Harnessing the power of Natural Science Collections



Distributed System of Scientific Collections





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DiSSCo enables the construction of an integrated knowledge base on top of data from Natural Science Collections

DiSSCo, a pivotal research infrastructure

The Distributed System of Scientific Collections (DiSSCo) is a new world-class Research Infrastructure (RI) for Natural Science Collections (NSCs). The DiSSCo RI works towards the digital unification of all European natural science assets under common curation and access policies and practices. These aim to make collections data easily *Findable*, more *Accessible*, *Interoperable* and *Reusable* (FAIR).

As such, DiSSCo enables the transformation of a fragmented landscape of essential natural science collections into an integrated knowledge base that provides interconnected hard evidence of the natural world.

DiSSCo represents the largest ever formal agreement between natural history museums, botanical gardens and collection-holding universities in the world.



Why do we need DiSSCo?

Natural Science Collections are essential resources that enable scientists to discover and document the world's bio- and geodiversity. Moreover, biodiversity and geodiversity data when pooled together, rendered accessible and managed properly, have the power to inform cross-domain efforts tackling societal and global challenges.

As a NSC-based infrastructure, DiSSCo is helping **to map out a sustainable future for the natural world.**

Data derived from European Natural Science Collections are crucial to understand life on Earth, analyse its history, and predict future alterations. These data provide baseline evidence of the natural world that informs policy decisions to mitigate climate change and halt biodiversity loss, contributing to the sustainable and healthy growth of our societies. DiSSCo becomes the digital repository of Natural Science Collections that are foundational to innovations worldwide, supports new breakthrough scientific discoveries and facilitates decision-making and legislative processes.



DiSSCo unites Natural Science Collections

DiSSCo facilitates innovation, scientific discovery and decision-making

Through an unprecedented agreement, more than 120+ institutions across 21 European countries have joined DiSSCo. In Europe, a continent that holds 1.5 billion specimens representing almost 80% of the species diversity described worldwide, these institutions host an invaluable heritage whose digitisation will make these collections accessible worldwide.



DiSSCo promotes European excellence in science











DiSSCo drives a transformative change among research communities in the way they address global challenges by providing access to open and FAIR data

DiSSCo is a data-driven infrastructure with natural science research at its heart.

DiSSCo is deeply rooted in the ambition to generate open and FAIR data used in multi-disciplinary geoand biodiversity research that will inform European and global environmental related policies such as the EU's Green Deal and the Biodiversity Strategy 2030.

Using a *Digital Extended Specimen* as a foundational research data unit will result in a profound transformation and paradigm shift in the way research is conducted.

DiSSCo provides data at an unprecedented scale and precision, empowering first-class research on biological and geological collections that supports a more sustainable future for European citizens.







What are DiSSCo's contributions?

DiSSCo transforms a fragmented landscape of NSCs into a comprehensive, accurate and sustainable knowledge base for bio- and geodiversity data with an holistic approach by linking all data classes. From that, DiSSCo:



- **Optimises collection access, curation and management practices in individual institutions**, enabling monitoring, specialisation and prioritisation strategies under a common research agenda;
- **Permanently links representations of digital specimens to their attributes** across distributed digital resources (allocated in different platforms and initiatives such as GBIF, GenBank, MorphoBank, GeoCASe), creating a technical environment for robust science whose assertions can always be validated or reproduced;
- **Reduces the global carbon footprint with digital collections access** that will reduce the current 25,000 annual international trips and 800,000 global shipments of specimens;
- **Improves efficiency**, facilitates economies of scale, makes natural science research more responsive and resilient to urgent needs, and accelerates biodiversity discovery.



DiSSCo entered the ESFRI Roadmap in 2018 thanks to a mature research community gathered around the *Consortium of European Taxonomic Facilities* (CETAF).

From that successful step, DiSSCo aims to become **operational by 2026**.

As of 2021, DiSSCo is in its **Preparatory Phase**, which is a pan-European effort, aided by a series of EU-funded projects: from **producing the blueprint** for what the DiSSCo RI could be (ICEDIG project) to developing the technical infrastructure, standards and pilot services that make DiSSCo tangible (SYNTHESYS+), through the DiSSCo Prepare Project under which DiSSCo aims to improve institutional readiness in their data, technology, scientific, financial and governance, in preparation for a **smooth transition into the Implementation Phase (construction and operation)** of the research infrastructure. In summary, the preparatory phase is working to raise the DiSSCo RI's overall maturity, enhancing its ability to successfully take on and construct services based on clear and actionable guidelines across **five dimensions**:









Scientific readiness will inform decisions around DiSSCo's future based on the needs of its science-driven user base and data providers;

Data readiness to provide and enrich FAIR data in a consistent, harmonised manner across the distributed facilities;

Technical readiness will establish sustainable and comprehensive data architecture and technical specifications of its future digital services;

Financial readiness to develop a robust and comprehensive financial framework supported by accurate and detailed calculations of costs and contributions;

Organisational readiness will facilitate setting up its overall legal and organisational (governance and management) structures, along with the strategic and operational plan.

By **delivering a comprehensive Construction Master Plan** DiSSCo is ensuring alignment with follow-up projects to minimise inconsistencies and gaps, and to improve efficiencies and synergies while reducing costs of implementation towards securing political and financial commitments from national partners. An agreement among 120+ institutions

Across 21 European countries

Participating in over 100 European funded projects

Reducing the **25,000 annual international trips** currently required to access physical collections

Dropping the number of specimens (currently 800,000) annually shipped worldwide

Involving 5,000 scientists

Working with **1.5 billion specimens** that represent **80%** of the world's described species biodiversity

Towards one digital collection

Saving **70M €** annually from reduced travel and shipping

"DiSSCo represents the largest ever formal agreement between Natural History museums, Botanic gardens and collection-holding universities in the world."

partner organisation

Consortium of European Taxonomic Facilities (CETAF AISBL)

national partners

Austria

Naturhistorisches Museum Wien

Belgium

Agentschap Plantentuin Meise Flanders Marine Institute (VLIZ) Instituut voor Natuur- en Bosonderzoek (INBO) Royal Belgian Institute of Natural Sciences Royal Museum for Central Africa Royal Zoological Society of Antwerp Université Libre de Bruxelles University of Namur

Bulgaria

Bulgarian Academy of Sciences (NMNHS-BAS) Institute of Biodiversity and Ecosystem Research Bulgarian Academy of Sciences (IBER-BAS) National Museum of Natural History, Sofia

Czech Republic

Charles University, Faculty of Science Czech National Museum Institute of Botany of the Czech Academy of Sciences Institute of Vertebrate Biology, Czech Academy of Sciences Masaryk University Nature Conservation Agency of the Czech Republic

Denmark

Natural History Museum of Denmark Naturhistorik Museum Aarhus The Science Museums, Aarhus University

Estonia

Estonian Museum of Natural History Estonian University of Life Sciences Tallinn University of Technology University of Tartu

Finland

Biodiversity Unit, University of Oulu Biodiversity Unit, University of Turku

Digitarium, SIB Labs Research Infrastructure Unit, University of Eastern Finland Finnish Museum of Natural History, LUOMUS, University of Helsinki

Kuopio Natural History Museum Open Science Centre/Museum, University of Jyvaïskyla¨ **France**

Conservatoire botanique national Alpin Muséum national d'histoire naturelle Centre de coopération internationale en recherche agronomique pour le développement Centre Informatique National de l'Enseignement Supérieur

Institut Recherche et Développement Le Jardin Botanique de la Ville de Lyon Muséum d'histoire naturelle Philadelphe-Thomas de Gaillac

Muséum d'histoire naturelle de Dijon Muséum d'histoire naturelle de La Rochelle Musée d'histoire naturelle de Lille Muséum d'histoire naturelle de Marseille Muséum Aquarium de Nancy Muséum d'histoire naturelle de Toulouse Société National des Sciences Naturelles et Mathématiques de Cherbourg Sorbonne Université Tela Botanica Université Aix-Marseille Université de Bourgogne Université Clermont Auvergne Université Claude-Bernard Lyon 1 Université de Grenoble

Université Lille 1 – Sciences et Technologies

Université de Lorraine Université de Montpellier Université de Rennes 1 Université de Strasbourg Université de Toulouse III-Paul Sabatier

Germany

Bavarian Natural History Collections (Staatliche Naturwissenschaftliche Sammlungen Bayers [SNSB]) Botanischer Garten und Botanissches Museum, Freie Universität Berlin Centrum für Naturkunde, Universität Hamburg

Institute for Evolution and Biodiversity Science, Berlin Museum für Naturkunde, Leibniz

Naturkundemuseum Stuttgart Senckenberg Gesellschaft für Naturforschung Zoological Research Museum Koenig-Leibniz Institute for Animal Biodiversity

Greece

Botanical Museum and Herbarium, National and Kapodistrian University of Athens

Botanical Museum, University of Patras

Department of Geology, University of Patras

Goulandris Natural History Museum

Mediterranean Agronomic Institute of Chania

Mineralogy and Petrology Museum, National and Kapodistrian University of Athens

Museum of Zoology, Aristotle University of Thessaloniki

Museum of Geology-Palaeontology-Palaeoanthropology, Aristotle University of Thessaloniki School of Geology

Museum of Geology and Palaeontology, National and Kapodistrian University of Athens

Museum of Zoology, National and Kapodistrian University of Athens

Natural History Museum of Crete – University of Crete

Natural History Museum of the Lesvos Petrified Forest

Zoological Museum, University of Patras

Hungary

Hungarian Natural History Museum

Italy

Accademia Nazionale di Entomologia Accademia Nazionale delle Scienze Associazione Nazionale dei Musei Scientifici Consiglio Nazionale delle Ricerche - CNR Museo di Storia Naturale dell'Università degli Studi di Firenze Società Botanica Italiana Società Geologica Italiana Società Italiana di Biogeografia Società Paleontologica Italiana

Luxembourg

Musée national d'histoire naturelle (MnhnL)

Netherlands

Natural History Museum Rotterdam Naturalis Biodiversity Center Natuurmuseum Brabant Natuurmuseum Fryslaîn Natuurmuseum Maastricht NIOZ - Royal Netherlands Institute for Sea Research NLBIF - Netherlands Biodiversity Information Facility Stichting De Bastei (Natuurmuseum Nijmegen) Stichting De MuseumFabriek Stichting Museon Teylers Museum University of Amsterdam, LifeWatch NL Utrecht University Museum Westerdijk Fungal Biodiversity Institute

Norway

Arctic University Museum of Norway, UIT The Arctic University of Norway Natural History Museum, University of Oslo

NTNU University Museum, Norwegian Museum of Science and Technology

University Museum of Bergen, University of Bergen

Poland

Museum and Institute of Zoology, Polish Academy of Sciences University of Warsaw

Portugal

Universidade de Coimbra (MUC-UC) Universidade de Lisboa (MUHNAC- ULisboa) Universidade do Porto (MHNC-UP)

Slovakia 🚽

Centrum biológierastlína biodiversity, Botanickýústav Slovenskej akadémievied

Univerzita Komenskéhov Bratislave Univerzita Pavla Jozefa Safárikav Košiciach

Spain

Instituto Geológico y Minero de España (IGME) Agencia Estatal Consejo Superior de Investigaciones Científicas (CSIC) Universidad de Navarra (UNAV)

Śweden

Bergius Foundation

Department of Biological and Environmental Sciences, University of Gothenburg Department of Biology, Lund University

Department of Ecology and Environmental Science, Umeå University

Gothenburg Botanical Garden

Swedish Museum of Natural History

Uppsala University, Museum of Evolution

Västarvet, The Gothenburg Museum of Natural History

United Kingdom

Natural History Museum Royal Botanic Garden Edinburgh Royal Botanic Gardens Kew

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