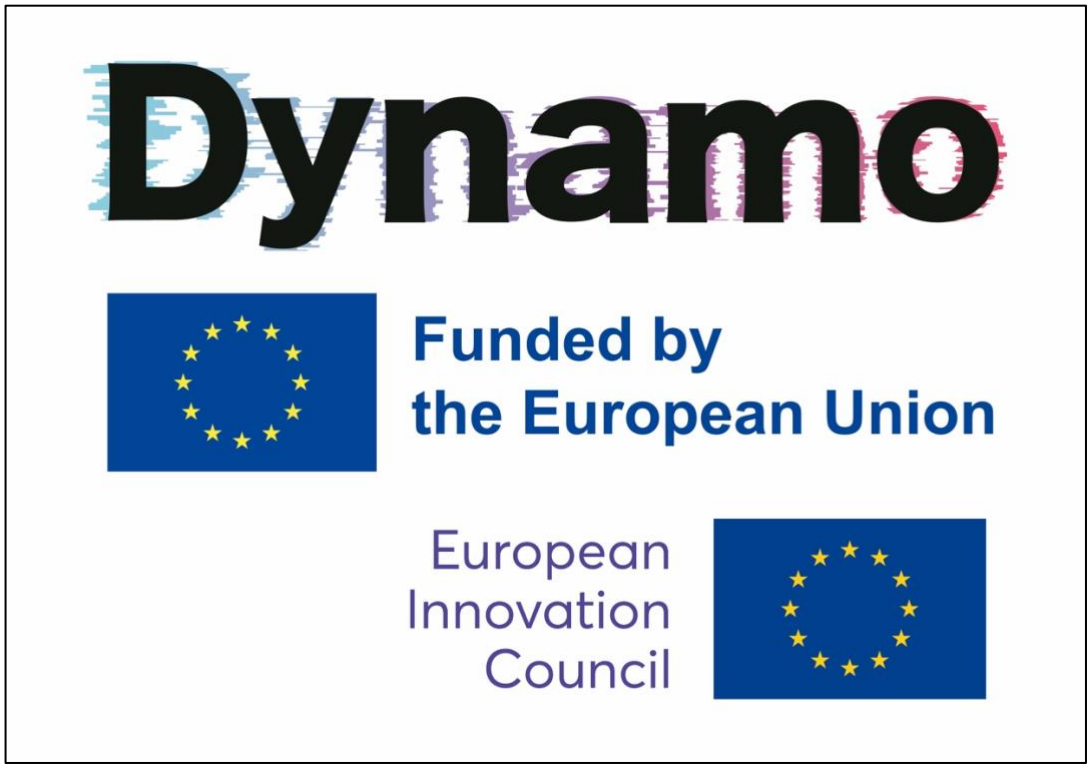

DATA MANAGEMENT PLAN

Date: 28 July 2022

D.6.2: Data Management Plan

WP6. T.6.1: Management and steering of the project

Authors and ORCIDs ID: Daniel Torrent (0000-0001-7092-7360), Agustín Mihi (0000-0003-3821-788), Bernard Bonello (0000-0003-4375- 4235), Pawel Packo (0000-0002-8962- 9969)

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement N° 101046489.

Dynamo Data Management Plan

Universitat Jaume I
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Disclaimer:

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1. Technical References

1.1.Project General Information

Project Number	101046489
Project Acronym	Dynamo
Project Title	Dynamic Spatio-Temporal Modulation of Light by Phononic Architectures
Granting Authority	European Innovation Council and SMEs Executive Agency
Call	HORIZON-EIC-2021-PATHFINDEROPEN-01
Topic	HORIZON-EIC-2021-PATHFINDEROPEN-01-01
Type of the Action	HORIZON EIC Grants
Duration	1 March 2022 - 28 February 2026 (48 months)
Entry into force of the Grant	1 March 2022
Project Coordinator	Daniel Torrent Martí

Deliverable	D6.2 Data Management Plan (DMP)
Work Package	WP 6 - Management and Dissemination
Task	T6.1 - Management and steering of the project
Dissemination level*	PU – Public
Lead beneficiary	Universitat Jaume I (UJI)
PIC of the Lead beneficiary	999882985
Contributing beneficiary/ies	- Agencia Estatal Consejo Superior de Investigaciones Científicas (CSIC) - Centre National de la Recherche Scientifique (CNRS) - Akademia Górniczo-Hutnicza Im. Stanisława Staszica W Krakowie (AGH)
PIC of the Contributing beneficiary/ies	CSIC: 999991722 CNRS: 999997930 AGH: 999844573
Due date of deliverable	31 May 2022
Actual submission date	28 July 2022

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1.2.Version History

Version	Date	Beneficiary	Author
V1	22/07/2022	UJI	Daniel Torrent
	Date	Beneficiary	Reviewed by
V2	25/07/2022	CSIC, CNRS, AGH	Agustín Mihi, Bernard Bonello and Pawel Packo
	Date	Beneficiary	Approved by
V3	28/07/2022	UJI	Daniel Torrent

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2. Table of Contents

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3. Introduction

3.1.Executive Summary

The present document is the deliverable D.6.2. "Data Management Plan (DMP)" of the Dynamo project, funded by the European Commission's European Innovation Council and SMEs Executive Agency (EISMEA), under its Horizon Europe Research and Innovation programme (HE). The Dynamo DMP follows the Horizon Europe Data Management Plan template.

The Data Management Plan describes the data management life cycle for the data to be collected, processed and/or generated. The DMP aims at defining the management strategy of data generated during the project with the purpose to making research data FAIR: findable, accessible, interoperable, and re-usable. The DMP covers: (i) data handling during and after the project, (ii) what types and formats of data will be generated/collected, (iii) what methodologies and standards will be applied, (iv) whether the data be shared or made open-access and (v) how data will be curated and preserved.

Dynamo is committed to give open access to data generated unless it goes against the beneficiary's legitimate interests or it is contrary to any other constraints, such as data protection rules, privacy, confidentiality, trade secrets, Union competitive interests, security rules, intellectual property rights or would be against other obligations under the Grant Agreement.

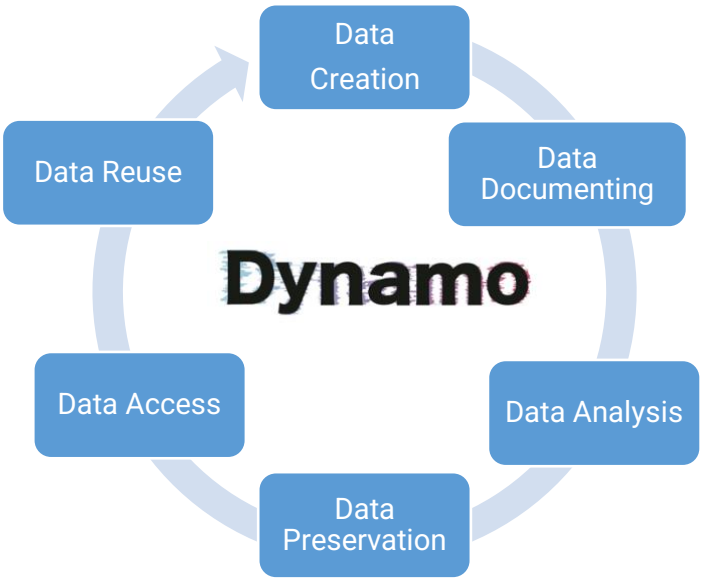

Figure 1: Dynamo data management lifecycle

The DMP should be updated, when necessary, through the lifecycle of the Dynamo. Whenever the procedures are updated, all partners will be duly informed about the changes made with respect to the previous version. Further updating of the DMP will be in month 30 with the D.6.6. Data Management Plan (updated).

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3.2.Relation to Other Project Documents

In the event of discrepancy between documents, this Data Management Plan is overruled by Grant Agreement including its Annexes and the Consortium Agreement with its possible addendums.

3.3.Abbreviation List

This is the list of the acronyms that are used in the present document:

- EISMEA: European Innovation Council and SMEs Executive Agency
- EIC: European Innovation Council
- DMP: Data Management Plan
- EOSC: European Open Science Clous
- EC: European Commission
- GA: Grant Agreement
- CA: Consortium Agreement
- DoA: Description of the Action
- WP: Work Packages
- IPR: Intellectual Property Rights
- DOI: Digital Object Identifier
- ORCID: Open Research and Contributor ID
- FAIR: Findable, Accessible, Interoperable and Re-usable
- CERN: European Council for Nuclear Research
- OpenAIRE: Open Access Infrastructure Research for Europe
- DPO: Data Protection Officer

3.4.Dynamo Data Management Strategy

Applying a comprehensive Data Management Strategy helps Dynamo meet European data management requirements. Collecting and making available the data of the analysis of physical acoustics and photoacoustic characterization to support the reliability and raise the quality of the scientific publications based on those data. Facilitate the exchange of data within the consortium and promote the re-use of quality data. Simplify to the follow-up of the similar projects to validate the results by using the same data, reduce efforts and costs associated with that data and to document the improvement of phononic architectures in a verifiable manner. The Dynamo Data Management Strategy will ensure an impact during the project period and beyond.

DMP guiding principles

The main principles for the Dynamo DPM are the following:

- The DMP is an official project Deliverable (D6.6) which will be updated during the lifecycle of the project. This first initial version will evolve depending on significant changes arising and periodic reviews at reporting periods of the project.
- The DMP follows the Horizon Europe Data Management Plan template available in the reference document section.

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- It follows the principle of Open Science according to the Horizon Europe Programme Guide and the European Open Science Cloud (EOSC) Declaration.
- Type of data, storage, confidentiality, ownership, management of intellectual property and access: procedures that will be implemented for data collection, storage, access, sharing policies, protection, retention, and destruction will be in line with EU standards as described in the Grant Agreement and the Consortium Agreement.
- The consortium complies with the requirements of Regulation (EU) 2016/679 and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)

4. Data Summary

Will you re-use any existing data and what will you re-use it for? State the reasons if re-use of any existing data has been considered but discarded.

Not applies. Dynamo have not considered re-using any existing data.

What types and formats of data will the project generate or re-use?

Types of data generated:

Among data generated in Dynamo, following project datasets and deliverables will be provided Open Access:

- Articles published in Open Access scientific journal
- Conference and Workshop abstracts/articles
- **More than the 60%** of the project deliverables: D1.1, D1.2 D1.3, D1.4, D2.1, D3.4, D4.3, D4.4, D4.5, D5.1, D5.2, D5.3, D5.4, D6.1, D6.2, D6.6, D7.1, D7.2, D7.3. In particular, the following project deliverables are relevant:

D1.1. T-matrix of spheres and pillars: Analytical expressions for the T-matrix of spheres and pillars deposited over an elastic surface.

D1.2. Formulation of multiple scattering: Multiple scattering code for objects deposited over surfaces or substrates.

D1.3. Equations of eigenvalues of twisted membranes: Development of a theory to obtain the resonant modes of acoustic membranes with moiré patterns.

D1.4. Algorithm for the density of modes: Numerical algorithm to determine the number of resonant modes in a given interval of frequencies of a micro structured surface.

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D2.1. Most influential features and parameters: Determination of the most relevant parameters for the design of highly dense micro structured surfaces.

D3.4. Optimal final device for imaging: Fabrication of the optimal spatial light modulator based on phononic architectures.

D4.3. Spatio-temp. maps of optimal pillar samples: Experimental maps of the spatio-temporal response of disordered samples.

D4.4. Spatio-temp. maps of optimal twisted simples: Experimental maps of the spatio-temporal response of moiré samples.

D4.5. Characterization of phononic surfaces with SLM: Application of spatial light modulators to the characterisation of samples.

D5.1. Experimental set up: Development of the experimental set up to use phononic surfaces as SLM.

D5.2. Development of single pixel applications: Application of phononic surfaces as single-pixel imaging devices.

D5.3. Report on imaging capabilities for living cells: Application of phononic surfaces for the imaging of living cells.

D5.4. Report on characterization of phononic surfaces: Application of phononic surfaces for the characterisation at low frequencies of other phononic surfaces.

Formats of data generated:

Dynamo follows the recommendation of the official portal for European data: data.europa.eu. and consider what formats maximise the reuse of data and ease access for potential users.

Most of the data will be in a comma separated values (CSV) format. It is an open, machine-readable format, which can be imported into rich-text files for word-processing or into spreadsheets. CSV represents the simplest format that still supports broad reuse of open data. Data will be generated in the following formats:

- Numeric data: dat
- Graphics: jpg, png, pdf
- Animations: avi
- Tables: odsu, opj, xlsx
- Text: docx, txt, pdf
- Other: nb, cpp

Summarising, Dynamo will generate, collect, and permit to reuse the following research data (shown in chronological order to follow-up) relevant for the DMP:

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Del. No.	Deliverable Name	WP No.	Lead Beneficiary	Format[1]	Dissemination Level	Due Date (month)
D7.1	Project website and social media profiles	WP7	1 – UJI	DEC — Websites, patent filings, videos, etc	PU - Public	2
D6.1	Project Management Handbook	WP6	1 – UJI	R — Document, report	PU - Public	6
D6.2	Data Management Plan (DMP)	WP6	1 – UJI	DATA — data sets, microdata, etc	PU - Public	6
D1.1	T-matrix of spheres and pillars	WP1	1 – UJI	R — Document, report	PU - Public	6
D7.2	First dissemination and exploitation plans	WP7	1 – UJI	DEC — Websites, patent filings, videos, etc	PU - Public	6
D5.1	Experimental set up	WP5	1 – UJI	R — Document, report	PU - Public	12
D4.3	Spatio-temp. maps of optimal pillar samples	WP4	3 – CNRS	DEM — Demonstrator, pilot, prototype	PU - Public	14
D1.3	Equations of eigenvalues of twisted membranes	WP1	1 – UJI	R — Document, report	PU - Public	18
D1.2	Formulation of multiple scattering	WP1	1 – UJI	R — Document, report	PU - Public	24

[1] R = Report, P = Prototype, D = Demonstrator, DEC = Dissemination-Exploitation-Communication; O = Other; ORPD = Open Research Data Pilot

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D1.4	Algorithm for the density of modes	WP1	1 – UJI	R — Document, report	PU - Public	24
D2.1	Most influential features and parameters	WP2	4 - AGH / AGH-UST	R — Document, report	PU - Public	24
D5.2	Development of single pixel applications	WP5	1 – UJI	R — Document, report	PU - Public	24
D4.4	Spatio-temp. maps of optimal twisted samples	WP4	3 – CNRS	DEM — Demonstrator, pilot, prototype	PU - Public	28
D6.6	Data Management Plan (DPM) update	WP6	1 – UJI	R — Document, report	PU - Public	30
D3.4	Optimal final device for imaging	WP3	2 – CSIC	DEM — Demonstrator, pilot, prototype	PU - Public	36
D5.3	Report on imaging capabilities for living WP5 cells	WP5	1 – UJI	R — Document, report	PU - Public	36
D4.5	Characterization of phononic surfaces with SLM	WP4	3 – CNRS	DEM — Demonstrator, pilot, prototype	PU - Public	40
D5.4	Report on characterization of phononic WP5 surfaces	WP5	1 – UJI	R — Document, report	PU - Public	48
D7.3	Final dissemination and exploitation plans	WP7	1 – UJI	DEC — Websites, patent filings, videos, etc	PU - Public	4

Table 1: List of (Public) Deliverables

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What is the purpose of the data generation or re-use and its relation to the objectives of the project?

The data generated will be re-use by the future R&D projects in the scope of the Dynamo project study on physical acoustics and photoacoustic characterization and will serve as a basis for their data files.

The final objective of the project is to establish a disruptive technology where the spatial modulation of optical beams reaches both the spatial and temporal limits, what constitutes a true breakthrough in current technologies where only the spatial limit has been reached. Managed collection and publication of the data shall help establishing a durable library of results that can help documenting the performance evolution of Dynamo across several years and to permit other researchers validating the results independently.

What is the expected size of the data that you intend to generate or re-use?

The expected size of all the data is not currently known, but initial experience with storing data during these months and taking into account that computer animation and images will be included, indicates that the size of data handled by Dynamo is likely to be ≤1 GB.

The main relevant data sizes will stem from images such as patterned photoresist SU8 in the D3.1: Initial set of samples for their experimental characterization, which are stored in high-resolution format.

The total size of data will be updated in the D6.6 Data Management Plan.

What is the origin/provenance of the data, either generated or re-used?

The data generated in Dynamo have their origin in the consortium partners:

- Phase 1: Theoretical and experimental study of phononic surfaces: UJI, IC, CSIC, CNRS
- Phase 2: Optimization of the structures previously studied to make them functional for the application: UJI, AGH, CSIC, CNRS
- Phase 3: Fabrication and characterization of the optimal samples for imaging with ultra-fast spatial light modulators: UJI, AGH, CSIC, IC, CNRS

To whom might your data be useful ('data utility'), outside your project?

Within the Consortium:

The data sets will be shared within the consortium partners as the working baseline to produce the scientific publications, to verify and validate the results through repeated experiments at different locations and as a baseline for a comprehensive documentation of the fundamentals of acoustic wave

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scattering study and the development of ultra-fast imaging applications in optics in the scope of the EIC Pathfinder Open Horizon Europe R&D program.

Beyond the Consortium:

Other researchers working on optics, non-linear optics and nano-optics, acoustics, and nanotechnology can use data to (i) understand better the contents and conclusions of the scientific publications, which base their findings on the data, (ii) to produce figures and publications, (iii) to compare their own results with Dynamo results, (iv) to repeat the experiments to verify and validate the Dynamo research.

Finally, the data sets may also be used by scientific writers and the press to produce high-quality infographics, demonstrating the impact potentials of the technology.

5. FAIR data

5.1.Making data findable, including provisions for metadata

Will data be identified by a persistent identifier?

According to the Annex 5, Article 17 "Communication, Dissemination, Open Science and Visibility" of the GA, where applicable, the metadata must include persistent identifiers for related publications and other research outputs.

ZENODO, the repository used by Dynamo, allows researchers to deposit both publications and data, providing tools to linking them to these through persistent identifiers and data citations. Zenodo assigns public Dynamo data and metadata uploaded a Digital Object Identifier (DOI) to make them uniquely citable and trackable. All uploads will be discoverable through search queries, its DOI, and any communities where it is included.

Will rich metadata be provided to allow discovery?

To enhance the findability of research outputs, and their potential reuse, standardized metadata frameworks are essential, ensuring that data and other research outputs are accompanied by rich metadata that provides them with context.

Rich metadata will provide to allow discovery data easier. Some persistent identifiers beyond the DOI, should be included such as the ORCID identifiers for primary and contributing authors and the Participant Identification Code (PIC) as the institutional identifier.

What metadata will be created?

The metadata created for Dynamo will be in accordance with the Specific Rules of the GA, section "Open science: research data management", states as

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follow: metadata of deposited data must be open … and provide information at least about the following: datasets (description, date of deposit, author(s), venue and embargo); Horizon Europe or Euratom funding; grant project name, acronym and number; licensing terms; persistent identifiers for the dataset, the authors involved in the action, and, if possible, for their organizations and the grant.

What disciplinary or general standards will be followed?

The content and format of metadata will be guided by the general metadata standards used by Zenodo, the repository of Dynamo's metadata, and the domain model is based on DataCite's Metadata Schema minimum and recommended terms will be used for open data generated by Dynamo.

In case metadata standards do not exist in your discipline, please outline what type of metadata will be created and how.

The following metadata will be created for Dynamo project:

- Project number
- Project acronym
- Project Title
- Granting Authority
- Call
- Topic
- Type of the action
- Deliverable name
- Work Package name
- Task name
- Author (s)
- Contributor(s)
- ORCIDs ID
- Lead beneficiary name
- Partners' name
- PIC of organizations
- Date
- Dataset description: description of the data generated or collected, including its origin (in cases where data is collected), nature and scale and to whom it could be useful; keywords to make it easy findable. Information on the existence (or not) of similar data and the potential for integration and reuse.

Files and folders at data repositories will be versioned and structured by using a name convention consisting as follow:

ProjAcronym_DeliverableNo_DatasetName_Version
For example: Dynamo_D6.2_ DataManagementPlan_V1

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Open data deposited in the Zenodo repository will use DOI versioning. DOI versioning allows for updating a dataset after it has been published and to cite either a specific version of a dataset or all versions of a dataset. In addition, version history control mechanisms should be documented before the data collected or generated.

Will search keywords be provided in the metadata to optimize the possibility for discovery and then potential re-use?

Dynamo data are easily findable; thus, standard measures are used to identify the data sets, which include search keywords, metadata, and data identifiers.

All open project results deposited in Zenodo will provide search keywords together with their metadata. Keywords for open data will be selected according to the most suitable and related vocabulary for the specific type of data. The keywords of the project are optics, non-linear optics, nano-optics, acoustics and nanotechnology.

Findability is also promoted by the search tool on Zenodo using keywords. Zenodo allows to perform simple and advanced search queries on Zenodo using keywords. Zenodo also provides a user guide with easy-to-understand examples.

The guide explains basic concepts of simple field searches, e.g., the keyword will be only the title field, as well as advanced concepts such as range searches, e.g., searching for publications dated between 2019 and 2021.

Will metadata be offered in such a way that it can be harvested and indexed?

Metadata are registered or indexed in a searchable resource: (i) metadata of each record is indexed and searchable directly in Zenodo's search engine immediately after publishing, (ii) metadata of each record is sent to DataCite servers during DOI registration and indexed there.

Metadata not only is findable but also accessible. Metadata are retrievable by their identifier using a standardized communications protocol: (i) metadata for individual records as well as record collections are harvestable using the OAI-PMH protocol by the record identifier and the collection name as well as (ii) metadata is also retrievable through the public REST API.

5.2.Making data accessible

Repository:

Will the data be deposited in a trusted repository?

The data will be deposited in Open Access Repository: Zenodo. It is compliant with the data management requirements of Horizon Europe and facilitates the finding, accessing, re-using and interoperating of data sets. Zenodo repository

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is provided by Open Access Infrastructure for Research in Europe (OpenAIRE) and hosted by CERN.

OpenAIRE is in the vanguard of open data movements in Europe, was commissioned by the EC to support their nascent Open Data policy by providing a catch-all repository for EC funded research. It aggregates European funded research output from nearly 1000 repositories (UJI among them) from all over the world and makes them available via the OpenAIRE portal.

The datasets are managed, curated, and uploaded to OpenAIRE by the Coordinator's Library (and beneficiaries' libraries, if it is possible).

Zenodo enables Dynamo to:

- Integrate their research outputs with the OpenAIRE portal
- Share research results in a wide variety of formats including text, spreadsheets, audio, video, and images
- Display their research results and get credited by making the research results citable and integrating them into existing reporting lines to the European Commission
- Easily access and reuse shared research results

In addition, links from Dynamo website will be provided to these storage systems.

Have you explored appropriate arrangements with the identified repository where your data will be deposited?

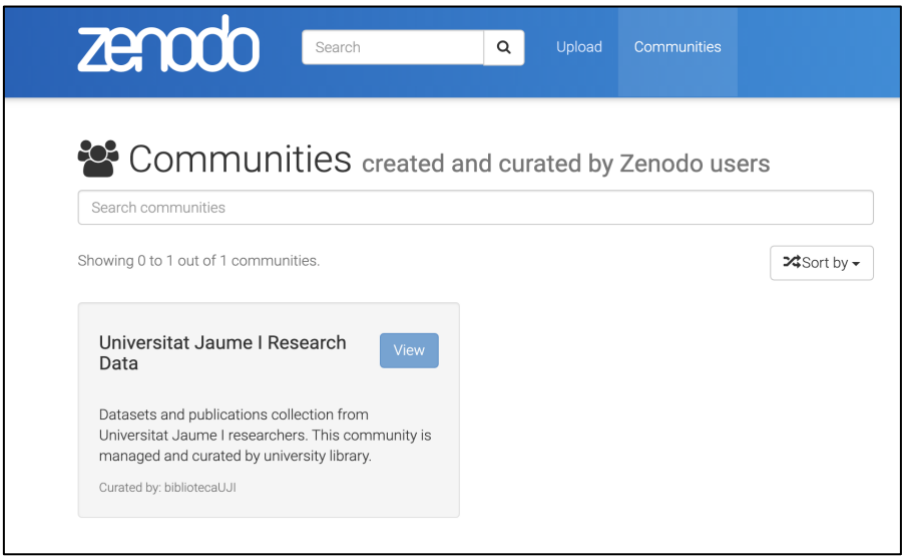

Figure 2: UJI community in Zenodo

We have already explored the appropriate arrangements with Zenodo through the work of the "Universitat Jaume I Research Data" (see above figure 2) which is the community, created in November 2020, managed, and curated by the UJI Library. Zenodo, as an Open Access Repository correctly labels datasets with the DataCite metadata scheme.

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Does the repository ensure that the data is assigned an identifier? Will the repository resolve the identifier to a digital object?

Zenodo assigns all publicly available uploads a Digital Object Identifier (DOI) to make the upload easily and uniquely citeable. Zenodo further supports harvesting of all content via the OAI-PMH protocol.

Data:

Will all data be made openly available? If certain datasets cannot be shared (or need to be shared under restricted access conditions), explain why, clearly separating legal and contractual reasons from intentional restrictions. Note that in multi-beneficiary projects it is also possible for specific beneficiaries to keep their data closed if opening their data goes against their legitimate interests or other constraints as per the Grant Agreement.

All the data from Dynamo will be made publicly available, except for datasets classified as sensitive or limited under the conditions of the Grant Agreement and, data that compromises the protection of a partner(s) intellectual property or go against their legitimate interests. The sensitive information only will be used to implement the Agreement and it will be treated in accordance with the Article 13.

The data openly available is **more than the 60% of the total amount of deliverables.** The description of the data that will be generated has been described in the table 3: List of (Public) Deliverables.

All the data associated with scientific publications will be made openly available as gold open access as default.

If an embargo is applied to give time to publish or seek protection of the intellectual property (e.g. patents), specify why and how long this will apply, bearing in mind that research data should be made available as soon as possible.

To increase the data re-use Dynamo data will be available as soon as possible. The scientific publications of Dynamo will be in Gold Open Access; thus, public access is immediate and there is no embargo period, according to the DoA.

Protection of results are managed according to the Article 8.4 of the Consortium Agreement, which indicates that protection should last for an appropriate period and have appropriate territorial coverage commercial or industrial exploitation and other elements.

The public data that are deposited in Zenodo will remain available and re-usable at least 5 years after the end of the project.

Will the data be accessible through a free and standardized access protocol?

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Dynamo takes in consideration the Article 15 of the Grant Agreement and data processing will be subject to the EU an international and national law on data protection, in particular to the Regulation (EU) 2016/679 and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) as well as the Articles 4 and 8 of the Consortium Agreement.

Internal process of Quality Evaluation is activated throughout the entire project duration to assess both project data /products and project process. The D6.1 Project Management Handbook (PMH) explains more in deep the project monitoring and risk management. An internal procedure of review is performed for the main project deliverables to guarantee the deliverable is developed with a high level of quality (see section 8.2 of the PMH). Each WP leader must submit all the produced documents to the coordinator and supporting partners assigned as internal reviewers to check for the quality of the documents and data produced.

The beneficiaries may grant their personnel access to personal data only if it is strictly necessary for implementing, managing and monitoring the Agreement and the beneficiaries must ensure that the personnel is under a confidentiality obligation.

If there are restrictions on use, how will access be provided to the data, both during and after the end of the project?

All public data generated in the context of the Dynamo must be managed by the beneficiaries as soon as possible and ensured open access via Zenodo. For access to restricted data, potential users must contact Dynamo coordinator. Appropriate IPR procedure and conditions, such as non- disclosure agreement, will be used if necessary.

There are no restrictions on use the public data, except the (i) protection of results that should last for an appropriate period and have appropriate territorial coverage commercial or industrial exploitation and other elements, and (ii) restrictions applied by the Creative Commons Attribution International Public License (CC BY).

Restrictions on re-use policy are applied for all protected data, whose re-use will be limited within Dynamo partners.

How will the identity of the person accessing the data be ascertained?

The procedure to determine the identity of the person accessing the data is established by the repository: Zenodo.

The identity of the person accessing the data will not be directly ascertained. Zenodo, as an Open Access repository, permits visit pages and make

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downloads by an anonymized visitor ID. In addition, to identify the users of data Dynamo opts to the Creative Commons Attribution International Public License (CC BY), in which users must credit authors as well as follow the standard norms of scientific citation.

Tracking for the use of the data will be done through scientific citation as well as following Zenodo standards, that is, by tracking two types of events: visit to a record page and downloads of a file.

Is there a need for a data access committee (e.g. to evaluate/approve access requests to personal/sensitive data)?

There is no need for a data access committee because Dynamo data was previously evaluated, and it was determined that there is no personal neither sensitive data.

In case of re-evaluation or approval access request to confidential data, decisions shall be taken by the Project Coordination Committee, which consist of one representative of each party. Their remit will be to select the data that will be openly accessible on a case-by-case basis. Ethical aspects and data security, including intellectual property requirements, will be considered. If necessary, some or all a potential publication's data will be withheld.

Metadata:

Will metadata be made openly available and licenced under a public domain dedication CC0, as per the Grant Agreement? If not, please clarify why. Will metadata contain information to enable the user to access the data?

According to Annex 5, section Open Science: research data management, metadata of Dynamo deposited data must be open under a Creative Common Public Domain Dedication (CC 0) or equivalent (to the extent legitimate interests or constraints are safeguarded), in line with the FAIR principles (in particular machine-actionable).

To facilitate the users to access to the data, Dynamo's metadata contains the following information: datasets (description, date of deposit, author(s), venue and embargo); Horizon Europe funding; grant project name, acronym and number; licensing terms; persistent identifiers for the dataset (DOI), the authors involved in the action (ORCID ID), and, if possible, for their organisations (PIC No.) and the grant (GA No.). Where applicable, the metadata must include persistent identifiers for related publications and other research outputs.

How long will the data remain available and findable? Will metadata be guaranteed to remain available after data is no longer available?

Data and metadata will be remained available at least 5 years after the end of the project and maximum 20 years, which is the lifetime of Zenodo according to

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the Zenodo's general policy. In addition, data will remain useful and usable on the Dynamo webpage.

Metadata will be remained available after data is no longer available in case other researchers consider it of interest, thus, they can contact the project coordinator to request access to Dynamo's data.

Will documentation or reference about any software be needed to access or read the data be included? Will it be possible to include the relevant software (e.g. in open source code)?

According to the Section 9 of the Consortium Agreement, parties' Access Rights to Software do not include any right to receive source code or object code ported to a certain hardware platform or any right to receive respective software documentation in any particular form or detail, but only as available from the Party granting the Access Rights.

5.3.Making data interoperable

What data and metadata vocabularies, standards, formats or methodologies will you follow to make your data interoperable to allow data exchange and re-use within and across disciplines? Will you follow community-endorsed interoperability best practices? Which ones?

Partners will ensure that Dynamo data observes FAIR data principles under Annex 5 of the Grant Agreement and, they will follow OpenAIRE Guidelines for interoperability, including OpenAIRE Guidelines for Literature Repositories, OpenAIRE Guidelines for Data Archives, OpenAIRE Guidelines for CRIS Managers. The guidelines are available at the following website: https://guidelines.openaire.eu/en/latest/.

Data and metadata of Dynamo use a formal, accessible, shared, and broadly applicable language for knowledge representation and follows FAIR principles. Zenodo, the repository for Dynamo data, uses JSON Schema as internal representation of metadata and offers export to other popular formats such as Dublin Core or MARCXML.

The data produced in the project will be interoperable as the datasets will adhere to standardized MS Office formats: txt, csv, xml.

In case it is unavoidable that you use uncommon or generate project specific ontologies or vocabularies, will you provide mappings to more commonly used ontologies? Will you openly publish the generated ontologies or vocabularies to allow reusing, refining or extending them?

The use of the uncommon ontologies will be avoided in Dynamo, but in case new ontologies are created a vocabulary section will be include as an annex in the dataset. It will contribute to a correct understanding of the concepts and extending their use.

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Will your data include qualified references to other data (e.g. other data from your project, or datasets from previous research)?

Dynamo will not include any reference to other data.

5.4.Increase data re-use

How will you provide documentation needed to validate data analysis and facilitate data re-use (e.g. readme files with information on methodology, codebooks, data cleaning, analyses, variable definitions, units of measurement, etc.)?

To validate the analysis and make it easier Dynamo's data re-use readme files and codebooks will be prepared and data cleaning and variable definitions will be explained, when necessary. The aim of these documents is save time and accelerate the pace of scientific discovery.

Will your data be made freely available in the public domain to permit the widest re-use possible? Will your data be licensed using standard reuse licenses, in line with the obligations set out in the Grant Agreement?

The deliverables associated to the dataset are licensed through an All Rights Reserved License as they are working papers not intended to be re-used. Nevertheless, the database should be shared as a possible reusable dataset. For this reason, when deposited to Zenodo, an Attribution-NonCommercial license (CC BY) will be requested. The data will be available for re-use from the Dynamo website and will also be findable and reusable through Zenodo.

According to annex 5, data generated in Dynamo will be open access via the Zenodo repository, under the latest available version of the Creative Commons Attribution International Public License (CC BY) or Creative Commons Public Domain Dedication (CC 0) or a licence with equivalent rights, following the principle 'as open as possible as closed as necessary', unless providing open access would, in particular, be against the beneficiary's legitimate interests, including regarding commercial exploitation, or be contrary to any other constraints, in particular the EU competitive interests or the beneficiary's obligations under the GA.

Type of Creative Common Licenses	Description	Logo to be used	Applications
Creative Commons Public Domain Dedication (CC 0)	This license enables scientists and owners of copyright- or database-protected content to waive those interests in their works and thereby place them as completely as possible in the public domain, so that others may freely build upon, enhance and reuse the works for any purposes without restriction under copyright or database law.		Metadata

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Attribution International Public License (CC BY)	This is a maximum dissemination license and permit the use of licensed materials. It let others distribute, remix, adapt, and build upon Dynamo data, even commercially, as long as they credit authors for the original creation, provide a link to the license, and indicate if changes were made.		Dataset deposited to Zenodo
All Rights Reserved License	This license grants to creators a bundle of exclusive rights over their creative works, which generally include, at a minimum, the right to reproduce, distribute, display, and make adaptations.		Deliverables and working papers not intended to be re-used.

Table 2: Creative Commons Licenses for Dynamo Open Data

For scientific publications, immediate open access is provided to the deposited publication via Zenodo, under the latest version of the Creative Commons Attribution International Public License (CC BY) or Creative Commons Public Domain Dedication (CC 0) or a licence with equivalent rights, for monographs and other long-text formats, the license may exclude commercial uses and derivate works (e.g. CC BY-NC, CC BY-ND). Metadata or deposited publications must be under a Creative Commons Public Domain Dedication (CC 0) or an equivalent.

Will the data produced in the project be useable by third parties, in particular after the end of the project?

Dynamo currently do not have any third party included, but if one is included in the next years an amendment to the Consortium Agreement must be done and it must be approved by the project consortium.

Data access and sharing activities will be rigorously implemented in compliance with the privacy and data collection rules and regulations, as they are applied in the EU. The data of the project will become useable by third parties as described in amendment and it must consider Article 13 and Annex 5 of the GA, EU classified information may not be disclosed to any third party (including participants involved in the action implementation) without prior explicit written approval from the granting authority.

Will the provenance of the data be thoroughly documented using the appropriate standards?

Dynamo will use Zenodo metadata standards to document the provenance of the data. See also in this document Section 4. Data Summary, subsection “Forms of Data Generated”, where is explained what the formats of data are generated in Dynamo.

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Describe all relevant data quality assurance processes.

The quality of the dataset produced in Dynamo is guaranteed by the excellence of the Consortium partners and the Advisory Board members. For data collection, the quality control of the data can happen at various stages during the quality assurance process, these include replication and comparison with results of similar studies in optics, non-linear optics, nano-optics, and acoustics.

An internal process of quality evaluation is activated throughout the lifecycle of the project to assess both project data and project process (See the D6.1 Project Management Handbook). Each WP leader must submit all the produced documents to supporting partners and the project coordinator to check for the quality of the documents produced. The initial quality control of the data, during data collection, is the primary responsibility of the project data creator/owner. In addition, Advisory Board will monitor and provide feedback on results evaluation. Risks have been taken into consideration and mitigation measures were proposed to assure the quality of the project is not affected by the potential risks. Errors can also occur during data entry, but quality is ensured by standardised and consistent procedures for data entry with clear instructions.

Further to the FAIR principles, DMPs should also address research outputs other than data, and should carefully consider aspects related to the allocation of resources, data security and ethical aspects.

6. Other Research Outputs

In addition to the management of data, beneficiaries should also consider and plan for the management of other research outputs that may be generated or re-used throughout their projects. Such outputs can be either digital (e.g. software, workflows, protocols, models, etc.) or physical (e.g. new materials, antibodies, reagents, samples, etc.).

Beneficiaries should consider which of the questions pertaining to FAIR data above, can apply to the management of other research outputs, and should strive to provide sufficient detail on how their research outputs will be managed and shared, or made available for re-use, in line with the FAIR principles.

The repository services offered by Zenodo permit to share and preserve research data and other research outputs in any size and format: datasets, images, presentations, publications, and software. The digital data and the associated meta-data are preserved through well-established practices such as mirroring and periodic backups. Each uploaded dataset is assigned a unique DOI rendering each submission uniquely identifiable and thus traceable and referenceable.

Demonstrators are among other research output at Dynamo project and are describe it below:

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Deliverable	**D3.1 Provide a set of calibration samples**
Type of output	DEM — Demonstrator, pilot, prototype
Data manager	CSIC
Dissemination level	SEN - Sensitive / Restricted
Description	Initial set of samples for their experimental characterisation
Due date (month)	3
Deliverable	**D3.2 Optimal disordered phononic surface**
Type of output	DEM — Demonstrator, pilot, prototype
Data manager	CSIC
Dissemination level	SEN - Sensitive / Restricted
Description	Optimal sample or set of samples with the adequate degree of disorder to generate a high density of resonant modes.
Due date (month)	12
Deliverable	**D3.3 Optimal twisted architectures**
Type of output	DEM — Demonstrator, pilot, prototype
Data manager	CSIC
Dissemination level	SEN - Sensitive / Restricted
Description	Optimal sample or set of samples with a moiré pattern over the surface.
Due date (month)	24
Deliverable	**D3.4 Optimal final device for imaging**
Type of output	DEM — Demonstrator, pilot, prototype
Data manager	CSIC
Dissemination level	PU - Public
Description	Fabrication of the optimal spatial light modulator based on phononic architectures.
Due date (month)	36

Table 3: Demonstrators Lists

7. Allocation of resources

What will the costs be for making data or other research outputs FAIR in your project (e.g. direct and indirect costs related to storage, archiving, re-use, security, etc.)?

The costs for making data FAIR includes:

- fees associated with the publication of scientific articles containing project's research data in "Gold" Open access journals. The total budgeted costs for publication in open access journals (12.000 € approx. / per partner) and result protection (10.000€ approx. / per partner) have been included within the "C.3. Other goods, works and services" category.
- Project Website operation: costs included in the WP7 and Deliverable 7.1: Project website and social media profiles
- Data archiving at Zenodo and on other online data base: free of charge
- Copyright licensing with Creative Commons: free of charge

Additional details will be reported, as needed, in future versions of the DMP.

How will these be covered? Note that costs related to research data/output management are eligible as part of the Horizon Europe grant (if compliant with

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the Grant Agreement conditions)

Costs related to making data FAIR are eligible for reimbursement under the conditions defined in the Dynamo Grant Agreement, in particular Article 6.

Who will be responsible for data management in your project?

Data management activities concern the whole project and needs to be coordinated and monitored both at project and work package level in accordance with each organization internal Data Protection Officer (DPO). Data management is also linked to publication of project results and thus dissemination activities. Therefore, the following roles and responsibilities can be identified:

Roles

Each partner is responsible for the data they produce, and any fee incurred for Open Access through scientific publication of the data will be the responsibility of the data owner (authors) partner(s).

The **Project Data Manager** (Daniel Torrent) is responsible for:

- Developing the data management plan and policy in cooperation with the project manager (Michelle Andrade) and the technical partners
- Coordinating the technical realization in the corresponding WPs (data survey, data repositories, metadata catalogues, ...)
- Monitoring data management activities (both collection and publication) and deadlines and sending reminders to WP data managers
- Providing support to WP data managers
- Writing the data management plan (D6.2 and D6.6 updated version)
- Providing solutions for specific issues in accordance with project management
- Contacting the Project Coordination Committee in case of ethical and privacy issues that may forbid a publication of the data

The **Workpackage Data Managers** (WP leaders: Agustín Mihi, Bernard Bonello and Pawel Packo) are responsible for:

- The implementation of the data management policy in their respective WPs
- Monitoring data management activities and deadlines and sending reminders to partners
- Offering customized help and further guidance for filling out the WP data surveys
- Asking partners for missing information or clarifications
- Providing input to the data management plan by analyzing and summarizing the WP-specific data surveys

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- Offering customized help and further guidance for publishing open data and open-source software, if necessary
- Monitoring that open results are deposited in Zenodo or a complementary repository
- Contacting the Project Coordinator in case of issues that may forbid a publication of the data

The **Dissemination Manager** (Daniel Torrent) is responsible for:

- Offering customized help and further guidance for publishing scientific publications
- Ensuring that the open access policy of the journal complies with the Horizon Europe open data requirements before the researcher submits a manuscript
- Monitoring that gold access publications are deposited in Zenodo and sending reminders to partners
- Monitoring that metadata about publications is made available in the R&I Participant Portal and on the Dynamo website
- Monitoring that research data related to a publication is made available in Zenodo and linked to respective publication
- Monitoring that publications available in Zenodo are properly linked with Dynamo

The **Data Provider/ Researcher** is responsible for:

- Informing the data & dissemination managers when new open data / papers ready for publication are available
- Describing the data (by means of appropriate metadata) or scientific publication in accordance with the Dynamo data management policy (e.g. according to the chosen metadata standard) and with help of the tools (e.g. template, web form, ...) provided by the project
- Depositing (publishing into Zenodo and the institutional repository) the data or scientific publication in accordance to the Dynamo data management policy

How will long term preservation be ensured? Discuss the necessary resources to accomplish this (costs and potential value, who decides and how, what data will be kept and for how long)?

Tentatively, all public data will be shared and preserved in Zenodo, unless the Project Coordination Committee will decide to restrict some data because it goes against their legitimate interests. Data preserving at Zenodo is free of charge and it will be retained for the lifetime of the repository, which currently is 20 years at least.

8. Data security

What provisions are or will be in place for data security (including data recovery as well as secure storage/archiving and transfer of sensitive data)?

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Dynamo data will be stored in at least two separate locations to avoid loss of data: all project deliverables and data will be stored in the **private intranet** restricted to the project partners. As an initial step, only Dynamo researchers will have access to the data, which is protected against unauthorized access by means of authentication by using the username and passwords. Appropriate access levels will be granted by the creation of groups. Following, public data such as scientific publications and articles, the dataset deliverables and the final research results will be stored in the respective **institutional repositories** and shared through Zenodo to promote the data making FAIR.

Regarding data and metadata storage in **Zenodo**: all files uploaded to Zenodo are stored in CERN's EOS service in an 18 petabytes disk cluster. Each file copy has two replicas located on different disk servers. For each file we store two independent MD5 checksums. One checksum is stored by Invenio and used to detect changes to files made from outside of Invenio. The other checksum is stored by EOS and used for automatic detection and recovery of file corruption on disks. Metadata and persistent identifiers in Zenodo are stored in a PostgreSQL instance operated on CERN's Database on Demand infrastructure with 12-hourly backup cycle with one backup sent to tape storage once a week. In addition to the metadata and data storage, Zenodo relies on Redis for caching and RabbitMQ and python Celery for distributed background jobs.

All consortium partners have their own institutional General Data Protection regulation in line with EU Data Protection Law and regulations, including the Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation): UJI Security and Privacy Centre, CNRS General Data Protection Regulation, CSIC Data Protection and AGH General Data Protection Regulation.

In addition, the following provisions will be implemented:

- Consortium partners will impose contractual clauses and agreement to terms and conditions before access is granted to the data to all employees, co-workers, and subcontractors.
- Awareness on data privacy and security will be enhanced by attending a meeting with the Data Manager or the respective office responsible for the data security in each institution.
- Files are label in a systematically structured way to ensure the coherence of the final dataset
- Data will be encrypted if it is necessary by the participating researchers
- The use of USB flash drives will be limited

Will the data be safely stored in trusted repositories for long term preservation and curation?

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Data will be preserved for the lifetime of the Zenodo, which currently is 20 years at least and in case of closure of the repository, data will be integrated into suitable alternative institutional and/or subject based repositories.

General Policies of Zenodo states the following terms regarding the longevity of data:

- Versions: Data files are versioned. Records are not versioned. Records can be retracted from public view; however, the data files and record are preserved.

- Replicas: All data files are stored in CERN Data Centres, primarily Geneva, with replicas in Budapest. Data files are kept in multiple replicas in a distributed file system, which is backed up to tape on a nightly basis
- File preservation: Data files and metadata are backed up nightly and replicated into multiple copies in the online system
- Functional preservation: Zenodo makes no promises of usability and understandability of deposited objects over time
- Formats of documents: even preservation unfriendly. Zenodo is working on guidelines and features that will help people deposit in preservation friendly formats.
- Fixity and authenticity: All data files are stored along with a MD5 checksum of the file content. Files are regularly checked against their checksums to assure that file content remains constant

9. Ethics

Are there, or could there be, any ethics or legal issues that can have an impact on data sharing? These can also be discussed in the context of the ethics review. If relevant, include references to ethics deliverables and ethics chapter in the Description of the Action (DoA).

Dynamo project raised no ethics issues. There are no references in the DoA.

Will informed consent for data sharing and long term preservation be included in questionnaires dealing with personal data?

Dynamo will not work with questionnaires neither personal data.

10. Other issues

Do you, or will you, make use of other national/funder/sectorial/departmental procedures for data management? If yes, which ones (please list and briefly describe them)?

As well as European Commission policies on open data management, Dynamo partners must also adhere to their own institutional policies and procedures for data management:

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Universitat Jaume I (UJI)

- Institutional Declaration for Promoting Open Access at the Universitat Jaume I in 2020
- Signature of the Berlin Declaration on Open Access to Knowledge in Sciences and Humanities by the UJI's Rector in 2005
- UJI Support Guide and Tools for the Management and Dissemination of Research Data
- UJI Open Repository

Agencia Estatal Consejo Superior de Investigaciones Científicas (CSIC)

- CSIC Institutional Open Access Mandate in 2019
- Institutional Policy for promoting Open Data and Metadata
- Signature of the Berlin Declaration on Open Access to Knowledge in Sciences and Humanities by the CSIC's Presidency in 2006
- Digital.CSIC. Open Repository of the Spanish National Research Council
- CSIC Good Practices and Guidelines for Open Research Data
- Tools for Open Research Data and Open Science

Centre National de la Recherche Scientifique (CNRS)

- Roadmap of CNRS for Open Science in 2019
- CNRS White Paper "Open Science in a Digital Republic" in 2016
- Signature of the Berlin Declaration on Open Access to Knowledge in Sciences and Humanities by the CNRS' General Director in 2003
- Launch of Berlin Declaration in cooperation between the CNRS and Max Planck Society

Akademia Górniczo-Hutnicza Im. Stanisława Staszica W Krakowie (AGH-AUGH)

- Promotion of the use of RepOD: Repository for Open Data
- RepOD. National Polish Repository of Open Research Data funded by the European Union and created in 2015
- Assessment Model of Academic Institutional Repositories in Poland in the Context of Open Science in 2021

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