



D7.3 *Initial* Data Management Plan

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Project Consortium



Executive Summary

This deliverable D7.3 is produced in the context of Work Package 7 (WP7) which is dedicated to the actions concerning management and coordination. This deliverable is one output of Task 7.2 about data management, in the context of the **Open Research Data Pilot** which is run by the European Commission for H2020 programmes.

This deliverable is the *initial* Data Management Plan (DMP) of the Fiware4Water (F4W) project. It will be updated at mid-term (M18) and at the end of the project (M36). Its objective is to describe how the F4W project will ensure that its research data will be made **findable, accessible, interoperable and reusable (FAIR)**, when possible.

The guiding principles for providing **open access to research data** are explained and the scope of application in the context of the F4W project is given.

In this initial version of the F4W DMP, each partner has been requested to anticipate the datasets which will be produced in each task of each work package (WP) during the whole life of the project. In the two other versions, this first list of presumed datasets will be updated and a table per completed dataset will be added, on a regular basis.

Related Deliverables

Three versions of the Data Management Plan will be produced:

- D7.3 – Initial Data Management Plan (M6)
- D7.3 – Detailed Data Management Plan (M18)
- D7.3 – Final Reviewed Data Management Plan (M36)

Moreover the specific case of Personal Data Management has been covered in the following two deliverables, in the context of WP8 about Ethics Requirements:

- D8.2 – POPD – Requirement No.2
- D8.4 – H – POPD – Requirement No.4

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V1	14/11/19	WP leaders: Martin Wagner (DVGW-TZW), Fernando Lopez (FF), Xavier Domingo (EUT), Christos Makropoulos (KWR and NTUA), Richard Elelman (EUT), Natacha Amorsi (OIEau), Angeles Tejado (FF)	Inputs by WP leaders who collected all the presumed datasets per tasks.
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List of Acronyms/Glossary

API	Application Programming Interfaces
DMP	Data Management Plan
DOI	Digital Object Identifier
DPO	Data Protection Officer
EC	European Commission
ETSI	European Telecommunications Standards Institute
F4W	Fiware4Water project
FAIR	Findable, Accessible, Interoperable and Reusable
IoT	Internet of Things
IPR	Intellectual Property Rights
ORCID	Open Researcher and Contributor ID
ORDP	Open Research Data Pilot
SmartM2M	Smart Machine-to-Machine Communications
WP	Work Package

Introduction

The purpose of this deliverable D7.3 is to describe the data management life cycle for the data to be collected, processed and/or generated by the F4W project. This **Data Management plan** is an **initial version**, delivered at M7 as advocated by the European Commission (EC). It will be updated in time with the interim report (M18) and at the end of the project, in time with the final review (M36). Moreover, it will also be updated over the course of the project if significant changes arise (such as changes in consortium composition).

Such a DMP is one of the two main pillars of the **Open Research Data Pilot (ORDP)** of the EC, the second being to provide open access to research data if possible. The ORDP aims at improving and maximising access to and reuse of data generated by H2020 projects. The objective is hence to make research data **findable, accessible, interoperable and reusable (FAIR)**.

F4W is part of the ORDP, which implies that the F4W consortium will do its best to:

- Develop (and update) a Data Management Plan (DMP);
- Deposit the data produced in a research data repository;
- Ensure that these data are FAIR for third parties;
- Provide related information about the raw data used to validate F4W research (metadata).

This DMP has been developed on the basis of the official template for H2020 projects, provided by the EC (available on the tool DMPonline at <https://dmponline.dcc.ac.uk/>).

I. Implications of being part of the ORDP

The ORDP aims at increasing openness and transparency of research results for the benefits of scientists but also ultimately of society and citizens. Being part of it implies to develop and update regularly a DMP (as explained in section I.1) and to ensure open access to research data and make these data FAIR (as respectively detailed in section I.2 and part III).

I.1. DMP, a living document

It was stated in the Grant Agreement that the Data Management Plan (DMP) will be updated every 6 months. The F4W-General Assembly has decided to rather update it on a more regular basis, in direct link with the work flow of the project, meaning: each time that a task is finished.

That way, the DMP will be updated continuously, each time that a dataset will be produced. This choice has been made to maximise the reusability of the scientific research data.

It is planned to prepare three versions of the Data Management Plan, as advised in “H2020 Programme, Guidelines on FAIR Data Management in Horizon 2020”, version 3.0, 26 July 2016:

- D7.3 – Initial Data Management Plan (M6)
- D7.3 – Detailed Data Management Plan (M18)
- D7.3 – Final Reviewed Data Management Plan (M36)

The present DMP is the **initial version** and is i) detailing all the datasets that the F4W partners plan to produce, ii) explaining the metadata that will be provided with each completed dataset and iii) answering as much as possible all the questions asked in the official DMP template ([1]).

I.2. Open access to research data

As specified by EC ([7]), **open access** is defined as the practice of on-line access to scientific information that is free of charge to the end-user. In the context of R&D, '**scientific information**' refers to peer-reviewed scientific research articles (published in academic journals) and also to scientific research data (data underlying publications, curated data and/or raw data).

In the context of F4W, several partners are academics and it is a research, innovation and demonstration project. It was hence announced in the Grant Agreement that at least 6 scientific articles will be written.

All the partners willing to publish their results will be encouraged to:

- Seek first protection using Intellectual Property Rights (IPR),
- Obtain the prior consent of the co-owners of the results (following the rules set out in the F4W consortium agreement),
- Once published: provide the article, the data underlying this publication and the related metadata (see Annexes 1 and 2) to the coordinator, who will upload them on the chosen public repository,
- Choose between the two ways to give open access to their publication:
 - Self-archiving (also called **Green open access**): the published article is archived by the researcher in an online repository; access to this article is often – but not necessarily – delayed ('embargo period') as some scientific publishers may wish to recoup their investment by selling subscriptions and charging pay-per-download;
 - Open access publishing (also called **Gold open access**): the article is immediately provided in open access mode by the scientific publisher; the associated costs are shifted away from readers, and instead to the organisation to which the researcher is affiliated, or to the funding agency supporting the research.

Within the F4W project, the research data repository chosen is ZENODO (<http://zenodo.org>). A community has been created for the project. It is called « Fiware4Water Project » <https://zenodo.org/communities/?p=Fiware4Water+Project>.



In this repository will be uploaded in a regular basis : the scientific articles and the data underlying these publications, the datasets described in this DMP and some additional information about the project, such as public deliverables, leaflets and power point presentations.

I.3. Type of data concerned by open access

Participants in the ORDP must comply with the legal requirements as outlined in Article 29.3 of the Grant Agreement (page 48) about 'Open access to research data'.

'Regarding the digital research data generated in the action ('data'), the beneficiaries must:

- a) deposit in a research data repository and take measures to make it possible for third parties to access, mine, exploit, reproduce and disseminate — free of charge for any user — the following:*
- (i) the data, including associated metadata, needed to validate the results presented in scientific publications as soon as possible;*
 - (ii) other data, including associated metadata, as specified and within the deadlines laid down in the 'data management plan'*

b) provide information — via the repository — about tools and instruments at the disposal of the beneficiaries and necessary for validating the results (and — where possible — provide the tools and instruments themselves).

This does not change the obligation to protect results in Article 27, the confidentiality obligations in Article 36, the security obligations in Article 37 or the obligations to protect personal data in Article 39, all of which still apply. As an exception, the beneficiaries do not have to ensure open access to specific parts of their research data if the achievement of the action's main objective, as described in the project Description of Action, would be jeopardised by making those specific parts of the research data openly accessible. In this case, the data management plan must contain the reasons for not giving access'.

The ORDP hence applies primarily to the **data needed to validate the results presented in scientific publications**. F4W partners will be encouraged to provide open access to other data on a voluntary basis if it is not sensitive or subject to protection, but this is not a requirement under the ORDP.

II. Data Summary

II.1. Description of the project

The main objective of F4W is to link the water sector to the open-source and free of charge online platform “FIWARE” by demonstrating its capabilities and the specific potential of its interoperable and standardised interfaces for both water sector end-users while **creating the Fiware4Water ecosystem**, demonstrating its technical, social and business innovative potential.

F4W is structured into 7 work packages:

- WP1: F4W User Requirements
- WP2: Architecture/Data/Ontology/API/Legacy links/ Standards
- WP3: Smart Applications and Devices
- WP4: Demonstrating F4W in the Real (Water) World
- WP5: Socio-political impact, end-user engagement and economic consequences of F4W
- WP6: Ecosystem building for communication and dissemination strategies and activities
- WP7: Coordination and project management

To ensure all F4W results and outcomes are demand driven and accessible by stakeholders, **WP1** aims to identify (use cases, end-users and innovation) requirements for F4W to be an open platform for the water sector. This includes the possibility for water utilities, third parties and end-users to use FIWARE for their specific needs. WP1 results will be gathered in a gap analysis and final requirements report that will constitute the foundation high value knowledge for other WPs.

The second pillar to ensure the interoperability and standardisation of the F4W platform is the design and development of a Reference Architecture (**WP2**). The support design requirements for the water domain will benefit from data semantics work and be embedded in a sustainable approach allowing the full integration of partners' legacy system.

Once the requirements are fully understood to bridge the physical and digital water world, and the interoperability and standardisation issues solved, then the prototype development of FIWARE-enabled Smart Applications and Smart Devices to the water sector will be undertaken by **WP3**.

Such analytical and tools will address the different water cycle stages to be tested and demonstrated through dedicated Demo Cases (**WP4**). Each of the 4 Demo Case of WP4 reflects a specific water cycle issue under different types of climate throughout Europe: (i) raw water supply in Greece (ii) water

distribution in France (iv) Waste water treatment in Netherlands and (iv) smart service for customers in England.

WP5 will study and test the socio-political impacts, end-user engagement and economic consequences of F4W. The first two will be specifically addressed in the three F4W Demo Networks focussing on citizen engagement in sustainable urban strategies and municipal relations. A full range of activities will tackle the Eastern part of Europe to raise awareness and support the deployment of smart water solutions. The economic consequences of F4W will be explored and detailed in an exploitation plan built on the Business Model Canvas method.

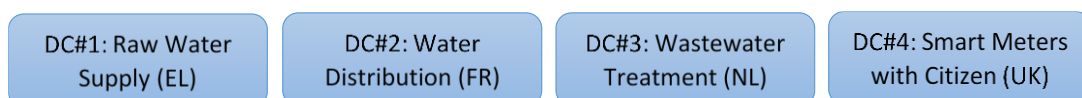
All communication and dissemination activities are deployed in **WP6** to engage with water utilities, cities, River Basin Organisations, SMEs (i.e. developers and equipment suppliers), industrials and citizen. WP6 will start by setting F4W communication and dissemination strategy plan towards water smart solutions for a water smart society. The other objective of WP6 is to concretely participate to the ecosystem building to specifically target developers, SMEs, industrials uses.

Finally, F4W coordination and management aims at ensuring that the tasks and outcomes are carried out according to time schedule, budget and resources. **WP7** will provide the financial, legal and administrative support during the all duration of the project as well as the governance procedure and tools and related monitoring and risk management.

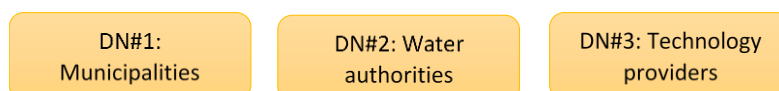
F4W follows a two-tier approach:

F4W will evaluate the performance and demonstrate at large scale the technical feasibility of FIWARE as the flexible digital solution of choice for the water sector and the whole value chain of water in several diverse, demanding real world situations, covering a wide range of water challenges and contexts. To reach this objective, F4W adopts a realistic, high impact strategy in its demonstration and engagement plan through a two-tier approach:

- In **Tier 1**, F4W will demonstrate specific Smart Applications and Smart Devices across the entire water cycle in **four large scale demo cases** throughout Europe. Tier 1 activities are undertaken mostly in WP3 and WP4



- In **Tier 2**, F4W will engage a wide audience of water stakeholders via **three demo networks**, in understanding, developing and adopting FIWARE-enabled water applications using consensus building, including the application and/or close observation of the ConCensus methodology, demonstrations and competitions (termed 'challenges') through partner-run European & Global networks. Tier 2 activities are undertaken mostly in WP5 and WP6.



II.2. Description of the data

F4W will generate and collect diverse data outputs, including data on 1) citizen awareness and engagement, 2) water quality, 3) water quantity, 4) multiparameter sensors performance, 5) wastewater treatment, 6) water demand forecast and 7) validation of innovative APIs end IoT devices. More detailed information about the datasets which will be produced during the project is given in Table 1 below.

Table 1: Listing and short description of the datasets that F4W consortium expect to produce during the F4W activities

Name of the data	Short description	Owner	Origin (How data were obtained?)	Type of data	Format used	Expected size (if known)	Tools needed to use the raw data ¹	Data Utility ²	Type of Access: open or restricted	If restricted, explain why	Specific repository ³
WP1 – Task 1.1 Requirements from the Demo Cases											
Standardized user stories and use cases	In the context of gathering the requirements within all Demo Cases, a set of user stories and use cases are collected in a standardized way	All the partners	Interviews and collaboration between water utilities and research partners	Tables	Excel	Several KB	Microsoft Excel		Restricted	Results are published in Deliverable D1.1	No
WP1 – Task 1.2 Requirements from the end-users											
Results of survey	The results contain the responses from a questionnaire about “Interaction and Functionalities with System related to the water sector”	TZW	Online-Survey platform “Survey Monkey”	Tables containing responses to several questions	Excel	Several KB	Microsoft Excel		Restricted	Results are published in Deliverable D1.2	No
WP1 – Task 1.3 Requirements for Innovation											
Results of survey	The results contain the responses from a questionnaire about “Open Source Applications and Data Sharing”	TZW	Online-Survey platform “Survey Monkey”	Tables containing responses to several questions	Excel	Several KB	Microsoft Excel		Restricted	Results are published in Deliverable D1.3	No
WP2 – Task 2.1 Legacy-compatible and cyber structure Fiware4Water Reference Architecture											
Fiware4Water Reference Architecture	Architectural description of the FIWARE Architecture applied to the Smart Water sector	All the partners	Analysis of Water Sector requirements in order to create the proper architecture of the project	Image	PNG	Several MBs	Any picture or browser viewer with PNG file format support	Anyone interested to see or use the F4W Reference Architecture	Open to get the picture		No

¹ (methods or software tools needed)

² (For whom could these data be useful, outside the Project consortium?)

³ (Does your organisation use a specific repository for data? if yes, which one?)

Name of the data	Short description	Owner	Origin (How data were obtained?)	Type of data	Format used	Expected size (if known)	Tools needed to use the raw data	Data Utility	Type of Access: open or restricted	If restricted, explain why	Specific repository
WP2 – Task 2.2 Big data processing and AI FIWARE GEs for Water Management											
FIWARE Storm connector	NGSI-LD connector between Orion-LD / Scorpio (NGSI-LD) and Apache Storm	EGM, All partners	Development activities inside the WP2 to be translated to the FIWARE Community	Code	text	Several KBs	Git and some IDE or text editor to see the code	Connector developed to send the Context Information to the Apache Storm	Open Source project inside GitHub		TBC
FIWARE Hadoop connector	NGSI-LD connector between Orion-LD / Scorpio (NGSI-LD) and Apache Hadoop	EGM, All partners	Development activities inside the WP2 to be translated to the FIWARE Community	Code	text	Several KBs	Git and some IDE or text editor to see the code	Connector developed to send the Context Information to the Apache Hadoop	Open Source project inside GitHub		TBC
FIWARE Flink connector	NGSI-LD connector between Orion-LD / Scorpio (NGSI-LD) and Apache Flink	EGM, All partners	Development activities inside the WP2 to be translated to the FIWARE Community	Code	text	Several KBs	Git and some IDE or text editor to see the code	Connector developed to send the Context Information to the Apache Flink	Open Source project inside GitHub		TBC
FIWARE Spark connector	NGSI-LD connector between Orion-LD / Scorpio (NGSI-LD) and Apache Spark	EGM, All partners	Development activities inside the WP2 to be translated to the FIWARE Community	Code	text	Several KBs	Git and some IDE or text editor to see the code	Connector developed to send the Context Information to the Apache Spark	Open Source project inside GitHub		TBC
TensorFlow integration schema	Library to extract the information of NGSI-LD to be processed with the algorithms provided by TensorFlow	EUT, All partners	Development activities inside the WP2 to be translated to the FIWARE Community	Code	text	Several KBs	Git and some IDE or text editor to see the code	Library developed to extract the Context Information relevant data to allow the automatic analysis of data by Tensorflow Open Source software library	Open Source inside GitHub		TBC

Name of the data	Short description	Owner	Origin (How data were obtained?)	Type of data	Format used	Expected size (if known)	Tools needed to use the raw data	Data Utility	Type of Access: open or restricted	If restricted, explain why	Specific repository
WP2 – Task 2.3 Common information models for Water Management											
Water Common Information TMForum Data Models	Standard representation of the data models to be used in Water Sector	All partners	Collaboration activity inside the WP2 together with the joint collaboration unit between TMForum and ETSI ISG CIM units	Text document	text	Several KBs	Git and some IDE or text editor to see the code	Reuse of standards	Public (GitHub)		Official accepted data models are in repository: https://github.com/smart-data-models Work-in-progress data models are maintained in: https://github.com/FIWARE/data-models
ETSI SmartM2M SAREF Water Ontologies	Standard representation of the Water Ontology used in Water Sector	All partners	Collaboration activity inside the WP2 together with ETSI SmartM2M SAREF and ICT4Water cluster	Text document	PDF, DOCX	Several MBs	PDF Viewer and Word Document Viewer	Reuse of standards	Restricted	Need to have an ETSI account to download the documents	The official version is maintained in ETSI.
ETSI ISG CIM NGSI-LD standard	Standard definition of the Context Information Model with Linked Data	All partners	Collaboration activity inside the WP2 together with ETSI ISG CIM to provide an extension of the specification if it is needed in the development of the project	Text document	PDF, DOCX	Several MBs	PDF Viewer and Word Document Viewer	Reuse of standards	Restricted	Need to have an ETSI account to download the documents	The official version is maintained in ETSI.

Name of the data	Short description	Owner	Origin (How data were obtained?)	Type of data	Format used	Expected size (if known)	Tools needed to use the raw data	Data Utility	Type of Access: open or restricted	If restricted, explain why	Specific repository
WP3 – Task 3.1 Smart Applications for Raw Water Supply											
Water quantity routing application	What-if hydraulic scenario assessment for optimal water conveyance using real time data	NTUA, All partners	Development of the system or software	Code	Text	Several MB	Git and some IDE or text editor to see the code	Replicability to other locations with similar needs	Open Source project (Tbc)		To be determined (i.e. GitHub)
Real time water quality early warning application	Provides warning of high turbidity water in raw water supply aqueducts before it reaches the treatment plant	NTUA, All partners	Development of the system or software	Code	Text	Several MB	Git and some IDE or text editor to see the code	Replicability to other locations with similar needs	Open Source project (Tbc)		To be determined (i.e. GitHub)
WP3 – Task 3.2 Smart Applications for Water Distribution											
Water demand forecast model	Focuses on predicting near-future demand behaviour and market trend	EURECAT, All partners	Development of the system or software	Code	Text	Several MB	Git and some IDE or text editor to see the code	Replicability to other locations with similar needs	Open Source project (Tbc)		To be determined (i.e. GitHub)
Leakage detection and mitigation tool	Aimed at detecting, locating and proposing mitigation actions to leakage	UNEXE, EURECAT, All partners	Development of the system or software	Code	Text	Several MB	Git and some IDE or text editor to see the code	Replicability to other locations with similar needs	Open Source project (Tbc)		To be determined (i.e. GitHub)
Predictive maintenance tool	Provides long-term forecasts of system malfunctions, and a workforce tool to optimally assign and schedule operator's tasks according to maintenance operations to be performed	EURECAT, All partners	Development of the system or software	Code	Text	Several MB	Git and some IDE or text editor to see the code	Replicability to other locations with similar needs	Open Source project (Tbc)		To be determined (i.e. GitHub)
Early detection of water contamination	Provides early detection of water contamination in water distribution networks	TZW, All partners	Development of the system or software	Code	Text	Several MB	Git and some IDE or text editor to see the code	Replicability to other locations with similar needs	Open Source project (Tbc)		To be determined (i.e. GitHub)

Name of the data	Short description	Owner	Origin (How data were obtained?)	Type of data	Format used	Expected size (if known)	Tools needed to use the raw data	Data Utility	Type of Access: open or restricted	If restricted, explain why	Specific repository
WP3 – Task 3.3 Smart Applications for Waste Water Treatment											
Waste Water treatment operation optimiser	Aimed at reducing greenhouse gas emissions and energy use	KWR, EURECAT, All partners	Development of the system or software	Code	Text	Several MB	Git and some IDE or text editor to see the code	Replicability to other locations with similar needs	Open Source project (Tbc)		To be determined (i.e. GitHub)
WP3 – Task 3.4 Smart Applications for Customers											
Services for customers and water companies	Aimed at elaborating a homogenised and intuitive visualization environment to offer the different services and tools to water companies and customers, using smart meters	UNEXE, All partners	Development of the system or software	Code	Text	Several MB	Git and some IDE or text editor to see the code	Replicability to other locations with similar needs	Open Source project (Tbc)		To be determined (i.e. GitHub)
WP3 – Task 3.5 Smart Applications for Customers											
Real time data from sensors deployed in FIWARE4WATER	Includes real time and time series data coming from installed sensors on each demo case	The corresponding utility	In-situ measurements collected using IoT architecture or equivalent. Depending on the source	Time series of sensors values	Variable: databases, Excel, CSV...	Hundreds of MB to some TB	FIWARE architecture Data Science oriented programming languages and scripts such as python or R	Sample time series in different demo cases can be used to train future models to provide (i.e.) decision support	Open		To be determined (i.e. zenodo)
WP3 – Task 3.1, Task 3.2, Task 3.3, and Task 3.4 common produced/used data											
Historical data from utility databases	Includes real time and time series data coming from legacy sensors on each demo case	The corresponding utility	In-situ measurements collected using IoT architecture or equivalent. Depending on the source	Time series of sensors values	Variable: databases, Excel, CSV...	Hundreds of MB to some TB	FIWARE architecture Data Science oriented programming languages and scripts such as python or R	Sample time series in different demo cases can be used to train future models to provide (i.e.) decision support	Restricted	Info on from legacy sensors is property of the utility	To be determined (databases, etc.)

Name of the data	Short description	Owner	Origin (How data were obtained?)	Type of data	Format used	Expected size (if known)	Tools needed to use the raw data	Data Utility	Type of Access: open or restricted	If restricted, explain why	Specific repository
Topology and internal characteristics of the systems	Location of sensors, diameter and length of pipes, etc.	The corresponding utility	Technical description	Document	PDF, DOCX	Some MB	PDF/DOCX Reader	Understanding different topologies and systems deployment in utilities	Restricted	Info of topology is property of the utility	Company's document management software
Information from utilities on the current operating conditions of the system	Rules and specifications of current operating systems	The corresponding utility	Technical description	Document	PDF, DOCX	Some MB	PDF/DOCX Reader	Understanding different operation strategies in utilities	Restricted	Info of operation strategies is property of the utility	Company's document management software
Technical specification of the legacy sensors	Data Sheet for each sensor, with technical specifications	The corresponding utility	Technical description	Document	PDF, DOCX	Some MB	PDF/DOCX Reader	General knowledge of available sensors	Restricted	Info of deployed sensors is property of the utility	Company's document management software
WP4 – Demonstrating Fiware4Water in the real (Water)world											
Regarding WP4, all the information needed has been already provided for WP3 as essentially, these two work packages are stepping forward together. Of course, during the particular WP4 activities, more specific datasets will be produced and used and this DMP will be updated accordingly.											
WP5 – Task 5.1 Socio-political Engagement I: A study of the current public perception of digital water											
Contact information of interviewees answering the survey for the completion of T5.1 and D5.1	List of contact details of participants in the undertaken survey located in Jerusalem (IL), Great Torrington (UK) and different locations in Romania, Hungary, Moldavia, Slovenia, Bulgaria and Croatia.	EUT, BDG and SWW	List collated by EUT, BDG and SWW of the responders of the survey. All responders have signed the Agreement to Participate and all answers have anonymised.	Names and E-mail addresses	Excel	60KB	PDF/DOCX Reader	None	Restricted	Personal contact details of responders. Only required for further internal project comm.	Company's document management software

Name of the data	Short description	Owner	Origin (How data were obtained?)	Type of data	Format used	Expected size (if known)	Tools needed to use the raw data	Data Utility	Type of Access: open or restricted	If restricted, explain why	Specific repository
Anonymised answers to Questionnaire specifically created for T5.1	Answers to Questionnaire described and analysed in D5.1	All members of WP5	Anonymised Information provided by responders to questionnaire distributed by EUT, SWW and BDG	Anonymised opinions about water as a global issue, the use of open source enabling technology in water management and their feelings concerning the services provided to them for their water supply.	Word/ PDF	2MB	PDF/DOCX Reader	Understanding public opinion in three locations regarding the issues addressed	Open	N/A	Company's document management software
WP5 – Task 5.2 Socio-political Engagement II: The Council of Citizen Engagement in Sustainable Urban Strategies in Pilot and Follower Cities											
Contact info of third-party participants in the Council of Citizen Engagement in Sustainable Urban Strategies (ConCensus)	List of contact details of participants in the implementation of ConCensus in the SWW region, further F4W sites, at least 3 Eastern EU Cities and Follower Cities who decide to participate in the initiative.	SWW, EUT, BDG, UNEXE	Info supplied by volunteer participants who will have previously signed an Agreement to Participate which states the GDPR employed.	Names and E-mail addresses	EXCEL	1MB	PDF/DOCX Reader	None	Restricted	Personal contact details of volunteer participants. Only required for internal project coord.	Company's document management software
WP5 – Task 5.3 Socio-political Engagement III: Follower cities and Supranational-Municipal relations											
Contact information of third-party participants in Project activities from Follower Cities and local and supranational organisations.	List of contact details of participants in the implementation of T5.3.	All partners of WP5	Info. supplied by volunteer participants who will have previously signed an Agreement to Participate which states the GDPR employed.	Names and E-mail addresses	EXCEL	1MB	PDF/DOCX Reader	None	Restricted	Personal contact details of volunteer participants. Only required for internal project coord.	Company's document management software
WP5 – Task 5.4 Fiware4Water Economic Impact and Exploitation Plan											
Value proposition canvas	Description of characteristics F4W potential outcomes to become exploitable services or products	Lead partner: OIEau	Projects results/ surveys/ desk analysis	Text, figures	report			Restricted to partners	confidential	Potential market opportunities development	zenodo

Name of the data	Short description	Owner	Origin (How data were obtained?)	Type of data	Format used	Expected size (if known)	Tools needed to use the raw data	Data Utility	Type of Access: open or restricted	If restricted, explain why	Specific repository
Business model	Description of the business potential of each F4W products and services identified as marketable.	Lead partner: OIEau	Market study	Text, financials assets, figure	report			Restricted to partners	confidential	Potential market opportunities development	zenodo
WP6 – Task 6.1 Communication and dissemination of project outcomes (this task produces information more than data)											
F4W website	On line presentation of the consortium, projects progress, events, etc.	Partners involved	Demo Cases, Demo Network, articles, presentations to events, etc.	TOC, N2O, volumes, flows, web articles	Web links			Water utilities, SMEs (developers, equipment suppliers) , River basin org., industrials, academia, citizen & consumers	public		zenodo
Template for presentation	Ppt presentation, banners, flyers to provide clear information on the project at one instant	Lead partner: OIEau	From the progress & results of the project	text	Ppt, Id, pdf				public		zenodo
E-newsletter	To communicate on the project progress	Lead partner: OIEau	From the progress & results of the project	text	Id, pdf				public		zenodo
E-Book	On line presentation of the tools and services developed by F4W - To be further detailed.	Lead partner: OIEau	From the results of the project	text	Id, pdf				public		zenodo
Social Innovation Factsheet	Description of F4W innovations covering the technical and non-technical dimensions	Lead partner: OIEau	From the results of the project	text	Id, pdf				public		zenodo

Name of the data	Short description	Owner	Origin (How data were obtained?)	Type of data	Format used	Expected size (if known)	Tools needed to use the raw data	Data Utility	Type of Access: open or restricted	If restricted, explain why	Specific repository
WP6 – Task 6.2 Communication and dissemination of project outcomes (this task produces information more than data)											
Challenges' applicants	Registrations to FIWARE4Water Challenges, acceptance of the regulation and the privacy policy, information materials made available to the participants, names of the winners, the name of the project, its purpose and description, together with extracts or images of the final product.	FF, all partners	Google form, Fundingbox, ...	-descriptive text + a file (max 10MB) with a clear description (text and graphic) of the architecture of the participant solution - link to a demo of the solution (demo/prototype, video, mock-up ...) - plan for the final development and deployment of the solution.	Excel (xlsx)	Several KBs	Excel Document Viewer (e.g. Microsoft Excel, Google Sheet, OpenOffice or LibreOffice)	Utilities, DIHs, ...	Restricted	GDPR (we are gathering personal data + corporate data, etc...)	Google Business Account (FIWARE Foundation)

III. FAIR Data

III.1. The FAIR Guiding Principles

According to Wilkinson *et al.* (2016), these are the general principles to apply to ensure that our research data are FAIR (Figure 1).



Figure 1: The FAIR Guiding Principles

These principles are not themselves a standard, but rather a guide to data producers. The objective is to reach FAIRness of datas which is a prerequisite for proper data management.

It is important to highlight that the accessibility to data produced during F4W activities must respect the rules set out in the Consortium Agreement on data ownership and its use by other parties. Moreover, the **protection of IPR** and **commercial confidentiality**, in order to achieve effective market replication and exploitation of F4W outputs, should led to a restricted access to some data.

In the following sections, we will explain how F4W consortium is going to ensure these FAIR principles concerning the data used and produced during F4W research activities, while respecting the rules and addressing the constraints above mentioned.

III.2. Making data findable, including provisions for matadata

Intellectual property rights (IPR) management in F4W project is primordial and is part of its data management plan. For each dataset, it will hence be specified who the owner is and how other users can reuse both the data collected, assembled or generated.

Data discoverability (and metadata provision)

After generating a dataset, which could be useful for other scientific research or the Society, partners will be required to list and to describe it in order to feed the F4W Data Management Plan. Metadata about each dataset completed will be collected by the Coordinator through an online survey allowing to gather in a single operation both the metadata necessary to deposit the dataset into Zenodo (see annex 2) and the metadata needed to update F4W DMP (see annex 1). Moreover, many datasets will also be published into the F4W website (<https://fiware4water.eu/>), that will increase the discoverability of the data used and/or produced by F4W.

Data identifiability

As already explained, all the datasets produced during the F4W project will be uploaded both in the F4W website and/or in Zenodo, as they are created. This will ensure a sustainable archiving of the final research datasets and publications produced.

Zenodo has been built and developed by researchers, in the context of the **OpenAIRE project**. One of its main advantage is to support the EC Open Data policy by providing a catchall repository for EC funded research. Moreover, it automatically assigns a DOI with the data archiving tool Zenodo.

Naming conventions

Within F4W project, the following naming convention will be used for datasets:

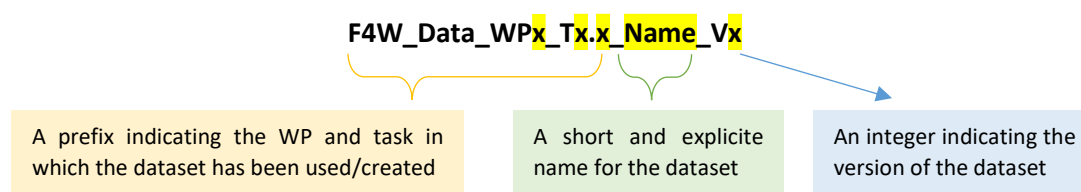


Figure 2: Naming convention for F4W datasets

The above information will also be used as a unique code for the dataset. Additional metadata such as the data provider and the creation date will be associated with the code and uploaded on the repository.

Search keywords for re-use optimization

Zenodo creates automatically searching keywords by analysing the metadata info provided during the upload (Annex 2). It is therefore crucial that each partner owning a dataset and filling in the metadata survey takes a special care to provide several keywords to describe his dataset, in order also to ease data discoverability.

Data clear versioning

Zenodo repository standardization ensures that data is stored under specific structure to be easily identified in a historical basis. Moreover, a parameter “Version” is requested to upload a dataset in Zenodo. Even if it is optional, partners will be encouraged to fill in it, especially for software. Finally, the unique DOI registered for each dataset uploaded definitely ensure a clear data versioning.

Metadata creation standards

Metadata standards are required to i) establish a common understanding of the meaning of the data, and ii) ensure correct and proper use and interpretation of the data by its owners and users.

For F4W data, metadata required will be collected by the Coordinator thanks to an online survey to ease the process of gathering metadata both to upload on Zenodo and/or to feed the DMP of the project (see Annexes 1 and 2).

III.3. Making data openly accessible

Data availability

In order to maximise the impact of F4W data, the project will facilitate sharing of results and deliverables within and beyond the consortium. Selected data and results will be shared with the scientific community and other stakeholders through publications in scientific journals and presentations at conferences, as well as through the open access to these data via the open Zenodo repository and/or the project website. As often as possible, and following the project policy concerning the IPR and open access, themselves directly linked to the rules enacted in the Grant Agreement and in the Consortium Agreement, the partners will be encouraged to give open access to the research data.

Data access methods and tools

If a specific tool is needed to access/read/use the data put in a dataset, the partner owning this dataset will be requested to indicate it in the metadata table which will accompany each dataset (Annex 1).

Access to restricted data

In some cases, the owner of the research data could decide to give a restricted access to the data. These are the main reason explaining this decision:

- Commercial sensitivity of datasets
- Data confidentiality for security reasons
- Conflicts between open-access rules and national and European legislation (e.g. data protection regulations).
- Sharing data would jeopardise the aims of the project
- Other legitimate reasons

Each time a data owner would like to opt for a restricted access to the dataset, he will be asked to explain why.

In such a case, a scientific who would see the dataset in Zenodo and who would be interested in having access to it, will have the possibility to contact the main author and motivate his request of access to the data.

III.4. Making data interoperable

According to Wilkinson *et al.* (2016), interoperability is defined as the ability of data or tools from non-cooperating resources to integrate or work together with minimal effort.

Interoperability of data to specific quality standards

Partners will observe OpenAIRE guidelines for online interoperability, which can be found at: <https://guidelines.openaire.eu/en/latest/>. Partners will also ensure that F4W data observes FAIR data principles under H2020 open-access policy ([1]).

Moreover, as many of the F4W research activities deal with the development of IoT devices and smart APIs, interoperability will be treated all along each activity and task of the project.

Data and metadata standard vocabularies

The task 2.3 of the F4W project “Common information Models for Water Management” specifically aims at defining the water specificity for the ongoing standardization of data models, ontologies and information context management. The ontology SAREF, developed by the ETSI SmartM2M, is currently

being adapted to the water sector through the future “**SAREF4Water**” ontology. Several of the F4W partners are taking part of this development and it is this ontology which will be followed and adopted in the context of F4W research activities in order to maximise data interoperability.

III.5. Enabling data reuse

Adopted data license

It is up to each partner owning a dataset to choose the Data License he thinks relevant to ensure the EC principle of Open Access to Research Data while protecting its own IPR. The different options for open access and Licensing will be explained to each partner in the online survey they will have to fill for allowing the Coordinator gather metadata (see Annex 2).

Data storage and handling

As a general principle, the responsibility for storage and handling of data lay to the partner who originally collected the data. Each partner owning datasets will hence have to store all the dataset he owns in a professional and well secured server and should be able to provide the datasets upon request.

All the datasets uploaded into Zenodo will be stored 20 years.

And all the datasets uploaded into F4W website will be kept during the whole lifetime of the project and 5 years more after the end of the project.

III.6. Specific case of the data concerning the F4W platform

The main objective of the F4W project is to link the physical water world to the digital one, via the creation of the FIWARE4Water platform hosted by FIWARE, already existing.

As specified in the table of datasets for WP2, specific repositories will be used to safeguard the data models and the different architectures versions, as also indicated in Table 2 below.

Table 2: Specific repositories for data concerning the F4W platform development

Type of data	Specific repository
Official accepted data models	https://github.com/smart-data-models
Work-in-progress data models	https://github.com/FIWARE/data-models
ETSI SmartM2M SAREF Water Ontologies	The official version is maintained in ETSI.
ETSI ISG CIM NGSI-LD standard	The official version is maintained in ETSI.

Moreover, all the data used and processed by FIWARE are and will be regularly uploaded in **CKAN**, which is an **open data publication platform**, widely extended, which enables the publication, search, discovery and consumption of open datasets. The FIWARE CKAN extensions enhance the default CKAN features in order to integrate this tool within the FIWARE ecosystem, supporting the publication, management and rich visualization of right-time context data, while improving the access control and enabling data monetization.

More information is available online at: <https://fiware-ckan-extensions.readthedocs.io/en/latest/>.

IV. Allocation of ressources

As a general principle, the Author Processing Charges incurred by beneficiaries for open access publishing are eligible for reimbursement during the duration of the action. No costs have been included in F4W budget. However, several partners, such as academics, generally have dedicated budget to cover the costs related to open accessibility of scientific articles.

Concerning the human related costs needed to manage data all along the project, it is shared among partners, as part of each WP activity. In addition, the Coordinator, who plays a specific role in collecting the datasets all along the project life, will use part of the WP7 budget to ensure an efficient data management.

V. Data security

All the datasets which are stored in Zenodo will be covered by Zenodo policies on longevity (<http://about.zenodo.org/policies/>), as follows:

- **Versions:** Data files are versioned. Records are not versioned. The uploaded data is archived as a Submission Information Package. Derivatives of data files are generated, but original content is never modified. Records can be retracted from public view; however, the data files and record are preserved.
- **Replicas:** All data files are stored in CERN Data Centres, primarily Geneva, with replicas in Budapest. Data files are kept in multiple replicas in a distributed file system, which is backed up to tape on a nightly basis.
- **Retention period:** Items will be retained for the lifetime of the repository. This is currently the lifetime of the host laboratory CERN, which currently has an experimental programme defined for the next 20 years at least.
- **Functional preservation:** Zenodo makes no promises of usability and understandability of deposited objects over time.
- **File preservation:** Data files and metadata are backed up nightly and replicated into multiple copies in the online system.
- **Fixity and authenticity:** All data files are stored along with a MD5 checksum of the file content. Files are regularly checked against their checksums to assure that file content remains constant.
- **Succession plans:** In case of closure of the repository, best efforts will be made to integrate all content into suitable alternative institutional and/or subject based repositories.

All the datasets which are stored in the servers or computers of a F4W partner will be covered by the Security Policy of this partner.

VI. Ethical aspects

VI.1. General ethical issues

The F4W research activities raise several Ethical issues that have been addressed in the four deliverables of **WP8: Ethics Requirements**. This WP has not been presented previously as it is not a WP within which research will be carried out. This WP was fully dedicated to provide explanations and guarantees concerning the different ethical issues that could raise in relation to F4W research activities.

The main ethical issues linked to F4W research activities deal with: the involvement of humans as research participants, the protection of health and security of all the research participants (being inside or outside F4W consortium), the protection of environment (because of the use of nanotechnologies) and the protection of personal data (in respect with the recent GDPR).

To avoid repetition, more information can be found in the four deliverables of this WP8.

VI.2. Intellectual Property Rights

Consortium Agreement

Ensuring Intellectual Property Rights (IPR) is of major importance and a special care has been given to that issue as from the beginning of the F4W project, with the writing of the Consortium Agreement. All the rules regarding management of knowledge and IPR are governed by this official document, signed by all the F4W partners. It has been written on the basis of the DESCA H2020 model. It addresses background and foreground knowledge, ownership, protected third party components of the products, and protection, use and dissemination of results and access rights.

The procedures for dissemination, protection and exploitation of intellectual property rights (IPR) are explicitly covered in the Consortium Agreement in Section 6 (Governance Structure, Sub-section 6.2.4: Veto rights, p 12). The intention has been to balance the requirements necessary to protect such intellectual property and the foreseen dissemination objectives. IPR will be applied according to the rules of the employer under the applicable European and national laws and regulations

Grant Agreement

In addition, F4W will always follow and refer to the rules laid down in the Grant Agreement, concerning the rights and obligations of all the F4W partners. The following principles (extracted from the Grant Agreement) will therefore be applied:

- **Confidentiality:** During the project duration and beyond (Section 10 of the GA – non disclosure of the information for a period of 4 years after the end of the project), the contractors shall treat any information, which is designated as property by the disclosing contractors, as confidential. They also shall impose the same obligations to their employees and suppliers.
- **Pre-existing know how:** Each Contractor is and remains the sole owner of its IPR over its pre-existing know-how. The Contractors will identify and list the pre-existing know-how over which they may grant access rights for the project. The Contractors agree that the access rights to the pre-existing know-how needed for carrying out their own work under the project shall be granted on a royalty-free basis.
- **Ownership and protection of knowledge:** The ownership of the knowledge developed within the project will be governed by an open source license.
- **Open data:** Data and results obtained during the project that are based on open public-sector data will be made available free of charge.

Conclusion and Perspectives

This report is the initial Data Management Plan of the F4W project. As it has to be a living document, it will be updated regularly and two new versions will be produced: a detailed DMP (M18) and a final reviewed DMP (M36, meaning at the end of the project).










References






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- [4] WILKINSON M. D. *et al.*, « The FAIR Guiding Principles for scientific data management and stewardship », *Scientific Data*, Vol.3, article 160018, 2016.
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- [6] OpenAIRE Horizon2020 Factsheets for Research Administrators and Project Coordinators, « Open Access and Open Data in Horizon 2020 – How can OpenAIRE help? »
- [7] European Commission, Research and Innovation, « Factsheet: Open Access in Horizon 2020 », 9 December 2013.

Annex 1: Metadatas provided for each dataset to feed F4W DMP

Dataset reference and name	F4W_Data_WPx_Tx.x_Name_Vx
Dataset Description	
<i>Making Data Findable, including provision of metadata</i>	
<i>Making data openly Accessible</i>	
<i>Making data Interoperable</i>	
<i>Increase data Reuse</i>	
Allocation of resources	
Data Archiving, preservation and security	
Ethical aspects	
Other issues	

Annex 2: Metadatas required to upload a dataset in Zenodo

File information			
File Name			Required
Upload of the file (maximum size: 50 GB)	<i>File addition, removal or modification are not allowed after the publication of the upload, because a Digital Object Identifier (DOI) is registered with DataCite for each upload.</i>		
Communities			
Community name	Fiware4Water Project		Recommended
Upload type			
Dataset type	<div>  Publication ○ </div> <div> <input type="checkbox"/> Book <input type="checkbox"/> Preprint <input type="checkbox"/> Software documentation </div> <div> <input type="checkbox"/> Book section <input type="checkbox"/> Project deliverable <input type="checkbox"/> Thesis </div> <div> <input type="checkbox"/> Conference paper <input type="checkbox"/> Project milestone <input type="checkbox"/> Technical note </div> <div> <input type="checkbox"/> Journal article <input type="checkbox"/> Proposal <input type="checkbox"/> Working paper </div> <div> <input type="checkbox"/> Patent <input type="checkbox"/> Report <input type="checkbox"/> Other </div>		Required
	<div>  Poster ○ </div> <div>  Presentation ● </div> <div>  Dataset ○ </div> <div>  Video/Audio ○ </div> <div>  Software ○ </div> <div>  Lesson ○ </div> <div>  Other ○ </div>		
	<div>  Image ○ </div> <div> <input type="checkbox"/> Figure <input type="checkbox"/> Plot <input type="checkbox"/> Drawing </div> <div> <input type="checkbox"/> Diagram <input type="checkbox"/> Photo <input type="checkbox"/> other </div>		
Basic information			
Digital Object Identifier (DOI) (Optional)	<i>If a publisher already assign a DOI to the dataset (for scientific publication for example), indicate it. If not, no need to fill in this field as Zenodo will automatically register a new DOI.</i>		Optional
Publication Date	YYYY-MM-DD		Required
Title			Required
Authors (as many as existing)	Family Name, given names		Required
	Affiliation		Required
	ORCID <i>(It provides a persistent digital identifier that distinguishes you from every other researcher and, through integration in key research workflows such as manuscript and grant submission,</i>		Optional

	supports automated linkages between you and your professional activities ensuring that your work is recognized" https://orcid.org/)			
Description	Short textual information		Required	
Version	Mostly relevant for software and dataset uploads. Any string will be accepted, but semantically-versioned tag is recommended. See www.semver.org for more information on semantic versioning		Optional	
Language	Primarily language of the record.		Optional	
Keywords			Required	
Additional notes	Textual information.		Optional	
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Access right	<div> <input checked="" type="radio"/>  Open Access </div> <div> <input type="radio"/>  Embargoed Access </div> <div> <input checked="" type="radio"/>  Open Access </div> <div> <input type="radio"/>  Restricted Access </div> <div> <input type="radio"/>  Closed Access </div>		<div> Embargo date: YYYY-MM-DD <i>Required only for Embargoed Access uploads. The date the upload will be made publicly available in case it is under an embargo period from the publisher.</i> </div> <div> Conditions <i>Textual information: Specify the conditions under which you grant users access to the files in your upload. User requesting access will be asked to justify how they fulfil the conditions. Based on the justification, you decide who to grant/deny access. You are not allowed to charge users for granting access to data hosted on Zenodo.</i> </div>	Required
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	<p>Creative Commons Attribution 3.0 Unported</p> <p><i>The user is free a) to use the data (reproduce it and incorporate it into one or more collections), b) to adapt the data (create and reproduce adaptations provided that any such adaptation, including any translation in any medium, takes reasonable steps to clearly label, demarcate or otherwise identify that changes were made to the original data), c) to distribute and publicly perform the data (including as incorporated in collections) and d) to distribute and publicly perform adaptations.</i></p> <p><i>The user must give appropriate credit, provide a link to the license and indicate if changes were made.</i></p>	
Funding		
Grants	European Commission	Recommended
	Grant number: 821036	