ENVRI-Hub NEXT

D3.2 Training Plan

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Abstract	
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The ENVRI-Hub NEXT Training Plan establishes a comprehensive strategy for providing project partners and stakeholders with the most relevant knowledge and skills needed to contribute effectively to the mission of the project and to fully exploit the functionalities of the ENVRI-Hub. This plan defines key training target groups and training activities, including internal and external processes, partner responsibilities, and quality standards for the production of training materials. The plan concludes with a detailed work plan outlining specific training formats, delivery modes, and events.	

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Terminology / Acronyms	
Term/Acronym	**Definition**
AAI	Authentication and Authorization Infrastructure
ECV	Essential Climate Variable
ENVRI	Environmental Research Infrastructure
ENVRINNOV	Environment Research Infrastructures Innovation Roadmap
EOSC	European Open Science Cloud
EVERSE	European Virtual Institute for Research Software Excellence
I-ADOPT	InteroperAble Descriptions of Observable Property Terminology
IRISCC	Integrated Research Infrastructure Services for Climate Change risks
FAIR	Findable, Accessible, Interoperable, Reusable
LMS	Learning Management System
Moodle	Modular Object-Oriented Dynamic Learning Environment
OSCARS	Open Science Clusters' Action for Research and Society
Training Need	The gap between the current level and type of knowledge, skills, mindset, and practices, and the desired one
VRE	Virtual Research Environment
WP	Work Package

Table of Contents

Table of Figures

Table of Tables

Executive summary

This deliverable outlines the strategy and key actions that will guide the training provision of tasks 3.5/4.5 "User training and skills" of the ENVRI-Hub NEXT project, to support the general objective of bringing the ENVRI-Hub demonstrators to a higher level of technology readiness, with a stronger integration framework, and user-friendly visual interfaces.

The strategy has been informed by an assessment that defined the priorities in catering for the training needs of the ENVRI-Hub developers and ENVRI-Hub service owners, i.e., the project partners responsible for the design and development of web services and interfaces, implementation of an Authentication and Authorization Infrastructure, and adoption of common metadata strategies and standards. The second target group of the training provision consists of relevant researchers with advanced IT skills and research software engineers with an interest in taking full advantage of the ENVRI-Hub functionalities by developing use cases. The third category targeted by training actions is researcher infrastructures from the ENVRI Community that must easily onboard new services, and manage, curate and access data on the ENVRI-Hub.

The training planning includes the production of training materials and the organisation of onsite and online events. The training content, considered a Key Exploitable Result of the project, will be developed with FAIR principles in mind and will be produced on the **ENVRI training platform**. Metadata of training materials will be added to the training catalogue and automatically listed in the Training Gateway of the ENVRI-Hub. Thanks to cross-WP collaboration through a task force and constant feedback, monitoring and evaluation will allow for the reassessment of training needs in the second part of the project. ENVRI-Hub NEXT Training team closely collaborates with other EU-funded projects (ENVRINNOV, IRISCC) supporting the ENVRI community to discuss possible synergies and align the training plans.

1 Introduction

The introduction illustrates the purpose and the structure of the training plan against the scope of the training activities, and in the context of the general mission of the ENVRI-Hub NEXT project. This chapter also briefly retraces the training services and products delivered by the ENVRI-Hub NEXT predecessors.

1.1 Scope and purpose of the training plan

The task 3.5. of ENVRI-Hub NEXT, "User training and skills", and its continuation, task 4.5 in the second half of the project, aims at supporting ENVRI-Hub end-users by providing training and guidance for optimal usage of the ENVRI-Hub services and products. Also, the task will equip research infrastructure operators and project participants with skills and knowledge of the adoption of effective technical solutions, ensuring optimised development and maintenance of the ENVRI-Hub.

Such training provision consists of the production of training content, and the organisation of training events, in collaboration with other project partners. Several assumptions regarding preferred content and event formats, and priority topics were reasonably made in the project proposal and described in the project Grant Agreement. The scope of this training plan is to corroborate, and adjust where needed, initial ideas with the best information currently available.

1.2 Structure of the document

The introduction clarifies the scope and purpose of this training plan in the context of the main objectives of the ENVRI-Hub NEXT project; it also describes the training products and services already developed during the predecessor ENVRI-FAIR project. Chapter 2 presents the methodology and findings of the training needs assessment that informs the training roadmap. Chapter 3 provides more detail about the current training architecture that will support the production, dissemination and discovery of the training materials. Chapter 4 includes recommendations on how to produce such training materials and keep them relevant for learners in the long term. Chapter 5 outlines project partners' roles and responsibilities in the training-related processes, and identifies preferred content formats, delivery modes, and key ENVRI Community events.

1.3 ENVRI-Hub NEXT: main objectives and services

At the beginning of the ENVRI-Hub NEXT project, the ENVRI-Hub demonstrator presents itself as a prototype of an aggregation platform (Adamaki, A., & Vermeulen, A., 2023) providing the following services :

- Knowledge Base delivered in the project ENVRI-FAIR;
- Catalogue of (cross-)RI science demonstrators delivered in the project ENVRI-FAIR;
- Catalogue of RI-managed services, provided within ENVRI-FAIR;
- Hands-on examples of Jupyter Notebooks multi-domain applications and API documentation developed during ENVRI-FAIR;
- Training Gateway.

The end-user experience on the ENVRI-Hub demonstrator is limited by the lack of underlying enabling services, such as a self-onboarding process for new RI services and the integration

with Virtual Research Environments (VREs). ENVRI-Hub NEXT will overcome such limitations and implement an AAI compatible with the EOSC solution now available

The overarching objective of ENVRI-Hub NEXT is to build a modular and interdisciplinary Hub, designed to enhance interoperability and scalability across the 4 environmental subdomains of atmosphere, solid Earth, ecosystems, and the ocean that form the ENVRI Community. This objective is pursued by developing, deploying and maintaining the following services:

1. Knowledge Base;
2. Catalogue of Services and Data;
3. Data Analytical Framework for workflows, VREs, and their documentation.
4. Training Gateway and Platform

These services and their sub-components will be harmonised with coherent Essential Climate Variables (ECVs) and metadata practices, and integrated as much as possible by the identity and authorisation management solution ENVRI-ID. According to the ENVRI-Hub NEXT Grant Agreement, the Training Gateway will be used as-is but will provide access to new enriched content.

1.4 ENVRI-FAIR Legacy

The ENVRI-Hub NEXT project follows and builds on the work and developments of its predecessors: the ENVRIplus project and the ENVRI-FAIR project. The ENVRI-Hub predecessor handed over a Training Catalogue for metadata, a Training Platform for producing content, and a Training Gateway.

When it comes to training actions, important work was conducted in particular by the ENVRI-FAIR WP6 'Training and Capacity Building', dedicated to the delivery of training to ENVRIs and key ENVRI stakeholder groups about FAIR (Findable, Accessible, Interoperable, and Reusable) principles and practices. More specifically, the ENVRI-FAIR training programme focused on the creation of training materials on the FAIR principles implementation in RI services and data management activities, on the evaluation of these principles implementation via FAIR metrics, on the development of relevant legal and policy requirements, and on the design and delivery of training initiatives related to these topics.

These training materials had to be as FAIR as possible themselves. To ensure their FAIRness, the ENVRI-FAIR project needed an online space where these training contents would be hosted. A foundational aspect therefore consisted in the development of a complete learning environment for the ENVRI Community, consisting of a metadata catalogue of learning objects and an online learning platform. Therefore, ENVRI-FAIR WP6 first defined a metadata schema for training objects and then developed a training catalogue that would allow ENVRI data centres and RIs to easily search, discover and access the training resources. Consequently, the ENVRI Community Training Platform was also developed as an evolution of the training platform created during the ENVRIplus project. This meant improving and customising the already existing training platform based on the Moodle Learning Management System (LMS) according to ENVRI-FAIR's new needs and requirements.

Finally, during the ENVRI-FAIR midterm review discussions with external experts, WP6 realised that an additional element was required to allow for hosting easily accessible introductory and descriptive information about the training activities and outputs. It was for this reason that, thanks to the collaboration and support of the WP5 ENVRI-Hub development team, it initiated the Training Gateway creation as a primary entry point to all ENVRI training and capacity building activities and materials. The Training Gateway, which can be considered an integral component of the ENVRI Community learning environment, was specifically designed and developed in order to be sustainable also after the end of the ENVRI-FAIR project.

2 Training Needs Analysis

This chapter presents the methodology designed to conduct a training needs analysis, and the findings of such analysis in terms of training needs, targeted actors, and training actions.

2.1 Methodology

A **training needs analysis** is the process of collecting data about organisational and individual needs that could be addressed with a relevant training provision. A **training need** corresponds to an existing gap between the current level and type of knowledge, skills, mindset, and practices, and the desired one (Barbazette, 2006). Several research methods can be adopted to effectively conduct a training needs analysis, based on time and resources available, and specific organisational structure and goals.

In the context of ENVRI-Hub NEXT, the training needs assessment was designed by considering the main objectives of the project and the profiles of the involved RIs, which are distributed, at different levels of maturity, part of a complex community as ENVRI, and other European research frameworks, such as the European Open Science Cloud (EOSC).
The methodology adopted for our training needs analysis combined the three following steps: 1) desk-based research; 2) alignment with other tasks and WPs across ENVRI-Hub NEXT and other ENVRI-related projects, e.g., EVERSE, OSCARS, ENVRINNOV, and IRISCC; 3) organisation of a 1-hour workshop during the ENVRI-Hub NEXT All-hands meeting in Lecce, on Friday 4 October 2024.

Desk-based research | It was necessary to map training content and events already delivered during the predecessor ENVRI-FAIR project. Particular attention was given to institutional knowledge and lessons learnt shared in ENVRI-FAIR D6.3: Training for FAIR services and data – outcomes and experiences (Hellström, M. et al., 2023).

Alignment with other ENVRI-Hub NEXT tasks and WPs, and other ongoing ENVRI-projects | It is important to note that not all needs can be catered for exclusively through training actions. In a project such as ENVRI-Hub NEXT, combining and coordinating different lines of work between user engagement, communications, training, software and web development, and project management represents an approach conducive to more robust outcomes. Such alignment was achieved through the following actions:

1. Definition of ENVRI-Hub NEXT primary training beneficiaries as a subset of the key stakeholder groups already identified by the mapping delivered in July 2024 (Brus, M. et al., 2024);

2. Support to the ENVRI-Hub NEXT "User-facing layer" development Task Force to closely follow the design of user groups and use cases;
3. Participation in the ENVRI Community Communications Network meetings;
4. Bilateral preparatory meetings with training task owners from other ongoing ENVRI-related projects.

Organisation of a 1-hour workshop during the ENVRI-Hub NEXT all-hands meeting | ENVRI-Hub NEXT WP coordinators were beforehand instructed on how to facilitate a brainstorming session by generating feedback on 5 posters, one for each of the main ENVRI-Hub services: 1) Knowledge Base and Search Engine; 2) Catalogue of Services and Data; 3) Enabling Services; 4) Data Analytical Framework; 5) Training Gateway. Each poster included questions about what priority actions and topics to include in the user engagement, communication and training agenda, targeting both internal and external stakeholder groups. The posters were available both physically in the meeting room and online on a mural board for remote participation. About three to five people per poster contributed ideas, rotating around to address overlapping areas of development.

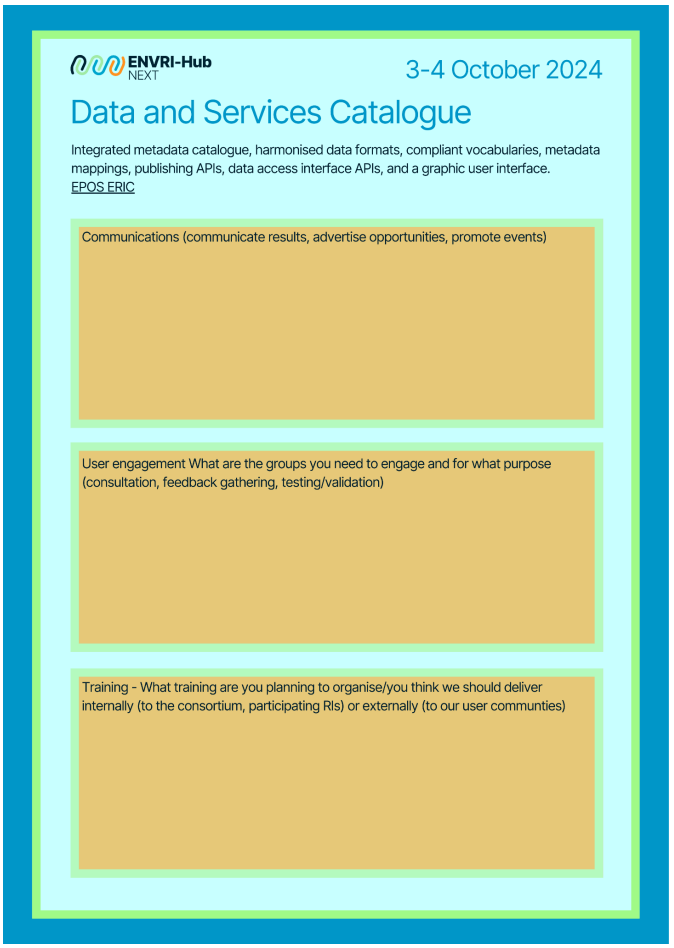

Figure 1 - Example of poster designed for the ENVRI-Hub NEXT all-hands workshop on 04/10/2024

2.2 Findings

2.2.1 Strategic priorities and training actions

According to D3.1 Communication, Dissemination and Exploitation Plan, the key stakeholder groups characterised by a combination of high levels of influence/interest in ENVRI-Hub NEXT are researchers from the ENVRI Community, the broader scientific community, other ENVRI-related projects and initiatives, and EOSC. To better define what training actions can support internal and external key stakeholders in achieving their priorities, it is useful to look at actors through the lens of the service *consumers* and service *providers'* segmentation. From a training standpoint, service consumers are humans who will mostly use our services and data: ENVRI and non-ENVRI researchers with a mixed level of IT skills; research software engineers; use case developers; ENVRI-Hub developers; ENVRI-Hub service operators; ENVRI-Hub content curators; and (cross)RIs service developers. On the other hand, service *providers* are RIs and digital infrastructures providing data and services to the ENVRI-Hub. Notably, service consumers and service providers often overlap and will both benefit from training provision. Finally, it is necessary to consider the needs of a third category of actors who play a crucial role in designing the ENVRI-Hub services and sub-components: the ENVRI-Hub service owners. Below (Table 1), we summarise project priorities and the training actions planned to cater for the training needs of key actors.

Table 1 - Strategic priorities and training actions

Priorities	Training needs	Actors	Training actions
Understanding and translating user needs into user stories for functional user interfaces	Evaluating and generating UX/UI requirements	ENVRI-Hub developers and ENVRI-Hub service owners	Training on UX/UI requirements elicitation
Providing seamless access to data from EOSC or RI services or other Virtual Labs	Understanding why AAI matters Know what licences to choose, what policies to adopt	ENVRI-Hub developers and ENVRI-Hub service owners Researchers with advanced IT skills (both ENVRI and non-ENVRI)	Training on cross-domain AAI service interoperability solutions and use cases
	Understanding relations between ECVs, i-Adopt, metadata, and vocabularies	Researchers (both ENVRI and non-ENVRI)	Training on vocabularies (I-ADOPT) and harvesting protocols
Providing a framework for sharing	How to integrate AAI, the KB, training, and VREs	ENVRI-Hub developers and	Training by search engine developers on best practices in

Priorities	Training needs	Actors	Training actions
consolidated research workflows		ENVRI-Hub service owners Researchers with advanced IT skills and research software engineers (both ENVRI and non-ENVRI)	information retrieval, search algorithms and patterns, and validation of search metrics Creating service user manuals and documentation Linking training content and documentation to Analytical Framework and KB search results
Demonstrating added value of improved FAIR metadata for discovery and integration of data	Converging towards common metadata strategies and standards	Metadata editors and curators, data stewards	Training on vocabularies (I-ADOPT), harvesting protocols, metadata ingestion, curation, validation
	Managing dataset	Researchers (both ENVRI and non-ENVRI)	
Demonstrating added value of ENVRI data-oriented services for Virtual Research Environments users	Improving reproducibility of research Equipping researchers with new data access and analysis capacities	Researchers with advanced IT skills and research software engineers (both ENVRI and non-ENVRI) Use case developers	Training on Python libraries, Jupyter Notebooks, APIs Creating user manuals, documentation, and tutorials
Ensuring user-friendly, autonomous and full-fledged access to ENVRI-Hub functionalities	Using ENVRI-Hub backend settings and functions Accessing ENVRI-Hub service endpoints	ENVRI-Hub service operators and ENVRI-Hub content curators Use case developers RIs service developers	Tutorial, FAQs, and user onboarding sessions
Ensuring ENVRI remains a key community in EOSC,	ENVRI being aware of developments in EOSC and other	Researchers (both ENVRI and non-ENVRI)	Co-organisation of Summer / Winter schools and co-hosting of training

Priorities	Training needs	Actors	Training actions
in collaboration with other initiatives	projects, and vice versa	Researchers with advanced IT skills and research software engineers (both ENVRI and non-ENVRI)	events based on specific data science and AI subjects Webinar hosting external and interdisciplinary experts Train-the-Trainers approach with recognition scheme Promoting ENVRI ambassadors in universities and training Communities of Practices

3 Training architecture

This chapter outlines the training architecture currently available to the ENVRI Community, and describes: 1) the different components used for training content production, indexation, and findability, and 2) the current level of interoperability between such components.

3.1 ENVRI Community Training Platform

The ENVRI Community Training Platform (**https://training.envri.eu/**), operated and maintained by LifeWatch ERIC on behalf of the ENVRI Community, is a fully-fledged Learning Management System (LMS) based on a Moodle application. Such a solution was adopted for two reasons: first, Moodle is an open source tool that includes a fairly simple web application written in PHP language and allows to greatly extend and customise the platform; second, Moodle is designed to be interoperable thus enabling integration of external applications and information onto a single Moodle instance. The architecture of the ENVRI Community training platform allows for easy creation of individual training items that can contain descriptive data and links to relevant learning supports (slides, recordings, documents, URLs and so on) related to an event, as well as be configured with plugin modules such as quizzes, discussion forums and student assessments and grading.
During the ENVRI-FAIR project, the Training Platform was populated, in close collaboration with RIs, with advanced and cutting-edge course materials, webinars, workshops and schools.

Throughout the project, WP6 organised and/or facilitated 28 ENVRI Community-related training events and initiatives.
This Training Platform, however, developed almost 10 years ago, thus based on the technology available then, presents some inherent technical constraints. It would therefore benefit from being upgraded to the latest available technology enhancing the user experience, the navigation, the back-end functionalities, and interoperability with the ENVRI-Hub. In particular, the training platform is based on what is now an outdated version of the Moodle LMS. Similarly, its visual identity became incoherent with the one that the ENVRI Community has currently selected for its portal. Consequently, the ENVRI-Hub NEXT project plan for the Training Platform is to explore the feasibility of conducting a revision and adaptation process that can lead to an updated and revamped ENVRI Community training platform. This analysis will interest:

- the technology behind the platform itself, in order to update it to the latest Moodle version release that can ensure a better learning experience for users and back-end managers;
- the enhanced interoperability with the ENVRI Hub;
- the renewed ENVRI Community visual identity.

3.2 ENVRI Community Training Metadata Catalogue

The ENVRI Community Training Catalogue (**https://trainingcatalogue.envri.eu/**), also operated and maintained by LifeWatch ERIC on behalf of the ENVRI Community, is a FAIR training service based on the international IEEE standard for learning resources, that facilitates the findability (for both humans and machine processes) and the reuse of training materials. To create an open catalogue of training resources for the ENVRI-FAIR project, its design and development phase included considerations on the metadata set required for the research and discovery of the most suitable training resources, the necessary functional/technical requirements, the implementation of a metadata catalogue able to index resource based on the identified metadata. The metadata catalogue lists all the ENVRI-related training and learning courses and resources hosted in the ENVRI Community Training Platform but also other resources of interest for the ENVRI Community elsewhere hosted. The link between the Training Catalogue and the Training Platform, and the subsequent access to the actual training resource and/or material, is possible directly from the catalogue by using an "Access the resource" button on the right side of the detail page of any given resource.
At the end of the ENVRI-FAIR project, the Training Catalogue hosted the metadata of close to 50 learning resources, half of which were created during the ENVRI-FAIR project while the other half were harvested from external sources and catalogues.
With its first instance launched in 2020, and in light of training metadata discussions which recently became vibrant and reinvented, the Training Catalogue brings today to reflections and considerations similar to those made above for the Training Platform. A technological update is in order, as well as an adaptation of its metadata set to the latest discussions taking place in the most relevant fora, such as in the related EOSC and RDA working groups. In addition, its visual identity needs to become coherent with the one that the ENVRI Community has currently selected for its portal. And its interoperability with the Training Gateway must be strengthened.

Consequently, the ENVRI-Hub NEXT project plan for the Training Catalogue is to explore the feasibility of conducting a revision and adaptation process that can lead to an updated and even more FAIR and interoperable ENVRI Community training catalogue. This analysis will interest:

- the technology behind the catalogue itself;
- the enhanced interoperability with the Training Gateway, as well as with other catalogues;
- the renewed ENVRI Community visual identity.

3.3 ENVRI-Hub Training Gateway

As mentioned above in paragraph 1.4 'ENVRI-FAIR Legacy', the Training Gateway was started to be developed as a component of the ENVRI-Hub, and in particular as the primary entry point to all ENVRI training and capacity building activities and materials, in the second half of the ENVRI-FAIR project.
As its development was suggested as a way to enhance the visibility and accessibility of training activities and outputs, by making more findable their introductory and descriptive information, the Training Gateway was designed as a simple and intuitive search interface that allows user search via free-text keywords or by resource title or name. Such search, in combination with the possibility to filter search results through some predefined filters, facilitates the user search experience maximising the chances to find and access the best possible resource for the specific user training and learning needs.
During the current project the Training Gateway functionalities will be reassessed and, if needed, adjusted and improved.

3.4 ENVRI-Hub Unified Search

Enhancing the findability of the ENVRI-Hub training content is among the key priorities emerging from our training needs analysis. To address this need, the Training Catalogue API was added to the top level unified Search field of the ENVRI-Hub Landing page. By indexing the content from the Training Catalogue and the Catalogue of Services this functionality will be part of the Knowledge Base search function search.envri.eu. Furthermore, an AI supported recommendation agent will help the user to refine the search.

4 Training development

This chapter highlights the relevant role played by training content for the overall, successful exploitation of the ENVRI-Hub NEXT project outcomes. The chapter continues by describing good practices for each phase of the training content lifecycle.

4.1 Training Materials as Key Exploitable Results

A Key Exploitable Result (KER) is a project result, i.e., products or outcomes generated during the project implementation, with high exploitation potential for commercial purposes, in policy making, or for social and scientific innovation. With *exploitation* we mean the use of results in

further research and innovation activities other than those covered by the action concerned, such as developing and creating a product, a process, or a service. KERs may include, for example, know-how, innovative solutions, algorithms, proof of feasibility, new business models, policy recommendations, guidelines, prototypes, demonstrators, databases and datasets, new infrastructures, and also trained researchers.

In the project ENVRI-Hub NEXT, the current list of KERs include: 1) ENVRI-Hub Framework; 2) ENVRI-Hub Service Management System; 3) ENVRI-Hub Technical Architecture; 4) Services and policies for EOSC integration; 5) ECV Scientific and technical framework; and 6) ENVRI-Hub Training Materials. The relevance of training content in supporting the scientific and technical innovation of ENVRI-Hub was made formally explicit and shall contribute to fostering knowledge exchange between ENVRI subdomains and between the ENVRI Community and other domains.

4.2 Content quality standards and FAIR by design

4.2.1 Content design

The training materials are going to be designed for the identified target actors, according to the training needs generated so far, and based on project priorities.
If the concepts of service consumers and service providers serve the purpose of a general training needs analysis, they offer too little degree of accuracy to depict a realistic image of all learners. At an operational level, the identification of target learners should take numerous aspects into account: core scientific and technical competencies, but also preferences, motivation, goals, and challenges. For a deeper level of insight, the logic of target groups can be refined by thinking in terms of **learner persona** (Madsen, A. et al., 2014).
A learner persona is a fictional representation of a real learner. This concept is borrowed from user-centered design where user personas are crafted to successfully guide the development of a product or a service to meet the actual needs of the end users and keep them satisfied and engaged. In ENVRI-Hub NEXT, the learner persona approach is beneficial to capture the nuanced complexity of a consortium of partners belonging to several ENVRI subdomains and with different levels and types of technical knowledge.
Defining a learner persona in the context of this project will also help adopt common technical vocabularies and reduce obstacles in accessing pre-required specialised knowledge outside the domain of origin of our research and research software engineers.
Another key step in the design of effective learning materials is drafting specific, measurable, achievable, relevant, and time-bound (SMART) **learning objectives** (Krathwohl, D. R., 2022). The learning outcomes will then describe the expected achievements and new scenarios opened up by a successful learning experience. Finally, training activities and content, produced across different formats and delivery modes, can be organised in thematic and narrative-based learning paths through which the level of competency gradually increases.

4.2.2 Content production and dissemination

Training materials will be designed with FAIR-by-design principles in mind, for instance, by opting for open document formats (.odt, .odp) instead of proprietary formats. The use of open document formats, which are compatible with a large variety of existing software, not only

allows for easy accessibility to training products, but also increases their overall reusability and longevity.
Re-sharing and re-use of training content for the creation of new learning materials will be encouraged through the adoption of suitable access rules and Creative Commons licensing options, as CC BY, one of the most permissive.
According to our metadata schema, learning objects with unique PIDs will be created on the training materials metadata catalogue and automatically collected by the Training Gateway via APIs.

4.2.3 Content curation and sustainability

The training content produced during the ENVRI-FAIR project will be curated, based on the current training needs and the substantial scientific and technical evolution of the practices and principles presented at the time. Regular checks for deprecated webpages and broken links will be conducted. Content will be deleted only after flagging up its potential obsolescence to the ENVRI-Hub NEXT DSB or to the relevant task forces and/or project partners.
The training materials produced during the ENVRI-Hub NEXT project will be curated and promoted as part of other communication, dissemination, and exploitation activities.

4.3 Monitoring and evaluation

Finally, the quality of the training contents, the effectiveness of the training events, and the efficiency of the training processes will be ensured by monitoring measures. These will capture immediate **reactions** to the training experience, assess achievement of **learning objectives**, and, possibly, track long-term **behavioural change** in the application of new knowledge and skills on the job (Kirkpatrick, J. D., & Kirkpatrick, W. K., 2016).
To ensure results comparability as much as possible, feedback about training will be collected by applying the same framework of questions consistently. Polls shown at the end of training events can elicit a high response rate, but this method does not ensure the same level of insights as a questionnaire.
Priorities and training actions defined in this training plan are open to revision during 2025, according to continuous feedback and reiteration of a training needs assessment.

5 Work plan

This final chapter streamlines the operational aspects of the ENVRI-Hub NEXT training plan: roles and responsibilities of project partners; internal and external coordination processes; concrete examples of training materials that will be delivered, and a timeline for training events.

5.1 Roles and responsibilities

LifeWatch ERIC, as task 3.5/4.5 leader for "User training and skills", handles the coordination and development of user support, training, and capacity-building opportunities in ENVRI-Hub NEXT. The design and delivery of training programmes and content targeting ENVRI-Hub actors are of course made possible through the collaboration between task participants and with the other tasks in WP3/4, led respectively by **EGI Foundation** (communication, dissemination,

ENVRI-Hub interface and promotion, innovation and exploitation), **LifeWatch ERIC** (stakeholder engagement and promotion of impact) and **ICOS ERIC** (communication, dissemination and promotion of ENVRI-Hub interface). **UvA**, as the key development partner of the Knowledge Base and the VRE integration, is another project partner closely followed by the training task. Through communications, dissemination and engagement campaigns, WP3/4 partners are instrumental in raising the visibility of the external training events and the available training resources.

All the RIs and research institutes participating in tasks 3.5/4.5:

1. contribute to the definition of training priorities and provide feedback on training activities;
2. share technical and scientific expertise as instructors or training content editors and reviewers;
3. act as ambassadors of the project training activities targeting the ENVRI Community and the broader Scientific Community.

CNR and **CNRS** manage and are involved in the rollout and integration of underpinning services as the connection of the cross-domain ENVRI-ID to the EOSC AAI Federation, and the harmonisation of metadata and vocabularies in compliance with I-ADOPT.

CREA has a major role in the project, by leading the design and the Agile development of the software architecture. Moreover, CREA coordinates the WP in charge of building the ENVRI-Hub Analytical Framework, including integration of VREs and workflows, and harmonisation of user experience.

EPOS ERIC, **INGV**, **UFZ**, **ICOS Carbon Portal/ULUND**, and **EURO-ARGO ERIC** are key actors in the development of the ENVRI-Hub catalogue of services and data, and other architectural components needed for the harmonisation of ECVs and metadata.

5.2 Processes

5.2.1 Internal processes

As already highlighted by the lessons learnt in the preceding ENVRI-FAIR project, for an effective training provision in ENVRI-Hub NEXT, it remains essential to continuously engage with other WPs, task leaders, and cross-WPs Task Forces (TF). This flexible approach allows us to capture needs across development phases as soon as they arise, and to respond quickly by developing or facilitating ad-hoc training.

Internal processes such as the periodical Development Steering Board (DSB) meetings and the task force discussions on cross-WPs topics allow the training task to cover internal training needs and collaborate with project partners, even when they are not directly involved with the task 3.5/4.5 but have a clear interest/impact on training. An example of this process is the creation of the "User-facing layer" TF, which coordinates the efforts to establish realistic ENVRI-Hub user groups to facilitate consultations, user requirements generation and collection, testing, continuous user feedback, and improvement of user interfaces.

5.2.2 External processes

Internal training may be scaled up to the whole ENVRI Community and beyond, targeting a broader scientific community. It is, therefore, crucial to identify training "contact points" for individual RIs and other research actors, and establish a channel of communication for accurate and timely exchange of relevant information and coordination. Also, in the second part of the project, training actions should steer towards an external audience of service consumers.

External processes as one-to-one meetings with ENVRI-related and EOSC projects such as ENVRINNOV, IRISCC, EVERSE, and OSCARS took place to establish the basis for an ENVRI-Hub training community, identify overlapping training needs and audiences, and explore opportunities for co-location of training events and initiatives. The number of projects and initiatives involved is expected to grow in 2025 and 2026.

5.3 Content

Mapping and curation of the ENVRI-FAIR training content is propaedeutic to the production of new training content in ENVRI-Hub NEXT. The 52 learning objectives retrieved by the Training Gateway cover several topics, with the most popular being research data lifecycle management, introduction to FAIR principles, AAI methods, still in line with a part of the current training priorities.

Production of new content, according to the development phase of the ENVRI-Hub, in 2025 will focus on supporting sprints and other activities of the ENVRI-Hub service owners and ENVRI-Hub developers. The video recording of 2024 hackathon presentations, tutorials, and lessons learnt organised by ENVRI-Hub NEXT will be made available via the ENVRI Community training platform. Moreover, a lecture series by RI Principal Investigators responsible for those individual ECVs they are curating in their RI will be produced, targeting the needs of the ENVRI-Hub service consumers and the whole ENVRI Community. By promoting RIs' mostly hidden work, this lecture series will offer users a first row insight of the Datasets they are using, including the scientific background and the measurement details from the RI operational point of view.

Capacity building sessions, in the form of webinars and workshops, will be recorded and shared along with any supporting materials. Content will be organised according to learning paths. The first internal capacity-building session about UX/UI needs elicitation has been scheduled for Monday 9 December, 2024.

ENVRI-Hub services user manuals, documentation, and onboarding tutorials will be produced, according to templates, to ensure consistency, and facilitate the role of the ENVRI-Hub service content curation. Other training content may be created according to feedback from user groups.

5.4 Training Events

Events will be scheduled in the second part of 2025 and during 2026.

The WP3 established a cross-project collaboration group of communication managers from different ENVRI-supporting projects. Besides joint communication campaigns, they expressed interest in joining forces in the organisation of training events since all the projects share similar internal and external stakeholders. Colocation or joint organisation of training events with other **ENVRI-related projects,** such as IRISCC and Blue-Cloud 2026 are being investigated.

On the **EOSC** front, the OSCARS and EVERSE projects, with a focus on research software quality and recognition of the role of training in research software engineering, might offer space to the ENVRI Cluster in training events targeting Early Career Researchers and research projects funded by OSCARS cascading grants.

ENVRI-Hub NEXT will submit **training session proposals** to key international scientific conferences on research software and data sciences, and Earth domain communities events, such as, for instance, the European Geophysical Union meeting (EGU).

6 References

Reference	
No	Description/Link
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