



interiot

# Interoperability of Heterogeneous IoT Platforms

## D 1.2 Data –Management Plan

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## Executive Summary

INTER-IoT Data Management Plan (DMP) outlines the measures that INTER-IoT project has put in place in order to accommodate for the requirements set for projects contributing to the Horizon 2020 pilot action on open access to research data. INTER-IoT selected this option in the Grant Agreement and it is compromised to release an ORDP deliverable on M6. The plan is considering the protection of personal data and business confidential information.

The DMP identifies the requirements for accessing existing datasets that form the basis of the work of the project. Primarily these datasets are scientific publications of prior art and documentation and specifications from standards bodies.

Pertaining to the data that the project will produce, the DMP initially identifies the types of datasets that will be outcome of the project, namely: public deliverables, scientific publications, contributions to standards, software and applications. But these data may evolve during the project, e.g anonymized data traces from the transport and logistics use case.

A central aim of the consortium is to provide benefits to the European member states and their population at large. INTER-IoT commits to integrate all results and products into adequate open source communities, under the applicable licenses. Furthermore, project partners work closely with the standardisation boards and it is planned to bring the working results directly into the international developments.

Data that will be made publicly available will receive a Digital Object Identifier (DOI) and will be made available through external repositories and the project webpage several years after the end of the project.

The DMP also discusses Data Copyright and Intellectually Property Rights issues and assigns responsible persons for each type of data identified in the DMP, the proposed license to be used is CC-BY. Considering always the restriction from the foreground work specified by the partners in the signed Consortium Agreement.

Finally, an overview of the Open Research Data Pilot is given and how Inter-IoT will collaborate in this plan, specifying which datasets will be published and which repositories will be used.

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## Abbreviations

Abbreviation	Explanation
<b>D#.#</b>	Deliverable number #.# (e.g. D2.1 deliverable 1 of work package 2)
<b>DoA</b>	Description of Action of the project
<b>EC</b>	European Commission
<b>EU</b>	European Union
<b>GA</b>	Grant Agreement
<b>H2020</b>	Horizon 2020 Programme for Research and Innovation
<b>INTER-IOT</b>	Interoperability of Heterogeneous IoT Platforms
<b>IoT</b>	Internet of Things
<b>IPR</b>	Intellectual Property Rights
<b>M#</b>	#th month of the project (M1=January 2016)
<b>PC</b>	Project Coordinator
<b>PCC</b>	Project Coordination Committee
<b>PIC</b>	Project Implementation Committee
<b>STPM</b>	Scientific and Technical Project Manager
<b>TL</b>	Task Leader
<b>WP</b>	Work Package
<b>WPL</b>	Workpackage Leader

# 1 INTRODUCTION

INTER-IoT project is aiming at the design, implementation and experimentation of an open cross-layer framework; an associated methodology and tools to enable voluntary interoperability among heterogeneous Internet of Things (IoT) platforms. The project will allow effective and efficient development of adaptive, smart IoT applications and services, atop different heterogeneous IoT platforms, spanning single and/or multiple application domains.

The two application domains and use cases addressed in the project and in which the IoT framework will be applied are port transportation and logistics and m-Health, additionally through the open call the INTER-DOMAIN use case will extend the project results to a cross application domain environment. Achievement of interoperability will optimize different strategic operations in the different use cases:

- Increasing efficiency in transportation time, reducing CO2 emission, improving access control and safety.
- Improving remote subject monitoring; increasing the number of people that medical units can assist using the same resources.
- Demonstrate interoperability between IoT platforms from the two addressed application domains, and additional ones (e.g. Smart Cities).

The INTER-IoT approach is indeed general and may be applied to any application domain and across domains, in which there is a need to interconnect diversified IoT platforms already deployed or add new ones. This will enable bottom-up formation of interoperable IoT ecosystems, and indeed will generate an increasing amount of data in different formats.

During the INTER-IoT project lifetime several results in form of documents, publications and specifications will be produced. Following the guidelines of the EU for open access to scientific knowledge produced within the European funded projects, the members of the INTER-IoT consortium are establishing mechanisms for allowing open access to their scientific publications, adopting the EU plan for “Open Access to Scientific Publications and Research Data in Horizon 2020”<sup>1</sup>, according to the strategy and plan outlined in this document.

This document provides an analysis of the main elements for the data management policy that will be used as guideline for all project partners with regard to the datasets that will be generated by the project. Most of these results will be publicly available, which induces the need to provide a plan for the long term availability of these results.

The INTER-IoT Consortium agreed on general dissemination rules (Sec. 1.1) that are clarified in the Consortium and Grant agreements. The key dissemination rules can be found in the following section and can be seen as a starting point for the general data dissemination strategy, supported by the plan already set in M4 through D8.3 “Impact Creation Plan”. As this document will work on a dataset by dataset basis that will be produced during the lifetime of the project, this document reflects the current status of reflection within the consortium

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<sup>1</sup> Available at [http://ec.europa.eu/research/participants/data/ref/h2020/grants\\_manual/hi/oa\\_pilot/h2020-hi-oa-pilot-guide\\_en.pdf](http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-pilot-guide_en.pdf)

about the data that will be produced, although it could be modified if needed during the execution of the project, and always to address the needs of the ORDP of EC.

It is obvious that this document is a living document that will be continuously adapted and updated during the lifetime of the project and information about corresponding updates will be provided in the project management reports.

### 1.1 General Dissemination Rules

The key dissemination rules of the INTER-IoT Consortium that can be found in the Consortium and Grant agreements are the following:

- Everyone is an active dissemination partner and as such is obliged (to collaborate) to disclose results (GA 29.1).
- Each partner must ensure open access (free of charge online access for any user) to all peer-reviewed scientific publications relating to its results (GA 29.2).
- Written notice of planned publications should be given at the latest 15 days prior to publication (CA 8.3.1).
- If a partner is planning to use another partner's unpublished results, Background and/or confidential information, ask for written permission (CA 8.3.2).
- If a partner is planning to use another partner's name, logo or trademark, ask for written permission (CA 8.3.4).

### 1.2 Objective of this Document

The objective of this document is to outline the plans for the long term availability of the project results. Project results can be categorised as follows:

- Project deliverables.
- Scientific publications.
- Contributions to standards.
- Software and Applications.
- Data (often traces) collected for analysis and evaluation.

The document is organised in several sections:

- Section 1 presents the INTER-IoT main goals and the general dissemination rules.
- Section 2 presents details of the datasets to be established.
- Section 3 describes the data availability for open access handling.
- Section 4 gives information about the participation in the Open Research Data Pilot.

## 2 DATASETS TO BE ESTABLISHED

A list of planned and expected data sets to be collected and generated in INTER-IoT project is presented below:

- Project deliverables.
- Scientific publications.
- Other publications and outputs.
- Contribution to standards.
- Software and applications.
- Data collected for analysis and evaluation.

More detail on the impact aspects of these datasets has been analysed and described in D8.3 “Impact Creation Plan” and the practical details on the management of the data sets will be provided on D8.4 “Data Management and Sustainability Plan”.

The project analyses available results from other research activities, publications, and further relevant information available. This information will be mainly used for internal project analysis and will be provided in respective project deliverables with appropriate references to origins of the gathered information. However, as the analysed information has not been created by INTER-IoT, the project is not considering provision of these data as public data sets because the INTER-IoT project does not own these information and results.

During the project lifetime, additional Information on the following aspects will be elaborated for all data sets on case by case base before making consortium decision on handling of the particular data generated or collected:

- Nature and scale of the data in consideration.
- To whom it could be useful, targeted audience and its size and level of interest.
- Information on the existence of similar data and possible synergies.
- Possibility for integration and reuse of the provided data by external users and researchers.
- Any further related issue.

The internal management of the information and the datasets will be handled using the Project Management tools deployed for the project, however to participate in ORDP different repositories will be used.

### 2.1 Public Deliverables

The list of the project deliverables is available for the public at the INTER-IoT project website <http://www.inter-iot-project.eu/deliverables>. The public project deliverables will be provided for download on the website after their approval by the consortium, submission to EC and approval by EC and external reviewers. The confidential deliverables will be not available through the website and they might be requested by external parties, in which case the consortium might make decision to disseminate corresponding deliverables or specific parts of the deliverables to particular external parties.

The project deliverables on the website will be provided in the widely adopted PDF format.

## 2.2 Scientific Publications

The scientific publications, mainly scientific papers, created by the consortium members, will contain technical results from the INTER-IoT project. These publications will be usually made available for a wide public audience. Restricted access to the publications will be accepted only if there are serious reasons expressed by the consortium members or publishers of the scientific papers, or if there are some restriction issues regarding copyright from the Editorial Company. Details on the scientific publication process, target journals, conferences and other

The consortium is strongly motivated to provide technological and scientific results that will be of major importance and interest for the scientific and industry communities. A set of international journals and conferences has been identified, which have a significant impact factor and broad public awareness respectively. Work conducted within INTER-IoT will be disseminated primarily through presentation at relevant conferences, fairs and meetings during the duration of the project. All dissemination activities will be carefully monitored and reported by the project consortium and scientific articles will also be prepared for the scientific community.

## 2.3 Other Publications

Besides the scientific publications mentioned above, e.g. in journals or conference proceedings, it is expected that the project will generate further publications and other project outcomes, such as:

- Promotion material (brochures, flyers, posters, etc.).
- Press releases and further project announcements.
- White papers created by the consortium on particular subjects.
- Information regarding the open call.
- Any further publication generated by the project.

Depending on the nature of these publications, the audience targeted by them, and potential for usability, they will be handled accordingly and stored in the adequate repository. Thus, all non-confidential publications will be provided on the project website and the project consortium. And following the ORDP approach in open repositories.

## 2.4 Contribution to Standards

Standardization constitutes an important dissemination activity in INTER-IoT project. It aims to contribute to the activities in major international standardization bodies, as defined in the INTER-IoT Description of Action (Part of the project Grant Agreement). For deployment of the new architecture a joint standardization initiative between and within the targeted standardisation and regulation bodies is planned to be initiated. The activity will be performed

by individual partners, group of partners, whole consortium or in the framework of different initiatives like IoT-EPI or AIOTI.

A central aim of this consortium is to provide benefit to the European member states and their population at large. INTER-IoT commits to integrate all results and products into adequate open source communities, under the applicable licenses (ej. CC BY<sup>2</sup>). Furthermore, project partners work closely with the standardisation bodies and it is planned to bring the working results directly into international developments.

Once, a contribution to a standardisation/regulation body from the INTER-IoT project is in preparation, appropriate publication means for the contribution (e.g. its availability in Open Access) will be discussed among the consortium members, to make a corresponding decision.

## 2.5 Software and Applications

The INTER-IoT project plans to develop and test several applications. In addition to the source code and binaries, documentation of the developed applications, their specifications, and other related material will be available in the project deliverables. INTER-IoT aims to follow an open source policy when possible, using open repositories like github or sourceforge for distributing the software and try to manage open source communities. Special care will be taken to protected foreground stated by the partners in the Consortium Agreement.

Rules for the development of code and software will be specified within WP3, WP4, WP5 and WP8. The groupware server will include links to Version Control System repositories for versioning management as required and defined by the WP.

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<sup>2</sup> <https://creativecommons.org/licenses/>

## 3 DATA AVAILABILITY

The exploitation commitment of the INTER-IoT partners, and the project's innovative aspects and results which may stimulate new products will require a careful planning of IPR issues. The INTER-IoT consortium will adopt the applicable IPR directives and regulations for Horizon 2020 by applying the principle of equality of all the partners towards the foreground knowledge and in full compliance with the general European Commission policies regarding ownership, exploitation rights and confidentiality.

### 3.1 IPR Management during the project

For the success of the project it is key that all partners agree on explicit rules concerning IP ownership, access rights to any Background and Foreground IP for the execution of the project before the project starts, as it was done with the signature of the CA on January 2016. Balancing with one of the main goals of INTER-IoT that is the release of every developed component within the project as open source with a CC BY license (as indicated in the GA), considering always the foreground provided by the partners and stated in the CA corresponding annex. Therefore, such issues have already been agreed during the elaboration of the proposal to avoid any conflict and they will be further detailed (in a legally binding form) within the Consortium Agreement between all project partners.

### 3.2 Access Rights to Background and Foreground IP

In order to ensure a smooth execution of the project, the partners agree to grant each other royalty-free Access Rights to the Background and Foreground IP necessary for the execution of the project. All backgrounds brought to the project after conclusion of the CA and foregrounds created in the project will have to be reported by the project partners claiming the IPR ownership to the Project Coordinator, who will then inform all consortium members. If no objections on the IPR ownership is received from the consortium within a defined period (matter of CA), the IPR will be recorded in the project document repository. Public project results, such as public deliverables, will be made available for wide public for information and research purposes, whereas commercial use of the public results might require particular agreements on related IPR's, as defined in the CA.

### 3.3 IP Ownership

Foreground IP shall be owned by the project partner carrying out the work leading to such Foreground IP. If any Foreground IP is created jointly by at least two project partners and it is not possible to distinguish between the contributions of each of the project partners, such work will be jointly owned by the contributing project partners. The same shall apply if, in the course of carrying out work on the project, an invention is made having two or more contributing parties contributing to it, and it is not possible to separate the individual contributions. Such joint inventions and all related patent applications and patents shall be jointly owned by the contributing parties.

### 3.4 Open Source and Standards

A central aim of this consortium is to provide benefit to the European member states and their population at large. INTER-IoT commits to integrate all results and products into adequate open source communities, under the applicable licenses. Furthermore, project partners work closely with the standardisation boards and it is planned to bring the working results directly into the international developments. The proposed license to be used is CC-BY, however if

### 3.5 Protection of knowledge and patents.

As a proper step in the exploitation of results the INTER-IoT project partners will file patents arising from project results. IPR rules will be described properly in the consortium agreement based on the EC recommendations.

### 3.6 Publishing model

INTER-IoT mainly targets top journal and conference venues, which may not always support an open access publishing model. For this reason, INTER-IoT cannot commit to consistent open access publishing. For publications not provided as open access, INTER-IoT commits to exploit a "green" open access strategy, consisting in the archival of a pre-print of the publication over public archives (e.g., arxiv) and/or personal/project web sites. The project partners strongly value fast and prompt dissemination of results, and will do all possible efforts to cope with the eventual restrictions (e.g. delays, limitations) posed by scientific publishers (e.g. by disseminating a technical report containing a preliminary version of the publication, etc.).

### 3.7 Digital Object Identifier repository

The data availability will be implemented by means of an own instance of a Digital Object Identifier (DOI) repository.

A digital object identifier (DOI) is a character string (a "digital identifier") used to uniquely identify an object such as an electronic document. Metadata about the object is stored in association with the DOI name and this metadata may include a location, such as a URL, where the object can be found. The DOI for a document remains fixed over the lifetime of the document, whereas its location and other metadata may change. Referring to an online document by its DOI provides more stable linking than simply referring to it by its URL, because if its URL changes, the publisher need only update the metadata for the DOI to link to the new URL. A DOI name differs from standard identifier registries such as the ISBN and ISRC. The purpose of an identifier registry is to manage a given collection of identifiers, whereas the primary purpose of the DOI system is to make a collection of identifiers actionable and interoperable.

Organizations that meet the contractual obligations of the DOI system and are willing to pay to become a member of the system can assign DOIs. The DOI system is implemented through a federation of registration and agencies coordinated by the International DOI Foundation, which developed and controls the system. The DOI system has been developed and implemented in a range of publishing applications since 2000; by late April 2011 more than 50

million DOI names had been assigned by some 4,000 organizations. By April 2013 this number had grown to 85 million DOI names assigned through 9,500 organizations.

Some scientific papers within INTER-IoT will have DOIs assigned by the editorial companies (e.g. IEEE, ACM or Springer), but other works may require that INTER-IoT consortium obtains the identifier. To get a DOI, INTER-IoT will use the service offered by a DOI Registration Agency (RA). RAs collect metadata, assign DOI names, and offer other services such as reference linking or metadata lookup. Landing pages for each Inter-IoT deliverable and publication will be developed, the URL of the landing pages is stored in the associated DOI. In the landing pages the actual download link of the document can be found, so that the archived publications and data can be reached through other websites as well.

## 4 OPEN RESEARCH DATA PILOT

### 4.1 Participation

Open Research Data Pilot (ORDP) is a new initiative of Horizon 2020 which aims to improve and maximise access to and reuse of research data generated by projects. The main focus of the Pilot is giving support and stimulate good practices and data management.

The Inter-IoT project is participating in the Open Research Data Pilot (ORDP), meaning that all publications, data and metadata to reproduce scientific experiments should be open access.

In the following section is presented an initial plan of the datasets that will be released, but since DMP is a living document (there will be updates in the project management reports) there is the possibility of opting out some of the datasets to be published if certain issues arise<sup>3</sup>.

### 4.2 ORDP Datasets

The following datasets will be included in the ORDP plan and will be released to a public repository:

- All open source software and components that are developed as part of the project, including source code and additional information.
- Results and enriched data derived from our research, as it will allow other researchers to verify and repeat the experiments. This will apply only to data which are not proprietary or commercially sensitive or do not have any ethical/legal implications will be made available. This is in line with the ORDP whereby a participant can opt out for reasons related to commercial, security or protection of personal data. D8.4 describes this aspect in detail listing the concrete datasets and the anonymization mechanisms to be used, especially for the INTER-HEALTH use case.
- All publications will ideally be made open access type gold (immediately accessible for free) if not certainly type green, in which case will be immediately released after the period of embargo. Note that if a peer reviewed publication contains any commercially sensitive content it will pass through IPR screening before being published and if any publishers are not "open access friendly", INTER-IoT can always opt to publish pre-print forms of articles as open access when allowed by the publishing companies

During the execution of the project new datasets could be considered to be published. Thus, this list will be considered as a living component that will be updated by the consortium after approval by the PCC. Each data set will be released being identified with a DOI.

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<sup>3</sup> See page 8 and 9 of "Guidelines on Open Access to Scientific Publications and Research Data in Horizon 2020" V2.1 (Feb. 2016)

## 4.3 Repositories

All data to be shared with or as part of the ORDP will be placed in a repository that will point to all data entities shared within ORDP so that these can be accessed, mined, exploited, reproduced, etc.

These repositories have to sustain the data value and be safe in legal terms, as well as maintain for as long as possible all the stored data. Preferably, it should support analysis and track data usage. For this reason, two main repositories will be used:

- Zenodo (<https://zenodo.org/>) is the repository recommended by the Open Access Infrastructure for Research in Europe (OpenAIRE).
- RiuNet (<https://riunet.upv.es/>) is an open access repository maintained by Universitat Politècnica de Valencia (UPVLC).

Although during the execution of the project other alternatives will be evaluated and considered.