D11.3
Catalogue of the integrated implemented services

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Deliverable abstract

In this deliverable we produce a list of services developed by Biodiversity and Ecosystems subdomain RIs. The services we considered were developed or utilised during the ENVRI FAIR project in order to increase the interoperability and the co-development of service among different RIs of the subdomain.

DELIVERY SLIP

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DELIVERY LOG

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DOCUMENT AMENDMENT PROCEDURE

Amendments, comments and suggestions should be sent to the Project Manager at
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GLOSSARY

A relevant project glossary is included in Appendix A. The latest version of the master list of the glossary is available at http://doi.org/10.5281/zenodo.4471374.

PROJECT SUMMARY

ENVRI-FAIR is the connection of the ESFRI Cluster of Environmental Research Infrastructures (ENVRI) to the European Open Science Cloud (EOSC). Participating research infrastructures (RI) of the environmental domain cover the subdomains Atmosphere, Marine, Solid Earth, and Biodiversity / Ecosystems and thus the Earth system in its full complexity.

The overarching goal is that at the end of the proposed project, all participating RIs have built a set of FAIR data services which enhances the efficiency and productivity of researchers, supports innovation, enables data- and knowledge-based decisions, and connects the ENVRI Cluster to the EOSC.

This goal is reached by: (1) well defined community policies and standards on all steps of the data life cycle, aligned with the wider European policies, as well as with international developments; (2) each participating RI will have sustainable, transparent, and auditable data services, for each step of data life cycle, compliant to the FAIR principles. (3) the focus of the proposed work is put on the implementation of prototypes for testing pre-production services at each RI; the catalogue of prepared services is defined for each RI independently, depending on the maturity of the involved RIs; (4) the complete set of thematic data services and tools provided by the ENVRI cluster is exposed under the EOSC catalogue of services.

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1   Introduction

The ENVRI-FAIR project's objective is to implement "FAIRness" for data produced in the European Research Infrastructures (RIs) organised in the Environmental Research Infrastructures (ENVRI) community, having FAIR data also helps RIs connecting to the European Open Science Cloud (EOSC). In this context, "FAIR" is an acronym comprising the aspects of "Findable", "Accessible", "Interoperable", and "Reusable" as specified by the FORCE11 community.

To test the accessibility of service offerings from the subdomains at the cluster level WP5 initiated the development of a prototype ENVRI-Hub: a portal to access the ENVRI catalogue of services and other digital assets. The ENVRI Catalogue of Services is populated by the Research Infrastructures in ENVRI-FAIR. It contains descriptions of the RI services that provide data, metadata, semantic assets, taxonomic information, and more.

In this deliverable, a table is provided for each RI, showcasing the services that were developed or utilised throughout the project, along with descriptions and links to access the products. The implementation status of each product is also described, indicating that some products are not yet operational. Links are not available for products that are planned or currently in progress. Furthermore, certain products have been developed but are not yet available, as additional support is required before they can be published.

2 AnaEE-ERIC

Name of the service	Description	Link	Status***	ENVRI Hub
AnaEE data portal	A catalogue of datasets compliant with TF1 and TF2 recommendations, ready for ENVRI catalogue federation.	data.anaee.eu	O	Not yet
AnaEE Developer Portal	A catalogue of API services, compliant with TF1 and TF2 recommendations.	developer.anaee.eu	O	Yes
AnaEE API gateway	A single endpoint for all AnaEE API services.	api.anaee.eu	O	Yes
AnaEE identity provider	An identity provider compliant with TF2 recommendations and federated with EPOS and EMSO's ones	Not applicable	O	Not applicable

*** O=operational S=support needed P=planned

3 DANUBIUS-RI

The implementation phase of DANUBIUS-RI has begun, and work on the data catalogue prototype has started. The portal has moved on to stage two of development. There are currently no public services running.

Name of the service	Description	Link	Status***	ENVRI Hub
DANUBIUS – RI Data portal demonstrator v1	Data portal demonstrator developed in house used for metadata catalogue, PID generator, data structure, REST API	https://gis.geoecomar.ro/danubius/dataportal/general_data_list.php?orderby=di	S	No
DANUBIUS – RI Data portal demonstrator v2	Data portal based on CKAN used for testing harvesting mechanism that will be implemented in the working version of the portal, data upload.	https://danubius.geoecomar.ro/	S	No

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4 DiSSCo

Name of the service	Description	Link	Status***	ENVRI Hub
ELViS	European Loans and Visits Service: A portal for supporting Virtual Access (VA) and Transnational Access (TA) calls	https://elvis.dissco.eu/	O	No
Authorisation and Authentication Infrastructure	Test AAI system	https://login.dissco.eu/auth/	S	No
DiSSCOVer	Digital Specimen Search and Annotation Service (currently in early development stage)	https://sandbox.dissco.tech/	S	No

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5 eLTER-RI

Name of the service	Description	Link	Status***	ENVRI Hub
DEIMS-SDR	DEIMS-SDR (Dynamic Ecological Information Management System - Site and dataset registry) is an information management system powered by eLTER. It allows you to discover long-term ecosystem research sites around the globe, along with the data gathered at those sites and the people and networks associated with them. DEIMS-SDR describes a wide range of sites, providing a wealth of information, including each site's location, ecosystems, facilities, parameters measured and research themes.	www.deims.org	O	Not yet
DCAT transformation	A transformation has been developed in the context of the "Site Documentation Interoperability" Use Case of the WP11. The transformation allows to map site data fetched from DEIMS REST-API to DCAT	The transformation is actually published on the personal GitHub of the author https://github.com/stopopol/deims_dcat	O	Not yet

Name of the service	Description	Link	Status***	ENVRI Hub
Digital Asset Register (DAR)	The Digital Asset Registry (DAR) is a web-based catalogue of digital assets generated by the eLTER research network. The types of assets that can be catalogued are datasets, web services (e.g. OGC WMS/WFS), models and code/computational notebooks (e.g. Jupyter).	https://catalogue.lter-europe.net/elter/documents	O	No
eLTER vocabulary server	The eLTER vocabulary server is the central access point for semantic resources in eLTER. It provides the controlled vocabularies for eLTER (including lists used for sites and datasets).	https://vocabs.lter-europe.net/en/	O	No

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6   ICOS ERIC

Name of the service	Description	Link	Status***	ENVRI Hub
Carbon portal	Single data access point for ICOS data with SPARQL query system. In the context of ENVRI-FAIR a number of improvements have been done: • New metadata addition on sensors and measurement locations • Information on data reproducibility • Single sensor history • New CV for sensors models	https://data.icos-cp.eu/portal/#%7B%22filterCategories%22:%7B%22project%22:%5B%22icos%22%5D,%22level%22:%5B1,2%5D,%22stationclass%22:%5B%22ICOS%22%5D%7D%7D	O	Not Yet

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7 LifeWatch ERIC

Name of the service	Description	Link	Status***	ENVRI Hub
EcoPortal	EcoPortal is a repository for semantic resources in the ecological domain that supports the community in the creation, management, mapping, and alignment of semantic resources.	https://ecoportal.lifewatch.eu	O	Yes
LifeWatch ERIC Metadata Catalogue	The LifeWatch ERIC Metadata Catalogue is a standard-based information management system based on GeoNetwork, designed and implemented to enable access to several resources from a variety of providers through descriptive metadata, enhancing and promoting the information exchange and sharing among organisations and research infrastructures.	https://metadatacatalogue.lifewatch.eu	O	Yes
XSL Transformation	An XSL Transformation has been developed in the context of the "Soil Water Content" Use Case of the WP11. The transformation allows to map the dataset metadata records from the ISO19139 standard to the EML2.2.0 standard so that Soil Water Content datasets can be publicly available on the LifeWatch ERIC Metadata Catalogue (https://metadatacatalogue.lifewatch.eu/srv/eng/catalog.search#/search?facet.q=groupOwner%2F14150%26type%2Fdataset&resultType=details&sortBy=relevance&fast=index&_content_type=json&from=1&to=20).	The transformation is actually published on the personal GitHub of the author (https://github.com/luciaV86/ISO19139_to_eml220) and will be available soon on the LifeWatch ERIC GitLab with the associated documentation.	O	No
Semantic model and dashboard for Soil Water Content datasets	A semantic model, a set of queries to retrieve information from the model, and a web application to run the queries and serve the output have been implemented. The final service is a prototype of a desktop web application, a dashboard, built with Angular framework and a semantic graph database (GraphDB) at its backend, and serves as an entry point for (meta)data in the model preference.	Prototype	Prototype http://81.56.18.116/lw-proto/dashboard/#/dashboard	No

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8 SIOS

Name of the service	Description	Link	Status***	ENVRI Hub
SIOS data discovery and access portal (SIOS-DAP)	The SIOS Data Management Service (SDMS) integrates information from SIOS partner data repositories into a unified virtual data centre, the SIOS Data Access Portal, allowing users to search for and access data regardless of where they are archived. Providers and users have to commit to the SIOS data policy.	https://sios-svalbard.org/metsis/search	O	Yes
Observation Facility Catalogue (SIOS-OFC)	This catalogue has been developed to provide an overview of the observation facilities which collect SIOS data. An observation facility can be one instrument or a collection of instruments, e.g. a weather station, and is a term used by the WMO. The purpose of the catalogue is to make better use of the existing research infrastructure by facilitating the search for given parameters and their location.	https://sios-svalbard.org/sios-ri-catalogue REST API for GEO-JSON export: https://sios-svalbard.org/sios-ri-catalogue/rest/sios-ri-catalogue.json	O	Yes
DCAT metadata standard conversion	To facilitate interoperability between CSW (SIOS OFC CSW concerned). As per use case "Soil Documentation Interoperability" a converter has been developed at AnaEE-ERIC which can be refined and integrated into SIOS OFC		P	Not yet
Controlled vocabularies for metadata harmonisation	Applied to SIOS Core Data at first necessity for cross-domain interoperability: inherited from ENVO, GCMD BODC NERC, inspired from eLTER EnvThes, ACTRIS and ICOS vocabularies.		P (mapping exercise and SIOS position-ment)	Not yet
Dataset validation service	Tools providing on-the-fly validation of CF and ACDD compliance for netCDF files. The tool is based on the IOOS compliance checker.	https://sios-svalbard.org/dataset_validation/form	O	Not yet

Name of the service	Description	Link	Status***	ENVRI Hub
Spreadsheet template generator for CF-NetCDF or DwC-A	Create spreadsheet templates that are easy to convert to CF-NetCDF or DwC-A files.	https://sios-svalbard.org/aen/template-generator/	O	Not appli-cable
SIOS-DAP interactive plotting tool (embedded in the CWS and the basket service)	On-the-fly building of interactive dashboards for plotting and processing of i) time series, ii) time series profiles, iii) profiles datasets via OPeNDAP urls subsetting of visualised data.	API: https://bokeh.metsis-api.met.no/TS-Plot Ex: https://bokeh.metsis-api.met.no/TS-Plot?url=https://thredds.met.no/thredds/dodsC/met.no/observations/stations/SN99760.nc	O	Not appli-cable
SIOS-DAP WMS visualisation tool (embedded in the basket service)	Interactive visualisation of WMS services. The tool allows for selection of layers, time, elevation and style. Overlaying of multiple getCapabilities is also supported.	API: https://bokeh.metsis-api.met.no/TS-Plot Ex: https://bokeh.metsis-api.met.no/GISPY?url=https://nbswms.met.no/thredds/wms_ql/NBS/S1A/2022/12/07/EW/S1A_EW_GRDM_1SDH_20221207T175706_20221207T175755_046229_05891F_6DE3.nc	O	Not appli-cable
Mosaic tool	Provide a quick visualisation of recent acquisitions of satellite data (Sentinel-1 & -2), coverage in and around Svalbard, metadata information included.	https://sios-svalbard.org/services/mosaic	O	Not appli-cable

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Name of the service	Description	Link	Status***	ENVRI Hub
Sentinel-2 Comparison Tool	Provides visual comparison of two Sentinel-2 products for a selected tile. Users can select tiles, cloud coverage, time and composite.	https://sios-svalbard.org/services/comparison	O	Not appli-cable
Sentinel Acquisition Plan	Show future acquisition plans for Sentinel passages over Svalbard region.	https://sios-svalbard.org/services/acquisition	O	Not appli-cable

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9 Results, Impacts, and Insights: A Critical Examination and Concluding Discussion

The co-development of services within the realm of RIs plays a pivotal role in advancing scientific endeavours and fostering collaborative innovation. As scientific research becomes increasingly interdisciplinary and complex, the need for specialised infrastructure and services to support diverse domains becomes evident. By joining forces and leveraging collective expertise, RIs can create synergistic solutions that cater to the evolving needs of the scientific community. Co-development not only enhances the efficiency and effectiveness of services but also promotes the sharing of best practices, resources, and knowledge. Moreover, it facilitates the establishment of standardised frameworks and interoperable systems, enabling seamless integration and exchange of data across different domains. The significance of RI services co-development extends beyond individual infrastructures; it contributes to the broader scientific ecosystem by fostering collaboration, driving discovery, and enabling breakthroughs that address global challenges. During the project, WP11 explored the feasibility of IR services co-development. At the beginning of the project, it was planned that a series of services should be developed with the double aim of:

i.   serving the scientific community of the respective RI, especially with regard to transdisciplinary research, and
ii.   creating shared services among two or more RIs to optimise them and demonstrate the interoperability of their digital systems.

Despite the difficulties faced at the start of the project, particularly the inability to meet in person to initiate activities due to the COVID-19 pandemic, as of today, a total of 29 services have been developed and/or refined by the Biodiversity and Ecosystems subdomain RIs during ENVRI-FAIR. Six of these are available through the ENVRI Hub, and onboarding onto the ENVRI Hub is planned for at least one more service by the project's closure (DEIMS-SDR). In general, the increased capacity achieved by the RIs during the project, along with the demonstration of interoperability between services of different IRs, has undoubtedly had a positive impact in terms of visibility and usability of the services within the stakeholder community. Some services developed during the project will be refined and possibly made fully operational with the support of existing projects (e.g., DANUBIUS-PP).

The onboarding of services onto the ENVRI Hub (https://envri-hub.envri.eu/cservicesmain) presents both challenges and opportunities. While the current services available on the ENVRI Hub serve as valuable demonstrators, it is important to acknowledge that they are not yet fully operational. Future projects will be necessary to transform these services into fully functional and sustainable solutions. The onboarding process itself requires careful consideration and collaboration between RIs, ensuring the interoperability of systems and adherence to standardised frameworks. Technical complexities, such as integrating diverse data formats and ensuring seamless data exchange, pose significant challenges. Additionally, the governance and long-term sustainability of these services need to be addressed, involving the establishment of appropriate funding models and community engagement strategies. Despite these challenges, the onboarding process offers an opportunity to foster collaboration and knowledge sharing among RIs, enhancing the visibility and usability of services within the scientific community. It provides a platform for testing and refining solutions, ensuring that the services meet the evolving needs of researchers and stakeholders. The future projects required to obtain fully operational services present an exciting prospect for advancing scientific research and driving societal progress. Through continued investment and collaboration, these projects will enable the transformation of demonstrators into robust, sustainable, and user-friendly services that have a tangible impact on scientific endeavours. The onboarding process on the ENVRI Hub, coupled with the commitment to future projects, exemplifies the dedication of the scientific community to co-develop and refine services that support interdisciplinary research and address global challenges. As these efforts progress, the ENVRI Hub will evolve into a central hub of innovative and interoperable services, driving the advancement of science and facilitating the achievement of research goals across diverse domains.

In conclusion, the increased capacity achieved by the RIs throughout the project, combined with the demonstration of interoperability between services from different RIs, has significantly enhanced the visibility and usability of these services within the stakeholder community. The positive impact on the scientific community is undeniable, as the developed services cater to transdisciplinary research needs

and contribute to the broader goals of the RIs. Furthermore, the successful co-development efforts have laid the foundation for future refinements and potential full operationalisation of the services with the support of existing and future projects.