# D8.4 Initial Data Management Plan

**WP8**

**Lead Partner: FENIX**

Partner Contributors: All partners

Dissemination Level: PU

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Deliverable Version: V1

| | |
|---|---|
| **Project Acronym** | EnDurCrete |
| **Project Title** | New Environmental friendly and Durable conCrete, integrating industrial by-products and hybrid systems, for civil, industrial and offshore applications |
| **Grant Agreement n°** | 760639 |
| **Funding Scheme** | Research Innovation Action |
| **Call** | H2020-NMBP-2017 |
| **Topic** | NMBP-06-2017<br>Improved material durability in buildings and infrastructures, including offshore |
| **Starting Date** | 1st January 2018 |
| **Duration** | 42 Months |

## Executive Summary

The present document constitutes deliverable D8.4 Initial Data Management Plan of the EnDurCrete project. It is a public document, delivered in the context of WP8 Training, dissemination and exploitation, Task 8.1 Dissemination, Communication and Networking. The objective of Task 8.1 is to design and create awareness raising tools and awareness raising campaigns.

This document presents the first release of Data Management Plan foreseen in the framework of the EnDurCrete project. The main purpose of this Deliverable is to provide the plan for managing the data generated and collected during the Project with focus on open access publication. Specifically, the Data Management Plan describes the data management life cycle for all datasets to be collected, processed and/or generated by the project. It covers:

- Identification of the results that should be subject of the EnDurCrete dissemination and exploitation
- Analysis of the main data uses and users
- Exploration of the restrictions related to Intellectual Property Rights in accordance with the Consortium Agreement
- Definition of the data assurance processes that are to be applied during and after the completion of the Project

In addition, the Data Management Plan specifies whether data will be shared/made open and how and what methodology and standards will be applied.

This document is prepared in compliance with the template provided by the Commission in the Annex 1 of the Guidelines on Data Management in Horizon 2020.

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## Abbreviations and Acronyms

| | |
|---|---|
| [AAC] | Advanced Audio Coding |
| [AB] | Advisory Board |
| [ATE] | Automatic Test Equipment |
| [AVI] | Audio Video Interleave |
| [CFO] | Chief Financial Officer |
| [CSO] | Chief Scientific-Technical Office |
| [DB] | Demonstration Board |
| [DESB] | Dissemination, Exploitation and Standardisation Board |
| [DMP] | Data Management Plan |
| [EC] | European Commission |
| [GA] | Grant Agreement |
| [MIDI] | Musical Instrument Digital Interface |
| [PC] | Project Coordinator |
| [PCG] | Project Coordination Group |
| [PDF] | Portable Document Format |
| [R&D] | Research and Development |
| [RP] | Report |
| [STDF] | Standard Test Data Format |
| [TB] | Technical Board |
| [UTI] | Uniform Type Identifier |
| [WMA] | Windows Media Audio |
| [WMV] | Windows Media Video |
| [WP] | Work package |

# 1 Introduction

This document constitutes the first issue of Data Management Plan (DMP) foreseen in the EU framework of the EnDurCrete project under Grant Agreement No. 760639. The objective of the DMP is to establish the measures for promoting the findings during the Project's life and detail what data the Project will generate, whether and how it will be exploited or made accessible for verification and re-use, and how it will be curated and preserved. The DMP enhances and ensures relevant Project´s information transferability and takes into account the restrictions established by the Consortium Agreement. In this framework, the DMP aligns The Dissemination, Communication and Networking Plan. The first version of the DMP is delivered at month 8, later the DMP will be monitored and regularly updated up to the release of the Final Data Management Plan. It is acknowledged that not all data types will be available at the start of the Project, thus whenever important, if any changes occur to the EnDurCrete project due to inclusion of new data sets, changes in consortium policies or external factors, the DMP will be updated in order to reflect actual data generated and the user requirements as identified by the EnDurCrete consortium participants.

The EnDurCrete project aims to develop a new cost-effective sustainable reinforced concrete for long lasting and added value applications. The concept is based on the integration of novel low-clinker cement including high-value industrial by-products, new nano and micro technologies and hybrid systems ensuring enhanced durability of sustainable concrete structures with high mechanical properties, self-healing and self-monitoring capacities.

EnDurCrete project comprises seven technical work packages as follows:

- WP1 Design requirements for structures exposed to aggressive environment
- WP2 Development and characterisation of new green and low-cost cementitious materials
- WP3 Innovative concrete technologies, including nano/microfillers, coatings and reinforcement
- WP4 Multifunctional and multiscale modelling and simulations of materials, components and structures
- WP5 Lab-scale performance testing and development of monitoring tools for concrete components & structures
- WP6 Prototyping, demonstration and solutions performance validation
- WP7 Life cycle assessment and economic evaluation, standardization and health and safety aspects

Two non-technical work packages ensure the facilitation of the technical work and coordination of all the work packages, dissemination and communication of the project results. These work packages consist of the following:

- WP8 Training, dissemination and exploitation
- WP9 Project Management

This document has been prepared to describe the data management life cycle for all data sets that will be collected, processed or generated by the EnDurCrete project. It is a document outlining how research data will be handled during the Project, and after the Project is completed. It describes what data will be collected, processed or generated and what methodologies and standards are to be applied. It also defines if and how this data will be shared and/or made open, and how it will be curated and preserved.

## 2 Open Access

Open access can be defined as the practice of providing online access to scientific information that is free of charge to the reader and that is reusable. In the context of R&D, open access typically focuses on access to "scientific information", which refers to two main categories:

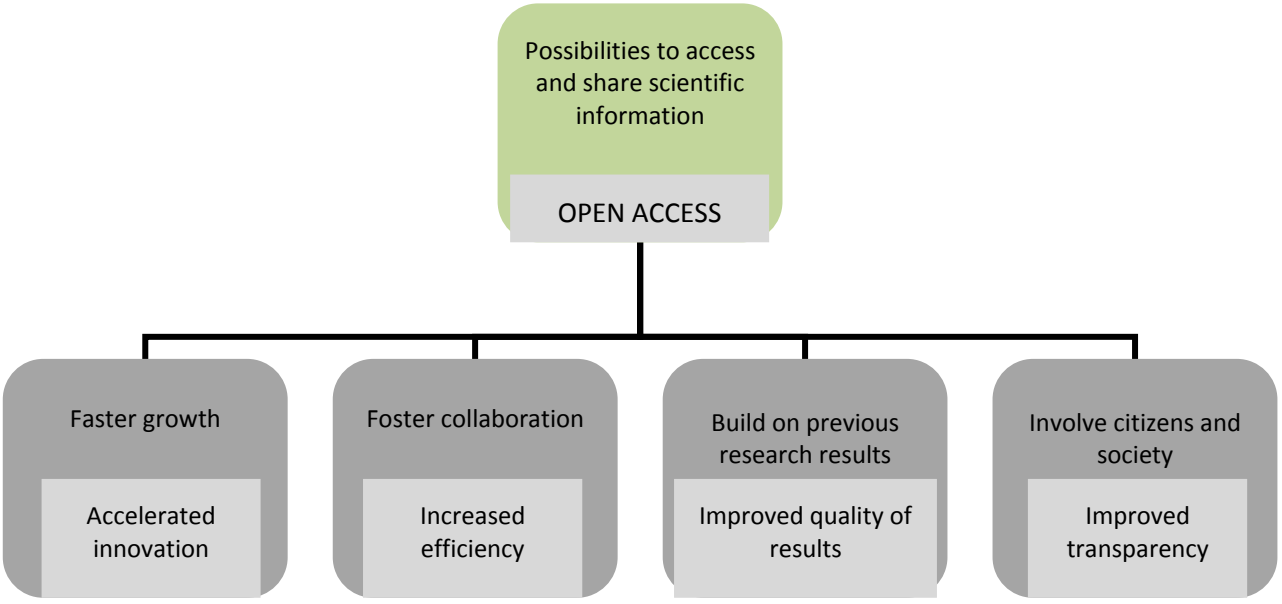
- Peer-reviewed scientific research articles (published in academic journals), or
- Scientific research data (data underlying publications and/or raw data).

It is important to note that:

- Open access publications go through the same peer review process as non-open access publications.
- As an open access requirement comes after a decision to publish, it is not an obligation to publish; it is up to researchers whether they want to publish some results or not.
- As the decision on whether to commercially exploit results (e.g. through patents or otherwise) is made before the decision to publish (open access or not), open access does not interfere with the commercial exploitation of research results. [1]

Benefits of open access:

- Unprecedented possibilities for the dissemination and exchange of information due to the advent of the internet and electronic publishing.
- Wider access to scientific publications and data including creation and dissemination of knowledge, acceleration of innovation, foster collaboration and reduction of the effort duplication, involvement of citizens and society, contribution to returns on investment in R&D etc.




[1] *European Commission background note on open access to publications and data in Horizon 2020*

Figure 1 - Open Access benefits

The EC capitalizes on open access and open science as it lowers barriers to accessing publicly-funded research. This increases research impact, the free-flow of ideas and facilitates a knowledge-driven society at the same time underpinning the EU Digital Agenda (OpenAIRE Guide for Research Administrators - EC funded projects). Open access policy of European Commission is not a goal in itself, but an element in promotion of affordable and easily accessible scientific information for the scientific community itself, but also for innovative small businesses.

## 2.1 Open Access to peer-reviewed scientific publications

Open access to scientific peer-reviewed publications (also known as Open Access Mandate) has been anchored as an underlying principle in the Horizon 2020 Regulation and the Rules of Participation and is consequently implemented through the relevant provisions in the Grant Agreement. Non-compliance can lead, amongst other measures, to a grant reduction.

More specifically, Article 29 of the EnDurCrete GA: "Dissemination of results - Open Access - Visibility of EU Funding" establishes the obligation to ensure open access to all peer-reviewed articles relating to the EnDurCrete project.

Article 29.2 EnDurCrete GA: Open access to scientific publications

"Each beneficiary must ensure open access (free of charge online access for any user) to all peer reviewed scientific publications relating to its results.

In particular, it must:

(a) as soon as possible and at the latest on publication, deposit a machine-readable electronic copy of the published version or final peer-reviewed manuscript accepted for publication in a repository for scientific publications;

Moreover, the beneficiary must aim to deposit at the same time the research data needed to validate the results presented in the deposited scientific publications.

(b) ensure open access to the deposited publication — via the repository — at the latest:

(i) on publication, if an electronic version is available for free via the publisher, or
(ii) within six months of publication (twelve months for publications in the social sciences and humanities) in any other case.

(c) ensure open access — via the repository — to the bibliographic metadata that identify the deposited publication.

The bibliographic metadata must be in a standard format and must include all of the following:

- the terms “European Union (EU)” and “Horizon 2020”;
- the name of the action, acronym and grant number;
- the publication date, and length of embargo period if applicable;
- a persistent identifier.”

### 2.1.1 Green Open Access

The green open access is also called self-archiving and means that the published article or the final peer-reviewed manuscript is archived by the researcher in an online repository before, after or alongside its publication. Access to this article is often delayed (embargo period). Publishers recoup their investment by selling subscriptions and charging pay-per-download/view fees during this period during an exclusivity period. This model is promoted alongside the “Gold” route by the open access community of researchers and librarians, and is often preferred.

### 2.1.2 Gold Open Access

The gold open access is also called open access publishing, or author pays publishing, and means that a publication is immediately provided in open access mode by the scientific publisher. Associate costs are shifted from readers to the university or research institute to which the researcher is affiliated, or to the funding agency supporting the research. This model is usually the one promoted by the community of well-established scientific publishers in the business.

## 2.2 Open Access to research data

“Research data” refers to information, in particular facts or numbers, collected to be examined and considered and as a basis for reasoning, discussion, or calculation. In a research context, examples of data include statistics, results of experiments, measurements, observations resulting from fieldwork, survey results, interview recordings and images. The focus is on research data that is available in digital form.

Article 29.3 EnDurCrete GA: 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' (see Annex 1 of the EnDurCrete GA);

(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.

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 Annex 1, would be jeopardized 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."

## 2.3 Dissemination & Communication and Open Access

For the implementation of the EnDurCrete project, there is a complete dissemination and communication set of activities scheduled, with the objectives of raising awareness in the research community, industry and wide public (e-newsletters, e-brochures, poster or events, are foreseen for the dissemination of the EnDurCrete to key groups potentially related to the project results' exploitation). Likewise, the EnDurCrete website, webinars, press releases or videos, for instance, will be developed for a communication to a wider audience. Details about all those dissemination and communication elements are provided in the deliverable D8.2 Communication, Networking and Dissemination Plan. The Data Management Plan and the actions derived are part of the overall EnDurCrete dissemination and communication strategy, which is included in the above-mentioned deliverable.

# 3 Objectives of Data Management Plan

The purpose of the EnDurCrete Data Management Plan is to provide a management assurance framework and processes that fulfil the data management policy that will be used by the EnDurCrete project partners regarding all the dataset types that will be generated by the EnDurCrete project. The aim of the DMP is to control and ensure quality of project activities, and to manage the material/data generated within the EnDurCrete project effectively and efficiently. It also describes how data will be collected, processed, stored and managed holistically from the perspective of external accessibility and long-term archiving.

The content of the DMP is complementary to other official documents that define obligations under the Grant Agreement and associated annexes, and shall be considered a living document and as such will be the subject of periodic updating as necessary throughout the lifespan of the Project.

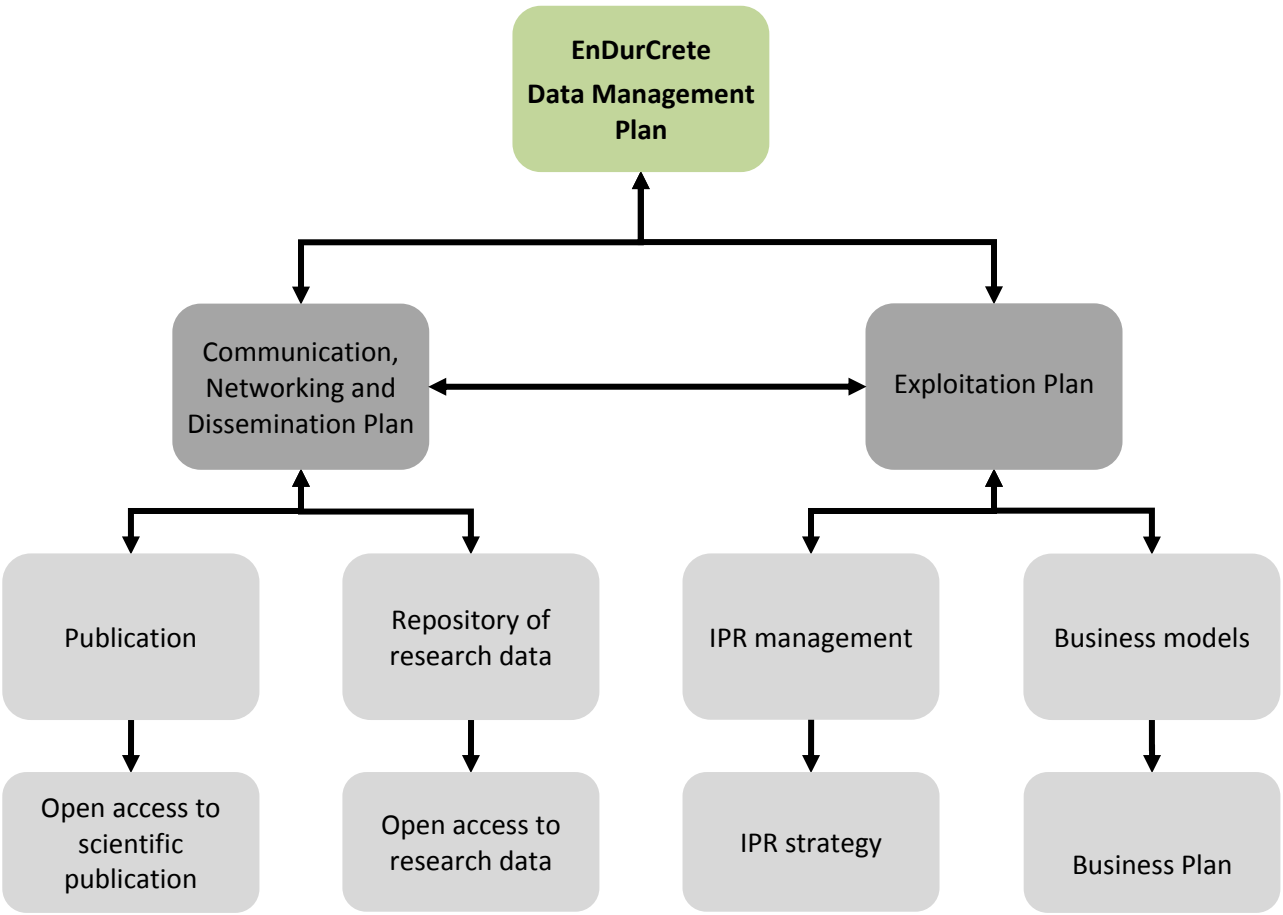



Figure 2 - EnDurCrete Data Management Plan overview

# 4 EnDurCrete Project Website - storage and access

EnDurCrete project website is used for storing both public and private documents related to project and dissemination, and is meant to be live for the whole project duration and minimum 2 years after the project end. Public section of the website contains mainly public deliverables, brochure, (roll up) poster, presentations, scientific papers, newsletters, magazine article, videos, photos, etc. Reserved Area section of the project website includes confidential deliverables, work packages related documentation, and is used as the main exchange of information among the Project partners.

The website www.endurcrete.eu was launched during the early Project stage, its design is done by dissemination leader FENIX that is also in charge of website maintenance and regular update. It is dynamic and interactive tool in order to ensure a clear communication and wide dissemination of project news, activities and results. The website is of primary importance due to the expected impact on the target audiences. It was designed to give quick, simple and neat information. The website is regularly updated with news and events related to EnDurCrete Project, press releases, magazine articles, scientific papers, etc. The website is available in English.

To ensure the safety of the data, the partners will use their available local file servers to periodically create backups of the relevant materials. The EnDurCrete project website itself already has its own backup procedures.

The Project Coordinator (HC) of the EnDurCrete along with the Dissemination and Exploitation Leader (FENIX) will be in charge for data management and all the relevant issues.

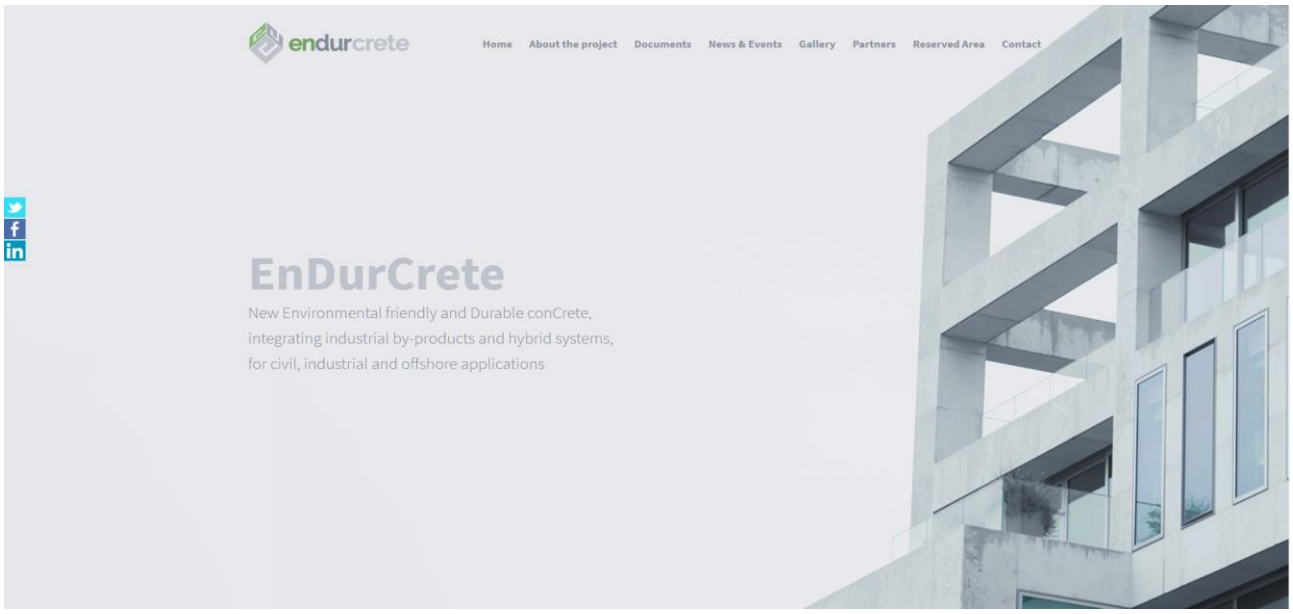



Figure 3 - EnDurCrete project website

# 5 Data Management Plan implementation

The organisational structure of the EnDurCrete project matches the complexity of the Project and is in accordance with the recommended management structure of the DESCA model Consortium Agreement. The organisational structure of the Project is shown in the figure below.

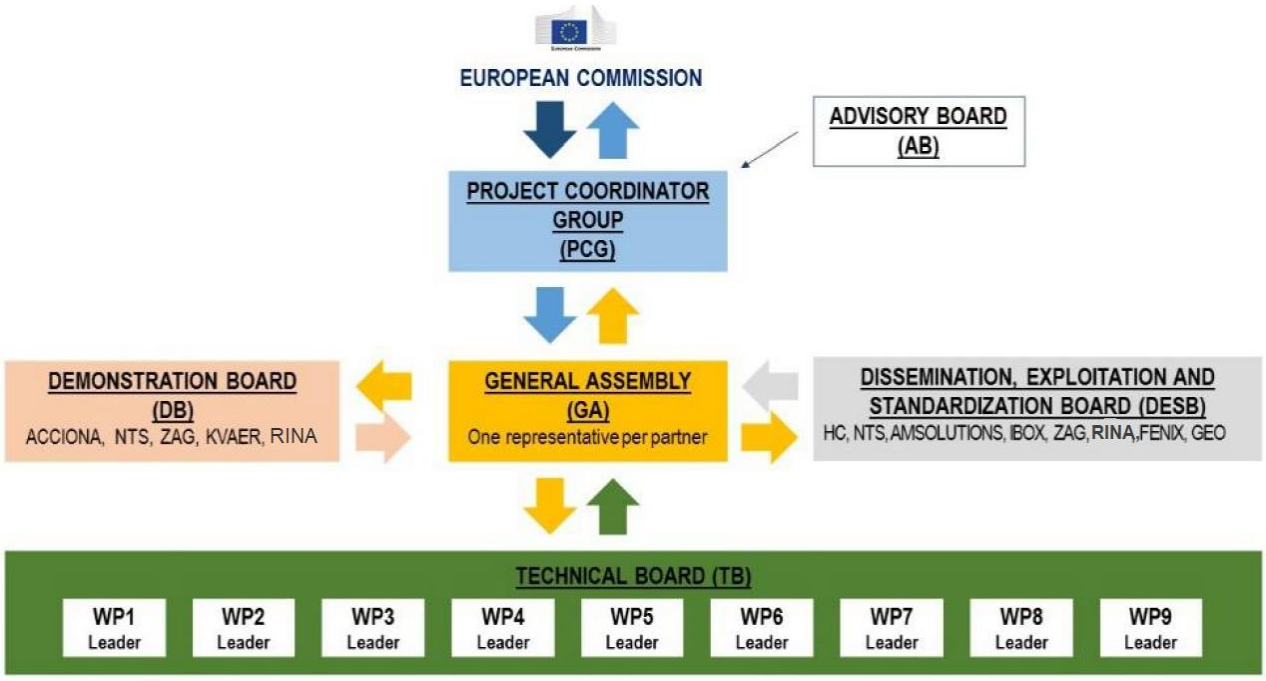



Figure 4 - Management and organizational structure of the EnDurCrete project

The general and technical management of the Project is handled by the **Project Coordination Group** (PCG). The PCG administers the project, acts as a single point of contact between the EnDurCrete consortium and the Commission. It provides the general direction to the project by regularly reporting to the General Assembly (GA). The PCG comprises the Project Coordinator (PC), the Chief Scientific-Technical Office (CSO), the Chief Financial Officer (CFO), and the Chief Administrative Officer.

Responsibilities of the PCG include:

- financial control,
- contractual issues,
- communication,
- IPR issues, and
- reporting to the Commission

The R&D work in the Project is divided in seven technical work packages and two non-technical work packages. Each work package is managed by **Work Package Leader** (WP Leader). WP Leaders are responsible for managing their work package as a self-contained entity.

Tasks and responsibilities of the WP Leaders include, among others, following:

- Coordination of the technical work in the WPs, including contribution to reporting
- Assessment of the WP progress to ensure the output performance, costs and timeline are met
- Identification of IPR issues and opportunities
- Organisation of the WP meetings
- Contribution to the dissemination activities
- Initiation of all actions necessary for reaching a solution or decision in consultation with the researchers involved and the PMs

In the case of technical problems at WP level, the WP Leader should be notified as soon as possible.

In addition, each WP is further subdivided into its large components tasks, which are allocated to a **Task Leader** responsible for their coordination.

In the organisation structure following management bodies are identified:

- **General Assembly (GA):**
  GA consists of one representative for each partner institution. Each representative is responsible for the proper utilization of the contractor's resources allocated to the project and for the attainment of the objectives assigned to his institution. Each representative further names a deputy who has the necessary knowledge and authorization to represent its institution in the framework of the EnDurCrete project.
- **Dissemination, Exploitation and Standardisation Board (DESB):**
  DESB forms a project body that shall assist and support the GA as far as concerns issues on the exploitation of results and disagreement resolutions. It constitutes the central office coordinating all the contacts towards stakeholder communities and other dissemination and communication target audiences. The DESB is also responsible for the performance of the innovation management activities.
- **Demonstration Board (DB):**
  DB coordinates the demonstration activities. The DB shall manage the activities performed in different locations with a common systemic approach.
- **Technical Board (TB):**
  TB is responsible for the technical activities of the Work Packages (WPs) and consists of all the WPs Leaders (WPLs). The TB directly refers to the GA and is responsible for providing technical updates on the on-going activities. The TB is also an essential tool to keep the whole consortium informed about any criticism, problem, and deviation from original plan that may arise when carrying out the technical activities.

The GA is supported by the **Advisory Board (AB)** consisting of the number of external experts that will be selected on the basis of their profound and long-lasting expertise in the field of research, innovation and industrialisation.

Partners of the EnDurCrete project demonstrate relevant management capabilities necessary to support and provide major contribution to all the activities envisaged in the Project work. All partners and their roles in the EnDurCrete project are listed in the following table.

Table 1 - EnDurCrete partners and their role in the project

| No. | Partner short name | Partner legal name | Partner role in the EnDurCrete project |
|---|---|---|---|
| 1 | HC | HEIDELBERGCEMENT AG | HC is a Project coordinator and leader of Development and characterisation of new green and low-cost cementitious materials. HC brings key knowledge on the development of new environmentally friendly low-clinker binders and of concrete mixes integrating novel additive technologies. In addition, HC is responsible for the Project Management. |
| 2 | RINA-C | RINA CONSULTING SPA | RINA-C develops requirements for structures exposed to harsh environmental conditions, designs and optimises smart textile self-monitoring reinforcing system, performs modelling simulation activities, calibrates monitoring tools and performs structural health monitoring activities. Additionally, RINA-C develops EnDurCrete business models and contributes to exploitation. RINA-C has also small contributions for LCA and safety related aspects. |
| 3 | CEA | COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES | CEA leads Multifunctional and multiscale modelling and simulations of materials, components and structures, being involved in modelling and simulations. CEA also contributes to Lab-scale performance testing and development of monitoring tools for concrete components and structures. CEA is responsible for the assessment of the exposure likelihood of the new nano-modified EnDurCrete products. |
| 4 | ACCIONA | ACCIONA CONSTRUCCION SA | ACCIONA provides its expertise to the demonstration and performance validation activities in the demonstration sites located in Spain. ACCIONA also collaborates in the definition of requirements for concrete design mix and additives to be used and develops concrete mix designs integrating new designed durability technologies and prepares concrete specimens for later analysis. ACCIONA also participates with NDT technologies NT492 and electrical resistivity measurements to asset |

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|---|---|---|---|
| | | | corrosion in laboratory specimens. |
| 5 | KVAERNER | KVAERNER AS | KVAERNER is primarily in charge to write the requirements for offshore platforms within Requirements and conceptual design of new components and structures and contributes in Multifunctional and multiscale modelling and simulation of materials, components and structures. KVAERNER also performs testing at Stord shipyard to simulate North Sea water condition. |
| 6 | SIKA | SIKA TECHNOLOGY AG | SIKA is a leader of Innovative concrete technologies, including nano/microfillers, coatings and reinforcement and coordinates the design and development of new durable concrete systems incorporating innovative technologies. SIKA is in charge of evaluating the compatibility of the novel additives developed by other partners with common additives in use in current concrete technology. |
| 7 | ZAG | ZAVOD ZA GRADBENISTVO SLOVENIJE | ZAG's main contribution to the project deals with lab-scale performance testing, the demonstration in a real environment (Croatia), performance validation (as far as concerns corrosion monitoring) and the promotion of standardisation activities. |
| 8 | VITO | VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V. | VITO contributes customized sustainable supplementary cementitious materials to the project and collaborates in the development of the low impact binder with minimal Portland cement content. In addition, VITO contributes to the environmental assessment and high-grade recyclability of the end products. In particular VITO will establish second life reuse potential of the developed concrete products. |
| 9 | NTNU | NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU | NTNU leads the characterization of the novel cementitious materials and contributes to modelling of the phase assemblage of the novel binders. In addition, NTNU contributes to the simulations of the experimental laboratory tests by providing experimental data and a critical review of the simulation results. NTNU performs purpose-build tests to validate or estimate durability parameters required for the numerical models. |
| 10 | UNIVPM | UNIVERSITA POLITECNICA DELLE MARCHE | UNIVPM is an academic leader of Lab-scale performance testing and development of monitoring tools for concrete components and structures. UNIVPM develops and optimizes |

| | | | |
|---|---|---|---|
| | | | novel self-sensing cement based mixtures manufactured with green micro-fillers and it contributes to their durability assessment. UNIVPM manages the calibration and testing of the self-sensing/monitoring properties of the new concrete. UNIVPM will develop advanced non-destructive testing tools for non-intrusive in-field inspection, which will be used in selected demos. |
| 11 | FENIX | FENIX TNT SRO | FENIX is in charge of training, dissemination and exploitation activities. |
| 12 | GEO | GEONARDO ENVIRONMENTAL TECHNOLOGIES LTD | GEO leads Life cycle assessment and economic evaluation, standardization and health and safety aspects and brings its expertise to address environmental and economic sustainability (LCA and LCC) and standardisation aspects. It also performs training activities on sustainable concrete products. |
| 13 | AMSolution | PROIGMENES EREVNITIKES & DIAHIRISTIKES EFARMOGES | The main role of AMSolution is to develop and optimise new multi-functional protective coatings. AMSolution is responsible for development of multi-functional coating formulation with self-healing as well as solar/UV reflection, hydrophobicity, anti-molding and self-cleaning properties; investigation and optimization of encapsulation technique for the achievement of desired healing efficiency in final coating formulation and finally, execution of variety tests for the confirmation of the full compatibility of the investigated materials. |
| 14 | NTS | NUOVA TESI SYSTEM SRL | NTS brings expertise in precasting process and performance evaluation. Additionally, NTS will manufacture the prototypes used for the demonstrations. NTS is also a recipient of scope visits for adequate safety assessment and management. |
| 15 | IBOX | I-BOX CREATE S.L. | The main contribution of IBOX concerns the development and optimisation of smart corrosion inhibitors, based on nano-modified clays. |
| 16 | INFRA PLAN | INFRA PLAN KONZALTNIG JDOO ZA USLUGE | The main role of INFRA PLAN is to lead the demonstration activity on the Krk bridge and contribute to ND monitoring activities. INFRA PLAN leads the Prototyping, demonstration and performance validation in a bridge in Croatia, by providing planning and the execution of the monitoring project. |

# 6 Research data

"Research data" refers to information, in particular facts or numbers, collected to be examined and considered as a basis for reasoning, discussion, or calculation. In a research context, examples of data include statistics, results of experiments, measurements, observations resulting from fieldwork, survey results, interview recordings and images. The focus is on research data that is available in digital form.

As indicated in the Guidelines on Data Management in Horizon 2020 (European Commission, Research & Innovation, October 2015), scientific research data should be easily:

- DISCOVERABLE

  The data and associated software produced and/or used in the project should be discoverable (and readily located), identifiable by means of a standard identification mechanism (e.g. Digital Object Identifier).

- ACCESSIBLE

  Information about the modalities, scope, licenses (e.g. licencing framework for research and education, embargo periods, commercial exploitation, etc.) in which the data and associated software produced and/or used in the project is accessible should be provided.

- ASSESSABLE and INTELLIGIBLE

  The data and associated software produced and/or used in the project should be easily assessable for and intelligible to third parties in contexts such as scientific scrutiny and peer review (e.g. the minimal datasets are handled together with scientific papers for the purpose of peer review, data is provided in a way that judgments can be made about their reliability and the competence of those who created them).

- USEABLE beyond the original purpose for which it was collected

  The data and associated software produced and/or used in the project should be useable by third parties even long time after the collection of the data (e.g. the data is safely stored in certified repositories for long term preservation and duration; it is stored together with the minimum software, metadata and documentation to make it useful; the data is useful for the wider public needs and usable for the likely purposes of non-specialists).

- INTEROPERABLE to specific quality standards

  The data and associated software(s) produced and/or used in the project should be interoperable allowing data exchange between researchers, institutions, organisations, countries, etc.

Some examples of research data include:

- Documents (text, Word), spreadsheets
- Questionnaires, transcripts, codebooks
- Laboratory notebooks, field notebooks, diaries
- Audiotapes, videotapes
- Photographs, films
- Test responses, slides, artefacts, specimens, samples
- Collection of digital objects acquired and generated during the process of research
- Database contents (video, audio, text, images)
- Models, algorithms, scripts
- Contents of an application (input, output, logfiles for analysis software, simulation software, schemas)
- Methodologies and workflows
- Standard operating procedures and protocols.

In addition to the other records to manage, some kinds of data may not be sharable due to the nature of the records themselves, or to ethical and privacy concerns (e.g. preliminary analyses, drafts of scientific papers, plans for future research, peer reviews, communication with partners, etc.). Research data also do not include trade secrets, commercial information, materials necessary to be held confidential by researcher until they are published, or information that could invades personal privacy. Research records that may also be important to manage during and beyond the project are: correspondence, project files, technical reports, research reports, etc.

# 7 Data sets of the EnDurCrete project

Projects under Horizon 2020 are required to deposit the research data - the data, including associated metadata, needed to validate the results presented in scientific publications as soon as possible; and other data, including associated metadata, as specified and within the deadlines laid down in a data management plan.

At the same time, projects should provide information (via the chosen repository) about tools and instruments at the disposal of the beneficiaries and necessary for validating the results, for instance specialised software(s) or software code(s), algorithms, analysis protocols, etc. Where possible, they should provide the tools and instruments themselves.

The types of data to be included within the scope of the EnDurCrete Data Management Plan shall as a minimum cover the types of data that is considered complementary to material already contained within declared Project Deliverables. In order to collect the information generated during the Project, the template for data collection will be circulated periodically every 6 months. The scope of this template is to detail the research results that will be developed during the EnDurCrete project detailing the kind of results and how it will be managed. The responsibility to define and describe all non-generic data sets specific to an individual work package is with the WP leader.

Data Set Reference and Name

Identifier for the data set to be produced. All data sets within this DMP have been given a unique field identifier and are listed in the table 10.1 (List of the EnDurCrete project data sets and sharing strategy).

Data Set Description

A data set is defined as a structured collection of data in a declared format. Most commonly a data set corresponds to the contents of a single database table, or a single statistical data matrix, where every column of the table represents a particular variable, and each row corresponds to a given member of the data set in question. The data set may comprise data for one or more fields. For the purposes of this DMP data sets have been defined by generic data types that are considered applicable to the EnDurCrete project. For each data set, the characteristics of the data set have been captured in a tabular format as enclosed in table 4 (List of the EnDurCrete project data sets and sharing strategy).

Standards & Metadata

Metadata is defined as “data about data”. It refers to structured information that describes, explains, locates, and facilitates the means to make it easier to retrieve, use or manage an information resource.

Metadata can be categorised in three types:

- Descriptive metadata describes an information resource for identification and retrieval through elements such as title, author, and abstract.
- Structural metadata documents relationships within and among objects through elements such as links to other components (e.g., how pages are put together to form chapters).
- Administrative metadata manages information resources through elements such as version number, archiving date, and other technical information for the purposes of file management, rights management and preservation.

There are a large number of metadata standards which address the needs of particular user communities.

Data Sharing

During the period, when the Project is live, the sharing of data shall be defined by the configuration rules defined in the access profiles for the project participants. Each individual project data set item shall be allocated a character "dissemination classification" (i.e. public, or confidential) for the purposes of defining the data sharing restrictions. The classification shall be an expansion of the system of confidentiality applied to deliverables reports provided under the EnDurCrete Grant Agreement.

The above levels are linked to the "Dissemination Level" specified for all EnDurCrete deliverables as follows:

- PU Public
- CO Confidential, only for members of the consortium (including the Commission Services)
- EU-RES Classified Information: RESTREINT UE (Commission Decision 2005/444/EC)
- EU-CON Classified Information: CONFIDENTIEL UE (Commission Decision 2005/444/EC)
- EU-SEC Classified Information: SECRET UE (Commission Decision 2005/444/EC)

All material designated with a PU dissemination level is deemed uncontrolled. In case the dataset cannot be shared, the reasons for this should be mentioned (e.g. ethical, rules of personal data, intellectual property, commercial, privacy-related, or security-related).

Data will be shared when the related deliverable or paper has been made available at an open access repository. The expectation is that data related to a publication will be openly shared. However, to allow the exploitation of any opportunities arising from the raw data and tools, data sharing will proceed only if all co-authors of the related publication agree. The Lead author is responsible for getting approvals and then with FENIX assistance sharing the data and metadata on Zenodo (www.zenodo.org), a popular repository for research data. The Lead Author will also create an entry on OpenAIRE (www.openaire.eu) in order to link the publication to the data. A link to the OpenAIRE entry will then be submitted to the EnDurCrete Website Administrator (FENIX) by the Lead Author.

OpenAIRE is an EC/funded initiative designated to promote the open access policies of the EC and help researchers, research officers and project coordinators comply with them. OpenAIRE implements the Horizon 2020 Open Access Mandate for publications and its Open Research Data Pilot and may be used to reference both the publication and the data. Each EC project has its own page on OpenAIRE, featuring project information, related project publications and data sets, and a statistics section.

In case of any questions regarding the Open Access policy of the EC the representatives of the National Open Access Desk for OpenAIRE should be contacted.

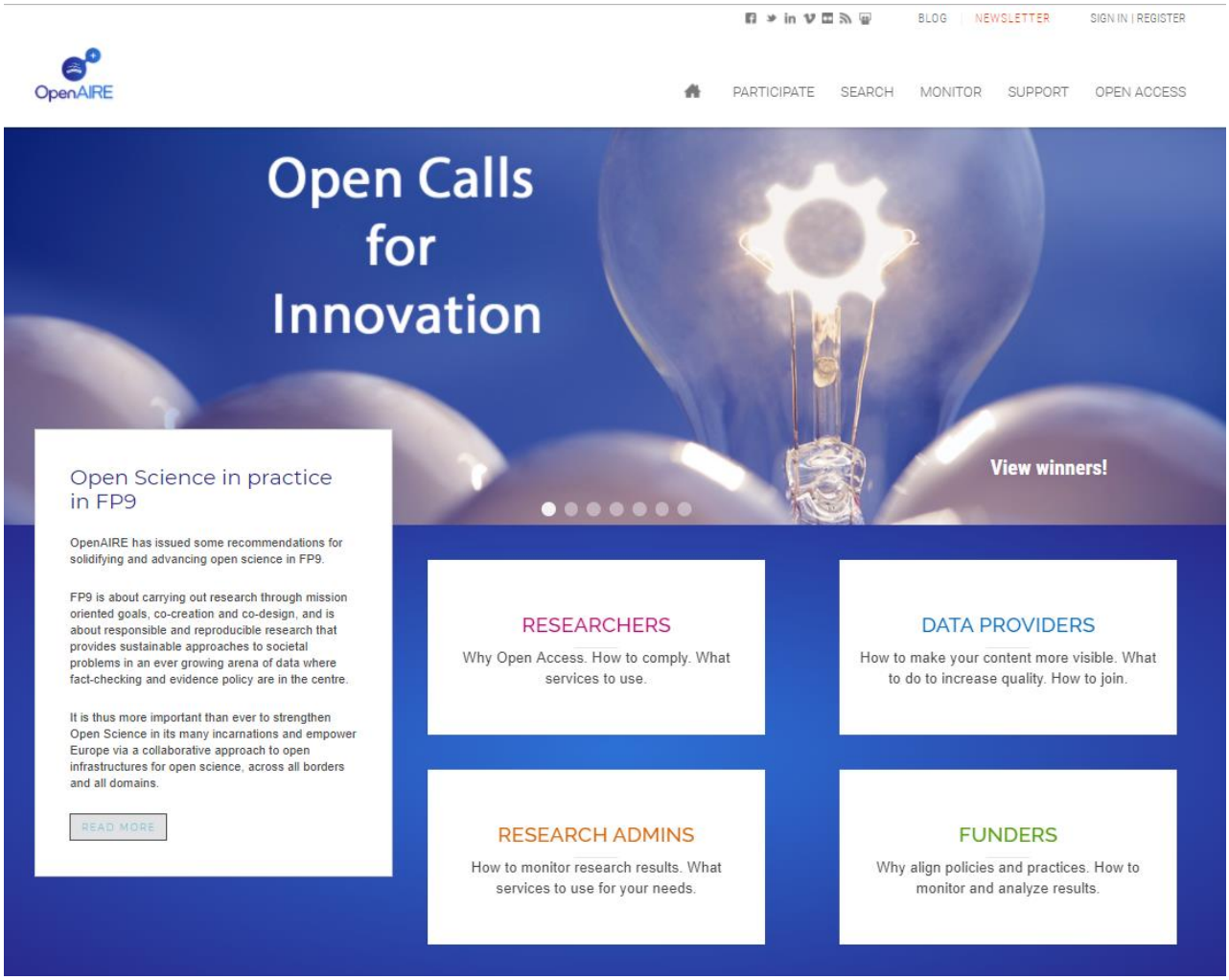


Figure 5 - Open Aire website

Data archiving and preservation

Both Zenodo and OpenAIRE are purpose-built services that aim to provide archiving and preservation of long-tail research data. In addition, the EnDurCrete website, linking back to OpenAIRE, is expected to be available for at least 2 years after the end of the Project. At the formal Project closure all the data material that has been collated or generated within the Project

and classified for archiving shall be copied and transferred to a digital archive (Project Coordinator responsibility).

The document structure and type definition will be preserved as defined in the document breakdown structure and work package groupings specified. At the time of document creation, the document will be designated as a candidate data item for future archiving. The process of archiving will be based on a data extract performed within 12 weeks of the formal closure of the EnDUrCrete project.

The archiving process shall create unique file identifiers by the concatenation of “metadata” parameters for each data type. The metadata index structure shall be formatted in the metadata order. This index file shall be used as an inventory record of the extracted files, and shall be validated by the associated WP leader.

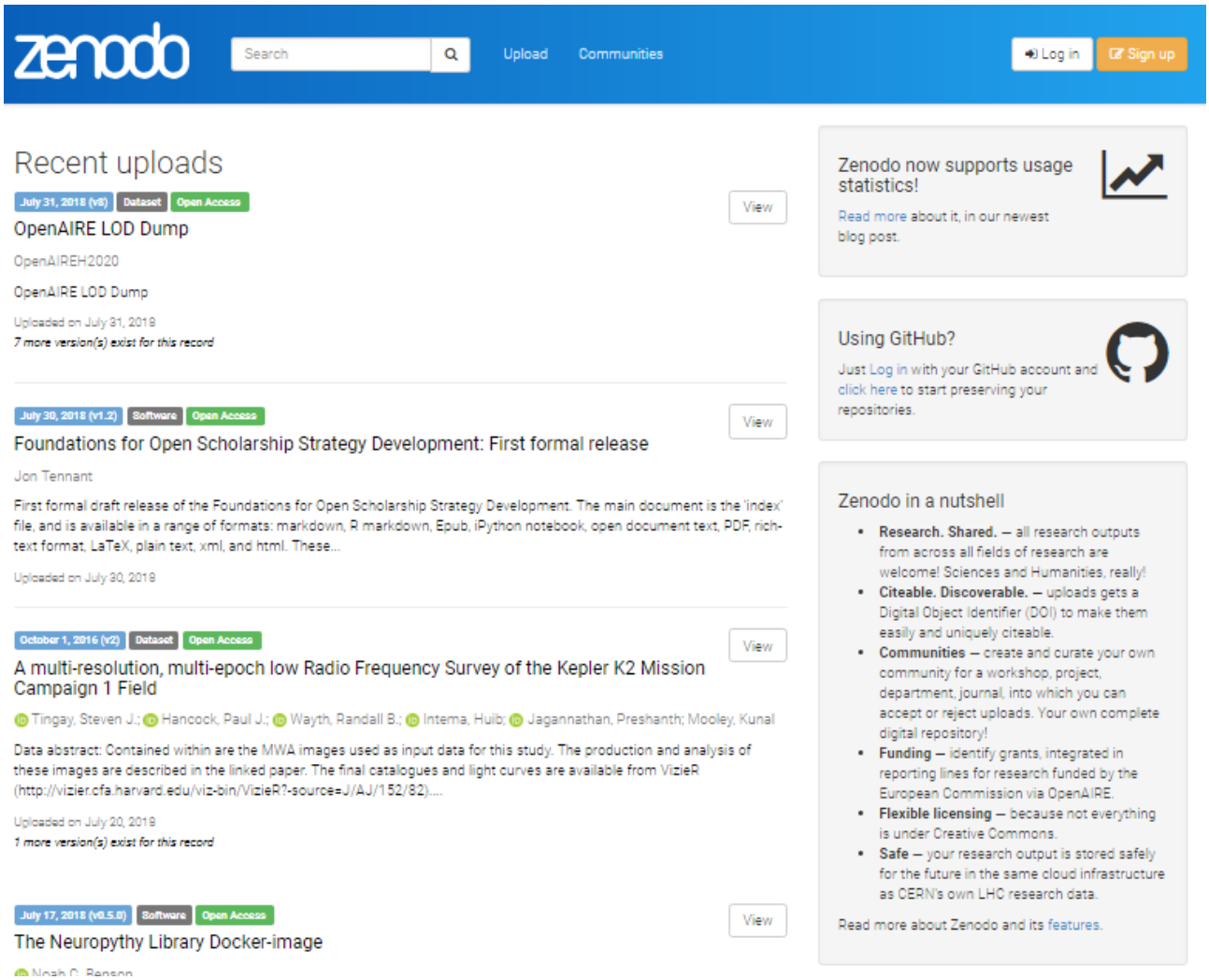


Figure 6 - ZENODO repository

# 8 Technical requirements of data sets

The applicable data sets are restricted to the following data types for the purposes of archiving. The technical characteristics of each data set are described in the following sections. The copy rights with respect to all data types shall be subject to IPR clauses in the Grant Agreement but shall be considered to be royalty free. The use of file compression utilities, such as “WinZip” is prohibited. No data files shall be encrypted.

## 8.1 Engineering CAD drawings

The .dwg file format is one of the most commonly used design data formats, found in nearly every design environment. It signifies compatibility with AutoCAD technology. Autodesk created .dwg in 1982 with the launch of its first version of AutoCAD software. It contains all the pieces of information a user enters, such as: Designs, Geometric data, Maps, Photos.

## 8.2 Static graphical images

Graphical images shall be defined as any digital image irrespective of the capture source or subject matter. Images should be composed such to contain only objects that are directly related to EnDurCrete activity and do not breach IPR of any third parties.

Image files are composed of digital data and can be of two primary formats of “raster” or “vector”. It is necessary to represent data in the rasterised state for use on a computer displays or for printing. Once rasterized, an image becomes a grid of pixels, each of which has a number of bits to designate its colour equal to the colour depth of the device displaying it. The EnDurCrete project shall only use raster-based image files. The allowable static image file formats are JPEG and PNG.

There is normally a direct positive correlation between image file size and the number of pixels in an image, the colour depth, or bits per pixel used in the image. Compression algorithms can create an approximate representation of the original image in a smaller number of bytes that can be expanded back to its uncompressed form with a corresponding decompression algorithm. The use of compression tools shall not be used unless absolutely necessary.

## 8.3 Animated graphical images

Graphic animation is a variation of stop motion and possibly more conceptually associated with traditional flat cell animation and paper drawing animation, but still technically qualifying as stop motion consisting of the animation of photographs (in whole or in parts) and other non-drawn flat visual graphic material. The allowable animated graphical image file formats are AVI, MPEG, MP4, and MOV. The WP leader shall determine the most suitable choice of format based on equipment availability and any other factors. This is mainly valid for the EnDurCrete project promo video, which is expected to contain animated graphical images, infographics and on-site interviews.

Table 2 - Video formats

| Format | File | Description |
|---|---|---|
| **MPEG** | .mpg<br>.mpeg | MPEG. Developed by the Moving Pictures Expert Group. The first popular video format on the web. Used to be supported by all browsers, but it is not supported in HTML5 (See MP4). |
| **AVI** | .avi | AVI (Audio Video Interleave). Developed by Microsoft. Commonly used in video cameras and TV hardware. Plays well on Windows computers, but not in web browsers. |
| **WMV** | .wmv | WMV (Windows Media Video). Developed by Microsoft. Commonly used in video cameras and TV hardware. Plays well on Windows computers, but not in web browsers. |
| **QuickTime** | .mov | QuickTime. Developed by Apple. Commonly used in video cameras and TV hardware. Plays well on Apple computers, but not in web browsers. (See MP4) |
| **RealVideo** | .rm<br>.ram | RealVideo. Developed by Real Media to allow video streaming with low bandwidths. It is still used for online video and Internet TV, but does not play in web browsers. |
| **Flash** | .swf<br>.flv | Flash. Developed by Macromedia. Often requires an extra component (plug-in) to play in web browsers. |
| **Ogg** | .ogg | Theora Ogg. Developed by the Xiph.Org Foundation. Supported by HTML5. |
| **WebM** | .webm | WebM. Developed by the web giants, Mozilla, Opera, Adobe, and Google. Supported by HTML5. |
| **MPEG-4 or MP4** | .mp4 | MP4. Developed by the Moving Pictures Expert Group. Based on QuickTime. Commonly used in newer video cameras and TV hardware. Supported by all HTML5 browsers. Recommended by YouTube. |

## 8.4 Audio data

An audio file format is a file format for storing digital audio data on a computer system. The bit layout of the audio data (excluding metadata) is called the audio coding format and can be uncompressed, or compressed to reduce the file size, often using lossy compression. The data can be a raw bitstream in an audio coding format, but it is usually embedded in a container format or an audio data format with defined storage layer. The allowable animated audio file formats is MP3 or MP4. This is mainly valid for the EnDurCrete project promo video, which is expected to contain interviews with key partners, voice over and music.

Table 3 - Audio formats

| Format | File | Description |
|---|---|---|
| **MIDI** | .midi<br>.mid | MIDI (Musical Instrument Digital Interface). Main format for all electronic music devices like synthesizers and PC sound |

| | | |
|---|---|---|
| | | cards. MIDI files do not contain sound, but digital notes that can be played by electronics. Plays well on all computers and music hardware, but not in web browsers. |
| **RealAudio** | .rm<br>.ram | RealAudio. Developed by Real Media to allow streaming of audio with low bandwidths. Does not play in web browsers. |
| **WMA** | .wma | WMA (Windows Media Audio). Developed by Microsoft. Commonly used in music players. Plays well on Windows computers, but not in web browsers. |
| **AAC** | .aac | AAC (Advanced Audio Coding). Developed by Apple as the default format for iTunes. Plays well on Apple computers, but not in web browsers. |
| **WAV** | .wav | WAV. Developed by IBM and Microsoft. Plays well on Windows, Macintosh, and Linux operating systems. Supported by HTML5. |
| **Ogg** | .ogg | Theora Ogg. Developed by the Xiph.Org Foundation. Supported by HTML5. |
| **MP3** | .mp3 | MP3 files are actually the sound part of MPEG files. MP3 is the most popular format for music players. Combines good compression (small files) with high quality. Supported by all browsers. |
| **MPEG-4 or MP4** | .mp4 | MP4. Developed by the Moving Pictures Expert Group. Based on QuickTime. Commonly used in newer video cameras and TV hardware. Supported by all HTML5 browsers. Recommended by YouTube. |

## 8.5 Textual data

A text file is structured as a sequence of lines of electronic text. These text files shall not contain any control characters including end-of-file marker. In principle the least complicated form of textual file format shall be used as the first choice.

On Microsoft Windows operating systems, a file is regarded as a text file if the suffix of the name of the file is "txt". However, many other suffixes are used for text files with specific purposes. For example, source code for computer programs is usually kept in text files that have file name suffixes indicating the programming language in which the source is written. Most Windows text files use "ANSI", "OEM", "Unicode" or "UTF-8" encoding.

Prior to the advent of Mac OS X, the classic Mac OS system regarded the content of a file to be a text file when its resource fork indicated that the type of the file was "TEXT". Lines of Macintosh text files are terminated with CR characters.

Being certified Unix, macOS uses POSIX format for text files. Uniform Type Identifier (UTI) used for text files in macOS is "public.plain-text".

## 8.6 Numeric data

Numerical Data is information that often represents a measured physical parameter. It shall always be captured in number form. Other types of data can appear to be in number form i.e. telephone number, however this should not be confused with true numerical data that can be processed using mathematical operators.

## 8.7 Process and test data

Standard Test Data Format (STDF) is a proprietary file format originating within the semiconductor industry for test information, but it is now a Standard widely used throughout many industries. It is a commonly used format produced for/by automatic test equipment (ATE). STDF is a binary format, but can be converted either to an ASCII format known as ATDF or to a tab delimited text file. Software tools exist for processing STDF generated files and performing statistical analysis on a population of tested devices. EnDurCrete innovation development shall make use of this file type for system testing.

## 8.8 Adobe Systems

Portable Document Format (PDF) is a file format developed by Adobe Systems for representing documents in a manner that is independent of the original application software, hardware, and operating system used to create those documents. A PDF file can describe documents containing any combination of text, graphics, and images in a device independent and resolution independent format. These documents can be one page or thousands of pages, very simple or extremely complex with a rich use of fonts, graphics, colour, and images. PDF is an open standard, and anyone may write applications that can read or write PDFs royalty-free. PDF files are especially useful for documents such as magazine articles, product brochures, or flyers in which you want to preserve the original graphic appearance online.

# 9 GDPR compliance

At every stage, the EnDurCrete project management and Project Consortium will ensure that the Data Management Plan is in line with the norms of the EU and Commission [as expressed in the General Data Protection Regulation (GDPR) (Regulation (EU) 2016/679)] and will promote best practice in Data Management. The GDPR comes into force on 25 May 2018.

The responsibility of protection and use of personal data[2] is on the Project partner collecting data. The questionnaire answers shall be anonymized in as early stage of the process, and data making it possible to connect the answers to individual persons shall be destroyed. The consent of the questionnaire participant will be asked in all questionnaires conducted within the EnDurCrete project. This will include a description how and why the data is to be used. The consent must be clear and distinguishable from other matters and provided in an intelligible and easily accessible form, using clear and plain language. It must be as easy to withdraw consent as it is to give it.

The questionnaire participants will not include children or other groups requiring a supervisor. Also when asking for somebody's contact information, the asking party shall explain why this information is asked and for what purposes it will be used.

Controller and Processor

Controller means the natural or legal person, public authority, agency or other body which, alone or jointly with others, determines the purposes and means of the processing of personal data.

Processor refers to a natural or legal person, public authority, agency or other body which processes personal data on behalf of the controller.

Data Protection Officer

The Data Protection Officer (DPO) is responsible for overseeing data protection strategy and implementation to ensure compliance with GDPR requirements. Under the GDPR, there are three main scenarios where the appointment of a DPO by a controller or processor is mandatory:

- The processing is carried out by a public authority
- The core activities of the controller or processor of processing operations which require regular and systematic processing of data subjects on a large scale; or
- The core activities of the controller or processor consist of processing on a large scale of sensitive data or data relating to criminal convictions / offences.

[2] Article 4 GDPR: "'personal data' means any information relating to an identified or identifiable natural person ('data subject'); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person"

Each EnDurCrete partner shall assess its own data processing activities to understand whether they fall within the scope of the requirements set out above. If they do, then it will be important to either fulfil the DPO position internally or from an external source. For those organisations to whom the requirements do not apply, they may still choose to appoint a DPO. If they choose not to appoint a DPO, then it is recommended to document the reasoning behind that decision.

Data protection

European citizens have a fundamental right to privacy. In order to protect this right of individual data subject, the anonymisation and pseudonymisation can be used.

Anonymisation refers to personal data processing with the aim of irreversibly preventing the identification of the individual to whom it relates. For the anonymized types of data, the GDPR does not apply, as long as the data subject cannot be re-identified, even by matching his/her data with other information held by third parties.

Pseudonymisation refers to the personal data processing in such a manner that the data can no longer be attributed to a specific data subject without the use of additional information.[3] To pseudonymize a data set, the additional information must be kept separately and subject to technical and organizational measures to ensure non/attribution to an identified or identifiable person. In other words, the pseudonymized data constitutes the basic privacy-preserving level allowing for some data sharing, and represent data where direct identifiers (e.g. names) or quasi-identifiers (e.g. unique combinations of date and zip codes) are removed and data is mismatched with a substitution algorithm, impeding correlation of readily associated data to the individual's identity. For such data, GDPR applies and appropriate compliance must be ensured.

Due to the limited amount and less harmful nature of the personal data that is collected within the EnDurCrete project, neither pseudonymisation nor anonymisation will be used. Other means of data security will be used to protect data collected in the framework of the Project.

Breach Notification

Under the GDPR, breach notification will become mandatory in all member states where a data breach is likely to "result in a risk for the rights and freedoms of individuals". This must be done within 72 hours of first having become aware of the breach. Data processors will also be required to notify the data subjects and the controllers, "without undue delay" after first becoming aware of a data breach.

Right to be Forgotten

Also known as Data Erasure, the right to be forgotten entitles the data subject to have the data controller erase his/her personal data, cease further dissemination of the data, and potentially have third parties halt processing of the data. The conditions for erasure include the data no longer being relevant to original purposes for processing, or a data subjects withdrawing consent.

[3] Article 4 GDPR

It should also be noted that this right requires controllers to compare the subjects' rights to "the public interest in the availability of the data" when considering such requests. If a data subject wants his/her personal data to be removed from a questionnaire, the non-personal data shall remain in the analysis of the questionnaire.

Data portability

GDPR introduces data portability which refers to the right for a data subject to receive the personal data concerning them, which they have previously provided in a 'commonly use and machine readable format' and have the right to transmit that data to another controller.

The personal data collected within EnDurCrete project will be in electronic form, mostly in Microsoft Excel file forms .xls or .xlsx. In case the data subject requests to transmit his/her data to another controller there should be no technical limitations for providing them.

Privacy by design and by default

Privacy by design refers to the obligation of the controller to implement appropriate technical and organisational measures, such as pseudonymisation, which are designed to implement data protection principles, such as data minimisation, in an effective manner and to integrate the necessary safeguards into the processing.

Privacy by default means that the controller shall implement appropriate technical and organisational measures for ensuring that only personal data which are necessary for each specific purpose of the processing are processed. That obligation applies to:

- the amount of personal data collected,
- the extent of personal data processing,
- the period of personal data storage, and
- the accessibility of personal data.

In particular, such measures shall ensure that by default personal data are not made accessible without the individual's intervention to an indefinite number of natural persons.[4]

Personal data collected during the EnDurCrete project will be used only by project partners, including linked third parties, and only for purposes needed for the implementation of the project. Also within the EnDurCrete project, if someone of the project consortium asks for personal data, the partner holding the data should consider whether that data is needed for the implementation of the Project. If personal data is provided, the data shall not be distributed further within or outside the Project.

[4] Article 25 GDPR

Records of processing activities

Records of data processing and plans for the use of data will be kept by the WP Leaders of those work packages that collect personal data.

# 10 Expected research data of the EnDurCrete project

Expected research data of the EnDurCrete project is listed below. The table template will be circulated periodically in order to monitor the data sets and set the strategy for their sharing.

Table 4 - List of the EnDurCrete project data sets and sharing strategy

| WP number and name | WP lead | Task number and name | Duration | Task lead | Dataset name | Dataset description | Format | Level[5] |
|---|---|---|---|---|---|---|---|---|
| WP1 Design requirements for structures exposed to aggressive environment | RINA-C | Task 1.1: Requirements and design process for marine environment | M1-M5 | RINA-C | List of technical directives, surveys, standards and regulations for concrete materials in the target applications | Report describing the development of guideline documents for concrete structures exposed to the different aggressive environments (marine, continental and offshore). | .pdf | PU |
| | | | | | Design requirements for concrete structures exposed to marine environment | Report reviewing actual technical directives, surveys, standards and regulations applying to concrete materials for harbours and maritime construction at European level, as well as some key national documents. | .pdf | CO |
| | | Task 1.2: Requirements and design process for continental environment (road | M1-M6 | RINA-C | List of technical directives, surveys, standards and regulations for concrete materials in | Report describing the development of guideline documents for concrete structures exposed to the different aggressive | .pdf | PU |

[5] PU – public, CO - confidential

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| | | infrastructures) | | | the target applications | environments (marine, continental and offshore). | | |
| | | | | | Design requirements for concrete structures exposed to continental environment (road infrastructures) | Report reviewing actual technical directives, surveys, standards and regulations applying to concrete materials for continental construction at European level, as well as some key national documents. | .pdf | CO |
| | | Task 1.3: Requirements and design process for offshore platforms | M1-M5 | KVAERNER | List of technical directives, surveys, standards and regulations for concrete materials in the target applications | Report describing the development of guideline documents for concrete structures exposed to the different aggressive environments (marine, continental and offshore). | .pdf | PU |
| | | | | | Offshore design requirements | Design loads, design process, design requirements, environmental exposure scenario, concrete constituencies and composition, references | .pdf | CO |
| **Data Sharing** | | • Confidential data: Reserved Area on the EnDurCrete website<br>• Public data: EnDurCrete website | **Data Archiving and preservation** | | EnDurCrete website and RINA-C server | **Data management Responsibilities** | Eriselda Lirza | |

| WP number and name | WP lead | Task number and name | Duration | Task lead | Dataset name | Dataset description | Format | Level |
|---|---|---|---|---|---|---|---|---|
| WP2 Development and characterisation of new green and low-cost cementitious materials | HC | Task 2.1: Optimisation of a novel Portland Composite Cement, including sustainable supplementary cementitious materials | M2-M7 | HC | D2.1 Report on in depth characterisation of Portland Composite Cement components | Report | .pdf | CO |
| | | | | | Results of the characterisation of individual cement components | Raw data and results of the various experiments carried out within T2.1 (TGA, XRD, calorimetry, PSD, trace elements and heavy metals, SEM-images) | .xlsx .png | CO |
| | | Task 2.2: Development of customised separate grinding technology for each PCC component | M5-M8 | HC | D2.2 Report on optimization of most promising mixes to be further investigated | Report | .pdf | CO |
| | | | | | Results of the cement development | Raw data and results of the tested cements within T2.2 (strength, workability, PSD) | .xlsx | CO |
| | | Task 2.3: Characterization of the novel cementitious materials | M5-M8 | NTNU | Results of the hydration study phase assemblage and reaction degree of the hydrated novel binders | Raw data and results of the various experiments performed within T2.3 (TGA, XRD, calorimetry, chemical shrinkage, rheological measurements, SEM-EDS, MIP) | .xlsx .docx .tif .jpg | CO |
| | | | | | D2.3 Report on rheological | This report describes the results of the rheological | .docx .pdf | CO |

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| | | | | | measurements and packing | tests performed in T2.3 | | |
| | | | | | D2.4 Report on the hydration study | This report describes the results of the hydration tests performed in T2.3 | .docx .pdf | CO |
| **Data Sharing** | | • Confidential data: Reserved Area on the EnDurCrete website and Heidelberg Cement server<br>• Raw data and results: Heidelberg Cement server<br>• Public data: EnDurCrete website | **Data Archiving and preservation** | | EnDurCrete website and Heidelberg Cement server | **Data management Responsibilities** | Gerd Bolte<br>Arnaud Muller | |
| **WP number and name** | **WP lead** | **Task number and name** | **Duration** | **Task lead** | **Dataset name** | **Dataset description** | **Format** | **Level** |
| WP3 Innovative concrete technologies, including nano/ microfillers, coatings and reinforcement | SIKA | Task 3.1: Development and optimization of smart corrosion inhibitors, based on nano-modified clays | M1-M15 | IBOX | Protocols with the synthesis description | Files with the description of the different steps to follow for the development and optimization of smart corrosion inhibitors, based on nano-modified clays | .pdf | CO |
| | | | | | Characterization graphs | graphs with the characterization of the synthesized products applying different techniques, such as, X-ray | .pdf .jpeg | CO |

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| | | | | | | diffraction, thermogravimetric analysis, infrared or ultra violet spectroscopy | | |
| | | Task 3.2: Development and optimization of novel self-sensing carbon-based green micro-fillers | M1-M15 | UNIVPM | Analysis of carbon based green micro-fillers behaviour in cement | Composition and properties, graphs | .xlsx; .pdf; .docx | CO |
| | | | | | Test data | Data of tests performed during the characterization of the self-sensing properties | .jpg; .xlsx; .pdf | CO |
| | | Task 3.3: Development and optimization of new multi-functional protective coatings | M1-M15 | AM - SOLUTIONS | Development of self-healing coatings | Images coming from microscopy techniques for the evaluation of microcapsules and coatings. | .png | CO |
| | | | | | Development of self-cleaning coatings | Contact angle measurements for the evaluation of self-cleaning performance of particles and coatings. | .xlsx | CO |
| | | | | | Development of anti-moulding coatings | Measurements and photos of anti-moulding properties of particles and coatings. | .xlsx, .png | CO |
| | | | | | Development of light-reflective coatings | Measurements of thermal behaviour of the coatings under IR lamps. | .xlsx | CO |
| | | | | | D3.6 Development and evaluation of new multi-functional | Report on self-healing agents for developed EnDurCrete coatings | .pdf | CO |

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| | | | | | protective coatings | | | |
| | | Task 3.4: Evaluation of compatibility of additives in concrete | M4-M12 | SIKA | - | - | - | - |
| | | | | | - | - | - | - |
| | | Sub Task 3.5.1: Development of mix designs according to requirements defined in WP1 | M3-M9 | HC | D3.1 Report on optimized mix designs using novel binders | Report | .pdf | CO |
| | | | | | Results of the concrete development | Raw data and results of concrete development (mix design/concrete composition, strength, workability and durability results) | .xlsx | CO |
| | | Sub Task 3.5.2: Implementation of novel additives | M6-M12 | HC | Implementation of novel additives in concrete | Raw data and results of the impact of the novel additive technologies (mix design/concrete composition, resulting concrete properties) | .xlsx | CO |
| | | Sub Task 3.5.3: Preparation of concrete specimens for lab-scale testing | M9-M15 | ACCIONA | - | - | - | - |
| | | Sub Task 3.5.4: Validation, final tuning and roll out to WP6 | M20-M22 | HC | D3.9 Report on optimized mix designs using novel binders and additives ready for upscaling in WP6 | Report | .pdf | CO |
| | | | | | Optimized mix design | Raw data and results of | .xlsx | CO |

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| | | | | | using additives | concrete development with additives (mix design/concrete composition, resulting concrete properties) | | |
| | | Task 3.6 Design and integration of the multifunctional self-monitoring reinforcing system | M1-M15 | RINA-C | Textiles datasheets | Datasheets of textiles selected as candidates for the application | .pdf | CO |
| | | | | | Optical fiber sensors datasheets | Datasheets of optical fiber sensors selected as candidates for the application | .pdf | CO |
| | | | | | Test images | Pictures related to the technological embedding tests | .jpg | CO |
| | | | | | Test videos | Videos of the technological embedding tests | video | CO |
| | | Sub Task 3.6.1: Design of multifunctional self-monitoring reinforcing system | M1-M12 | RINA-C | Textiles datasheets | Datasheets of textiles selected as candidates for the application | .pdf | CO |
| | | | | | Optical fiber sensors datasheets | Datasheets of optical fiber sensors selected as candidates for the application | .pdf | CO |
| | | Subtask 3.6.2: Integration of the multifunctional self-monitoring reinforcing system | M6-M15 | NTS | Test images | Pictures related to the technological embedding tests | .jpg | CO |
| | | | | | Test videos | Videos of the technological embedding tests | video | CO |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Data Sharing** | | • Confidential data: Reserved Area on the EnDurCrete website<br>• Public data: EnDurCrete website, Zenodo | **Data Archiving and preservation** | | EnDurCrete website and servers of the respective partners | **Data management Responsibilities** | TBD | |
| **WP number and name** | **WP lead** | **Task number and name** | **Duration** | **Task lead** | **Dataset name** | **Dataset description** | **Format** | **Level** |
| WP4 Multifunctional and multiscale modelling and simulations of materials, components and structures | CEA | Task 4.1: Completed EnDurCrete MODA template | M1-M41 | RINA-C | EnDurCrete MODA | Modelling work flow and description of the single modelling steps | .docx .ppt | PU |
| | | Task 4.2: Multiscale modelling of the ageing mechanical and diffusive properties of the new materials due to hydration and degradation | M3-M30 | CEA | - | - | - | - |
| | | | | | - | - | - | - |
| | | Sub task 4.2.1: Simulation of the phase assemblage of the novel binders | M3-M24 | NTNU | Results of the modelling of the phase assemblage | Input data, modelling code, and results of the modelling of the phase assemblage performed within T4.2.1 | .xlsx .docx | CO |
| | | | | | D4.1 Report on modelling of the | This report presents the results of the modelling | .docx | CO |

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| | | | | | phase assemblage of the novel binders | activities performed in T4.2.1, which constitutes inputs for T4.2.2 (D4.2) | .pdf | |
| | | Subtask 4.2.2: Multiscale modelling of the material mechanical and diffusive properties at the cement paste, mortar and concrete scale | M3-M30 | CEA | D4.2 Report on multiscale analytical modelling at the cement paste, mortar and concrete scale | Report describes modelling methods and results | .pdf | CO |
| | | | | | Results of the multiscale analytical modelling | Input data and results of the modelling (evolution of the effective properties as a function of phase assemblage) | .xlsx | CO |
| | | Task 4.3: Computational analyses of micro-mesostructures for model testing and corrosion and cracking investigations | M9-M36 | CEA | D4.3 Report on computational analyses of micro-mesostructures | Report describes modelling and simulations at micro-meso scale | .pdf | CO |
| | | | | | Results of the computational analyses of micro-mesostructures | Results of the computational analyses: evolution of effective properties, degradation (carbonation), cracking (carbonation-induced corrosion) | .xlsx, .png .jpg .gif | CO |
| | | Task 4.4: Computational analyses of macrostructures for service life estimation | M30-M39 | RINA-C | Report on computational analyses of macrostructures for service life estimation, including corrosion phenomena and critical | This report describes macro modelling and simulations, aiming ultimately at service life prediction of critical infrastructures. | .pdf | CO |

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| | | | | | environments | | | |
| **Data Sharing** | | • Confidential data: Reserved Area on the EnDurCrete website<br>• Public data: EnDurCrete website, Zenodo | **Data Archiving and preservation** | | EnDurCrete website and servers of the respective partners | **Data management Responsibilities** | Benoît Bary | |

| WP number and name | WP lead | Task number and name | Duration | Task lead | Dataset name | Dataset description | Format | Level |
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| WP5 Lab-scale performance testing and development of monitoring tools for concrete components & structures | UNIVPM | Task 5.1: Lab-scale performance testing | M12-M20 | ZAG | Lab-scale development of self-healing coatings | Images coming from microscopy techniques for the evaluation of the coatings. | .png | CO |
| | | | | | Reports on air permeability tests | Reports | .pdf | CO |
| | | | | | Reports on carbonation tests | Reports | .pdf | CO |
| | | | | | Reports on chloride diffusion tests | Reports | .pdf | CO |
| | | | | | Reports on water absorption and penetration of water tests | Reports | .pdf | CO |
| | | | | | Reports on porosity tests | Reports | .pdf | CO |
| | | | | | Reports on FT and FTS tests | Reports | .pdf | CO |
| | | | | | Reports on corrosion | Reports | .pdf | CO |

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| | | | | | tests | | | |
| | | | | | D5.1 Report on durability testing | Report on the durability tests results performed in T5.1, with the goal of assessing the durability of novel concrete EnDurCrete solutions (against several benchmarks) and giving inputs for computational model calibration. | .pdf | CO |
| | | Task 5.2: Calibration and laboratory testing of self-sensing/monitoring properties | M12-M21 | UNIVPM | Test data | Data of tests performed during the metrological characterization of the self-sensing/monitoring properties | mat; json; xls; pdf. | CO |
| | | Task 5.3: Advanced NDT tools for non-intrusive in-field inspection | M12-M30 | UNIVPM | Test data | Data of tests performed during the metrological characterization of the self-sensing/monitoring properties | mat; json; xls; pdf. | CO |
| | | Sub Task 5.3.1: NDT solutions for cracks/sub-surface damages and moisture | M12-M30 | UNIVPM | Test data | Data of tests performed during the metrological characterization of the self-sensing/monitoring properties | jpg; mat; json; xls; pdf. | CO |
| | | | | | Test data | Data of tests performed during the metrological characterization of the self-sensing/monitoring properties | mat; json; xls; pdf. | CO |

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| | | Sub Task 5.3.2: Ion migration under Electrical field | M12-M30 | CEA | Test data | Data of tests performed during the ion migration under electrical field measurement | .jpg<br>.txt<br>.xlsx<br>.mphbin<br>.mphtxt | CO |
| | | | | | Ion migration under electrical field study | Report on the feasibility of Ion migration under electrical field measurement as NDT solutions | .doc<br>.pdf | CO |
| | | Sub Task 5.3.3: Electrical resistivity measurement | M12-M30 | ACCIONA | Electrical resistivity measurement | Evaluation of the electrical resistivity in EnDurCrete concretes | .docx | CO |
| **Data Sharing** | | EnDurCrete project website in Reserved Area | **Data Archiving and preservation** | | Regular backup of data on server, managed by IT departments and EnDurCrete website | **Data management Responsibilities** | Gian Marco Revel; Paolo Chiariotti | |

| WP number and name | WP lead | Task number and name | Duration | Task lead | Dataset name | Dataset description | Format | Level |
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| WP6 Prototyping, demonstration and solutions performance validation | ACCIONA | Task 6.1: Demonstration and Validation Plan | M17-M22 | UNIVPM | - | - | - | - |
| | | Task 6.2: Prototyping, demonstration and | M22-M40 | ACCIONA | Evaluation of coatings performance | Images coming from optical observation | .png | CO |

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| | | performance validation in a maritime port in Spain | | | | (including microscopy techniques) for the evaluation of the coatings. | | |
| | | | | | Evaluation of EnDurCrete concretes and additives in a maritime port | Strength, porosity, permeability, chloride content, electrical conductivity, and SEM results | .docx | CO |
| | | Task 6.3: Prototyping, demonstration and performance validation in a tunnel in Spain | M22-M40 | ACCIONA | Evaluation of coatings performance | Images coming from optical observation (including microscopy techniques) for the evaluation of the coatings. | .png | CO |
| | | | | | Evaluation of EnDurCrete concretes and additives in a tunnel | Strength, porosity, permeability, chloride content, electrical conductivity, and SEM results | .docx | CO |
| | | Task 6.4: Prototyping, demonstration and performance validation in an offshore structure in Norway | M22-M40 | KVAERNER | Evaluation of coatings performance | Images coming from optical observation (including microscopy techniques) for the evaluation of the coatings. | .png | CO |
| | | Task 6.5: Prototyping, demonstration and performance validation in a bridge in Croatia | M22-M40 | INFRA PLAN | Evaluation of coatings performance | Images coming from optical observation (including microscopy techniques) for the evaluation of the coatings. | .png | CO |

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| | | | | | D6.3 Ready-mix concrete prototypes ready for demonstration | Report on prototypes for the bridge demo. | .pdf | CO |
| | | | | | D6.6 Pilot deployment report on the Adriatic coast bridge demo site | Report describing the bridge pilot, the installation made, including the sensors and monitoring equipment. | .pdf | CO |
| | | Task 6.6: Analysis of the results and validation of EnDurCrete solutions | M27-M40 | RINA-C | Evaluation of coatings performance | Images coming from optical observation (including microscopy techniques) for the evaluation of the coatings. | .png | CO |
| | | | | | Demo data analysis 2 | Data related to physical and mechanical parameters (corrosion progress, mechanical strength, porosity, water permeability, Chloride content, electrical conductivity etc.) | .xls<br>.doc | CO |
| **Data Sharing** | | • Confidential data: Reserved Area on the EnDurCrete website | **Data Archiving and preservation** | | EnDurCrete website and partners' servers | **Data management Responsibilities** | Rosa Lample | |
| **WP number and name** | **WP lead** | **Task number and name** | **Duration** | **Task lead** | **Dataset name** | **Dataset description** | **Format** | **Level** |
| WP7 | GEO | Task 7.1: Environmental | M2-M42 | GEO | Life cycle inventories | The inventory of all | .xls | CO |

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| Life cycle assessment and economic evaluation, standardization and health and safety aspects | | and economic viability of the novel products based on LCA and LCCA | | | | inputs (material, energy etc.) related to all considered (sub)products | | |
| | | | | | D7.1 Sustainability Life Cycle Assessment of the new product types | Short report providing overview of the key factors influencing the sustainability of the novel products | .pdf | PU |
| | | | | | D7.2 Life Cycle Analysis at material level | Intermediate report on LCA of the new materials, cradle-to-gate | .pdf | CO |
| | | | | | D7.5 Report on environmental and economic viability of the novel products based on the findings of the LCA and LCCA | Final report including LCA on the product level ( cradle-to-grave) and life cycle cost analysis | .pdf | PU |
| | | Task 7.2: Standardisation | M6-M42 | ZAG | D7.4 Recommendations for updates of current European standards and national technical requirements | Report on technical recommendations collected during the projects for updates of existing standards or for future standards | .pdf | PU |
| | | | | | Recommendations for updates of current European standards and national technical requirements | Presentation on technical recommendations collected during the projects for updates of existing standards or for future standards | .pdf | For relevant CEN TCs |
| | | Task 7.3: Assessment of the exposure likelihood of the new nano- | M1-M42 | CEA | Samples pictures | Pictures of the different samples tested (before/after) to illustrate | .jpg | CO |

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| | | modified EnDurCrete products | | | | the final report | | |
| | | | | | Mechanicals tests and artificial protocols | Description of the mechanical tests and the climatic ageing done on samples and also of the standards used to performed its | .docx<br>.pdf | CO |
| | | | | | Real-time measurements raw data | Data obtained by CPC, FMPS, OPC during mechanical tests on no-aged and aged samples | .txt<br>.xlsx | CO |
| | | | | | Off-line measurements raw data | SEM/TEM pictures, EDS spectra, XPS data on samples collected during the mechanical tests | .jpg<br>.tif | CO |
| | | | | | Report on assessment of nanomaterial exposure likelihood | Global report on the evaluation of the general exposure likely to occur and the value chain and the life cycle of the new “Endurcrete” concrete materials developed in WP3.<br>The report is based on data obtained by CEA, IBOX, NTS and DAPP | .pdf | CO |
| | | Task 7.4: Health, safety and risk assessment and management activities | M6-M42 | CEA | Questionnaire for scoping visit | Questionnaire addressed to Endurcrete partners who handled or synthetized nanoparticles to plan scoping visit and performed in second time measurement campaign | .doc | CO |

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| | | | | | | (exposure assessment) | | |
| | | | | | Raw data obtain during measurement campaign (real-time and off-lines) | Real-time measurement and off-lines characterisations obtained during measurement campaign performed in Endurcrete partners facilities where nanoparticles are used (handling or synthetised) | .txt<br>.jpg<br>.tif<br>.xlsx<br>.doc | CO |
| | | | | | Report on health and safety assessment and management measures | Global report in two parts, 1st regarding the occupational exposure assessment and management, 2nd regarding the risk assessment and management<br>The report is based on data obtain by CEA, IBOX, NTS and DAPP | .pdf | CO |
| **Data Sharing** | | • Confidential data: Reserved Area on the EnDurCrete website<br>• Public data: EnDurCrete website, Zenodo | **Data Archiving and preservation** | | EnDurCrete website and servers of the respective partners | **Data management Responsibilities** | Jakub Heller | |
| **WP number and name** | **WP lead** | **Task number and name** | **Duration** | **Task lead** | **Dataset name** | **Dataset description** | **Format** | **Level** |
| WP8 Training, | FENI X | Task 8.1: Dissemination, Communication and | M1-M42 | FENIX | D8.1 Project Website | Report describing the project website, including | .pdf | PU |

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| dissemination and exploitation | | Networking | | | | public and private area | | |
| | | | | | D8.2 Communication, Networking and Dissemination plan | Report identifying target audiences, key messages, communication channels, roles and timelines | .pdf | CO |
| | | | | | D8.3 Promo material design | Images and logos from project partners, photos/videos from dissemination events, project promo videos consisting of animated graphical images, filming, voice over and music. Promo materials shared online | .eps, .jpeg, .png, .mpeg, .avi, .mp4, .pdf | PU |
| | | | | | D8.4 Initial Data Management Plan | Initial data management plan analysing the main data uses and restrictions, with focus on open access publication | .pdf | PU |
| | | | | | D8.7 Progress report on dissemination and networking activities and awareness campaign | Progress report on performed dissemination and networking activities and activities towards spreading project awareness among stakeholders and public workshop organization | .pdf | PU |
| | | | | | D8.9 Final Data Management Plan | Final data management plan, including references to open | .pdf | PU |

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| | | | | | | access publication developed by the Consortium | | |
| | | | | | D8.11 Final report on dissemination and networking activities and awareness campaign | Final report on performed dissemination and networking activities and activities towards spreading project awareness among stakeholders and public workshop organization | .pdf | PU |
| | | Task 8.2: Exploitation and IPR management | M3-M42 | FENIX | D8.5 Market Assessment | Preliminary market assessment mapping concrete market and other relevant sectors information | .pdf | CO |
| | | | | | D8.6 Initial Exploitation Plan | Initial identification of the key project exploitable results, characterization of each result and its expected use, individual partners' exploitation plans and identification of potential risks | .pdf | CO |
| | | | | | D8.10 Final Exploitation Plan | Report on final version of the exploitation plan, consolidating comprehensive exploitation strategy | .pdf | CO |
| | | Task 8.3: Business models | M12-M42 | RINA-C | D8.8 Business models | Business models for the new technologies, paving the way for future | .pdf | CO |

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| | | | | | | market uptake | | |
| | | Task 8.4: Training Activities | M24-M42 | GEO | D8.12 Report on training activities and guidelines | Report on training activities and guidelines and webinars for easy installation, use and disassembly of the new solution | .pdf | PU |
| **Data Sharing** | | • Confidential data: Reserved Area on the EnDurCrete website<br>• Promo material (PU): EnDurCrete website, social network profiles, videos on YouTube, thematic portals<br>• Public data: EnDurCrete website | **Data Archiving and preservation** | | EnDurCrete website and FENIX server | **Data management Responsibilities** | Petra Colantonio | |
| **WP number and name** | **WP lead** | **Task number and name** | **Duration** | **Task lead** | **Dataset name** | **Dataset description** | **Format** | **Level** |
| WP9 Project Management | HC | Task 9.1: Project Coordination | M1-M42 | HC | - | - | - | - |
| | | | | | - | - | - | - |
| | | Task 9.2: Consortium Management | M1-M42 | HC | D9.1: Periodic and final reports | Report | .pdf | CO |
| | | | | | - | - | - | - |
| | | Task 9.3: Administrative and Financial Management | M1-M42 | HC | - | - | - | - |
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| **Data Sharing** | • Confidential data:<br>Reserved Area on the EnDurCrete website and Heidelberg Cement server | **Data Archiving and preservation** | EnDurCrete website<br>Heidelberg Cement server | **Data management Responsibilities** | Arnaud Muller |

# 11 Publication

The EnDurCrete Consortium is willing to submit papers for scientific/industrial publication during the course of the EnDurCrete project. In the framework of the The Dissemination, Communication and Networking Plan agreed by the GA, project partners are responsible for the preparation of the scientific publications. As a general approach, the project partners are responsible for the scientific publications as well as for the selection of the publisher considered as more relevant for the subject of matter. Each publisher has its own policies on self-archiving (Green Open Access: researchers can deposit a version of their published work into a subject-based repository or an institutional repository, Gold Open Access: alternatively, researcher can publish in an open access journal, where the publisher of a scholarly journal provides free online access).

After the paper is published and license for open access is obtained, project partner will contact the leader of the Training, dissemination and exploitation (FENIX), who is responsible for EnDurCrete data management, and FENIX will upload the publication into project website and deposit in the OpenAIRE repository ZENODO indicating the project it belongs to in the metadata. Dedicated pages per project are visible on the OpenAIRE portal.

For adequate identification of accessible data, all the following metadata information will be included:

- Information about the grant number, name and acronym of the action: European Union (UE), Horizon 2020 (H2020), Innovation Action (IA), EnDurCrete acronym, GA N° 760639
- Information about the publication date and embargo period if applicable: Publication date, Length of embargo period
- Information about the persistent identifier (for example a Digital Object Identifier, DOI): Persistent identifier, if any, provided by the publisher (for example an ISSN number)

For more detailed rules and processes about OpenAIRE, ZENODO, it is possible to find within FAQ on the link https://www.openaire.eu/support/faq.

# 12 Conclusions

This deliverable contains the first release of the Data Management Plan for EnDurCrete project and it provides preliminary guidelines for the management of the project results during the project and beyond. The Data Management related to the data generation, storage and sharing has been addressed. The report will be subject to revisions as required to meet the needs of the EnDurCrete project and will be formally reviewed every six months and at the end of the project to ensure ongoing fitness to the purpose.

# 13 References

Guidelines on Data Management in Horizon 2020, source: http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-data-mgt_en.pdf