

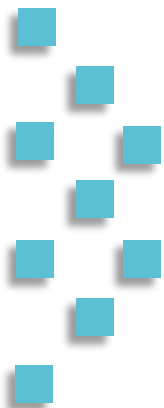


## D2.3 Extension of FIWARE for supporting water management and quality monitoring use-cases

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May 2022



This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant agreement No. 821036.



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# Project Consortium



# Executive Summary

The Fiware4Water project reaches its end, and the four Demo Cases have constructed the corresponding digital platforms and smart applications for intelligent water management on top of the F4W Reference Architectures designed in WP2.

The present document represents the last step and efforts in the definition and development of the proposed FIWARE-enabled F4W Reference Architectures, and closes the working loop started in deliverables D2.1 and D2.2. In this context, the Southbound and Northbound RAs' interfaces are described, representing the RA integration with i) Context Information Producers and IoT devices and ii) high-level services for data storage, manipulation and visualization, respectively. Thanks to the patterns, mechanisms and technologies identified and designed in previous project stages (D2.1 and D2.2) its development, based on FIWARE components, has resulted in a set of powerful digital platforms able to respond to the F4W Demo Cases requirements and needs. In this scenario, critical features such as real-time data analytics, Artificial Intelligence and Machine Learning models integration, scalability, fault tolerance or high performance are provided.

Furthermore, standardized and bidirectional communication and interoperability between water systems, including IoT sensors and devices, smart applications, or legacy systems among many other water-related actors, is enabled thanks to the definition and development of a set of harmonized water data models. Water domains such as Water Consumption, Water Quality monitoring, Wastewater or Water Distribution are covered and many entities have been modelled and standardized in close collaboration with other water-domain experts belonging to the ICT4Water cluster or the DigitalWater2020 synergy group, in which five H2020 projects are involved. Furthermore, semantic reasoning capabilities have been included in the F4W solutions by linking the data models to SAREF and SAREF4WATR ontologies. The proposed data models define the so-called **Common Information Model for Digital Water Management**, which can be reused and upscaled in any other digital water management domain case as it has been done and demonstrated in the Fiware4Water project. As a result, the F4W standardized data models have been included in the Smart Data Models Program (<https://smartdatamodels.org>), an open, collaborative and non-profit initiative for the curation of data models across different domains, which will ensure its maintenance and extension, and will provide visibility to the digital water society. In this scenario, this document provides several guidelines, mechanisms and resources to dynamically create new water-related data models and easily deploy and use them in a FIWARE powered ecosystem.

Additionally, contributions to the ETSI ISG-CIM standardization group are also reported, which include efforts to extend the NGSI-LD API specification or the implementation of the Digital Twin concept with NGSI-LD support.

Finally, with the aim of addressing the critical security concerns identified during the first stage of the project regarding Open Source developments, several activities have been carried out which include i) Static analysis of vulnerabilities in the deployment infrastructure (Docker), ii) Detecting and preventing hardcoded secrets (SAST), iii) Checks for common best practices in production deployments (Docker), iv) Configuration of GitHub Actions, and v) Reporting of issues.

The EU added value and policies recommendations related to this document are detailed in the Conclusion sections.

## Related Deliverables

**D1.4 – “Gap analysis and final Requirements”**, which concludes with the final requirements that need to be addressed.

**D2.1 - “Specification of system architecture for water consumption and quality monitoring”**, which defines the general architecture and serves as a base for the different extensions.

**D2.2 – “Extensions of FIWARE ecosystem with Big Data and AI frameworks”**, which provides big data and ai capabilities to the ecosystem, enabling the proper integration of components.

**D4.1, D4.2, D4.4 and D4.5, from WP4**, which describe the deployment and integration of the smart applications developed within each demo case during WP3.

## Document Information

Programme	H2020 – SC0511-2018
Project Acronym	<b>Fiware4Water</b>
Project full name	FIWARE for the Next Generation Internet Services for the WATER sector
Deliverable	<b>D2.3: Extension of FIWARE for supporting water management and quality monitoring use-cases</b>
Work Package	<b>WP2: Architecture/Data/Ontology/API/Legacy links/Standards</b>
Task	Task 2.3: Common information models for water management
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Quality check	Elad Salomons (EAB)
Planned Delivery Date	31/05/2022
Actual Delivery Date	30/05/2022
Dissemination Level	Public

## Revision history

Version	Date	Author(s)/Contributor(s)	Notes
Draft1	01/04/2022	Alberto Abella (FF), Marc Ribalta (EUT)	ToC
Draft2	02/05/2022	Marc Ribalta (EUT), Aitor Corchero (EUT), Alberto Abella (FF) ), Fernando López (FF), Benoit Orihuela (EGM), Chris Pantazis (NTUA), Siddharth Seshan (KWR), Gareth Lewis (UNEXE)	Main contributions
Draft3	20/05/2022	Lluis Echeverria (EUT), Fernando López (FF), Alberto Abella (FF)	
Review	26/05/2022	Elad Salomons (OptiWater)	
Final	27/05/2022	Lluis Echeverria (EUT)	Final

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## List of Acronyms/Glossary

<b>AI</b>	Artificial Intelligence
<b>API</b>	Application Programming Interface
<b>DC</b>	F4W Demo Case
<b>DW2020</b>	DigitalWater2020 synergy group
<b>DWC</b>	Digital Water City project
<b>ETSI</b>	European Telecommunications Standards Institute
<b>F4W</b>	Fiware4Water project
<b>LD</b>	Linked Data
<b>ML</b>	Machine Learning
<b>NGI</b>	Next Generation Internet <i>The Next Generation Internet (NGI) initiative, launched by the European Commission in the autumn of 2016, aims to shape the future internet as an interoperable platform ecosystem that embodies the values that Europe holds dear: openness, inclusivity, transparency, privacy, cooperation, and protection of data.</i>
<b>NGSI</b>	Next Generation Service Interfaces
<b>RA</b>	Reference Architecture
<b>RDF</b>	Resource Description Framework
<b>WPL</b>	Work Packages Leaders