D3.5 FIWARE-enabled Water Quality Sensors

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Executive Summary

This deliverable (D3.5) contains part of the work done within Work Package 3 (WP3) 'Smart Applications and Devices', specifically Task 3.5 'Advanced Water Quality Sensors', aiming at developing smart devices that improve Urban Water Supply monitoring and infrastructure management. In this task, three actions have been executed: i) develop advanced water sensors to improve the data gathering of water quality, ii) increase the reliability of the raw data using intelligent processing, and iii) demonstrate the integration of the extracted data into data management platforms.

The document reports the development of two different sensors. First, the development of the 'Nanosensor' sensor, a device that detects multiple chemicals dissolved in water, temperature and conductivity, with a perfect size to be used in water loops, and second, the development of a printed device that consists in a free chlorine electrochemical sensor and temperature sensor platform with a wireless compact autonomous electronic control unit (ECU) and software for data acquisition into a remote computer.

The Nanosensor development is reported describing all the steps carried out, starting with the theoretical concept behind the sensor, involving the concept, the multi-parameter strategy, the working principle, and the fabrication process. It is followed by the resistance study of the sensor under water conditions to ensure a minimum time of data gathering until failure, the software developed to improve in raw data acquisition by reducing signal noise, and the laboratory sensor testing, which encounters several problematics that are addressed, identified, and improved afterwards.

The printed sensor is explained in a similar manner, starting with the theoretical concept behind it, the sensor design, the fabrication route, and a theoretical description of the electronic control unit encapsulating it, which enables the connection of the printed sensor with external devices. The development involved the creation of a desktop application to configure and visualize the sensor readings.

The further development of hardware/software components is necessary to integrate the data extracted from these sensors into the FIWARE ecosystem of the project, properly named FIWARE4Water architecture. This deployment is demonstrated within the Cannes Demo Case #2 (France) and detailed in the deliverable 4.2 "FIWARE4_Leakage Management", and the technical development of the software is explained in deliverable 2.3 "Extension of FIWARE for supporting water management and quality monitoring use-cases". Furthermore, the intelligent processing of raw data extracted from sensors is technically explained in D4.3 "FIWARE4_Water Quality Monitoring and Pollution Response", and tested under practical conditions.

European added value (EAV) and upscaling

The European Added Value of deliverable 3.5 has multiple aspects: (i) showcasing the fabrication and implementation of two different multiparameter sensors as advanced water quality sensors, (ii) the methodology on how to validate sensor behaviour and localize the errors, and (iii) the development of FIWARE components to export the raw data to remote systems. All these actions can be reimplemented across Europe since the theoretical knowledge can be learnt from and future recommendations can be extracted from it. Furthermore, software development requires design and implementation time. The component developed is integrated with the FIWARE ecosystem, which means that the adaptation of the FIWARE architecture already solves the principle of sensor integration and deployment.

Related Deliverables

D2.3 – "Extension of FIWARE for supporting water management and quality monitoring use-cases", reporting the connectors implemented to enable the integration of sensors.

D4.2 – "FIWARE4_Leakage Management", where the deployment and end-testing of the developed smart solutions for the French demo case are described.

D4.3 – "FIWARE4_Water Quality Monitoring and Pollution Response", where the raw data improvement algorithms and the sensors are tested under practical conditions.

Document Information

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Final	27/05/2022	Marc Ribalta (EUT)	Addressed internal review suggestions

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List of Acronyms/Glossary

Acronym	Description
BIXX	Business Issue, one of the four French Business issues (BI01 to BI04)
CIRSEE	Centre International de Recherche Sur l'Eau et l'Environnement (in English, International Centre for Research on Water and Environment), partner in the F4W project
CNRS	Centre National de la Recherche scientifique (in English, National Centre for Scientific Research)
EGM	Easy Global Market, partner in the F4W project
EUT	Eurecat, partner in the F4W project
F4W	Fiware4Water project
NGI	Next Generation Internet *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.*
PLC	Programmable Logic Controller
RTU	Remote Terminal Unit
SCADA	Supervisory Control And Data Acquisition
SUEZ	Parent company of 3S and third party of 3S in the F4W framework
TZW	DVGW-Technologiezentrum Wasser, partner in the F4W project
WPL	Work Packages Leaders
3S	SUEZ Smart Solutions, subsidiary of the worldwide group SUEZ, and partner in the F4W project
GA	Grant Agreement