

SYNTHESYS+

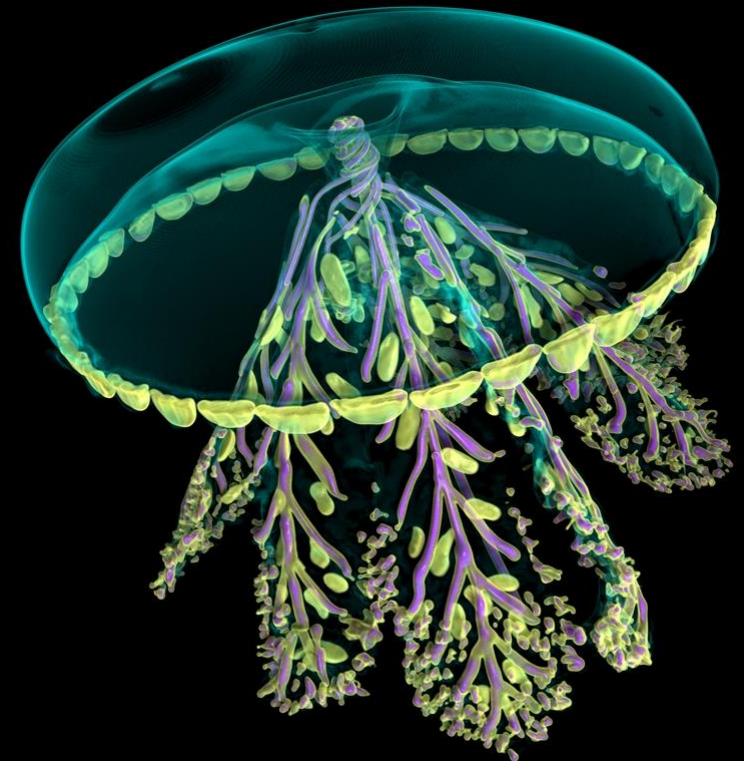
Overview

Vince Smith, SYNTHESYS coordinator

@vsmithuk, @synthesysEU

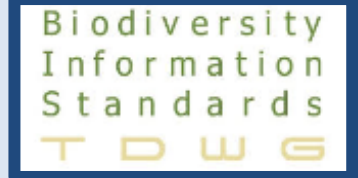
SYNTHESYS+ Kick-Off Meeting

London, 18th Feb. 2019



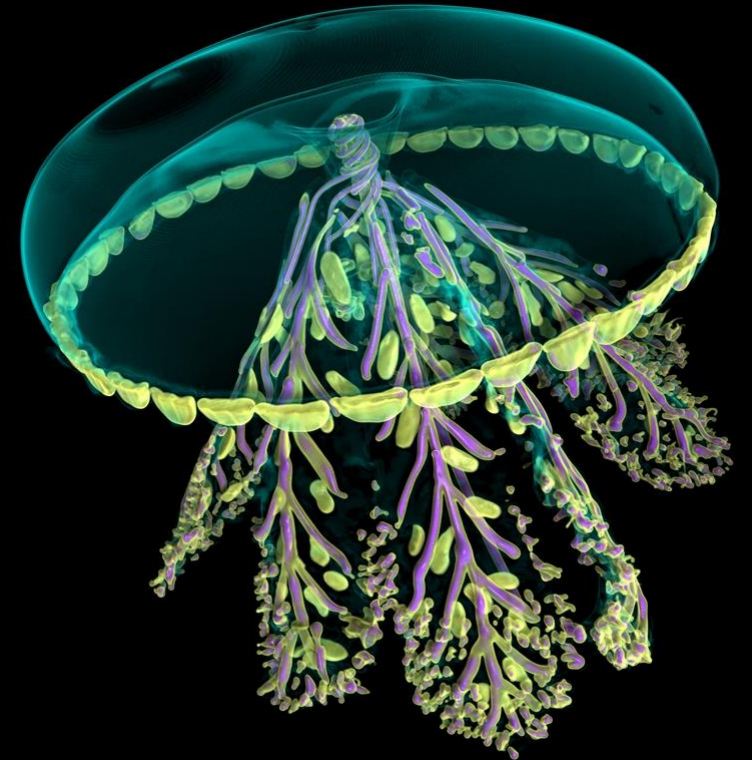
Consortium

32 partner consortium: 17 NH museums, 4 botanic gardens, 4 international networks, 3 commercial, 2 research centres, 1 university, 1 not-for-profit.



Housekeeping

- Wi-fi (Public Wi-fi & Eduroam)
- Charging stations
- Fire alarm
- Toilets
- Please return cups/drinks back out after the session
- Roving microphones available for Q+A
- Sessions are being recorded (will circulate, alongside PPT's)



SYNTHESYS+

Synthesis of Systematic Resources

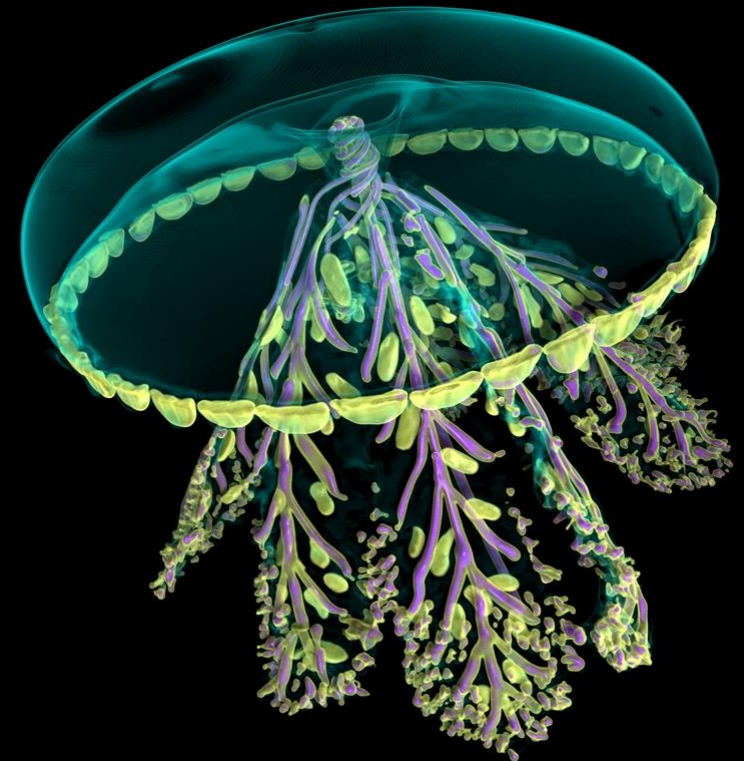
a DiSSCo project

Day 1 (18th Feb)

- SYNTH+ Overview
- Management (NA1)
- Access
- Reporting & Admin
- New partners
- Drinks reception
- Dinner

Day 2 (19th Feb)

- Networking (NA2-5)
- Research (JRA1-3)
- Lunch (stream WP. meetings)
- DiSSCo Overview
- Teamwork system
- Coordination & planning
- Dissemination
- Links & horizon-scanning

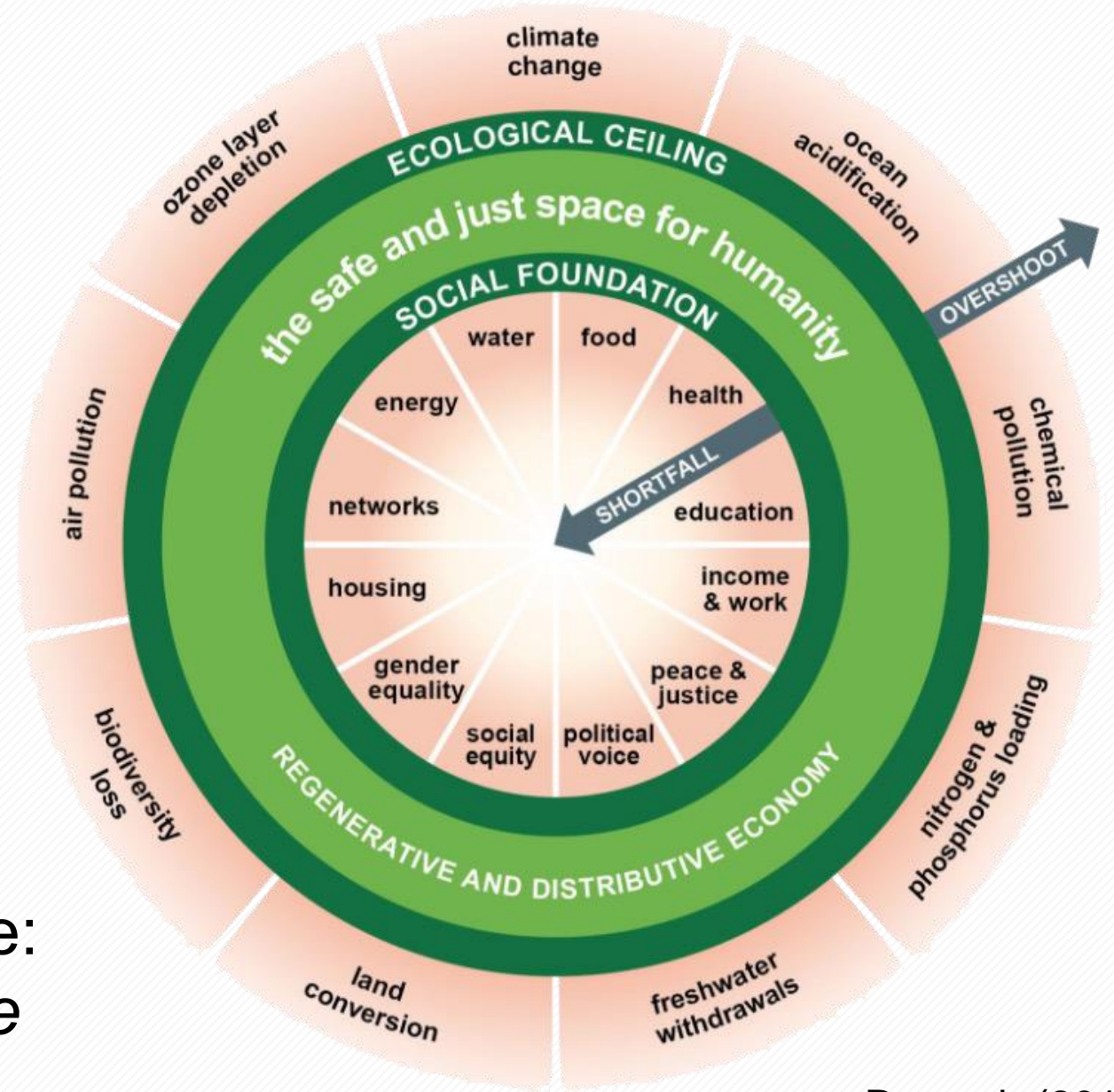


Why are we here?



Mount Taranaki (Mt. Egmont), N.Z.

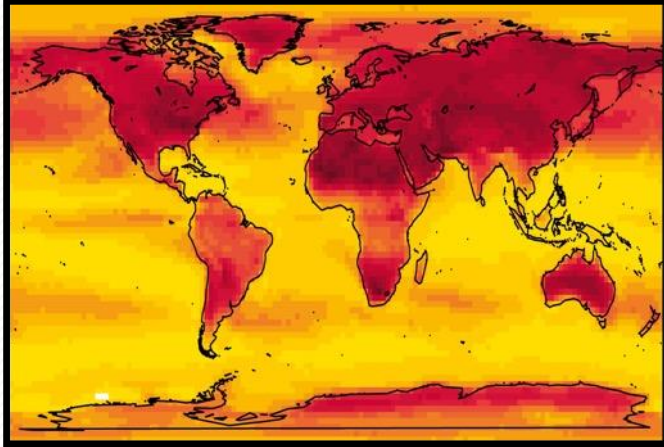
Humanity's 21st century challenge:
to meet the needs of all, within the means of the planet



Raworth (2017)

Bio/geodiversity are central to humanity's sustainability

Climate change



Emerging diseases



Biodiversity loss



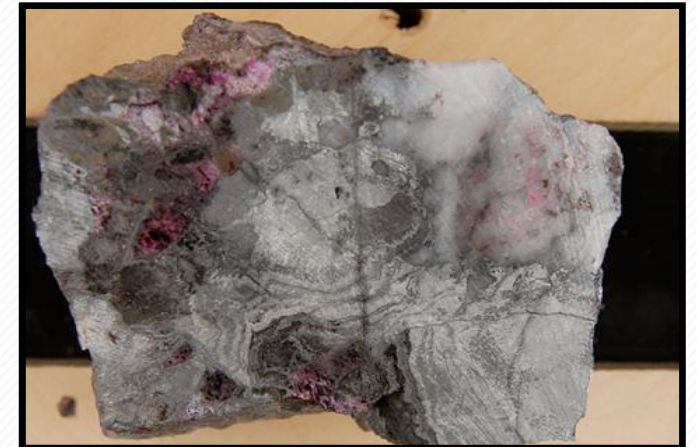
Food security



Human migration



Mineral supply



Collections are key to addressing these challenges...



International Journal of Epidemiology, 2017, 1–10
doi: 10.1093/ije/dyw366
Original article



Original article

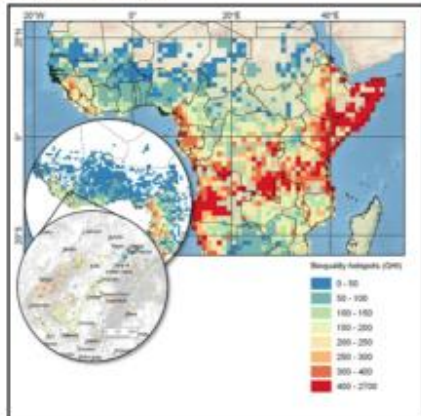
Spatial quantification of the world population potentially exposed to Zika virus

Alberto J. Alaniz,^{1,2*} Antonella Bacigalupo³ and Pedro E. Cattán³

Current Biology

Bioquality Hotspots in the Tropical African Flora

Graphical Abstract



Authors

Cicely A.M. Marshall, Jan J. Wieringa, William D. Hawthorne

Correspondence

cicely.marshall@plants.ox.ac.uk

In Brief

Marshall et al. introduce a new conservation framework for tropical Africa. The authors use “big data” to integrate species-level conservation assessments into reliable minimum local estimates of global irreplaceability across the region, providing a framework for conservationists and researchers applicable at the local scale.

Report

Conservation Biology

Contributed Paper

Effectiveness of protected areas for vertebrates based on taxonomic and phylogenetic diversity

Qing Quan,¹ Xianli Che,¹ Yongjie Wu,^{2,3} Yuchun Wu,¹ Qiang Zhang,¹ Min Zhang,¹ and Fasheng Zou^{1*}

¹Guangdong Key Laboratory of Animal Conservation and Resource Utilization, Guangdong Public Laboratory of Wild Animal Conservation and Utilization, Guangdong Institute of Applied Biological Resources, Guangzhou 510260, China

²Key Laboratory of Bio-resources and Eco-environment of Ministry of Education, College of Life Sciences, Sichuan University, Chengdu 610065, China

³Department of Ecology and Evolution, University of Chicago, Chicago, IL 60637, U.S.A.

Journal of Ecology



Research Article

Climate change increases ecogeographic isolation between closely related plants

Karl J. Duffy, Hans Jacquemyn

First published: 22 June 2018 | <https://doi.org/10.1111/1365-2745.12652>

Journal of Ecology



RESEARCH ARTICLE

Effect of pollination strategy, phylogeny and distribution on pollination niches of Euro-Mediterranean orchids

Nina Joffard, François Massol, Matthias Grenié, Claudine Montgelard, Bertrand Schatz

First published: 29 May 2018 | <https://doi.org/10.1111/1365-2745.12652>

Journal of Ecology



Standard Paper

Urban warming favours C₄ plants in temperate European cities

Grant A. Duffy, Steven L. Chown

First published: 11 August 2016 | <https://doi.org/10.1111/1365-2745.12652> | Cited by: 1

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ECOSPHERE

Forecasting an invasive species' distribution with global distribution data, local data, and physiological information

CATHERINE S. JARNEVICH,^{1,†} NICHOLAS E. YOUNG,² MARGAN TALBERT,³ AND COLIN TALBERT^{1,3}

¹U.S. Geological Survey Fort Collins Science Center, 2150 Centre Ave Bldg C, Fort Collins, Colorado 80526 USA

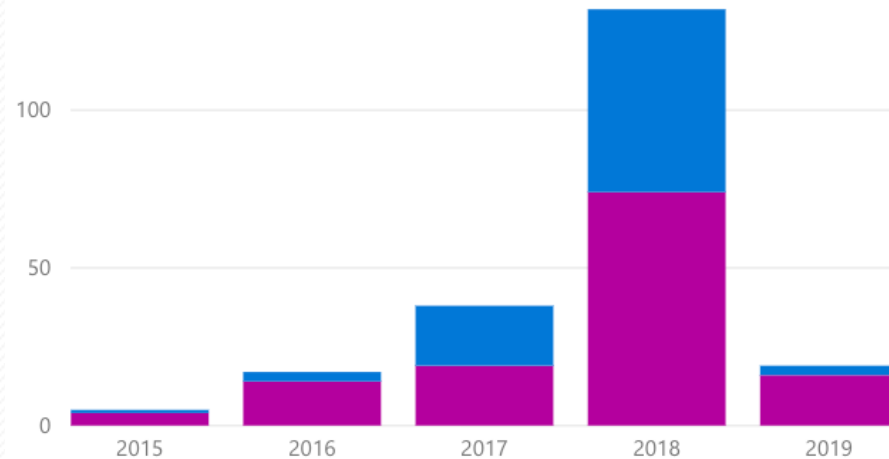
²Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, Colorado 80523-1499 USA

³Department of Interior, North Central Climate Science Center, Colorado State University, Fort Collins, Colorado 80523 USA

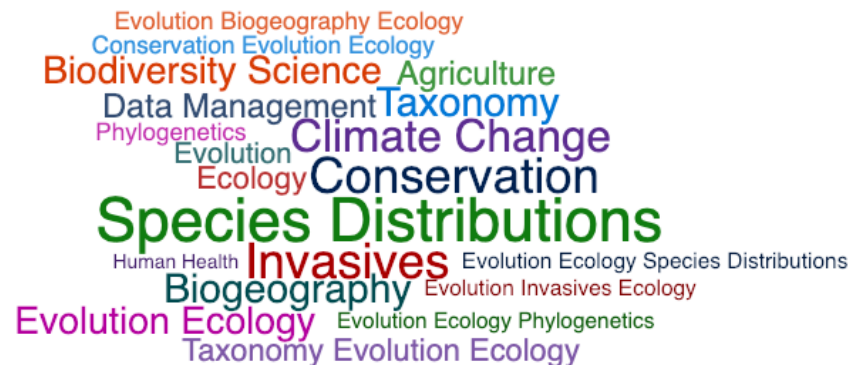
The impact of the NHM's digital collection, from 2015

Publications citing NHM data (GBIF only)

open_access ● False ● True



GBIF topic tags by frequency



211

Publications

1.1bn

GBIF occurrences

6.7bn

GBIF occ. downloaded

176

Peer-reviewed

3.9M

NHM occurrences

18M

NHM downloads

2.4%

% preserved species

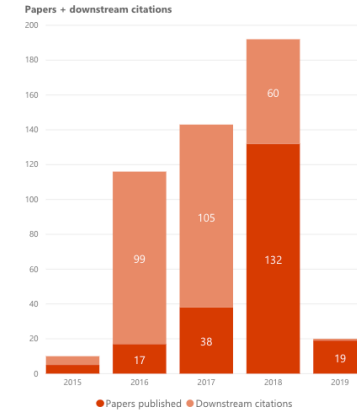
84

Open Access

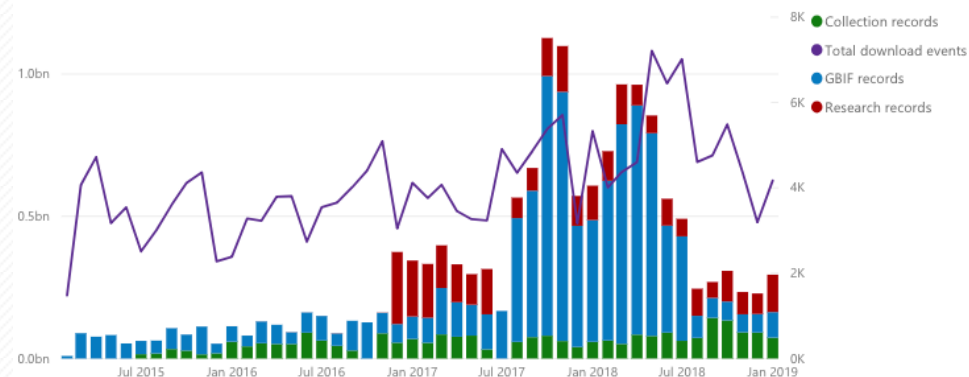
7

H-index

Title	Records	NHM records	NHM record %	Downstream citations	Publication
Infomap Bioregions: Interactive Mapping of Biogeogr...	6,267,528	9,191	0.15%	168	Systematic Biology
Taxonomic bias in biodiversity data and societal prefe...	649,785,068	4,25	0.40%	167	Scientific Reports
Big data for forecasting the impacts of global change ...	9,397	2	0.02%	159	Global Ecology and Biogeog...
Toward a Self-Updating Platform for Estimating Rates ...	724,002	516	0.07%	138	Systematic Biology
Symbiosis limits establishment of legumes outside the...	7,799,056	10,998	0.14%	79	Nature Communications
Habitat diversity predicts orchid diversity in the tropic...	14,205	494	3.48%	59	Journal of Biogeography
Spatial quantification of the world population potenti...	1,442	234	16.23%	54	International Journal of Epid...
Self-compatibility is over-represented on islands	11,464,159	27,823	0.24%	53	New Phytologist
Finding needles in the haystack: Where to look for rar...	116,523,962	213,332	0.18%	51	Ecography
Bioquality Hotspots in the Tropical African Flora	1,979,812	19,026	0.96%	49	Current Biology
Ecological niche model comparison under different cli...	39,027	18	0.05%	45	Ecosphere
Fidelity and Promiscuity in an Ant-Plant Mutualism: A...	1,957	26	1.33%	45	PLOS ONE
Alien flora of Turkey: checklist, taxonomic compositio...	998,730	5,467	0.55%	39	Neobiota
Reexamining Phylloscopus trochiloides complex as a r...	14,034	75	0.53%	31	Journal of Avian Biology
Amazonia is the primary source of Neotropical biodiv...	9,422,225	64,584	0.69%	28	Proceedings of the National ...
ConR: An R package to assist large-scale multispecies...	74,352	895	1.20%	26	Ecology and Evolution
SSDM: an R package to predict distribution of species ...	6,639,903	13,093	0.20%	26	Methods in Ecology and Evo...



Record downloads



iCollections



Phthiraptera collection

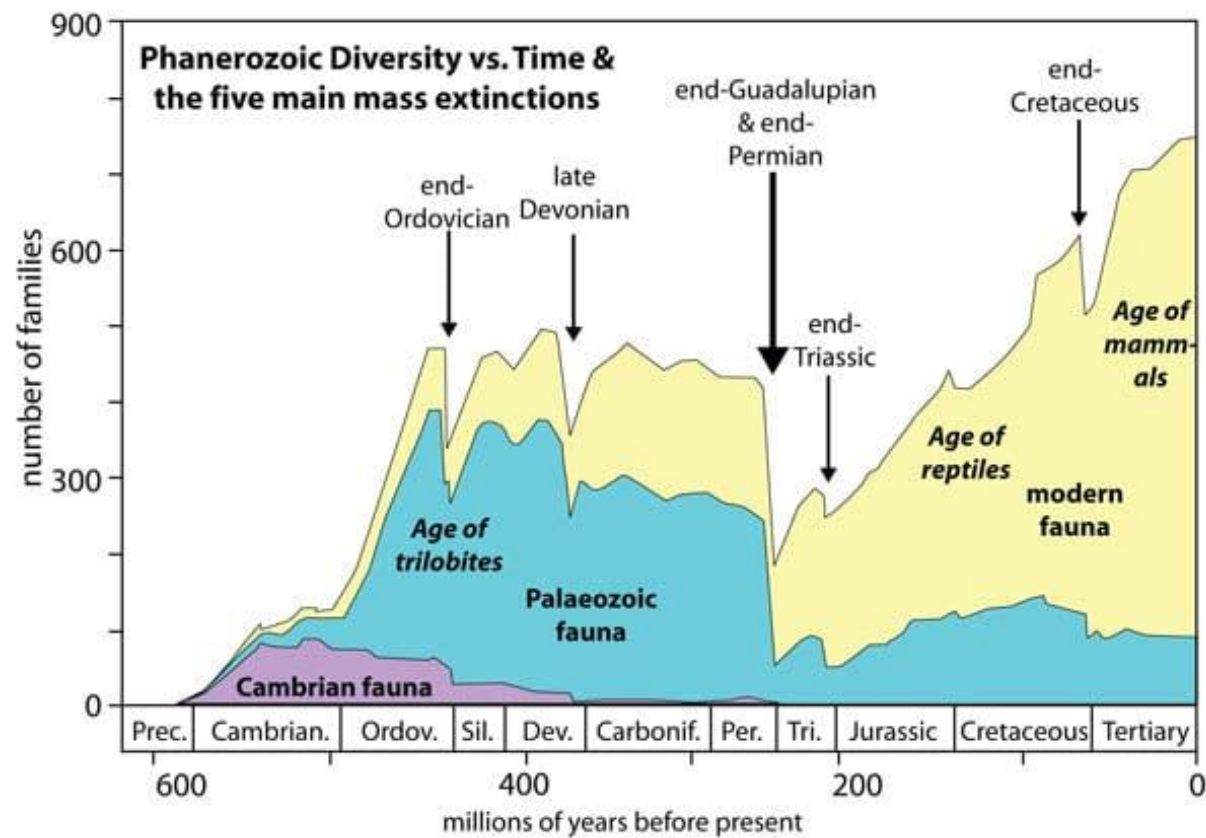


Wallace and Banks drawers



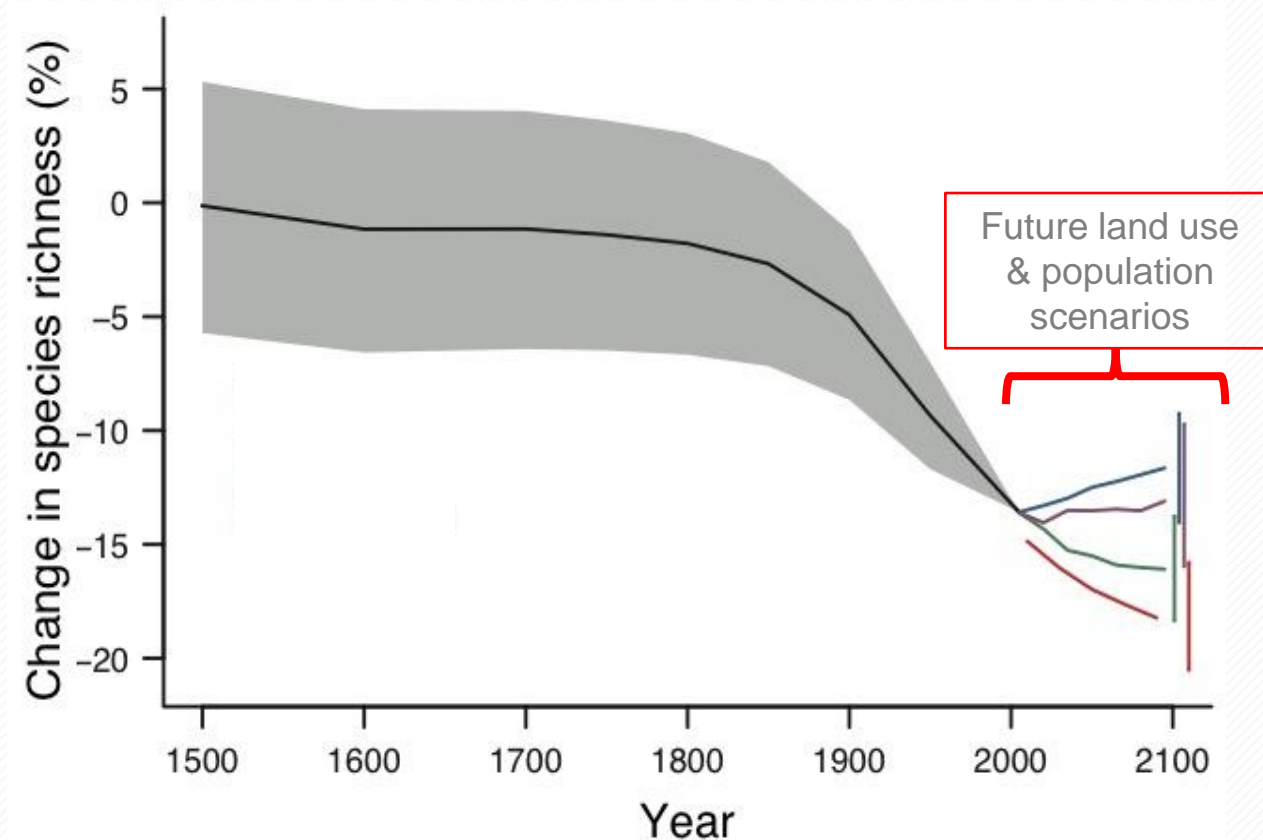
Collections as a time machine

Mass extinctions through deep time



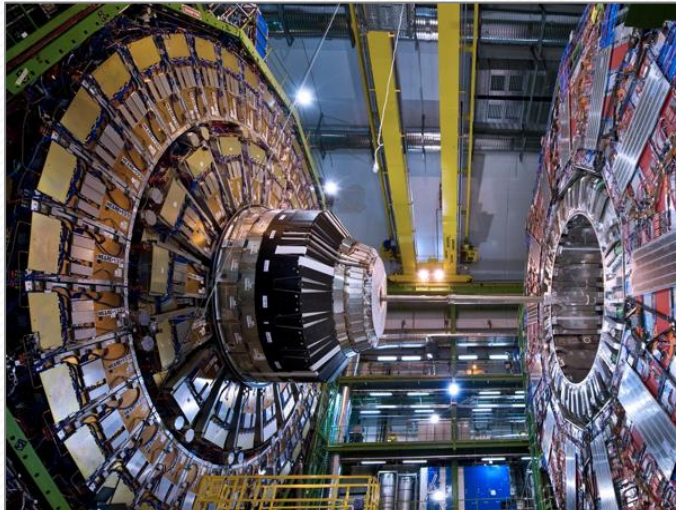
Raup & Sepkoski 1982, *Science* 215:1501-1503

Recent & future impact on biodiversity



Newbold *et al.* 2016, *Science* 353:288-291

NH collections are research infrastructure (RI)



ESFRI



115 National Facilities 21 Countries



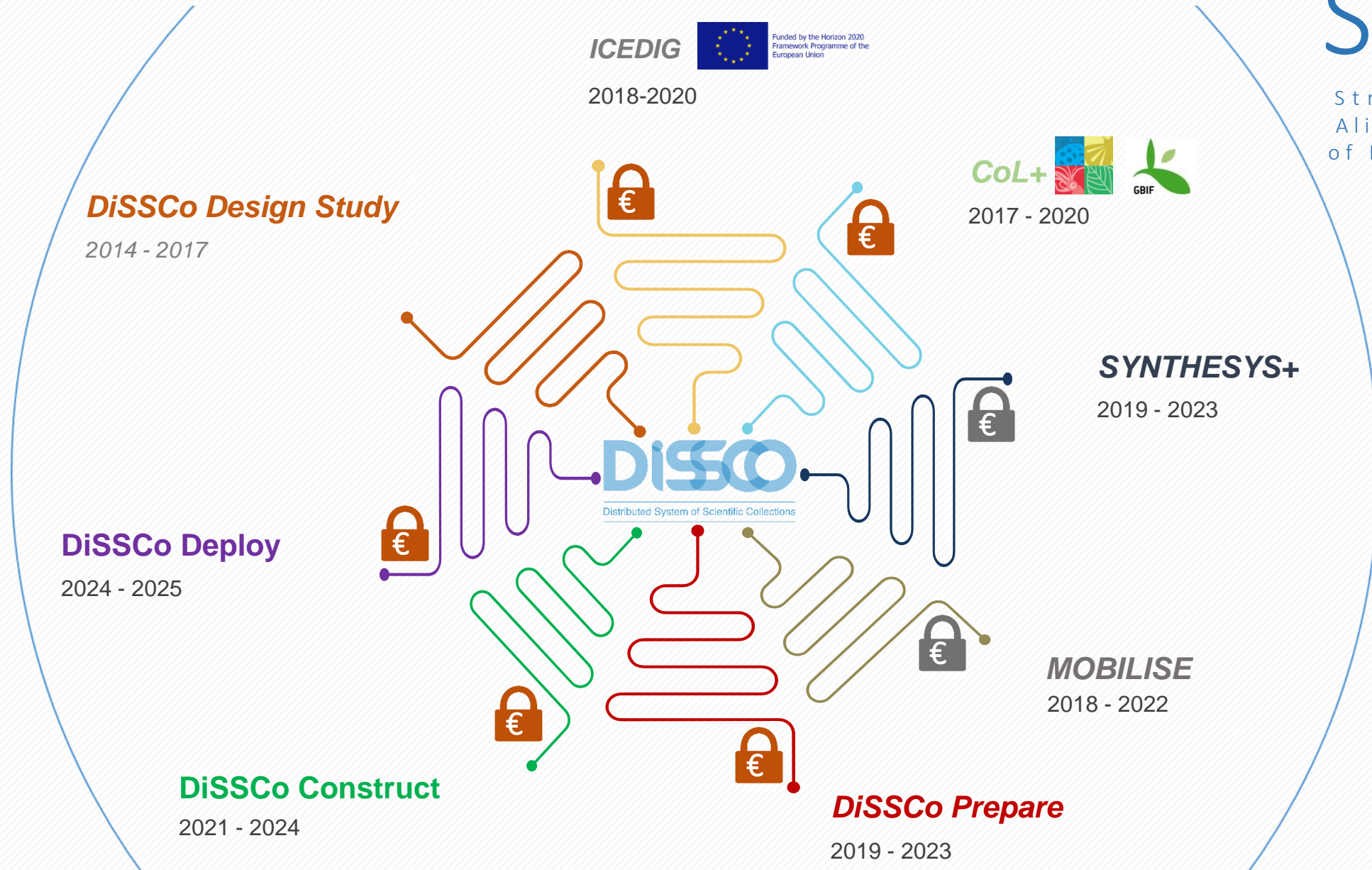
a new business model: ONE EUROPEAN COLLECTION

- Largest ever formal agreement between natural science collection facilities
- A system of distributed facilities
- Centralised shared governance model
- One European Collection of scientific assets
- Common Collections development strategy
- Economies of scope and scale
- Monitoring impact of collections (documenting ROI)
- Specialisation strategies
(e.g. in alignment with national priorities, e.g. Smart Specialisation Strategies)
- Joint Research Agendas

DiSSCo Aligned Projects

SAP

Strategic
Alignment
of Projects



ICEDIG: Future-proofing digitisation

- Quality assurance, applying common digitisation standards, procedures & policy
- Stable & robust metadata schemes including adoption of persistent identifiers on our data
- New digitisation techniques, driven by research requirements



DiSSCo EC-funded project (ICEDIG.eu)
(scored: 14.5/15)



Co-funded by the Horizon 2020
Framework Programme of the European Union



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

MOBILISE: Mobilising data, policies & experts in scientific collections



First MOBILISE management committee meeting, Brussels, 2 Oct, 2018

MC: Management
WG2: Digitisation standards and guidelines
WG3: Data management standards and guidelines
WG4: Data archival & preservation standards and guidelines
WG5: Data publication standards and guidelines
WG 6: Education, Training, Dissemination & Outreach

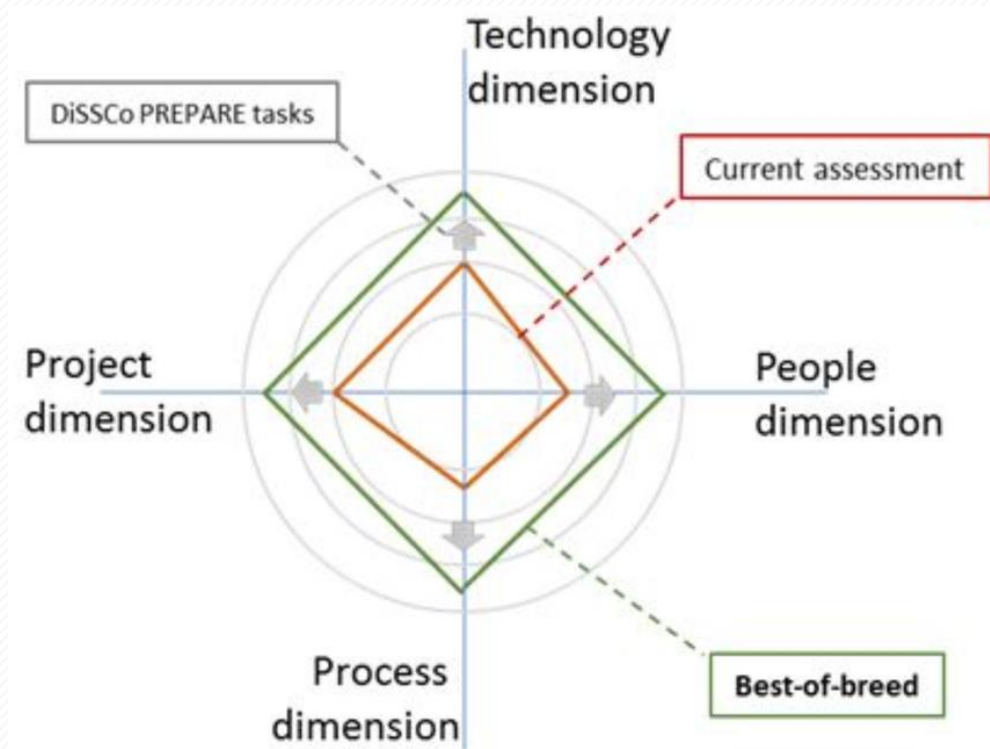
- 4 years (starting 2/10/2018)
- Supports (hopefully) the networking costs underpinning DiSSCo & SYNTHESYS activities

DiSSCo PREPARE



Co-funded by the Horizon 2020
Framework Programme of the European Union

Prep. Phase Project (PPP) of the DiSSCo RI
Call: H2020-INFRADEV-2018-2020



Implementation Readiness Level (IRL) dimensions

- WP1: User needs & socio-economic impact
- WP2: Human resources, training & users
- WP3: Capacity enhancement
- WP4: Business framework
- WP5: Common resources & standards
- WP6: Technical architecture & service
- WP7: Governance, policy & legal
- WP8: Stakeholder engagement & comms.
- WP9: Project management

- For submission, 20 Mar. 2019, 3-years (starting c. 10/2019), c. 4-5M
- Maturing DiSSCo in preparation for the construction phase

SYNTHESYS+

- 1) Developing infrastructure coupled with comprehensive access programme;
- 2) Develop & deliver support, training & dissemination activities;
- 3) JRA innovating digital/molecular workflows & prioritising collections to digitise;
- 4) Developing common policies, harmonise processes & link out internationally.

SYNTHESYS+
Synthesis of Systematic Resources a DiSSCo project

*DiSSCo EC-funded project ([Synthesys.info](https://synthesys.info))
(scored: 14.5/15)*

Access

TA1: Physical Access

VA1: Virtual Access

Joint Research Activities

JRA1: European Loans +
Visits System (ELViS)

JRA2: Collections on
Demand

JRA3: Specimen Data
Refinery

Networking Activities

NA1: Management

NA2: Training, Support &
Policy dissemination

NA3: Molecular standards
& processes

NA4: Digital standards &
processes

NA5: Internationalisation



Co-funded by the Horizon 2020
Framework Programme of the European Union

4 years
(started
01/02/2019)

Linked with DiSSCo goals & supported by CETAF, GGBN, TDWG & GBIF

Background

- EC promoting “integrated research infrastructures”
- NH consortia developed “SYNTHESYS” led by NHM
- Three iterations, €28.2m funding since FP6 in 2004
- Common themes
 - Access (unifying mechanism to access participating collections)
E.g. >51k researcher days, 4168 projects, circa 4k outputs
 - Networking (unifying best practice, policy & collections assessment)
E.g. CSAT, Geo data standards (ABCDEFGF), 3D Wiki
 - Research (ancient DNA, virtual collections)
E.g. DNA degradation profiles, Inselect software, crowdsourcing projects
- SYNTHESYS3 ended Aug 2017, SYNTHESYS+ awarded €10m Aug 2018
- Aligned with DiSSCo ESFRI initiative



SYNTHESYS+ differences

Requirements:

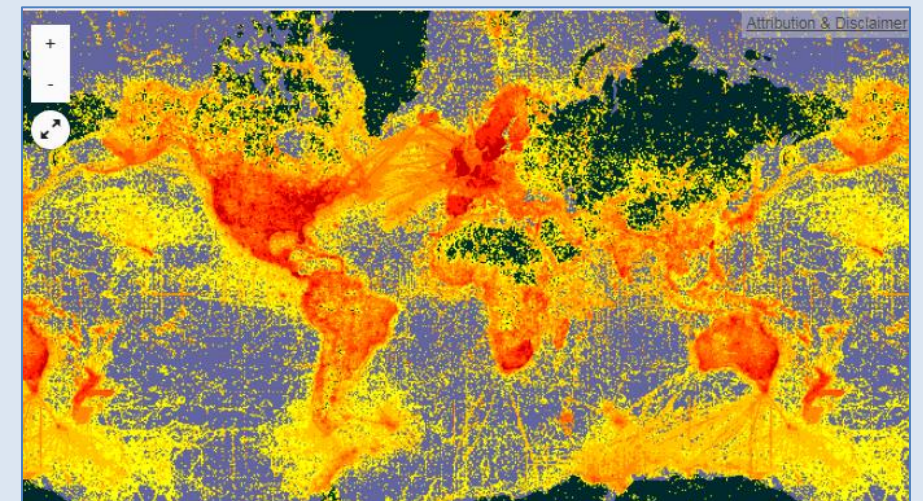
Strong links with ESFRI	Align with DiSSCo objectives & use DiSSCo to sustain activities
Place virtual and transnational [=physical] Access on a par	Create new routes for digital Access
Focus on innovation	Increase SME engagement on digitisation & data exploitation
Develop new audiences in EC priority areas	Develop concept of digital Access & target selected Access Calls at climate change, human health & food security domains
Support strategic roadmaps	Work with other EC RIs in roadmap development
Internationalisation	Work with non-EU institutes potentially including some in Access Calls
Foster the use & deployment of global standards	Work with TDWG, RDA & GGBN to fill gaps
Data management plans (DMPs)	Require DMP submission as part of Access requests
KPIs and metrics	Pre-define these for all objectives & deploy in live dashboard

TA1: Transnational (physical) (NHM)

- 13 TAFs, 21 institutions, Target of 7,017 User Days
- 4 annual competitive funding calls in Feb 2019-2022
- Online application system (transferring to ELViS)
- Scoring + discussion by User Selection Panel (USP)

VA1: Virtual (digital) access (NHM)

- Digitisation on Demand (DoD) service
- Proposer & institutions co-develop proposals
- Bounded by institutional capacity & capabilities
- 2 open calls (years 2 + 3) for collections at 19 institutions
- c. 1M Euros available (indicative bids TBC of 10-30k?)
- Larger cross institutional bids encouraged
- Open access to data (e.g. via GBIF) & no embargos
- Prioritisation panel (established in yr. 1 via JRA2)



NA1: Management (NHM)

- Integrated governance model
- Risk management strategy (including BREXIT)

NA2: Training, Support & Policy dissemination (CETAF)

- Develop training modules
- Run helpdesk for online services (including use of ELViS)
- Integrate & expand institutional collections assessments (Passports, One World Collection & Join the Dots)
- Facilitate implementation of policy mandates

NA3: Molecular Standards & Processes (GGBN)

- Landscape analysis of biobanking standards
- Development & endorsement of missing standards & best practices on biobanking
- Best practice for Collection on Demand requests



NA4: Digital Standards and Processes (TDWG)

- Landscape (gap) analysis of biodiversity data standards & dashboard
- IIIF metadata standard implementation
- Attribution + data tracking standards (linked with RDA working group)
- Networking to support standards adoption + community engagement

NA5: Internationalisation and New User Communities (GBIF)

- International roadmap (linked to NH community outcomes of GBIO 2018)
- International stakeholders + new user communities (continental clusters)
- European Biodiversity infrastructures stakeholder forum



JRA1: European Loans & Visits System (ELViS) (Naturalis)

A platform replacing current SYNTH TA requests system, supporting access requests, tracking access outputs and ultimately integrating with CMSs to support loans. Includes multi-lingual interface & dashboard reporting functionality.

JRA2: Collections on Demand (HCMR)

Supporting and enhancing the technical infrastructure and institutional capacity to undertake “collection on demand” requests. This includes prioritisation of digitisation-on-demand requests as well as enhancing workflows for molecular sequencing and 3D digitisation.

JRA3: Specimen Data Refinery (NHM)

A platform that integrates machine learning, computer vision and human-in-the loop approaches to extract, enhance and annotate data from digital images and records at scale.

Key resources

SYNTHESYS

Main website: <http://www.synthesys.info/>

Access applications: <https://application.synthesys.info/>

Self Assessment Tool: <https://application.synthesys.info/csat.html>

Teamwork: <https://dissco.teamwork.com/#/projects/494531/>

Rio special collections: <https://riojournal.com/articles> (pending)

SYNTHESYS3: <http://synthesys3.myspecies.info/reports-outcomes>

Other projects

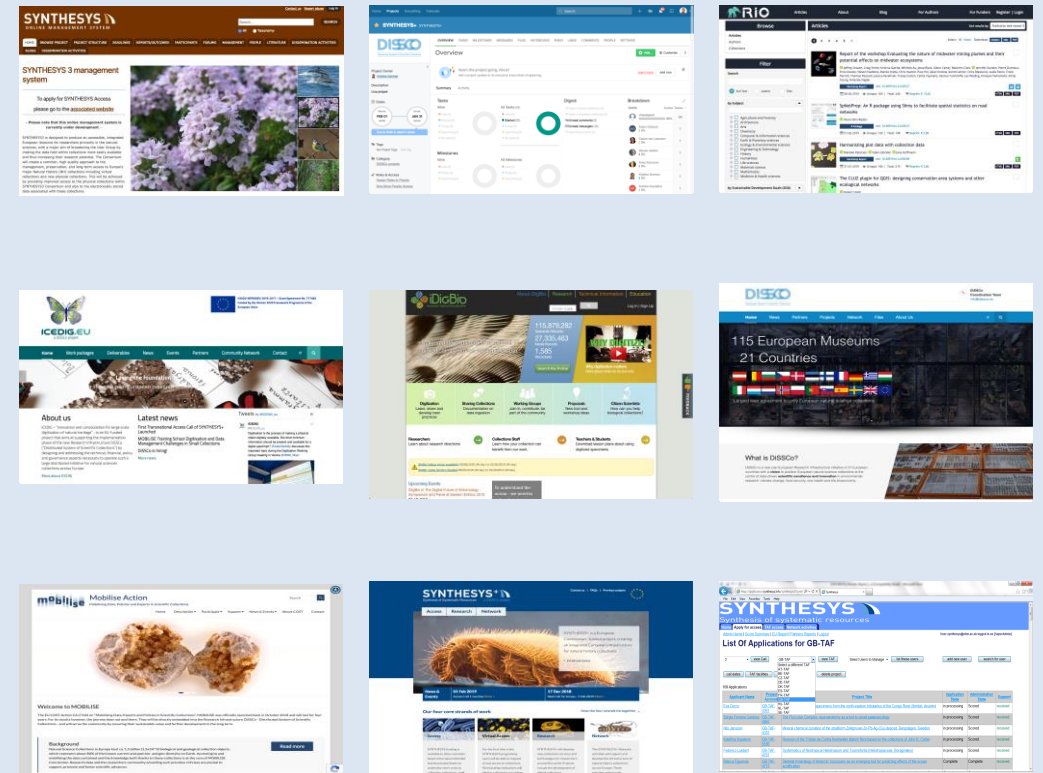
ICEDIG: <https://icedig.eu/content/deliverables>

iDIGBio: <https://www.idigbio.org/>

MOBILISE: <https://www.mobilise-action.eu/>

DiSSCo: <https://dissco.eu/>

DiSSCo Prepare: Knowledgebase (pending...)



synthesys@nhm.ac.uk

Key people

WP1 (NA1) & WP11: Kristina Gorman, Katherine Dixie & Vince Smith

Networking Stream

Dimitris Koureas

2 (NA2)

Ana Casino

3 (NA3)

Ole Seberg

Gabi Dröge

4 (NA4)

Quentin Groom

5 (NA5)

Donald Hobern

Tim Robertson

Research Stream

Elspeth Haston

6 (JRA1)

Wouter Addink

7 (JRA2)

Christos Arvanitidis

8 (JRA3)

Laurence Livermore

Access Stream

Sandy Knapp

9 (TA1)

Kristina Gorman

10 (TA1)

Sandy Knapp

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a DiSSCo project

www.synthesys.info

synthesys@nhm.ac.uk

