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DATA MANAGEMENT PLAN (2nd updated version)

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Document history

DATE	VERSION	AUTHOR	COMMENTS
28/08/2020	1.0	Marc Velasco	Updated version of the document
04/09/2020	1.1	David Pacheco	Inclusion of the tables corresponding to the new datasets generated by the project
08/09/2020	2.0	Marc Velasco	Final version incorporating the comments of the reviewers

1. **Changes with respect to the DoA**
   This deliverable has been considered as Confidential, whereas in the original DoA was considered Public. This change will be included in the next amendment of the GA, so the actual dissemination level is shown.

2. **Dissemination and uptake**
   Public

3. **Short Summary of results (<250 words)**
   Deliverable 8.6 - Data Management Plan (2nd updated version) has been developed by Aquatec within task 8.2 of WP8 - Project Management. The DMP is an instrument to ensure an effective implementation of the *Open Research Data Pilot* initiative of RESCCUE and addresses the points set in the DMP template of the EC Guidelines on FAIR Data Management in HORIZON 2020 (EC, 2016b).

   The DMP establishes the life cycle for the data to be collected, processed, and/or generated which is to be followed by all partners in the consortium. Moreover, it details what kind of data will be reused and produced, which of the data generated by RESCCUE project will be open and how these data will be exploited and made accessible (for verification and/or reuse) and, on the contrary, which of the data will be preserved, considering also that this project deals with some cases of Critical Infrastructures.

   Additionally, it includes the requirements for making research data findable, accessible, interoperable and re-usable (FAIR data management).

   This document is an updated version of the D8.5 submitted in M24.

4. **Evidence of accomplishment**
   This report

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Summary Tables

1 Introduction

This document is developed as part of RESCCUE (RESilience to cope with Climate Change in Urban arEas - a multisectorial approach focusing on water) project, which has received funding from the European Union's Horizon 2020 Research and Innovation program, under the Grant Agreement number 700174.

This document is an updated version of the Data Management Plan (DMP) presented in M24 (D8.5) and corresponds to Deliverable 8.6 of Work Package 8 (WP8) – Project Management. WP8 ensures an optimal coordination and management of RESCCUE, guaranteeing the effective implementation of the project activities.

This document is to be used by all partners to efficiently handle data, and make sure that the several obligations that RESCCUE has in terms of data are properly fulfilled by all partners at all time. The Data Management Plan (DMP) also ensures an effective implementation of the *Open Research Data Pilot* initiative of the European Commission and addresses the points set in the DMP template of the EC Guidelines on FAIR Data Management in HORIZON 2020 (EC, 2016b). Nevertheless, this has to be balanced with the protection of scientific information, commercialisation and Intellectual Property Rights (IPR).

The DMP establishes the life cycle for the data to be collected, processed, and/or generated which is to be followed by all partners in the consortium. Moreover, it details what kind of data will be reused and produced, which of the data generated by RESCCUE project will be open and how these data will be exploited and made accessible (for verification and/or reuse) and, on the contrary, which of the data will be preserved, considering also that this project deals with some cases of Critical Infrastructures (CI) and that Directive 2008/114/EC on CI must be respected (EC, 2008).

2 Objectives and methodology

The goal of a DMP is to consider the many aspects of data management, metadata generation, data preservation and analysis, which ensures that data are well-managed in the present, and prepared for preservation in the future.

On the other hand, it is of key importance to make sure that the research data is findable, accessible, interoperable and re-usable (FAIR).As stated in the Guidelines on FAIR Data Management in Horizon 2020 (EC, 2016b), a DMP must include information on:

- the handling of research data during and after the end of the project
- what data will be collected, processed and/or generated
- which methodology and standards will be applied
- whether data will be shared/made open access and
- how data will be curated and preserved (including after the end of the project)

Consequently, these several items are included in this Deliverable 8.5, describing the data management life cycle for the data to be collected, processed and generated by the RESCCUE Project.

The methodology to produce this DMP, is based on the Guidelines on FAIR Data Management in Horizon 2020 (EC, 2016b) the Digital Curation Centre (DCC) online tool called DMP Online (https://dmponline.dcc.ac.uk) and the Guidelines on Open Access to Scientific Publications and Research Data in Horizon 2020 (EC, 2016a).

The document has been divided into the following sections:

3. Research data management and sharing
4. Metadata and FAIR data
5. Protection of critical infrastructures and sensitive information
6. Ethics and Legal Compliance
7. Responsibilities and Resources
8. References

3 Research data management and sharing

3.1 Data classification and management

RESCCUE project deals with the resilience of cities, specifically in the case studies of Barcelona, Bristol and Lisbon, in terms of urban services response in critical situations derived from climate change. The assessment of the response and interdependencies of the urban services (water services, transport, telecommunication, energy supply or solid waste collection) both for current and future scenarios is therefore the basis of the research. The expected results involve, among others, the hazard, vulnerability and risk assessment of the urban services operation, including the identification of critical infrastructures.

In order to achieve all the project objectives, data is being complied, methodologies are developed, models are built and finally datasets are generated.

3.1.1 Output data

Table 1 presents the datasets that will be generated by RESCCUE. For each dataset, the following characteristics are described: brief description of the result; WP where these data are generated; producer/owner of the results; date (project's month) in which these data are expected; type and data format; estimated size of data; naming conventions to be used and expected end users.

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Table 1 – Summary of the data generated in RESCCUE

Description of result	Associated WP	Result owner(s)	Delivery date	Type and data format	Estimated data size	Naming conventions	End-users
Climate downscaled projections, decadal and seasonal simulations	1	FIC	M18	Ascii files with climate data per variable, model, scenario, etc.	-Climate timescale: 500,000 files (30 Gb) -Decadal timescale:42,000 files (16 Gb) -Seasonal timescale:500 files (80 Mb)	-For zip file: Variable_Model_Scenario_City .zip -For plain text file: Variable_Model_Scenario_Stat ionId.txt	Model owners or other climate researchers that will use this information as inputs for their research
Extreme climate scenarios	1	FIC, Aquatec	M24	KML polygons with climate data per variable, horizon and scenario.	300 files (4Mb)	-For climate/decadal simulations: CITY_variable_threshold_Retu rnPeriod_TimePeriod_quantile .kml -For seasonal forecast: CITY_variable_threshold_scen ario_criterion_seasonal.kml	Model owners or other climate researchers that will use this information as inputs for their research
Drought and water quality analysis	2	Cetaqua	M36	Excel sheets presenting the water contributions at each reservoir for the future scenarios Excel sheets presenting the evolution of quality problems in the Llobregat's river at the DWTP of Sant Joan Despí for the future scenarios	2 Excel files 20 Mb (x2)	Contributons_Ter_Llobregat_r eservoirs.xlsx Water_Quality_Llobregat_SJD. xlsx	Water companies and the Catalan Water Agency
Urban drainage simulations in Barcelona	2	Aquatec, BCASA	M36	Shape file presenting hydraulic behaviour of sewer system for the several scenarios (5 different return periods for the current (1) and future (4) scenarios → TOTAL: 25 simulations) Shape files presenting the pedestrian hazard maps for the several scenarios (5 different	75 shape files of data (of 250 Mb each) TOTAL: 18.75 Gb	Name_of_city_Hazard_target_ Return_period_Scenario_Time _period	Other researchers, all the stakeholders that might have flooded assets and the general population of the city

				return periods for the current (1) and future (4) scenarios → TOTAL: 25 simulations) Shape files presenting the vehicular hazard maps for the several scenarios (5 different return periods for the current (1) and future (4) scenarios → TOTAL: 25 simulations)			
Assessment of marine model impacts	2	Aquatec	M36	MOHID files and Ascci data (Time series simulations of E.Coli concentration in the Barcelona bathing water) for current (1) and future scenarios (2)	Ascii files of concentration distribution every hour for 10 years of continuous simulations (7GB). A total of 30 years simulations between baseline and future scenarios (TOTAL=21GB).	Name_of_city_Scenario_Time_period	Waste water operators, public administrations and general population
Simulations of the electric model in Barcelona	2	IREC, Endesa	M36	Maps Images and data in table format presenting the impacts	4 cases with 3 PR for 3 scenarios (36 Figures) ~150Mb	Simulation_City_Sector_Scenario_PR_case	All the stakeholders that have critical infrastructures depending on the electric network
Simulation of hazards on the traffic model	2	Barcelona CC	M36	Maps and ascii information presenting the impacts	25 shape files of data (of 250 Mb each) → TOTAL: 6.25 Gb	Name_of_city_Hazard_target_Return_period_Scenario_Time_period	Local police and other public administrations
Urban drainage simulations in Lisbon	2	Hidra and CML	M36	1. Lisbon citywide drainage system (1D GIS based model) Image files presenting sewer capacity for 4 return periods of current situation (results taken from Lisbon Drainage Master Plan 2016-2030) 2. Alcântara drainage system (1D SWMM Model) Image files presenting main hydraulic variables (flow capacity, flow rate and	1. 4 png files (1 Mb each) → TOTAL: 4 Mb 2. 3x11 png files (2 Mb each) → TOTAL: 66 Mb 3. 11 Raster files (1.5 Mb each) → TOTAL: 16.5 Mb	NameOfTheCity_Model_Scenario_ReturnPeriod	Other researchers, all the stakeholders that might have flooded assets and the general population of the city

			velocity) for 5 return periods of current situation and 3 return periods for 2 future scenarios (most severe and most probable) 3. Lisbon downtown catchments J and L (1D/2D Combined Model SWMM+BASEMENT) Raster files presenting water depths for 5 return periods of current situation and and 3 return periods for 2 future scenarios (most severe and most probable)			
Simulations of the energy distribution model in Lisbon	2	EDP	M36	DXF files presenting the simulation of the impact in electrical infrastructure for Lisbon using the information of urban drainage models. 6 Scenarios: i) Lisbon Low/Medium/High Voltage Grid at normal configuration (2 simulations); ii) Lisbon municipality citywide drainage (2 simulations); iii) Lisbon municipality estuary water (1 simulation); iv) Lisbon downtown catchments J an L (7 simulations); iv-1) 1 primary substation out of service (4 simulations); iv-2) 9 secondary substations out of service (14 simulations)	30 files of data. Total: 6 Mb	City, Low, Medium, High Voltage Grid, Urban Drainage model approaches and electrical infrastructure results Contingency Plan for different scenarios for simulations of iv), iv-1) and iv-2)	All the stakeholders that have critical infrastructures depending on the electric network
Urban drainage simulations in Bristol	2	BCC	M36	Shape files presenting the depth, extent, hazard and velocity maps for the several scenarios (5 different return periods (RP) per catchment (7) – TOTAL: 35 simulations).	8Mb per catchment per RP. 7 catchments = 56Mb per RP. TOTAL: 5 RP x 56 x 3 = 0.85Gb.	Catchment name_Mreturn period	Other researchers, all the stakeholders that might have flooded assets and the general population of the city
Tidal and Fluvial Flooding simulations in Bristol - Central Area Flood Risk	2	BCC	M36	Shape files presenting the depth, extent, hazard, maps for the several scenarios (32 RP (mixed combination events), 4 epochs, 3 emissions scenarios, with existing defences. TOTAL – 24 simulations (however equivalency runs exist, for instance current	Varying sizes of ASCII grid and DAT file format 400Mb per run x 24 = 9.6Gb	CAFRA_Versions_RP_Fluvialelement_Tidalelement_EpochEmmissions_DepthMaximumoutputs_Gridsize	Other researchers, all the stakeholders that might have flooded assets and the general population of the city

Assessment (CAFRA)			Flood Zone 2 is equivalent to future Flood Zone 3 so some represent 2 scenarios))			
Tidal and Fluvial Flooding simulations in Bristol - Avonmouth Strategic Flood Risk Assessment	2	BCC	M36	Shape files presenting the hazard maps for the several scenarios (5 RP per epoch, 3 epochs plus various wave and surge components and different failure scenarios. Current defended/undefended/blockage. 2073 defended/undefended/breach. 2110 defended/undefended/breach. TOTAL – 118 simulations	Varying sizes of ASCII and dat files TOTAL = 60Gb	AVM_gridsize_RPtidal_RPfluvial_epoch_withdefences_blockage_breach_modeldesignruns	Other researchers, all the stakeholders that might have flooded assets and the general population of the city
Integrated flooding – traffic simulations in Bristol	2	Uni Exeter	M36	Shape files presenting the impacts for all the simulated events. XML files outputted via micro-simulation traffic CSVs for graphical analysis	Approximately 2-5GB per flood event simulation	NameOfCity_EventType_ReturnPeriod_AdditionalInfo.FileType	Local police and other public administrations
Integrated flood and waste sectorial model	2	Cetaqua	M26	Shapefiles with the location of potentially unstable containers in Barcelona for the different scenarios	1.5 GB	For the actual event (to validate the model): Containers_0_31_07_2011; Containers_50_31_07_2011; Containers_100_31_07_2011 For the design storms: Containers_0_T2; Containers_0_T5; Containers_0_T10 Containers_50_T2; Containers_50_T5; Containers_50_T10 Containers_100_T2; Containers_100_T5; Containers_100_T10	Model owners or other researchers that will use this information as inputs for their research. Also the Barcelona City Council will use this model to prevent containers' instabilities
Flood impact assessment in the energy sector	3	IREC	M36	Maps Images and data in table format presenting the impacts	5 PR for 3 scenarios (15 Figures + optimization table) ~200Mb	Hazards_City_Sector_Scenario_PR_case	All the stakeholders that have critical infrastructures depending on the electric network

Flood direct damage assessments	3	Uni Exeter, Cetaqua, Aquatec	M36	1.Depth damage curves and shape files with the impacts for all the scenarios. KML/KMZ files for use in Google Earth 2.CSVs for graphical analysis	1.Approximately 2-5GB per flood event simulation 2.Excel File xls 5 Mb (curves) shape files 100 Mb (damage maps)	NameOfCity_EventType_ReturnPeriod_AdditionalInfo.FileType T1_damages.shp T5_damages.shp T10_damages.shp T100_damages.shp T500_damage.shp	Other researchers, public administrations and insurance companies
Flood indirect damage assessments	3	Cetaqua	M36	Ascii files presenting the impacts for all the simulated events	Ascii files 10 Mb (no definitive)	Flood_indirect_damage (no definitive)	Other researchers, public administrations and insurance companies
Assessment of transport indirect damages	3	Cetaqua, Uni Exeter	36	1.Shape files presenting the impacts for all the simulated events. XML files outputted via micro-simulation traffic 2.CSVs for graphical analysis	1.Approximately 2-5GB per flood event simulation 2.Ascii files 10 Mb (no definitive)	NameOfCity_SubArea_EventType_ReturnPeriod_AdditionalInfo.fileType Transport_indirect_damage (no definitive)	Other researchers, public administrations and insurance companies
Adaptation measures and strategies database	5	Cetaqua	18	Database containing all the strategies compiled	Not required (in cloud)	https://resccue.herokuapp.com	Other researchers, service operators and public administrations
RAF app	6	LNEC	M48	RESCCUE Assessment Framework Tool for application	Not required	https://incd.pt/	City and services managers and scientific community

As it is later explained in section 4, the data generated in RESCCUE project (i.e. datasets summarized in Table 1) will be made publically available and discoverable, by publishing the metadata in the Inspire portal and uploading the datasets in Zenodo. More details related to that can be found in that section.

3.1.2 Input data

In addition to the information presented in Table 1, it is also important to show the information that the RESCCUE project reuses to generate its outputs. In Table 2 there is a brief overview of the data needed (reused) in each WP and the source(s) to obtain them.

The data necessary to develop RESCCUE project is being collected by the responsible and contributors involved in each task. In general, though, primary data is being collected at the case studies (Barcelona, Lisbon and Bristol) by the case-study responsibles (Aquatec, LNEC and University of Exeter, respectively).

Regarding the data used or reused from other sources, some of this information is private (it belongs to some of the project stakeholders) or has been purchased to use it on the project (as some of the climate information). Therefore, the RESCCUE partners are not allowed to share it, but only to use it to generate the outputs.

Table 2 – Summary of input data used in the RESCCUE project classified per Work Package

WORK PACKAGE	INPUTS	
	Type of data	**Source(s)**
WP1-Climate Change Scenarios	Climatic data/models	-Public data from: PCMDI GHCN-daily ISH/ISD -AEMet -IPMA -Met Office
	Future climate scenarios	Public data from IPCC
WP2-Hazard Assessment for Urban Services Operation	Field data, sensor data and physical data from the several sectorial models and studies implemented in the 3 research sites	-Public data -Know-how and networks data from Barcelona CC (BCASA), CML, Bristol CC, Endesa, EDP and Wessex Water
WP3-Vulnerability & Risk Assessment for Urban Services Operation	Data quantifying the impacts of identified hazards in urban areas	-Public data on impacts for the three research sites -Know-how (such as damage curves or other methodologies) from UNEXE, Aquatec, CETaqua and LNEC

WP4-Integration in a software tool	Information of the location of infrastructures and services from the three research sites, as well as their interdependencies, redundancies and other key parameters	-City councils -Urban services providers such as water utilities, electricity providers, waste management services, etc.
WP5-Resilience and adaptation strategies ready for market uptake	Resilience strategies	-Public information coming from previous research projects (such as CORFU, PREPARED, RESIN, BRIGAID – see Aneex 2 of D5.1) -Expert knowledge from RESCCUE partners to complete the methodology proposed
WP6-Validation Platform & First Applications	Resilience studies undertaken by third parties	-Reports from C40, 100RC, UN-Habitat and others
WP7-Dissemination & Exploitation	Information of key stakeholders and personal data	-Information of the key stakeholders that have been identified for the project -Personal data of the attendees of RESCCUE workshops and other public events, complying with the GDPR regulations
WP8-Project Management	Personal data	-Personal data of the attendees of RESCCUE PCM meetings, complying with the GDPR regulations

3.1.3 Data quality

All data generated and collected in RESCCUE undergo a quality check in order to analyse its individual plausibility and consistency. Collection and generation of climate and service related data follow established standards such as INSPIRE implementing rules, metadata and data specifications; OpenMI; WaterML; GML and OGC geospatial data services.

When needed, additional measures are taken in order to ensure the quality of data. As an example, in "D1.1 - Data collection and quality control report. Summary of studies on climate variables at the research cities", a thorough analysis of all the data compiled was undertaken, ensuring consistency, removing outliers and homogenizing the information.

Open standardised and interchangeable formats are used whenever possible and adequate to ensure the long-term usability of data. Proprietary software-specific data formats are avoided, with exception to those widely spread and openly documented or eventually related to software platforms used by the project teams.

3.2 **Data sharing**

3.2.1 Open access to peer-reviewed scientific publications

RESCCUE research partners publish scientific publications including project results in Open Access. Open access can be defined as the practice of providing on-line access to scientific information that is free of charge to the end-user To meet this requirement, beneficiaries ensure that these publications can be read online, downloaded and printed (free of charge, online access to any user).

The links to abstracts of research articles published in scientific journals are also available in the project website (www.resccue.eu).

The open access to publications procedure comprises 3 steps:

1. Selecting the open access route (green or gold open access)
2. Providing open access to publications
3. Depositing the data in repositories (online archive) in order to allow for replicability of the results

Thus, all scientific publications generated by the RESCCUE project will be made available both online through open access in peer reviewed scientific journals and at RESCCUE web page.

3.2.2 Open access to research data

RESCCUE is part of the EC's initiative Open Research Data Pilot. Within the framework of Horizon 2020, the Open Research Data Pilot aims to improve and maximise the access to and re-use of research data generated by projects. The Open Research Data Pilot applies to two types of data:

a) Data, including metadata, needed to validate the results presented in scientific publications (published in scholarly journals);
b) Other data (e.g. curated data not directly attributable to a publication or raw data), including associated metadata.

The research data that will be produced, as it could be seen in Table 1, will be of interest to other researchers, public administrations, service operators and other stakeholders as well as the general population. In order to allow for replicability of research results, the information generated (final results as specified in Table 1) will be made available so other can reproduce the methodologies used in RESCCUE.

Accordingly, the data generated in the project will be available in a research data repository so that it will be possible to access, mine, exploit, reproduce and disseminate it, free of charge for any user. The RESCCUE data will be available in: CLARITY portal repository (https://csis.myclimateservice.eu/studies) and the RESCCUE Toolkit (http://www.toolkit.resccue.eu).

According to the Exploitation Plan (Deliverable 7.4) the exploitation of the results generated from RESCCUE project must be ensured up to four years after the project end. Therefore, both the CLARITY portal repository, the RESCCUE Toolkit and the RESCCUE website (including the deliverables and scientific publications) will be completely operative, at least, until May 2024. Additionally, all the Gold Open Access scientific publications will be available for an unlimited period after the end of the project.

3.2.2.1 Clarity Portal Repository

CLARITY is the first point of reference and the most important information, service and collaboration hub for everybody being concerned with climate change impact assessment in Europe. CLARITY's value proposition is to make climate-proofing of infrastructure easier and faster at a fraction of the cost of individual climate sensitivity, vulnerability impact and adaption strategy studies.

The CLARITY portal repository creates awareness on the CLARITY climate service, case studies, demonstrators and tools among relevant stakeholders in the climate and urban infrastructure planning and management sector, industries and civil society. It builds up and foster the CLARITY Community with regional experts and contact points. It analyses and provides data relevant to stakeholders, shares knowledge and connects the CLARITY Community.

This platform also fosters a Community involving local target sectors and stakeholders that are interested in CLARITY scenarios. Either as host of events, regional experts or contact point for tools and services.

3.2.2.2 RESCCUE Toolkit

Throughout the project's lifetime, RESCCUE has placed much effort on dissemination tasks, aiming at allowing general and specialised audiences to access information about the project progress and its outcomes, as well as promoting the widest application of the RESCCUE outcomes in other cities.

In this regard, RESCCUE has developed the RESCCUE toolkit, an interactive space where the main project's results are gathered, along with a set of guidelines outlining the steps to be taken to make your city resilient. Here you will find all the tools, datasets and methodologies developed within RESCCUE sorted by topic and by the three case studies: Barcelona, Lisbon and Bristol.

4 Metadata and FAIR data

The Guidelines on FAIR Data Management in Horizon 2020 (EC, 2016b), clearly state that making research data findable, accessible, interoperable and re-usable (FAIR), is on the main roles of the DMP.

4.1 Making data findable, including provisions for metadata

In order to make data findable, the main tool is to assure that data used and produced in the project can be discoverable with **metadata**. Since there are several ISO metadata standards produced by ISO committees including ISO 19115 (Geographic information — Metadata) and ISO 19119 (Geographic information — Services), the RESCCUE consortium will take advantage of the schemas already defined to define its metadata. Therefore, common criteria will be followed for all the RESCUE generated data while following the requirements of one of these standards.

In addition, the European INSPIRE Directive (2007/2/EC) aims to create a European Union (EU) spatial data infrastructure. This Directive requests that Member States shall ensure that metadata are created for the spatial data sets, and that those metadata are kept up to date. In order to do so, INSPIRE created an online portal called "INSPIRE GeoPortal" (http://inspire-geoportal.ec.europa.eu/) that can be used to store and search for metadata. This portal will be used in RESCCUE in order ensure that the project data will be findable.

Given that data will be linked to each of the research sites, Barcelona, Bristol and Lisboa, to a certain service and timeframe, naming conventions are established in order to clearly identify the dataset by its name. All these can be seen in Table 1, together with information corresponding to the several datasets generated in the project.

Taking advantage of those naming conventions, a set of keywords will be defined for each dataset, in order to ease the search of the metadata. These keywords will be defined in accordance with the terminology that is defined in the glossary of the RESCCUE project.

All these metadata will be stored in the "INSPIRE GeoPortal" making sure that all the RESCCUE partners follow the same criteria. In addition, the Keyword "RESCCUE" will always be included in order to easily track the project results. An internal guide on how to generate the metadata of the RESCCUE results will be prepared and circulated to all the RESCCUE partners.

4.2 Making data openly accessible

The A from FAIR stands for accessible, which is precisely the main goal of the Open Research data pilot that was presented in section 3.2.2. As stated there, the research data generated by the RESCCUE Project will be shared in the Zenodo repository.

This is of special relevance for the data used to publish results, in order to ensure replicability of research results. Only on the cases in which the key stakeholders do not give permission to disclose the results (when the vulnerabilities of the networks that they manage are being presented), the data will not be updated to Zenodo. On the rest of the cases, the RESCCUE results will be found there.

4.3 Making data interoperable

Making data interoperable, means that data exchange and re-use between researchers, institutions, organisations, countries, etc., should be available. The main goal of all this is to facilitate the re-combination of the data produced with different datasets from other origins. In order to do this, the use of standard formats and of available (open) software applications is promoted.

In RESCCUE, the main pathway to make data interoperable is to include the metadata in the INSPIRE GeoPortal as presented before, as well as upload the datasets to the Zenodo repository, so other researchers are able to use this information with different software applications (no matter if they are open or not).

Finally, a terminology glossary has been prepared, using the most common ontologies available from each of the fields that RESCCUE is dealing with. It can be found in D5.1, including all the definitions that are of interest for the project and thus, the results obtained will be easily understood and therefore re-used by others.

4.4 Increase data re-use

As explained before, data will be licensed to permit the widest re-use possible, when no limitations are identified by the key stakeholders.

All data generated and collected in RESCCUE (see Table 1) undergoes a quality check in order to analyse its individual plausibility and consistency, making sure that others can directly use it to do their assessments and validate the research done by the RESCCUE team.

As in some cases similar results will be generated for different case studies, data harmonisation will also be of critical importance both for increasing data re-use in general, but also to ease the comparison of RESCCUE results in the three research sites.

In this sense, an Exploitation Plan (Deliverable 7.4) has been developed to ensure the use (and re-use) of project results (and data). In this deliverable, it is ensured that the results of RESCCUE project will be exploited, at least, during four years after the end of the project. More details about some of the RESCCUE detailed business plans can be also seen in Deliverable 7.3).

5 Data security

5.1 Data confidentiality

Due to the topics addressed in RESCCUE Project, some of the results and datasets generated could be potentially used for unfair purposes, that is, to cause a complete collapse of a city through the failure of its main urban services. Accordingly, apart from detailing what key data the project will reuse and generate, how it will be exploited or made accessible (as explained in "D7.7 Dissemination and Exploitation Plan"), in the context of RESCCUE project it is very important to determine which of this data needs to be protected and how it will be done.

As stated in the guidance document "Guidelines for the classification of research results" (European Commission, 2015), the results of a project must be classified if their unauthorized disclosure could adversely impact the interests of the EU or of one (or more) of its Member States. E.g. some of the information produced by a project could potentially be used to plan terrorist attacks or avoid detection of criminal activities. However, while RESCCUE deals with critical infrastructures and utilities research (e.g. buildings and urban areas; energy, water, transport and communications networks; supply chains; financial infrastructures, etc.), the results on criticalities or vulnerabilities will not reach a level of detail that would imply a risk. Therefore, there is no need in protecting the project results with the category of EU CONFIDENTIAL. Nevertheless, in order to protect the results concerning critical infrastructures at the case study areas, a couple of measures have been taken.

The first measure is already tackled in the Consortium Agreement, where all the project partners have agreed not to use confidential information otherwise than for the purpose for which it was disclosed, that is the development of the tasks of RESCCUE project.

The second measure is to establish the dissemination level of several deliverables as **confidential**. The list of confidential deliverables are listed below:
- D2.2: Multi-hazards assessment related to water cycle extreme events for current scenario
- D2.3: Multi-hazards assessment related to water cycle extreme events for future scenarios
- D3.4: Impact assessments of multiple hazards in case study areas
- D4.1: Report from HAZUR® implementation in each city
- D4.2: City RESILIENCE Assessment software (HAZUR® Assessment)
- D4.3: City RESILIENCE Management software (HAZUR® Manager)
- D5.3: Functional design of a resilience assessment operational module

Nevertheless, in order to not limit the exploitation of the project results, a public version of deliverables 2.2, 2.3, 3.4 and 4.1 will be developed and thus available at the RESCCUE web page (www.resccue.eu). These public versions will be, respectively, 2.4, 2.5, 3.5 and 4.4, being a compacted version of the original deliverable avoiding the information or results affecting critical infrastructures.

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5.2 **Protection of sensitive information**

As presented earlier, some of the assessments being done in the RESCCUE project are dealing with Critical Infrastructures (CI). The Directive 2008/114/EC (EC, 2008), defines "critical infrastructure as an asset, system or part thereof located in Member States which is essential for the maintenance of vital societal functions, health, safety, security, economic or social well-being of people, and the disruption or destruction of which would have a significant impact in a Member State as a result of the failure to maintain those functions".

It must be noticed thought that RESCCUE project deals with a scope at a city level and therefore, there is not a lot of details of the specific critical infrastructures and other sensitive information used. Consequently, although information about CI is used, no sensitive data regarding these infrastructures is disclosed and therefore, there would be no security measures to be taken in this sense (unless, as mentioned earlier, the key stakeholders specifically request that).

In Spain, the CNPIC (Centro Nacional para la Protección de Infraestructuras Críticas) is the Centre that manages CI, which depends from the Ministry of Interior. Although, as explained before, they still haven't identified all the CI from all the fields, they are using this principle in order to identify them: "the infrastructures that have been considered as critical for now, are the ones that might have impacts to the whole city (e.g. Barcelona). Therefore, localized impacts, even being severe, they are not considered critical as of now".

Finally, since the Hazur tool will be compiling information from several networks, containing several CI, general recommendations are proposed for the use of the Hazur tool and the presentation of final results:

- Represent CI by its "zone of influence" rather than a singular point to not reveal its location
- Completely anonymize the data of CI so that there is no spatial attributes stored within HAZUR
- In order to establish interdependencies, use generalized nomenclature e.g. "Exchange box #12", so the infrastructures affected by this CI know that it is an exchange box but do not know anything else.

5.3 **Systems security**

Sensitive or confidential information that will not be made publicly available, will be stored in at least two systems: Hazur and Basecamp.

Consequently, the security characteristics of both systems was assessed to make sure that the minimum standards were reached. Hazur is hosted in classical servers in a OVH data center with maximum physical security (servers can only be physically accessed by authorized employees, access restricted by security badge control system, video surveillance and security personnel, 24/7 on-site, rooms fitted with smoke detection systems and technicians on site

24/7) and high availability infrastructure (Systematic double power supply and generators with an initial autonomy of 48 hrs.)

The servers have the following characteristics:

Virtualization	64-bit OpenVZ
SLA	99.98%, reboot in 10 mins in the event of hardware failure
Scalability	Upgrade whenever you want from our control panel. No need to transfer our data nor to reinstall our VPS.
Anti-DDoS	Included
IP	1 IPv4 and 1 IPv6 included (all ports open)
Management	Web Control Panel, RESTful API, KVM, root access
Reboot and reinstallation	Unlimited, at any time via the Control Panel
Monitoring	Detailed monitoring and key performance indicators
Backup	Once a week

OptiCits is considering different options to upgrade the software hosting in order to increase both the software performance and the data access security.

Regarding Basecamp, they guarantee the security and confidentiality of the information stored there, by using encrypted protocols via HTTPS. Whenever data is in transit, everything is encrypted, and sent using HTTPS. Any files uploaded are stored and are encrypted at rest, and backups of data are encrypted using GPG.

Additionally, all data is written to multiple disks instantly, backed up daily, and stored in multiple locations. Uploaded files are stored on servers that use modern techniques to remove bottlenecks and points of failure.

The servers operate at full redundancy. The systems are engineered to stay up even if multiple servers fail. Their state-of-the-art servers are protected by biometric locks and round-the-clock interior and exterior surveillance monitoring. Only authorized personnel have access to the data center. 24/7/365 onsite staff provides additional protection against unauthorized entry and security breaches.

Their software infrastructure is updated regularly with the latest security patches. Their products run on a dedicated network which is locked down with firewalls and carefully monitored. While perfect security is a moving target, they work with security researchers to keep up with the state-of-the-art in web security.

6 Ethics and Legal Compliance

Ethics is taken into account in the way data is stored, regarding who can see/use it and how long it is kept.

The consent for data preservation and sharing obtained from data producers, or data owners, are strictly fulfilled according to applicable license rules. The identity of external participants is secured through anonymization, when and if applicable. The terms of use, curation and sharing of all datasets made available in the scope of RESCCUE, by data producers and data owners, are established in formal consent agreements.

The formal consent agreements state who will own the copyright on the data to be collected or created, along with the license(s) for its use and reuse. When applicable, permissions to reuse third-party data and any restrictions needed on data sharing will also be referred in the associated metadata.

However, ethics should not only be taken into account in the way data is stored and shared, but also regarding many other issues as all consortium members are subject to the EU Directive on Data Protection and its national transpositions. Therefore, there are several aspects to be considered, such as details on what type of personal data is being collected; details on data transference to non-EU countries; or examples of the Information Sheets and Consent forms to be used.

According to the recent General Data Protection Regulation (GDPR) (EU) 2016/679, entering into application on the 25th of May 2018, there is one set of data protection rules for all companies operating in the EU, wherever they are based. Specifically, the regulation contains provisions and requirements pertaining to the processing of personally identifiable information of individuals (formally called data subjects in the GDPR) inside the European Union, and applies to all enterprises, regardless of location, that are doing business with the European Economic Area. Business processes that handle personal data must be built with data protection by design and by default, meaning that personal data must be stored using pseudonymisation or full anonymisation, and use the highest-possible privacy settings by default, so that the data is not available publicly without explicit consent, and cannot be used to identify a subject without additional information stored separately. No personal data may be processed unless it is done under a lawful basis specified by the regulation, or if the data controller or processor has received explicit, opt-in consent from the data subject.

Taking into consideration all these requirements, several measures have been adopted in the framework of RESCCUE project regarding personal data protection. The project manager (Aquatec) is the only one authorized for collecting and processing personal data. Due to this role, Aquatec must clearly disclose any data collection, declare the lawful basis and purpose for data processing, how long data is being retained, and if it is being shared with any third-parties or outside of the EU.

To accomplish this requirements, Aquatec has prepared a consent form to be disclosed each time personal data is collected, for example, at the registration form of periodic project

meetings or other project's events involving people from RESCCUE consortium and external ones. This consent form informs that:

- Aquatec is the responsible for collecting and using personal data of project's partners and other attendees to RESCCUE events
- Personal data include: name, ID number, contact numbers, mailing, email addresses, photographic or video images
- Personal data will be disclosed only to the European Commission and only when necessary (i.e. justification of partners' contributions, travel expenditures, etc.)
- Aquatec will keep data securely according to the GDPR
- Aquatec will not disclose "sensitive personal data" as defined in the GDPR (*i.e.* data concerning health such as alimentary intolerances) or address, telephone or email details without your explicit consent unless the disclosure is strictly necessary to protect your vital interests
- Aquatec will record personal data during a period of 4 years after the project end after that period, personal data will be destroyed.

A model of the consent form to be used before collecting this data is included in the Annex of this deliverable and will be applicable from the 25th of May 2018 at each event or procedure collecting such personal data.

7 Responsibilities and Resources

Aquatec (as Project Coordinator) as well as the leaders of WP1 to WP6 (where most of the project data is produced) are responsible to ensure that it is duly reviewed and timely revised. However, it is important to highlight that all beneficiaries must implement the DMP.

The data management activities within each WP should be assured by the person responsible for data management at WP level.

RESCCUE has 3 research sites that will be studied across several project activities and WPs. The coordination of data management is to be done by the WP leader and the people responsible for each research site: Cetaqua, FIC, Opticits, UNEXE, LNEC and Aquatec.

However, as presented in Table 1, the owners of each dataset are clearly identified and they are precisely the ones responsible for the data management activities. So after generating each dataset, the partner that owns it should be in charge of uploading the information in a repository and making the dataset findable by generating the corresponding metadata.

8 References

European Commission (2008). *Council Directive 2008/114/EC of 8 December 2008 on the identification and designation of European critical infrastructures and the assessment of the need to improve their protection*. Official Journal of the European Union.

European Commission (2015). *Guidelines for the classification of research results*. European Commission, Directorate-General for Migration and Home Affairs.

European Commission (2016a). *Guidelines on Open Access to Scientific Publications and Research Data in Horizon 2020* – Version 3.1 – available online: http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-pilot-guide_en.pdf

European Commission (2016b). *Guidelines on FAIR Data Management in Horizon 2020* – Version 3.0 – available online: http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-data-mgt_en.pdf

Annex

PERSONAL DATA COLLECTION
CONSENT FORM

In compliance with the General Data Protection Regulation (GDPR), Aquatec, managers of RESCCUE project, seeks your consent to collect and use your personal data (i.e. Name, ID number, contact numbers, mailing, email addresses, photographic or video images) in order to maintain the RESCCUE partners database and the registry of partners and external attendees participating at the project's events (project meetings, workshops, etc.).

This personal data will be disclosed to the European Commission only when necessary (i.e. justification of partners' contributions, travel expenditures, etc.): "Purpose".

Aquatec respects your privacy and assures that your personal data will be kept securely according to the GDPR.

Aquatec will not disclose "sensitive personal data" as defined in the GDPR or address, telephone or email details without your explicit consent unless the disclosure is strictly necessary to protect your vital interests

Aquatec will record your personal data during a period of 4 years after the project end, after that period personal data will be destroyed.

I hereby give my acknowledgement and consent to Aquatec to use my personal data for the aforesaid Purpose.

- **Event:**

- **Date:**

- **Type of personal data compiled:**

NAME	SIGNATURE