Natural Science collections - bio- & geo-diversity

Leading scientific facility

Discovering, describing and interpreting life on Earth

Tackling societal challenges

Sustainable future
Europe: the global leader

55% of the world's assets with rich historical and global distribution

European Collection facilities:

> 1.5 billion specimens
> 80% of world's species
> 5,000 scientists employed
> 16,000 scientific visitors pa
> 10 million public visitors pa
> 25 million web visitors pa
Our grand challenges require
Data-driven solutions urgently needed

Collections need to deliver data at the
Scale, form and precision required
Case study – Invasive Alien Species

UN Sustainable Development Goals (Target 15.8)

- Institutional collections
- Species distribution & genomics
- Modelling / Prevention / Early detection

Facilities & information
- Linked Data
  - Analysis / Interpretation Services

Urgent challenge

Economic costs of IAS for EU
€20 Billion / year
Kettunen et al. 2009

EXAMPLE: Alligator Weed (Alternanthera philoxeroides)
Negative impact on native species, ecosystem services and infrastructure
DiSSCo: A new European infrastructure

114 National Facilities
21 Countries

- Largest ever formal agreement between natural science collection facilities
- Centralised governance model already in place
- Supporting network of working groups

With political support by 11 European Governments
The DiSSCo approach

- **Transfer of authority** from facilities to central for all key operations
- Clear **decision making** mandate
- Focused **scientific scope**
- **Binding institutional commitments** (already in place)
- New **independent legal framework**
DiSSCo science services

1. e-Science services
   A one-stop shop for services providing unified discovery, access, interpretation and analysis of complex linked data

2. Physical and remote access services
   A universal harmonised physical access service and digitisation on demand service. Supporting mass-scale, yet synchronised content mobilisation across European Collections

3. Support & Training services
   Integrated user support desk and implementation of multi-modal training programmes to enhance data skills
Lowering barriers for users

16,000 researchers travel every year to physically access scientific collections and 800k objects are packed and shipped (at an annual public cost of more than €70M)

Current model
- Slow
- Expensive
- Inefficient
- Limited

Integrated RI model
- Wide access
- Lower costs
- Faster
- New insights
- Optimised
- FAIR data

User services

ESFRI
RIs
A new business model
One European Collection

Synchronising 114 facilities:
- One European Collection of scientific assets
- European level strategy
- Monitoring impact of collections
- Specialisation strategies (e.g. in alignment with national priorities, e.g. Smart Specialisation Strategies)
- Joint Research Agendas

Build economies of **scope and scale**

*Collective annual cost of **EUR 12M** for **ca. 100 different CMS solutions***
Added value of DiSSCo

Without DiSSCo | With DiSSCo
---|---
Disconnected information sources | Linked and open information with semantic annotation
Slow and fragmented access | Coordinated physical and virtual access through a single entry point
Bio- and geo-diversity data invisible to other Ris | Cross-disciplinarity facilitated through RI systems interoperability
Provenance and quality difficult to ensure | Provenance and quality assurance embedded in services/processes
Big data science questions unresolvable | Bio- and geo-diversity data brought to the big data pool
Institutional based digitisation activities | Coordinated digitisation programmes: One EU collection
Fragmented efforts | Coordinated investments - Economies of scope and scale
All data classes unambiguously linked to the physical objects they derive from.
**Brokering framework** - achieving interoperability across different disciplinary data systems, leaving the systems autonomous.
European Loans and Visits System
DiSSCo Data Portal
Unified Curation & Annotation System

DiSSCo Data Store
Future-proofing data & digitisation

- Quality assurance and fit for purpose by applying common standards and procedures
- Stable to future technologies through robust metadata schemes
- Advanced digitisation techniques will be driven by research requirements

Established technology
2D image
1 picture with sub-micron resolution
= 20 MB / specimen

Emerging Technology
3D model
raw data and reconstructed images
= 200 GB / specimen
Financial Resourcing: Sources of support

**European Level**
Additional funding / financing through FPs and European Investment Bank

**National Level**
Industrial scale digitisation funded through national digitisation programmes and supported by national data infrastructure

**Institutional Level**
Curation, collection management and expertise for data enrichment, on-demand digitisation
DiSSCo fills an identified gap in the RI landscape
A stepwise implementation of a vision

DiSSCo Design Study
€10M | 2014 - 2017

DiSSCo Construct
€53M | 2021 - 2024

DiSSCo Deploy
€2M | 2024 - 2025

DiSSCo Prepare
€20M | 2019 - 2023

CoL+
€0.8M | 2018 - 2019

SYNTHESYS+
€10M | 2019 - 2021

MOBILISE
€0.5M | 2018 - 2022

ICEDig.eu
€3M | 2018-2020
Europe has the opportunity for **scientific leadership** at a global level

- **Direct response to identified needs** in the European and international RI landscape
- **Lowers the barrier for big, open science** practices across tens of thousands of users
- **A super-mature community with 114 self-sustainable facilities (nodes) across 21 countries**
Distributed System of Scientific Collections