MISSIONE 4
ISTRUZIONE
RICERCA

# D 3.10Report: Training Executive Working Plan for the third period

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# 1. INTRODUCTION

The deliverable D3.10 was planned to be released within the framework of the ITINERIS project and it is part of the activities of the Work Package (WP)3 concerning the mapping and planning of training activities for the third period of the project; in detail, the actions would have involved all the Operative Units (OUs) of WP3 and covered the training activities for the scientific and technical personnel of the 22 Italian environmental Research Infrastructures (RIs), the Ph.D. students and the RIs employees on science communication involved in the project.

This deliverable was expected to be released in Bimester 12 and to be included into the intermediate objective IO3.8; it was produced under the responsibility of the Operative Unit (OU) of the National Research Council, Research Institute on Terrestrial Ecosystems (CNR-IRET).

The primary objective of deliverable 3.10 is to provide a comprehensive overview of progress during the third project period and to detail the structure, organization, and content of the ITINERIS training program for courses already provided and planned under activities 3.6, 3.7, and 3.8; moreover, it aims to illustrate the advancements and state-of-the-art of WP3 online platforms, i.e. the ITINERIS Training Platform.

The document is structured into 4 chapters, including this one. Chapter 2 of this document presents the executive work plan for the activities 3.6, 3.7, and 3.8 foreseen within WP3. In detail, the chapter includes details on the courses already provided, the training calendar developed by the OUs and the five universities (i.e. University of Naples Federico II, University Naples Parthenope, University of Pisa, University of Salento and Tuscia University) involved under the coordination of OU CNR-IRETLE. Chapter 3 provides a concise overview of the ITINERIS training platform. Chapter 4 includes the list of acronyms used in this report.

# 2. TRAINING EXECUTIVE WORKING PLAN

The OU CNR-IRETLE has been carried out the activity of planning and coordination of the training activities dedicated to technical and scientific personnel of RIs, students of XXXVIII and XXXIX Ph.D. cycles from the five universities involved in WP3, and RIs employees dedicated to science communication.

The fixed term personnel with a level III Technologist profile hired in WP3 with all the OUs involved, and in according with the referents of the universities (i.e. University of Naples Federico II, University Naples Parthenope, University of Pisa, University of Salento and Tuscia University) have worked on the ITINERIS training plan taking into account the needs of the scientific community and the personnel of the research infrastructures involved in the project.

The Operational Units maintained the dedicated digital space within the LifeWatch Italy Community platform's Working Group folder, using it as a central hub for information sharing and discussion among key WP3 personnel. Additionally, a complementary section within the CNR SharePoint environment was implemented to enhance accessibility and streamline document management.

Following the publication on December 22, 2023 of the DAC for "the assignment of specialized training services for the technical-scientific staff of the ITINERIS infrastructures, for doctoral students, and for the staff of infrastructures dedicated to science communication, divided into 3 functional batchs", listed below, the evaluation of technical and economic offers was completed, and the contract signed with Forma.Lab S.R.L in current year:

- batch one for Activity 3.6 COST: 1.400.000 € (VAT included)
- batch two for Activity 3.7 941.490 € (VAT included)
- batch three for Activity 3.8 625.000 € (VAT included),

Consequently, the first training course was scheduled to be provided in October 2024.

At the present day, the training work plan was continuously refined throughout all WP3 meetings organized by OU-CNR IRETLE, with the participation of all the Operational Units and the five involved universities; the meeting with these universities were particularly crucial for the training plan of the courses provided in Activity 3.7. This ongoing refinement aimed to: *I)* ensure readiness while maintaining flexibility regarding the contract signing dates with the economic operator responsible for course management, and *II)* adapt to the evolving needs and new requests from the scientific community and infrastructure personnel, in light of the project's overall progress.

It is particularly important to underline that the comprehensive and updated list of training courses, detailing dates, times, and delivery methods, is accessible within the dedicated sections of the ITINERIS training platform (https://training.itineris.cnr.it/en/). It is imperative to acknowledge that the ITINERIS training program, encompassing course titles, content, and tutor assignments, is subject to ongoing revisions and adjustments beyond the scope outlined in this document. This adaptability is essential to align with real-time evaluations of the training requirements of the project's research infrastructures and personnel, including participants, tutors, and logistical considerations.

## 2.1 Training programme and actions in activity 3.6

Each advanced training course within Activity 3.6 was designed and refined to address the specific needs of the target technical and scientific staff at the ITINERIS-involved Research Infrastructures. To achieve this, Level III Technologists hired in WP3, under the coordination of OU CNR-IRET, conducted an in-depth needs analysis across each domain and thematic subcategory of the RIs. These courses are structured to enhance the RIs' human capital through targeted training content

delivered via flexible methods, including in-person, online, and hybrid formats, catering to the RIs' requirements.

Specifically, the Activity 3.6 training courses will offer: theoretical modules providing conceptual background and thematic knowledge related to the Ris involved in ITINERIS; practical sessions to reinforce understanding of RI scientific instrumentation and services; and case studies facilitating the analysis of real-world scenarios and discussions with professionals from related or parallel sectors, thereby fostering synergy among the RIs. Is it important to underlie that all the organizational and logistical aspect of the course with all travel expenses fully covered, are to the society (Forma.Lab. S.R.L.) who won the selection of the assignment of specialized training services for the technical-scientific staff of the ITINERIS infrastructures, for doctoral students, and for the staff of infrastructures dedicated to science communication, divided into 3 functional batchs; in this case all the costs comes from the batch from WP3 - Activity 3.6.

Table 2.1.1 lists the 36 planned training courses in activity 3.6 while Table 2.1.2 presents the calendar oh the training programme including the course already provided and the courses planned. The courses listed in Autumn 2024 should be considered as courses already provided when this document was drafted; the calendar dates and the course names were updated respect to the previous documents.

*Table 2.1.1 – Updated training programme planned in activity 3.6*

| *WP2* Access and *Management* | *WP2 eScience* Domain | *WP4 Atmospheric Domain* | *WP5 Marine Domain* | *WP6 Terrestrial Domain* | *WP7 Solid Earth Domain* | *WP8 Trans Domain* |
|---|---|---|---|---|---|---|
| Access process and modalities-1 | Semantic tools and Datalabs: an Integrated approach to data analysis | ACTRIS Aerosol Remote Sensing Data Acquisition, Processing, and Submission | Introduction to Marine Research Infrastructures: managing complexity | Datalogger programming and sensors connection – basic course | Digital collection and archiving of drilling data with mDIS | Safety in the field work related to RIs (fire risk and sea activities) |
| Access process and modalities-2 | FAIR Awareness | Atmospheric composition data exploitation | Marine data management and data quality control | Use of Isotopes in environmental investigations | Distributed Acoustic Sensing (DAS) for high-resolution and large-scale geophysical imaging | How to write a successful proposal |
| | FAIR Assessment via FAIR Implementation Profiles | Atmospheric Standardized observations: methods and maintenance in the labs - In-Situ | Ship-based training initiatives in marine-related sciences | Introduction in python programming | Data mining and machine learning for Geophysics | Safety in the field work related to RIs (towers climbing and hiking principles) |
| | Open Science on Cloud using Jupyter Notebooks | Atmospheric Data acquisition, processing and submission - In Situ | Structure of the Marine Data access at the European Level | Introduction to High Performance and Data Intensive Computing - RIs | Geophysical instruments and data processing | VRE operating mode - basic |
| | Geocomputation and geospatial modelling analysis (RI) | Atmospheric Standardized observations: methods and maintenance in the labs – Remote Sensing | Introduction to Marine Research Infrastructures: managing complexity | Datalogger programming and sensors connection advanced | Advanced technologies for landslides | Use open scientific infrastructure facilities and VRE - Advanced |
| | Artificial Intelligence applied to environmental monitoring | Climate change and urban pollution: challenges and objectives for | Marine data management and data quality control | Eddy Covariance theory and practice: from sensor setup to | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | the atmospheric research | | preliminary data processing - RIs | | |

*Table 2.1.2 – Calendar for training courses of activity 3.6*

| | *Autumn 2024* | *Winter 2024* | *Spring 2025* | *Summer 2025* |
|---|---|---|---|---|
| WP2 Access and Management | # Access process and modalities-1 | | # Access process and modalities-2 | |
| WP2 eScience | # FAIR Awareness | # FAIR Assessment via FAIR Implementation Profiles | # Geocomputation and geospatial modelling analysis (RI) | # Open Science on Cloud using Jupyter Notebooks<br><br># Semantic tools and Datalabs: an Integrated approach to data analysis<br><br># Artificial Intelligence applied to environmental monitoring |
| WP4 Atmosphere Domain | # ACTRIS Aerosol Remote Sensing Data Acquisition, Processing, and Submission | | # Atmos\pheric composition data exploitation;<br><br># Atmospheric Standardized observations: methods and maintenance in the labs - In-Situ;<br><br># Atmospheric Data acquisition, processing and submission - In Situ | # Atmospheric Standardized observations: methods and maintenance in the labs – Remote Sensing<br><br># Climate change and urban pollution: challenges and objectives for the atmospheric research |
| WP5 Marine Domain | # Introduction to Marine Research Infrastructures: managing complexity;<br><br># Marine data management and data quality control; | | | # Ship-based training initiatives in marine-related sciences;<br><br># Structure of the Marine Data access at the European Level;<br><br># Introduction to Marine Research Infrastructures: managing complexity;<br><br># Marine data management and data quality control; |
| WP6 Terrestrial Domain | | # Datalogger programming and sensors connection – basic course | # Use of Isotopes in environmental investigations;<br><br># Introduction in python programming;<br><br># Introduction to High Performance and Data Intensive Computing - RIs | # Datalogger programming and sensors connection advanced;<br><br># Eddy Covariance theory and practice: from sensor setup to preliminary data processing - RIs |
| WP7 Solid Earth Domain | # Advanced technologies for landslides | # Digital collection and archiving of drilling data with | # Data mining and machine learning for Geophysics | #Geophysical instruments and data processing |

| | | | | |
|---|---|---|---|---|
| | | Mdis;<br><br># Distributed Acoustic Sensing (DAS) for high-resolution and large-scale geophysical imaging | | |
| WP8<br>Trans Domain | # VRE operating mode - basic | # Safety in the field work related to RIs (towers climbing and hiking principles);<br><br># How to write a successful proposal | # Use open scientific infrastructure facilities and VRE – Advanced;<br><br># Safety in the field work related to RIs (fire risk and sea activities) | |

## 2.2 Training programme and actions in activity 3.7

The advanced training courses, included in Activity 3.7, have been designed and updated respect previous documents to meet the specific needs of RIs, providing high-level training to early career environmental scientists in Ph.D. programs, with Ph.D. fellowships supported by WP3 - ITINERIS for the XXXVIII and XXXIX Ph.D. Cycles and focused on the main research areas of RIs, with the main aim to supply them the skills and to actively contribute to the development of scientific research.

The fixed-term units of personnel involved for training activities in WP3, have been fully involved with the Ph.D. representatives of the five universities (University of Naples Federico II, University Naples Parthenope, University of Pisa, University of Salento and Tuscia University) involved in WP3 for the rescheduling of the early career environmental scientists training program.

It is important to emphasize that this achievement was made possible through collaborative efforts between each WP3 Operational Unit and their respective university partners specializing in thematic domains. Specifically: the Atmospheric Domain OU partnered with the University of Naples Federico II; the Marine Domain OU with Naples Parthenope University; the Solid Earth Domain OU with the University of Pisa; the eScience Domain OU with the University of Salento; and the Terrestrial Domain OU with Tuscia University. These collaborations facilitated also the organization of the N.6 transdisciplinary practical courses.

Each course developed within the vertical domains offered all Ph.D. students from the partner universities the opportunity to participate in the ITINERIS training courses held at that university. Forma.Lab S.R.L., the company awarded the tender for the provision of specialized training services for the technical-scientific staff of the ITINERIS infrastructures, doctoral students, and science communication infrastructure staff (divided into three functional batches), handled all organizational and logistical aspects of these courses. However, only the transdisciplinary courses provided all WP3 Ph.D. students with the opportunity to attend, with all travel expenses fully covered and organized by Forma.Lab S.R.L. with founds of WP3 - Activity 3.7.

The training programme of the courses in activity 3.7 for the revised plan is presented in Tables 2.2.1, while Table 2.2.2 presents the calendar oh the training programme including the course already provided and the courses planned. The courses listed in Autumn 2024 should be considered as courses already provided when this document was drafted; the calendar dates and the course names were updated respect to the previous documents.

*Table 2.2.1 – Updated training programme planned in activity 3.7*

| *WP2* eScience Domain | *WP4 Atmosphere Domain* | *WP5 Marine Domain* | *WP6 Terrestrial Domain* | *WP7 Solid Earth Domain* | *WP8 Trans Domain* |
|---|---|---|---|---|---|
| Exploring the World of Metabolomics and Metagenomics | Anthropogenic activities and effects on the living environment and human health | Autonomous instruments in oceanography | Introduction to High Performance and Data Intensive Computing | Geophysical methods in geoscience and near surface geophysics | Use open scientific infrastructure facilities and VRE - Basic |
| Introduction to MatLab | Can Science Save the Earth? (Optical advanced instruments for atmospheric monitoring design and operation) | Advanced data analysis and processing techniques | Python for Data Sciences | Geophysics and natural risks: instruments and principles of data analysis | Use open scientific infrastructure facilities and VRE - Advanced |
| Data mining and machine learning | | Oceanographic observational and modelling products available for marine research. | Computer Vision and Machine Learning Techniques for Environment | Advanced technologies for monitoring and prediction of ground instabilities | Safety in lab and field work related to RIs (UNIPisa) |
| Data harmonization and integration | | Software for processing meteorological and oceanographic data. | Eddy Covariance processing and data use | | Safety in lab and field work related to RIs (UNISalento) |
| Geocomputation and geospatial modelling analysys (PhD) | | Oceans and climate. | Programming with R | | How to present your activities and results – 1 (UNISalento) |
| Developing research projects in Virtual Research Environments | | Applications of dynamic systems theory in oceanography. | Build a project proposal | | How to present your activities and results – 2 (UNIPisa) |

*Table 2.2.2 – Calendar for training courses of activity 3.7*

| | *Autumn 2024* | *Winter 2024* | *Spring 2025* | *Summer 2025* |
|---|---|---|---|---|
| WP2 eScience | | | # Introduction to MatLab<br><br># Geocomputation and geospatial modelling analysys (PhD)<br><br># Developing research projects in Virtual Research Environments | # Exploring the World of Metabolomics and Metagenomics<br><br># Data mining and machine learning<br><br># Data harmonization and integration |
| WP4 Atmosphere Domain | | | # Can Science Save the Earth? (Optical advanced instruments for atmospheric monitoring design and operation) | # Anthropogenic activities and effects on the living environment and human health |
| WP5 Marine Domain | | # Autonomous instruments in oceanography;<br><br># Advanced data analysis and processing techniques;<br><br># Oceanographic | | # Software for processing meteorological and oceanographic data;<br><br># Oceans and climate;<br><br># Applications of dynamic systems |

| | | | | |
|---|---|---|---|---|
| | | observational and modelling products available for marine research; | | theory in oceanography; |
| WP6<br>Terrestrial Domain | | | # Introduction to High Performance and Data Intensive Computing | # Python for Data Sciences;<br><br># Computer Vision and Machine;Learning Techniques for Environment;<br><br># Eddy Covariance processing and data use;<br><br># Programming with R;<br><br># Build a project proposal |
| WP7<br>Solid Earth Domain | # Advanced technologies for monitoring and prediction of ground instabilities | # Geophysical methods in geoscience and near surface geophysics;<br><br># Geophysics and natural risks: instruments and principles of data analysis | | |
| WP8<br>Trans Domain | | # Safety in lab and field work related to RIs (UNIPisa) | # Use open scientific infrastructure facilities and VRE – Basic;<br><br># Use open scientific infrastructure facilities and VRE – Advanced;<br><br># Safety in lab and field work related to RIs (UNISalento);<br><br># How to present your activities and results (UNISAlento);<br><br># How to present your activities and results – 2 (UNIPisa) | |

## 2.3 Training programme and actions in activity 3.8

Activity 3.8 focused on providing training courses for Research Infrastructure (RI) employees involved in science communication. The program was designed to offer six learning-by-doing courses and two intensive practical courses. These practical courses are planned to be led by RI employees who had completed the preceding training, and were specifically targeted towards stakeholders. OU CNR-IRETLE initiated communication with the WP3 Operational Units (OUs) to develop a revised draft of the training courses, based on updated mapping activities of RI needs and areas of interest. While the core content of the courses remained largely consistent, minor revisions were implemented to refine specific modules, and the calendar dates were updated. Also for the training courses developed in this activity, should be underlied that all the organizational and

logistical aspect of the course with all travel expenses fully covered, are to the society (Forma.Lab. S.R.L.) who won the selection of the assignment of specialized training services for the technical-scientific staff of the ITINERIS infrastructures, for doctoral students, and for the staff of infrastructures dedicated to science communication, divided into 3 functional batchs; in this case all the costs comes from the batch from WP3 - Activity 3.8.

Table 2.3.1 lists the six training courses within Activity 3.8, and Table 2.3.2 presents the proposed, updated calendar for this training program.

*Table 2.3.1 – Updated training programme planned in activity 3.8*

| *Advanced Training courses for RIs employees for science communication* |
|---|
| Science communication: principles and foundations |
| Mastering Communications in RIs: from strategy to implementation |
| Communication methods for scientific journalism |
| The art of communication: Presentations design |
| Podcast and video for science communication |
| Science communication in the Digital Era: social media |
| Scientific communication toward stakeholders and public |
| Citizens in science for a healthier and more sustainable global Earth system |

*Table 2.3.2 – Calendar for training courses of activity 3.8*

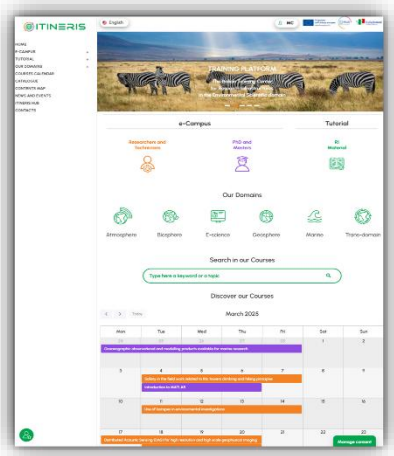
| *Autumn 2024* | *Winter 2024* | *Spring 2025* | *Summer 2025* |
|---|---|---|---|
| | | # Communication methods for scientific journalism;<br><br># Podcast and video for science communication | # Mastering Communications in RIs: from strategy to implementation;<br><br># Science communication: principles and foundations;<br><br># Science communication in the Digital Era: social media;<br># Scientific communication toward stakeholders and public;<br><br># Citizens in science for a healthier and more sustainable global Earth system |

# 3. ITINERIS TRAINING PLATFORM

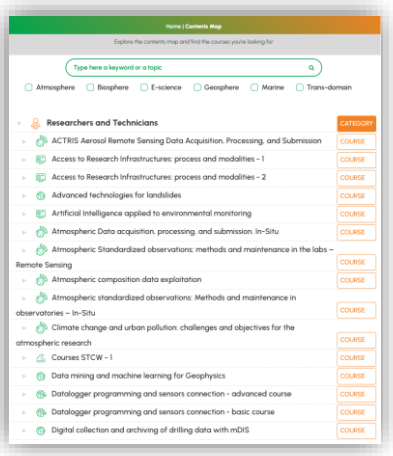
The OU CNR-IRETLE has been carried out in Activity 3.1 the development of the ITINETIS training platform in order to contain and provide all the training courses and the relative training digital objects developed in WP3. The financial commitments was undertaken for subsequent procedures "*DIRECT ASSIGNMENT OF THE SOFTWARE DEVELOPMENT SERVICE AND SERVICES NECESSARY FOR THE CREATION OF THE TRAINING PLATFORM AND THE METADATA CATALOGUE OF THE ITINERIS TRAINING RESOURCES*". This supply establishes the ITINERIS project's training platform, ensuring its sustainability by integrating with LifeWatch Italy's platform. The design reflects ITINERIS's branding and ensure compatibility with other project services.

The ITINERIS training platform (available on https://training.itineris.cnr.it/en/) and its functions is a key node of the WP3 training programme. At the current day is offers to around 300 users, more than 200 training digital resources (PDF, external link, doc, jpg, ...) and 73 training courses areas, with some of the courses still in development. The fixed term personnel with a level III Technologist profile hired in WP3 are coordinated and supported by UO CNR-IRET LE in uploading the training materials, managing the course's areas and participants, providing the feedback survey, test, and the certificates of Attendance and Achievements.

The platform is under constant monitoring by UO CNR-IRET LE, in close collaboration with the service provider of LifeWatch Italy. A comprehensive user support service is provided, with support requests typically addressed within 24 hours of submission.




a)

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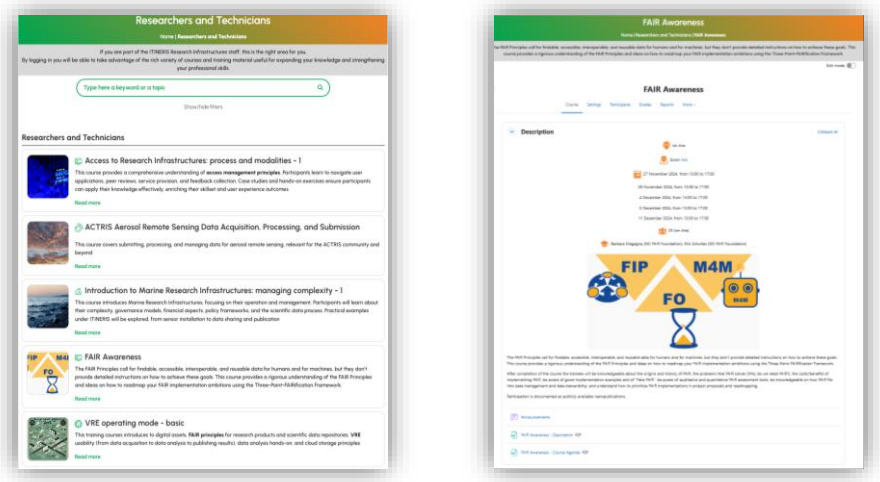


c) d)

*Figure 1. Some Key areas within the ITINERIS training platform: a) the Homepage section, b) the Content Map, c) the Course Area for Researchers and Technicians, d) the Internal Course Area.*

From the feedback surveys provided to users, it was highlighted the platform's key benefits as its ease of use in managing and selecting specialized training courses, the provision of different digital training formats, the user status tracking and supporting actions, the availability of built-in quizzes for assessment to certificate of Attendance and Achievement, and the overall user-friendly interface.

# 4. LIST OF ACRONYMS

CNR-IRET: National Research Council, Research Institute on Terrestrial Ecosystems

OU: Operative Unit

Ph.D.: Doctor of Philosophy

RI: Research Infrastructure

VRE: Virtual Research Environment

WP: Work Package