Memorandum of Understanding
Earth Life Observatory (ELO)

A Federated Research Data Management Environment for Biodiversity and Geodiversity

Founding and Preparatory Memorandum of Understanding

Convening organisation	**NATARC Consortium — National Research Infrastructures Roadmap Consortium for Natural History Archives and Common Data Space, Estonia**
Representative	Prof. Urmas Kõljalg NATARC Project Lead Professor of Mycology, University of Tartu
Contact	urmas.koljalg@ut.ee
Launch event	Online PlutoF webinar: Introducing the Earth Life Observatory (ELO), 4 November 2026, 10:00–11:00 CET.

Preamble

The signatories recognise that contemporary biodiversity, geodiversity and environmental research increasingly depends on trusted, interoperable and sustainable digital infrastructures supporting the entire research data lifecycle. This includes data collection and import, management, documentation, quality control, collaboration, analysis, preservation, publication, and reuse.

Biodiversity and geodiversity communities have developed numerous valuable databases, repositories, collections, monitoring systems, and research infrastructures. However, research data and associated workflows remain distributed across different systems, institutions, and scientific domains. Greater interoperability among these resources is required to make data more FAIR, reusable, and accessible to both humans and machines.

The signatories therefore share the ambition to establish a federated research data management environment that connects biodiversity, geodiversity and related environmental data while respecting institutional autonomy, data stewardship responsibilities and community ownership.

Through this Memorandum of Understanding, the signatories express their shared intention to jointly explore, design and establish the Earth Life Observatory (ELO) as a federated research data management environment connecting data, infrastructures, services and scientific communities. ELO will provide a common data foundation upon which publication services, analytical workflows, Artificial Intelligence, modelling, visualisation, Digital Twins, and other advanced applications can be developed.

Vision

The Earth Life Observatory (ELO) is envisioned as a federated research data management environment connecting biodiversity, geodiversity and related environmental data across institutions, infrastructures and scientific communities.

ELO will support the research data lifecycle from data collection, import and management through documentation, quality control, collaboration and analysis to preservation, publication, discovery and reuse. It will promote FAIR and Open Science principles while allowing participating organisations to retain stewardship, ownership and governance of their own data, systems, and expertise.

Rather than creating a single centralised database or infrastructure, ELO will federate existing and emerging data management systems, repositories, research infrastructures, scientific communities and service providers through shared interoperability principles and services.

PlutoF and SARV will provide the initial operational foundations of ELO for biodiversity and geodiversity research data management, respectively. Additional compatible platforms and infrastructures may join the federation as ELO develops.

On this interoperable data foundation, ELO will enable data publication, analytical workflows, AI-ready data services, modelling, visualisation, decision-support applications, and Digital Twins.

Why ELO?

Biodiversity and geodiversity communities currently operate numerous successful databases, repositories, portals, collections, monitoring systems, and publishing platforms. While these initiatives provide invaluable services, users increasingly require integrated environments that support the entire lifecycle of data, from collection and management to analysis, visualisation, publication and decision-making.

Emerging technologies such as data spaces, artificial intelligence, cloud computing, and digital twins create new opportunities for interdisciplinary collaboration and knowledge generation. ELO seeks to provide a collaborative framework through which existing organisations and infrastructures can jointly develop common foundations while preserving institutional autonomy, scientific independence, and community ownership.

The initiative therefore focuses not on replacing existing infrastructures, but on enabling them to work together more effectively through shared research data management principles, interoperable technologies, standards, persistent identifiers, reusable services and coordinated data publication pathways.

ELO Research Data Management Framework

ELO will evolve as a federated ecosystem comprising several interconnected layers.

1. Research Data Management Layer

Provides environments for managing biodiversity, geodiversity, and related research data throughout their lifecycle. PlutoF and SARV will constitute the initial operational components, complemented by compatible systems contributed by participating organisations.

2. Interoperability and FAIR Data Layer

Supports metadata standards, controlled vocabularies, persistent identifiers, digital objects, machine-to-machine interfaces, and interoperability between participating systems.

3. Publication and Knowledge Integration Layer

Connects ELO-managed data with repositories, biodiversity and geodiversity data infrastructures, molecular sequence repositories, taxonomic and nomenclatural resources, scientific publications and other knowledge systems.

4. Analytical and Advanced Services Layer

Enables analytical workflows, visualisation, Artificial Intelligence, modelling, decision-support systems, Digital Twins and other services that build upon interoperable and well-managed research data.

Guiding Principles

- FAIR research data management throughout the data lifecycle
- Federation and interoperability across participating infrastructures and communities
- Open Science and responsible data sharing and reuse
- Persistent identification and machine-actionable data
- Transparency, scientific independence and institutional autonomy
- Community stewardship and respect for domain-specific practices
- Long-term sustainability and reuse of existing infrastructures
- Responsible development of AI, analytical and Digital Twin services based on trusted research data

Categories of Signatories

To reflect the different roles within the ELO ecosystem, this Memorandum of Understanding recognises two complementary classes of signatories.

1. ELO Operational Participants

ELO Operational Participants are organisations that use, plan to use, host, contribute to, or co-develop ELO-aligned operational infrastructures and services. This includes organisations actively managing biodiversity, geodiversity, environmental, molecular, collection, monitoring or observational data using systems such as PlutoF, SARV, and future ELO-compatible platforms.

ELO Operational Participants may contribute to the development of research data management workflows, services, standards, digital objects, analytical environments, and other ELO-compatible capabilities.

Examples may include universities, museums, natural history collections, geological surveys, research infrastructures, national initiatives, scientific communities, and other organisations operating or adopting ELO-aligned systems.

2. ELO Interoperability and Publication Partners

ELO Interoperability and Publication Partners are organisations that provide repositories, publication platforms, knowledge systems, registries, data infrastructures, persistent identifier services, interoperability services or related platforms through which ELO-managed or ELO-aligned data and knowledge products may be published, archived, disseminated, indexed, cited, exchanged or reused.

ELO Interoperability and Publication Partners may contribute expertise in interoperability standards, metadata harmonisation, data publication, digital preservation, persistent identifier strategies, data citation practices and alignment with European and global data infrastructures.

Examples may include biodiversity data infrastructures, sequence repositories, scientific publishers, collection infrastructures, knowledge systems, identifier providers and international data initiatives.

Both categories of signatories are recognised as equal contributors to the development of ELO and may participate in consultations, workshops, and discussions established during the preparatory phase.

Strategic Benefits

Participation in ELO will provide organisations with opportunities to: shape a federated research data management environment connecting biodiversity and geodiversity; improve interoperability among existing research data infrastructures and platforms; develop common approaches to FAIR research data management and publication; connect biodiversity and geodiversity data across institutional and disciplinary boundaries; strengthen collaboration among research infrastructures, collections, repositories, publishers and scientific communities; improve the discoverability, accessibility and reuse of research data; develop trusted, machine-actionable and AI-ready data resources; enable new analytical, modelling, visualisation and Digital Twin applications; increase the visibility and impact of participating data resources and services; and contribute to sustainable European and international research data ecosystems.

Future Development

This Memorandum of Understanding is intended as a founding and preparatory declaration of interest. It provides a common framework for organisations that wish to support the development of the Earth Life Observatory (ELO) and contribute to its further co-design.

Following the initial signature period, the participating organisations may collaboratively develop a more detailed ELO Consortium and Research Data Interoperability Memorandum of Understanding. That future document may address governance arrangements, participation models, operational roles, interoperability principles, technical architecture, data publication pathways, sustainability approaches and other matters considered relevant by the participating organisations.

The present MoU does not predetermine the content of the future MoU and does not create obligations regarding governance, financial contributions, service provision or long-term participation. These matters may be considered separately if participating organisations agree that they are needed for the next stage of ELO development.

Timeline

Date or period	Milestone	Description
4 November 2026	Launch of the MoU	The Founding and Preparatory MoU is formally launched and opened for signature during an online PlutoF webinar.
4 November 2026 – 4 March 2027	Founding participant signature period	Organisations signing during this period shall be recognised as Founding Participants of the Earth Life Observatory (ELO) Initiative.
November 2026 – March 2027	Initial consulta-tions	Participating organisations may provide comments and suggestions on the development of ELO and on the scope of the future ELO Consortium and Interoperability MoU.

March-April 2027	Consolidation of comments	Feedback received during the first signature period is consolidated by the convening organisation and used to prepare the second-stage MoU.
1 May 2027	Publication of the ELO Consortium and Interoperability MoU	The second-stage MoU is expected to be published and opened for signature. Its content will be developed based on input from participating organisations.

Legal Status

This Memorandum of Understanding reflects the intentions of the signatories to collaborate in good faith. It does not establish a legal partnership, create a new legal entity, impose financial obligations, or create legally binding commitments.

Future agreements concerning governance, funding, hosting, membership, service provision, interoperability, data publication or long-term operation may be developed separately.

Eligibility for Participation

This Memorandum of Understanding is open to universities and research institutions, museums and collections, geological surveys, research infrastructures, scientific communities and networks, publishers and scholarly communication organisations, governmental agencies, non-governmental organisations, industry partners, international organisations, data infrastructures, repositories, knowledge systems and other stakeholders aligned with the aims of ELO.

Organisations interested in participating in ELO are invited to complete an Expression of Interest describing their activities, data management needs, infrastructures, potential contributions and areas of interest. The Expression of Interest will support stakeholder mapping and inform the co-design of ELO during the preparatory phase.

Convening Organisation and Contact Point

The Earth Life Observatory (ELO) Founding and Preparatory Memorandum of Understanding is convened by the NATARC Consortium (National Research Infrastructures Roadmap Consortium for Natural History Archives and Common Data Space, Estonia), which initiated the ELO process and coordinates the initial stakeholder engagement during the preparatory phase.

During the preparatory phase, NATARC shall serve as the contact point for organisations interested in the ELO initiative and shall facilitate the preparation of the future ELO Consortium and Research Data Interoperability Memorandum of Understanding, where appropriate and based on input from participating organisations.

Representative of the Convening Organisation

Prof. Urmas Kõljalg

NATARC Project Lead
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The Convening Organisation acts solely as facilitator of the preparatory process and does not obtain any permanent governance role unless subsequently agreed by ELO participants through a future agreement.

Concluding Statement

By signing this Memorandum of Understanding, the participating organisation expresses its intention to contribute to the co-design and development of the Earth Life Observatory (ELO), a federated research data management environment connecting biodiversity, geodiversity and related environmental data, infrastructures and scientific communities. ELO will seek to provide an interoperable foundation for managing, sharing, publishing and reusing research data across institutional and disciplinary boundaries while respecting institutional autonomy and community stewardship. Building upon this trusted research data foundation, ELO will enable the development and integration of analytical workflows, Artificial Intelligence, modelling, visualisation, Digital Twins and other advanced research and decision-support services. The signatories share the ambition to strengthen FAIR and Open Science practices and establish sustainable connections among research data, infrastructures, collections, repositories, publications and knowledge systems from local to global scales.

Signatories

By signing this Memorandum of Understanding, the participating organisation expresses its intention to contribute to the co-design and development of the Earth Life Observatory (ELO) during the preparatory phase.

Please indicate one of the following signatory categories: ELO Operational Participant; ELO Interoperability and Publication Partner; or Both. Information on the procedure for signing the MoU will be provided by the convening organisation following its launch on 4 November 2026.

No	Organisation	Signatory category	Representative	Position	Signature

Founding Convening Organisation

Organisation	**NATARC Consortium — National Research Infrastructures Roadmap Consortium for Natural History Archives and Common Data Space, Estonia**
Representative	Prof. Urmas Kõljalg
Position	NATARC Project Lead; Professor of Mycology, University of Tartu
Email	urmas.koljalg@ut.ee
Signature	_____
Date	_____

For information regarding participation in ELO, please contact Prof. Urmas Kõljalg (urmas.koljalg@ut.ee).