



GLOBIS-B

D2.5 Report of Workshop 4

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1 Executive summary

The fourth GLOBIS-B workshop was held from 26-28th February 2018 in Bari, Italy. The workshop was focused on the EBV 'Species interactions'.

A total of 50 participants attended, representing 26 scientific experts, 11 technical and infrastructure experts, 4 legal/policy experts, and 9 GLOBIS-B project members (see Annex 4.1 for participant list).

The scientific experts discussed and developed the EBV class 'Species interactions', the technical and infrastructure experts discussed general EBV informatics challenges and issues, and the legal/policy experts further discussed legal aspects from previous workshops and the planning of the final policy workshop in May 2018.

In several plenary sessions the scientific, technical and legal/policy experts met together to discuss and develop a framework for implementing EBVs on species interactions. An overview of the full program is provided in Annex 4.2 (workshop agenda).

2 Contributors

This document has been put together by the Work Package leaders Daniel Kissling (WP2), Alex Hardisty (WP3), Enrique Alonso García (WP4) and project manager Jacco Konijn.

3 Workshop 4 report

3.1 Report from the scientific experts

In the first parallel session (session 3), the invited scientific experts discussed the definition and characteristics of species interaction EBVs, including how they are situated between primary data and indicators, their policy relevance, their sensitivity to change, feasibility of monitoring, and specific spatial and temporal scales. In the following session (session 4), a few selected (5 min) lightning talks introduced different topics related to sampling and standardization of species interaction data, including recent efforts in data standards for plant-pollinator interactions and marine food web data, and ways of using traditional field sampling as well as next-generation sequencing for monitoring species interactions and ecological networks.

In the next parallel session (session 5), the scientific experts split up into 3 break-out groups with focus on three species interaction types: plant-pollinator interactions, food webs/predation, and microbial species. All three break-out groups aimed to discuss the following three questions:

- (1) How do we define and conceptualize 'interaction' as well as species interaction EBVs (from co-occurrence to changes in growth rate, EBV data cube, which EBVs etc.)?
- (2) What are cost-effective and feasible ways for monitoring changes in species interactions (in-situ, DNA, citizen science)?
- (3) How can we standardize (field) data collection (sampling protocols) and reporting (metadata) for species interaction data and ecological networks?

This allowed to go into more depth by focusing on specific types of interactions and their related data.

In session 6, a joint session with the technical and legal experts was organized to discuss informatics aspects of species interactions. This included experiences from data portals such as the Global Biotic Interactions (GloBI) database and the metagenomics portal, and the importance of ontologies for EBVs. It was followed by a discussion about these data portals, data integration tools, metadata standards, and relevant software.

Sessions 7 & 8 were again organized as a parallel session in which the scientific experts got together again and discussed the outcomes from the three break-out groups. After a joint discussion, the experts split again into the three break-out groups to continue a focused discussion on the three questions above.

On the last day, the scientific experts started with a parallel session (session 9) to discuss the outline of a potential manuscript. After the coffee break, the scientific experts joint with all other experts a plenary session which informed each other about the progress from the last couple of days. In addition, potential contributions to GEO BON were identified.

3.2 Report from the technical and infrastructure experts

In the first parallel session (session 3) the technical and infrastructure experts received reports about the work of earlier GLOBIS-B workshops in identifying the main technical issues for supporting EBVs, and the work of the GEO BON Data Task Force that commenced working towards end of 2017. Important to note from the latter is the work started on Minimum Information Standards for EBV data products, the adoption of GEO data management principles and GEO labels for branding EBV data products, and establishment by GEO BON of an EBV Data Portal cataloguing EBV datasets that meet the minimum information standards. Experts agreed that these are generally good steps in the right direction. Discussion exposed that capturing provenance information is an essential component presently missing and that its complexity to implement is woefully underestimated. There is a distinction to be made between capturing provenance and exploiting it, and it is necessary to understand the purpose(s) for which provenance is needed to properly capture the aspects necessary for that purpose(s). It was noted that the DataCite schema has explicit support for provenance and that it will be far simpler to use this than to invent something new. The DataCite schema has the advantage that it supports citation too.

In the following session (session 4) experts were unable to further discuss and improve details of the EBV strategy canvas model, initiated during workshops 2 and 3 due to the unforeseen absence of the rapporteur. Nevertheless, the experts present agreed there is potential value to the work and that it should be offered to GEO BON. Most of the session was thus devoted to learning about and discussing the potential of emerging ideas on “networks of digital objects” as an appropriate means of managing the expected large numbers of artefacts to emerge from factory-scale EBV data products production. Experts agreed that Digital objects (DO) should be used as the means of wrapping and structuring information associated with the production and maintenance of EBV data products, including the steps necessary to generate EBV-ready datasets from documented sources. Operations acting on DOs and EBV data products should be unified at both the DO level and the EBV data product level, allowing interactions with the EBV data product through DO level operators (create, move, copy, update, etc.). Typed EBV DOs should carry minimum level kernel information, including, but not limited to DO type, version, capabilities list and access control information.

In the next parallel session (session 5 and continuing in sessions 7 & 8) technical and infrastructure experts worked on developing the broad outlines of a manifesto offering best current practice guidance to data and infrastructure organisations to enhance their ability to contribute towards production of global EBV data products. There was general support among the experts for proceeding with the idea of a manifesto rather than a more prescriptive roadmap. Based on an aggregated view derived from pre-workshop homework (see Annex 4.3) ten topics were advanced for further thought and elaboration. These were: data management plan, metadata, provenance, workflows, data quality (fitness-for-use), ontologies / vocabularies, data preservation, policy (access control, licenses, etc.), data structure, and services. For each topic, a desired outcome, some short-term goals and an aspirational goal were formulated. Once the broad outlines were agreed by the participants, further work was planned after the workshop to tidy up details, and to write up and

distribute the manifesto for agreement. Note this manifesto becomes, eventually deliverable D3.3 from the project.

In session 6, a joint session with the scientific and legal experts on informatics for species interactions was joined. In addition to outcomes reported above, the idea of developing an EBV application ontology (as part of the OBO Foundry ontologies) was floated and received broad agreement.

On the last day, the technical and infrastructure experts started with a parallel session (session 9) to finalise and agree the main elements of the manifesto. After the coffee break, the technical and infrastructure experts joined with all other experts in a plenary session that informed each other about the progress from the last couple of days. In addition, potential contributions to GEO BON were identified. From the technical / infrastructure perspective, these include:

- Noting there is a role for GEO BON to play in strengthening the interactions with TDWG and RDA, and in communicating with data providers and infrastructures at the global level;
- Developing concrete plans for funding and building “EBV factories” but noting this cannot happen until there is a real signal about the value and hence demand for EBVs;
- Stimulating a project to cross the first key gap in translation i.e., for a project that moves beyond proof-of-principle prototype EBV product (such as in the EBV invasive species distribution case study with Australia and GBIG) to something that can be properly trialled with real users.

3.3 Report from the legal / policy experts

The law & policy working group worked on three different items:

1.- Attempt to streamline the subtle but relevant differences of opinion among the members of the group concerning some aspects of licenses and open access that had appeared during the elaboration of the draft of the article on species traits (follow-up of Workshop three).

2.- Participation in the discussions of the other two groups to identify potential problems concerning those same issues (open access and licenses). In particular, concerning the joint session as described in paragraph 4 of the report from the scientific experts, the group identified specific problems already flagged out by different existing actors on species interactions at the global level (such as Global Biotic Interactions - GloBI). These are problems such as whether it would be required to go beyond the FAIR principles and identify issues concerning the endurance of repositories and availability of data in the long term in order to allow their reusability and eventual technical reprocessing even when some datasets would disappear. The group explained to the workshop scientists the differences between the FAIR principles (mainly addressing the guidance to scientists wanting to provide access for “their” data) and the policies already approved by GEO such as the branding of its 10 Data Management Principles (mainly addressing the data requirements from the point of view of global users of the data) which help better whenever what is demanded is to ensure 100% open access forever.

3.- Discussion of the topics, agenda, organization and list of invitees of the High Level Policy workshop that would take place in Amsterdam by the beginning of May of 2018.

Notwithstanding the need to refine the final version of all the documents in the following weeks, the working group agreed to forward to the invitees both the tentative agenda (see Annex 4.4) and the draft of the Abstract on the information document (“Towards an Operational Framework for the Production of Essential Biodiversity Variables (EBVs)”). This last document, together with the discussions in the final workshop in Amsterdam, will form the basis for D4.3: 'Final position paper for policy makers'.

4 Annexes

4.1 Participant list

First name	Last Name	Organization	Country
Kristian	Trøjelsgaard Nielsen	University of Aalborg	Denmark
Dominique	Gravel	Université de Sherbrooke	Canada
Quentin	Groom	Botanic Garden Meise	Belgium
Owen	Petchey	University of Zurich	Switzerland
Antonio M.	Saraiva	Universidade de São Paulo, São Paulo	Brazil
Michael	Pocock	Centre for Ecology & Hydrology	UK
Pier Luigi	Buttigieg	Alfred-Wegener-Institut, Helmholtz-Zentrum für Polar- und Meeresforschung	Germany
Timothée	Poisot	Université de Montréal	Canada
Anna	Traveset	Institut Mediterrani d'Estudis Avançats (CSIC-UIB), Mallorca	Spain
Jeff	Ollerton	University of Northampton	UK
James	Simons	Center for Coastal Studies	USA
Lúisa G.	Carvalho	University of Brasília	Brazil
Jorrit	Poelen	Independent Software Developer	USA
Elizabeth	Clare	Queen Mary University of London	UK
Marion	Vittecoq	Tour du Valat, Research Institute for the conservation of Mediterranean Wetlands	France
Emma	Ransome	Imperial College London	UK
Rob	Finn	EBI Hinxton, Cambridge	UK
David	Bohan	INRA France	France
Néstor	Fernández	GEO BON, iDiv	Germany
Giuseppe	Corriero	University of Bari	Italy
Cataldo	Pierri	University of Bari	Italy
Stefano	Piraino	Università del Salento	Italy
Alberto	Basset	Università del Salento	Italy
Pedro	Beja	Research Centre in Biodiversity and Genetic Resources	Portugal
Cecilia	Sacone	CNR-IBBE	Italy
Bashir	Balech	CNR-IBBE	Italy
Robert	Guralnick	University of Florida	USA
Rui	Figueira	Research Centre in Biodiversity and Genetic Resources	Portugal
Dmitry	Schigel	Global Biodiversity Information Facility (GBIF)	Denmark
Hannu	Saarenmaa	University of Jyväskylä/GEOBON	Finland
Jeffrey	Manuel	South African National Biodiversity Institute (SANBI)	South Africa
Wim	Hugo	South African Environmental Observation Network (SAEON)	South Africa
Lucy	Bastin	Joint Research Center EC	Italy

First name	Last Name	Organization	Country
Lee	Belbin	Atlas of Living Australia (ALA)	Australia
Dimitris	Koureas	Natural History Museum/Distributed System of Scientific Collections (DiSSCo)	UK
Bill	Michener	DataOne	USA
Renato	De Giovanni	Centro de Referência em Informação Ambiental (CRIA)	Brazil
Donat	Agosti	Plazi	Switzerland
Willy	Egloff	Plazi	Switzerland
Anne	Bowser	Wilson Center Commons Lab	USA
Paul	Uhlir	RDA/CoData	USA
Daniel	Kissling	University of Amsterdam	Netherlands
Wouter	Los	University of Amsterdam	Netherlands
Jacco	Konijn	University of Amsterdam	Netherlands
Laetitia	Navarro	GEO BON/IDIV	Germany
Alex	Hardisty	Cardiff University	UK
Enrique	Alonso	Universidad de Alcala	Spain
Graziano	Pessole	CNR-IBBE	Italy
Francesca	de Leo	CNR-IBBE	Italy
Monica	Santamaria	CNR-IBBE	Italy

Scientific Group
Informatics/Infrastructure Group
Legal&Policy Group
Project Members

4.2 Workshop Agenda

Monday, 26 February, 9.00h - 18.00h		
Session 1: 9.00-10.30, plenary		
9.00-9.15	Welcome by the local host of the meeting	Graziano Pesole
9.15-9.45	Introduction of participants, general aims of GLOBIS-B, overview of workshop 4	Daniel Kissling
9.45-10.00	Overview of work so far and planned work in the coming workshop – Science	Daniel Kissling
10.00-10.15	Overview of work so far and planned work in the coming workshop – Informatics	Alex Hardisty
10.15-10.30	Overview of work so far and planned work in the coming workshop – Legal & Policy	Enrique Alonso
10.30-11.00	Coffee/Tea	
Session 2: 11.00-13.00, plenary		
11.00-11.30	Recent developments in GEO BON (new implementation plan, organisational structure, key focus on EBVs and BONs, working groups, task forces). Presentation on EBV strategy/policy/positioning/networks/data. This topic comes back in the final session (contributions to GEO BON), the aim is for all participants to keep this in mind during the workshop.	Laetitia Navarro
11.30-13.00	11.30-11.45 Biodiversity monitoring, citizen science and species interactions	Michael Pocock
	11.45-12.00 Data standards and open tools for analyzing species interactions	Timothée Poisot
	12.00-12.15 Metagenomics: high-throughput profiling of microbiome-host interactions	Graziano Pesole
	12.15-13.00 Discussion	
13.00-14.00	Lunch	
Session 3: 14.00-15.30, parallel		
Scientific	Defining species interaction EBVs: discussing and clarifying several EBV aspects, e.g. primary data -> EBVs -> indicators, policy relevance, sensitivity to change, biological and generalizable, spatial scaling, feasibility, stable state variables, spatial and temporal scales. What could be the (for instance 5) top species interaction EBVs (in terms of relevance, feasibility, and complementarity)?	Lead by Daniel Kissling
Informatics	Reviewing previous workshop outcomes in context. Current GEO BON data / informatics context and outcomes of GEO BON Data Task Force meeting, December 2017 (Nestor Fernandez). Adjusting earlier GLOBIS-B outcomes (discussion). Improving the strategy model canvas (David Manset, presentation; discussion continues after coffee break)	Lead by Alex Hardisty, input from Nestor Fernandez, David Manset
Legal	Preparation and review of the relevant material for the 8/9 May Policy workshop in Amsterdam. Consider any comments on collected replies from RI's to the background material for the workshop. Discuss detailed agenda, assign presenters, rapporteurs and chairs. Prepare tasks for D4.3 (position paper for policy makers).	Lead by Enrique Alonso
15.30-16.00: Coffee/Tea		

Session 4: 16.00-18.00, parallel

Scientific (incl. legal)	<p>Discussion about species interaction data, with focus on data sampling and data standardization, and with short lightning talks. These talks should stimulate the discussion rather than presenting an exhaustive overview about the topic, and hence be very short (5 min!):</p> <ul style="list-style-type: none"> - Quentin Groom: Summary of the TDWG workshop on species interactions - Jeff Ollerton: Monitoring plant-pollinator interactions - Antonio M. Saraiva: Data standards for plant-pollinator interactions - James Simons: Standardizing marine food web data - Elizabeth Clare: Using DNA for food web analysis - David A. Bohan: Next-generation sequencing for monitoring ecological networks 	<p>Lead by Daniel Kissling (including short, 5 min lightning talks)</p>
Informatics	<p>This is followed by a discussion about openness of species interaction data.</p> <p>Improving the strategy model canvas (continued; David Manset, discussion). Talk and discussion: Building a network of data objects (Dimitris Koureas). Developing a manifesto: Identifying the main elements to be covered.</p>	<p>Lead by Anne Bowser Lead by Alex Hardisty, input from David Manset, Dimitris Koureas</p>

Evening: social dinner

Tuesday, 27 February, 9.00h - 18.00h

Session 5: 9.00-10.30, parallel

Scientific	<p>Developing a workflow for species interaction EBVs: general discussion of a species interaction EBV workflow and its key steps/components. Start of discussing potential case studies (e.g. pollination, genomics, other?)</p>	<p>Lead by Daniel Kissling</p>
Informatics	<p>Continued: Developing a manifesto. Developing a manifesto for interoperability to support EBVs. Identifying the main elements to be covered. Organising the elements. Identifying barriers and opportunities.</p>	<p>Lead by Alex Hardisty</p>
Legal	<p>Continued: Preparation and review of the relevant material for the 8/9 May Policy workshop in Amsterdam. Consider any comments on collected replies from RI's to the background material for the workshop. Discuss detailed agenda, assign presenters, rapporteurs and chairs. Prepare tasks for D4.3 (position paper for policy makers).</p>	<p>Lead by Enrique Alonso</p>

10.30-11.00 Coffee/Tea

Session 6: 11.00-13.00, joint session

11.00-13.00	Discussion about informatics aspects of species interactions, including experiences from data portals (GloBI, metagenomics portal). Introductory talks (15 min each) on the following topics: 11.15-11.30 Informatics for integrating species interaction data: the Global Biotic Interactions (GloBI) database 11.30-11.45 Integrating species interaction data in the metagenomics portal 11.45-12.00 Ontologies for Essential Biodiversity Variables Followed by a discussion about data portals, data integration tools, metadata standards, software etc.	Lead by Daniel Kissling and Alex Hardisty Jorrit Poelen Rob Finn Pier Buttigieg
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13.00-14.00 Lunch

Session 7: 14.00-15.30, Parallel

Scientific	Developing workflow case studies for (1) pollination (or other field-based/observational interaction data), and (2) genomics. Split up the group into molecular vs. non-molecular approaches. The results will have to be presented in the next session which also includes the informatics experts (session 8).	Lead by Daniel Kissling
Informatics	Continued: Developing a manifesto: Developing a manifesto for interoperability to support EBVs. Identifying the main elements to be covered. Organising the elements. Identifying barriers and opportunities.	Lead by Alex Hardisty
Legal	Discuss draft for a journal article on legal and policy outcomes from the GLOBIS-B project.	Lead by Enrique Alonso

15.30-16.00 Coffee/Tea

Session 8: 16.00-18.00, Joint session

	Joint session to discuss two case studies for a species interaction workflow: (1) pollination case study, and (2) genomics case study. For each a presentation will be given from a subgroup of the scientific experts, subsequently a discussion with all, including the informatics experts (1 h pollination, 1 h genomics)	Lead by Daniel Kissling, presenters to be determined during the previous sessions
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Evening free

Wednesday, 28 February, 9.00h - 12.30h

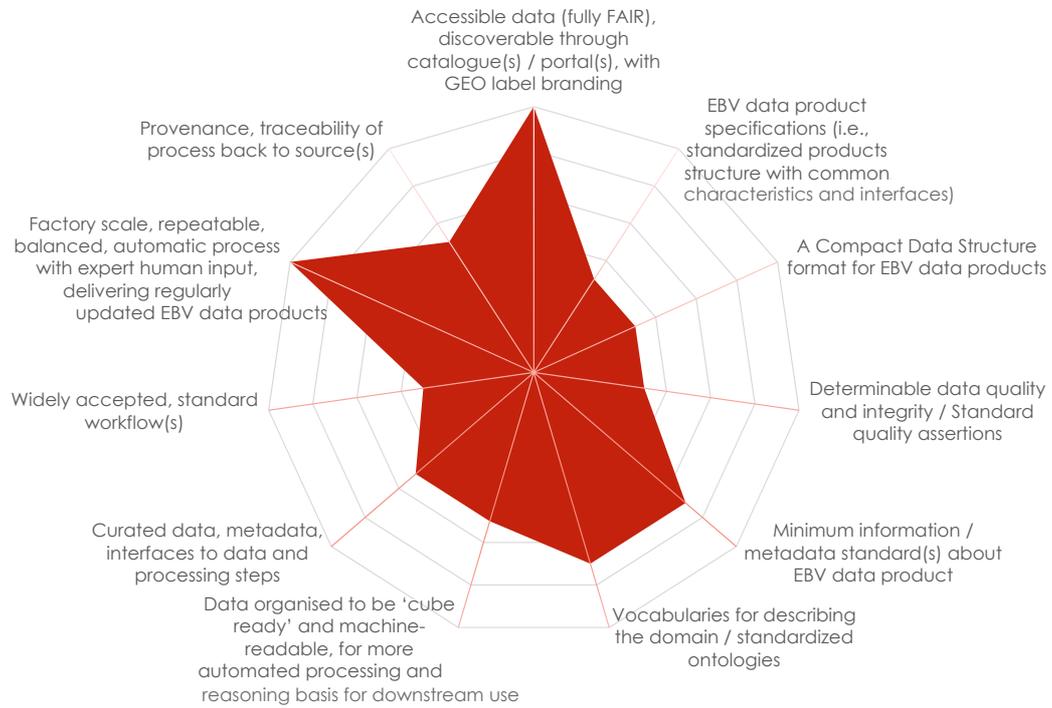
Session 9: 9.00-10.30, parallel

Scientific	Developing an outline for a manuscript on species interaction EBVs, incl. manuscript structure and content, time planning, contributions, allocation of tasks	Lead by Daniel Kissling
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Informatics	Finalizing the informatics manifesto. Tidying. Steps to agreement and adoption. Presentation / promotion. Inputs to following policy meeting with RIs and others	Lead by Alex Hardisty
Legal	Conclusions and agreements on next steps for policy workshop and draft journal article, timelines and who does what. Preparation of a final presentation of outcomes and report of the preceding sessions.	Lead by Enrique Alonso
10.30-11.00	Coffee/Tea	
Session 10: 11.00-12.30, plenary		
11.00-11.45	Expected outcomes from this workshop/GLOBIS-B: (1) scientific manuscript on species interactions (present & discuss outline, Daniel Kissling), (2) informatics manifesto (present & discuss results, Alex Hardisty), and (3) legal/policy (present next steps towards the policy workshop, Enrique Alonso/Wouter Los).	Daniel Kissling, Alex Hardisty, Enrique Alonso, Wouter Los
11.45-12.30	Developing contributions to GEO BON: How can we make sure that our knowledge feeds well into the GEO BON strategy, and how can the RIs contribute to making this strategy reality. For instance, (1) developing species interaction EBVs within the GEO BON structure (contribution to new working group), (2) informatics aspects (how to bring our informatics conclusions to GEO BON working groups, the Data Task Force, the Remote Sensing Task Force, etc., and (3) legal/policy aspects (e.g. feeding into the Policy Task Force of GEO BON and raising awareness about our results within RIs, policy bodies etc.).	Daniel Kissling, Laetitia Navarro
12.30 Close		

4.3 Homework Informatics/RI session

Homework – Consolidated and reduced



4.4 Draft agenda for the high-level policy workshop

8 May 2018

1. 13:30 Welcome & Introduction to the objectives of the Workshop
2. 14:00 Keynote lectures (*Chair: Daniel Kissling*)
 - EBVs as key input for policy objectives (*Laetitia Navarro*).
 - Results from the GLOBIS-B project relevant for the workshop (*Daniel Kissling*).
 - Test case (ALA & GBIF) on invasive species (*Alex Hardisty*).
 - EC and GEO BON (EC person)

15:00 Coffee / Tea

3. 15:30 – 17:30 Table groups of 5-6 persons each will discuss the proposed recommendations.
 - A. Policy priorities on required EBV products (species, assemblage, ecosystem, biome, areas, scales).
 - B. Coordinated monitoring schemes for primary data collection or production on of constructing EBV-usable datasets, such as foreseen with Biodiversity Observation Networks (BONs) around the world.
 - C. Computational workflows to process primary data into various EBV data products.
 - D. Cooperation of research infrastructures for curating processed (EBV) data products and publishing them in required formats.
 - E. Overcoming legal constraints in relation to accessing data and achieving workflow interoperability.

Discuss and agree on each of the recommendations, note any special remarks, and highlighting (if necessary) any significant points of concern (1 or 2 per recommendation only).

4. 17:30 – 18:00 Presentations of the rapporteurs from each table group & questions (*Chair: Laetitia Navarro*)

9 May 2018

5. 09:00 Presentation & questions of the common set of recommendations (*Wouter Los*).
6. 9:30 Initial Discussion proposed conclusions from the workshop with a list of recommendations (*Chair: Laetitia Navarro and Rapporteur appointed the previous evening*).

10:30 Coffee / Tea

6. 11:00-13:15 (Continued) Discussion proposed conclusions from the workshop with a list of recommendations (*Chair: Laetitia Navarro and Rapporteur appointed the previous night*).

13:15 Lunch and end of workshop

7. 14:00 – 15:30 Publicity and next steps. What is going to happen next and who acts.