



GLOBIS-B (654003)

The logo for GLOBIS-B, featuring a stylized globe with a grid pattern, a blue and green infinity symbol, and a blue and green geometric shape above the text "GLOBIS-B".

GLOBIS-B

D2.1 Input Discussion Document

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1 Executive summary

This Discussion Document gives a detailed overview of the setup for the first GLOBIS-B workshop. It contains:

- A short description of the project itself
- The aims and expected outcomes of the first workshop
- A detailed Workshop program
- References
- A list of participants

The document aims to bring participants up to date on the issue at hand, define requirements and expectations from all participants and sets the scene for on- and off line discussions prior to the workshop.

2 Contributors

Main contributors are Daniel Kissling (UvA), Wouter Los (UvA), Alex Hardisty (CU) and Jacco Konijn (UvA)

3 Main body of the report



Background and program for the 1st Workshop in Leipzig, 29 February – 2 March 2016

- 1. The GLOBIS-B project**
- 2. Framing and defining EBV related terminology**
- 3. Workshop 1 on species distribution and population abundance**
- 4. Workshop program**

Annex 1: List of confirmed workshop participants

1. The GLOBIS-B project

The GLOBIS-B project aims to facilitate the global cooperation of world-class research infrastructures with a focus on supporting frontier research on biodiversity. The project aims to contribute to developing key measurements that underpin global indicators which are required to study, report and manage biodiversity change (Pereira *et al.*, 2013). More specifically, the project is focusing on potential infrastructure services supporting research on measuring biodiversity change, specifically Essential Biodiversity Variables (EBVs). Thereby GLOBIS-B serves a major goal of the Group on Earth Observations Biodiversity Observation Network (GEO BON). More details about the GLOBIS-B project can be found in Kissling *et al.* (2015) and on the project homepage (www.globis-b.eu).

A key question for global biodiversity monitoring is how the multi-lateral cooperation of data collectors, data providers, monitoring schemes, and biodiversity research infrastructures can be achieved at the global level to support the harmonic implementation of EBVs. Until now, EBVs are hardly tested for their significance in constructing biodiversity indicators and for their applicability at different spatiotemporal scales. Frontier research in this area requires the availability and accessibility of substantial data sets with sufficient spatiotemporal coverage. GLOBIS-B aims at elucidating how the cooperating research infrastructures may contribute to such an objective by focusing on offering data, workflows and computational services for calculating EBVs...

- ...for any geographic area, small or large, fine-grained or coarse;
- ...at a temporal scale determined by need and/or the frequency of available observations;
- ...at a point in time in the past, present day or in the future;
- ...as appropriate, for any species, assemblage, ecosystem, biome, etc.
- ...using data for that area / topic that may be held by any and across multiple research infrastructures;
- ...using a harmonized, widely accepted protocol (workflow) capable of being executed in any research infrastructure;
- ...by any (appropriate) person anywhere.

As such, the related scientific questions and methods will assist in defining the user requirements for extracting, handling and analyzing data to measure biodiversity change. To this end, the project brings together key scientists with global research infrastructure operators, technical experts and legal interoperability experts to address research needs and infrastructure services underpinning the concept of EBVs. With this focus on research needs for calculating and testing EBVs, the attention is on ad-hoc on-demand services (and related workflows) in the cooperating research infrastructures. The obtained experiences may later lead to a more systematic, periodic production cycle where EBV data products are produced, updated and extended, for example annually, quarterly or monthly. However, the latter is not a specific deliverable of the project.

2. Framing and defining EBV related terminology

Recent documents from GEO express how data should be shared and managed¹, and a recent document² from GEO BON indicates how to aggregate biodiversity observations into EBVs and then into biodiversity indicators. In the introduction of the GEO BON document², Henrique M. Pereira explains that biodiversity indicators are derived by integrating data from various Essential Biodiversity Variables. The EBVs applied here are based on large global datasets, state of the art remote-sensing information, model-based integration of multiple data sources and types, including in situ (ground based) observations, and online infrastructure enabling inexpensive and dynamic updates, with full transparency.

Relevant terminology can be defined as follows (see Pereira *et al.* (2013), available here³).

¹ <http://www.earthobservations.org/geoss.php> and http://www.geoportal.org/web/guest/geo_home_stp

² http://www.geobon.org/Downloads/brochures/2015/GBCI_Version1.2_low.pdf

³ http://www.earthobservations.org/documents/cop/bi_geobon/ebvs/201301_ebv_paper_pereira_et_al.pdf

Biodiversity indicators are designed to convey messages to policy-makers and management, for example on delivering regular, timely evidence-based information on biodiversity change. They are derived from aggregated primary data to convey information beyond the data itself. Indicators are often used to track progress towards specific targets (e.g. the Aichi targets of the Convention of Biological Diversity⁴ and the Biodiversity Indicators Partnership⁵)

Essential Biodiversity Variables are quantities, based on observations and for large parts of the Earth, which are required for the long-term management of biodiversity at national to global scales and especially for the detection of change. They facilitate data integration by providing an intermediate abstraction layer between primary observations and indicators. As such they are defining a minimum set of essential measurements to capture major dimensions of biodiversity change, complementary to each another. The EBV framework is based on repeated measures or representative sampling at the same locations or regions, ideally at regular intervals.

Data are the result of measurements (e.g. based on direct observations, remote sensing etc.), and include both existing legacy data and targeted, newly generated or reprocessed data. Data can also be produced by models and proxies, extrapolated from a few real measurements.

3. Workshop 1 on species distribution and population abundance

The first GLOBIS-B workshop is one in a series of four (Figure 1). Workshop 1 is coupled with workshop 2 and both are related and focused on species distributions and abundances (EBV class ‘Species populations’).

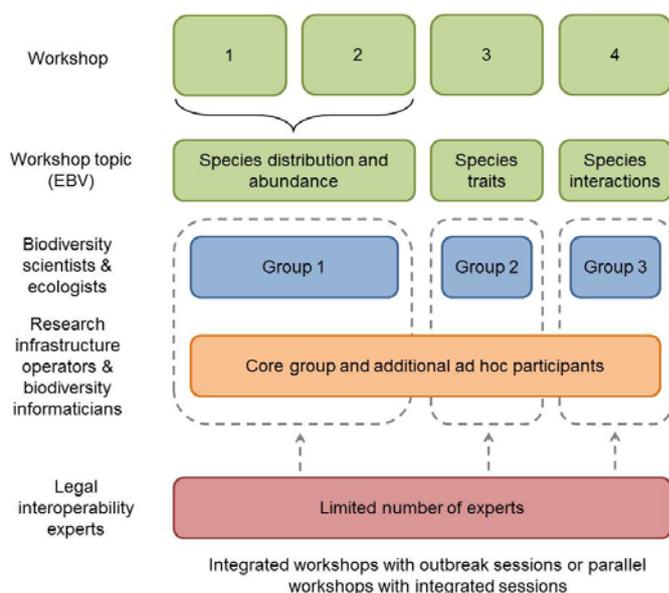


Figure 1: Overview of the four GLOBIS-B workshops which are related to species distribution and abundance (1 & 2), species traits (3), and species interactions (4). The aim of the workshops is to discuss and develop a framework for implementing Essential Biodiversity Variables (EBVs) across research infrastructures worldwide. This will be achieved by discussions among different participant groups, including biodiversity scientists and ecologists, biodiversity informaticians, technologists and infrastructure operators, and legal interoperability experts. The figure is derived from Kissling *et al.* (2015).

The GLOBIS-B workshops are meant as *experiments*, where different scenarios are considered on how scientists may want to test the relevance of EBVs to build indicators, and which data, workflows and computational capacity each scenario will require. In turn, the cooperating research infrastructures will consider the challenges and potential solutions of providing the required data and workflow services, to achieve global interoperability. This requires to discuss in detail the necessary steps and tools needed to move from data collection and transformation over modelling, testing & validation to the final EBV presentation (Figure 2, green). Important scientific discussion points will be which data are needed and how they have to be transformed, which models need to be implemented and tested, and how to present and visualize EBVs (Figure 2, blues). Related technical discussion points are how workflows have to be designed, which Information and Communication Technology (ICT) approaches and options are available, and how they can be made interoperable (Figure 2, red). This will allow to

⁴ <https://www.cbd.int/sp/targets/default.shtml>

⁵ <http://www.bipindicators.net/>

formulate key research questions for testing EBVs and help to identify which technical and legal challenges the research infrastructures are facing to support the interoperable, on-demand, ad-hoc calculation of EBVs.

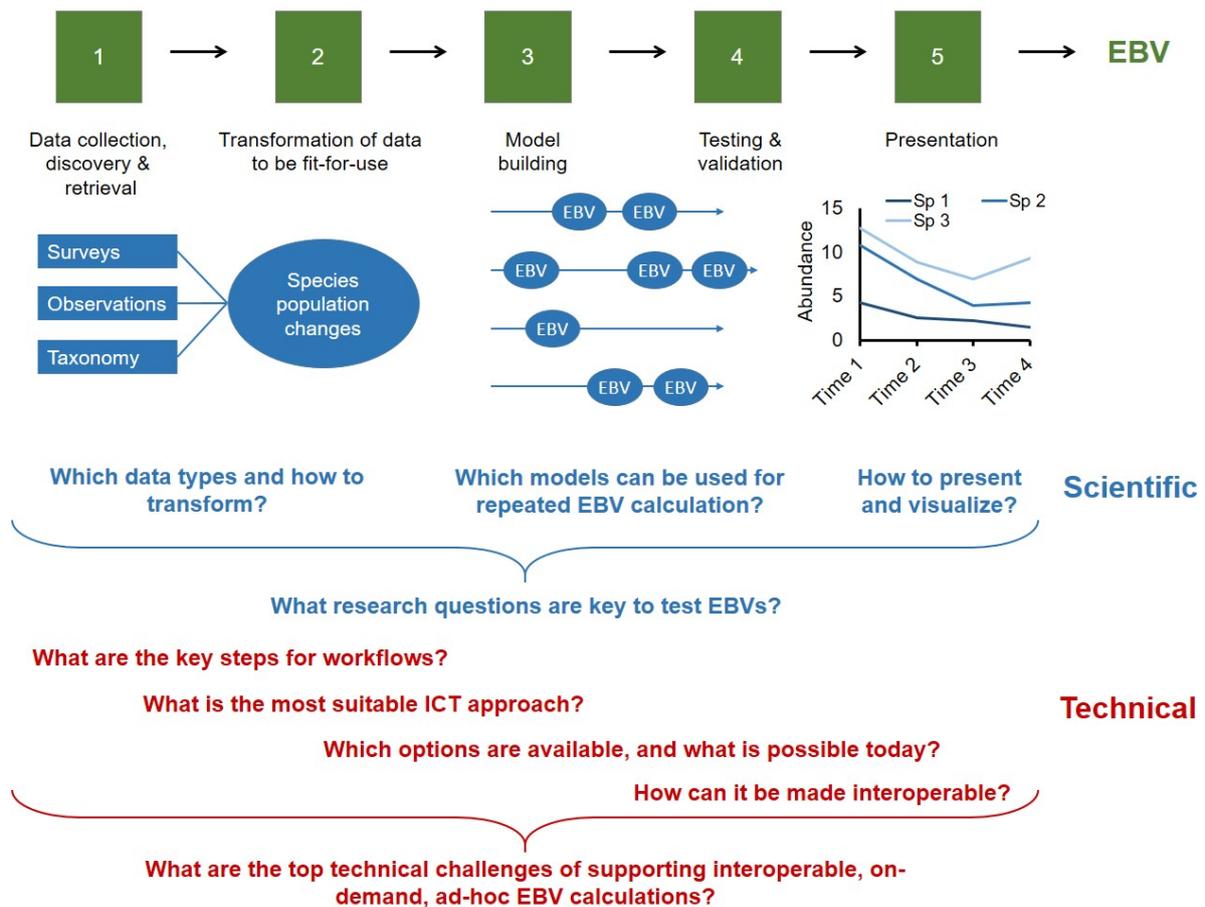


Figure 2: Potential steps for the calculation of Essential Biodiversity Variables (EBVs, green) and related scientific (blue) and technical (red) questions and challenges.

Workshop 1 aims at identifying the options and problems associated with infrastructure support for the EBV class ‘Species populations’ (EBVs ‘Species distribution’ and ‘Population abundance’). The currently confirmed workshop participants are listed in Annex 1. The expected outcomes of the workshop are:

- Agreed research questions to test EBVs and the implications with respect to data and methodology (analysis, models)
- Agreed data characteristics (spatial, temporal and periodicity dimensions, following the EBV criteria as listed by the GEO BON strategy for EBV development⁶) and technical requirements, including potential software and workflows for calculating EBVs, e.g.
 - o Candidate datasets which are available that meet the criteria
 - o Methods that are needed/useful to convert the raw data into normalized/derived data that fit the purpose to calculate EBVs
 - o Required workflows; support for their execution, and management of studies and results
 - o Statistical methods and analysis tools
 - o Techniques and tools for visualization
- Preliminary views of the research infrastructures on how they could accommodate the

⁶ http://www.geobon.org/Downloads/reports/2015/Essential_Biodiversity_Variable_Strategy_v1.pdf

- requirements and enhance their performance by global cooperation, e.g. via
- Cross-mapping of requirements and current capabilities of research infrastructures, i.e. readiness (matrix of workflow steps on one axis and capabilities of research infrastructures on the other axis, with level of readiness indicated)
 - Options for infrastructure cooperation, task division and sharing of services
 - Identification of existing barriers, obstacles and risk, including legal barriers to access or reuse data, with suggestions for removing them
- Recommendations and guidelines for the harmonization of EBV-relevant data collection, data transformation/normalization, and for data exchange and sharing of interoperable datasets, e.g.
- Standards for data production
 - Guidelines for handling existing data
- Views on associated policy and legal implications, e.g.
- Preliminary observations on legal issues
 - Potential implications for contributing to policy requirements and to inform policy bodies
- Plans for continued remote interaction of participants and/or test implementations in order to prepare for the next workshop 2, e.g.
- Identifying steps to develop a demonstration of how a global cooperation among research infrastructures could lead to an EBV calculation, maybe with the aim to present it at a large event in 2018 (e.g. GEO related event)
 - Identify who (i.e. people and research infrastructures) can take the lead on various steps

Workshop 2 will be a follow-up a few months later with the objective of writing a peer reviewed scientific paper and other dissemination of key results from the first workshop.

4. Workshop program

Day 1 (afternoon)

- **Lunch** (optional for confirmed requests)
- **13:30 Welcome** and introduction of participants (15 mins)
- **13:45 Introductory session** with lightning talks (from data to science and policy) & discussion (15 minutes each, plus questions)
 - a. Introduction
 - EBVs and biodiversity indicators (Henrique Pereira?)
 - Why are we sitting together? (Daniel Kissling)
 - b. Views from biodiversity science
 - Sampling procedures and field data collection for biodiversity monitoring (Nicolas Titeux?)
 - Methods for extracting trends from distribution data (Nick Isaac?)
 - Calculating biodiversity indicators (Louise McRae?)
 - c. Views from infrastructures, informatics and legal expertise
 - Data Sharing Principles in GEO and RDA / CODATA (Jörg Freyhof ? / Dimitris Koureas?)
- [Coffee break (20 min)]
 - The infrastructure landscape: data portals and related biodiversity infrastructures (Donald Hobern?)
 - Interoperability and workflows: state-of-the-art (Alex Hardisty)
 - Demonstration of EBV pilot from EU BON (Hannu Saarenmaa?)
- d. How to proceed in the next sessions (45 mins)
- **18:00/18:30 Dinner**

Day 2 (morning)

- **08:30 Science session** with 6 parallel table groups, each one with a mixture of scientists and technical experts (plus a legal expert) addressing the following *scientific* questions for the EBV class 'Species populations':
 - What are relevant EBV-related research questions, and what is their purpose/relevance?
 - Which scientific methods are required to calculate EBVs?
 - Which data types are preferred (and if possible available) to address the selected EBV research questions?
 - How should results preferably be presented and visualized?
- **9:45 Plenary reports (short summary by each group) and discussion**
- **10:30 Technical session** with 6 parallel table groups, each one with a mixture of scientists and technical experts (plus a legal expert) addressing the following *technical* questions for the EBV class 'Species populations':
 - What are the key steps of a workflow for calculating EBVs?
 - What is a suitable technical (ICT) approach to perform this workflow for calculating EBVs (any place, any time, using data anywhere, by anyone)?
 - What are the options available and what is possible to achieve today / within 12 months?
 - What are the top 3-5 technical challenges of supporting interoperable EBV calculations?
- **12:00 Plenary reports (short summary by each group) and discussion**
 - Topic ranking

Day 2 (afternoon)

- **14:00 Specific parallel group sessions**, scientists, technical experts and legal experts are separated
 - a. Research infrastructures discuss available data sources, associated services, problems to solve, and readiness level of each research infrastructure. Informatics experts discuss potential workflow development for interoperability and data processing.
 - b. Scientists discuss details of selected EBV research, which methods and data are needed and

- their characteristics, which provenance information needs to be recorded, and how outcomes should be presented for developing EBV-related biodiversity indicators.
- c. Legal experts discuss policy and legal issues arising from the previous sessions.
- **16:30 Plenary reports (short summary by each group) and deeper plenary discussion**
 - Potential topics for considerations
 - o How can remote sensing information and models be used to interpolate EBVs between monitoring sites?
 - o How can existing datasets mobilized into the Extended Darwin Core?
 - o Should we focus, for specific case studies (e.g. workshop 2), on a specific taxonomic group (e.g. mammals, birds, other)?
 - o Other topics? **ALL: PLEASE PROVIDE SUGGESTIONS TO DANIEL KISSLING (wdkissling@gmail.com)**

Day 3 (morning)

- **08:30 Plenary closing session**
 - Summary and conclusion from the three parallel group meetings, with discussion.
 - Discussion
 - o What might be common conclusions and required next steps on the *thought experiment*?
 - o Recommendations and guidelines for the harmonization of EBV-relevant data collection and curation and for the sharing of interoperable datasets?
 - o How can we frame a scientific paper with high impact?
 - o How to prepare for the next workshop 2?
 - o Who takes which tasks?
- **12:30 Closure**

References

Kissling, W.D., Hardisty, A., García, E.A., Santamaria, M., De Leo, F., Pesole, G., Freyhof, J., Manset, D., Wissel, S., Konijn, J. & Los, W. (2015) Towards global interoperability for supporting biodiversity research on essential biodiversity variables (EBVs). *Biodiversity*, 1-9.

Pereira, H.M., Ferrier, S., Walters, M., Geller, G.N., Jongman, R.H.G., Scholes, R.J., Bruford, M.W., Brummitt, N., Butchart, S.H.M., Cardoso, A.C., Coops, N.C., Dulloo, E., Faith, D.P., Freyhof, J., Gregory, R.D., Heip, C., Höft, R., Hurtt, G., Jetz, W., Karp, D.S., McGeoch, M.A., Obura, D., Onoda, Y., Pettorelli, N., Reyers, B., Sayre, R., Scharlemann, J.P.W., Stuart, S.N., Turak, E., Walpole, M. & Wegmann, M. (2013) Essential Biodiversity Variables. *Science*, **339**, 277-278.

Annex 1: List of confirmed workshop participants

Colour legend:

	Biodiversity experts		Legal experts
	Technical experts		GLOBIS-B partners

No.	First name	Last name	Organisation	Country
1	Jorge	Ahumada	Tropical Ecology Assessment and Monitoring (TEAM) Network	USA

2	Neil	Brummitt	Natural History Museum London	GBR
3	Mark John	Costello	University of Auckland	NZL
4	Jane	Elith	University of Melbourne	AUS
5	Miguel	Fernandez	iDiv Leipzig, GEO BON	DEU
6	Simon	Ferrier	CSIRO Ecosystem Sciences	AUS
7	Nick	Isaac	Centre for Ecology & Hydrology	GBR
8	Steve	Kelling	Cornell Lab of Ornithology	USA
9	Keping	Ma	Chinese Academy of Sciences	CHN
10	Melodie A.	McGeoch	Monash University	AUS
11	Louise	McRae	Zoological Society of London	GBR
12	Matthias	Obst	Göteborg University	SWE
13	Henrique	Pereira	iDiv Leipzig	DEU
14	Carlo	Rondinini	Sapienza University of Rome	ITA
15	Dirk	Schmeller	UFZ Leipzig	DEU
16	Nicola	Segata	University of Trento	ITA
17	Nicolas	Titeux	Forest Sciences Centre of Catalonia	ESP
18	Eren	Turak	New South Wales Government Office of Environment	AUS
19	Andrew	Skidmore	University of Twente	NLD
20	Donald	Hobern	GBIF	DNK
21	Hannu	Saarenmaa	Univ. Eastern Finland, EU BON	FIN
22	Lee	Belbin	Atlas of Living Australia	AUS
23	Mark	Schildauer	National Center for Ecological Analysis and Synthesis	USA
24	Robert	Guralnick	Univ. Florida	USA
25	Wim	Hugo	SAEON/GEOBON	ZAF
26	Lucy	Bastin	EC JRC, Ispra	ITA
27	Liqiang	Ji	CAS Beijing Institute of Zoology	CHN
28	David	Martin	Atlas of Living Australia	AUS
29	Jesus	Marco Lucas de	CSIC (IFCA)	ESP
30	Brian	Wee	NEON	USA
31	Francisco	Hernandez	VLIZ	BEL
32	Renato	De Giovanni	CRIA	BRA
33	Daniel	Amariles	Instituto de Investigación de Recursos Biológicos A. v. Humboldt	COL
34	Dimitris	Koureas	Natural History Museum, London	GBR
35	Dmitry	Schigel	GBIF, University of Helsinki	FIN
36	Johannes	Peterseil	Umweltbundesamt Austria	AUT
37	Donat	Agosti	Plazi	CHE
38	Willy	Egloff	Plazi	CHE
39	Thomas	Margoni	Stirling University	GBR
40	Legal 4			
41	Daniel	Kissling	University of Amsterdam	NLD
42	Wouter	Los	University of Amsterdam	NLD
43	Jacco	Konijn	University of Amsterdam	NLD
44	Alex	Hardisty	Cardiff University	GBR
45	Enrique	Alonso	Universidad de Alcalá	ESP

46	David	Manset	Gnúbila	FRA
47	Francesca	De Leo	National Research Council Italy	ITA
48	Monica	Santamaria	National Research Council Italy	ITA
49	Joerg	Freyhof	German Centre for Integrative Biodiversity Research	DEU

4 Conclusions

The document should be seen as first input. From this specific questions will be derived to provide the participants with 'homework' to prepare for the workshop itself.

5 References

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6 Annexes

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