Synergy Group DigitalWater2020

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Executive Summary

This document contains the synergies and common activities of five H2020 projects that started in the summer of 2019: The five projects are digital-water.city, Score Water, Fiware4Water, Naiades and aqua3S. The first four were funded by the SC5-11-2018 call and the latter by the H2020-SU-SEC-2018-DRS-03. All these five projects have a common theme: Digital Water, with a variety of case studies and approaches, but also with several similarities in challenges, scope and goals.

Following a suggestion by EASME that supervises the SC5-11-2018 projects, the synergies and clustering activities were included in the Grant Agreement of each project, resulting in the contractual obligation to report about them in a common deliverable (this document). Thus a Synergy group was born: **DigitalWater2020 (DW2020).**

DW2020 is organised along four thematic areas/task forces: Task Force 1: Ontologies, Task Force 2: Sensors demonstration, Task Force 3: Business models and Task Force 4: Communication, each with its own task force leader. Additionally a fifth task force (Task Force 0: Management) has been created, to coordinate the efforts and activities overall.

This document is the first DW2020 report, in common for all the projects, describing their synergies and cooperation, which started early in 2020 and is scheduled to continue until the end of the projects (and hopefully beyond). It contains a brief presentation of each project, details about the structure and activities of each Task Force, as well the planned events for 2020-21 and the next steps.

So far the synergies and cooperation among these five projects has been very successful. It gave to all the chance to interact, to exchange knowledge, to cooperate for specific challenges and to help each other. We are already discussing future steps that will lead to DW2020 being “alive” after the end of the five projects.

Document Information

Programme	**H2020 – SC0511-2018**
Project Acronym	**digital-water.city, Fiware4Water, Naiades, ScoreWater, aqua3S**
Deliverable	**D7.5: Synergies inside the portfolio of SC05-11-2018 projects, digital-water.city** **D5.7: Synergies with the SC05-11-2018 cluster, Fiware4Water** **D9.5: Synergetic activities with the other projects of the SC05-11-2018 portfolio, Naiades** **D8.6: Plan for synergies with other projects, ScoreWater** **For aqua3S this is not a GA Compulsory Deliverable**
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Final	27/05/2020	Nico Caradot (KWB)	Final review
Q.C.	28/05/2020	Francesco Fatone (UNIVPM)	Quality Check and minor adds

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List of Acronyms/Glossary

DW2020	Synergy Group DigitalWater2020
DWC	digital-water.city 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.*
TFL	Task Force Leader
WPL	Work Packages Leaders
GA	Grant Agreement

I. Introduction

The EU H2020 call SC5-11-2018 was entitled: « Digital solutions for water: linking the physical and digital world for water solutions ». Four projects were funded out of this: digital-water.city, Score Water, Fiware4Water and Naiades. Given the theme of the call, it was expected that the four projects had a lot in common in their scope, goals and innovation content. All the above four projects started at the same time, in June 2019.

During the preparation of the Grant Agreement (GA), EASME suggested that these four projects should cluster/group together and develop synergies and common activities, so as to facilitate cooperation and enhance the impact of each project. This suggestion was included as contractual obligation for the four projects, i.e. that there would be a common deliverable, describing the synergies and cooperation of this group.

During the same period (summer 2018) there was another EU H2020 call with similar content, namely the call H2020-SU-SEC-2018-DRS-03 "Pre-normative research and demonstration for disaster-resilient societies", which for the year 2018 was open for the Sub-topic 1: [2018] Pre-standardisation for the security of water supply. There was only one project funded out of this call: aqua3S, which started on September 1, 2019 (i.e. only three months-summertime after the others). Since there was no sister project out of this call, no synergies were suggested, although it had a lot in common in its scope and goals with the other four sister projects.

All five projects, obviously, given their themes, became members of the ICT4WATER cluster. Beyond this general cooperation, aqua3S had some key partners in common with the other four projects (e.g. CERTH, EGM, UNEXE, 3S), who quickly realised the closeness of this project to the others, and suggested for this standalone to be "adopted" in the group of the four sister projects. Thus the group increased in size, comprising now five projects (4+1), with interests and activities in common around "digital water" themes and organised itself as the **DigitalWater2020 (DW2020)** group.

DW2020 is organised along four thematic areas/Task Forces: Ontologies, Sensors demonstration, Business models and Communication, each with its own Task Force leader. Additionally a fifth task force (Task Force 0: Management) has been created, to coordinate the efforts and activities overall. Participation in the task forces is voluntary for the people/researchers involved in the five projects, based on their interests and the specific tasks they are involved in their respective projects. The goal of the task forces is to do "real" work, with several regular teleconferences, investigating common problems and approaches, helping each other, exchanging knowledge to avoid "re-inventing the wheel" for specific challenges. Consequently several early career researchers are actively involved, together with more experienced older researchers, benefiting all from the knowledge exchange that takes place on a regular basis.

This document is the first DW2020 report, a common outcome of this grouping/clustering initiative, co-authored by partners of all these five projects. It is structured as follows: the next section includes short presentations of the five projects, followed by details on the structure of the synergies and the thematic groups. The documents concludes with the next steps and plans for the future.

II. Presentation of the projects

II.1. digital-water.city (DWC)

European cities face major challenges to achieve the desired level of sustainability in the management of urban water systems. Digital technologies such as mobile devices, real-time sensors, machine learning, artificial intelligence and cloud solutions have the potential to improve the management of water infrastructures significantly. In addition, they can improve the quality of services provided to citizens as well as the level of awareness and collaboration between utilities, authorities and citizens.

The DWC main goal is to boost the integrated management of waters systems in five major European cities – Berlin, Milan, Copenhagen, Paris and Sofia – by leveraging the potential of data and smart digital technologies. Under the leadership of Kompetenzzentrum Wasser Berlin gGmbH (KWB), 24 partners from 10 European countries will develop and demonstrate the benefits of a panel of innovative digital solutions to address major water-related challenges. These include the protection of human health, the performance and return on investment of water infrastructures and the public involvement in urban water management. Areas of application of DWC digital solutions range from groundwater management, sewer maintenance and operation, wastewater treatment and reuse to urban bathing water management. The solutions are developed in close collaboration between municipalities, utilities, research institutes and innovation players from both digital and physical spheres. DWC integrates the development of digital solutions in a dedicated guiding protocol to cover the existing gaps regarding governance, interoperability and cybersecurity.

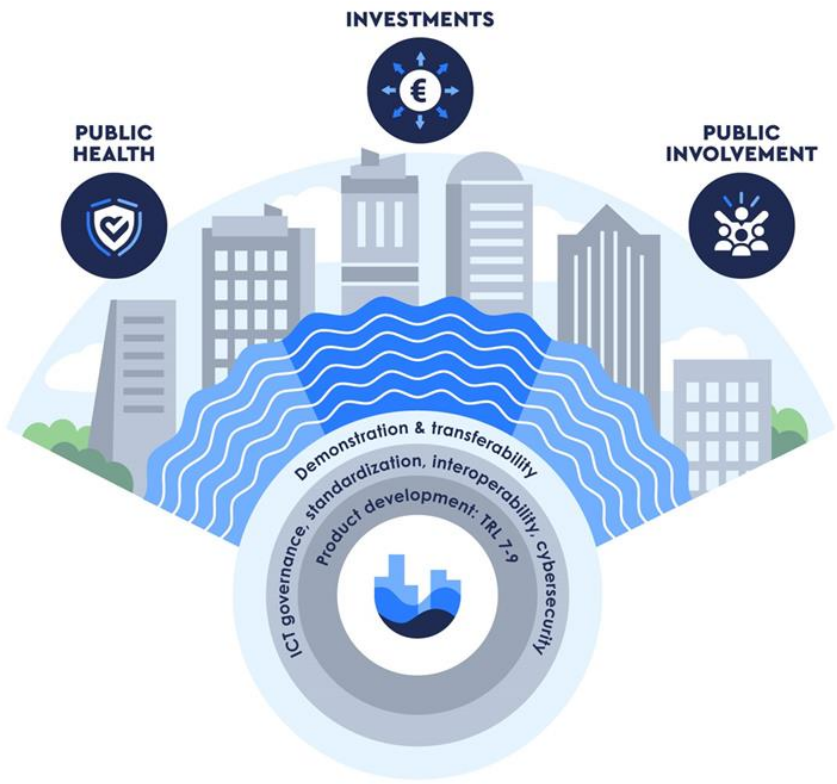

Figure 1. Illustration of DWC's concept, creating links between the digital and physical worlds

In Berlin, several innovations will reduce the environmental impacts of the sewer network focusing on illicit connections, combined sewer overflows and optimize the maintenance and planning of water wells. An Augmented Reality application visualize the groundwater flows for the public and highlight the relevance of drinking water resource as hidden part of the water cycle. In Paris, DWC aims at improving the bathing water quality in the river Seine for the Olympic games of 2024 using innovative sensors for bacterial measurements in the river and machine learning to forecast the contamination risk at the official bathing places. In Sofia, the main objective is to improve the management of the sewer network and reduce operational costs using a smart sewer cleaning technology. In Copenhagen, the aim is to reduce environmental impacts and flooding through forecasting, real-time control of sewer network and wastewater treatment plant. The main focus in Milan is the to digitally support the achievement of sustainable and safe waste water reuse and efficient distribution for agricultural irrigation, through real-time energy and carbon footprinting and assessment within an knowledge-discovery framework integrated in the existing utility asset.

The large scale assessment and communication of the benefits provided by the digital solutions in the five cities will serve as lighthouse, raising the awareness of other European cities and opening new market opportunities for European technology providers.

The description of the digital solutions is now available on our DWC website. Have a look to understand which objectives we want to achieve and how our innovations will be an added value for the water sector at https://www.digital-water.city/digital-solutions/. We also invite you to follow our LinkedIn page digital-water.city where we will post regular news about the project outcomes, activities and events.

II.2. Fiware4Water (F4W)

F4W team

F4W consortium is composed of 14 partners coming from France, Greece, Spain, Germany, United Kingdom, The Netherlands and Romania. This consortium cover different fields of competence on Water, IoT, sensors, data modelling, social sciences and political engagement. One of our force is to have four water utilities (public and private) involved.

F4W is coordinated by Gilles Neveu (g.neveu@oieau.fr) and managed by Sonia Siauve (s.siauve@oieau.fr). Lydia Vamvakeridou-Lyroudia is the scientific and technical manager (lydia.vamvakeridou-lyroudia@kwrwater.nl).

F4W objective

F4W intends to **link the water sector 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). **FIWARE** is a smart solution platform, funded by the EC (2011-16) as a major flagship PPP, to support SMEs and developers in creating the next generation of internet services, as the main ecosystem for Smart City initiatives for cross-domain data exchange/cooperation and for the NGI initiative.

Fiware4Water is making a strong step forward towards the consecution of digital water challenges, linking the physical and the virtual worlds, converting data coming from sensors, and combining it with information from other systems, value chains and domains. FIWARE provides technology enablers which simplify the generation of effective knowledge, and the deployment of personalised smart

applications. These will maximise the water data value by providing collective and collaborative management of the water resources, considering side-effects at cross-domain.

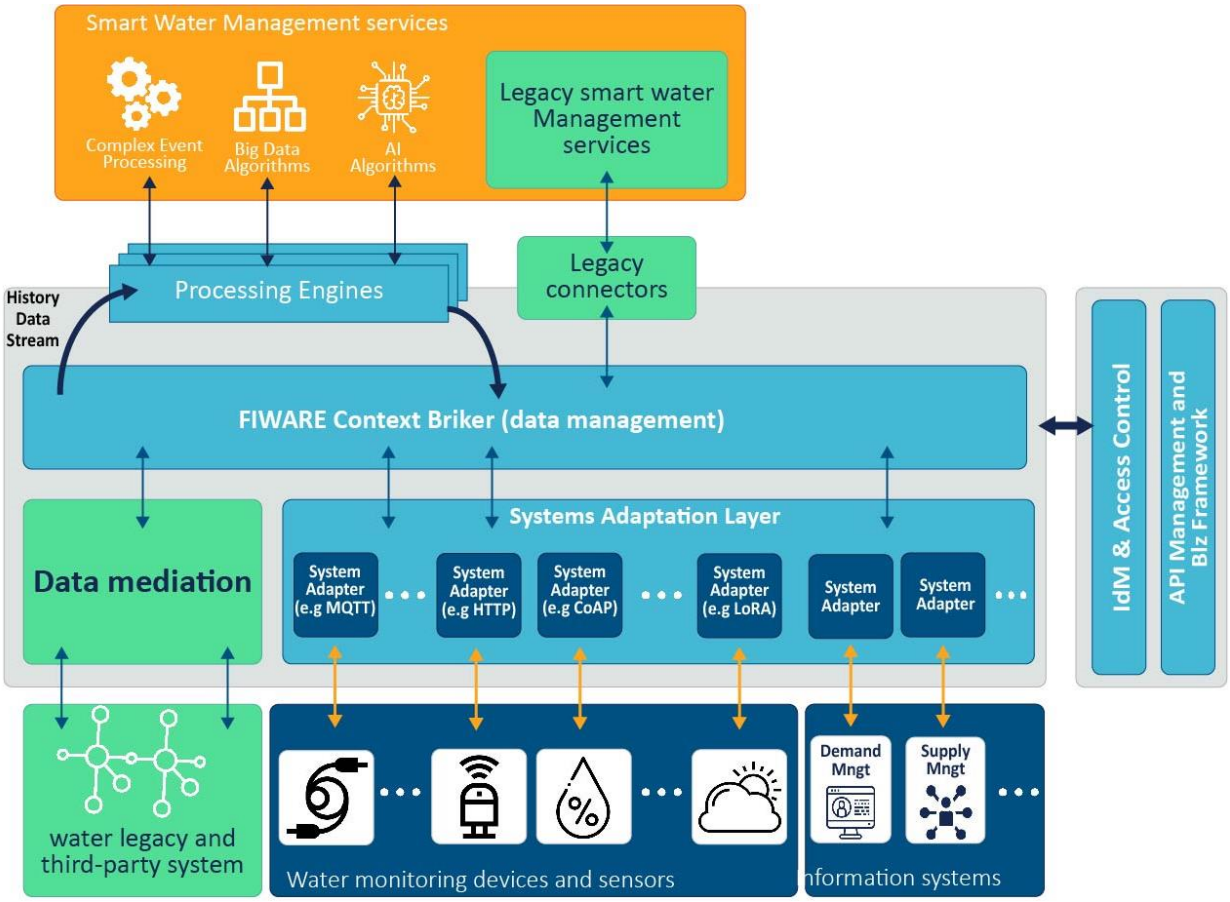

Figure 2. Fiware4Water functional structure and links with legacy systems

F4W work plan

F4W has adopted a two-tier approach in order to reach its objectives:

- In **tier 1**, F4W builds and demonstrates modular Smart Applications and Devices across the entire water cycle in **four large demo cases** throughout Europe:

DC#1: real time management and operation of raw water conveyance system, providing operational rules for the optimal sluice gates' settings (Demo Case #1 Athens, Greece)

DC#2: optimal management of water resources during summer months to prevent drought events, thanks to advanced forecasting techniques to predict demand and resources availability (Demo Case #2 Cannes, France)

DC#3: optimal control settings for the operation of waste water treatment plant towards the reduction of greenhouse gas emissions and energy use, and optimisation of treatment plant performance (Demo Case #3 Amsterdam, Netherlands)

DC#4: improved leakage/anomalies detection and management towards the optimal operation of water distribution network (Demo Case #4 Great Torrington, UK).

- In **tier 2**, F4W is engaging a wide audience of stakeholders in understanding, developing and adopting F4W applications , thanks to the following **three demo networks**:

DN#1: engagement with Municipalities of the Lower Danube Basin and from the Middle East and North Africa; assessment of the potential for uptake of the F4W portfolio of APIs and Devices

DN#2: engagement with Water authorities via the International Network of Basin Organisations (INBO); the concept and advantages of F4W to support water management will be explained during 6 workshops organised between June 2021 and June 2022, during the general assemblies of INBO regional networks (Europe, Africa, Mediterranean, South America, North America, Central Asia)

DN#3: engagement with Technology providers thanks to FIWARE hubs, notably the Mundus Programme; F4W challenges will be organised to boost innovation in the domain of water, using F4W functionalities.

For more information, visit F4W website: https://www.fiware4water.eu/

II.3. Naiades

NAIADES's vision is to support the modernization and digitization of water sector by providing a holistic solution for the control and management of water ecosystems. NAIADES aims to address the increased need for sustainable and eco-friendly water methodologies and redefines water management. NAIADES covers four application domains namely: (i) Water consumption and Efficiency, (ii) Confidence of water consumers, (iii) Safety and reliability, (iv) Personalized persuasive feedback and services.

NAIADES integrates within its Ecosystem, existing, emerging and constantly increasing in site data resources from urban water sector (e.g.: pressure, discharge, velocity, chlorine concentrations, temperature). Data resources will be integrated on the basis of data homogenisation and semantic alignment toolkits that will be researched and developed, enabling effective cross-domain data search, retrieval and sharing. Integrated data resources derive from both (a) the existing and constantly increasing datasets of organizations of the core pillars, as well as (b) datasets that have already been aggregated within existing related infrastructures will also put emphasis on utilising their offered data analysis tools and computational resources.

NAIADES embed human-reasoning techniques in every layer of the cloud, improving automation, which provide tools, frameworks, and beyond the state-of-the-art infrastructure to rapidly build, train, and test machine-learning models and advanced control strategies. NAIADES platform leverage three unique strengths that are critical for a successful model development: contextual data, advanced data and analytics management, and a high-speed cloud infrastructure.

NAIADES Ecosystem envisions transforming urban water management through automated and smarter water resource management and environmental monitoring. NAIADES aims to:

- Address the increased need for sustainable and eco-friendly water methodologies defining a new ICT framework.
- Provide multidimensional intelligence on the water ecosystem through the introduction of Artificial Intelligence technologies

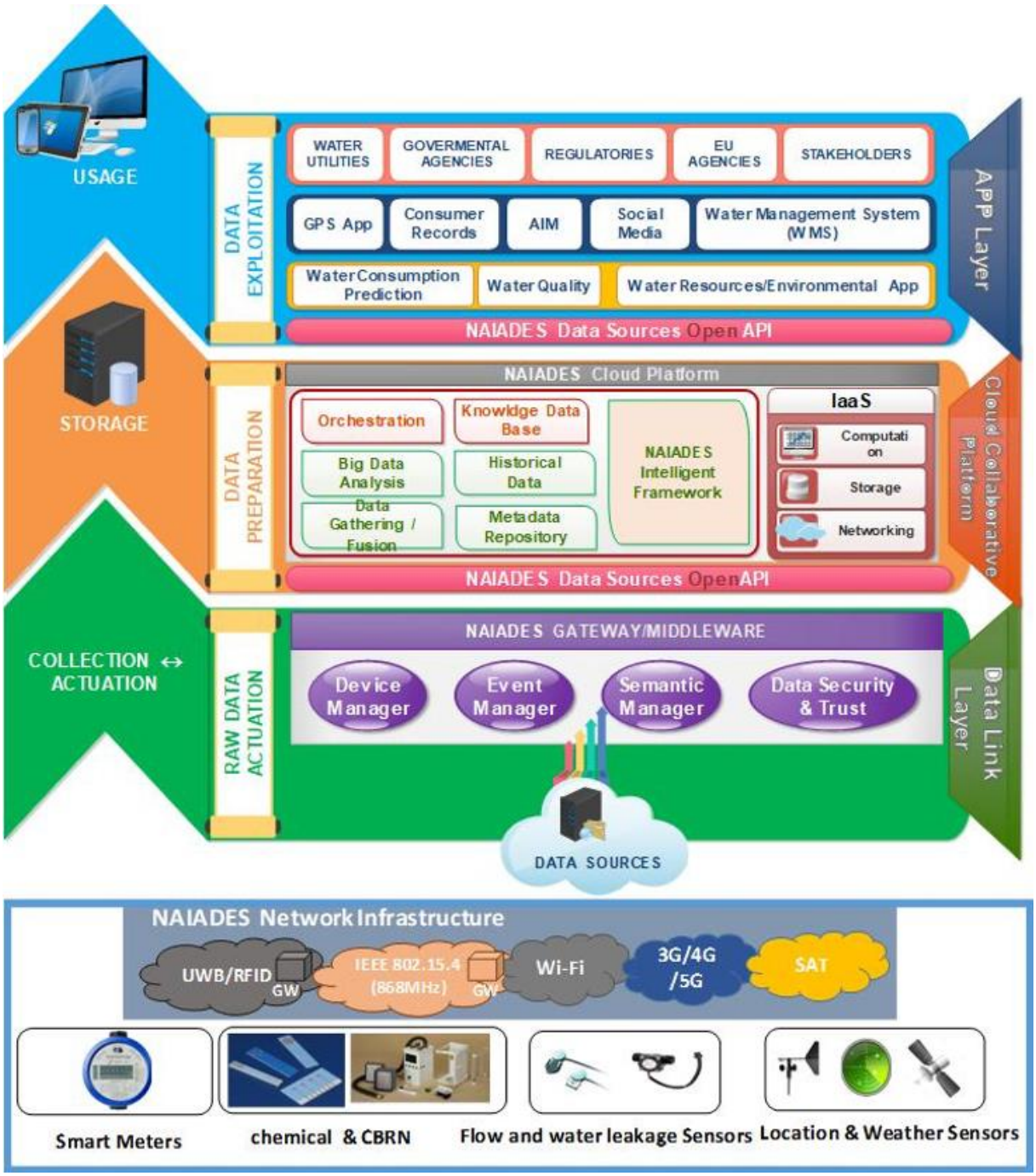

Figure 3: NAIADES Overall Architecture.

The Intelligence Framework of the proposed integrated solution comprises a number of interconnected technological components:

- Data Collection, integration and Fusion Middleware
- Advanced Data Mining Engine
- The core Machine Learning and control Development Environment
- The NAIADES Decision Support tool-Migration and Counteraction Platform
- AI-driven services

- Communication platform
- Blockchain Auditing mechanism
- NAIADES AI Marketplace

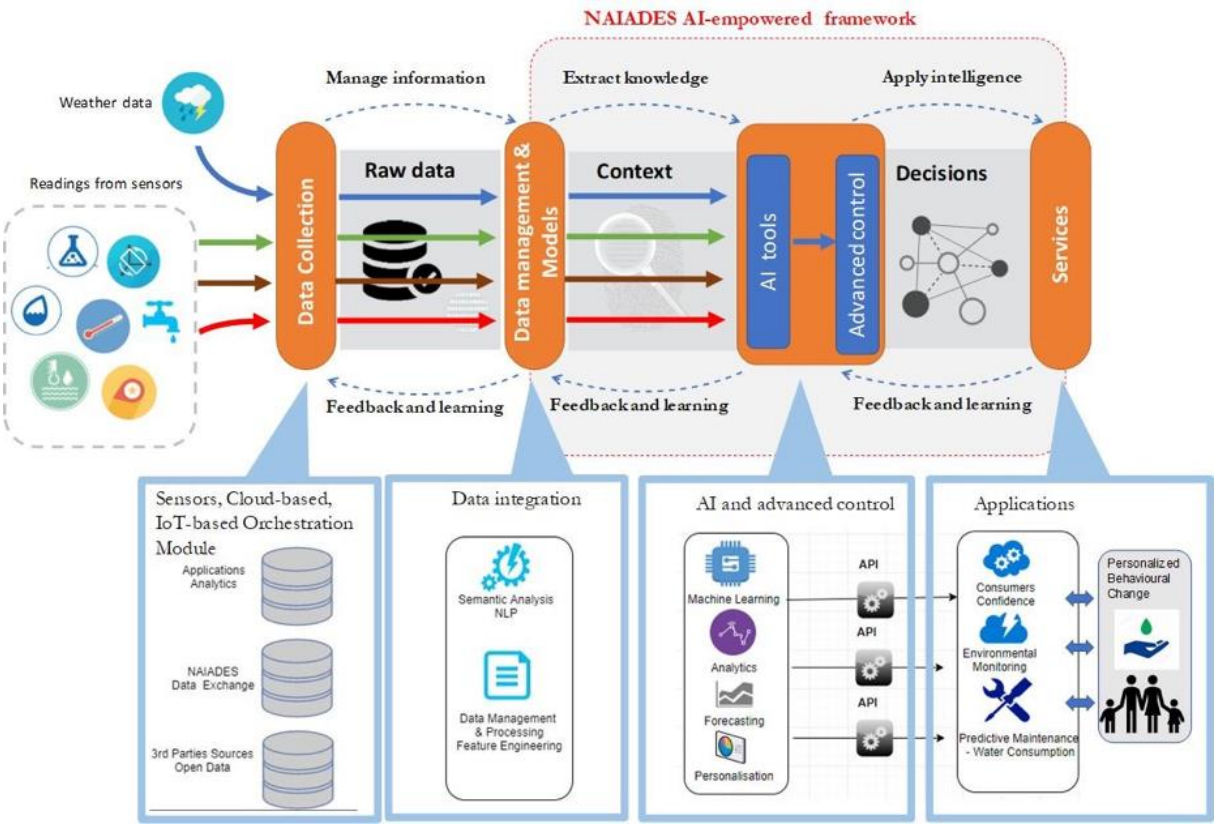

Figure 4: Intelligence Framework

NAIADES will validate the proposed technology framework through pan-European demonstrations in water management areas, cycles and value chains and use cases aiming to present the high adaptability and flexibility of the proposed solution. For that reason, several pilots will be deployed in the last part of the project. The proposed ecosystem and business framework will be validated through demonstrations in 3 areas Alicante (Spain), Brăila (Romania) and Carouge (Switzerland).

II.4. SCOREWater

SCOREWater focuses on enhancing the resilience of cities against climate change and urbanization by enabling a water smart society that fulfils SDGs 3, 6, 11, 12 and 13 and secures future ecosystem services. We introduce digital services to improve management of wastewater, stormwater and flooding events.

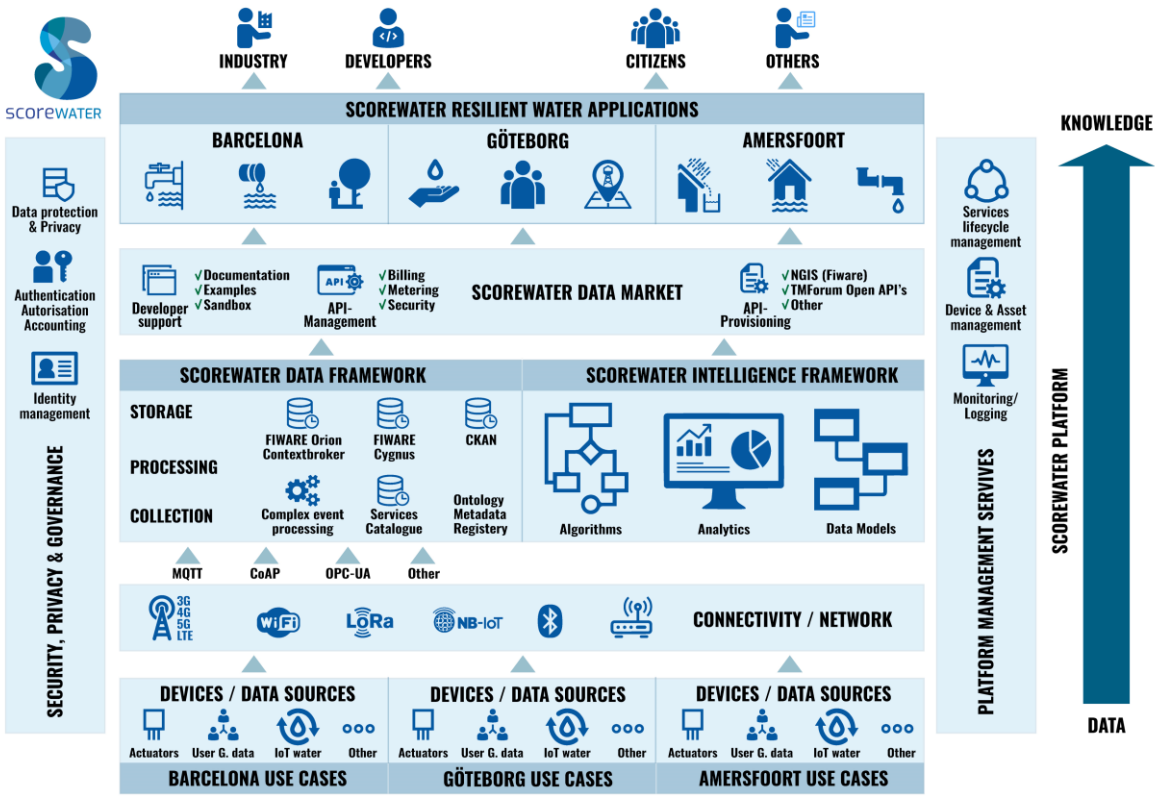

Figure 5: Concept of SCOREWater

We implement three large-scale, cross-cutting innovation demonstrators and enable transfer and upscale by providing harmonized data and services. The aims in the three cases are:

- Barcelona case is to innovate in the digitalization of water services, by demonstrating how sensing the sewer system of Barcelona can provide information at a neighbourhood scale on health status, dietary habits and waste management at households. This information will be used to: 1) reduce the discharge of antibiotics in the environment, 2) promote healthier dietary habits, and 3) prevent damaging discharges from households of wet wipes, oils and greases to the sewer system, 4) decrease sewer maintenance costs.
- Gothenburg will implement solutions to comply with the non-deterioration principle during infrastructure developments ("Weser judgement") and control of wastewater overflows according to the Urban Wastewater Directive. Raise public awareness of urban surface water quality, promote water-friendly behaviour (thus fostering a water-responsible society), and provide information about the actual effects of infrastructure projects on urban water resources.
- In Amersfoort the objective is to demonstrate how climate and flooding resilience can be achieved with the engagement of citizens and other relevant stakeholders in the co-creation, co-design and co-implementation of urban water management innovations.

SCOREwater initiates a new domain "sewage sociology" mining biomarkers of community-wide lifestyle habits from sewage. We develop new water monitoring techniques and data-adaptive storm water treatment and apply to water resource protection and legal compliance for construction projects. We enhance resilience against flooding by sensing and hydrological modelling coupled to urban water engineering. We will identify best practices for developing and using the digital services, thus addressing water stakeholders beyond the project partners. The project will also develop

technologies to increase public engagement in water management. Moreover, SCOREwater will deliver an innovation ecosystem driven by the financial savings in both maintenance and operation of water systems that are offered using the SCOREwater digital services, providing new business opportunities for water and ICT SMEs.

II.5. aqua3S

aqua3S aims at enhancing standardisation strategies in order to integrate innovative technologies and to ensure that the procedures and processes involved in water networks are both safe and secure. Towards this goal, aqua3S proposes a technical solution that is designed to offer a very effective detection system that will facilitate practitioners from the water and the medical sector, first responders and utility providers in their handling of water related crises. This system will combine novel technologies in water safety and security, and will incorporate state-of-the-art detection mechanisms towards a less fragmented and more secure water sector.

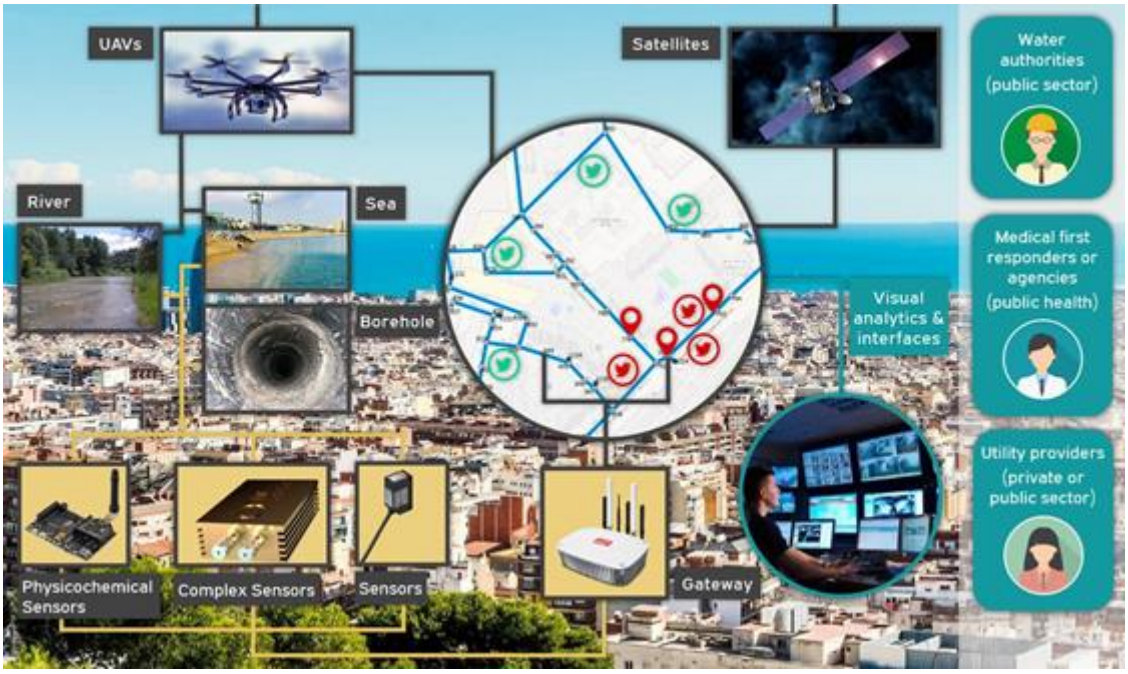

Figure 6: aqua3S Overview

The sources used for sensing water quality and safety are a combination of **newly-developed** by the project sensors that will be installed at key points of the existing water distribution network across Europe, **market sensors**, and the measurements of SCADA legacy systems of the water facilities. The data collected from the aforementioned sensors are going to be complemented by **UAV** and **satellite** imagery for the successful detection and evaluation of harmful substances in the water network. Finally, additional data is going to be collected from citizens' reports on **social media**, introducing a bottom-up approach that will also raise awareness and encourage interactive knowledge sharing. For the processing of the collected data from these sources, aqua3S will semantically enrich the information it receives from them while capitalizing on existing advanced knowledge representation and intelligent context-based reasoning solutions. This will result in the creation of a "smart" interconnection among the data produced from all the sources, the raising of alarms when anomalies are detected in terms of time and space, the real-time assessing for the crisis severity level, the forecasting of future performance of the water distribution networks under different scenarios and the modelling of the actions that should be taken in case of crises by considering past experience. All this information will be visualized either in 3D that allows inspection of the system status and temporal

variations or on top of a map as part of an intuitive and efficient interface that is covers the needs of each end user.

In order to test aqua3S' functionality and interoperability, 7 pilots are going to take place throughout the project's lifetime:

- **Italy**: focusing on transboundary pollution and the effects it may have on groundwater systems and other backup sources.
- **Greece**: focusing on a variety of unpredictable events near water sources.
- **France**: focusing on using existing DSS hydraulic functionalities for real-time water networks management.
- **Cyprus**: focusing on desalinated and treated water sources.
- **Belgium**: focusing on pollution events throughout the water distribution network.
- **Bulgaria**: focusing on monitoring and tracking water quality in reservoirs and in the water supply network.

All involved partners are of various backgrounds in order to provide their expertise on the water sector and to achieve innovative solutions both from a technical and an end-user point of view. Enhanced substance detection in water, targeted data acquisition from UAVs and earth observation, focused social media monitoring, improved algorithms for threat detection and localisation, crisis management modelling for enhance preparedness, crisis classification, decision support and standardization policies are the focal points of aqua3S' research and the impact it aspires to have on EU societies.

For more information, visit aqua3S website: https://aqua3s.eu/

III. Structure of the DigitalWater2020 (DW2020) group

III.1. Task force 0 : Management

At the outset

The starting point of the work on synergies within the four sister projects of the SC05-11-2018 cluster began at the initiative of Nico Caradot, coordinator of DWC. He invited the coordinators and managers of the four projects to a first meeting held on March 18, 2020.

The objective of that first meeting was to present each of the four projects and to start identifying the potential synergies and complementarities. The objective was also to design all together a preliminary action plan and an ad-hoc schedule.

After a short presentation of each project objectives and in the continuity of the work of synergy identification carried out during the joint kick-off meeting (June 12, 2019), 5 Task Forces were identified, as shown in figure 7 below.

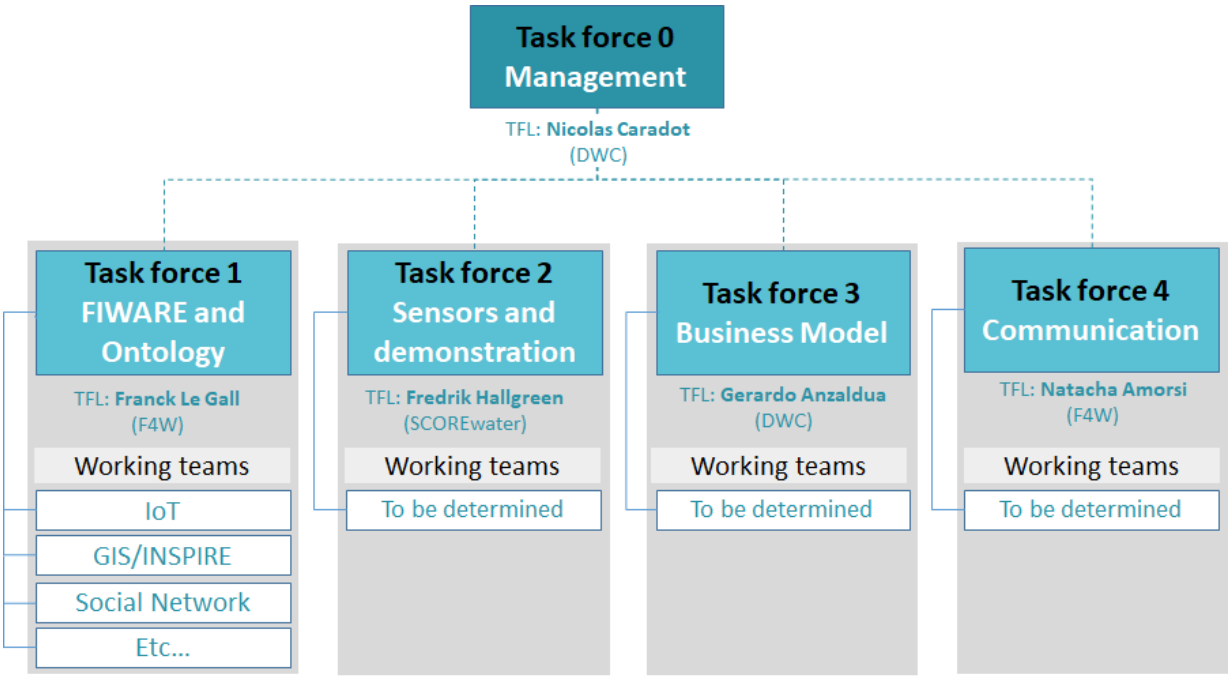

Figure 7: Organisation of the cluster SC05-11-2018 in task forces (1 general and 4 thematic)

This organization could evolve in the future if a need emerges. For the moment, DW2020 has been structured around five task forces. While Task Force 0 is the management entity of the cluster, the other four Task Forces are thematic and address four relevant topics.

- Task Force 1: FIWARE and ontology (Lead by Franck Le Gall)

FIWARE is an open source initiative defining a universal set of standards for context data management which facilitate the development of digital solutions for different domains such as Smart Cities, Smart Industry and Smart Energy. The 5 sister projects are working with the FIWARE platform: F4W is dedicated to the use of FIWARE in the water sector, while SCOREwater, NAIADES and aqua3S develop all their digital solutions FIWARE compatible. DWC aims at using FIWARE for the development of 2 digital solutions. There is a clear need to exchange best practices on the use of FIWARE for the

development of digital solutions in order to solve technical issues linked to the design and architecture of the solutions and the integration of multiple data sources into the platform.

Linked to FIWARE, all sister projects contribute to the development of specific ontologies and data model for the water sector. Here again, the sister projects see a strong benefit in collaborating to build together robust and generalized data models for the diversity of data sources. The goal is to end-up with interoperable water data models, covering the water lifecycle, easily deployable at European level using NGSI-LD protocols and FIWARE.

- Taskforce 2 Sensors and demonstration (Lead by Fredrik Hallgreen)

The sister projects have in common that they rely on the value of data and information to support decision making. Each project has an ambitious monitoring program including the development of new sensors and the deployment of real-time sensors to collect data on the behaviour on systems and infrastructures. The sister projects see a clear need in sharing best practices linked to the technical development of new sensors, the establishment of communication protocols, the validation of the measurement accuracy and the optimization of maintenance and operations. In particular, the task force will serve to ensure the replicability of the newly developed sensors in the variety of European contexts by cross-testing sensors in the sister projects or analysing the relevance, barriers and drivers of implementation of the solutions.

- Task force 3 Business plan (Lead by Gerardo Anzaldua)

The sister projects have additionally a common objective: bringing to the market innovative digital solutions and achieve their wide uptake among European utilities and municipalities. This task force is born with the objective to align the strategies of the sister projects in order to achieve this objective, increase the effectiveness of the commercial exploitation and exchange knowledge on the latest innovations on digital water business models.

- Task force 4 Communication leaded by F4W (Lead by Natacha Amorsi)

The last Task Force is crucial since it aims at improving our communication and dissemination capacities through regular collaboration with the sister projects. Each project develops independent and efficient communication channels and strategies which can be used to improve the visibility of all sister projects. This regular exchange with foster the participation to common events and exchange information to communicate on social media and publications. It will also inform on the common activities of the cluster.

Members of Task Force 0

This task force is led by Nico Caradot (coordinator of DWC). It is mainly composed of the project coordinators and managers of the cluster and of the task force leaders. When needed, some other members of the other task forces will be invited. Even if the meetings of this Task Force will be opened to all, the idea is not to have too many people assisting, in order to ensure that the meetings are effective and not time-consuming.

Objective and missions of Task Force 0

Task Force 0 is the unique general task force of DW2020, the other four being thematic. Its main objective is to manage the work done in the four thematic task forces and to ensure that the action plan is implemented.

Its missions are to:

- manage the whole task forces and decide the addition or the remove of a task force,
- ensure that the work plan is implemented,
- support thematic task force leaders in their mission,
- decide collectively the acceptance or rejection of new members,
- organise common events,
- prepare common reports, notably the deliverables about “Synergies with the SC05-11-2018 cluster”,
- work in close collaboration with EC and with the ICT4Water cluster action groups.

Action plan and work plan of task force 0

These are the first actions carried out by this task force:

- acceptance of aqua3S as the 5th sister project, because this project was not already clustered, this project has common partners with F4W and NAIADES, this project has started at the same time as the other four sister projects so the temporality is relevant and this project is willing to use FIWARE platform,
- identification of the cluster work structure (see Figure 7) and appointment of task force leaders, on a voluntary basis,
- identification of the people from the five sister projects willing to participate in the task forces
- creation of a dedicated workplace for the cluster in the cloud solution used by DWC (possibility to upload files in a folder hierarchy based on the cluster structure and possibility to work in common documents)
- decision to prepare collectively this first deliverable for DW2020.

Regular meetings will be organised on a monthly basis.

III.2. Task Force 1 : FIWARE & Ontologies

The task force #1 named “FIWARE & ontologies” is pursuing 2 objectives:

- Providing technical support for the deployment of FIWARE based solution within the projects
- To progress data models for water management though the FIWARE API (NGSI-LD)

To organise this work, a series of workshop has taken place. First, a get “know each other session” has been organised with the following agenda:

List of data sources and use cases

- digital-water.city (Nico Caradot, KWB)
- Aqua3S (Anastasia Moumtzidou, ITI)
- Naiades (George Banias, CERTH)
- FIWARE4WATER (Aitor Corchero, EURECAT)
- SCOREWater (Fredrik Hallgreen, IVL)

On-going data modelling activities

- EPANET / NGSI-LD mapping (Ahmed Abid, EGM + Elad Salomons, EAB)
- SAREF4WATER / NGSI-LD mapping (Aitor Corchero, EURECAT + Ahmed Abid, EGM)
- The SANDRE Model (Louis Crespin, OIEAU)
- Relations of interest with GIS/OGC systems/interfaces (Eleftherios Ouzounoglou, ICCS)

Collaborative tools to progress further

- FIWARE data model contribution process (FIWARE foundation)
- Potential collaboration tools (Anastasia Moumtzidou, ITI)

The purpose was for projects to show their current activity and needs. This allowed to list several areas of interest from which a survey has been circulated to identify topics of interest and build corresponding working teams and identify their priority level. Overall 34 participants raised their interest about the following topics…

- General purpose team
  - FIWARE deployment
  - General info
- Transversal data models team
  - IoT
  - GIS/ INSPIRE
  - Social network
  - Multimedia
  - Documents
  - Water management KPIs
  - Health & socio eco indicators
  - People & organisations
  - Risk Assessment & Mitigation
  - Call Centre / Complains
- Water specific data models team
  - Waste water treatment
  - Waste water collection
  - Water consumption
  - Water distribution
  - Water abstraction & treatment
  - Source ecosystems
  - Water quality

… and decision has been taken to initiate the teams related to IOT, GIS/INSPIRE, Social network, Risk assessment & mitigation, water distribution. To drive the work, several tools have been identified for shared repository (NextCloud from DWC), online chat (slack) and code repository (git). The procedure to contribute to new data models within the FIWARE community has been revised and communicated to the participants.

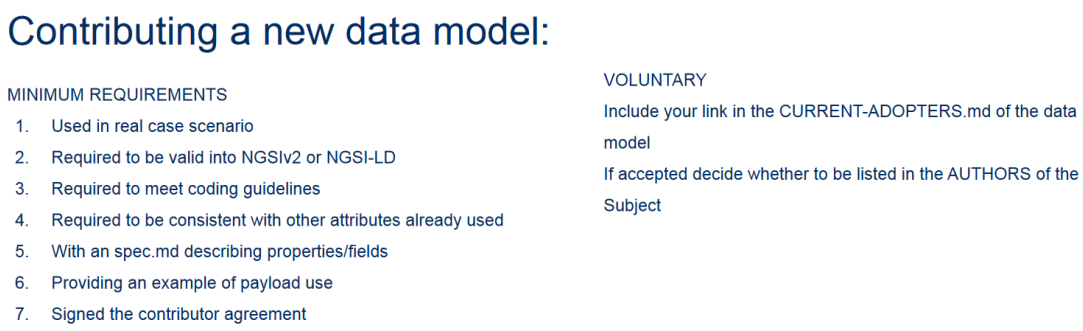

Figure 9: Overview of the contribution process to the FIWARE community

Synchronisation of the different teams is done weekly during cross project conference calls and reported by designated team leaders.

III.3. Task force 2 : Sensors and Demonstration

The driving forces for contributing to the Sensor and Demonstrator Task Force are to: avoid reinventing, sharing approaches, sharing good examples of integration, sharing software development to reduce development time, and speed up implementation time. New innovations, upscaling, potential replication and real impact are the higher goals of collaboration between our projects.

Table 1. Overview of new sensors being developed or validated in our projects. For which application we use it, what type of measurement principle uses it, expected costs for the end product and how the sensor is installed in a real environment.

Sensor	**Application**	**Technique**	**Cost (final product)**	**Installation method**
Turbinator (by IVL)	Measures turbidity and water level in stormwater wells	Contactless optical measurement	200-1 000€	Is installed under the lid in wells. Hanging down from the ring.
ALERT (by FLUIDION)	Measurement of fecal indicator bacteria in surface and wastewaters	Modified Real-Time Define Substrate Technology (rapid culture-based method)	20000-25000 € depending on options	Sliding rack (fixed to wall, pontoon, dock) or floating
T-Sensor	CSO detection	installed at CSO crest, measures CSO frequency and duration via shift in temperaure	~100 €	Installed (with screws) at the CSO crest
DTS cables	detection if illicit connections in the sewer	measures anomalies in temperature which indicate illegal connections of waste water pipes to a storm sewer	full monitoring truck: ~100k €; rental for rental: ~30k € for a 4 week monitoring campaign	Not installed, just laying in the sewer
Soil water content probes	detection of water stress	Frequency Domain Reflection (FDR) probe		Flying with a unmanned aerial vehicle (drone)
Multispectral camera	detection of water stress	acquires images in the visible and near-infrared bands		Put in soil

Table 2. Overview of our demonstration sites and what will be measured in them.

Demonstration site	Application	Sensors used
F4W-Amsterdam: 1 treatment lane in WWTP has been designated as a research lane.	The research lane has been equipped with additional sensors in order to develop and test data-driven/AI enabled control of WWTP processes.	Various sensors to measure wastewater treatment process parameters.
DWC-Paris: Measures in Seine and in Marne rivers	ALERT sensors used to measure fecal indicator bacteria in surface waters and reject waters to control bathing water quality	ALERT-System and ALERT Lab
DWC-Milan: Measure in Peschiera Borromeo WWTP	ALERT sensors used to measure fecal indicator bacteria in wastewater to support health risk management for wastewater reuse; Ground sensors and aerial sensors for water stress detection Process sensors and energy meters already used in the utility existing asset	ALERT-System and ALERT Lab Various sensors for real-time energy and carbon footprinting of integrated urban wastewater treatment and reuse system
DWC-Berlin: Measurement in the sewer system	Temperature sensors for CSO detection, Distribute Temperature Sensing (DTS) cables for tracking illicit connections, Electrical conductivity (EC) sensors for tracking illicit connections	T-sensors DTS-cables EC-sensors
DWC-Sofia: measurements in the sewer system	Temperature sensors for CSO detection	T-sensors
DWC-Copenhagen: measurements in the sewer system	water level and flow sensors in the sewer system	level and flow sensors
SCOREwater - Gothenburg	In and around a construction site to monitor pollutant entering the site, how much is added, cleaned and the released back to the system	Turbidity, flow, conductivity, pH, water level

Table 3. Synergies with voting results of which projects are interested in the different synergies.

Replicability of sensors in other cities. • Platform interoperability with IoT backends • Communication interoperablity for LoRawan • Best practises for FIWARE integration	DWC-Milan-Paris-SCOREwater
Validation of sensors in our different demonstration sites or test facilities • Sensor functionality for different applications • Practical functionality in different environments	DWC-Milan-Paris-SCOREwater
Joint paper or joint special issue in a journal	F4W-Amsterdam
Shared software development, sensor diagnostics, soft sensors	F4W-Amsterdam DWC-Milan-Paris-SCOREwater
Shared platform architecture, deployment tools and guidance for securing replicability on platform level	F4W-Amsterdam-SCOREwater
Enhance synergies in other fields as CBRN	aqua3S-NAIADES
Anomaly and pattern detection in sensor signals with high temporal and spatial resolution	DWC-Berlin-Milan

A suggestion for how to proceed is to have bi-monthly meetings in an overall group to share progress and have smaller breakout groups based on the votes in table 3.

III.4. Task force 3 : Business model

Vision, mission and goals

The vision of the Task Force on Business Models is to use the digital water trend to leverage the evolution of business processes in the European water sector. Our overarching mission is to uncover plausible pathways for the most efficient and sustainable solutions to reach the market, and to highlight the barriers that stand in between. For this, we will build upon the achievements of previous projects and initiatives, complement our efforts and align our work with that of the ICT4Water Cluster. This will help us to transit from individual achievements towards the collective impact required to achieve our vision.

Action plan and work plan

From the outside-in perspective, our collaboration will be directed at:

- Increasing the effectiveness of the commercial exploitation tasks planned in the sister projects
- Increasing the chances of uptake of digital solutions being developed in the sister projects
- Generating new knowledge on digital water business models to contribute to the efforts being undertaken across Europe on this topic

Our concrete actions will entail:

- Coordinating inputs and outputs across the sister projects
    - Creating a list of all commercial exploitation activities planned within each of the five projects

    - Reviewing the descriptions of all the activities listed and identifying potential links and complementarities between them
    - Mapping out the complementary activities in a timeline to assess the concrete possibilities for coordination and alignment
- Examining the business models of (selected) solutions from the five projects, characterizing them on the basis of a) who their target customers are; b) what value they offer to their target customers; c) how they create the value offered; d) how they generate revenue
- Activate the latent network of the five project consortia to validate the examined business models and trigger deals or fine-tuning/redesign of the previously conceived business models

The latent network represented by the five project consortia is also a microcosm of Europe's water industry. It effectively incorporates all elements of the quadruple helix model of innovation (academia, business, government and the public). In this sense, through coordinated and concerted action, our cluster has the opportunity to pilot a working model of the digital single market for water services.

Based on the actions listed above, the Task Force will draft a detailed work plan after its first meeting in June 2020.

III.5. Task force 4 : Communication

Vision, mission and goals

The vision of the task force 4 dedicated to the communication is to join forces to communicate and disseminate with shared materials and channels in order to provide a common picture of the progress and results of the 5 projects. So, the first level is to promote the DigitalWater2020 projects and promote their task forces. It is also for each project to benefit from a wider audience as the different projects target similar and complementary audiences. Finally, as for typical communication and dissemination strategy, task force 4 also envisages to complete the way out communication (from the projects to the audience) to deploy co-development of knowledge by engaging with the targeted audiences. For example, the different projects have through their life time surveys to deploy, feedbacks from stakeholders to gather. When possible, the idea is to widespread surveys to the DigitalWater2020 projects.

Action plan and work plan

The following steps are proposed to join and implement the synergies among the 5 projects with the aim of initially setting shared habits for common communication and progressively move towards common communication:

- set the working group for the Task Force communication and a planning of virtual meetings
- compare our different plans of communication and dissemination
- identify the synergies (events, workshops, channels, materials, frequency, networks) to...
- ...set the implementation plan by:
    - deciding which events, channels, materials could regularly welcome a word on the progress of DigitalWater2020 projects (ex: DigitalWater2020 project topic in each individual newsletter; share planning of events, etc.)
    - framing the content of the shared communication by identifying different themes and topics (ex: promotion of task force 1 to 3)
        - to be disseminated in each projects own network
        - envisage common communication through articles, posts written (validated) by all DigitalWater2020 projects and possibly webinars.

IV. Common events

The Group DigitalWater2020 already identified a series of digital and water-related events to present together project results and participate to common panel sessions or workshop. This list will be updated along the project

- WWC 2021 : a workshop has been accepted with the title : « Digital water: challenges and benefits for the water sector »
- ICT 2020
- IoT Week 2021: it currently discussed to have a common session on « IoT applications for the water sector».
- IFAT 2022

V. Next steps and perspectives

The clustering of the five projects digital-water.city, SCOREWater, Fiware4Water, Naiades and aqua3S all working along the general theme “Digital Water” has so far been very successful and promising. It was initiated and suggested by EASME, but it went a lot further than expected. It gave to all the chance to interact, to exchange knowledge, to cooperate for specific challenges and to help each other, by creating the DigitalWater2020 Group, organised along five Task Forces.

The Task Forces are very active, especially with activities around FIWARE (Task Force 1) and Sensors (Task Force 2). Regular teleconferences are organised and well attended, leading to interesting presentations, dialogue and knowledge exchange. These interactions are useful both for experienced members of the team, but particularly for early career researchers involved in the projects. Most of all they provide real help in solving challenges and moving forward at a faster speed, taking advantage of each other’s expertise and experiences. Task Force 3 is still at early stages, because all the five projects are in their first year, but we expect that its activities will be more relevant towards the end of all the projects.

As DW2020, we are also planning a good number of future events and participations in conferences and fairs for the coming year (Task Force 4), which we hope to be able to fulfil (if there are no any pandemic-related adverse circumstances). In any case, given that all the interactions are through teleconferences (so far), we did not experience any negative impacts because of the lockdown, nor do we expect any in the future for the “real” work of the Task Forces.

In conclusion, we understand that this was the first time that EASME adopted this “compulsory” cooperation among projects from the same call, with a common deliverable as part of the Grant Agreement. Being part of it, we believe that it was a very good idea, which has started already to have positive and useful outcomes. Additionally it brought together in cooperation, getting to know each other, people who would not have otherwise “met”, working in different projects.

We are already discussing the future of DW2020: Based on our synergies and interactions, we are building common knowledge, especially in innovative areas (e.g. FIWARE, IoT, sensors) which could be useful to others and to future projects. As the projects progress, our critical mass in specialised knowledge in specific areas of the “Digital Water” domain increases. It would be good to incorporate DW2020 to specific activities or as a specialised Working Group within the ICT4WATER cluster.