



BIODIVERSITY BUILDING BLOCKS FOR POLICY

D1.4 Helpdesk activity

31/07/2026

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Funded by
the European Union

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Prepared under contract from the European Commission

Grant agreement No. 101059592

EU Horizon Europe Research and Innovation Action

Project acronym: **B3**

Project full title: **Biodiversity Building Blocks for policy**

Project duration: 01.03.2023 – 31.08.2026 (42 months)

Project coordinator: Dr. Quentin Groom, Agentschap Plantentuin Meise (MeiseBG)

Call: HORIZON-CL6-2021-GOVERNANCE-01

Deliverable title: Helpdesk activity

Deliverable n°: D1.4

WP responsible: WP1

Nature of the deliverable: Document, Report

Dissemination level: Public

Licence of use: Creative Commons Attribution 4.0 International

Lead partner: Meise Botanic Garden

Recommended citation: Abraham, L., Kumschick, S., Stoykova, N., Langerhaert, W., Depecker, J., Breugelmans, L., Desmet, P., Dove, S., Robertson, T., Machado, A. L., Preda, C. & Hendrickx, L. (2026). **Helpdesk Activity**. B3 project deliverable D1.4.

Due date of deliverable: Month n°41

Actual submission date: Month n°41

Deliverable status:

Version	Status	Date	Author(s)
1.0	Draft	3 June 2026	Laura Abraham (MeiseBG)
1.1	Draft	30 June 2026	Laura Abraham (MeiseBG), Sabrina Kumschick (SUN), Nikol Stoykova (Pensoft), Ward Langerhaert (EV INBO), Jonas Depecker (MeiseBG), Lissa Breugelmans (MeiseBG), Louise Hendrickx (MeiseBG), Peter Desmet (EV INBO), Shawn Dove (JLU), Tim Robertson (GBIF)
1.2	Draft	17 July 2026	Laura Abraham (MeiseBG)
1.3	Review	27 July 2026	Ana Luísa Machado & Cristina Preda
1.4	Final	30 July 2026	Louise Hendrickx





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Key takeaway messages

- A hybrid, general-to-specific support model: To address the needs of an evolving software ecosystem, B3 uses a hybrid support model that guides users from general conceptual assistance (main website FAQs), through structured educational resources (training webinars and Q&As), to self-service technical documentation (documentation website) and, where needed, interactive technical support through GitHub Issues.
- GitHub Issues as an interactive helpdesk: B3 utilises GitHub Issues as a modern, sustainable, and real-time helpdesk. By connecting users directly with software developers, this system facilitates transparent issue tracking, technical problem solving, and knowledge sharing through a searchable record of discussions, resolutions, bug fixes, and feature developments.
- Archived training series Q&As: To support continuous capacity building, the project has archived and published 41 practical questions and answers collected from participants during six hands-on training sessions. These resources are hosted on the B3 website (<https://b-cubed.eu/training-series>), alongside webinar recordings and presentation slides, providing a lasting reference for users.
- Centralized and versioned documentation: The B3 documentation website (docs.b-cubed.eu) serves as the primary self-service technical resource. It provides software specifications, R package guides (including the b3verse), and step-by-step tutorials to support users in applying B3 tools and workflows.

Executive summary

Deliverable 1.4 (D1.4), titled “Helpdesk activity”, is a public report prepared under Task 1.4 (“Training & support services to the users of B3”) in Month 41 (July 2026) of the project. Coordinated by Meise Botanic Garden alongside partners from Stellenbosch University (SUN), the Global Biodiversity Information Facility (GBIF), Universitatea Ovidius din Constanta (UOC), the South African National Biodiversity Institute (SANBI), the University of Aveiro (UAVR), and Martin-Luther-Universität Halle-Wittenberg (MLU), this report provides an overview of the implementation and outcomes of the project's user support framework.

Because B3's software packages and workflows are continuously evolving, the project partners recognised that a traditional, static helpdesk would quickly become outdated. Instead, B3 implemented a hybrid support model that guides users from introductory concepts to advanced programming workflows through complementary support channels:

- General support ([/b-cubed.eu/faq](https://b-cubed.eu/faq)): Provides answers to more general and conceptual questions, such as intended users of B3 outputs, infrastructure requirements and potential costs, explaining the scientific value and applications of biodiversity data cubes.
- Educational support (Training series on several topics e.g. automating biodiversity turnover mapping using the dissmapr R package; b-cubed.eu/training-series): Archives 41 practical questions and answers collected during six live hands-on training sessions and webinars, creating a lasting resource for user training and capacity building. The recordings of the training webinars are (and remain) available on [B3's youtube channel](#).





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- Self-service technical documentation (docs.b-cubed.eu): Offers searchable, version-controlled documentation, software specifications, and tutorials for B3 software packages and workflows.
- Technical support via GitHub Issues (github.com/orgs/b-cubed-eu/repositories): Serves as a real-time helpdesk where users can report bugs, request features, and obtain technical assistance directly from software developers.

A review of the B3 GitHub repositories demonstrates an active software development and testing ecosystem, with more than 300 issues recorded across these repositories. The majority of these issues relate to internal software development, testing, and collaboration among project partners, which is expected during the development phase. External user engagement has primarily taken place through webinars and hands-on workshops (including a hackathon), where participants received direct support and contributed questions that have been incorporated into the project's training resources. As the software reaches a broader user community, the number of externally submitted GitHub Issues is expected to increase, further strengthening the project's interactive support system.

By combining publicly accessible documentation, training materials, and an interactive GitHub-based helpdesk, while preserving software releases and documentation through GitHub and Zenodo, B3 ensures that its technical knowledge remains accessible, searchable, and sustainable for at least five years after the project's completion, in line with its long-term sustainability objectives.

Non-technical summary

The B3 project develops online tools, computer code, and indicators to help researchers, conservationists, and policymakers monitor global biodiversity change more rapidly and reliably. To ensure that people can use these tools effectively, the project developed a hybrid support system that combines online documentation, training resources, and direct interaction with software developers.

Rather than relying on a traditional helpdesk, the project uses "GitHub Issues", a public online platform where users can post questions, report software bugs and request new features directly from the software developers. This direct connection allows problems to be resolved quickly and creates a public, searchable list of solutions so that if one user runs into an issue, he/she can easily find the answer online if the issue has been previously addressed, or start a new line of inquiry.

To make sure support is available to everyone, regardless of their programming background, B3 supplements this technical system with three other layers of help:

- General support on the B3 website (b-cubed.eu/faq): explains the core concepts behind the project, such as biodiversity data cubes and how users can integrate their own data.
- Learning from workshops (b-cubed.eu/training-series): A database of 41 real questions and answers asked by participants during six live training workshops, published alongside the original presentation slides and video recordings, to peruse at user's own pace.





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- Documentation website: A central, easy-to-use documentation website (docs.b-cubed.eu) that guides users through step-by-step tutorials, from spatial mapping to ecological modeling.

All of these resources are free, open source, and preserved through GitHub and Zenodo. This ensures that, even after the B3 project ends in August 2026, the software, documentation, and support materials remain accessible for at least five years after the project's completion, supporting the global biodiversity community.

List of abbreviations

B3	Biodiversity Building Blocks for Policy
GBIF	Global Biodiversity Information Facility
FAQ	Frequently Asked Questions
MeiseBG	Meise Botanic Garden
MLU	Martin-Luther-Universität Halle-Wittenberg
Q&A	Questions and Answers
SANBI	South African National Biodiversity Institute
SUN	Stellenbosch University
UAVR	Universidade de Aveiro
UOC	Universitatea Ovidius din Constanta
VITO	Flemish Institute for Technological Research
WP1	Work Package 1





1. Introduction

1.1. Project

Biodiversity is changing more rapidly than ever before, increasing the urgency for reliable, up-to-date information to support decision-makers in evaluating policy options. Effective biodiversity monitoring is essential to address this need (Niemi, 2000).

The project Biodiversity Building Blocks for Policy (B3) seeks to transform biodiversity monitoring from a disconnected, labour-intensive activity into an agile, rapid, and responsive process at a global level. This transformation is achieved by providing easy access to open-source tools in a cloud computing environment, in real-time, and on-demand, utilising state-of-the-art prediction models to generate indicators of biodiversity status and change. To facilitate this, B3 is developing the necessary infrastructure, workflows, tools, and indicators to simplify and standardise access to biodiversity monitoring data.

1.2. Scope and objectives of the deliverable

A core objective of B3's Work Package 1 (WP1) is to provide training and support services to users, ensuring the effective uptake of the project's tools and services. Deliverable 1.4 (D1.4), titled "Helpdesk activity", is a public report prepared under Task 1.4 ("Training & support services to the users of B3") and is submitted in Month 41 of the project. Meise Botanic Garden serves as the lead partner for this deliverable, coordinating with Task 1.4 partners including Stellenbosch University (SUN), the Global Biodiversity Information Facility (GBIF), Universitatea Ovidius din Constanta (UOC), South African National Biodiversity Institute (SANBI), Universidade de Aveiro (UAVR), Martin-Luther-Universität Halle-Wittenberg (MLU). The primary objective of D1.4 is to outline and summarise the helpdesk and user support activities conducted throughout the project's lifetime. This includes outlining how user queries are managed, tracking technical issues on code repositories and documenting questions with answers (Q&A) to continuously refine B3 software and training resources.

1.3. Task planning and execution

During the project, the planning and implementation of support services were evaluated to identify the most effective way to assist the biodiversity informatics community. The project team concluded that because B3's software packages and workflows are highly dynamic and rapidly evolving, a traditional, static helpdesk would quickly become outdated. To address this challenge, B3 adopted a hybrid support model structured systematically from general conceptual assistance to specific, individualized code support.

A dedicated Q&A page was established on the main B3 website to provide introductory guides on core concepts of B3 (b-cubed.eu/faq). To build on this foundation, B3 actively delivered webinars, hands-on workshops and compiled extensive training materials (as detailed in [Milestone 2](#)). For technical guidance, the team launched a central, versioned documentation website (docs.b-cubed.eu). Finally, to resolve technical, code-level queries in a sustainable manner, B3 integrated the GitHub Issues system as an interactive helpdesk where external users can communicate directly with software developers.





1.4. Relation to other tasks and deliverables

This deliverable is closely connected to and integrated with multiple work packages, tasks and deliverables across B3:

- Task 1.4 (Training series): The helpdesk directly supported the hands-on training sessions and webinars, gathering direct user inquiries that were synthesized into the B3 training series Q&As (b-cubed.eu/training-series).
- Task 3.2 (Documentation & tutorials): The helpdesk works alongside B3's documentation efforts, guiding users to the central B3 documentation website (docs.b-cubed.eu) for comprehensive tutorials and R package guides.
- WP2, WP4, and WP5 (Software & indicators): The helpdesk acts as an important feedback loop for project developers. Bug reports and feature requests submitted as GitHub Issues on repositories like the GBIF occurrence cube, b3gbi, and pdindicator directly contribute to software updates and improvements.
- Task 1.8 (Sustainability): The dynamic repository-based helpdesk format is closely linked to B3's sustainability objectives outlined in the D1.8 Sustainability report, ensuring that user questions and technical resolutions remain permanently archived, searchable, and maintainable for five or more years post-project.

1.5. Deliverable structure

Following this introductory chapter, the rest of the report is organised as follows:

- **Chapter 2: Helpdesk and support activities** forms the core of this deliverable. It details the outcomes of the user support strategy, which is structured as follows:
 - **Core conceptual Q&A on the B3 website** (Section 2.1)
 - **Training Series Q&As** (Section 2.2)
 - **Guides and documentation on B3 software** (Section 2.3)
 - **Direct interaction via GitHub Issues** (Section 2.4)
- **Chapter 3: References** outlines the project documentation, website links, and repositories utilized in B3.

2. Helpdesk and support activities

2.1. Core conceptual Q&A on the B3 website

To help new users familiarise themselves with the core concepts of the B3 project, a Q&A page is maintained on the B3 website (b-cubed.eu/faq). These Q&As explain core project concepts (such as biodiversity data cubes and cloud computing implications) to help new users grasp the project's scope outside of a highly specialized context. The questions and answers hosted on the B3 website are outlined in Table 1.



**Table 1: Core conceptual questions and answers hosted on the B3 website.**

B3 Questions	Answers
What is the main goal of the B3 project?	The B3 project aims to transform biodiversity monitoring from a disconnected, labor-intensive activity into a rapid, agile, and responsive global process. It achieves this by standardising access to biodiversity data and providing tools that can generate on-demand models and indicators of biodiversity status and change.
Who are the intended users of the B3 tools and services?	B3 is designed to be useful for a wide variety of stakeholders, including data collectors, academic researchers, data scientists, conservation NGOs, and policymakers. The project aims to democratise access to biodiversity data products globally and lower the technical thresholds and costs required for running automated biodiversity assessments.
Are B3 software and workflows free to use?	Yes, the tools and algorithms developed by B3 are provided as free and open-source software, typically under an MIT License or equivalent. The project strictly adheres to open science and FAIR (Findable, Accessible, Interoperable, and Reusable) principles, ensuring that datasets, software, and training materials are openly available to both the scientific community and the general public.
How can I get technical support or ask questions about using B3 tools?	For technical support, B3 utilizes the GitHub Issues system where users can ask questions, request clarifications, and report problems directly to the software developers in real time. We encourage questions being asked on the respective repo's of the software packages and on the cube service repo (https://github.com/gbif/occurrence-cube/issues). Additionally, users can access a comprehensive documentation website (docs.b-cubed.eu) that hosts a wide collection of tutorials, step-by-step guides, and training materials.





Can I integrate my own local data into B3 workflows?	Yes, users are not restricted solely to global databases. The B3 suite includes software packages, such as gcube, that allow users to create custom spatial grids and integrate their own local, independent, or non-GBIF occurrences for analysis alongside standard B3 functions.
What are biodiversity data cubes and why does B3 use them?	Biodiversity data comes from a highly diverse range of sources, including citizen scientists, museums, automatic sensors, and satellite tracking, which makes integrating the information a major challenge. Data cubes solve this by standardising primary species occurrence data into uniform units across spatial, temporal, and taxonomic dimensions. This standardisation makes it possible to seamlessly integrate biodiversity data with other environmental data (such as climate and land-use scenarios) to create reliable predictive models and indicators for policymakers.
What are the infrastructure requirements and cloud-related costs for running B3 workflows?	While the algorithms, software packages, and workflows developed by the B3 project are provided as free and open-source tools to lower technical thresholds and overall expenses, users looking to deploy these automated workflows independently on commercial cloud computing platforms (such as Microsoft Azure, AWS, or Google Cloud) will need to consider the associated infrastructure costs. Cloud computing operates on metered charges, meaning that costs are based entirely on the amount of computational resources (processors) and disk space you consume. Consequently, the more computationally intensive your analysis is, and the larger the data file sizes you are processing, the higher the resource implications and financial costs will be. It is also worth noting that while independent cloud deployments require careful resource planning, core B3 services, like the Species Occurrence Cube download service, are already integrated into GBIF's infrastructure and are maintained as a free service as part of their core work programme.





2.2. Training series Q&A

Throughout the project's lifespan, B3 delivered a comprehensive program of training events, including a dedicated series of webinars, a hackathon, training courses, and live demonstrations at international conferences. All of these resources including accompanying presentation slides and session recordings are openly accessible on the B3 website under the training series (b-cubed.eu/training-series) and videos webpage (b-cubed.eu/videos?categoryId=2). For more information regarding the planning and delivery of the outreach events, see Milestone 2 "Training Materials" ([M2_WP1_2025_training_materials.docx](#)).

In addition to the conceptual Q&A page on the website, B3 provides comprehensive Q&A resources generated directly from live user engagement. Across six hands-on training sessions, a total of 41 questions and answers were collected, resolved and archived. Published on the B3 website alongside their corresponding presentation materials and video recordings, these archived Q&As detail the technical clarifications, workflow issues and live inquiries raised by internal and external participants.

2.3. Guides and documentation on B3 software

The primary hub for guides, tutorials and technical documentation on all B3 software is the B3 documentation website (docs.b-cubed.eu/). Developed under Task 3.2 ("Documentation and tutorials"), this website serves as a comprehensive, searchable and version-controlled technical reference designed to help data scientists, researchers and biodiversity informatics implement B3's tools and workflows. For more detailed information regarding the technical design and structural setup of the website see [Deliverable 3.2 "Documentation for working with species occurrence cubes"](#).

2.4. Direct interaction via GitHub Issues

To allow direct interaction with software developers and to best support users of B3's tools and services, the project team decided that a traditional, helpdesk would quickly become outdated as the software evolves. Instead, B3 encourages users to submit questions, bug reports, or feature requests as GitHub Issues in the relevant repository within the B3 organization (github.com/orgs/b-cubed-eu/repositories) or at the GBIF occurrence cube service repository (github.com/gbif/occurrence-cube/issues). Each issue is reviewed and addressed by the project's software developers, who provide technical guidance, propose solutions or update the code to ensure the accuracy of B3 tools.

As is typical during the intense construction and deployment phase of a new software suite and technical documentation website, the vast majority of issues raised and resolved across the B3 repositories were internal technical issues. These issues represented development tasks, feature implementations and documentation updates handled directly by project partners, including those implementing the B3 case studies and testing the tools during case study implementation.

Software developers indicated that questions were primarily raised during live webinars and training workshops. When a participant's question revealed a software bug or a valuable feature request, B3 developers immediately recorded it as a formal issue on GitHub. Furthermore, to





ensure long-term support, the B3 website helpdesk page guides external users to submit technical queries directly to the respective software repositories.

The current number of all issues raised on the B3 code repositories are detailed in Table 2.

Table 2: Status and metrics of issues raised across primary B3 code repositories.

Repository	Total issues	Contributor type	Key details and status
B3 Documentation website (https://github.com/b-cubed-eu/documentation/issues)	41	100% internal	All issues represented internal technical issues, software updates and structural refinements to the Astro-based documentation website.
GBIF occurrence cube (https://github.com/gbif/occurrence-cube/issues?q=is%3Aissue)	64	Hybrid (63 internal, 1 external)	63 issues opened by project partners or GBIF staff. One external typo correction submitted.
General biodiversity indicators (https://github.com/b-cubed-eu/b3gbi/issues)	45	Hybrid (44 internal, 1 external)	The single external issue was raised by a participant during the B3 Hackathon.
b3gbi Graphical user interface (https://github.com/b-cubed-eu/b3gbi-gui/issues)	16	100% internal	Refinements to the GUI.
Phylogenetic diversity indicator (https://github.com/b-cubed-eu/pdindicator/issues)	31	100% internal	These issues primarily focused on internal software updates and technical improvements. Received direct usage and testing inquiries from VITO (Flemish Institute for Technological Research) for





			practical use-case application.
Trias R (https://github.com/trias-project/trias)	7	100% external	7 issues opened by non-B3 users were successfully resolved and closed during the lifespan of the project.
gcube Simulation R (https://github.com/b-cubed-eu/gcube/issues?q=is%3Aissue)	54	100% internal	53 issues were raised by package maintainers and 1 by a project partner. No issues were raised by external users.
dubicube bootstrapping R (https://github.com/b-cubed-eu/dubicube/issues?q=is%3Aissue)	61	100% internal	All 61 issues were raised by package maintainers.

3. References

3.1. Project deliverables and milestones

- Abraham, L., Kumschick, S., Trekels, M. (2025). Milestone 2: Training Materials. [B3 project milestone report](#).
- Depecker, J., Abraham, L., Pijls, S., Trekels, M., Groom, Q., & Yovcheva, N. (2025). Sustainability report. [B3 project deliverable D1.8](#).
- Desmet P., Govaert S., Trekels M., Abraham L. (2026). Documentation for working with species occurrence cubes. [B3 project deliverable D3.2](#).

3.2. Software repositories and online resources

- B3 Main project website: <https://b-cubed.eu/>
- B3 Documentation website: <https://docs.b-cubed.eu/>
- B3 Training & recordings: <https://b-cubed.eu/training-series> & <https://b-cubed.eu/videos?categoryId=2>
- B3 GitHub repositories: <https://github.com/orgs/b-cubed-eu/repositories>
- B3 GitHub issues: <https://github.com/b-cubed-eu/documentation/issues>
- B3 Documentation website source repository: <https://github.com/b-cubed-eu/documentation>
- GBIF Species occurrence cube repository: <https://github.com/gbif/occurrence-cube>
- b3gbi R Package repository: <https://github.com/b-cubed-eu/b3gbi>
- b3gbi Graphical User Interface repository (b3gbi-gui): <https://github.com/b-cubed-eu/b3gbi-gui>





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- pdindicatoR R Package repository: <https://github.com/b-cubed-eu/pdindicatoR>
- gcube Simulation R Package repository: <https://github.com/b-cubed-su/gcube>
- dubicube Bootstrapping R Package repository: <https://github.com/b-cubed-eu/dubicube>
- Trias R Package repository: <https://github.com/trias-project/trias>
- b3verse R Package suite portal: <https://b-cubed-eu.r-universe.dev/builds>

