explaining how the DAB brokering framework works and what are the benefits of the brokering approach. The presentation is available [here](#).



Interoperability and interconnection of the existing Water Quality Data Systems

Mr Grellet started the discussion by giving a presentation on Interoperability and interconnection of the existing Water Quality Data Systems. The presentation is available [here](#).

After his presentation, Mr Grellet moderated a discussion which included interactive questions and polls carried out through the Mentimeter tool.

The figures below show the responses of workshop participants.

Do you know standards that you can use for an Information System on Water Quality? Mentimeter

No	NO	SensorThings API
WQX	WQX	Qartod
no	No	WQX
No	Hopefully soon	No
O & M	Yes	
No	OGC, ISO, INSPIRE specs, W3C:SOSA, RDA:I-ADOPT	No
NO	No	No
WPDX	No	No
Yes. WQX	O&M (ISO 19156), OGC SensorThings API, INSPIRE Models (utilizing 19156)	No
O&MSOSAQUDTI-ADOPTUCUMChEBINVS	no	no
No	Water Magement System database in South Africa	Yes

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If some were listed, why do not you implement those standards in your system?

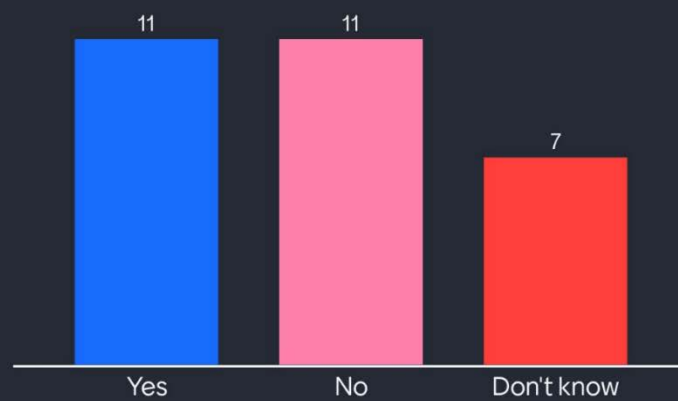
Mentimeter

- No resources or capacity
- changing a pre-existing system is a HUGE endeavour
- We have O&M, STA, SOS, INSPIRE all operational
- No personnel to do it
- We will do!
- Lack of vocabularies
- We do implement them ;)
- Our system is based on ad-hoc prior development and adapting isn't possible with existing resources.
- N/a
- Lack of organisational expertise
- na
- afraid of consequences
- We would definitely ensure to have the standard in our system. Working without a standard is like driving a car without a license ;)
- I am not aware of those standards
- Looking at doing this at the moment but gathering information
- We implement several controls in our data bases, but it's a personal effort from our scientific staff. We do not have a Quality System to support this controls or to evaluate its success.
- Not aware of one
- Development team retiring
- No water information system implemented
- Standards do not cover all variables, methods, equipment and limits
- auto_awesomeQuizds quisiste decir: falta de coordinación institucional35 / 5.000Resultados de traducciónlack of institutional coordination

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Does your institution have constraints to share WQ data outside the institution?

Mentimeter



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If your institution have constraints to share WQ data , what are these constraints?

Mentimeter

The problem is not data but specific coordinates for domestic wells

Licence policies and unavailability of information management system

No legal order

There is no system for managing the data

We are a testing body and we don't share our test results because of the contract between us and our client

Challenge with obtaining and sharing data from companies that generate data

Restrictions on publishing detailed spatial information of sensitive locations

we have an open data policy

no constraint in sharing data , ours are shared on water portal

Surface Water tends to be openly available. Ground Water data has issues as impacts property rights.

License policies

Usage restrictions as set by data producers, e.g. non-commercial use only

Unavailability of information management system

No constraints but citation of source required

Only restrict if data is suspect

Data must be reviewed to be of known quality and documented according to specific protocols. This can be costly.

Need permission from counterparts who are collecting water samples and providing data. We can only openly share data that we generate ourselves

INSPIRE + EU reportings (not compliant to INSPIRE/OGC) + French spec (not compliant to INSPIRE/OGC) + OpenData => quite a conundrum ...

Excel

None

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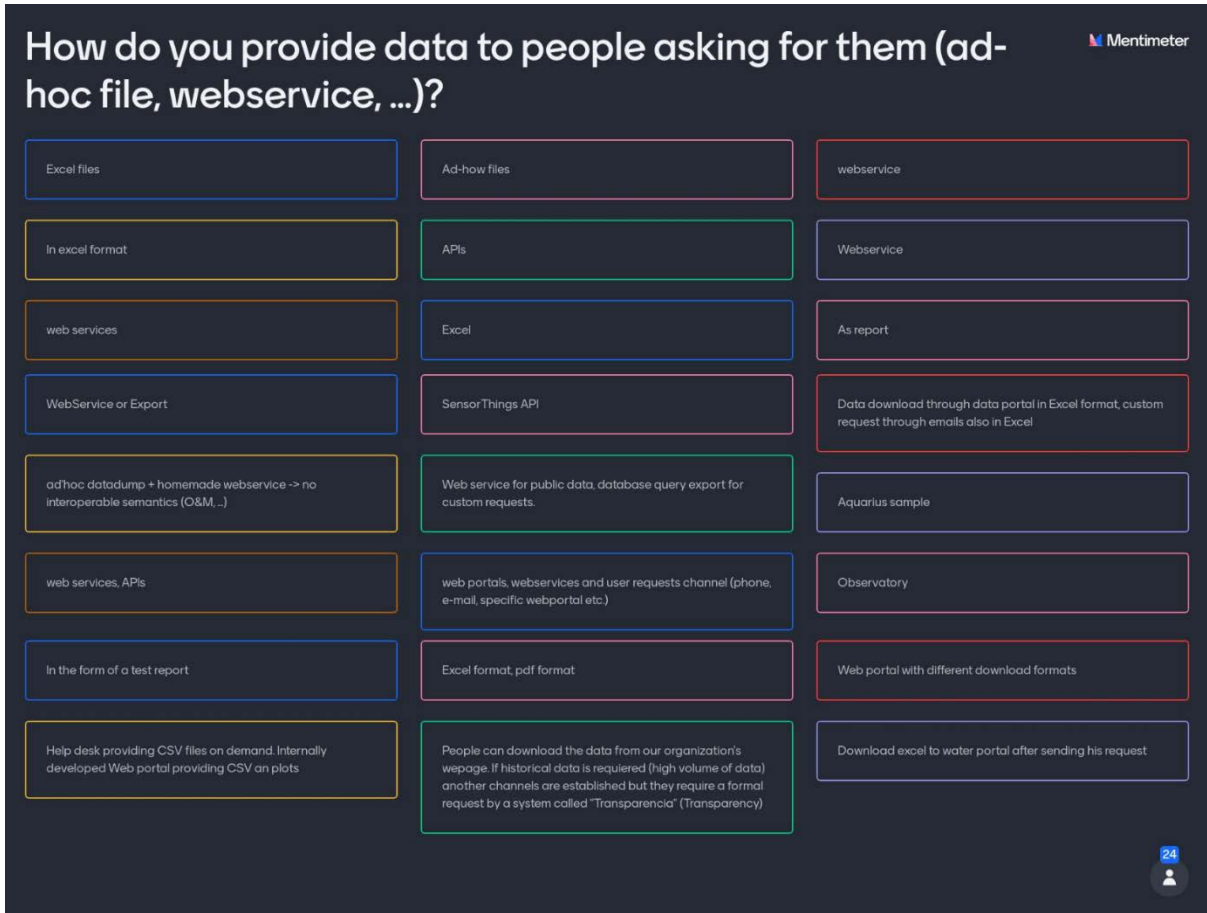


What WQ data software/tooling is your organization using?

Mentimeter

Home made & national one. Compliant to national spec (no O&M, etc...)	Waiting on Bureau of Meteorology to mandate standards	Inhouse developed
Internally developed Informix-based system	Custom built	In house
KISTERS Wiski + custom python code, ESRI AGOL + servers for interactive geospatial dataproducts	Excel	Provided by labs, Aquarius Samples, and internally built.
AQUARIUS	FROST SensorThings API	Aquarius Samples
Custom built	AQUARIUS Samples	Oracle, GIS
Excel, R mainly	FROST-Server, Geoserver	Custom built
None. I am from the Mauritius Standards Bureau. Will have to enquire from other Ministries and Organizations	Relational databases for storing and processing data. ETL tool for transfer and other tasks	Own development
None		

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Water quality Ontology and WaterML-WQ

In this session, Simon Cox (CSIRO Land and Water) gave a presentation on Water Quality information models, focusing on the OGC standards and the Observable Property Vocabulary.

The presentation is available [here](#).

Identifying how to support the WaterML development in the domain of Water Quality

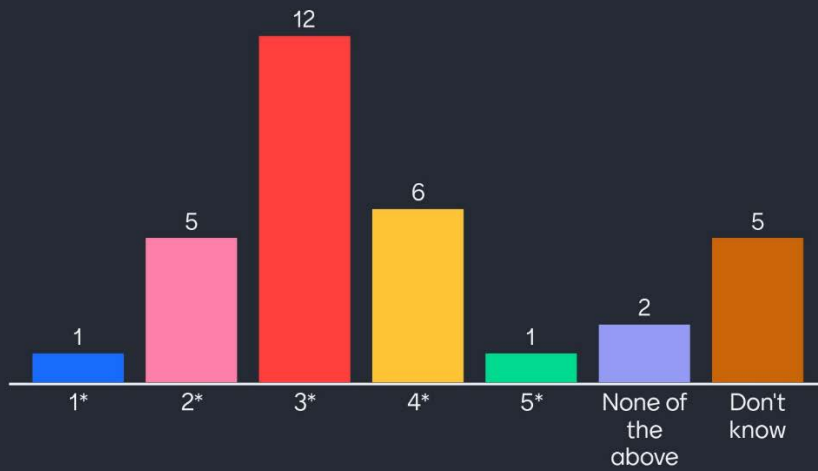
The discussion was moderated by Mr Saile, who gave a presentation on how to support further development of interoperable water quality data in the context of WaterML2 suite of standards and the 5 Star Deployment Scheme for Open Data. The presentation is available [here](#).

The figures below show the responses of workshop participants to interactive questions and polls carried out through the Mentimeter tool in this Moderated Discussion.



How many stars would you give to your WQ data?

Mentimeter



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What do you expect from the WQ standard community to upgrade your WQ data?

Mentimeter



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Which communities should we also engage with, to ensure proper coverage of what needs to be achieved for a 5* WQ data exchange?

Mentimeter

Oceanography, Agricultural	We need to close the gap between research & public authorities data.	Oceanography and agriculture and human health
political decision makers	researchers and higher learning institutions	GEOAqydWatch, CEOS COAST,
national agencies, like ministries of environment; needs some funding to support the actual doers	Academia, NGOs, Governmental Authorities related to water quality information (Environment, Agriculture, Sanitary Services, Water, to name a few).	Laboratories, environmental compliance-verification agencies, academic/research data coordination groups.
National Agencies, members of UN	NGO'S, CMO'S	Government authorities and various laboratories
Chief financial officer, funding organisation - explain that we are adding value	Bureau of Standards within the country, Policy makers,WHO, National labs,National hydrological agencies, Funding agencies, NGO's	Oceanography institute Agricultural Research Institute , Ministry of Environment, Water Resources Unit ,Fisheries Research Centre
nexus between academia (encourage to create a database within their institutions/department) - governmental institutions -NGOs	laboratories environmental compliance-verification agencies, academic research data coordination groups	

What organizations could also step up in this activity to support & follow these developments -> interested parties?

Mentimeter

Anything with female representation given the gender bias in todays presentation. Just a suggestion.	Please engage with the EEA (European Environment Agency) that could help having a good uptake in Europe	Centre for Ecology and Hydrology (UK)
UNEP, BM, GEF	Aquarius, Kisters, Fraunhofer, other private sector participants.	Software vendors
GEOSEC and 4 Regional GEOS to connect to users	Engage EEA is a good idea	Freshwater research NGOs - this would be specific to each country or region
from bottom to top - research institutes/departments (encourage to put together all their WQ data into the standard format) - most of the WQ are still not put in the opensource space.	research institutions and University/ training institutions and software developers	Pangeo
WASH Consultants	Water resource management authorities	It depends on the country.
GWP, UNESCO, GEMS Water	Global Water Partnership	



Water Quality Data Interoperability Experiment

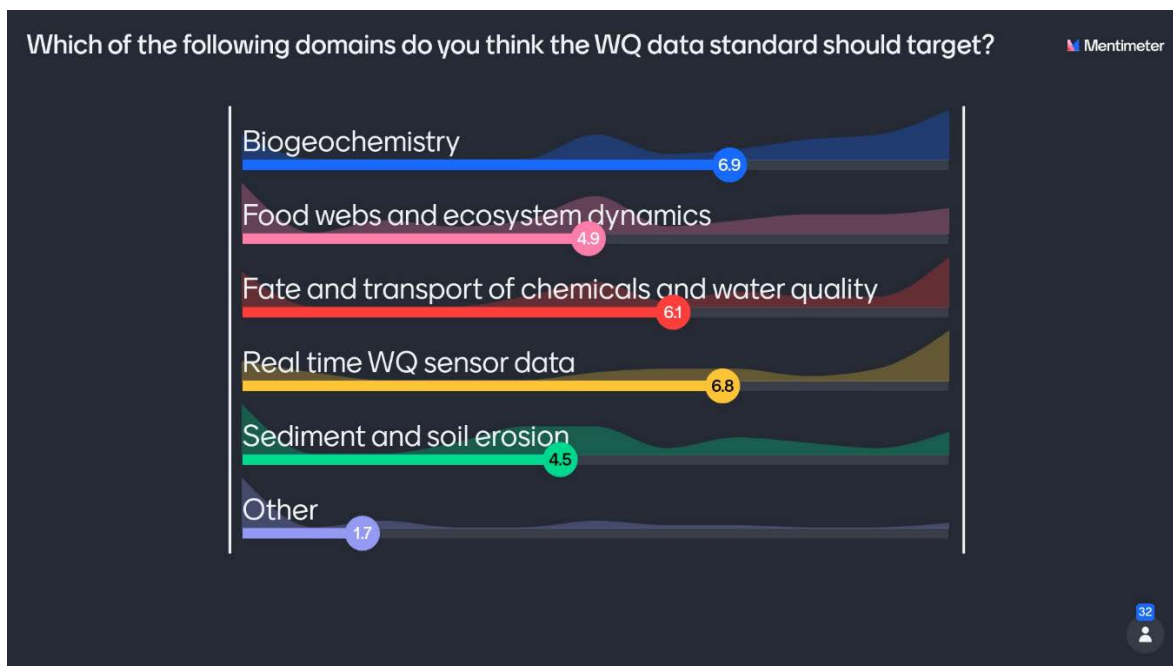
In this session, Mr Grellet introduced the Water Quality Data Interoperability Experiment, one of the OGC innovation initiatives. Mr Grellet explained what an OGC Interoperability Experiment (IE) is, and he gave an overview of the 2022 Water Quality IE.

The presentation is available [here](#).

Defining the Roadmap for the Interoperability Experiment of water quality data with pilot use cases

The discussion was moderated by David Blodgett (U.S. Geological Survey), who gave a presentation on defining a roadmap for the Water Quality Interoperability Experiment (WQ IE). The presentation is available [here](#).

The figures below show the responses of workshop participants to interactive questions and polls carried out through the Mentimeter tool in this Moderated Discussion.





What IT building blocs should be included in the WQ data standard? Mentimeter

Vocabulary service Persistent Identifier service	Core vocabulary/ontology to use(ex: OMS...) Identified APIs (and their implementation) Integration pattern of APIs Domain taxonomies to use Client that can ingest this	Harmonized logical model between multiple national / international data standards.
Vocabularies, conceptual model, possibly logical model... start small and reusable.	Re-use wq ontologies and vocabularies Simon has shown, map it to WHOS hydrological ontology, extend WHOS and GEMStat to use OGC API Services/STA	Find an underlying ontology to align the various models in use
Doi, of metadata standard, basic quality flags, text push to users with link to more info for users with low bandwidth	water quality by satellite images	Vocabularies, logical and conceptual model
A standardised set of Data Validation limits and a data correction policy that will allow for easy exchange of data between varying parties	water quality by satellite images	At a high level, the WQ data standard should underlie these functions: [Discoverable inventory] [Data retrieval] [Data packaging and provision]
Ocean water quality using satellite imagery		

Way forward for the Roadmap

Mr Blodgett and Mr Grellet led the last session of the workshop, focusing on what are the next steps to take regarding the WQ IE.

Closing

Mr Cullmann concluded the Workshop by delivering his closing remarks and providing a recap of all three days of the Opening Workshop.