



INSPIRE

D5.3 Interoperable requirements and specification

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Executive Summary

This document provides an overview of the interoperability framework across the INSPIRE ecosystem. It defines interfaces between the INSPIRE Community Platform including NextCloud and OpenProject, as well as the data repository Zenodo and its connection with the resource portal GenPORT, and the INSPIRE main web site.

Building upon achievements of previous projects (e.g., GenPORT, Effort, ACT, GEAM site), this document aims at providing the specifications of a data repository and the development of an interoperable framework across INSPIRE sites. First and foremost, there is a need to specify and setup up an interface between leading EU Open Science data repository Zenodo and GenPORT.

Any integration required within the lifetime of the project would need to be specified as part of this document which remains a living document until the end of the project's development phase.

This deliverable complements the suite of documents associated with the overall specifications of the INSPIRE technological ecosystem, namely:

- D5.1: Specification of online collaboration and knowledge sharing environment.
- D5.2: INSPIRE main site and service platform specification, and
- D5.4: Adapted and operable online training platform.



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List of Acronyms

API	Abstract Programming Interface
CCR	Country Cluster Report
CoP	Community of Practice
DOI	Document Object Identifier
EC	European Commission
EDI	Equality, Diversity and Inclusion
EIGE	European Institute for Gender Equality
ERA	European Research Area
GEADC	Gender Equality and Anti-discrimination Committees (Greece)
GEAM	Gender Equality Audit and Monitoring Tool
GEAR	Gender Equality in Academia and Research
GEP	Gender Equality Plan
HEI	Higher Education Institution
HR	Human Resources
HRS4R	Human Resources Strategy for Researchers
ICT	Information and communications technology
NAP	National Action Plan
NGO	Non-governmental organisation
PAP	Positive Action Plan (Italy)
RFO	Research funding organisation
RPO	Research performing organisation
R&I	Research and Innovation
REST API	Representational State Transfer Abstract Programming Interface
SDG	Sustainable development goals

1 Introduction

This document provides an overview of the interoperability framework across the INSPIRE ecosystem. It defines interfaces between the INSPIRE Community Platform (i.e., NextCloud, OpenProject), the data repository Zenodo and existing infrastructures, such as GenPORT, the GEAM site, and the INSPIRE web site and services.

Building upon achievements of previous projects (e.g., GenPORT, Effort, ACT, GEAM site), this document aims at providing the specifications of a data repository and the development of an interoperable framework across INSPIRE sites. First and foremost, there is a need to specify and setup up an interface between leading EU Open Science data repository Zenodo (REST API) and existing infrastructure, primarily GenPORT. GenPORT will continue to serve as the main site for uploading and storing any type of resource related to gender and science. Its integration with Zenodo will allow for a more persistent resource identification by assigning a DOI (Document Object Identifier).

Any integration required within the lifetime of the project would need to be specified as part of this document which remains a living document until the end of the project's development phase.

This deliverable complements the suite of documents associated with the overall specifications of the INSPIRE technological ecosystem, namely:

- D5.1: Specification of online collaboration and knowledge sharing environment.
- D5.2: INSPIRE main site and service platform specification, and
- D5.4: Adapted and operable online training platform.

2 Zenodo Integration

2.1 Overview

INSPIRE ecosystem needs to be integrated with Zenodo (<https://zenodo.org>) primarily in the context of the "Gender Equality Plans (GEPs) database" as this is described in detail in D5.2: INSPIRE main site and service platform specification.

Zenodo was launched within the frame of the OpenAIRE project (<http://www.openaire.eu>), which was commissioned by the European Commission to provide open access to research outputs financed by public funding in Europe. Not all researchers necessarily have access to

an institutional repository. Zenodo was designed to help them to comply with the open access requirement.

Zenodo is an open repository for all scholarship, enabling researchers from all disciplines to share and preserve their research outputs, regardless of size or format. Free to upload and free to access, Zenodo makes scientific outputs of all kinds citable, shareable, and discoverable for the long term.

The Zenodo repository is open and not restricted to scientific disciplines or publications; it adheres to the principle “All fields of research. All types of research artefacts”. It also permits sharing, curation and publication of data and software.

Anyone with research output may deposit it (e.g., articles, datasets, images, posters, software). Zenodo accepts large files (up to 50GB) without format restriction. The data is assigned a Digital Object Identifier (DOI) which makes the publication easily citable according to international standards. Other features are very helpful for researchers: flexible licensing and accessibility, long-term storage, automatic integration in reporting for European Commission-funded projects via OpenAIRE.

2.2 Zenodo API

The Zenodo API allows for programmatic interaction with the platform, enabling developers to automate the process of depositing, managing, and retrieving research outputs.

Here's an overview of the main functionalities of the Zenodo API:

1. **Authentication:** Zenodo uses OAuth2 for API authentication. Users need to create a personal access token via the Zenodo web interface to interact with the API programmatically.
2. **Depositions:** Depositions are draft or published records. They can contain files and metadata.
 - a. Create a New Deposition (Endpoint: `POST /deposit/depositions`): This action creates a new draft record.
 - b. Retrieve Depositions (Endpoint: `GET /deposit/depositions`): You can retrieve a list of all your depositions or get details of a specific deposition using its ID.
 - c. Edit Deposition Metadata (Endpoint: `PUT /deposit/depositions/:id`): Allows for editing the metadata of a specific deposition.
 - d. Delete a Deposition (Endpoint: `DELETE /deposit/depositions/:id`): This action deletes a specific draft deposition.
3. **Files:** Depositions can have associated files (like datasets, images, software, etc.).
 - a. Upload a File (Endpoint: `POST /deposit/depositions/:id/files`): This action uploads a file to a specific deposition.

- b. List Files (Endpoint: `GET /deposit/depositions/:id/files`): Retrieve a list of files associated with a specific deposition.
- c. Delete a File (Endpoint: `DELETE /deposit/depositions/:deposition_id/files/:file_id`): Removes a specific file from a deposition.

4. Actions: Various actions can be performed on depositions.

- a. Publish a Deposition (Endpoint: `POST /deposit/depositions/:id/actions/publish`): This action changes a draft deposition to a published record.
- b. Discard Changes (Endpoint: `POST /deposit/depositions/:id/actions/discard`): Discards changes on an unpublished record.
- c. Edit a Published Deposition (Endpoint: `POST /deposit/depositions/:id/actions/edit`): This action unlocks a published record for editing. A new version of the record is created.

5. Communities: Zenodo supports communities, which are curated collections of records.

- a. List Communities (Endpoint: `GET /communities`): Retrieves a list of all communities or specific details of one.

6. Search & Retrieval: Zenodo offers a search endpoint that allows querying the repository.

- a. Search Records (Endpoint: `GET /records`): Allows for searching published records based on various criteria.

This is just an overview of the primary functionalities of the Zenodo API, which are described in more detail under <https://developers.zenodo.org>.

2.3 Service specification / Use case

The GenPORT website allows for the uploading a sharing of any type of resource (for example reports, posters, video lectures, links to other portals and sites, etc.). Users can indicate public identifies that already existing during the upload process, together with other meta-data information such as title, description, languages available, etc. Thus, a user sharing a scientific publication can indicate the assigned DOI of the given article. However, many resources do not have a unique identifier, such as for example Gender Equality Plans. This makes the identification and referencing of many gender and science resources difficult. As a solution, we propose to allow for the automatic assignment of a DOI during the upload process of a new resource to GenPORT.

A user uploads a given resource to GenPORT. Only if this new resources has an associated file, does the Zenodo mirroring make sense. During the resource creation process on

GenPORT, in case a user starts the file-upload dialog, GenPORT will offer the option to make this file also available via Zenodo and obtain a corresponding DOI. The minimum requirements for the creation of a Zenodo entry are:

- Upload at least one electronic file up to 50GB of max file size → Exists on GenPORT
- Indicate a “upload type” of either: Publication, Poster, Presentation, Dataset, Image, Video/Audio, Software, Lesson, Physical object, Workflow, Other. “Publication” and “Image” sub-types can be furthermore specified. → Matching needed from GenPORT Resource type to Zenodo Upload Type.
- Publication date (current date used, if not otherwise specified) → Exists on GenPORT
- Title → Exists on GenPORT
- Authors, one or several indicating Name, Affiliation and optional ORCID. → Does not exist on GenPORT.
- Description → Exists on GenPORT
- Access rights: Open Access, Embargoed Access, Restricted Access, Closed Access. → Does not exist on GenPORT
- License → Exists on GenPORT

As a consequence, the file-upload dialog of GenPORT will have to cover those meta-data fields that are specific to Zenodo, namely: authors name, access rights, and the matching of GenPORT Resource type to Zenodo Upload Type.

The Zenodo API will be used via GenPORT to implement the following functionalities:

Resource creation/ uploading to GenPORT

- Make sure that the minimum meta-data fields necessary for creating a resource on Zenodo are filled out
- Create a new resource on the GenPORT Zenodo account, uploading – in case available – the corresponding electronic files. If not electronic files such as pdf, word, zip files are attached,
- Obtain the resulting DOI for the newly created entry on Zenodo
- Retrieve the obtained DOI from Zenodo and insert it in the corresponding meta-data field “public identifier” on GenPORT.

Resource editing

- If any of the meta-data fields on GenPORT for an already uploaded resource are edited, the corresponding meta-data fields on Zenodo need to be updated. There is not an overall match between the required Zenodo meta-data fields and GenPORT meta-data fields.

Resource deletion

- If a resource is deleted from GenPORT, the corresponding entry on Zenodo needs to be marked for deletion, although an entry once created on Zenodo cannot be removed automatically. Although the same entry on Zenodo can contain several files, and users can delete these files, the parent Zenodo entry cannot be completely removed.

3 INSPIRE Community Platform Integration

OpenProject offers close integration with NextCloud. Starting with OpenProject 12.2, Nextcloud can be used as an integrated file storage in OpenProject. The integration application, which can be found in the NextCloud App store, enables seamless integration with open-source project management and collaboration software OpenProject.

On the NextCloud end, it allows users to:

- Link files and folders stored in NextCloud with work packages in OpenProject
- View, open and download files and folder linked to a work package via the Files tab.
- View OpenProject notifications via the NextCloud dashboard.
- Search for work packages using NextCloud's search bar.

On the OpenProject end, users are able to:

- View all NextCloud files and folders linked to a work package.
- Download linked files or open them in NextCloud to edit them.

4 DRUPAL Integration

As already described in D5.1: Specification of online collaboration and knowledge sharing environment and D5.2: INSPIRE main site and service platform specification, INSPIRE web site has been developed in Drupal v. 9.5.7 and based on the preliminary specifications of the dynamic services of INSPIRE, there is a strong integration required between INSPIRE web site and GenPORT, which has also been developed in Drupal and will be updated in the context of the work conducted in this project.

Drupal is a powerful, open-source content management system (CMS) and platform that provides extensive capabilities for building, managing, and extending websites and web applications. At the core of Drupal's flexibility and extensibility lies its robust API (Application Programming Interface) which allows developers to interact with and extend the core functionality of Drupal.

Here is an overview of some of the APIs and systems you might encounter in a typical Drupal setup:

1. Core API:

- Database API: Provides an abstraction layer for database queries, making it easier to interact with various database backends in a secure and performant way.
- Form API: Used for creating and managing forms within Drupal, providing both validation and submission handling.
- Render API: Manages the rendering of arrays into HTML, allowing developers to create and modify page content and layout.
- Entity API: Used for interacting with entities in Drupal, which are the primary method of storing content and configuration.

2. Field API:

- Allows developers to define custom fields, widgets, and formatters, making it possible to create complex data structures and user interfaces.

3. Configuration API:

- Provides an interface for developers to store and retrieve configuration data, making it easier to manage settings and ensure consistency across environments.

4. Plugin API:

- Enables developers to create plugins, which are swappable pieces of functionality that can be reused throughout a site.

5. Routing and Menu API:

- Used for defining routes (URLs) and menu items, helping to manage the navigational structure of a site.

6. Theme API:

- Allows developers to create and manage themes, which control the look and feel of a site.

7. Block API:

- Used for creating and managing blocks, which are containers for content, forms, or other interactive elements.

8. RESTful Web Services API:

- Allows developers to expose Drupal data and services to other systems in a RESTful manner.

9. JSON:API:

- An implementation of the JSON:API specification, allowing developers to build robust APIs quickly.

10. Update API:

- Provides mechanisms for modules and themes to register and execute code when the system is updated.

11. **Migration API:**

- Provides the framework for migrating content and configuration from other systems into Drupal.

12. **Queue API:**

- Allows developers to process a number of tasks at a later time, improving performance for time-consuming processes.

Drupal's modular and extensible nature is largely due to its comprehensive set of APIs. They provide the foundation for developers to build upon, whether they are creating custom modules, interacting with external systems, or extending existing functionality.

These APIs are well-documented on the Drupal website (<https://api.drupal.org/api/drupal>), and there's a vibrant community of developers who contribute to the ecosystem, making it a rich platform for web development.

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