Futher reading

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Presentation of

Fiware4Water context

Fiware4Water is a three years project funded by the European Horizon 2020 research and innovation program. Fiware4Water links the water sector especially the urban one to FIWARE by demonstrating its capabilities and the potential of its interoperable and standardised interfaces for both water sector end-users (cities, water utilities, water authorities, citizens and consumers), and solution providers (private utilities, SMEs, developers).

So far little progress has been made on developing specific water-related applications using FIWARE, due to fragmentation of the water sector, restrained by licensed platforms and lagging behind other sectors (e.g. telecommunications) regarding interoperability, standardisation, cross-domain cooperation and data exchange.

Fiware4Water activities

The solutions developed by Fiware4Water tackled the whole water cycle while being embedded in a social innvoation approach with the 4 demo cases addressing (i) the raw water supply optimisation (Greek case), (ii) the water supply system management (French case), (iii) the intelligent control of waste water (Dutch case) and (iv) the smart metering and citizen engagement (English case).

The promotion and solutions uptake are experimented through Fiware4Water Demo Networks at the Danube region level (DemoNetwork#1), with the River Basins Organisations (DemoNetwork#2) and with FIWARE Ecosystem (DemoNetwork#3).

Website: www.fiware4water.eu

Realisation

Authors: Natacha Amorsi (OiEau), Ben Ward (South West Water)

Graphic Design: OiEau **Version:** April 2021

Consortium

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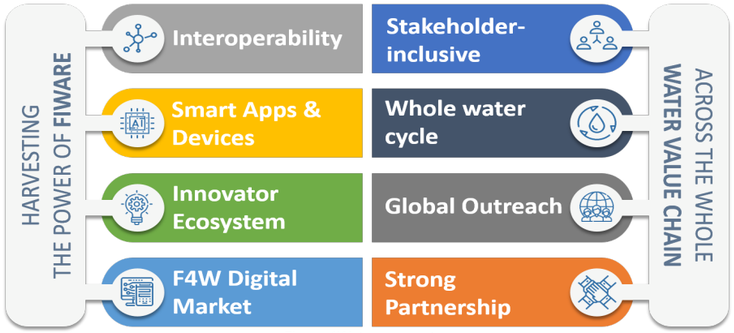
FIWARE 4 WATER

Digital Smart Metering and Citizen Engagement

DESCRIPTION

The water sector is facing societal challenges in the context of climate change adaptation. Water availability (in quantity and quality), agriculture, energy, extreme events, population growth, urbanisation and more lately sanitary crisis are some of the crosscutting issues increasing the needs for accurate, on time and meaningful data embracing a much wider questioning: what type of data, how to make them compatible, how to gather them, where to store them and last but not the least how to make them useful and comprehensible for water stakeholders.



Fiware4Water concept

Digital innovation for smart water is seen as one key component to answer these questions from the source to the multiple uses of water and support water managers and stakeholders. Digital innovation is creating unprecedented opportunities to leverage data and analytics to inform better system-level choices today and improve future outcomes for watershed management, operations, maintenance, capital planning and customer service [a].

Fiware4Water specifically tackles these issues throught the development of IT solutions along the water cycle. In this Social Innovation Factsheet (SIF), the focus is put on the solutions developed by South West Water (SWW), aiming at engaging with behavioural science experts to implement innovative approaches that empower customers towards water efficiency. Doing so, SWW intends to become the first Water Company in the UK using FIWARE to exploit the capabilities of smart meters for feedback to the customers and increasing water saving awareness [b].

FOCUS ON SOUTH WEST WATER

• South West Water (SWW) provides drinking water and wastewater services for approximately 1.7 million customers in the South West of England, and drinking water services to approximately 0.5 million customers in Bournemouth, South England [b].

• SWW is working in partnership to improve wildlife habitats, and to preserve wetlands on the whole territory.

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Social Innovation Factsheet #1

DIGITAL WATER

Fiware4Water intends to link the water sector (especially the urban one) to FIWARE by demonstrating its capabilities and the potential of its interoperable and standardised interfaces for both water sector end-users (cities, water utilities, water authorities, citizens and consumers), and solution providers (private utilities, SMEs, developers).

Over the duration of Fiware4Water (2019-2022), two SIFs and one Policy brief will be delivered. Each of them will present Fiware4Water outcomes through the lens of social innovation.

The South West Water technology development to engage with citizens is the focus of this first Fiware4Water SIF.

As detailed below, social innovation combines four dimensions: technological, governance, capacity development and economic & business. Each is described in a specific section of this thematic SIF.

SOCIAL INNOVATION

• In Fiware4Water, social innovation means tackling societal, water-related challenges arising from climate change by combining the technological & non-technological dimensions of innovation [c].

• Social innovation refers to those processes and outcomes focused on addressing societal goals, unsatisfied collective needs, as opposed to mere economic returns. It is particularly salient in the context of the complex and cross-cutting challenges that need to be addressed in the field of Water-Energy-Food-Ecosystem and which will not be met by relying on market signals alone.

• Social innovation consists of combinations of (new or hybrids of existing and new) products, processes and services. In order to succeed, social innovation needs to pay attention to technological as well as non-technological dimensions:
1) technology, 2) capacity development, 3) governance structures and 4) economic & business. As such, these four dimensions of the social innovation process cut across organisational, sectoral and disciplinary boundaries and imply new patterns of stakeholder involvement and learning.

• The success of social innovation is reliant on the accountability of diverse stakeholders and across all government levels.

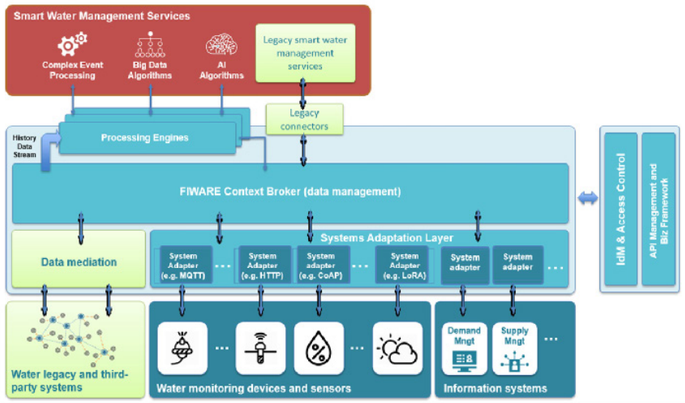
TECHNOLOGICAL SOLUTIONS

"The digital transformation of water is currently enabling real time water quantity and quality monitoring, vastly improved management of infrastructure assets, direct consumer engagement and facilitating the adoption of off-grid and localized infrastructure technologies" [a].

South West Water goal, within the context of Fiware4Water European project, is to create a FIWARE enabled pipeline to retrieve consumption data from smart meters and provide this data to customers via a smart phone application to drive positive changes in water use behaviour, reduce consumption and reduce the customers' water bill. The technological innovation is based on a series of development [b],[c],[d]:

■ Smart water meters and masts were installed in Great Torrington, Devon in the South West of the UK to transmit daily water consumption data via Sigfox to Fiware and a SWW owned data store. By December 2019, SWW were receiving daily data for around 100 customers who had signed up to the trial.

■ A link between Sigfox and the FIWARE context broker is delivering consumption data to the FIWARE ecosystem where it can be stitched together with other datasets through the use of common data models in a common data structure known as JSON-LD. Rainfall data and energy consumption could for example be integrated within this data to help predict water consumption and help SWW manage supply in real time. Downstream of the context broker, the data will be saved in a database for billing and trend analysis.



Fiware4Water functional structure and links with legacy systems

■ A utilities web application will provide a user-friendly interface to help SWW staff to detect customer leaks, promote water efficiency practices and encourage customers to switch to a metered bill and save money. Under the hood, powerful machine learning will trigger alarms and make water consumption predictions.

■ In addition, linking FIWARE to EPANET, the open source water distribution modelling software, to allow real time simulations could provide helpful insights for the management of network incidents such as bursts.

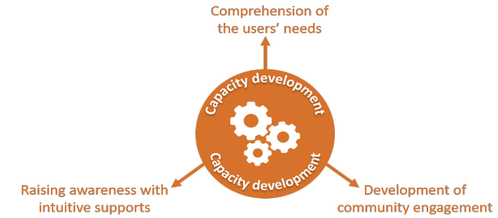
CAPACITY DEVELOPMENT

"Enhancing institutional and individual capacity is key to promoting effective water management" [a].

Capacity development is defined by the United Nations Development Programme (UNDP) as an integral process for the mediation, strengthening, preservation and further development of individual, organizational and societal capabilities, in order to realize functions, solve problems and set and achieve sustainable goals [b]. Delivering solutions and ensuring they are meaningful and reach potential end-users require the whole cycle of raising awareness on the tackled issues, co-development and additional training to the solutions. These different dimensions are fully integrated in Fiware4Water solutions development. Some examples are:

■ At the scale of the comprehension of the end-users and technological requirements to develop digital solutions using the Fiware platform, the first steps have consisted in gathering the technological needs while understanding the societal perspectives on digital issues. The former was approached with a series of deliverables available on the project website dealing with Requirements from use cases [c], Requirements from end-users [d], Requirements for innovation [e], all leading to the Gap analysis and final requirements [f]. The latter was addressed in a specific study of the current public perception of digital water and other related innovations [g].

■ At the scale of the co-development of solutions, the community engagement initiative is being set for SWW demo case. It is important to co-design technology with users, in this case, the community of Great Torrington. The aim is to work with the public and the council to design a platform that helps communities reduce their water usage. Findings from the study will feedback to the EU and UN World Water Quality Alliance (UNWWQA) [h]. This approach is also used to support the Demo Network focusing on the Danube region.



Fiware4Water capaticy development illustration

■ At scale of the raising awareness and training dimensions, the first initiative has been put into place with an on-going series of webinars that have targeted the academic and developers' communities, the River Basins Organisations, the Fiware community. This will be carried on until the end of the project and additional training tools will be developed such as MOOC.

SOCIAL INNOVATION

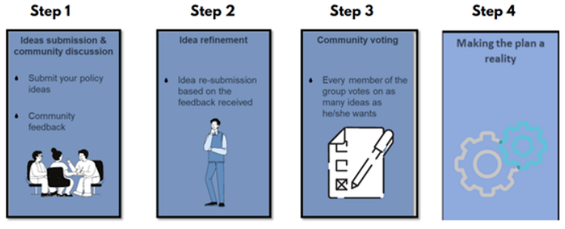
GOVERNANCE STRUCTURE

"Water governance is the set of rules, practices, and processes through which decisions for the management of water resources and services are taken and implemented, and decision-makers are held accountable" [a]

Facing the need to promote and develop digital tools to support the management of water but also to better connect water to other policies, different governance initiatives are raising in Europe and throughout the world. The citizens and their representatives through associations have become key actors. In the end, all changes of practices will be valid if accepted and integrated in the everyday routine. On the other hand, it means that the policy and decision makers are accountable for the propositions made and decisions taken. This is very true for the digital water field addressing water citizens' consumption. To provide better water services and tailor the demand to the supply in the most efficient way, accurate data on consumption have become crucial. But accessing real time consumption data requires that the technologies are available and the consumers agree to use these technologies which lead to governance issues

■ At the European level, ICT4Water cluster is a hub for EU-funded research and innovation projects developing digital innovations for the water sector. It brings projects together supporting them to (i) exchange information and best practices (ii) disseminate and exploit project outputs (iii) contribute to defining digital water strategies and (iv) contribute to policy development in digital and water domain [b].

■ At the trans-national level: the DigitalWater2020 synergy group is composed of five European projects funded by the European Union's Horizon 2020 Research and Innovation programme. Aqua3S, DigitalWater.City, Fiware4Water, Naiades and Scorewater act together to (i) support decision making and bring innovative water digital solutions to the market and (ii) achieve wide uptake among utilities, municipalities, SMEs and start up, software industry and general public [c].



Steps of a water local forum [d]

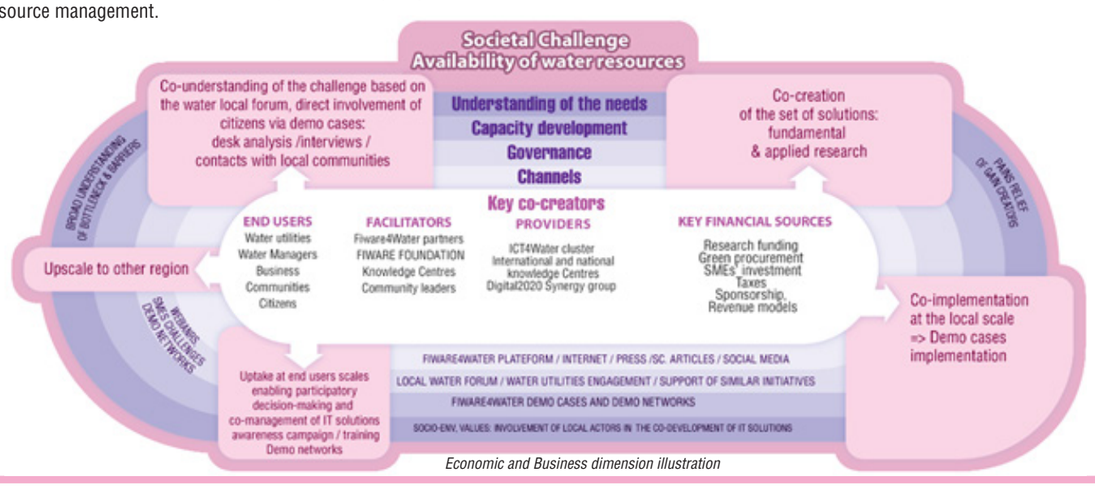
■ At the local level: SWW demo case benefits from the World Water Quality Alliance initiative. To raise awareness and engage with citizens for the development of the digital water solutions, a Local Water Forum is being created. It is composed of volunteers who want to participate in actions which will contribute to solving water-related problems. Volunteers will meet together with members of the local council or local water company and representatives of Fiware4Water. They will be given an introduction to the water situation in the World and then asked about local water issues. Then they will create an idea for a local water plan [d].

ECONOMIC AND BUSINESS DIMENSIONS

"Social innovation relies on means other than market mechanisms in order to link the demand and supply sides"

■ At that stage, only a first insight can be provided on the key elements of the economic and business dimensions. This will be further explored with the development of Fiware4water business canvas. The following scheme highlights the key economic & business opportunities, indicating key activities and their socio-environmental values. Digital water solutions have the transformative power to build new access markets and increase economic productive capacity for a better resource management.

■ Solution providers and potential users need to interact during the different stages of the innovation process to create a common ground for the co-production of the required knowledge: from the comprehension of the need to the design, implementation and use of innovative digital water solutions [a].



Economic and Business dimension illustration