An open surface Water Quality Emergency Monitoring Service (WQeMS) to the water utilities' industry leveraging on the Copernicus products and services. Target is an optimized use of resources by gaining access to frequently acquired, wide covering and locally accurate water-status information.

# Newsletter I

## Copernicus Services Evolution


Ioannis Manakos, project coordinator
(on behalf of the consortium)

This project has received funding from the European Union's Horizon 2020 Research and Innovation Action program under Grant Agreement No 101004157

# Contents



# Editorial

Dear Reader,

we kindly welcome you to get acquainted with activities, aims and expectations of a Copernicus Service Evolution project within the Research and Innovation Action program of the H2020 framework. Being part of the cluster of projects for Space Research by the European Commission our working team is honoured to inform you about the Copernicus Assisted Lake Water Quality Emergency Monitoring Service (WQeMS).

In this context, you may enjoy interesting articles about the objectives and expectations of the project, the partner organizations, and the pilot areas. A rich diversity in environmental and socioeconomic conditions is covered across Europe, while focusing on the need for drinking water quality monitoring.

Major components and enablers for assimilating Copernicus Earth Observation products into the operating Decision Support Systems of the water utility industry are detailed. In this issue focus is given to the WQeMS' system architecture and the



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medatata and water semantics. They are considered as the backbone towards a successful outcome.

Another element for success is the interaction with users (e.g. water utility companies) and end users (e.g. stakeholders, citizens); both for raising awareness and for enhancing capacity to enable smooth exploitation of the service. Users' training sessions and a variety of webinars are planned in order to enhance and support the sustainability of the developed tools and services.

Finally, a few important elements about WQeMS outreach are provided and offer and open invitation for communication and interaction.

Ioannis Manakos

Project Coordinator

Principal Researcher @ CERTH

# About WQeMS

The 'Copernicus Assisted Lake Water Quality Emergency Monitoring Service' (WQeMS) RIA H2020 project aims to provide an open surface Water Quality Emergency Monitoring Service (https://wqems.eu/) to the water utilities' industry leveraging on the Copernicus products and services. Target is an optimized use of resources by gaining access to frequently acquired, wide covering and locally accurate water-status information. Citizens will gain a deeper insight and confidence for selected key quality elements of the 'water we drink', while enjoying a friendlier environmental footprint.

WQeMS initiated formally its activities on 01.01.2021 and kicked off on 18.01.2021 with the participation of representatives by DG DEFIS, DG ENV, DG ECHO, EEA (Land, Marine, and Climate components), who suggested an active communication with the potential users. The objective is to generate an outcome at the end of the project that best suits the interests of the users and citizens, while also enabling compatibility, synergy and complementarity with existing infrastructure and services.

The partner organizations led by the Centre for Research and Technology-Hellas (CERTH) (Greece) are the following:

- Centre for Ecological Research and Forestry Applications (CREAF) (Spain),
- EOMAP GMBH & CO KG (EOMAP ) (Germany),

https://wqems.eu/



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- Cetaqua, Centro Tecnológico del Agua, Fundación Privada ( CETAQUA) (Spain),
- Autorita' Di Bacino Distrettuale Delle Alpi Orientali ( AAWA ) (Italy),
- Serco Italia SpA (SERCO) (Italy),
- Thessaloniki Water Supply and Sewerage Company SA (EYATH SA) (Greece),
- Engineering - Ingegneria Informatica S.p.A (ENG) (Italy),
- Finnish Environment Institute (SYKE) (Finland),
- Phoebe Research and Innovation Ltd (PHOEBE) (Cyprus),
- Empresa Municipal de Agua y Saneamiento de Murcia, S.A ( EMUASA) (Spain)

## WQeMS aims to

- generate knowledge to support existing decision support systems (DSSs) and not develop a new one,
- provide a wide set of parameters useful for the quality assessment of raw drinking water, as captured by existing and emerging requirements of the water utilities industry.
- promote further alignment of existing decision support and implementation chains with the updated Drinking and Water Framework Directives.

WQeMS relies on the Copernicus Data and Information Access Services (e.g. DIAS ONDA) for data provision; aiming also at connection with current Thematic Exploitation Platforms. Generated knowledge shall support existing decision support systems (DSSs) and not the development of a new one.

The main ambition of WQeMS is to receive approval by the Member States to be embedded in the existing Copernicus Services portfolio. Activities and results are expected to contribute to Europe's endeavors towards GEO and its priorities in the framework of the UN 2030 Agenda for Sustainable Development, the Paris Climate Agreement and the Sendai Framework for Disaster Risk Reduction.


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# Pilot Areas


The five pilot areas are located in Finland, Germany, Greece, Italy, and Spain. They are selected for the service development and demonstration across Europe, representing a variety of geomorphological, anthropogenic and climatological conditions.

Developing services concern:

- Water quality features estimation;
- Bloom events detection;
- Land-water transition zone change monitoring;
- Extreme events detection;
- Alerting through reporting and crowdsourcing.



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# Drinking water quality monitoring in the Finnish pilot area

Lake Pien-Saimaa, part of Lake Saimaa in southeastern Finland, is a medium-size lake with a surface area of ~120 km$^2$, a water volume of 0,57 km$^3$, and a mean depth of 4,7 m. It is located at the water divide, has a small catchment area of 260 km$^2$, and the natural average water flow in the lake is small (4 m$^3$/s), with a lake water retention time of 4,5 years.

Lake Pien-Saimaa is fragmented and incudes several islands. It can be divided into three different sub-basins according to their trophic status and sources of pollution. Both the western and eastern parts of the Lake Pien-Saimaa classify as mesotrophic; however, their sources of pollution vary greatly. The western Pien-Saimaa's main anthropogenic source of phosphorus is the surrounding agricultural whereas in the eastern Pien-Saimaa the main source of phosphorus is an industrial point-source pollution, Kaukaa's paper mill. The northern Pien-Saimaa (Maavesi) classifies as a humic lake and falls within an area of peatland and, hence, the main anthropogenic sources of pollution are from agriculture and peat production. Because of Pien-Saimaa's unique characteristics spatially water quality variation is high.

Pien-Saimaa has substantial intrinsic value to the local population and its many small islands and beaches serve as a location for many holiday houses and recreational activities (e.g. boating, fishing). Moreover, Pien-Saimaa is an important source of fresh water for the city of Lappeenranta with water intake located in the southern part of the lake. Lappeenrannan Energia Ltd. produces water for the needs of about 40.000 people (about 15.000m$^3$/day) and half of it originates from Pien-Saimaa. The Kaukas Pulp Mill in Lappeenranta (located in the south-eastern part of the lake) takes its raw water from Pien-Saimaa, as well. The state of the lake is of major concern and improved monitoring is needed e.g. for algal blooms warnings.

This pilot area will be served by SYKE, a public research Entity of the Ministry of Environment while the main user is the Environmental Office of Lappeenranta Region. The Environmental Office is responsible for statutory environmental health



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services and environmental protection and has different licensing, supervision, and developing tasks, which influence the state of the environment and human health. It also prepares plans to mitigate climate change and managing lake restoration projects. One example of this is a pump system that has been implemented in the Kivisalmi strait since spring 2015, which separates the western part of Lake Pien-Saimaa from its eastern part. Water pumping increases water circulation and improves water flow control in shallow and narrow straits, especially during summer-time stratification, and thus improves the lake water quality. The state of the lake environment is monitored using biological, physical, chemical and other variables and by analysing the interaction between them. From WQeMS the end users will get access to spatially accurate EO products through the TARKKA map service (http://syke.fi/tarkka/en) for browsing, visualizing and examining the available satellite imagery. It also allows the user to see other environmental information such as monitoring station locations and land-use. The users will be able to monitor the spatial distribution of water quality parameters in general and in summer and autumn periods the algal blooms in particular. During WQeMS the TARKKA service will be optimized with the new workflows and findings in order to enhance the user experience.


## Drinking water quality monitoring in the German pilot area

The German pilot areas for demonstrating the WQeMS services are three Saxony drinking water reservoirs; in particular, the Saidenbach, Carlsfeld and Eibenstock reservoirs. The approximately 136 ha large Saidenbach reservoir is used as drinking water source for the town of Chemnitz with over 250000 inhabitants. Additionally, the reservoir serves flood protection of the


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region and hydropower production. The even larger Eibenstock reservoir with its water area of 315 ha, has the largest water storage volume in Saxony.

It is also used for drinking water supply, flood protection and hydropower production and also for recreational purposes, i.e. for fishing. The in higher altitude located Carlsfeld reservoir (at 905m above mean sea level) has a smaller extent (46 ha) and is known for its soft water. Small-scaled auxiliary dams, located upstream of the actual reservoirs, are used for early warning purposes and regulatory means for the drinking water operation. This way, certain events can be pre-detected and controlled accordingly. In order to support and optimize the operational management of the reservoirs, the water quality of the drinking water reservoirs need to be monitored in efficient ways. The traditional in situ measurements applied so far, can be supported by satellite-based services for e.g., the assessment of influences of humic substances, especially in Carlsfeld or Eibenstock. In these reservoirs, high amounts of these humic acids and yellow substances can lead to a shutdown of the reservoirs for drinking water purposes. In the Carlsfeld area, very small rivers are contributing with inputs of humic substances originated from bogs and woodland around the reservoir, which are influencing the water quality of the reservoir and pose potential threats to the operations.

Furthermore, operational water quality monitoring of the reservoirs by means of remote sensing can be used to track (evolving) algal blooms, which can cause problems by potential toxin producing species such as cyanobacteria such as microcystins.

The integration of Copernicus based services will substantially reduce planning costs and cost for evaluation of dam management. Also, water authorities will be efficiently supported in their monitoring obligations of inland water bodies for the Water Framework Directive (WFD). Regular in situ monitoring will be supported by continuous EO based monitoring, made accessible through WQeMS selected online products and services; following the example of the preferred application by the end user.

The pilot areas in Saxony will be served in WQeMS by EOMAP, an SME with a long track record of Earth Observation Services



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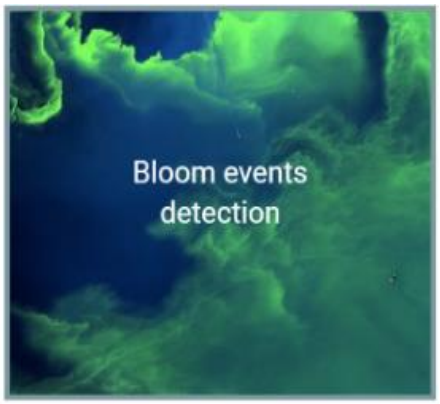
for water quality assessment in lakes and water reservoirs for the water utilities in Germany and for diverse clients all over the globe. EOMAP provides water quality products for different bodies of water, ranging from rivers to lakes and the ocean.




## Drinking water quality monitoring in the Greek pilot area

Polyphytos Reservoir is an artificial lake located in an extended area (watershed >5500 km$^2$) characterized by a variety of land use and development activities (e.g agriculture, livestock, hydropower). Downstream of Polyphytos reservoir, there are two additional smaller reservoirs that regulate surface water (a daily amount of ~ 145.000 m$^3$) towards an open, free flow channel of 50 km long.

Then water is siphoned under Axios River via a sealed (8,5 km long) pipe and then it is pumped to the Drinking Water Treatment Plant (TDWTP). There it undergoes all the appropriate treatment (A3 treatment type) procedures to fulfil all the necessary quality conditions and to serve as the main drinking water supply of the city of Thessaloniki.

In the past decades, these human-induced activities along with other influences (e.g morphological features) have significantly impacted the reservoir's water quality. More specifically, in the warm period of 2003-2005, cyanobacterial blooms were recorded for the first time in Polyphytos Reservoir. In 2005, a cyanobacterial bloom reached the DWTP through the surface water inflow, causing emergency operational problems. Additionally, in the last years there have been incidents during which, considerable amounts of hydrocarbon compounds were detected at the river water entering the DWTP. To minimize the occurrence of such incidents that can influence surface water quality and in order to timely design appropriate mitigation measures, regular collection and



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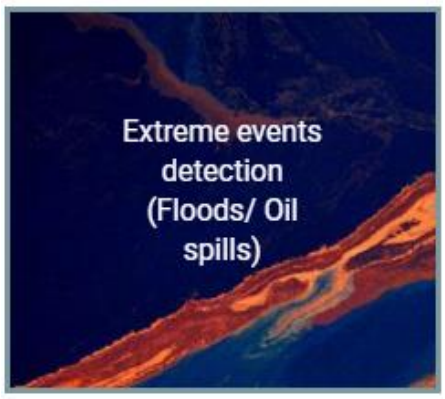
analysis of data is required. The current online instrumentation installed, consists mainly of sensors monitoring the physicochemical properties of water such as pH, conductivity, color, dissolved oxygen and turbidity as well as the residual chlorine concentration.

These online sensors are located inside TDWTP as well as at the area where the open channel meets the underground sealed pipe. In order to strengthen to have a more efficient and comprehensive quality monitoring of Aliakmon's surface water entering the city's DWTP, additional in situ data is needed especially at Polyphytos Reservoir.

A satellite-based water quality monitoring tool will offer the benefit of a dense temporal and spatial data set that could support EYATH SA to map and monitor high-risk areas and design/adopt appropriate measures/strategies in case of pollution phenomena. The basic requirement of EYATH SA as a user of the WQeMS platform is the satellite monitoring of the occurrence, extent and duration of incidents affecting the water quality of the reservoir in order to:

i) strengthen monitoring efforts of this remote and crucial water resource, ii) attain early detection for the establishment of effective mitigation strategies and iii) facilitate decision making in the case of pollution phenomena.

A combination of real - time monitoring via online sensors and early warning measurements is a high - priority project for the company. EYATH SA seeks to improve insight into the spatial and temporal patterns in the water quality of the reservoir by strengthening current in situ monitoring efforts; thus, understand the impact of human activities and other environmental influences and to design/adopt appropriate measures/strategies in case of pollution phenomena.





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# Drinking water quality monitoring in the Italian pilot area

The Italian pilot area is the Giaretta Lake (also known as Camazzole) located in the Province of Padova, Municipality of Carmignano di Brenta. It will be served for WQeMS by AAWA. It is the rising of the groundwater and the water quality of Giaretta lake an indicator for groundwater quality and consequently for water extract from wells for human purposes. The most important wells field that sustain the system is the field near Camazzole lake, where Brenta river present many leakages.

Out of the pilot it is expected a tool to monitor the water quality of the Giaretta lake and indirectly of Brenta river. It is important to monitor the water that will be infiltrated into the aquifer to avoid risk for human health. The monitoring data will demonstrate the boundary conditions of a more detailed model that will reproduce the condition of the aquifer that serves the Mosav aqueduct. Variables to be monitored are, apart from those needed for prevention of flood (that could stop wells during the submergence), surface temperature, bacteria and biological activities' surface occurrence, vegetation presence (linked with increased nutrient content), soil moisture, water level (area of lake is linked with the groundwater acquirer level), and other chemical parameters indirectly derived from satellite observations.

A better monitoring plan could improve the safety of drinking waters, mainly during flood events or extreme events, when Brenta river's low-quality water infiltrate in the aquifer.

Copernicus services can provide crucial information about the status of surface waters, and indirectly of the groundwater and other parameters linked with quality and quantity. AAWA envisages monitoring with the help of WQeMS enhanced Copernicus services a range of variables; from land use change to the presence of pollution. A further ambition would be to monitor leakages of the main pipes of the system near the wells; although the current spatial resolution sets serious limitations. WQeMS frequently acquired and wide covering information is important for water authorities, responsible for drinking water plans, the water quality and production rate requirements.



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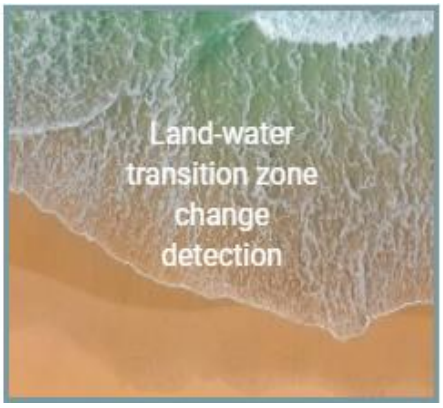
WQeMS products can provide a spatial distributed data grid (10/20 meters by 10/20 meters) that can be the baseline for a better geostatistical interpolation of variables.

Then the hydrological-hydraulic model of Brenta river can give the magnitude of the recharge of the aquifer and also can provide information about possible floods to avoid the loss of wells' engines or electrical parts. Inputs are hydrological parameters and hydraulic parameters for Brenta river and also from Giaretta lake (water surface level), measurements from the monitoring net (piezometers), and data from Copernicus/ WQeMS about the water presence, water status, etc.




# Drinking water quality monitoring in the Spanish pilot area

The water supply of the Segura River Basin (Mediterranean coast of Spain) is heavily dependent on the water transfer from the Tagus Basin (central Spain). This transfer is done through a major system of infrastructures, dams and reservoirs to provide surface water for the supply of Murcia Metropolitan Region, pilot area of the WQeMS.

The pilot area will be served for WQeMS by CETAQUA, a water technology center, EMUASA, the Murcia City water operator, and supported by HIDROGEA, a regional water operator; all linked to SUEZ, the main water operator company in Spain.

The companies manage the urban cycle: tap water production and distribution, sewage network management, discharges control and wastewater treatment. As general data, EMUASA serves 447,182 inhabitants, with a drinking water network of 2,203 km and an average



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water consumption of 112 liters/inhabitant/day. HIDROGEA serves 13 municipalities and 1,034,047 inhabitants of the province of Murcia, with a 85% of Hydraulic Technical Ratio (HTR) with more than 7,500 km of the drinking water network.

The use of satellite images will bring more frequent and complete information on the state of the different reservoirs and ponds and will allow a cost-efficient management of the risks induced by water quality changes. WQeMS will especially provide high spatial resolution information about the water quality parameters of the reservoir of Ojós and Mayés, and the DWTP regulation ponds of DWTP La Contraparada (EMUASA) and DWTP Los Guillermos (HIDROGEA).

La Contraparada DWTP is located on the Segura River, was designed to treat 2,000 m3/h and is producing nearly the 25% of the tap water consumed by the municipality of Murcia.

EMUASA, proposes the application of this new satellite technology as part of the risk management process for the application of ISO 22000 Food Safety Management System.

Los Guillermos DWTP operates 365 days/24 hours to guarantee drinking water for the city of Alcantarilla (more than 40,000 inhabitants). The reservoir of the DWTP can self-supply the municipality with drinking water for more than 40 days in case of risk in previous reservoirs. In 2020 a total of 2,067 $hm^3$ was produced.

The parameters and indicators targeted are Chlorophyll a, Turbidity, Harmful Algal Bloom (HAB) or Dissolved Organic Matter (DOM). This would allow a better understanding of the processes at stake (link between physical and chemical parameters of importance for water treatment), and a frequent information update to foster decision-making and tune the treatment accordingly (towards a better environmental footprint by adjusting doses of chemical reactive agents and economy of costs).

Other benefits concern risk management through a better control and forecast of the hazards (e.g. algal bloom, toxins), reduction of the vulnerability of the plant (e.g. improve decision-making process by using new information in order to tune or change treatment), reduction of exposure of the plant (e.g. change water sources).

The frequent monitoring offered by WQeMS would allow a better control of


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the surface waters in all the system (upstream reservoirs and regulation ponds close to the DWTP); thus, allowing more efficient routine laboratory analysis.


## Architecture of the WQeMS system

The WQeMS system will bring to life the main objective of the project that is enabling the optimization of the use of resources by gaining access to frequently acquired, wide covering and locally accurate water-status information. It will be based on a modular architecture composed of three main layers: frontend, middleware and backend.

The frontend layer is the main point of interaction with the users. It will give a face to the data gathered and elaborated in the other two layers. It will deliver advanced dashboarding and data visualization, and will efficiently exploit the data of the system in order to support decision makers and stakeholders to take effective and evidence-based decisions about the 'water we drink'. This layer will not include a DSS, but will generate knowledge to support existing ones, providing access to elaborated data through APIs and data visualization widget-based interfaces.

The middleware layer is where processing chains resulting from the project will be integrated and where the actual value for end-users is generated. Here is where all the data federation, processing, analysis happens.

The backend layer, thanks to the ONDA DIAS services[1], will be in charge of collecting and providing Copernicus EO Data throughout appropriate Application Programming Interfaces (APIs). WQeMS will benefit from the huge volume of geospatial information available today on ONDA (more than 15 PB data).

The modules of WQeMS will be designed in a way that is syntactically

[1] https://www.onda-dias.eu/cms/



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and semantically interoperable with existing DSSs.

**Key points**

The overall system will be hosted on the ONDA DIAS Cloud infrastructure and will be designed as a microservice, container-based architecture. The cloud nature of the platform, together with the microservice architecture of the solution, provide multiple benefits to the critical objective of the current project, such as:

(i) Data availability - data coming from ONDA DIAS will be always available due to the cloud and micro-service architecture of the solution;

(ii) Fault Tolerance - the cloud microservice architecture of the solution provides fault tolerance to the entire process;

(iii) Data Interoperability - the special deployment of the platform will enhance data interoperability at all stages, thanks to water data semantics (e.g. GEO EWV, INSPIRE, FIWARE Data Models, OGC standards) and standard APIs (e.g. OGC protocols, OpenAPI);

(iv) Scalability - assures on one hand easy deployment of novel services, (as it facilitates fast prototyping, continuous deployment and integration, resilience to failure and service availability), on the other the possibility to increase resources for processing on-demand.

Another key aspect of the WQeMS system is the easy access to a big and various source of geospatial information. For some applications the access to recent data is essential. However, the availability of data often is under the full control of the data provider. The ONDA DIAS will provide the 80% of Sentinels data within 3-5 hours from the sensing, complemented by other satellites data. The decision to host WQeMS on ONDA will allow having location-based applications taking advantage of proximity of the data.

**Current status**

The WQeMS system is actually in the design stage. When available, the users' requirements will be interpreted and analyzed into specific system functional and non-functional requirements that will drive the development of the WQeMS system. In the meanwhile, a first draft architecture is being created by analyzing technical requirements of the processing chains and the other software components foreseen (e.g. ONDA DIAS). Based on such requirements analysis, the WQeMS modules, their expected functionalities, data structures,


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protocols, and guidelines will be defined, together with the reference Architecture of the WQeMS platform.

## Metadata and water semantics solution in WQeMS

Documenting data is one of the most important steps when offering spatial products: which topic refers to? At which level? What quality can I expect from the data? Are these reliable? Fit for my purposes? Which processes and data have been involved? All these questions are basic for data users and helps them to discover and select the best datasets.

This means that all this information explaining the data (metadata) must be described in a standard way, to be commonly understood and used by all the community.

In WQeMS we are going to extend GeM+ metadata editor (a free and ISO-compliant desktop tool) to include specific vocabularies to describe data elaborated from the project:

✓ From one side, water-related vocabularies (INSPIRE vocabularies, Water Cycle Essential Variables, SDG indicators, etc) to clearly define data.

✓ From the other side, data quality vocabularies coming from QualityML to describe in detail the quality associated to data sources, processes and workflows, in terms of spatial, temporal or thematic accuracies.

Lineage processes will include workflow routines to be fully traceable and reproducible. This whole chain will be ended to an export.

## WQeMS' users training

The WQeMS consortium puts particular emphasis to the adoption and sustainability of the developed tools and services. The first objective is of course the design and development of the technologies and their friendly presentation to the end-users. However, experience shows that this is only the first of three steps.

The second important step is to help the users and stakeholders acquire the necessary skills to use the tools and services in the correct way, while the third step is to demonstrate to the users the value of the tools and



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services, to increase their engagement and motivation to use them. Adoption and sustainability are only achieved if all steps are designed and made systematically.

To address the second and third steps, the WQeMS project has specified 'User training' in its workplan, through which training will be provided to users and stakeholders via a blended approach, which combines the delivery of content in various formats via offline and online means. Interactive workshop sessions will be organised to maximise the user engagement and skills/competences transferability. The skills' transfer process will adhere to dimensions of Analyse, Plan, Execute, Evaluate and Lessons Learnt. The users training activities will result to the creation of a training curriculum with clear indication of skills/competences to be pursued, a set of learning objects (textual information, videos, etc.), gaming tools and a training handbook to be used as a guide by users for the effective training of additional stakeholders in implementing WQeMS services. The provision of the training will be facilitated by an eLearning environment, to benefit from the functionality to organize the content and interact with the trainees remotely and even to provide a more advance blended learning experience with learning objects (e.g., assessments, videos) offered through the same environment.

During the first project semester, we are closely observing the technical progress of the project and the collection of users' needs, while in parallel we are working on the curriculum units.

In addition, the eLearning environment has been created based on open source technologies and is ready to facilitate the interaction with the users during the creation of the training material.

## WQeMS' webinars

The WQeMS project organizes a series of webinars with an overall objective to disseminate information about various topics within the project team. These topics include technical and scientific ones such as algorithm, data processing, and user interface design and development, but also policy and other issues such as relevant EU directives and other legislation, ethics of citizen data and the Copernicus services.

We plan to have webinars every 1 to 2 months and each time select a topic



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that is relevant for the work currently underway.

The first webinar took place on March 23, 2021. There CREAF presented their work on metadata, which is important for a) ensuring the findability of datasets and data services and b) standardizing the way the properties and content of the datasets and data services are described. In addition to generic introduction to the metadata topic CREAF introduced a desktop application called GeM+. It allows users to create, manage and edit XML metadata documents from very diverse sets of geographic information formats (such as a TIFF or SHP, or in geospatial databases Oracle SDO).It supports the relevant standards ISO 19115 of Geopgraphic Information and ISO 19139 for export, import, and XML editing and is also compliant with the INSPIRE regulations for implementing metadata. The GeM+ interface is based on tabs organized in a conceptually coherent and intuitive way, beyond the simple concatenation of terms presented in some version of one of the different standards and it supports the validation and consistency analysis between metadata and the dataset.

The second webinar took place on May 12, 2021. In this Peter Salamon from the Joint Research Centre (JRC) presented the Copernicus Emergency Management Service (EMS). Its services include:

✓ On demand mapping where rapidly acquired satellite-based information is provided during and/or immediately after a disaster to support the immediate emergency management activities, and also during the prevention, preparedness, risk reduction and recovery phases.

✓ Early Warning & Monitoring where geospatial information is offered at European and global level through continuous observations and forecasts for floods, droughts and forest fires.

The webinar included an active Q/A session where the project team asked questions about technical topics and the potential to collaborate in the future.

The third webinar took place on May 18, 2021. At this webinar SERCO presented the Copernicus programme of the European Union and described the Copernicus Sentinels Space component, Copernicus Ground Segments, Sentinels User Products and EO Applications.

So far the webinars have been very useful for enhancing common understanding across the consortium. This links well to the other dissemination and exploitation



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activities such as the scholarship support for young scientists.

Further webinars are planned to enhance intra-consortium capacity and knowledge, while additional ones are going to be open to the wide community of users and the public.

## The WQeMS official website

The official website of the WQeMS Project was designed to be informative and yet minimal. Our intention was to convey as much information about the project as possible, in a simplistic and easy-to-engage manner.

The official website of the WQeMS Project was developed using cutting-end web technologies. The Angular application design framework was employed for developing the front-end and a series of services (i.e. Firestore Database, Firebase Hosting, Firebase Extensions) offered by the Firebase platform were integrated.

The website was evaluated in terms of accessibility, early and throughout the development process. Various accessibility problems were successfully addressed. This website currently meets WCAG 2.1, Conformance Level A. Accessibility features, in which this site strongly includes Text Alternatives and Keyboard Accessibility.

You can visit the official website of the WQeMS Project either by visiting https://wqems.eu or by scanning the QR Code below with your smartphone.

https://wqems.eu/



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