D8.9 Final Data Management Plan

WP8

Lead Partner: FENIX

Partner Contributors: All partners

Dissemination Level: PU

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 Improved material durability in buildings and infrastructures, including offshore
Starting Date	1st January 2018
Duration	48 Months

Executive Summary

The present document constitutes the final update of the EnDurCrete 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.

The main purpose of this Deliverable is to provide the final version of 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 data sets collected, processed and/or generated by the project. It covers:

- Identification of the results 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 applied during and after the completion of the Project

In addition, the Data Management Plan specifies whether data is shared/made open and how and what methodology and standards are 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
[LCA]	Life Cycle Assessment
[LCC]	Life Cycle Costing
[MIDI]	Musical Instrument Digital Interface
[ND]	Non-Destructive
[NDT]	Non-Destructive Technologies
[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 final issue of the Data Management Plan (DMP) in the EU framework of the EnDurCrete project under Grant Agreement No. 760639. Initially, 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 considers 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 was delivered at month 8; it was later monitored and regularly updated up to the release of the present document – the Final Data Management Plan. It was acknowledged that not all data types would be available at the start of the Project, thus whenever it was important, when any changes occurred to the EnDurCrete project due to inclusion of new data sets, changes in consortium policies or external factors, the DMP was always updated to reflect actual data generated and the user requirements as it was identified by the EnDurCrete consortium participants.

The main goal of the EnDurCrete project was to develop a new cost-effective sustainable reinforced concrete for long lasting and added value applications. The concept was 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 comprised 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/micro fillers, 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 ensured the facilitation of the technical work and coordination of all the work packages, dissemination, and communication of the project results. These work packages consisted 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 the data sets that were collected, processed, or generated by the EnDurCrete project. It is a document outlining how research data were handled during the Project, and after the Project's completion. It describes what data have been collected, processed, or generated and what methodologies and standards have been applied. It also defines if and how these data have been shared and/or made open, and how they have been 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.

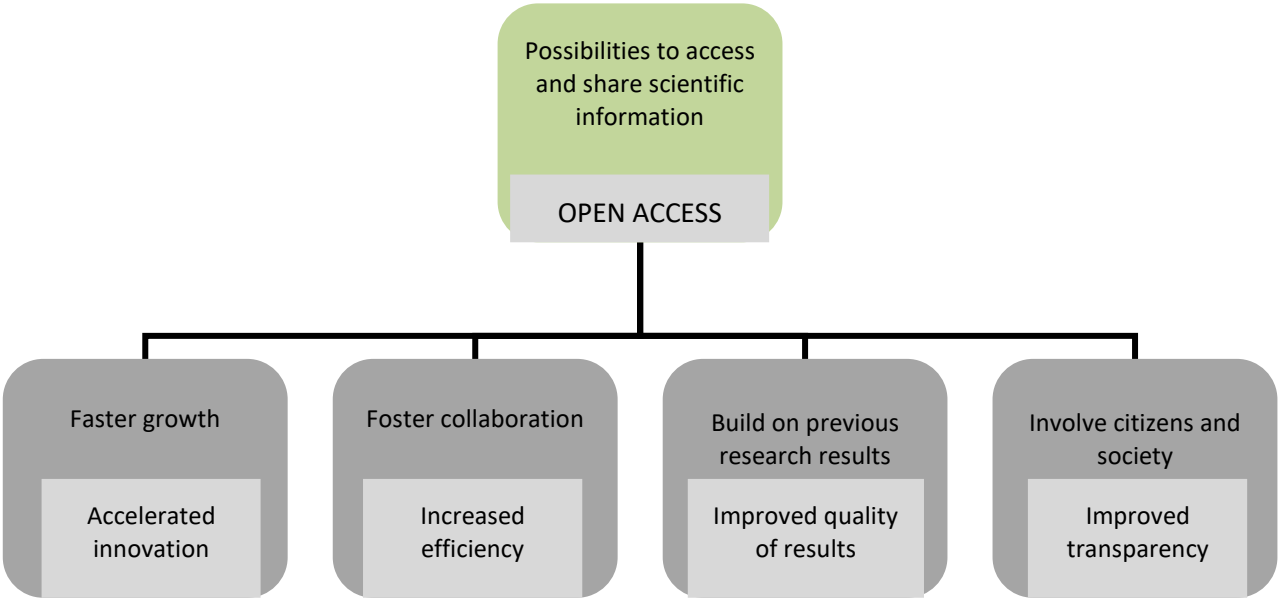

Figure 1 - Open Access benefits

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

The EC capitalizes on open access and open science as it lowers barriers to access 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, 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 has been 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" established 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.

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 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 are 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 did 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 applied.

The beneficiaries did not have to ensure open access to specific parts of their research data if the achievement of the action 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 had to contain the reasons for not giving access."

2.3 Dissemination & Communication and Open Access

For the implementation of the EnDurCrete project, there was 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, have been 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, have been developed for a communication to a wider audience. Details about all those dissemination and communication elements have been provided in the deliverable **D8.2 Communication, Networking and Dissemination Plan.** The Data Management Plan and the derived actions have been part of the overall EnDurCrete dissemination and communication strategy, which has been included in the above-mentioned deliverable.

3 Objectives of Data Management Plan

The purpose of the EnDurCrete Data Management Plan has been to provide a management assurance framework and processes that fulfil the data management policy to be used by the EnDurCrete project partners regarding all the data set types that have been generated by the EnDurCrete project. The aim of the DMP has been to control and ensure the quality of project activities, and to manage the material/data generated within the EnDurCrete project effectively and efficiently. It also describes how data have been 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 have been considered a living document and as such were the subject of periodic updating as necessary throughout the lifespan of the Project.

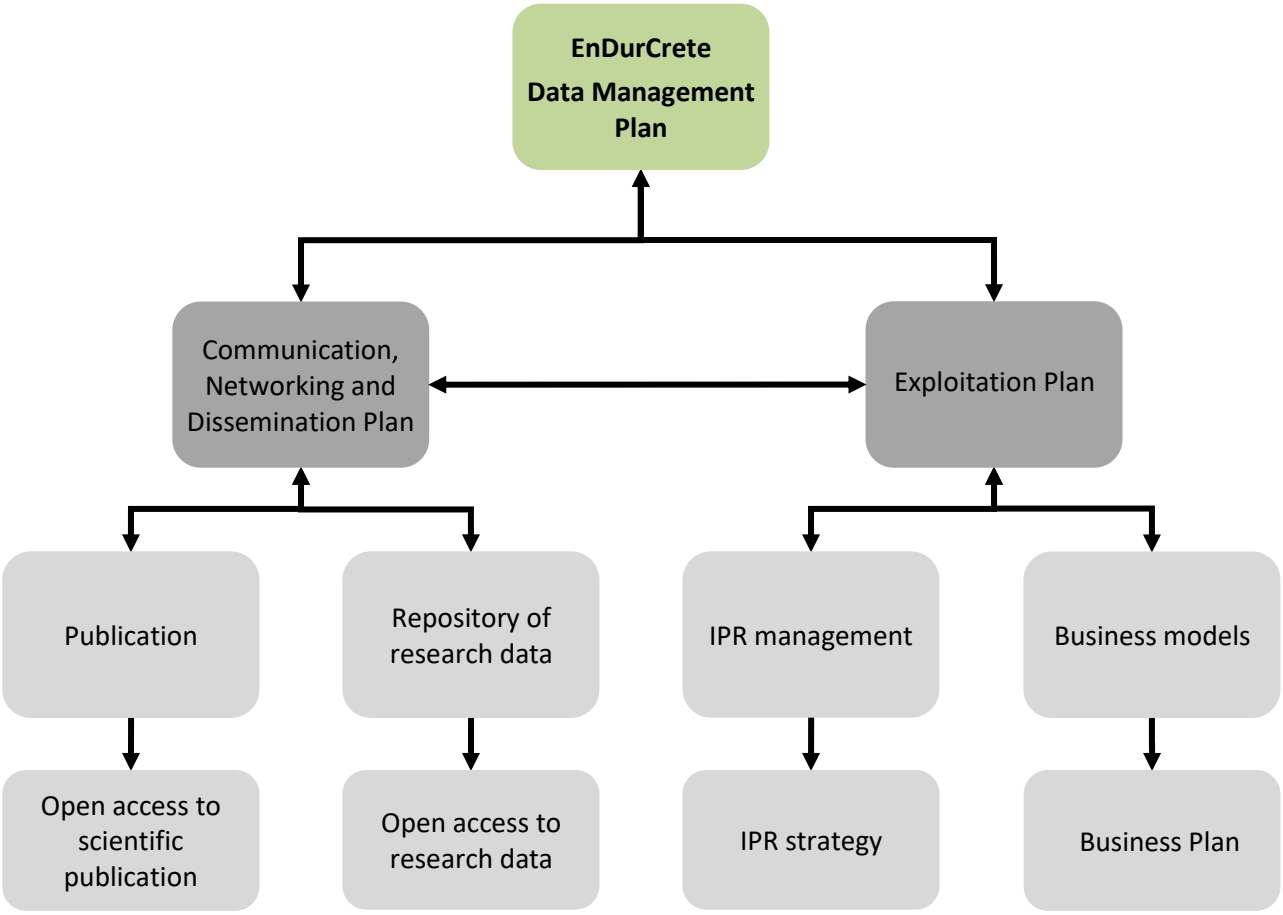

Figure 2 - EnDurCrete Data Management Plan overview

4 EnDurCrete Project Website - storage and access

EnDurCrete project website has been used for storing both public and private documents related to project and dissemination; it has been meant to be live for the whole project duration and minimum 2 years after the project ends. 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 has been 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 was done by dissemination leader FENIX that has been also in charge of website maintenance and regular update during the project's framework. It has been a dynamic and interactive tool 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 has been 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 have been using their available local file servers to periodically create backups of the relevant materials. The EnDurCrete project website itself has its own backup procedures.

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

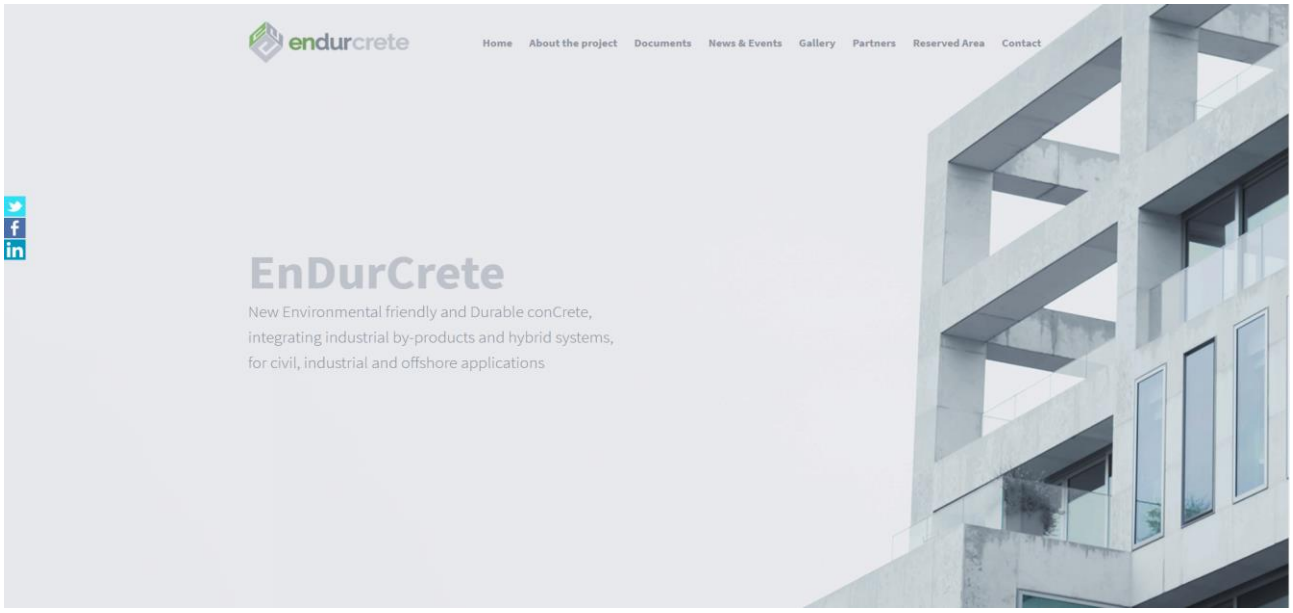

Figure 3 - EnDurCrete project website

5 Data Management Plan implementation

The organisational structure of the EnDurCrete project was created to match the complexity of the Project and to be 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.

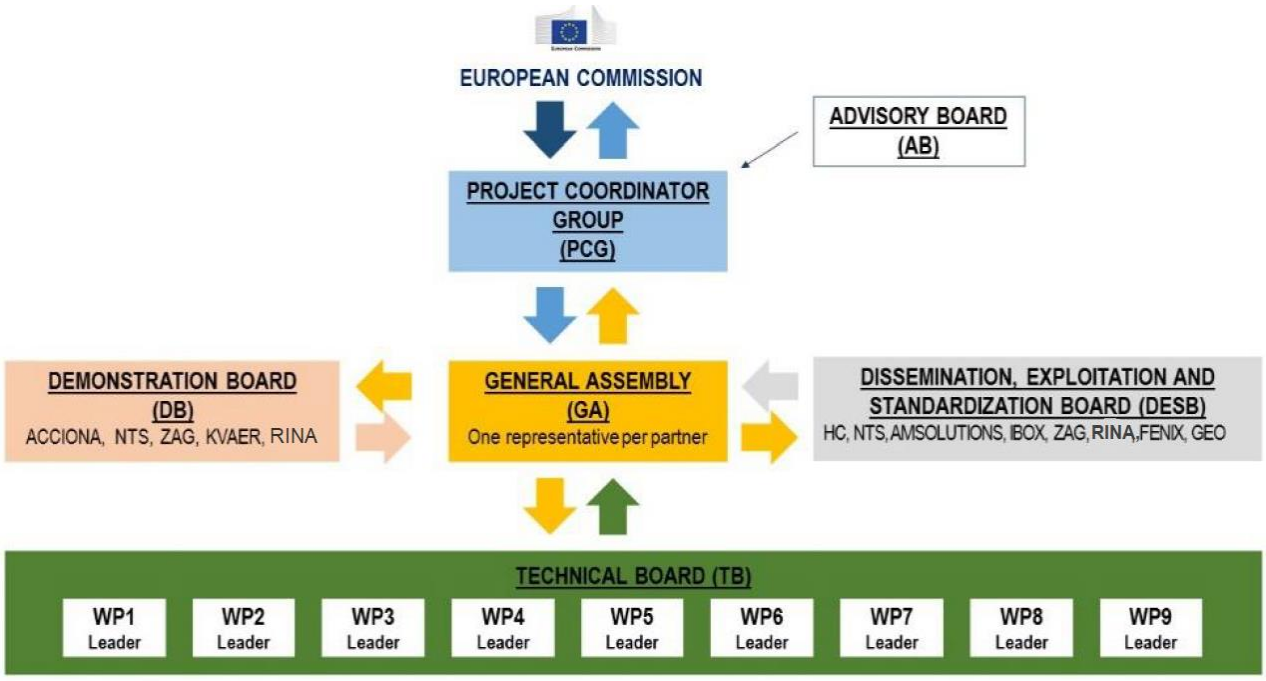

Figure 4 - Management and organizational structure of the EnDurCrete project

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

Responsibilities of the PCG have included:

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

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

Tasks and responsibilities of the WP Leaders have included, among others, the 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 was notified as soon as possible.

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

In the organisation structure, the following management bodies have been identified:

- **General Assembly (GA):**
  GA has been consisted of one representative for each partner institution. Each representative has been 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 has named a deputy who had the necessary knowledge and authorization to represent its institution in the framework of the EnDurCrete project.
- **Dissemination, Exploitation and Standardisation Board (DESB):**
  DESB has formed a project body that has assisted and supported the GA as far as concerned issues on the exploitation of results and disagreement resolutions. It has constituted the central office coordinating all the contacts towards stakeholder communities and other dissemination and communication target audiences. The DESB has been also responsible for the performance of the innovation management activities.
- **Demonstration Board (DB):**
  DB has coordinated the demonstration activities. The DB has managed the activities performed in different locations with a common systemic approach.
- **Technical Board (TB):**
  TB has been responsible for the technical activities of the Work Packages (WPs) and has been consisted of all the WPs Leaders (WPLs). The TB has directly referred to the GA and has been responsible for providing technical updates on the on-going activities. The TB has also been an essential tool to keep the whole consortium informed about any criticism, problem, and deviation from original plan that may have arisen when carrying out the technical activities.

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

Partners of the EnDurCrete project have demonstrated 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 has been a Project coordinator and leader of Development and characterisation of new green and low-cost cementitious materials. HC has brought key knowledge on the development of new environmentally friendly low-clinker binders and of concrete mixes integrating novel additive technologies. In addition, HC has been responsible for the Project Management.
2	RINA-C	RINA CONSULTING SPA	RINA-C has developed requirements for structures exposed to harsh environmental conditions, designs and optimised smart textile self-monitoring reinforcing system, performed modelling simulation activities, calibrated monitoring tools and performs structural health monitoring activities. Additionally, RINA-C has developed EnDurCrete business models and contributed to exploitation. RINA-C has also made small contributions for LCA and safety related aspects.
3	CEA	COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES	CEA has led Multifunctional and multiscale modelling and simulations of materials, components, and structures, being involved in modelling and simulations. CEA has also contributed to Lab-scale performance testing and development of monitoring tools for concrete components and structures. CEA has been responsible for the assessment of the exposure likelihood of the new nano-modified EnDurCrete products.
4	ACCIONA	ACCIONA CONSTRUCCION SA	ACCIONA has provided its expertise to the demonstration and performance validation activities in the demonstration sites located in Spain. ACCIONA has also collaborated in the definition of requirements for concrete design mix and additives to be used and developed concrete mix designs integrating new designed durability technologies and prepared concrete specimens for later analysis. ACCIONA has also participated with NDT technologies NT492 and

			electrical resistivity measurements to asset corrosion in laboratory specimens.
5	KVAERNER	KVAERNER AS	KVAERNER has been primarily in charge to write the requirements for offshore platforms within Requirements and conceptual design of new components and structures and contributed to Multifunctional and multiscale modelling and simulation of materials, components, and structures. KVAERNER has also performed testing at Stord shipyard to simulate North Sea water condition.
6	SIKA	SIKA TECHNOLOGY AG	SIKA has been a leader of Innovative concrete technologies, including nano/microfillers, coatings and reinforcement and coordinated the design and development of new durable concrete systems incorporating innovative technologies. SIKA has overseen 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 has been dealing 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 has contributed customized sustainable supplementary cementitious materials to the project and collaborated in the development of the low impact binder with minimal Portland cement content. In addition, VITO has contributed to the environmental assessment and high-grade recyclability of the end products. VITO has established second life reuse potential of the developed concrete products.
9	NTNU	NORGES TEKNISK-NATURVITENSKAPELIGE UNIVERSITET NTNU	NTNU has led the characterization of the novel cementitious materials and contributed to the modelling of the phase assemblage of the novel binders. In addition, NTNU has contributed to the simulations of the experimental laboratory tests by providing experimental data and a critical review of the simulation results. NTNU has performed purpose-build tests to validate or estimate durability parameters required for the numerical models.
10	UNIVPM	UNIVERSITA POLITECNICA DELLE MARCHE	UNIVPM has been an academic leader of Lab-scale performance testing and development of monitoring tools for concrete components and structures. UNIVPM has developed and

			optimized novel self-sensing cement-based mixtures manufactured with green micro-fillers/fibers and it has contributed to their durability assessment. UNIVPM has managed the calibration and testing of the self-sensing/monitoring properties of the new concrete. UNIVPM has developed advanced non-destructive testing tools for non-intrusive in-field inspection, which have been used in selected demos.
11	FENIX	FENIX TNT SRO	FENIX has overseen training, dissemination, and exploitation activities.
12	GEO	GEONARDO ENVIRONMENTAL TECHNOLOGIES LTD	GEO has led Life Cycle Assessment and economic evaluation, standardization and health and safety aspects and brought its expertise to address environmental and economic sustainability (LCA and LCC) and standardisation aspects. It has also performed training activities on sustainable concrete products.
13	AMSolution	PROIGMENES EREVNITIKES & DIAHIRISTIKES EFARMOGES	The main role of AMSolution has been to develop and optimise new multi-functional protective coatings. AMSolution has been 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 has brought expertise in precasting process and performance evaluation. Additionally, NTS has manufactured the prototypes used for the demonstrations. NTS has also been a recipient of scope visits for adequate safety assessment and management.
15	IBOX	I-BOX CREATE S.L.	The main contribution of IBOX has concerned 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 has been to lead the demonstration activity on the Krk bridge and contribute to ND monitoring activities. INFRA PLAN has led the Prototyping, demonstration, and performance validation in a bridge in Croatia, by having provided 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 are 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 are 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 data sets are handled together with scientific papers for the purpose of peer review, data are 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 are safely stored in certified repositories for long term preservation and duration; they are stored together with the minimum software, metadata, and documentation to make them useful; the data are 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 invade personal privacy. Research records that may have also been 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 are considered complementary to material already contained within declared Project Deliverables. To collect the information generated during the Project, the template for data collection has been circulated periodically every 6 months. The scope of this template is to detail the research results that have been developed during the EnDurCrete project detailing the kind of results and how they have been managed. It has been the responsibility of WP leaders to define and describe all non-generic data sets specific to an individual work package.

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 4 (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 each 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 are defined as “data about data”. They refer 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 divided into three types:

- Descriptive metadata describe an information resource for identification and retrieval through elements such as title, author, and abstract.
- Structural metadata document 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 manage 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 many metadata standards, which address the needs of particular user communities.

Data Sharing

During the period when the Project was live, the sharing of data has been defined by the configuration rules defined in the access profiles for the project participants. Each individual project data set item has been allocated a character "dissemination classification" (i.e., public, or confidential) for the purposes of defining the data sharing restrictions. The classification is 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 have been deemed uncontrolled. In case the data set could not be shared, the reasons for this were mentioned (e.g., ethical, rules of personal data, intellectual property, commercial, privacy-related, or security-related).

Data were shared when the related deliverable or paper had been made available at an open access repository, data related to a publication was openly shared. However, to allow the exploitation of any opportunities arising from the raw data and tools, data sharing proceeded only if all co-authors of the related publication agreed. The Lead author was 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 also created an entry on OpenAIRE (www.openaire.eu) to link the publication to the data. A link to the OpenAIRE entry was 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 to 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.

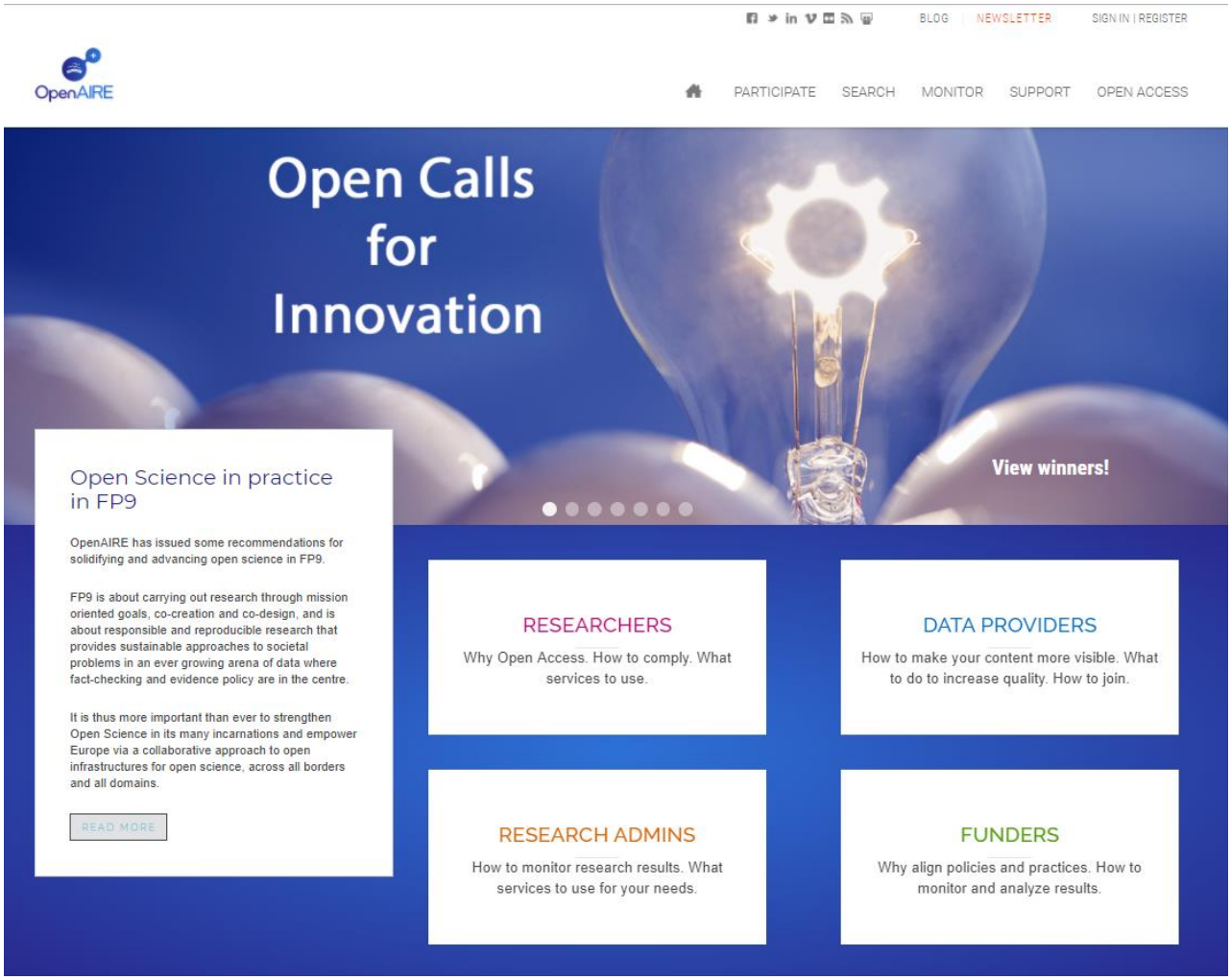

Figure 5 - Open AIRE website

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 has been copied and transferred to a digital archive (Project Coordinator's responsibility).

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

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

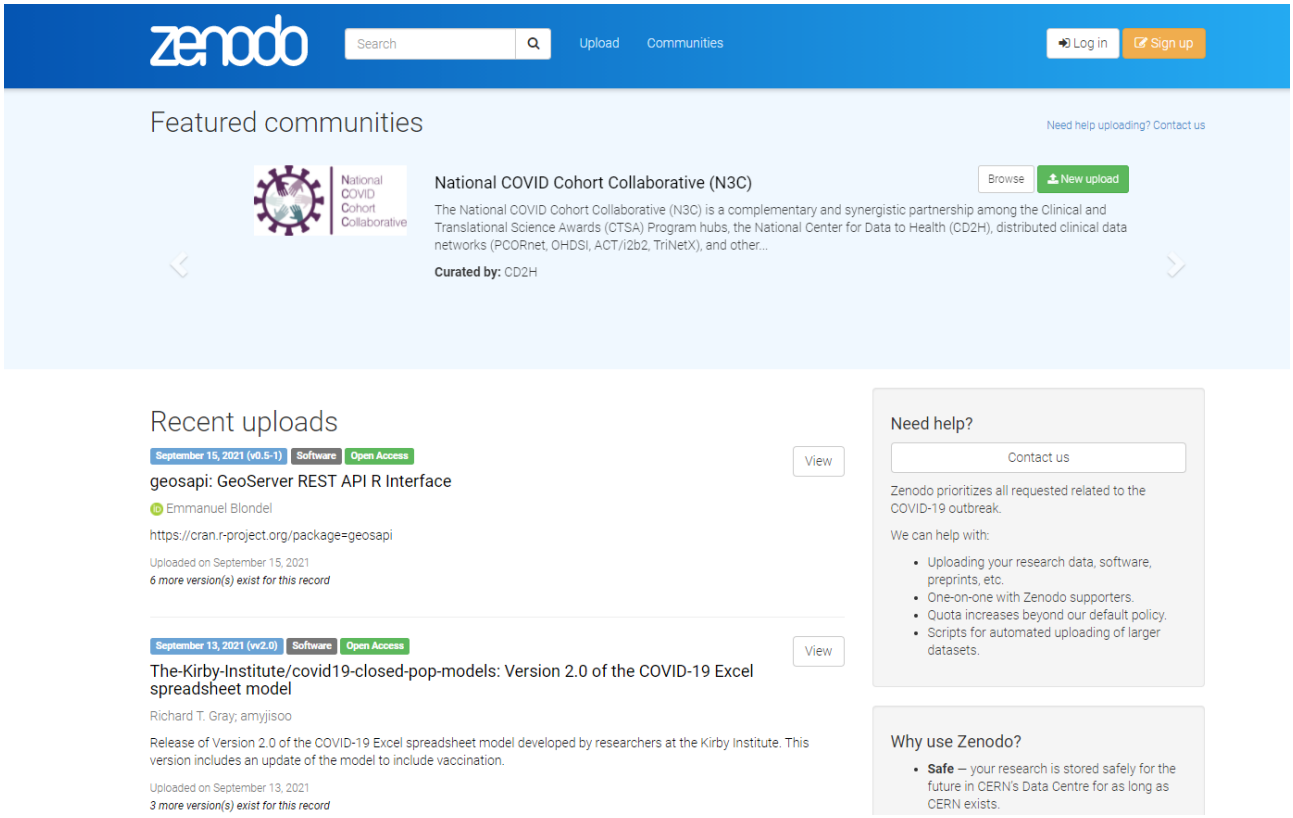

Figure 6 - ZENODO repository

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 copyrights with respect to all data types are subject to IPR clauses in the Grant Agreement but can be royalty free. The use of file compression utilities, such as "WinZip", is prohibited. No data files have been encrypted.

8.1 Engineering CAD drawings

The .dwg file format is one of the most 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 are defined as any digital image irrespective of the capture source or subject matter. Images have been composed 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 several bits to designate its colour equal to the colour depth of the device displaying it. The EnDurCrete project has only used 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 has not been made unless it has been 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. In the EnDurCrete project it has been allowed to use the following animated graphical image file formats: AVI, MPEG, MP4, and MOV. The WP leader determined 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 contains animated graphical images, infographics, and on-site interviews.

Table 2 - Video formats

Format	File	Description
MPEG	.mpg .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 .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 .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 have been MP3 or MP4.

Table 3 - Audio formats

Format	File	Description
MIDI	.midi .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 .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 do not contain any control characters including end-of-file marker. In principle the least complicated form of textual file format is 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 Unix certified, 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 are information that often represents a measured physical parameter. It is always captured in number form. Other types of data can appear to be in number form (e.g., 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 has made 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 have ensured the Data Management Plan to be in line with the norms of the EU and Commission [as expressed in the General Data Protection Regulation (GDPR) (Regulation (EU) 2016/679)] and to promote best practice in Data Management. The GDPR came into force on 25 May 2018.

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

The questionnaire participants have not included children or other groups requiring a supervisor. Also, when asking for somebody's contact information, the asking party has explained why this information was asked and for what purposes it would 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 has assessed its own data processing activities to understand whether they fall within the scope of the requirements set out above. If they did, then it was important to either fulfil the DPO position internally or from an external source. For those organisations to whom the requirements did not apply, they may have still chosen to appoint a DPO. If they chose not to appoint a DPO, then it was recommended to document the reasoning behind that decision.

Data protection

European citizens have a fundamental right to privacy. 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 constitute 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 are 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 collected within the EnDurCrete project, neither pseudonymisation nor anonymisation have been used. Other means of data security have been 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

[3] Article 4 GDPR

relevant to original purposes for processing, or a data subject withdrawing consent. 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 is in electronic form, mostly in Microsoft Excel file forms .xls or .xlsx. In case the data subject requested to transmit his/her data to another controller, there were 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.

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 have been 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 asked for personal data, the partner holding the data considered whether those data were needed for the implementation of the Project. If personal data were provided, the data were not 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 have been kept by the WP Leaders of those work packages that collect personal data.

10 Data summary of the EnDurCrete

Research data of the EnDurCrete project are listed below. The table template has been periodically circulated to monitor the data sets and set the strategy for their sharing. The overview of the data set description, data sharing, storage, preservation, and responsibilities in the framework of the EnDurCrete project is specified below.

10.1 Design requirements for structures exposed to aggressive environment

WP leader	Task number and name	Duration	Task lead	Data set name	Data set description	Format	Level[5]
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 infrastructures)	M1-M6	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 continental environment (road infrastructures)	Report reviewing actual technical directives, surveys, standards, and regulations applying to concrete materials for continental construction at European level, as	.pdf	CO

[5] PU – public, CO - confidential

					well as some key national documents.		
	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, servers of the respective partners Public data: • EnDurCrete website	**Data Archiving and preservation**		EnDurCrete website, RINA-C server	**Data management Responsibilities**	Eriselda Lirza	

10.2 WP2: Development and characterisation of new green and low-cost cementitious materials

WP leader	Task number and name	Duration	Task lead	Data set name	Data set description	Format	Level
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	M5-M8	HC	D2.2 Report on optimization of most promising mixes to be further investigated	Report	.pdf	CO

	grinding technology for each PCC component			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-M18	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, rheological measurements, SEM-EDS, MIP)	.xlsx .docx .tif .jpg	CO
				D2.3 Report on rheological measurements and packing	This report describes the results of the rheological tests performed in T2.3	.docx .pdf	CO
				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, servers of the respective partners • Raw data and results: servers of the respective partners Public data: • EnDurCrete website	**Data Archiving and preservation**		EnDurCrete website, servers of the respective partners	**Data management Responsibilities**	Gerd Bolte Arnaud Muller	

10.3 WP3: Innovative concrete technologies, including nano/micro fillers, coatings, and reinforcement

WP leader	Task number and name	Duration	Task lead	Data set name	Data set description	Format	Level
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 diffraction, thermogravimetric analysis, infrared or ultra violet spectroscopy	.pdf .jpeg	CO
	Task 3.2: Development and optimization of novel self-sensing carbon-based green micro-fillers/fibers	M1-M15	UNIVPM	Analysis of carbon based green micro-fillers/fibers behaviour in cementitious materials	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
				D3.5 Synthesis and production of novel carbon-based micro fillers from alternative raw materials	Report on the novel carbon-based micro fillers and carbon-based fibres for self-sensing cement-based materials	.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 protective coatings	Report on self-healing agents for developed EnDurCrete coatings	.pdf	CO

	Task 3.4: Evaluation of compatibility of additives in concrete	M4-M12	SIKA	D3.2 Preliminary results of compatibility evaluation of EnDurCrete additives	Report on initial screening to address compatibility of novel additives with fresh concrete properties	.pdf	CO
				Assessmnet of fresh and hydration kinetic properties	Initial flow, slump life and calorimetric data	.xlsx	CO
	Task 3.5: Development of Concrete Mix Designs integrating novel additive technologies	M3-M22	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
				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
				-	-	-	-
				D3.9 Report on optimized mix designs using novel binders and additives ready for upscaling in WP6	Report	.pdf	CO
				Optimized mix design using additives	Raw data and results of concrete development with additives (mix design/concrete composition, resulting concrete properties)	.xlsx	CO
	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,	.xlsx	CO

					strength, workability, and durability results)		
	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 using additives	Raw data and results of concrete development with additives (mix design/concrete composition, resulting concrete properties)	.xlsx	CO
	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 fibre sensors datasheets	Datasheets of optical fibre 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-	M1-M12	RINA-C	Textiles datasheets	Datasheets of textiles selected as candidates for the application	.pdf	CO

	monitoring reinforcing system			Optical fibre sensors datasheets	Datasheets of optical fibre 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, servers of the respective partners Public data: • EnDurCrete website, Zenodo	**Data Archiving and preservation**		EnDurCrete website, servers of the respective partners	**Data management Responsibilities**	Emmanuel Gallucci	

10.4 WP4: Multifunctional and multiscale modelling and simulations of materials, components and structures

WP leader	Task number and name	Duration	Task lead	Data set name	Data set description	Format	Level
CEA	Task 4.1: Completed EnDurCrete MODA template	M1-M47	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 phase assemblage of the novel binders	This report presents the results of the modelling activities performed in T4.2.1, which constitutes inputs for T4.2.2 (D4.2)	.docx .pdf	CO
	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-M38	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-M45	RINA-C	Report on computational analyses of macrostructures for service life estimation, including corrosion phenomena and critical environments	This report describes macro modelling and simulations, aiming ultimately at service life prediction of critical infrastructures.	.pdf	CO
Data Sharing	Confidential data: • Reserved Area on the EnDurCrete website, servers of the respective partners Public data:	**Data Archiving and preservation**		EnDurCrete website, servers of the respective partners	**Data management Responsibilities**	Benoît Bary	

	• EnDurCrete website, Zenodo				

10.5 WP5: Lab-scale performance testing and development of monitoring tools for concrete components & structures

WP leader	Task number and name	Duration	Task lead	Data set name	Data set description	Format	Level
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 tests	Reports	.pdf	CO
				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	Reports on Test performed during the metrological characterization of the self-sensing/monitoring properties	Report	pdf.	CO
				D5.2 Report on calibration and assessment of self-sensing/monitoring properties (Due M24)	Report on calibration and assessment of self-sensing/monitoring properties carried out on mortars/concretes	pdf	CO
	Task 5.3: Advanced NDT tools for non-intrusive in-field inspection	M12-M30	UNIVPM				
				D5.3 Report on advanced NDT tools for non-intrusive in-field inspections (Due M30)	Report on tests performed during the metrological characterization of the self-sensing/monitoring properties	pdf	CO
	Sub Task 5.3.1: NDT solutions for cracks/sub-surface damages and moisture	M12-M30	UNIVPM	Report on computer vision technique to identify crack location and width	Report	jpg; pdf.	CO
				Report on ultrasonic testing for subsurface damage identification	Report	pdf.	CO
	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 .txt .xlsx .mphbin .mphtxt	CO
				Ion migration under electrical field study	Report on the feasibility of Ion migration under electrical field measurement as NDT solutions	.doc .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, servers of the respective partners	**Data Archiving and preservation**		Regular backup of data on UNIVPM server, managed by IT departments, EnDurCrete website	**Data management Responsibilities**	Gian Marco Revel; Paolo Chiariotti	

10.6 WP6: Prototyping, demonstration, and solutions performance validation

WP leader	Task number and name	Duration	Task lead	Data set name	Data set description	Format	Level
ACCIONA	Task 6.1: Demonstration and Validation Plan	M17-M22	UNIVPM	D6.1 Demonstration and validation plan (Due M22)	Report on the final demonstration and validation plan detailing prototypes, monitoring and testing activities for each demo site	.pdf	-
	Task 6.2: Prototyping, demonstration and performance validation in a maritime port in Spain	M22-M46	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 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-M46	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-M46	KVAERNER	Evaluation of coatings performance	Images coming from optical observation (including microscopy techniques) for the evaluation of the coatings.	.png	CO
				Evaluation of EnDurCrete concretes, additives, and coatings in the conditions of the North Sea	Strength, porosity, chloride content, frost resistance	.docx	CO
	Task 6.5: Prototyping, demonstration, and performance validation in a bridge in Croatia	M22-M46	INFRA PLAN	Evaluation of coatings performance	Images coming from optical observation (including microscopy techniques) for the evaluation of the coatings.	.png	CO
				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-M46	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 .doc	CO

Data Sharing	Confidential data: • Reserved Area on the EnDurCrete website, servers of the respective partners	**Data Archiving and preservation**	EnDurCrete website, servers of the respective partners	**Data management Responsibilities**	Rosa Lample

10.7 WP7: Life cycle assessment and economic evaluation, standardization and health and safety aspects

WP leader	Task number and name	Duration	Task lead	Data set name	Data set description	Format	Level
GEO	Task 7.1: Environmental and economic viability of the novel products based on LCA and LCCA	M2-M48	GEO	Life cycle inventories	The inventory of all inputs (material, energy etc.) related to all considered (sub)products	.xls	CO
				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-M48	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-modified EnDurCrete products	M1-M48	CEA	Samples pictures	Pictures of the different samples tested (before/after) to illustrate the final report	.jpg	CO
				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 .pdf	CO
				Real-time measurements raw data	Data obtained by CPC, FMPS, OPC during mechanical tests on no-aged and aged samples	.txt .xlsx	CO
				Off-line measurements raw data	SEM/TEM pictures, EDS spectra, XPS data on samples collected during the mechanical tests	.jpg .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. 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 (exposure assessment)	.doc	CO
				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 .jpg .tif .xlsx .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 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, servers of the respective partners Public data: • EnDurCrete website, Zenodo	**Data Archiving and preservation**		EnDurCrete website, servers of the respective partners	**Data management Responsibilities**	Jakub Heller	

10.8 WP8: Training, dissemination and exploitation

WP leader	Task number and name	Duration	Task lead	Data set name	Data set description	Format	Level
FENIX	Task 8.1: Dissemination, Communication and Networking	M1-M48	FENIX	D8.1 Project Website	Report describing the project website, including public and private area	.pdf	PU
				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 access publication developed by the Consortium	.pdf	PU
				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-M48	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-M48	RINA-C	D8.8 Business models	Business models for the new technologies, paving the way for future market uptake	.pdf	CO
	Task 8.4: Training Activities	M24-M48	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, servers of the respective partners • Promo material (PU): EnDurCrete website, social network profiles, videos on YouTube, thematic portals Public data: • EnDurCrete website	**Data Archiving and preservation**		EnDurCrete website, FENIX server	**Data management Responsibilities**	Petra Colantonio	

10.9 WP9: Project Management

WP leader	Task number and name	Duration	Task lead	Data set name	Data set description	Format	Level
HC	Task 9.1: Project Coordination	M1-M48	HC	-	-	-	-
				-	-	-	-
	Task 9.2: Consortium Management	M1-M48	HC	D9.1: Periodic and final reports	Report	.pdf	CO
				-	-	-	-
	Task 9.3: Administrative and Financial Management	M1-M48	HC	-	-	-	-
				-	-	-	-

Data Sharing	Confidential data: • Reserved Area on the EnDurCrete website, Heidelberg Cement server	**Data Archiving and preservation**	EnDurCrete website, Heidelberg Cement server	**Data management Responsibilities**	Arnaud Muller

11 Publication

The EnDurCrete Consortium has been willing to submit papers for scientific/industrial publication during the EnDurCrete project. In the framework of the Dissemination, Communication and Networking Plan agreed by the GA, project partners have been responsible for the preparation of the scientific publications. As a general approach, the project partners have been responsible for the scientific publications as well as for the selection of the publisher considered as more relevant for the subject of matter.

Partners could freely choose between the most appropriate route towards open access for them:

- Green Open Access (self-archiving): a published article or the final peer-reviewed manuscript is archived (deposited) in an online repository before, alongside or after its publication. Repository software usually allows authors to delay access to the article ("embargo period"). If this route is chosen partners must ensure open access to the publication within a maximum of six months.
- Gold Open Access (open access publishing): an article is immediately provided in open access mode (on the publisher/journal website). Publishers sometimes charge so called Article Processing Charges (or APCs) to make articles open. Such costs are eligible for reimbursement during the duration of the project as part of the overall project budget.

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

For adequate identification of accessible data, all the following metadata information have been 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 EnDurCrete Data Management Plan progress

The table below lists data sets shared publicly. To obtain the best results related to the data sharing, partners have been uploading public deliverables on the EnDurCrete website as the regular website monitoring shows a very high interest in such data and a big number of downloads.

Table 4: Data sets shared publicly

WP	Data set name	Lead partner	Format	Type	Data sharing	Open access	DOI	Link
WP1	ENDURCRETE_D1.1_List of technical directives, surveys standards and regulations at EU level target applications_RINA	RINA	pdf	Project deliverable	EnDurCrete website	green	10.5281/zenodo.3859485	http://www.EnDurCrete.eu/documents/deliverables https://zenodo.org/record/3859485#.XvSVU2gzaUk
WP7	D7.1 Sustainability Life Cycle Assessment of the New Product Types	GEO	pdf	Project deliverable	Zenodo, EnDurCrete website	green	10.5281/zenodo.3908007	http://www.EnDurCrete.eu/documents/deliverables https://zenodo.org/record/3908007#.XvSVp2gzaUk
	D7.4 Recommendations for updates of current European standards and national technical requirements	ZAG	pdf	Project deliverable	EnDurCrete website	green	n/a	http://www.EnDurCrete.eu/documents/deliverables

WP8	EnDurCrete_D8.1 Project website_FENIX, EnDurCrete_D8.3 Promo material design_FEN_v1 EnDurCrete_D8.4_Initial data management plan_FENIX EnDurCrete_D8.7 Progress report on dissemination and networking activities and awareness campaign	FEN	pdf	Project deliverable	Zenodo, EnDurCrete website	green	10.5281/zenodo.3859489 10.5281/zenodo.3859505 10.5281/zenodo.3859527	http://www.EnDurCrete.eu/documents/deliverables https://zenodo.org/record/3859489#.XvSUvWgzaUk https://zenodo.org/record/3859505#.XvSU42gzaUk https://zenodo.org/record/3859527#.XvSU_mgzaUk
	The EnDurCrete project	FEN	pdf	Article	Zenodo, EnDurCrete website	green	10.5281/zenodo.3543593	https://zenodo.org/record/3543593#.Xc7vXFdKg2w http://www.EnDurCrete.eu/documents/publications/popularized-publications
	Durable, low-impact concrete	HC FEN	pdf	Article	Zenodo, EnDurCrete website, Cement review magazine	green	10.5281/zenodo.3234599	https://www.cemnet.com/sample/magazine/icr-september-2018-sample/index.html https://www.zenodo.org/record/3234599#.Xs5bIBMzalM http://www.EnDurCrete.eu/documents/publications/popularized-publications
	EnDurCrete: Concrete eco friendly	NTS	pdf	Article	Zenodo, EnDurCrete website	green	10.5281/zenodo.3234668	https://zenodo.org/record/3234668#.Xc7pF1dKg2w

								http://www.EnDurCrete.eu/documents/publications/popularized-publications
	Ny sement for bedre miljø	NTNU	pdf	Article	Zenodo, EnDurCrete website	green	10.5281/zenodo.3543663	https://zenodo.org/record/3543663#.Xc7vt1dKg2w http://www.EnDurCrete.eu/documents/publications/popularized-publications
	EnDurCrete project_Project repository journal	FEN	pdf	Article	Zenodo, EnDurCrete website, The project repository journal	green	10.5281/zenodo.3784195	https://www.zenodo.org/record/3784195#.XsTv_mgzaUk http://www.EnDurCrete.eu/documents/publications/popularized-publications https://edition.pagesuite-professional.co.uk/html5/reader/production/default.aspx?pubname=&edid=596e9fec-465c-4ef2-ae36-21c7d861c0f0
	Gasification Char and Used Foundry Sand as Alternative Fillers to Graphene Nanoplatelets for Electrically Conductive Mortars with and without Virgin/Recycled Carbon Fibres	UNIVPM	pdf	Article	Zenodo, EnDurCrete website, MDPI website	green	https://doi.org/10.3390/app11010050	https://www.mdpi.com/2076-3417/11/1/50 http://www.EnDurCrete.eu/documents/publications/popularized-publications https://zenodo.org/record/4646761#.YHf6AegzaUk

	Development of composite cements characterized by low environmental footprint	HC	pdf	Article	Zenodo, EnDurCrete website	green	10.5281/zenodo.3891002	https://zenodo.org/record/3891002#.XuNHo0UzaUk http://www.EnDurCrete.eu/documents/publications/scientific-publications
	Production optimization of composite cements with low environmental footprint	HC	pdf	Article	Zenodo, EnDurCrete website	green	10.5281/zenodo.3891008	https://zenodo.org/record/3891008#.XuNIXEUzaUk http://www.EnDurCrete.eu/documents/publications/scientific-publications
	Development of composite cements characterized by low environmental footprint and appreciable performance	HC	pdf	Preprint of journal article	Zenodo, EnDurCrete website	green	10.5281/zenodo.3891030	https://zenodo.org/record/3891030#.XuNJTUUzaUk http://www.EnDurCrete.eu/documents/publications/scientific-publications
	EnDurCrete_Logo manual, EnDurCrete_logo	FEN	pdf, png	Promo material	EnDurCrete website	green	n/a	http://www.EnDurCrete.eu/documents/promo-material/logos
	EnDurCrete_Project presentation_July 2018, EnDurCrete Project presentation_April 2020, EnDurCrete Project Presentation April 2020_16.9, EnDurCrete WP7 for CEN 104 2020	FEN	pdf	Promo material	EnDurCrete website	green	n/a	http://www.EnDurCrete.eu/documents/promo-material/presentation
	EnDurCrete_Press Release_April 2018	FEN	doc	Press release	EnDurCrete website	green	n/a	http://www.EnDurCrete.eu/documents/promo-material/press-releases

	Common Newsletter_May 2019, EnDurCrete_1st newsletter_January 2019, EnDurCrete_2nd newsletter_October 2019, EnDurCrete_4th newsletter_March 2021	FEN	pdf	Newsletter	EnDurCrete website	green	n/a	http://www.EnDurCrete.eu/documents/promo-material/newsletters
	EnDurCrete_Brochure_July 2019, EnDurCrete_Brochure_June 2018, EnDurCrete_Brochure_Sep 2018	FEN	pdf	Brochure	EnDurCrete website	green	n/a	http://www.EnDurCrete.eu/documents/promo-material/leaflets
	EnDurCrete_Roll Up Poster_June 2018, EnDurCrete_Roll Up Poster_Sep 2018 2021 nanotox - poster - Bringing Nanosafety expertise from research to industry via training	FEN	pdf	Promo material	EnDurCrete website	green	n/a	http://www.EnDurCrete.eu/documents/promo-material/posters
	EnDurCrete_Promo video_Final	FEN	mp 4	Promo material	EnDurCrete website	green	n/a	http://www.EnDurCrete.eu/documents/promo-material/videos
	EnDurCrete_Project Made EXPO 19 web site, Master-PPT-4-3_BSMART2019 - Associazioni_Corvaglia_rid_rev2_ext, Master-PPT-4-3_BSMART2019 - Associazioni_STRESS, Master-PPT-4-3_BSMART2019 - UNIVPM_v9 web site	FEN, RINA, STRESS, UNIVPM	pdf	Promo material for Clustering activities	EnDurCrete website	green	n/a	http://www.EnDurCrete.eu/documents/clustering-activities/made-expo-milano
	Common Newsletter_May 2019, Common Newsletter_May 2019_01, Common Newsletter_May 2019_02,	FEN	pdf	Presentations and promo material for	EnDurCrete website	green	n/a	http://www.EnDurCrete.eu/documents/clustering-activities/amanac-workshop-2019

	Common Newsletter_May 2019_03, Common Newsletter_May 2019_04, Common Newsletter_May 2019_05, Common Newsletter_May 2019_06, Common Newsletter_May 2019_07, Common Newsletter_May 2019_08, EnDurCrete_AMANAC workshop_flyer with agenda_FINAL			Clustering activities				
	Environmental and economic viability of the novel products	FEN	pdf	Other	EnDurCrete website	green	n/a	http://www.EnDurCrete.eu/documents/other
	Protecting concrete with new technologies	HC	issu u	Article	EU researcher website	green	n/a	http://www.euresearcher.com/14/eu-research-live
	Experimental carbonation study for durability assessment of novel cementitious materials	ZAG, NTNU, CEA, ACCIONA	pdf	Conference paper	Conference's website	green	The paper is being considered to be published in the special issue of Materials journal, it is an open access journal that will give a paper DOI, the answer is expected to be by the end of the year	http://www.zag.si/dl/coms2020-21-proceedings-2.pdf
	Performance of concretes manufactured with newly developed low-clinker cements exposed to water and chlorides: Characterization by means of electrical impedance measurements.	UNIVPM	pdf	Article	Zenodo, EnDurCrete website ScienceDirect	green only on manuscript (preprint)	https://doi.org/10.1016/j.conbuildmat.2020.121546	https://www.sciencedirect.com/science/article/pii/S0950061820335509 https://zenodo.org/record/5337054#.YSz0f44zaUk http://www.EnDurCrete.eu/documents/publications/scientific-publications

	Automated measurement system for detecting carbonation depth: image-processing based technique applied to concrete sprayed with phenolphthalein.	UNIVPM	pdf	Journal article	Zenodo, EnDurCrete website ScienceDirect	green only on manuscript (preprint)	https://doi.org/10.1016/j.measurement.2021.109142	https://www.sciencedirect.com/science/article/pii/S0263224121001676 https://zenodo.org/record/5340844#.YS3bxo4zaUk http://www.EnDurCrete.eu/documents/publications/scientific-publications
	Realization and testing of Textile Reinforced Concrete panels sensorized with distributed Fiber Optic Sensors	RINA-C, NTS	pdf	Conference paper	Springer, Cham	Abstract and keywords - green access; the access to the paper must be bought	https://doi.org/10.1007/978-3-030-74258-4_47	https://link.springer.com/chapter/10.1007/978-3-030-74258-4_47
	Measurement of the chloride resistance of Environemntally friendly and Durable conCrete	NTNU, ZAG, CEA	pdf	Conference paper	Slovenian National Building and Civil Engineering Institute (ZAG), online	green	n/a, will be published in an open access journal	http://www.zag.si/dl/coms2020-21-proceedings.pdf
	Changes in C-S-H composition during chloride exposure	NTNU	pdf	Conference paper	Zenodo, EnDurCrete website	green	10.5281/zenodo.5482880	https://zenodo.org/record/5482880#.YTdqdI4zaUk http://www.EnDurCrete.eu/documents/publications/scientific-publications

	Monitoring of steel corrosion in concrete exposed to marine environment	ZAG	pdf	Conference paper (only abstract)	Slovenian National Building and Civil Engineering Institute (ZAG), online	green	n/a	http://www.zag.si/dl/coms2020-21-abstracts-programme.pdf
	Impact of leaching on chloride ingress profiles in concrete	NTNU, ZAG, HC	pdf	Article	Springer (Materials & Structures)	green	n/a	Accepted for publication but online appearance (DOI) still pending
	Effect of leaching on the composition of hydration phases during chloride exposure of mortar	NTNU, ZAG, Sintef, CEA, HC	pdf	Article	Elsevier (Cement and Concrete Research)	gold	n/a	Submitted for publication – review pending
	Correlation between compressive strength and pore size distribution in a novel composite cement	NTNU, HC, VITO	pdf	Conference paper	NCR (Nordic Concrete Research)	green	n/a	Paper submitted, but conference was postponed to Aug 22 due to Covid-19
	Chloride ingress in mortar samples prepared with novel composite cements - impact of leaching conditions during the exposure	NTNU, ZAG	pdf	Conference paper	NCR (Nordic Concrete Research)	green	n/a	Paper submitted, but conference was postponed to Aug 22 due to Covid-19
	Multi-scale strategy to estimate the mechanical and diffusive properties of cementitious materials prepared with CEM II/C-M	CEA, NTNU, HC	pdf	Article	Elsevier (Cement and Concrete Composites)	gold	n/a	Submitted for publication – review pending
	Hydration kinetics of ternary slag-limestone cements: impact of water to binder ratio and curing temperature	VITO, NTNU, HC	pdf	Article	Elsevier (Cement and Concrete Research)	gold	n/a	Submitted for publication – review pending
	Rilevazione di difettosità superficiali nel calcestruzzo mediante sistemi di visione (In English: Detection of surface defects in concrete by machine vision systems)	UNIVPM	pdf	Bachelor Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission,

								depending on the duration of the degree course.[6]
	Analisi non distruttiva di componenti in cemento tramite ultrasuoni (In English: Non-destructive analysis of cement components by means of ultrasound technique)	UNIVPM	pdf	Bachelor Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]
	Influenza del tempo di stagionatura e dell'umidità relativa sulle proprietà elettriche e meccaniche di malte con capacità self-sensing contenenti alti dosaggi di filler (In English: Influence of curing time and relative humidity on the electrical and mechanical properties of self-sensing mortars containing high dosages of filler)	UNIVPM	pdf	Bachelor Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]
	Influenza del tempo di stagionatura e dell'umidità relativa sulle proprietà elettriche e meccaniche di malte con capacità self-sensing contenenti bassi dosaggi di filler (In English: Influence of curing time and relative humidity on the electrical and mechanical properties of self-sensing mortars containing low dosages of filler)	UNIVPM	pdf	Bachelor Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]
	Caratterizzazione di nuove composizioni di calcestruzzo per proprietà di self-sensing (In English: Characterization of new concrete compositions for self-sensing properties)	UNIVPM	pdf	Bachelor Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]

[6] The bibliographic data are available at the link: https://cad.univpm.it/SebinaOpac/article/catalogo-delle-tesi-di-laurea/catalogo-tesi, the link is progressively updated

	Carbonation resistance of concrete and mortar containing novel low clinker cement	NTNU	pdf	Project work	NTNU website	green	n/a	https://hdl.handle.net/11250/2825401
	Valorizzazione di sottoprodotti industriali biobased per calcestruzzi self-sensing (In English: Valorization of biobased industrial byproducts for self-sensing concrete)	UNIVPM	pdf	Bachelor Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]
	Impact of leaching on chloride ingress profiles in concrete	NTNU	pdf	Master Thesis	NTNU website	green	n/a	https://hdl.handle.net/11250/2656758
	Influenza del tempo di stagionatura e delle condizioni ambientali sulle proprietà elettriche di calcestruzzi e malte con capacità self-sensing contenenti fibre e filler conduttivi (In English: Influence of curing time and environmental conditions on the electrical properties of self-sensing concretes and mortars containing conductive fibres and fillers)	UNIVPM	pdf	Master Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]
	Effetto di aggiunte conduttive a basso costo sulle proprietà elettriche e meccaniche di calcestruzzi strutturali (In English: Effect of low-cost conductive additions on the electrical and mechanical properties of structural concretes)	UNIVPM	pdf	Master Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]
	Effetto del degrado accelerato sulle proprietà elettriche di calcestruzzi confezionati con cementi innovativi a basso impatto ambientale (In English: Effect of accelerated	UNIVPM	pdf	Bachelor Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]

	degradation on the electrical properties of concretes manufactured with innovative cements at low environmental impact)							
	Sviluppo di un Sistema di misura per il monitoraggio dello stato di salute nel tempo di nuove composizioni di calcestruzzo (In English: Development of a measurement system for the monitoring over time of the health status of different concrete compositions)	UNIVPM	pdf	Bachelor Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]
	Caratterizzazione di campioni in cemento tramite tecnica ultrasonora (In English: Characterization of cement specimens by means of ultrasound technique)	UNIVPM	pdf	Bachelor Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]
	Gestione e analisi dei dati di misure di impedenza elettrica su blocchi di calcestruzzo self-sensing (In English: Data management and analysis of impedance-based measurements in self-sensing concrete blocks)	UNIVPM	pdf	Bachelor Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]
	Acquisizione ed analisi di immagini per l'ispezione di cricche: identificazione della posizione relativa tra sistema di visione e superficie target (In English: Image acquisition and analysis for crack inspection: identification of the respective positions of vision system and target surface)	UNIVPM	pdf	Bachelor Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]

	Effetto di cicli di bagnasciuga in soluzioni simulanti l'acqua marina sull'impedenza elettrica di malte "self sensing" (In English: Effect of wet-dry cycles in solutions simulating sea water on the electrical impedance of self-sensing mortars)	UNIVPM	pdf	Bachelor Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]
	Effetto di aggiunte conduttive sostenibili sul comportamento a corrosione di armature in calcestruzzi "self sensing" esposti ad ambienti ricchi di cloruri (In English: Effect of sustainable conductive additions on the corrosion behaviour of reinforcements embedded in "self-sensing" concretes exposed to chloride-rich environments)	UNIVPM	pdf	Master Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]
	Misura dell'impedenza elettrica di malte self-sensing esposte a cicli di bagnasciuga in una soluzione simulante l'acqua marina (In English: Electrical impedance measurement of self-sensing mortars exposed to wet-dry cycles in a solution simulating sea water)	UNIVPM	pdf	Bachelor Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]
	Calcestruzzi self-sensing: effetto di aggiunte conduttive “green” sul comportamento a corrosione di armature indotto da cloruri (In English: Self-sensing concretes: effect of green conductive additions on the corrosion behavior of reinforcements induced by chlorides)	UNIVPM	pdf	Bachelor Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]

	Misure di impedenza elettrica su elementi di calcestruzzo (In English: Electrical impedance measurements on concrete elements)	UNIVPM	pdf	Bachelor Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]
	Development of an application to remotely monitor concrete elements through multi-sensor system	UNIVPM	pdf	Bachelor Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]
	Valutazione della durabilità di armature in acciaio immerse in malte self-sensing esposte a cicli di bagnasciuga in una soluzione simulante l'acqua marina (In English: Evaluation of the durability of steel reinforcements embedded in self-sensing mortars exposed to wet-dry cycles in a solution simulating sea water).	UNIVPM	pdf	Bachelor Thesis	UNIVPM website	green	n/a	Open access to the thesis will be granted 3-5 years after the submission, depending on the duration of the degree course.[6]
	Continuous monitoring of the health status of cement-based structures: electrical impeadance measurements and remote monitoring solutions	UNIVPM	pdf	Extended abstract and poster presentation	AESSE Grafica srls Benevento	Not granted	n/a	Publication was presented at the event 'V FORUM NAZIONALE DELLE MISURE', September 2021, the book with proceedings is available only for the participants.

13 Conclusions

This is the final revision of the Data Management Plan for the EnDurCrete project. The deliverable provides 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. EnDurCrete data, which has already been publicly shared, including data with open access, are listed in Table 4 (Data sets shared publicly) with links where they can be accessed and downloaded.

14 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