



D3.17 – Report Training Centre sustainability and business Plan



Deliverable number:	D3.17
Work package:	WP3 – ITINERIS Training Centre
Intermediate Objective:	IO3.10
Deliverable type:	<input checked="" type="checkbox"/> Document, report
	<input type="checkbox"/> Websites, patent filings, videos, etc.
	<input type="checkbox"/> Other: please specify
Dissemination level:	<input checked="" type="checkbox"/> Public
	<input type="checkbox"/> Restricted
Estimated delivery (bimester):	B20
Actual delivery date:	26/02/2026
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Note:	

IR0000032 – ITINERIS, Italian Integrated Environmental Research Infrastructures System - CUP B53C22002150006 (D.D. n. 130/2022)
 Funded by EU - Next Generation EU
 Mission 4 “Education and Research” - Component 2: “From research to business” -
 Investment 3.1: “Fund for the realisation of an integrated system of research and innovation infrastructures”

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1. INTRODUCTION

This report illustrates the training architecture developed within the framework of the ITINERIS project, focusing on the management of digital training objects, their cataloguing, and their integration with the technological ecosystem of the LifeWatch ERIC Service Centre.

This document was expected to be released in Bimester 20 and to be included in Intermediate Objective IO3.10; it is produced under the responsibility of the Operative Unit (OU) of the National Research Council – Research Institute on Terrestrial Ecosystems (CNR-IRET).

The document is organized into five chapters, including this one. Chapter 2 provides an overview of the Digital Training Objects (DTOs) developed within the 70 training courses of WP3 and uploaded to the ITINERIS training platforms. Chapter 3 outlines the technical features and the workflow that was carried out, from the creation to the publication of the DTOs. Chapter 4 analyzes the LifeWatch Italy Metadata Catalogue, which reflects the ITINERIS Metadata Catalogue, describing the integration with the EOSC-Training Profile standard and the future prospects for economic and logistical sustainability. Finally, chapter 5 presents the list of acronyms used in the report.

2. DIGITAL TRAINING OBJECTS

All Digital Training Objects (DTOs), defined as “self-contained and reusable digital resources designed to support learning”, such as videos, quizzes, or interactive modules, represent the modular building blocks of the knowledge generated by WP3. These resources result directly from training activities dedicated to the personnel of the 22 Research Infrastructures (RIs) and to PhD students from the universities involved in the ITINERIS project, totalling **70 courses** delivered within the framework of WP3. Specifically, 36 courses were delivered to ITINERIS research infrastructure personnel under Activity 3.6, 24 courses were provided to PhD students from WP3 partner universities as part of Activity 3.7, and 10 courses were held for infrastructure personnel involved in scientific communication to stakeholders within the framework of Activity 3.8.

Each DTO is accompanied by a rigorous set of descriptive metadata, which is essential to guarantee the FAIR principles (Findable, Accessible, Interoperable, Reusable). The Training resources metadata schema is based on the EOSC – Training Profile, as presented in Deliverable 2.5 (Catalogue of data and services - Specification document). According to this schema, resources are described with a minimum set of attributes identified as mandatory. This set includes basic information, detailed access data, availability information, contact details, classification information, and learning information.

A critical aspect of DTO management concerns usage licenses. While the primary objective of ITINERIS is the promotion of Open Science, an analysis of real-world cases highlights a more complex landscape. As of the publication date of this deliverable, the ITINERIS training platform (<https://training.itineris.cnr.it>) shown in figure 2.1, hosts over **1.200 resources** of which, over **603** are indexed in the LifeWatch Italy Metadata Catalogue (<https://metadatalogue.lifewatchitaly.eu>) and subsequently harvested by the ITINERIS Metadata Catalogue (<https://geonetwork.itineris.cnr.it>); among these, almost 600 are DTOs fully Open Access, while a small fraction of remains restricted to the course participants. This is due to the fact that not all DTOs can be released under fully open licenses (e.g., CC-BY); in certain instances, lecturers or their organizations opted for more restrictive licenses only for participants, due to the use of proprietary data or constraints related to the Intellectual Property (IP) of the original materials.

The remaining portion of approximately 600 non-metadated resources consists of either *I)* duplicates, used for different target audiences from the lecturers); *II)* restricted resources withheld by providers to protect proprietary data and intellectual property rights; *III)* support materials. The latter are not strictly DTOs but rather auxiliary resources used during Activities 3.6, 3.7, and 3.8 to support training events, such as pre-course knowledge assessments, scientific papers, certificate generation tools, course exam modules, course satisfaction-evaluation surveys, and shared working folders.

The platform features a real-time counter (Figure 2.2) that displays live statistics, including the 70 training courses delivered within WP3, the total number of uploaded resources (1,224 as of today), the 800 users registered on the platform, and the total number of Research Infrastructures (RIs) involved in the ITINERIS project.

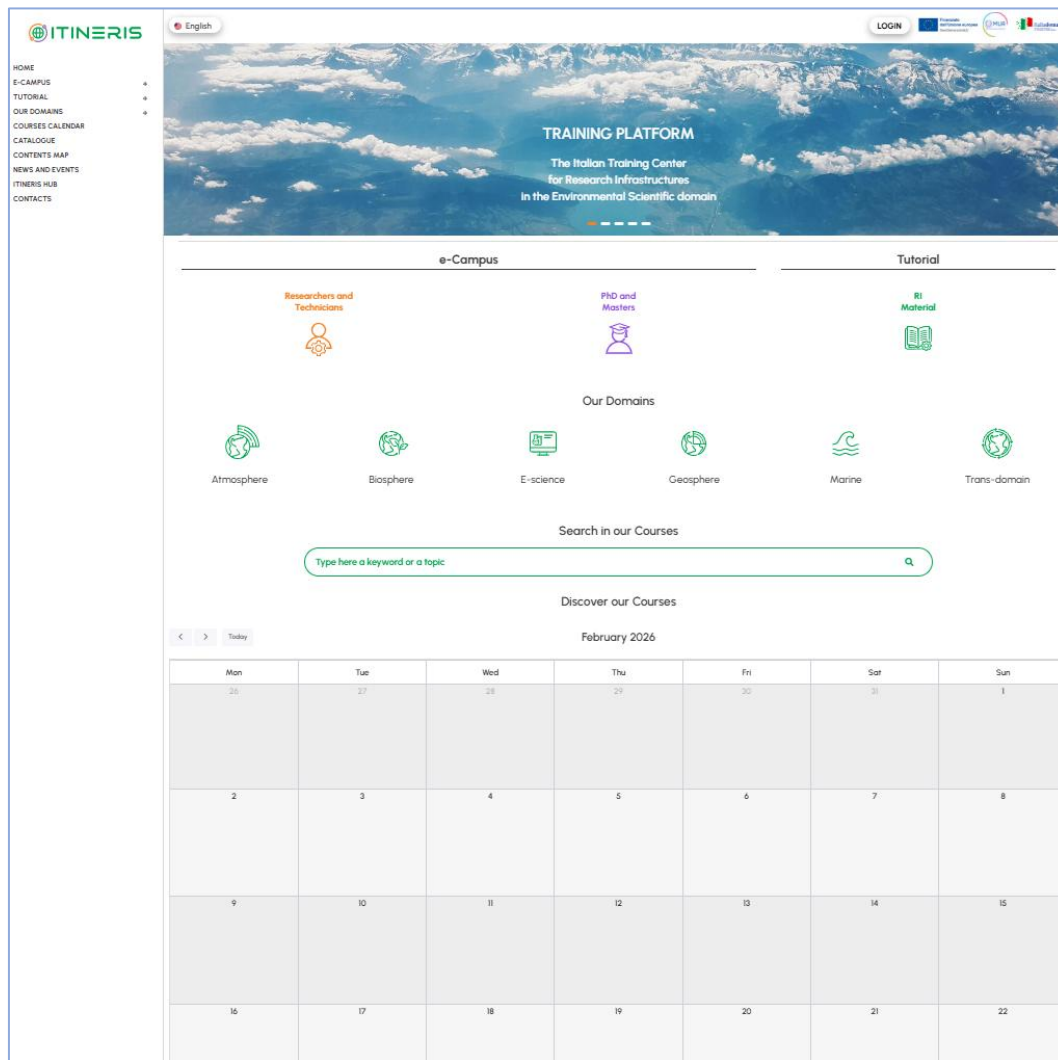


Figure 2.1. ITINERIS training platform homepage. The scientific domains of interest, under which the resources are categorized, are displayed at the center. Users can access courses and their related materials by selecting a specific domain of interest, searching for a resource via the search bar or the Knowledge Base, or picking a course directly from the calendar located at the bottom. Alternatively, the sidebar offers an e-campus section, where courses are grouped according to the target audience (i.e., infrastructure personnel or PhD students).

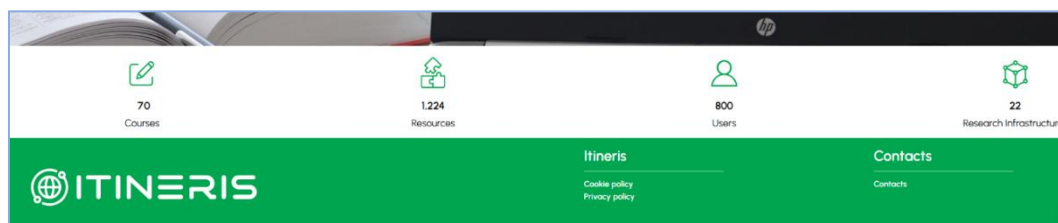


Figure 2.2. Statistical section of the ITINERIS training platform. From right to left, it shows the number of uploaded and delivered courses, the number of resources available on the platform (including DTOs and others), the number of users registered on the platform, and the number of ITINERIS project infrastructures.

It is important to emphasize that the ITINERIS Training Platform hosts a larger volume of resources (i.e. over 1.200 resources) than those currently available in Open mode and participants of in-person or online courses still retain access to these materials.

From an architectural perspective, as specified in the relevant Deliverable (D3.1-ITINERIS Training Centre Platform), the ITINERIS training platform is hosted and fully integrated by the LifeWatch Italy ecosystem and is also accessible via the ITINERIS HUB. This setup ensures the medium-to-long-term sustainability of all available and metadata-enriched resources.

3. RESOURCES PUBLISHING WORKFLOW

This paragraph presents the resource workflow through its main stages, from the initial upload to the final publication of the resource. Noting that all described activities were coordinated by the WP3 technologist of the CNR-IRET Lecce Operative Unit under the direction of the WP3 leader and are synthetically presented in Table 1.

Resources creation: The lecturers, contacted by the relevant WP3 technologists, are responsible for creating the resource based on the course's educational objectives established during the module structuring and course learning goals phase.

Online resource upload: Instructors or WP3 technologists upload the educational materials (videos, PDFs, links, etc.) to the ITINERIS Training Platform within the designated course area before the course starts, ensuring all resources are readily available for participants.

Metadata draft production: For the DTOs of activities 3.6, 3.7, and 3.8, where feasible, local documents were compiled containing the fields of the metadata scheme described in the previous chapter and provided by the WP3 technologists. "Duplicate" resources and not-accessible training courses were not metadated and are excluded from the DTO count to avoid redundancy issues within the LifeWatch Italy and ITINERIS Metadata Catalogues, and to ensure compliance with the FAIR principles upon which the catalogues are based.

Resources and metadata processing: During this phase, the WP3 technologists, coordinated by the OU CNR-IRET Lecce, completed the metadata themselves if the lecturers had not already created or finalized it. Additionally, the resources were reviewed; for instance, videos were shortened where requested, or materials were adapted for publication in accordance with open-source access rights.

Metadata digitization: The staff of FormaLab S.R.L., in close collaboration with and coordinated by the technologist in Lecce, digitized the initial metadata drafts into the LifeWatch Italy Metadata Catalogue. This was done by interacting with the WP3 technologists and the FAIR Implementation Coordinator, Dr. Ilaria Rosati (CNR-IRET Lecce), to obtain access to the resource catalogue.

Metadata draft review: Metadata drafts for approximately 600 DTOs in the LifeWatch Italy Metadata Catalogue were reviewed by the digital resource validation team. This team was coordinated by Dr. Ilaria Rosati and composed of temporary units of personnel from the CNR-IRET Lecce OU (Dr. Andrea Tarallo, Dr. Enrica Nestola, Dr. Gianmarco Ingrosso, and Dr. Gregorio Sgrigna). Meanwhile, all necessary checks were performed alongside the OU's WP3 staff to ensure all resources had been uploaded. Any missing or incomplete metadata identified during this stage were filled in directly on the online catalogue, bypassing the upload process previously handled by FormaLab S.R.L..

Validation: In this phase, once a metadata record has been checked by an initial operator from the validation team, it requires approval by a second operator from the same team to be considered final.

Publication: Once validated, the metadata is finally published and the resources are made available under either open or restricted access, depending on the authors' provisions. This

makes them available to the European nodes of the research infrastructures and to users interested in the field of environmental sciences.

This makes it indexable by both the LifeWatch Italy Metadata Catalogue and the ITINERIS Metadata Catalogue, the latter via automatic harvesting, as well as by the ITINERIS Semantic Training Platform on Environmental Science described in Deliverable D3.9. This allows end-users to discover various materials through keyword searches or by domain of interest.

Table 1. Schematic workflow for the management of digital training resources and related metadata. It outlines the various operational phases, the personnel responsible for each phase, and the main outputs.

Phase	Operator	Main Output
Resource creation	Lecturers of the 70 training courses (Activities 3.6, 3.7, and 3.8)	Creation of resources and DTOs
Online resource upload	Lecturers / WP3 Technologists	Uploading of resources and DTOs to the ITINERIS Training Platform
Metadata draft production	Lecturers / WP3 Technologists	Compilation of metadata in shared documents
Resource and metadata processing	WP3 Technologists	Initial local metadata review and material adaptation (e.g., video editing)
Metadata digitization	FormaLab S.R.L. Staff	Digital draft on the LifeWatch Italy Metadata Catalogue
Metadata review	CNR-IRET Lecce FAIR Implementation Team	Cross-check of metadata
Validation	CNR-IRET Lecce FAIR Implementation Team	Metadata validation
Publication	CNR-IRET Lecce FAIR Implementation Team	Publication in the LifeWatch Italy and ITINERIS Metadata Catalogues for European research infrastructures nodes and final users

4. METADATA CATALOGUE FOR DIGITAL TRAINING OBJECTS

All the training resources produced during the training events carried out in WP3, and uploaded on the ITINERIS training platform (<https://training.itineris.cnr.it>) as part of the 70 courses delivered under Activities 3.6, 3.7, and 3.8, have been indexed on the LifeWatch Italy Metadata Catalogue (<https://metadatalogue.lifewatchitaly.eu>).

The Catalogue is a fundamental resource for the scientific community and environmental education. Designed to serve as a “*discovery portal*”, it facilitates the search, sharing, and reuse of educational materials related to biodiversity and ecosystem science. As an integral part of the LifeWatch ERIC Service Centre, the catalogue acts as a bridge between theoretical science and practical technology. It provides datasets, ICT services, and training materials to empower researchers and infrastructure users to tackle high-priority challenges, such as climate change and biodiversity loss. The catalogue is powered by the GeoNetwork core engine and is structured in accordance with FAIR principles (Findable, Accessible, Interoperable, Reusable). It utilizes advanced metadata schemas (such as the EOSC profile) to ensure that every resource is easily discoverable, well-documented, and accessible.

On the catalogue’s Home page (Figure 4.1), users can search for resources by entering keywords or resource names into the central search bar, or by browsing the various categories provided (e.g., Datasets, Research sites, Workflows, etc.).

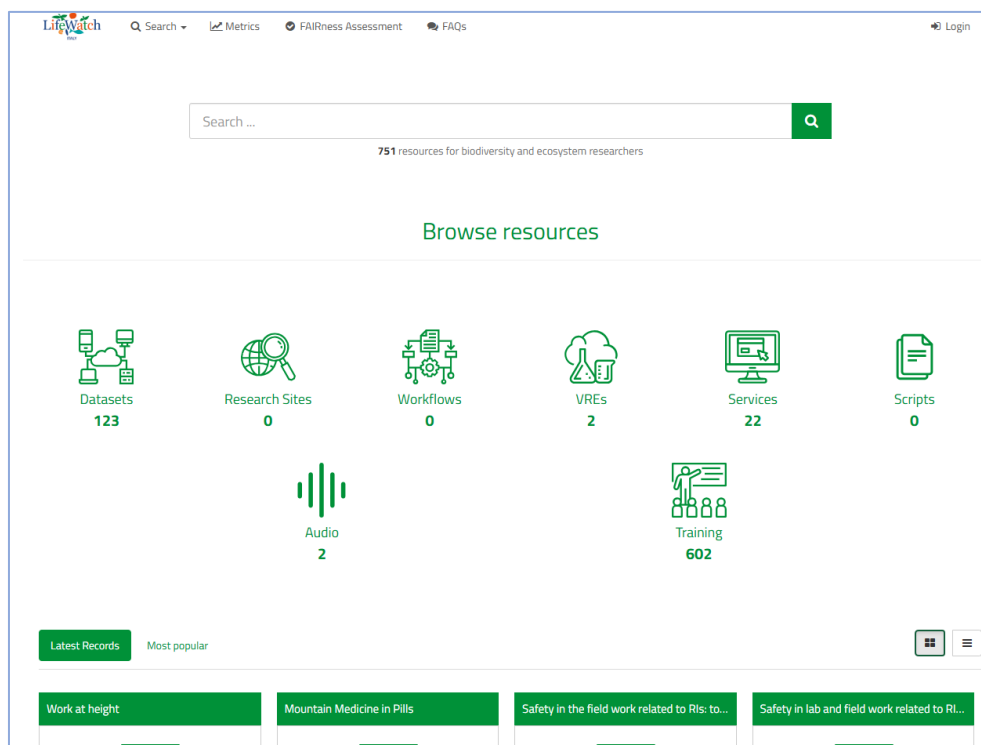


Figure 4.1. LifeWatch Italy Metadata Catalogue homepage. The search functions are located at the top; the centre displays the categories for the uploaded metadata, including the Training section. The latest metadata entries added to the catalogue are shown at the bottom.

The platform supports both simple and advanced searches, allowing users to locate data by entering keywords or by navigating through categories. A part for the search system, the key features include also the Map, a cartographic interface used to visualize data or resources that contain a geographic component and the Semantic component, a catalogue also provides access to the LifeWatch Italy Semantic Platform (<https://semantics.lifewatchitaly.eu>), which offers the possibility to query the primary semantic model for data and metadata using a simplified and structured search mode.

Visualization resources in the Metadata Catalogue

Once the search is performed, a list of results will appear, displaying a preview with a thumbnail image, the resource title, and its category (Figure 4.2).

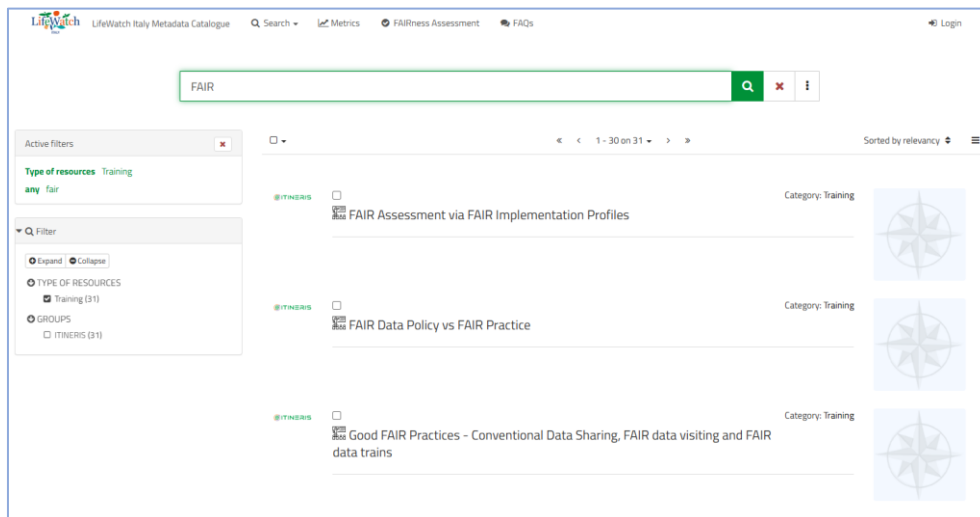


Figure 4.2. LifeWatch Italy Metadata Catalogue search page. In the example shown, all resources matching the search term, in this case, “FAIR”, are listed in the central area. All of them belong to the Training category, identified on the left.

Clicking the chosen resource Title opens the full metadata sheet, organized into different main sections. First, there is a detailed textual description of the dataset or resource, providing basic general information, detailed access data, availability information, contact details, classification information, and learning information (Figure 4.3). For each resource, it is possible, where available, to download the metadata information’s in various formats (permalink, ZIP, XML, JSON) or to copy the metadata citation. Additionally, three counters are provided above the metadata information, allowing users to track how many times the resource has been downloaded, how many views it has received, and its total number of citations. All resources can be linked to others and, in the specific case of the DTOs developed by WP3, a “parent metadata record” was identified to serve as a primary reference that contains all the general information about the training course, regardless of the specific activity in which it was provided. Consequently, all DTOs developed to achieve the course’s learning objectives have been linked to this parent metadata.

Figure 4.3. Example of a parent metadata record, specifically for the FAIR Awareness course, delivered to PhD students at the University of Salento as part of Activity 3.7. In the filed “Related resources”, are listed all the DTOs produced for this course, including presentations and video recordings.

4.1 Future of Work Package 3 resources

The metadata for the Digital Training Objects produced within WP3 activities have been indexed in the LifeWatch Italy Metadata Catalogue, which serves as the primary source for harvesting by the ITINERIS Metadata Catalogue. Furthermore, the resources and the training platforms developed (specifically the ITINERIS Training Platform and the ITINERIS Semantic Training Platform on Environmental Sciences), are hosted within the LifeWatch Italy Service Centre environment, and in the ITINERIS HUB, to achieve logistics optimization and medium-to-long-term economic sustainability while further enhancing the “training heritage” built throughout WP3 by granting it stability and durability over time. This approach enables the dissemination of resources across multiple online platforms through a single central entry point, eliminating manual duplication and reducing potential inconsistencies caused by broken links, thereby optimizing the workload for various groups in the long run. Furthermore, indexing within a European-recognized catalogue increases the visibility of the resources produced, encouraging their reuse for both scientific and educational purposes and amplifying the impact of the training activities carried out under the ITINERIS project.

From a logistical perspective, the LifeWatch Italy Metadata Catalogue is an established, operational platform fully compliant with international standards for scientific metadata management that adheres to FAIR principles by aligning with the EOSC-Training Profile, as mentioned above, ensuring that every training resource produced within WP3 is described in a standardized, interoperable, and reusable way. This approach avoids overlapping technological developments and the creation of parallel data repositories, thereby reducing

overall operational complexity. A further logistical advantage is the existence of a formalized workflow where the review, validation, and publication of metadata are integral parts of a process managed by a team specializing in FAIR implementation.

Since, the Metadata Catalogue, the training resources and the training platforms are already a fully inherent part of the LifeWatch ERIC Service Centre, and consequently integrated into the European ecosystem of Research Infrastructures, stable governance and operational continuity are guaranteed beyond the duration of the ITINERIS project itself.

Finally, on the economic point of view, the adopted solution reduces initial investment costs and lowers operating expenses (OPEX), offering to researchers and users, across research infrastructures, the access to online data and services with high levels of quality, control, and reusability. Routine maintenance, technological updates, regulatory conformity, and technical support are already covered within the LifeWatch ERIC framework, leveraging economies of scale through shared management at both national and European levels, mitigating financial risk and ensures greater predictability of long-term costs, confirming also that maintaining metadata, resources and platforms on the LifeWatch Italy ecosystem is a strategic choice capable of combining logistical efficiency, economic sustainability, and institutional robustness.

5. ACRONYM LIST

CC-BY: Creative Commons Attribution

DTO: Digital Training Resource

EOSC - European Open Science Cloud

FAIR: Findable, Accessible, Interoperable, Reusable

ICT: Information and Communication Technology

IP: Intellectual Property

JSON: JavaScript Object Notation

OPEX: Operating Expenses

RI: Research Infrastructure