

# GBIF Implementation Plan 2017-2021 and Annual Work Programme 2017

## Overview

This document serves both as the 2017 version of the GBIF Implementation Plan for the period 2017-2021 and also as the GBIF Annual Work Programme 2017. Both elements are based upon the [GBIF Strategic Plan for 2017-2021](#).

The relationship between these documents is represented by the graphic below.

The Strategic Plan (agreed in 2015 at GB22) established five **priorities** for GBIF's work.

The Implementation Plan presented here in this document identifies 22 **activities** that GBIF must undertake to address these priorities during the five-year period (and a set of specific **tasks** under each activity).

Each year, GBIF will review progress against these activities and available resources (including Secretariat staff and other uses of core and supplementary funding, as well as resources committed by GBIF Participants). Using this information, an Annual Work Programme will be defined for the following year. Each Annual Work Programme will identify a prioritized set of tasks for work during the year.

The Implementation Plan should be reviewed and refined each year.



The Implementation Plan comprises the body of this document, with 2017 Annual Work Programme tasks highlighted in green.

Following the Implementation Plan, the Annual Work Programme 2017 is summarized, starting on page 50.

## GBIF Implementation Plan 2017-2021

The GBIF **Strategic Plan** 2017-2021 presents five broad overlapping priorities for the GBIF network. Each of these priorities sets a direction and guides activities for the coming period. This document here presents an **Implementation Plan** to enable the GBIF community as a whole to make significant progress in each priority area. It establishes the framework for GBIF's **Annual Work Programmes** over the period of the Strategic Plan.

The following notes provide context for the activities outlined here.

### Delivery

Some activities in this plan will be led or coordinated by GBIF Secretariat staff, using core or supplementary funds. Other activities may be led or coordinated by GBIF Participants with particular interest or expertise in the areas in question.

Combining energies across the whole network within the framework of this plan will enable GBIF to progress the set of activities identified in this document more rapidly. Each Annual Work Programme in the period 2017 to 2021 will build on progress in past years and will focus available resources on remaining priorities identified in this document.

### Structure of GBIF

GBIF operates on three primary levels:

- **Global** – GBIF is an international activity and works at the global level to increase standardization and adoption of best practices, to facilitate sharing of expertise and resources and to offer an integrated global dataset and associated informatics infrastructure.
- **Participant** – GBIF Participants, including the nodes that they establish, have primary responsibility for engaging stakeholder communities, mobilizing and curating data, providing support and training, and ensuring that national researchers and agencies gain maximum benefit from GBIF. GBIF regional networks provide a framework for national and organizational stakeholders to collaborate more closely, particularly when addressing challenges and opportunities they share.
- **Data Publisher** – Data-holding institutions, agencies and individual researchers are the foundations on which GBIF depends. GBIF has a responsibility to ensure that data publishers have access to the tools and support that they need and that they receive recognition for their work and contributions.

This Implementation Plan seeks to address needs at all three of these levels while aiming to reinforce the value of GBIF for stakeholders at each level.

A particular requirement is for the GBIF network to maintain and coordinate software to support each of these levels and to ensure that the publication, integration, management and use of data are as efficient as possible.

At the global level, GBIF focuses on delivery of [GBIF.org](http://GBIF.org) as a software platform to support both human users and tools (via web services). Many of GBIF's goals depend on being able to deliver a fully integrated view of all data from all sources in the best possible forms.

At the data publisher level, GBIF maintains the Integrated Publishing Toolkit (IPT) as its default tool for sharing GBIF-compatible data. Ongoing enhancements are required to increase both the usability of this tool and the value that its services provide to data publishers. At the same time, GBIF seeks to support GBIF-compatible data publishing via other tools such as collection management systems and citizen science platforms.

At the Participant level, several efforts have been made to deliver generic portal tools to assist node managers in their work and to deliver value at the national level. The most significant roles for such a platform would be to:

- Enable national- or regional-level integration and curation of datasets
- Enhance data records to reflect national administrative units and national species lists
- Provide tools that meet the requirements of national or regional researchers, policymakers and the general public

Over the last few years, a growing number of GBIF Participants have collaborated to leverage Australia's investment in the *Atlas of Living Australia* (ALA) and to customize these tools to deliver their own portals. The Implementation Plan responds to this with a focus on increasing community development and support to deliver a reusable and sustainable portal toolkit based on the ALA tools. This approach not only benefits Participants already committed to using these tools, but also provides a solution for rapid adoption by other Participants at national, regional, or even thematic levels. In addition, Belgium has indicated an interest in exploring the potential for an alternative lightweight solution based on repository tools such as [CKAN](#).

The vision for the technical aspects underlying this Implementation Plan is that the components developed and offered by the GBIF network at each scale should combine to deliver a robust solution to support GBIF data management and that together they should continue to evolve to support a leading international data infrastructure. One aspect of this will be to ensure that all users can share and reuse common components such as data validation tests and that GBIF promotes and fosters wider activity around open projects.

GBIF is more than just a technical network, and this Implementation Plan also addresses the capacity enhancement, networking, communication and reporting activities necessary to advance GBIF's work in these areas. Since it is impossible for GBIF to support all aspects of its network using core funds, this plan focuses on resources which will support the work of GBIF Participants and data holders everywhere, coordinating the skills, expertise and investment of the whole network to maximize benefits to all stakeholders.

### Timeline

None of the priorities, or the more specific goals identified for each priority, can be achieved in a single year; each will require coordinated effort across multiple annual work programmes. This document describes the set of activities currently recognized as important to deliver the Strategic Plan over the five-year period. It will be revised and expanded as required each year to address changes in the landscape in which GBIF operates.

This Implementation Plan was presented to the Governing Board for approval at GB23, accompanied by the Annual Work Programme for 2017 (presented on page 50 following of this document). Both components were approved at the meeting, subject to the following additions, which are included in this final version:

- The version submitted to the Governing Board did not yet include some of the 2017 commitments from GBIF participants. These have been added to this version of the document.
- The Governing Board recognized the challenge represented by a continued decline in GBIF budgets in real terms, and acknowledged that, based on funding committed at the time, it would not be possible for GBIF to fund all activities normally included in its annual calendar. However, concern was expressed both at the proposed exclusion of the Ebbe Nielsen Challenge and Young Researchers Awards and also at the proposal for a significantly reduced programme of activity around the 2017 Governing Board meeting. Accordingly, the GBIF Secretariat committed to seek

additional sources of funding with the aim of reinstating these components if possible.

Additional commitments from GBIF Participants or others to contribute or deliver particular elements will be welcomed during 2017 and onwards.

## Resources

GBIF has a range of resources for use in delivering its programme of activity, including core funding from annual Participant contributions, supplementary funds (including [BID](#) and [BIFA](#) and funds received for activities within other projects), and investments by GBIF Participants.

These resources combine as follows:

- **Core Funding**
  - Supports GBIF Governance structures (Governing Board, committees)
  - Supports staffing and operation of GBIF Secretariat to coordinate global activity, including:
    - Delivery of global-level IT infrastructure (GBIF.org)
    - Coordination of delivery of software components to support Participants and Data Publishers
    - Coordination of capacity enhancement activity and information materials for Participants, Data Publishers and Users
    - Coordination of supplementary-funded activity and Participant investments in shared GBIF activity
    - Monitoring and reporting usage and benefits
    - Administrative support for GBIF activities
    - Communication, outreach and partnership activities
  - Limited funds to support workshops, capacity enhancement and developments to expand or enhance GBIF
- **Supplementary Funding**
  - Additional funds to support workshops, capacity enhancement and developments to expand or enhance GBIF
  - Funding to support Participants and Data Publishers with content mobilisation or development of national Biodiversity Information Facilities
- **Participant Investments**
  - Operating GBIF nodes
  - Engaging with and supporting data publishers and users
  - Curating data from Data Publishers
  - Additional funds or staffing to support workshops, capacity enhancement and developments to expand or enhance GBIF

In past years, Annual Work Programmes have been developed to reflect the use of Core Funding, but this Implementation Plan is intended to offer a framework for GBIF Participants and other stakeholders to take leadership in delivering some of the identified activities and tasks. Where possible, Participants are encouraged to seek funds or allocate staff time to enable progress in areas beyond those for which Core Funding is adequate.

All such commitments reported by GBIF participants have been included within the 2017 Annual Work Programme and will be reported as part of GBIF's work during the year. Additional Participant commitments will be most welcome at any stage in the implementation of the 2017 Annual Work Programme and for inclusion in subsequent Annual Work Programmes. Examples of such commitments include (but are not limited to):

- Organization of workshops to develop required new standards or best practice recommendations
- Capacity enhancement and training at regional or global levels
- Development of tools or software components to advance GBIF's work
- Representation of GBIF in international fora
- Recruitment of additional GBIF Participants

Please advise the Secretariat at the earliest possible opportunity of any such proposed commitments. A form is made available for this purpose.

### Implementation Plan structure

The Implementation Plan is structured around the five priorities identified in the GBIF Strategic Plan 2017-2021. These are presented here in reverse order from their sequence in the Strategic Plan, and numbered accordingly. This reordering allows the Implementation Plan to place its initial focus squarely on the global network of GBIF Participants and data publishers, building on these foundations to address in turn GBIF's informatics, content mobilization, curation and delivered products.

For each of the five priorities, the plan presents a series of numbered **Activities**. These are the major areas where GBIF needs to develop further in the coming period. A rationale and implementation approach is presented for each Activity.

Based on the implementation approach, each Activity includes a series of **Tasks**. These Tasks are the items that the Annual Work Programmes need to address. They are presented here as a table, at the end of each section describing the Activity.

Where activity is expected on a Task during 2017, it has been coloured green and includes information on the allocated resources. All such Tasks are collated in the [Annual Work Programme 2017](#).

The "Start" column indicates whether each Task will be commenced in 2017, or otherwise whether it should ideally commence early in the five-year period or may be deferred to the middle or later in the period.

The "Participant activity" column indicates where GBIF Participants may contribute through the ongoing activities of their nodes and/or where particular Participants have declared an interest in leading or contributing to a Task.

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## Priority 1 – Empower Global Network

*“Ensure that governments, researchers and users are equipped and supported to share, improve and use data through the GBIF network, regardless of geography, language or institutional affiliation.”*

### Activity 1a - Focus on people

#### Rationale

GBIF is the result of work by thousands of people in agencies and institutions worldwide. This network’s long-term sustainability depends on demonstrating the value of such contributions and justifying continued investment of effort.

The GBIF Secretariat can enhance efforts to develop capacity within the network and build an effective distributed help desk system that acknowledges and showcases relevant skills and experience that people across the network possess. Users of GBIF data products would also benefit from showcasing the network’s indispensable human resources and their impact on assessing and improving biodiversity data.

For these reasons, the next round of improvements to GBIF.org should enhance the network’s capacity to serve as a hub for the GBIF community by identifying its active contributors, integrating information on their relevant GBIF activities, and supporting broader knowledge exchange and skill development.

#### Approach

The key task is to enhance GBIF.org to connect and display information on its contributors and other users of the site. This may include contact details (subject to individual control), formal roles (e.g. within participant delegations; in connection to publishing/improving datasets; based on training experience) and online participation in help desk discussions. Whether through the use of existing social or commercial platforms or through custom web application development, GBIF.org should absorb activity currently handled through the separate GBIF community site. GBIF should also build on experience during 2015-2016 in using digital badges to identify skills held by individuals. Such community functions will support the operation of GBIF Task Groups, externally funded projects like BID, and engagement of expert groups to curate GBIF data.

#### Tasks

Task number	Description	Start	Secretariat staff	Allocated funding	Participant activity
1.a.i	Develop mechanisms to support and reflect the skills, expertise and experience of individual and organizational contributions to the GBIF network (including revision of identity management system and integration of ORCID identifiers)	2017	Participation 0.15 FTE Informatics 0.6 FTE Data Products 0.1 FTE		
1.a.ii	Consolidate use of digital badges to record skills and contributions	2017	Participation 0.1 FTE		Align with / contribute to consistent criteria for recognizing skills (possible workshop, links to national training programmes) BELGIUM, SPAIN: plans to align with national programmes

See also:

- [1b. Strengthen skills](#) - help desk and training activities build on community portal functions
- [1c. Equip nodes](#) – GBIF.org should highlight role of node managers and staff
- [1d. Equip data publishers](#) – proper credit should be given for data publishers
- [3c. Engage data holders](#) – stronger community support and help desk to support data publishing
- [4c. Enable data curation](#) – a community structure is required before GBIF can support engagement with experts as data curators

## Activity 1b - Strengthen skills

### Rationale

The strengthening of personal skills through international collaboration has been one of the great successes of the GBIF global network. During this implementation period, GBIF must build on this past experience (including the support mechanisms developed for the BID programme) to reinforce efficient training and capacity enhancement across the network. Central to this is the development of a collaborative help desk capability and the alignment of relevant aspects of national training initiatives with a global curriculum to facilitate direct reuse of resources.

### Approach

To strength key skills, GBIF needs to develop and maintain a comprehensive set of clear reference information and training materials that support all GBIF audiences. During 2016, the Secretariat has been upgrading documentation to deliver this comprehensive resource, first via concise explanatory text materials (including numerous translations by network members into French, Portuguese, Spanish, Chinese, Japanese and Russian). By the end of 2016, some of these text materials will be supported by short videos that present key functional and operational aspects of GBIF. The aim is to deliver a structured set of short, clear, current and complete documents that enable GBIF stakeholders to gain an understanding of relevant aspects of GBIF's work quickly, including formal Participation, establishing a national or thematic node, planning digitization, mobilizing data, discovering and using data, citing data, among others. This work complements significant activity among Participants to produce information and training materials relevant to particular audiences.

GBIF will organize all these materials to form a curriculum that builds and supports the skills and activities identified in GBIF's self-assessment tools for nodes and data holders. A core set of these resources should provide new stakeholders with an effective introduction to GBIF's structure, roles, approaches and solutions. Other more technical resources will provide the additional detail needed by those working in specific areas like digitization, data publishing and use of GBIF-mediated data. The Secretariat will coordinate ongoing maintenance and updates to this curriculum with contributions and translations from the network.

### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
1.b.i	Develop collaborative help desk capability – including discussion groups, support materials and FAQs	2017	Participation 0.1 FTE Informatics 0.1 FTE Data Products 0.6 FTE Including offset of €50K from BID	€50K BID for mentors, etc.	Engage national experts to provide support to others through GBIF collaboration mechanisms BELGIUM: Support help desk activity
1.b.ii	Articulate training and capacity enhancement activities around a single, global curriculum for GBIF	2017	Participation 0.1 FTE		Align training activities to the GBIF global curriculum and its certification mechanisms FRANCE: organize and deliver training session SPAIN: coordinate efforts

					<p>around training nodes staff; operate e-learning platform</p> <p>GERMANY: Each year, 4-5 one-day Diversity Workbench <a href="#">workshops</a> are offered</p>
1.b.iii	Deliver explainer texts and videos to support self-directed instruction and learning	2017	Participation 0.25 FTE		<p>Contribute to review, adaptation and translation of both written and video explainers</p> <p>FRANCE: French explainer texts and videos</p> <p>SPAIN/COLOMBIA – Spanish video tutorial on GBIF data publishing</p>

See also:

- [1a. Focus on people](#) - acknowledgement of skills and contributions in the area of training and capacity
- [1c. Equip nodes](#) - capacity enhancement and support directed to nodes teams
- [1d. Equip data publishers](#) – documentation and help desk must support data publishing
- [1e. Expand national participation](#) – improved information materials will assist with communicating benefits of national participation
- [3c. Engage data holders](#) – improved information materials will assist with engagement of new data holders
- [4b. Assess data quality](#) – GBIF data quality approaches must be clear and well documented
- [4c. Enable data curation](#) – as GBIF seeks to engage experts to curate data, processes and tools must be clear and well documented
- [5a. Engage academia](#) – broader engagement with academic bodies, universities and libraries will require clear standalone information resources

## Activity 1c - Equip Participant nodes

### Rationale

By coordinating national, regional and thematic networks, Participant nodes play an essential role in helping GBIF engage the broadest possible community of institutions, initiatives and individuals engaged in biodiversity informatics. GBIF must provide learning materials and tools to support nodes efficiently as they work to mobilize biodiversity data, promote the reuse of available data and support users by improving data management and quality. Preferred approaches enable any one node to invest in developing tools and capacity that others can easily leverage for the benefit of the whole community. The skills and experience of the node managers and other team members are recognized as uniquely valuable in helping new Participants establish their nodes and allowing the community to develop together.

### Approach

GBIF promotes capacity self-assessment as a tool to help nodes with planning and tracking progress at all stages in the development of national biodiversity information facilities. The results of these assessments can also identify important capacity needs to address with learning materials, tools and collaborative projects. The reuse and adaptation of the Atlas of Living Australia's open-source software tools by a growing community of nodes between 2013 and 2016 is an example of successful collaboration based on the mutual needs of the countries involved. Additional support for this international partnership will allow still more nodes to benefit from the collective resources and expertise to build websites that provide biodiversity data and services to a range of national and regional user communities. The nodes' teams will also engage in collaborative helpdesk activities to enable them to share knowledge across the scientific and technical domains handled by the nodes.

### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
1.c.i	Perform ongoing nodes capacity self-assessment	2017	Participation 0.05 FTE		Perform capacity self-assessment to support planning and monitoring of progress in national activities
1.c.ii	Build reusable national/regional platform tools centred on ALA software	2017	Informatics 0.25 FTE		Contribute staff time to help desk support for national platform implementation Contribute (in coordination with ALA team) resources for development or customization of ALA tools AUSTRALIA: at least one FTE to support national/regional development/deployment; staff time to help support development activity, hackathons, etc. FRANCE: half an FTE to

					work on national portals (France, Benin...)  SPAIN: assist other nodes with deployment PORTUGAL: build reusable national/regional platform tools, based on ALA software; ALA promotion in related countries
1.c.iii	Develop online collaboration through GBIF.org helpdesk to assist and mentor node managers	2017	Participation 0.1 FTE Administration 0.3 FTE		Contribute expertise in node management by participating in the helpdesk  BELGIUM, FRANCE: support for helpdesk
1.c.iv	Explore alternative options for lightweight national portal solutions, e.g. CKAN	2017			BELGIUM: Lead evaluation of options

See also:

- [1a. Focus on people](#) - acknowledgement of roles and contributions of those engaged in the nodes' teams
- [1b. Strengthen skills](#) - resources to support the learning of members of the nodes' teams that can also be adapted for reuse within their networks
- [1e. Expand national participation](#) – better tooling and support for nodes is an incentive for broadened participation
- [1f. Plan implementation](#) – implementing this plan requires strong nodes to take leadership and build national capacity
- [1g. Coordinate resources](#) - programmes supporting the development of fundable collaborative projects and capacity exchange and between the nodes
- [2c. Catalogue collections](#) – nodes are central to understanding and cataloguing national collections
- [3c. Engage data holders](#) – nodes lead in engagement with data holders, including collections, citizen science groups, consultants, universities, government agencies, etc.
- [4c. Enable data curation](#) – data curation mechanisms need to build on nodes capacity and engage with national bodies
- [5a. Engage academia](#) – nodes are the primary interface between GBIF and national academic bodies and universities
- [5b. Document needs](#) – nodes contribute to understanding data requirements and best practices and may take leadership in new fitness-for-use investigations
- [5d. Assess impact](#) – understanding and presenting GBIF's impact will support nodes in demonstrating the value of engagement and data publishing

## Activity 1d - Equip data publishers

### Rationale

Data publishers are an essential component of the GBIF network as they share their content through the common infrastructure. More than 800 data publishers actively distribute datasets through GBIF.org, and their ranks increase steadily. Publishers from different parts of the world often face unique challenges, though common themes emerge. These problems range from lack of data publishing experience or skills, lack of equipment, language barriers, difficulties in managing data hosting facilities, and the inability to publish high-quality data or curate data into the future. The Integrated Publishing Toolkit (IPT) requires ongoing improvements and enhancements, including the establishment of hosted instances that reduce the technical burden on data publishers.

### Approach

Following the model of the self-assessment tool for node managers, the Secretariat has developed a self-assessment tool for data publishers as part of the support for the BID programme, which will guide the work with collection managers and other data holders to assess and prioritize areas for capacity enhancement or investment. The Secretariat already operates instances of the IPT that data publishers lacking their own infrastructure may use, and Participants are encouraged to deploy instances of the IPT or other GBIF-compatible data publishing software to support data holding institutions. Planned enhancements to the IPT will simplify publishing pathways using spreadsheet templates as an alternative for the less advanced data publishers. GBIF will improve reporting to data publishers on both quality aspects of their data and uses of data documented through download DOI citations.

### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
1.d.i	Promote and support capacity self-assessment for data holders	2017	Participation 0.05 FTE		Promote and guide self-assessments BELGIUM: promote self-assessments
1.d.ii	Promote publication of collection metadata	2017			Include collection metadata as part of data mobilization FRANCE: promote metadata publication
1.d.iii	Simplify data publication pathways (spreadsheet-level publishing)	2017	Data Products 0.05 FTE		FRANCE: French language version NORWAY: explore collaboration around IPT enhancements GERMANY: 0.2 FTE - <a href="#">Diversity Workbench</a> team is implementing SQL databases, clients, web interfaces, services, and workflows and procedures to deliver stand-compliant occurrence data and

					checklist data for GBIF
1.d.iv	Manage IPT feature upgrades	2017			FRANCE: update versions for France, Madagascar, Togo, etc.
1.d.v	Operate hosted IPT infrastructure	2017			FRANCE, PORTUGAL: host IPT services
1.d.vi	Consolidate NSG-led endorsement process	2017			NODES: Efficiency in communications and decision making to speed up endorsement – including a stated endorsement policy and service level agreement where appropriate
1.d.vii	Develop online collaboration through GBIF.org helpdesk to assist and mentor data publishers	2017	Participation 0.05 FTE Data Products 0.1 FTE		Volunteer expertise in mentoring and helpdesk support BELGIUM, FRANCE, SPAIN: support for helpdesk
1.d.viii	Provide clear online reporting of the use of data for data publishers	2017	Data Products 0.05 FTE		FRANCE: feedback at national level

See also:

- [1a. Focus on people](#) – GBIF.org needs to give credit to data publishers and support them through the help desk
- [1b. Strengthen skills](#) – documentation and help desk for data publishing
- [2a. Modernize data standards](#) – improvements are required to clarify and simplify key aspects of representing biodiversity data
- [2b. Deliver names infrastructure](#) – data publishers would benefit from a more robust and comprehensive taxonomic framework
- [2c. Catalogue collections](#) – cataloguing collections will highlight opportunities to digitize collections and mobilize their data
- [3a. Identify priority gaps](#) – identified gaps may support efforts to mobilize data
- [3b. Expand data streams](#) – GBIF should ensure tools and documentation support all relevant sources of data
- [3c. Engage data holders](#) – tools and documentation will assist with convincing data holders to publish data
- [3d. Rescue datasets](#) – community assistance is a mechanism to support data publishing
- [3e. Liaise with journals](#) – better visibility for data in research publications

- [4a. Ensure data persistence](#) – assistance with long-term management of data
- [4b. Assess data quality](#) – includes feedback to publishers on potential improvements
- [4c. Enable data curation](#) – opportunities for broader involvement in improving data
- [5d. Assess impact](#) – visibility for the important role of data publishers

## Activity 1e - Expand national participation

### Rationale

GBIF’s national membership has remained largely static in recent years. Active participation in the network is confined to a limited number of regions, with the most dynamic activity in node collaboration and data publication focused in Western Europe, North America, Latin America, Oceania, increasingly sub-Saharan Africa and limited parts of Asia. Thus, significant parts of the world have little or no direct involvement in GBIF’s activities, which poses a risk to the long-term credibility of GBIF as a global collaborative network. Secretariat staff and existing Participants constantly engage potential new members through ad hoc contacts, but the situation calls for a more strategic approach to expand membership.

### Approach

The Secretariat will compile and maintain an up-to-date register of the status of GBIF engagement and relevant contacts in all countries, providing the Governing Board with an annual review that analyses progress and remaining gaps in membership across each region. Following the development of a coordinated engagement plan for each region, Participants and regional groups with strong contacts to relevant agencies in other governments may take the lead in engagement. The Secretariat will continue to develop strategic engagement through the CBD and other intergovernmental networks, as well as through the BID programme and other capacity-related activities. Adapting the GBIF.org interface to support key content in multiple languages will seek to address language barriers to national expansion, with targeted translation carried out both through external contracts and in-kind services provided by Participants.

### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
1.e.i	Ensure GBIF.org interface and key content supported in relevant languages	2017	Participation 0.1 FTE Informatics 0.2 FTE		Support for translation BELGIUM, FRANCE, PORTUGAL: translation of key materials
1.e.ii	Improve coordination and mechanisms for engaging new countries	2017	Participation 0.1 FTE Administration 0.3 FTE		Responsibility to lead engagement activities with neighbouring/related country governments FRANCE: activity under SEP2D PORTUGAL: Lead engagement and improve coordination with related countries
1.e.iii	Provide Governing Board with annual review and	Mid			

	progress assessment for GBIF status and engagement in all countries			
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See also:

- [1b. Strengthen skills](#) – clearer documentation, tools and basic information will assist with engaging national stakeholders
- [1c. Equip nodes](#) – support for establishing nodes will reinforce case for engagement
- [1f. Plan implementation](#) – all GBIF stakeholders to work together to plan and support engagement with additional countries
- [1g. Coordinate resources](#) – Secretariat to coordinate activity by GBIF Participants to engage national governments
- [5a. Engage academia](#) – increased national participation will enable linkages with additional academic communities
- [5d. Assess impact](#) – demonstrating GBIF's impact will support approaches to new countries

## Activity 1f - Plan implementation

### Rationale

Implementing this plan hinges on effective coordination with the plans of individual GBIF national and organizational Participants. GBIF must also ensure that node activities are well recognized and integrated with other biodiversity research and informatics initiatives at national, regional and organizational levels.

### Approach

To make national-scale implementation more central across the GBIF network, the Secretariat will consult with the Governing Board on models for unifying aspects of the work of the Nodes Committee into Governing Board meetings. The Secretariat also seeks funds to increase the scope of nodes meetings to include work to develop proposals for fundable activities aligned with this Implementation Plan, particularly by addressing regional priorities. The GBIF Secretariat will also engage organizational Participants to develop specific memoranda of cooperation in key areas and to identify and support alignments with this Implementation Plan and opportunities for joint organization of meetings and workshops.

### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
1.f.i	Develop better integration between nodes activities and Governing Board processes	Mid			
1.f.ii	Expand regional meetings to serve as GBIF community Implementation Planning conferences and opportunities to develop fundable programmes of work	2017	Participation 0.5 FTE Administration 0.2 FTE	€60K BID for Caribbean and Pacific regional meetings  €35K BIFA for Asian regional meeting	Additional funding to expand scale and scope of regional meetings  Opportunity to seek GBIF capacity enhancement funds to seed such meetings JAPAN – BIFA funding
1.f.iii	Increase alignment between GBIF work programmes and activities of each GBIF Organizational Participant and Affiliate	2017	Participation 0.15 FTE Executive Secretary 0.1 FTE		CHINESE ACADEMY OF SCIENCE – Funding for one-year secondment to work at GBIF Secretariat, particularly on data mobilization from Asia
1.f.iv	Explore increased alignment and joint organization of workshops with other networks such as TDWG, SPNHC, GEO BON, RDA, etc.	2017			Proposals for GBIF conferences (e.g. on model of GBIC in 2012) USA (USGS) – assist GBIF with

					DataONE participation
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See also:

- [1c. Equip nodes](#) – reinforce mechanisms for nodes planning and implementation
- [1e. Expand national participation](#) – work together to seek new Participants
- [1g. Coordinate resources](#) – shared planning supports better alignment of resources
- [2a. Modernize data standards](#) – aligning plans with other informatics activities depends on clearer data models
- [2b. Deliver names infrastructure](#) – requires joint plans with other projects and organisations
- [2c. Catalogue collections](#) – requires joint plans with other projects and organisations
- [3a. Identify priority gaps](#) – prioritisation is a key stage in planning implementation
- [3b. Expand data streams](#) – requires broad shared strategy
- [5b. Document needs](#) – needs should help to determine implementation
- [5c. Support biodiversity assessment](#) – requires joint plans with other projects and organisations

## Activity 1g - Coordinate resources

### Rationale

Among its other roles, the GBIF Secretariat coordinates efforts to expand the scale and scope of GBIF activity beyond the levels achievable using only annual core Participant contributions. GBIF Participants commit to establish and operate nodes that serve as significant centres for GBIF activity. Some nodes have sufficient resources to contribute skills and developments that advance GBIF's work, while others may require external support to become fully active. A limited amount of funding has been allocated each year under the GBIF work programme to support capacity enhancement for GBIF nodes. GBIF or individual Participants may also secure supplementary funds to contribute to particular areas of GBIF work. Improved coordination of these various resources will assist GBIF to advance more rapidly at all scales.

### Approach

This Implementation Plan itself provides a framework for organizing information on Participant and supplementary fund resources to complement GBIF's core funding. The GBIF Secretariat seeks information from all Participants on planned activities and commitments which may help to advance the work of other Participants or GBIF globally – examples may include funding for workshops; committed resources to develop tools, standards or best practices; mentoring actions; etc. These will be recorded as part of the overall GBIF Work Programme and updates will be presented in the GBIF annual report. A shared Implementation Plan also offers the opportunity for GBIF (either the Secretariat or Participants) to develop concept notes to seek supplementary funding to target currently unfunded or underfunded areas. The annual Capacity Enhancement Support Programme budget includes only limited funds, but existing supplementary funds (in particular BID and BIFA) align with these funds and leverage CESP tools and processes. Future supplementary funds should follow a similar model.

### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
1.g.i	Secretariat to coordinate participant-led activities aligned with Work Programme (process and models to support participant commitments)	2017	Executive Secretary 0.1 FTE		Secure supplementary funds for GBIF activities  Secure funding for extra personnel (any location) to work on GBIF regional or thematic activities
1.g.ii	Development of concept notes/proposals for supplementary funding at regional or global scales	Mid			
1.g.iii	Operate annual Capacity Enhancement Support Programme (CESP) with core funds, aligned with supplementary	2017	Participation 0.1 FTE Administration 1.0 FTE	€80K core for CESP call  €1,300K BID for Caribbean	Identifying or securing additional capacity enhancement funds and aligning with GBIF CESP

	investments			and Pacific calls and second African call	
				€100K BID for Caribbean and Pacific training events	
				€80K BIFA for Asian projects	
1.g.iv	Ensure that BID programme and other supplementary funds align with and reinforce CESP and GBIF community, online resources and infrastructure	2017	Executive Secretary 0.1 FTE Participation 0.5 FTE Administration 0.5 FTE  Including €60K from BID and €31K from BIFA for coordination and visibility		
1.g.v	Align Ebbe Nielsen Challenge and Young Researcher Awards with GBIF priorities	Early		No budget in 2017	

See also:

- [1c. Equip nodes](#) – nodes are the primary focus for use of nationally aligned GBIF activity
- [1e. Expand national participation](#) – coordinate GBIF resources to seek new country Participants
- [1f. Plan implementation](#) – plans underpin coordinated activity
- [5d. Assess impact](#) – understanding impact will assist with future coordination

## Priority 2 – Enhance Biodiversity Information Infrastructure

*“Provide leadership, expertise and tools to support the integration of all biodiversity information as an interconnected digital knowledgebase.”*

### Activity 2a - Modernize data standards

#### Rationale

The GBIF network participants are able to reliably exchange data thanks to their adherence to a set of standards. As GBIF looks to grow in capability, enable exchange of richer content and improve the quality of data, the standards must be revised and evolve accordingly. Current standards adopted by GBIF are not yet adequate to accommodate the needs expressed by many potential and existing data publishers. Weaknesses in the model have led to ambiguous or over-complex data representations and unclear documentation, leading to difficulties in data integration and use. The main issues relate to uncertainties around the use of Darwin Core record types, the basisOfRecord element, and the use of Core and Extension vocabularies. Reviewing and updating the core domain model, tightening up the vocabularies and documentation and adopting more robust exchange standards will result in an easier to use, and a wider reaching GBIF data exchange network.

#### Approach

GBIF will work with TDWG and other key stakeholders to review existing solutions for a common domain model, working towards agreement on a model to adopt with key partners. This conceptual model should cover the main components of biodiversity information (the domain “classes” such as Specimen, Collection, TaxonName, TaxonConcept, Publication, Sequence) and document the mandatory and recommended properties expected for each component and the vocabularies that should control the properties. A review of existing vocabularies and their current uses will be undertaken and revisions and new vocabularies will be proposed where necessary. A revision of the Darwin Core Archive mechanism and supporting tools, such as the publishing toolkit (IPT) and the data validator, will be undertaken to accommodate the richer content model and the new recommendations from the W3C CSV on the Web working group. GBIF should continue discussions with other key global biodiversity data infrastructures to develop comprehensive catalogues to support discovery and normalization of instances of the most critical domain classes (particularly TaxonName, TaxonConcept, Collection, Specimen, TaxonOccurrence).

In addition to completing this knowledge graph, GBIF should be equipped to link between people, datasets, cited use and funding agencies through the correct attribution chains using e.g. Digital Object Identifiers (DOIs) and Open Researcher and Contributor ID (ORCID) as potential mechanisms.

#### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
2.a.i	Promote development of a shared domain model for sharing and linking all components of biodiversity information	2017	Informatics 0.3 FTE		GERMANY: DFG-funded development of platform providing ABCD concepts in machine-readable form, with versioned documentation. This will remove the dependency of ABCD concepts on XML schema and will offer an ontology for the

					Semantic Web.
2.a.ii	Lead a review of the Darwin Core vocabulary and associated extensions to ensure consistency and full alignment with a shared domain model	Mid			NORWAY, USA (OBIS) – ready to contribute to Dwc review
2.a.iii	Explore opportunities to increase accessibility of biodiversity data through evolution of Darwin Core Archive formats to W3C CSV on the Web formats	2017	Informatics 0.3 FTE		Outsourced / cofounded development opportunities
2.a.iv	Explore models to enable GBIF and other biodiversity infrastructures to deliver comprehensive global catalogues of instances of key data classes	Mid			Investment in GBIF and key biodiversity infrastructures
2.a.v	Improve management of trait data of relevance to GBIF	Mid			AUSTRALIA: Convene/support workshop to create shared vision for managing trait data. Contribute to development work to support vision.

See also:

- [1d. Equip data publishers](#) – improvements to standards can simplify and improve tools and documentation
- [1f. Plan implementation](#) – changes will require coordinated activity with TDWG and other partners
- [2b. Deliver names infrastructure](#) – should reflect broader standards model
- [2c. Catalogue collections](#) – should reflect broader standards model
- [3b. Expand data streams](#) – expansion to new categories of occurrence and sample data should offer clarity around provenance and evidence type
- [4b. Assess data quality](#) – improvements will simplify and enhance quality processing
- [4c. Enable data curation](#) – data curation should build on clear data standards
- [5c. Support biodiversity assessment](#) – depends on clear standards for underlying evidence

## Activity 2b - Deliver names infrastructure

### Rationale

The most significant challenge to improving the quality of aggregated occurrence data is the continuing need for a comprehensive checklist of known species, and even for a comprehensive list of published scientific names. Interpreting and mapping names depends on the quality and completeness of these resources. Even in cases where names in occurrence records are incorrect or misspelled, better names infrastructure can assist by increasing confidence that fuzzy match algorithms or human intervention is required. Delivering these resources is the focus of a number of GBIF Participants and other stakeholders, including the Catalogue of Life partnership, WoRMS, nomenclators (IPNI, Index Fungorum, ZooBank) and many national, regional or taxonomic databases. A comprehensive resource for scientific names and taxon concepts organized at least as a workable reference classification (but with support for additional classifications as appropriate) would also benefit other infrastructures, including Encyclopedia of Life, Biodiversity Heritage Library, Barcode of Life and GBIF nodes, and improve interoperability between data from these infrastructures. It would also be beneficial to accommodate vernacular names, informal names for undescribed species and other identifiers such as Barcode Index Numbers.

### Approach

GBIF and many other partners have worked on this challenge and much progress has been made, but we are still far from a comprehensive shared solution. GBIF has been in discussion with Catalogue of Life, EOL, BHL, BOLD Systems, nomenclators and others about pooling resources to deliver the best possible complete nomenclator and catalogue of all species, along with improved tools to enable the taxonomic community to own and maintain these resources more effectively. The challenges are not primarily informatics issues. The most important requirement is to understand the constraints and needs of existing content holders and the features that are required from an infrastructure that can be embraced by the majority of taxonomists. The solution must build on existing initiatives and give sufficient credit and benefit back to those who have invested in developing data. It must be flexible enough to accommodate existing well-managed datasets without disrupting their activity and to accommodate more open mechanisms to support wide community input for taxa that need more work. In the longer term, it should support evolution towards ownership of curation responsibilities by international taxonomic societies or other bodies recognized by researchers for each group. The infrastructure should include processes to review and interpret unrecognized name strings found by GBIF and others in aggregated data. Once these requirements have been resolved, implementation must rapidly follow to offer these resources as open public datasets for use by all.

The Netherlands has coordinated a significant commitment for 2017 and 2018, led by NLBIF and including resources both from Species 2000 and Naturalis. This funding will enable GBIF and partners to direct significant effort to this area over the period.

### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
2.b.i	Partner with other biodiversity informatics initiatives and taxonomic database holders to plan and deliver a comprehensive nomenclatural dataset and working consensus	2017	Executive Secretary 0.1 FTE Data Products 0.2 FTE Informatics 0.2 FTE	80,000 €	Host meetings with content holders and relevant initiatives Lead engagement with taxonomic societies NETHERLANDS: Initiate and fund a

	classification for all life				<p>dedicated development team of stakeholders and experts</p> <p>AUSTRALIA: plan/host workshops; participate in development</p> <p>SPECIES 2000: 0.2 FTE</p> <p>BHL: contribute to comprehensive nomenclatural dataset</p> <p>GERMANY: Developing and implementing an online registration system for algal names and nomenclatural types. Building a taxonomic index and supplying checked names for the GBIF names-backbone.</p>
2.b.ii	Promote publication of species checklists through GBIF network	2017			FRANCE, SPAIN: promote checklist publication
2.b.iii	Explore potential use of checklists to assist with data validation or derive augmented data products	Mid			
2.b.iv	Explore integration of Linnaean nomenclature of formally described taxa with provisional names and species hypotheses and OTU naming	Late			

See also:

- [1d. Equip data publishers](#) – key tool to support data publishers in improving data
- [1f. Plan implementation](#) – requires joint activity with multiple partners
- [2a. Modernize data standards](#) – part of broader standards revision
- [3a. Identify priority gaps](#) – complete taxonomy would assist with evaluating taxonomic coverage
- [3c. Engage data holders](#) – benefits for data holders in linking to consistent framework
- [4b. Assess data quality](#) – lack of complete checklist a limit on quality processing
- [4c. Enable data curation](#) – curation of taxonomic framework and taxonomic aspects of other data

- [5a. Engage academia](#) – need to engage effectively with taxonomic societies and nomenclatural codes
- [5c. Support biodiversity assessment](#) – taxonomic organisation of data fundamental

## Activity 2c - Catalogue collections

### Rationale

Natural history collections are the largest source of data on biodiversity outside nature itself. Collectively the world's natural history collections number about 3 billion specimens and document over 300 years of active human exploration of biodiversity on earth. In addition the fossil remains provide us with glimpses into the very far past before humans existed. The collections and their ancillary materials (images, collectors' notes, sequences, measurements, etc.), contain colossal amounts of data that should be digitized and shared. Only about 10% of the world's collections have been digitized and only a portion of digitized collections are shared publicly through the Internet. A large number of current GBIF publishers comprise natural history museums and herbaria. The Secretariat will work with Participants to deliver the most comprehensive catalogue possible of collections, including metadata to publicize undigitized collections as a first step towards their digitization and mobilization.

### Approach

GBIF will collaborate with existing biodiversity collection registries such as GRBio to develop a rich collections catalogue to facilitate the discovery and use of the world's collections. Collections will be guided and facilitated to publish metadata-only datasets by drawing on the recommendations of the GBIF task force on accelerating the discovery of bio-collections data. The generation of a collection catalogue through metadata assessments will help establish roadmaps for further digitization of the collections.

### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
2.c.i	Partner with other biodiversity informatics initiatives to deliver a single, comprehensive catalogue of the world's natural history collections	Mid			Collect data for catalogue
2.c.ii	Use collection metadata as a first stage in content mobilization from natural history collections, including identification or development and adoption of necessary data standards	2017	Participation 0.05 FTE Data Products 0.05 FTE Informatics 0.1 FTE		Promote publishing metadata-only datasets BELGIUM, FRANCE, PORTUGAL: promote metadata publishing

### See also:

- [1c. Equip nodes](#) – nodes contribute to and benefit from data on collections
- [1d. Equip data publishers](#) – assisting collections in publicising their holdings is a route towards seeking funding for digitisation
- [1f. Plan implementation](#) – need to coordinate with GRBio and other catalogues
- [2a. Modernize data standards](#) – catalogue should build on common data standards
- [3a. Identify priority gaps](#) – knowledge of collections can assist with identifying digitisation opportunities
- [3c. Engage data holders](#) – catalogue can assist with engagement of collections as publishers

- [5a. Engage academia](#) – catalogue should be an operational tool for researchers
- [5b. Document needs](#) – fitness-for-use groups may identify priority collections for mobilisation
- [5d. Assess impact](#) – catalogue can measure progress in global digitisation

## Priority 3 – Fill Data Gaps

*“Prioritize and promote mobilization of new data resources which combine with existing resources to maximize the coverage, completeness and resolution of GBIF data, particularly with respect to taxonomy, geography and time.”*

### Activity 3a - Identify priority gaps

#### Rationale

GBIF has a range of tools, including fitness-for-use groups, other community consultations, feedback channels, direct communication with authors of scientific studies, and societal demands, to identify and collect data needs. The Ebbe Nielsen Challenge for 2016 focuses specifically on tools and algorithms to identify significant gaps. These gaps may relate to different facets of the data, including geography, taxonomy, time periods, and coverage of particular ecosystems or land units. Addressing these gaps may require focus on gaining additional occurrence records, targeting data areas missing from published records or getting additional metadata elements. By consolidating and prioritizing demands for data content, in the context of already accessible data and knowledge of resources that are not yet available as open data, GBIF will be positioned to inform collection and data holders, funding institutions and political decision makers of the most worthwhile and cost-effective ways to extend the available knowledge base.

#### Approach

The GBIF Secretariat will harmonize and document data mobilization demands from different sources. Simple tools are required to support needs capture, including informative documentation and justification for such demands. Automated assessment and reporting of gaps will be included where this proves possible and valuable. This combined information can support transparent decision making and target setting for gap-filling efforts, allowing all interested actors to step in at appropriate levels. GBIF will coordinate with efforts through the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) to identify and address significant knowledge and data gaps, including outreach and funding strategies for gap-filling. A thorough, regularly updated overview of data coverage in [gbif.org](http://gbif.org) both makes it easier to identify gaps, and to monitor progress and efficiency of mobilization efforts over time. GBIF should offer (e.g. annually) a brief report of significant gaps that need to be addressed. Such a report may be valuable to Participants and funding bodies to stimulate and evaluate digitization and mobilization options.

#### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
3.a.i	Organize and integrate requirements identified by fitness-for-use groups	2017	Data Products 0.1 FTE		
3.a.ii	Establish open mechanism for researchers and users to document specific data needs	2017	Data Products 0.05 FTE		
3.a.iii	Develop assessments and visualizations of strengths and weaknesses of GBIF data in key dimensions (taxonomic, geographic, environmental, temporal)	Mid			FRANCE: PhD thesis on biases, gradients and visualization for terrestrial species

3.a.iv	Maintain well-publicized GBIF priorities for data publishing, incorporating needs of IPBES and other networks	2017	Data Products 0.1 FTE		
3.a.v	Provide Governing Board with annual review and progress assessment for digitization of major natural history collections	2017	Data Products 0.1 FTE Participation 0.15 FTE		
3.a.vi	Provide GBIF Participants with actionable priorities and targets for content mobilization	2017	Data Products 0.05 FTE		Promote priorities with data holders and funding bodies

See also:

- [1d. Equip data publishers](#) – priorities can assist with planning or funding digitisation
- [1f. Plan implementation](#) – implementation should respond to critical gaps
- [2b. Deliver names infrastructure](#) – taxonomic framework important for identifying gaps in taxonomic coverage
- [2c. Catalogue collections](#) – support identification and targeting of undigitized collections
- [3b. Expand data streams](#) – prioritize sources of data to address gaps
- [3c. Engage data holders](#) – highlight value of targeted mobilisation
- [3d. Rescue datasets](#) – additional justification for mobilisation
- [5a. Engage academia](#) – communicate priority needs
- [5b. Document needs](#) – fitness-for-use priorities should be included
- [5c. Support biodiversity assessment](#) – addressing gaps will be critical to providing high-quality data for assessments

## Activity 3b - Expand data streams

### Rationale

GBIF serves as an integration point for any source of evidence of the recorded occurrence of species in time and space. A primary role for the GBIF infrastructure is to serve as a comprehensive single point of access for discovery, access, use and curation of all such evidence. Several classes of data are already well-supported within the GBIF network. These include collections data, observations from field research, and many categories of citizen science data. However, there are other new and developing streams of data that GBIF should accommodate if it is to serve as the platform for supporting comprehensive data assessment and modelling (e.g. for GEO BON Essential Biodiversity Variables, IPBES assessments, Red List assessments, etc.). These include efforts to mine historical data records from literature, genomics activities and particularly barcode-driven surveys, and potentially species-level data from remote-sensing systems. More work is also still needed to engage with the full spread of research activities delivering sampling event data of various kinds. GBIF needs to ensure that it provides simple, effective and beneficial ways for researchers to share these and other streams of Darwin Core compatible data.

### Approach

Existing GBIF models include support for occurrence records and for sampling-event datasets that organize occurrence records as sets of observations deriving from a single field sample (which make provision for GBIF to accommodate “absence data” from surveys which did not record a particular species despite searching). These approaches are core to all potential streams of data to be added. GBIF therefore needs to ensure that existing tools and documentation are clear and usable for relevant research communities and that GBIF sufficiently understands existing data management by these communities to avoid proposing unnecessary additional work. During 2016, GBIF is coordinating a consultation that builds on past engagements with genomics activities such as the Global Genome Biodiversity Network. Recommendations from this consultation are expected to guide improvements in GBIF tools, documentation and communications to support publishing of molecular data in formats that can be integrated within GBIF. Several projects are working on automated or human mining of data records from literature. GBIF needs to learn from these initiatives and ensure that its tools support integration in a simple way. GBIF should also seek exemplar projects for bringing occurrence records from remote sensing into the network.

### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
3.b.i	Promote use of sampling event data model for ecological and monitoring datasets	2017	Data Products 0.2 FTE		Translating, advocacy, training, etc. BELGIUM: Assistance with translation of materials
3.b.ii	Partner with BHL and others to support integration of species occurrence records based on literature	2017			Funding for development work to enhance mining of occurrence records from historical publications Enhancements to BHL interfaces to support user annotation with GBIF-compatible

					occurrence records BHL: collaborate in seeking funds; data mining for export and repurposing
3.b.iii	Work with bioinformatics initiatives and databases to form robust bidirectional linkages with molecular data	2017			GERMANY: 0.5 FTE - Engage with natural history collections not yet publishing to GBIF. BGBM hosts the GGBN portal, which is based on BioCASE and Darwin Core Archive and aims at making DNA and tissue collections available based on the GGBN Data Standard. Underlying voucher specimens are published through GBIF as well.
3.b.iv	Explore opportunities to integrate species-level data from remote sensing	Late			

See also:

- [1d. Equip data publishers](#) – support for data publishers is fundamental for this activity
- [1f. Plan implementation](#) – broad GBIF planning and engagement is required to work with all potentially relevant data communities
- [2a. Modernize data standards](#) – improvements to data standards will ensure that the underlying characteristics of the evidence for GBIF data are clear
- [3a. Identify priority gaps](#) – new data streams may address gaps in existing coverage
- [3c. Engage data holders](#) – support and tools are inadequate without engaging communities to prioritize sharing data
- [3d. Rescue datasets](#) – mechanisms to liberate historical data will also benefit from support for a broader range of data sources
- [3e. Liaise with journals](#) – journals are important channels for coordination and promotion of research data publishing
- [5a. Engage academia](#) – support from key research bodies and field studies
- [5b. Document needs](#) – requirements from users may assist with prioritising new data streams
- [5c. Support biodiversity assessment](#) – some new streams may have high value for delivering comparable data for monitoring and assessment

## Activity 3c - Engage data holders

### Rationale

GBIF has tools and support mechanisms in place to enable publication of several categories of biodiversity data. The key requirement is for increased engagement with, and support for, the communities of institutions and individuals who hold these data. Such engagement is normally most effective at the national level, although international networks also have an important role to play.

### Approach

The primary need is for national Participants to engage with the broadest possible spread of data holders within their countries, for organizational Participants to share relevant data and for the whole GBIF network to promote the importance and value of sharing data. The GBIF Secretariat will focus on enhancement to documentation and tools and on highlighting priorities for complementing existing data and addressing gaps. Data holders should be encouraged and assisted in sharing data in the richest form appropriate for the data in question (sampling event data where relevant elements are available, occurrence data for other spatially explicit data, checklists otherwise) and with the most open data licences possible. As well as natural history collections, Participants should identify opportunities to build partnerships with citizen science groups and promote the value of open access to data from environmental impact assessments and monitoring. GBIF should argue the case for open data as part of the policy for funding agencies, research councils, industry bodies, licensing authorities, development banks and other stakeholder groups.

### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
3.c.i	Engage with natural history collections not yet publishing to GBIF	2017	Participation 0.1 FTE		Outreach work with collections  GERMANY: 0.5 FTE - BioCASE helpdesk aims to advertise GBIF and BioCASE and continuously supports new providers to publish their data to BioCASE and GBIF. Maintenance and updates of hosted datasets and provider software (BioCASE) installation.  Linkage of additional datasets to GBIF if new suitable datasets are available.
3.c.ii	Work with national citizen science groups	2017	Participation 0.05 FTE		Outreach to citizen science  SPAIN,

					PORTUGAL: Focus on this task as priority data gap
3.c.iii	Promote national policies and platforms to enable publishing of environmental impact and monitoring data	2017	Participation 0.05 FTE		Contribute to policy development
3.c.iv	Promote importance of data sharing to funding bodies, licensing authorities and industry bodies	Mid			Engage with funding agencies, national licensing authorities and private sector
3.c.v	Address the tropical data gap	2017			FRANCE: Promote GBIF in global South and assist with data connection in this area

See also:

- [1a. Focus on people](#) – GBIF must give visibility to the efforts of data publishers
- [1b. Strengthen skills](#) – documentation and support materials must be as clear and simple as possible
- [1c. Equip nodes](#) – nodes are the main agent for engaging data publishers
- [1d. Equip data publishers](#) – GBIF must focus on delivering tools and processes which are intuitive and effective for data holders to use
- [2b. Deliver names infrastructure](#) – better names management and integration will be a benefit for data publishers
- [2c. Catalogue collections](#) – a collections catalogue will assist with engaging collections as data publishers
- [3a. Identify priority gaps](#) – knowledge of key gaps will assist with prioritising focus on particular data holders and may assist them with securing necessary funds
- [3b. Expand data streams](#) – GBIF needs to support the widest possible range of relevant data sources
- [3d. Rescue datasets](#) – processes to assist data holders to publish data even if they themselves have limited capacity
- [3e. Liaise with journals](#) – work with journals to promote and prioritize data publishing
- [4a. Ensure data persistence](#) – provide robust and stable support for published data
- [4c. Enable data curation](#) – offer benefits to data publishers through community collaboration in improving data

## Activity 3d - Rescue datasets

### Rationale

Many researchers hold potentially valuable data that are not yet in a suitable digital format for integration into GBIF. Historical publications are a similar source of valuable data that remain inaccessible. This offers an opportunity to establish a community platform to capture information on such datasets where the researcher or owner lacks the time or capability to make the data available as a GBIF-compatible dataset, and to enable interested individuals to volunteer time to collaborate with the owner to publish a dataset, potentially in conjunction with a data paper credited to all parties. Such a model may address a key bottleneck in bringing valuable data online.

### Approach

The GBIF Secretariat, or an interested Participant, should develop a test environment to explore this model. The model should support identification of basic information on datasets that may be rescued, including details of ownership, etc. Volunteers may be required to undergo some training or demonstrate some knowledge of GBIF data publishing and the taxa concerned prior to adopting a dataset for mobilisation. Mobilisation should include consultation or partnership with the owner and should deliver quality metadata and a valid mapping of the original information. Opportunities should be explored for publication of resulting datasets as data papers as an incentive to all parties.

### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
3.d.i	Develop tools for reporting potential data sources for integration into GBIF	2017	Data Products 0.15 FTE		
3.d.ii	Develop support materials (including accreditation) for collaborative data preparation and mapping datasets in GBIF	2017	Data Products 0.05 FTE Participation 0.2 FTE		
3.d.iii	Develop site and support mechanisms for users to adopt and map datasets	2017			GERMANY: <a href="#">reBiND</a> is a cost-efficient system and workflow for rescuing legacy databases from biodiversity sciences which are not integrated in an institutional data curation strategy and are, therefore, at risk of getting lost. BGBM can contribute their experience with mapping threatened datasets to GBIF-compliant standards.
3.d.iv	Review and update definitions of data publisher within GBIF to	Mid			

	reflect collaborative data publishing				
3.d.v	Develop partnerships with data journals to support data papers for rescued datasets	Late			

See also:

- [1d. Equip data publishers](#) – a process for data rescue would serve as an additional tool to support data publishers
- [3a. Identify priority gaps](#) – priority gaps may motivate sharing and rescue of data
- [3b. Expand data streams](#) – data rescue processes will benefit from other support for additional data sources
- [3c. Engage data holders](#) – data rescue will reduce the work for some data holders in making their data accessible
- [3e. Liaise with journals](#) – supplementary materials include datasets which may be rescued
- [4c. Enable data curation](#) – linkages between data rescue and curation communities
- [5a. Engage academia](#) – additional mechanism to support work with researchers

## Activity 3e - Liaise with journals

### Rationale

Journals are the traditional established avenues for scientific communication. They not only disseminate research findings and other scholarly communications but also increasingly help to disseminate research data. These data may be provided as supplementary materials or deposited in biodiversity data repositories as a precondition for publication of the paper. However, such data publishing data does not necessarily facilitate its integration with other related data or make the data discoverable and reusable. In order to benefit from data disseminated through journals, the Secretariat will lead or coordinate activity to engage directly with publishing houses, journal editors and authors to promote GBIF-compatible approaches to publication and the use of GBIF-operated repositories as accepted or preferred destinations for supporting data.

### Approach

GBIF Secretariat will engage with relevant journals in developing and promoting best practices and publishing workflows that reduce the effort required to publish data to GBIF. The aim will be to publish data once but be able to cite it as supporting data for a journal paper and where appropriate produce a data paper as an additional product. The Secretariat will use its experience with Pensoft Publishing where a workflow and a dedicated data-paper publishing tool is established.

### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
3.e.i	Develop scalable approach to support research journals and data journals in publishing to GBIF network	Mid			
3.e.ii	Produce relevant support materials to justify benefits and explain processes to publish primary data	2017	Participation 0.1 FTE		
3.e.iii	Integrate support for data journals into hosted IPT infrastructures and data rescue processes	Mid			Data hosting and publication, helpdesk support; help identify datasets in need of rescue

See also:

- [1d. Equip data publishers](#) - hosted IPT infrastructure to support journal datasets
- [3b. Expand data streams](#) – support for additional data sources will increase value of GBIF as a data repository for use by journals
- [3c. Engage data holders](#) – data holders may be motivated by increased visibility in conjunction with published research
- [3d. Rescue datasets](#) - engage community assistance in mapping research data into GBIF
- [5a. Engage academia](#) – bidirectional opportunities to build GBIF visibility and influence
- [5d. Assess impact](#) – increase citation levels for GBIF-hosted data

## Priority 4 – Improve Data Quality

*“Ensure that all data within the GBIF network are of the highest-possible quality and associated with clear indicators enabling users to assess their origin, relevance and usefulness for any application.”*

### Activity 4a - Ensure data persistence

#### Rationale

There exists a significant portion of data available through GBIF.org that is not actively curated by a data host. In some cases, there are no resources or desire to make further edits to the datasets. These datasets are effectively orphaned and the GBIF.org version of the dataset is often the last remaining version available on the Internet. As GBIF develops mechanisms to provide feedback to data publishers and support curation of datasets, we need to consider that these orphaned datasets will not be updated with corrections or migrated to adhere to modern data standards.

#### Approach

The task is to ensure that all datasets have a primary version available on the Internet that acts as the source for GBIF.org to index. Orphaned datasets will be identified, extracted from the GBIF.org index and loaded into the most suitable data repository supporting versioning: either run by a GBIF participant or a central cloud installation of an IPT. As issues are identified anyone will be able to volunteer to correct the source data, upload a new version into the data repository, document the changes applied and follow editor guidelines. Once republished GBIF.org will reflect the updated data, and the provenance of changes will be traceable through the repository versioning system. Policies for editors, including attribution and the settlement process for disputes will be documented. This entire activity could be led and implemented by a GBIF Participant.

#### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
4.a.i	Identify and verify datasets within GBIF network without current owners	2017	Data Products 0.3 FTE		Investigations and adoption wherever possible
4.a.ii	Publish reference instances of these datasets within hosted IPTs	2017	Data Products 0.05 FTE		Parallel activity to GBIFs: export and publish orphaned datasets
4.a.iii	Develop processes and mechanisms for adoption of orphaned datasets by suitable agencies or experts	2017	Data Products 0.05 FTE		

#### See also:

- [1d. Equip data publishers](#) – ensure sustainable benefits from data publishing
- [3c. Engage data holders](#) – greater security for data holders that data publication brings long-term benefit
- [4b. Assess data quality](#) – data persistence is a key aspect of data quality
- [4c. Enable data curation](#) – data can only be curated if a stable reference copy exists

## Activity 4b - Assess data quality

### Rationale

Assessing data quality includes applying data validation tools to capture and monitor suspected and confirmed errors and ambiguities in data, highlighting useful areas for additional information (metadata and qualifiers) that would improve usability and enhance processing options, and documenting completeness and standardization of information both within a dataset and within aggregated data. A number of validation tools exist in the wider community, and should be brought together to mutually profit from investments and to more efficiently plan future distributed development efforts. This will benefit data publication frameworks as well as individual data holders, giving concrete feedback on best gains in data management.

### Approach

Consolidation requires an overview of existing data validation tools, their goals and application areas, building on existing community work to produce an annotated tools catalogue (including work by TDWG and the GEO BON “Bon in a Box”). To make best use of development resources, GBIF will support collaboration between networks to bring those developments together and harmonize efforts, so that further development can more efficiently concentrate on new priority areas. Consistent tests and reports will both inform users of the suitability of data for their use, provide feedback to publishers on their holdings, provide a measure for the overall state of the network, and help to prioritize improvement options. Ideally, the most common reporting measures and formats are agreed and unified to a degree that allows publishers an easy crosswalk between and integration of data quality reports supplied by different services and aggregators.

### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
4.b.i	Develop extensible data validation tools framework in partnership with ALA, TDWG and other networks (e.g. Symbiota, iDigBio, VertNet)	2017	Informatics 0.3 FTE Data Products 0.05 FTE		Developers of existing validation tools: support partnering and collaboration  FRANCE: Training on data quality assessment and data cleaning tools – tools accessible on GBIF.fr
4.b.ii	Integrate consistent data validation tools in GBIF.org, national/regional portals, IPT and elsewhere	2017	Informatics 0.4 FTE		Nodes / partners with existing portals: collaboration
4.b.iii	Improve presentation and reporting of data validation results	2017	Data Products 0.15 FTE Informatics 0.1 FTE		
4.b.iv	Develop regular data set reports for data publishers and nodes	2017	Data Products 0.1 FTE Participation 0.2 FTE		Advisory support of required / priority reporting lines BELGIUM: Develop

			Informatics 0.1 FTE		regular data set reports for data publishers and nodes
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See also:

- [\*\*1b. Strengthen skills\*\*](#) – documentation and training materials must give clear guidance on quality
- [\*\*1d. Equip data publishers\*\*](#) – tools and processes must reinforce focus on quality
- [\*\*2a. Modernize data standards\*\*](#) – data provenance and semantics are key to quality
- [\*\*2b. Deliver names infrastructure\*\*](#) – gaps in the names infrastructure hinder quality assessment and improvement
- [\*\*4a. Ensure data persistence\*\*](#) – persistence is a key aspect of quality
- [\*\*4c. Enable data curation\*\*](#) – curation processes should focus on measurable improvement to quality
- [\*\*5a. Engage academia\*\*](#) – support researchers in publishing high quality data and collaboration to improve data
- [\*\*5b. Document needs\*\*](#) – gather requirements which can improve quality management at all stages
- [\*\*5d. Assess impact\*\*](#) – overall quality metrics for GBIF data

## Activity 4c - Enable data curation

### Rationale

In a global network, curation of the shared data pool is increasingly becoming a joint responsibility of aggregators, publishers, experts and data users. The goal is to integrate corrections, improvements, additional information and analysis results in a timely manner, with better visibility to all network participants and data users. Expanding the existing knowledge base requires improved communication channels and workflows for collaboration between all actors, tools to capture and rapidly display new or improved information, commentary and data, and not least tools, credit systems and support to engage expert activities.

### Approach

The main task is to provide tools and mechanisms that make it easy for users and experts to contribute knowledge to the available pool of data. Building on existing data filtering and data improvement workflows in the community, GBIF tools and mechanisms are to support the identification of relevant data, their cleaning and preparation for specific purposes, and the sharing of the results of such processes with the wider community. Input collected through existing feedback mechanisms (e.g. JIRA feedback on gbif.org, AnnoSys, GitHub) is to be raised to a visibility level that supports and drives the usefulness of the published data.

### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
4.c.i	Develop network-wide approach to handling and processing annotations and feedback	2017	Informatics 0.3 FTE Data Products 0.2 FTE		GERMANY: DFG-funded internationalization and extension of online annotation system AnnoSys to further data quality in on-line data systems. NORWAY: explore opportunities to contribute to data annotation tools
4.c.ii	Enhance IPT to offer dataset-level peer review and commentary mechanisms and record-level annotations	Mid			
4.c.iii	Develop mechanism and tools within GBIF.org for sharing cleaned and annotated datasets based on GBIF downloads ("reference datasets")	2017	Data Products 0.05 FTE Informatics 0.2 FTE		
4.c.iv	Develop GBIF data workbench tool (within GBIF.org and possibly	Mid			

	also as standalone) for cleaning and filtering network data (e.g. in red list assessments)				
4.c.v	Develop strategy and support mechanisms for expert communities to curate sections of GBIF data	Late			

See also:

- [1a. Focus on people](#) – give credit for contributions to data improvement
- [1b. Strengthen skills](#) – documentation and training materials to guide data curation
- [1c. Equip nodes](#) – nodes will be key in engaging expert communities
- [1d. Equip data publishers](#) – ensure that data curation processes bring benefits to publishers
- [2a. Modernize data standards](#) – a common data model underpins effective curation
- [2b. Deliver names infrastructure](#) – normalising names and taxonomy is a key aspect of curation
- [3c. Engage data holders](#) – data holders need to be able to respond to curation actions
- [3d. Rescue datasets](#) - integration of new but previously uncurated data sources
- [4a. Ensure data persistence](#) – curation depends on persistent datasets
- [4b. Assess data quality](#) – understanding issues with data quality can drive future tools and guidance for curators
- [5a. Engage academia](#) – collaborate with taxonomic societies and other expert communities
- [5b. Document needs](#) – incorporate end user requirements in curation processes

## Priority 5 – Deliver Relevant Data

*“Ensure that GBIF delivers data in the form and completeness required to meet the highest-priority needs of science and, through science, society.”*

### Activity 5a - Engage academia

#### Rationale

The most significant user community for GBIF is academic researchers. Even policy-related uses of GBIF often derive from the work of such individuals. It is accordingly important for GBIF to understand the needs of researchers and academic societies and to communicate clearly regarding the tools and services GBIF can deliver. Communication should include information and support materials for students and early-career researchers, on both publication and use of data, including citation, use tracking and data papers. University faculties and libraries may be important channels for this information. In addition, GBIF needs to engage more closely with taxonomic societies and other academic bodies that could be key collaborators in curating and improving data. Achieving such an outcome depends on understanding how GBIF can become a more central tool for their work, so that work on digital knowledge directly benefits those who contribute.

#### Approach

GBIF Participants may be well-positioned to lead in engaging with taxonomic societies and other interested research groups, including assuming responsibility to serve as ambassadors for GBIF within particular communities. Particular focus should be given to opportunities to explore models for such communities to assist GBIF with data curation. Few university programs include clear guidance and promotion for open data sharing. GBIF should make use of its own documentation materials and of curriculum materials from throughout the GBIF community to engage with biological science faculties and university libraries to share information on GBIF tools and resources and practices.

#### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
5.a.i	Promote biodiversity informatics curriculum, support training of the users	2017	Participation 0.15 FTE		
5.a.ii	Publicize GBIF as data tool via university libraries and faculties	2017			BELGIUM: Translate materials Publicize with national universities SPAIN: Engage coordinators of biology degrees to incorporate GBIF and GBIF Spain credit courses into curriculum
5.a.iii	Develop online collaboration through GBIF.org helpdesk to assist and support data users	2017	Participation 0.1 FTE		

5.a.iv	Represent GBIF at the relevant science fora, esp. at the frontier directions such as ecology and molecular research	2017	Data Products 0.05 FTE Participation 0.05 FTE		Representation shared with nodes and institutions
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See also:

- [1b. Strengthen skills](#) - broader engagement with academic bodies, universities and libraries will require clear standalone information resources
- [1c. Equip nodes](#) – nodes are key to engaging national research councils and academic societies
- [1e. Expand national participation](#) – engagement with academic societies may support further national engagement
- [2b. Deliver names infrastructure](#) – taxonomic societies should be key partners in delivering names infrastructure
- [2c. Catalogue collections](#) - catalogue should be an operational tool for researchers
- [3a. Identify priority gaps](#) – communicate priority needs with academia
- [3b. Expand data streams](#) – work with research communities to incorporate additional sources of data
- [3d. Rescue datasets](#) - additional mechanism to support work with researchers
- [3e. Liaise with journals](#) - bidirectional opportunities to build GBIF visibility and influence
- [4b. Assess data quality](#) – work with research communities to improve data quality
- [4c. Enable data curation](#) – engage research communities to oversee and improve data
- [5b. Document needs](#) – engage relevant academic groups as fitness-for-use working groups
- [5d. Assess impact](#) – published research is a key measure of GBIF impact

## Activity 5b - Document needs

### Rationale

GBIF data are aggregated from many sources and are consequently heterogeneous, varying in fitness for various uses. During 2015-2016, GBIF established three task groups on data fitness-for-use, in agrobiodiversity research, in distribution modelling and in research on invasive alien species, to document how these communities use GBIF data and to understand their data quality demands. The resulting reports inform data mobilization, data processing and improvements to GBIF.org. During 2017, GBIF will expand this work to incorporate more key areas of use, provisionally focusing on: 1) Phylogenetic and (continuation from 2016 work) DNA evidence for names and occurrences, 2) human health and vectored diseases and 3) marine biodiversity. Depending on resources, these groups will operate through a combination of face-to-face meetings and online or remote collaboration.

### Approach

In 2017, the DNA work will continue from 2016 through online meetings and e-mails. Human health and vectored disease fitness for use group will be formed and will operate using the basic model with two in-person meetings. Work on fitness for use in marine research will continue / start depending on the availability of marine data from OBIS by the end of in 2016. Participants are encouraged to organize working groups in additional areas to review the state of GBIF data relevant to particular domains and themes and to provide recommendations on critical gaps, improvements in recommended metadata or data elements, minimum criteria for usable data, etc. The GBIF Secretariat will compile these recommendations and, where possible, develop query profiles to support rapid access and monitor progress by the network in delivering data suited for the needs of these domains.

### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
5.b.i	Prioritize areas for fitness-for-use assessments	2017	Data Products 0.05 FTE		Contracted literature mining study to work out key sectors of science making use of GBIF
5.b.ii	Support fitness-for-use groups	2017	Data Products 0.15 FTE		Fund/coordinate a fitness-for-use group and report, through "adopt a topic" schema, with the support from GBIF S

See also:

- [1c. Equip nodes](#) – nodes may coordinate requirements gathering in particular areas
- [1f. Plan implementation](#) – GBIF plans should respond directly to needs
- [2c. Catalogue collections](#) – comprehensive knowledge of collections will serve as a basis for identifying collections particularly important for digitisation
- [3a. Identify priority gaps](#) – needs feed into assessing gaps in data
- [3b. Expand data streams](#) – additional data sources may address needs
- [3c. Engage data holders](#) – work with data holders to improve quality and address gaps

- [4b. Assess data quality](#) – needs may determine quality checks which can be performed and metrics to report
- [4c. Enable data curation](#) – assistance with setting curation priorities
- [5a. Engage academia](#) – work with research communities to define needs
- [5c. Support biodiversity assessment](#) – requirements for assessment are a key aspect of needs

## Activity 5c - Support biodiversity assessment

### Rationale

One of GBIF's key roles is as organizer of global evidence for species distribution, based on point records for species in time and space. Expansion of data publishing to accommodate sampling event data enables this evidence base also to mobilize and organize basic data on species populations and abundance. As a result, GBIF is positioned to serve as a critical resource for supporting biodiversity assessment at all scales. In particular, GBIF should serve as the data foundation for GEO BON to deliver Essential Biodiversity Variables (EBVs) for species distribution and population abundance. These EBVs represent a continuum from modelled representation of species occupancy (presence-only) in defined units of space and time through to richer assessment of species abundance in those units. GEO BON should serve as a forum for addressing the challenges of modelling such variables and interpolating sensibly between existing data points. This includes determination of appropriate scale at which modelled variables are adequately supported by current data. GBIF needs to ensure that it delivers the data foundations required for these activities, thereby supporting the requirements of IPBES, species Red Listing through IUCN and national authorities, the CBD and the Aichi Targets and Sustainable Development Goals.

### Approach

This activity depends on the activities defined for all goals, in order to improve the comprehensiveness, coverage and quality of data accessed through the GBIF network. An additional area for enhancement will be GBIF.org search interfaces and presentation (via maps and other visualizations) of sampling event data. Such interfaces should ensure that researchers can properly evaluate and assess data suitable for biodiversity assessment activities. Additionally GBIF needs to be active within GEO BON to ensure that there is close alignment and evolution between the concepts and implementation of EBVs and the data and services offered by GBIF.

### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
5.c.i	Enhance GBIF.org presentation of sampling event data	2017	Informatics 0.2 FTE		
5.c.ii	Support development of species distribution/population abundance EBVs	2017	Data Products 0.05 FTE Executive Secretary 0.1 FTE Informatics 0.1 FTE		
5.c.iii	Showcase tools and practices for use of GBIF in Red Listing and other species assessment processes	Mid			

See also:

- [1e. Expand national participation](#) – assessment is a need and motivation for national agencies

- [1f. Plan implementation](#) – delivering high quality global and regional datasets in support of assessment will require coordinated action
- [2a. Modernize data standards](#) – improve information on data provenance and semantics
- [2b. Deliver names infrastructure](#) – names are key to organising data from multiple sources
- [3a. Identify priority gaps](#) – assessment needs will contribute to prioritisation
- [3b. Expand data streams](#) – ensure that all relevant data sources are included
- [5b. Document needs](#) – requirements for assessment are a key aspect of needs
- [5d. Assess impact](#) – many governments, along with intergovernmental collaborations, expect GBIF to deliver solutions in support of assessment activities

## Activity 5d - Assess impact

### Rationale

GBIF Participants require clear evidence of the benefits arising from investments in national-scale content mobilization and from GBIF global activity. At present, the main source of evidence presented derives from monitoring of published literature to identify uses of GBIF within research. This activity has been reported through annual GBIF Science Reviews and clearly demonstrates growing use of GBIF in research. Monitoring the literature in this way is time-consuming, and becomes more so as the relevant literature increases. A sustainable approach is required for future monitoring of this kind. GBIF now issues and promotes Digital Object Identifiers for data downloads and expects that these can be used both to simplify discovery and to improve the detail offered to Participants and data publishers on some uses of data. Participants also require more information on non-research uses of GBIF infrastructure, particularly in various kinds of government or industry assessments. A broader review of costs and benefits arising from GBIF investment would be valuable for Participants arguing continued engagement within GBIF and other countries considering Participation.

### Approach

The GBIF Secretariat will lead a consultation with Participants on the level of detail desired from literature tracking and possible approaches to maintain this as a shared task across the network. GBIF.org will be enhanced to present known uses of GBIF DOIs and to ensure that data publishers receive information on such uses. Within the BID programme, GBIF is already seeking reports from funded projects on non-research applications of data. A general model is required to enable Participants easily to contribute examples of such uses and for these to be integrated into GBIF's overall reporting on usage. Several countries have requested information on known costs and benefits from GBIF investment. The Secretariat wishes to identify one or more Participants interested in leading case study investigations to value GBIF benefits at national scale and to assist with developing general recommendations for a suitable way for GBIF to track and report this value.

### Tasks

<i>Task number</i>	<i>Description</i>	<i>Start</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
5.d.i	Develop sustainable approach to literature tracking	2017	Participation 0.2 FTE Administration 0.2 FTE		
5.d.ii	Automate detection and reporting of use of GBIF DOIs	2017	Informatics 0.05 FTE		
5.d.iii	Provide mechanisms to report and track uses of data and grey literature	2017	Participation 0.05 FTE Informatics 0.05 FTE		Report uses of GBIF data
5.d.iv	Develop a valuation for the services delivered by the GBIF network	Mid			Workshop or consultancy to develop a valuation model for GBIF

See also:

- [1c. Equip nodes](#) – information on impacts will assist nodes in building strong national networks and nodes will be the key source of information on uses of data outside peer-reviewed literature
- [1d. Equip data publishers](#) – data publishers need information on the benefits arising from use of their data
- [1e. Expand national participation](#) – information on impacts will increase the case for GBIF participation
- [1g. Coordinate resources](#) - understanding impact will assist with future coordination
- [2c. Catalogue collections](#) – catalogue will serve as benchmark for progress in digitising collections
- [3e. Liaise with journals](#) – use of GBIF data in published research a key measure of impact
- [4b. Assess data quality](#) – improvements in quality should be a metric for impact
- [5a. Engage academia](#) - published research is a key measure of GBIF impact
- [5c. Support biodiversity assessment](#) - many governments, along with intergovernmental collaborations, expect GBIF to deliver solutions in support of assessment activities

## GBIF Annual Work Programme 2017

### Financial situation

The current expectation is that income from Participant contributions will be reduced in 2017. As a consequence, there is a need to make savings compared to recent years to ensure that the end-of-year financial situation is reasonable.

Staff changes in recent years have enabled the Secretariat to maintain a steady level of service with lower salary costs than in the past. The Secretariat is now structured as four teams, as follows:

- Participation and Engagement (six staff)
  - Direct support and guidance for GBIF participants and Nodes
  - Capacity enhancement activities
  - Documentation and communication
- Data Products (four staff)
  - Technical support and helpdesk for data publishers and users
  - Data quality and fitness-for-use
- Informatics (six staff)
  - Software development
  - Operation of GBIF IT infrastructure
  - Standards
- Administration (six staff)
  - Support for Governing Board and Committee activities
  - Administration of calls for proposals and contract processes
  - Organisation of meetings and travel
  - Financial management

In comparison with past years, the Administration team is greatly strengthened and provides dedicated support for many activities that formerly occupied the time of Programme Officers. As a result, the Participation and Engagement team is better positioned to provide more strategic support for the community.

Staff levels will be kept at the current levels in 2017, with recruitment of one Programme Officer to maintain capacity during staff turnover. Unless the budget situation changes, no other recruitment is included in the plans. It should be noted however that Secretariat staff are experiencing heavy workloads and current staff levels limit progress in a number of critical areas, particularly around addressing the wide range of functional and service needs identified by users and data publishers, and around increasing the effectiveness of GBIF's relationships with other international initiatives.

To avoid irresponsible depletion of funds during 2017, several cuts are required in other areas of GBIF operation. The proposal for 2017 is to make savings for a single year as follows:

1. Organise a reduced GB24 Governing Board meeting in Copenhagen for Voting Participant business only
2. No Global Nodes Meeting (normally alongside Governing Board meetings in alternate years)
3. Defer Ebbe Nielsen Challenge and Young Researchers' Awards for one year

These savings correspond to a reduction in expenditure of around €130K.

It has been recognized that the interactions between the Nodes Steering Group and the Science Committee have been limited in recent years. As a consequence a joint meeting of these two committees is planned for February 2017 to review all aspects of GBIF's work and to provide recommendations to feed into the Executive Committee meeting in March/April 2017.

The Global Nodes Meeting is an important opportunity for node managers to collaborate and benefit from capacity enhancement activities. The Secretariat proposed to mitigate this loss in the following ways:

- The Secretariat plans to organise a series of webinars, each accompanied by online discussion groups, approximately every other month, to update node managers and other representatives of GBIF Participants on developments within the GBIF network and to provide training on key aspects of GBIF's operation. These webinars will commence at the start of 2017. Participants are encouraged to make recommendations on topics of particular interest.
- Funding from Japan under the BIFA programme and from the EU under the BID programme will support meetings and capacity enhancement activity in Asia, Africa, the Caribbean and the Pacific.
- A larger figure than in recent years, €80K will be allocated for the 2017 GBIF Capacity Enhancement call. Proposals will be welcome under this call for partial funding for regional meetings.
- In response to the opportunity offered by the BID programme, the GBIF Secretariat is reinforcing the helpdesk capability offered to the whole network.

In addition to the allocation of €80K for the Capacity Enhancement call, a further €80K is allocated for work during 2017 to build on efforts in 2016 to forge a coalition with the Catalogue of Life and other nomenclatural and taxonomic content networks jointly to deliver the best possible community-managed catalogue of all scientific names and checklist of all species. The taxonomic framework for GBIF data remains the single biggest weakness in the overall quality of data delivered through the network. Recent developments give GBIF the opportunity to work with key partners to address this deficit and to deliver a critical knowledge resource to underpin all biodiversity informatics. The funds are reserved for development activity in support of this joint initiative. Participants with an interest in delivering a comprehensive global nomenclator and species checklist are encouraged to make additional commitments under Implementation Plan activity 2.b – Deliver Names Infrastructure.

As proposed by the Netherlands at GB22, the Secretariat has sought to develop the 2017 Annual Work as a framework for contributions from Participants to joint delivery of GBIF's goals. We are grateful to Australia, Belgium, France, Germany, Netherlands, Norway, Portugal, Spain, USA, BHL and the Chinese Academy of Science for their responses to this call. Specific responses have been detailed in the text of the Implementation Plan. It should be noted that these Participants and others will be active during 2017 in many of the tasks where *Participant activity* has been listed without identifying particular Participants. The Secretariat will seek to communicate outcomes from these efforts and to ensure that these Participants are supported in maximizing the benefit of their contributions to GBIF as a whole. All Participants are encouraged to communicate with the Secretariat on ways in which they wish also to contribute to the activities identified in the Implementation Plan, or otherwise to advance GBIF's work.

The budget proposal for 2017 may be summarized as follows (see GBIF Draft 2017 Budget for more detail):

Opening balance	€595K
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Participant contributions	€2,635K
Secretariat supplementary income	€145K
<b>Total available funds</b>	<b>€3,375K</b>
Secretariat salaries	€2,319K
Governance costs	€73K
Operating costs	€467K
Work programme expenditure	€160K
<b>Total expenditure</b>	<b>€3,018K</b>
<b>Closing balance</b>	<b>€357K</b>

## Summary of planned 2017 tasks

The following table brings together the tasks planned for initiation during 2017, and summarizes effort from Secretariat staff, dedicated expenditure of core and supplementary funds, and committed Participant activities.

<i>Task number</i>	<i>Description</i>	<i>Secretariat staff</i>	<i>Allocated funding</i>	<i>Participant activity</i>
1.a.i	Develop mechanisms to support and reflect the skills, expertise and experience of individual and organizational contributions to the GBIF network	Participation 0.15 FTE Informatics 0.6 FTE Data Products 0.1 FTE		
1.a.ii	Consolidate use of digital badges to record skills and contributions	Participation 0.1 FTE		BELGIUM, SPAIN
1.b.i	Develop collaborative help desk capability – including discussion groups, support materials and FAQs	Participation 0.1 FTE Informatics 0.1 FTE Data Products 0.6 FTE  Including offset of €50K from BID	€50K BID for mentors, etc.	BELGIUM
1.b.ii	Articulate training and capacity enhancement activities around a single, global curriculum for GBIF	Participation 0.1 FTE		FRANCE, SPAIN, GERMANY
1.b.iii	Deliver explainer texts and videos to support self-directed instruction and learning	Participation 0.25 FTE		FRANCE, SPAIN/COLOMBIA
1.c.i	Perform ongoing nodes capacity self-assessment	Participation 0.05 FTE		
1.c.ii	Build reusable national/regional	Informatics 0.25 FTE		AUSTRALIA,

	platform tools centred on ALA software			FRANCE, PORTUGAL, SPAIN
1.c.iii	Develop online collaboration through GBIF.org helpdesk to assist and mentor node managers	Participation 0.1 FTE		BELGIUM, FRANCE
1.c.iv	Explore alternative options for lightweight national portal solutions, e.g. CKAN			BELGIUM
1.d.i	Promote and support capacity self-assessment for data holders	Participation 0.05 FTE		BELGIUM
1.d.ii	Promote publication of collection metadata			FRANCE
1.d.iii	Simplify data publication pathways (spreadsheet-level publishing)	Data Products 0.05 FTE		FRANCE, NORWAY, GERMANY
1.d.iv	Manage IPT feature upgrades			FRANCE
1.d.v	Operate hosted IPT infrastructure			FRANCE, PORTUGAL
1.d.vi	Consolidate NSG-led endorsement process			NODES
1.d.vii	Develop online collaboration through GBIF.org helpdesk to assist and mentor data publishers	Participation 0.05 FTE Data Products 0.1 FTE		BELGIUM, FRANCE, SPAIN
1.d.viii	Provide clear online reporting of the use of data for data publishers	Data Products 0.05 FTE		FRANCE
1.e.i	Ensure GBIF.org interface and key content supported in relevant languages	Participation 0.1 FTE Informatics 0.2 FTE		BELGIUM, FRANCE, PORTUGAL
1.e.ii	Improve coordination and mechanisms for engaging new countries	Participation 0.1 FTE		FRANCE, PORTUGAL
1.f.ii	Expand regional meetings to serve as GBIF community Implementation Planning conferences and opportunities to develop fundable programmes of work	Participation 0.5 FTE	€60K BID for Caribbean and Pacific regional meetings  €35K BIFA for Asian regional meeting	JAPAN
1.f.iii	Increase alignment between	Participation 0.15 FTE		CHINESE

	GBIF work programmes and activities of each GBIF Organizational Participant and Affiliate	Executive Secretary 0.1 FTE		ACADEMY OF SCIENCE
1.f.iv	Explore increased alignment and joint organization of workshops with other networks such as TDWG, SPNHC, GEO BON, RDA, etc.			USA (USGS)
1.g.i	Secretariat to coordinate participant-led activities aligned with Work Programme (process and models to support participant commitments)	Executive Secretary 0.1 FTE		
1.g.iii	Operate annual Capacity Enhancement Support Programme (CESP) with core funds, aligned with supplementary investments	Participation 0.1 FTE	<p>€80K core for CESP call</p> <p>€1,300K BID for Caribbean and Pacific calls and second African call</p> <p>€100K BID for Caribbean and Pacific training events</p> <p>€80K BIFA for Asian projects</p>	
1.g.iv	Ensure that BID programme and other supplementary funds align with and reinforce CESP and GBIF community, online resources and infrastructure	Executive Secretary 0.1 FTE Participation 0.5 FTE  Including €60K from BID and €31K from BIFA for coordination and visibility		
2.a.i	Promote development of a shared domain model for sharing and linking all components of biodiversity information	Informatics 0.3 FTE		GERMANY
2.a.iii	Explore opportunities to increase accessibility of biodiversity data through	Informatics 0.3 FTE		

	evolution of Darwin Core Archive formats to W3C CSV on the Web formats			
2.a.v	Improve management of trait data of relevance to GBIF			AUSTRALIA
2.b.i	Partner with other biodiversity informatics initiatives and taxonomic database holders to plan and deliver a comprehensive nomenclatural dataset and working consensus classification for all life	Executive Secretary 0.1 FTE Data Products 0.2 FTE Informatics 0.2 FTE	80,000 €	AUSTRALIA, GERMANY, NETHERLANDS, BHL, SPECIES 2000
2.b.ii	Promote publication of species checklists through GBIF network			FRANCE, SPAIN
2.c.ii	Use collection metadata as a first stage in content mobilization from natural history collections, including identification or development and adoption of necessary data standards	Participation 0.05 FTE Data Products 0.05 FTE Informatics 0.1 FTE		BELGIUM, FRANCE, PORTUGAL
3.a.i	Organize and integrate requirements identified by fitness-for-use groups	Data Products 0.1 FTE		
3.a.ii	Establish open mechanism for researchers and users to document specific data needs	Data Products 0.05 FTE		
3.a.iv	Maintain well-publicized GBIF priorities for data publishing, incorporating needs of IPBES and other networks	Data Products 0.1 FTE		
3.a.v	Provide Governing Board with annual review and progress assessment for digitization of major natural history collections	Data Products 0.1 FTE Participation 0.15 FTE		
3.a.vi	Provide GBIF Participants with actionable priorities and targets for content mobilization	Data Products 0.05 FTE		
3.b.i	Promote use of sampling event data model for ecological and monitoring datasets	Data Products 0.2 FTE		BELGIUM
3.b.ii	Partner with BHL and others to support integration of species occurrence records based on literature			BHL
3.b.iii	Work with bioinformatics initiatives and databases to			GERMANY

	form robust bidirectional linkages with molecular data			
3.c.i	Engage with natural history collections not yet publishing to GBIF	Participation 0.1 FTE		GERMANY
3.c.ii	Work with national citizen science groups	Participation 0.05 FTE		PORTUGAL, SPAIN
3.c.iii	Promote national policies and platforms to enable publishing of environmental impact and monitoring data	Participation 0.05 FTE		
3.c.v	Address the tropical data gap			FRANCE
3.d.i	Develop tools for reporting potential data sources for integration into GBIF	Data Products 0.15 FTE		
3.d.ii	Develop support materials (including accreditation) for collaborative data preparation and mapping datasets in GBIF	Data Products 0.05 FTE Participation 0.2 FTE		
3.d.iii	Develop site and support mechanisms for users to adopt and map datasets			GERMANY
3.e.ii	Produce relevant support materials to justify benefits and explain processes to publish primary data	Participation 0.1 FTE		
4.a.i	Identify and verify datasets within GBIF network without current owners	Data Products 0.3 FTE		
4.a.ii	Publish reference instances of these datasets within hosted IPTs	Data Products 0.05 FTE		
4.a.iii	Develop processes and mechanisms for adoption of orphaned datasets by suitable agencies or experts	Data Products 0.05 FTE		
4.b.i	Develop extensible data validation tools framework in partnership with ALA, TDWG and other networks (e.g. Symbiota, iDigBio, VertNet)	Informatics 0.3 FTE Data Products 0.05 FTE		FRANCE
4.b.ii	Integrate consistent data validation tools in GBIF.org, national/regional portals, IPT and elsewhere	Informatics 0.4 FTE		Nodes / partners with existing portals
4.b.iii	Improve presentation and reporting of data validation	Data Products 0.15 FTE Informatics 0.1 FTE		

	results			
4.b.iv	Develop regular data set reports for data publishers and nodes	Data Products 0.1 FTE Participation 0.2 FTE Informatics 0.1 FTE		BELGIUM
4.c.i	Develop network-wide approach to handling and processing annotations and feedback	Informatics 0.3 FTE Data Products 0.2 FTE		GERMANY, NORWAY
4.c.iii	Develop mechanism and tools within GBIF.org for sharing cleaned and annotated datasets based on GBIF downloads ("reference datasets")	Data Products 0.05 FTE Informatics 0.2 FTE		
5.a.i	Promote biodiversity informatics curriculum, support training of the users	Participation 0.15 FTE		
5.a.ii	Publicize GBIF as data tool via university libraries and faculties			BELGIUM, SPAIN
5.a.iii	Develop online collaboration through GBIF.org helpdesk to assist and support data users	Participation 0.1 FTE		
5.a.iv	Represent GBIF at the relevant science fora, esp. at the frontier directions such as ecology and molecular research	Data Products 0.05 FTE Participation 0.05 FTE		
5.b.i	Prioritize areas for fitness-for-use assessments	Data Products 0.05 FTE		
5.b.ii	Support fitness-for-use groups	Data Products 0.15 FTE		
5.c.i	Enhance GBIF.org presentation of sampling event data	Informatics 0.2 FTE		
5.c.ii	Support development of species distribution/population abundance EBVs	Data Products 0.05 FTE Executive Secretary 0.1 FTE Informatics 0.1 FTE		
5.d.i	Develop sustainable approach to literature tracking	Participation 0.2 FTE Administration 0.2 FTE		
5.d.ii	Automate detection and reporting of use of GBIF DOIs	Informatics 0.05 FTE		
5.d.iii	Provide mechanisms to report and track uses of data and grey literature	Participation 0.05 FTE Informatics 0.05 FTE		

## Overview of Secretariat staff allocation

The following table summarizes planned allocation of GBIF Secretariat staff time. The columns indicate level of effort expressed as a fraction of a year's work for a single staff member (although the work may be shared between several individuals).

It is recognized that the Secretariat needs to respond to unplanned needs and opportunities during the year, and to support internal tracking and planning. In this overview, an allocation of around 25% of the time for most staff members has been left unallocated to reflect these needs. A smaller proportion of the work of the Administration Team is reported since their activity is required in support of most aspects of the Secretariat's work.

Each of the six right-hand columns represents a different Secretariat team, as follows:

- **Participation** – Deputy Director, three Programme Officers, Communications Manager, Science Communications Coordinator – total 6.0 staff
- **Data Products** – Head of Data Products, Scientific Officer, IPT Product Manager, Data Manager – total 4.0 staff
- **Informatics** – Head of Informatics, Lead Software Developer, two Software Developers, two Web Developers – total 6.0 staff
- **Administration** – Head of Administration, HR Manager, Financial Controller, three Administrative Assistants – total 6.0 staff
- **Executive Secretary** – Executive Secretary – total 1.0 staff

<i>Task number</i>	<i>Participation</i>	<i>Data Products</i>	<i>Informatics</i>	<i>Administration</i>	<i>Executive Secretary</i>	<i>TOTAL</i>
1.a.i	0.15	0.1	0.6			0.85
1.a.ii	0.1					0.1
1.b.i	0.1	0.6	0.1			0.8
1.b.ii	0.1					0.1
1.b.iii	0.25					0.25
1.c.i	0.05					0.05
1.c.ii			0.25			0.25
1.c.iii	0.1			0.3		0.4
1.d.i	0.05					0.05
1.d.iii		0.05				0.05
1.d.vii	0.05	0.1				0.15
1.d.viii		0.05				0.05
1.e.i	0.1		0.2			0.3
1.e.ii	0.1			0.3		0.4
1.f.ii	0.5			0.2		0.7
1.f.iii	0.15				0.1	0.25
1.g.i					0.1	0.1
1.g.iii	0.1			1.0		1.1
1.g.iv	0.5			0.5	0.1	1.1

2.a.i			0.3			0.3
2.a.iii			0.3			0.3
2.b.i		0.2	0.2		0.1	0.5
2.c.ii	0.05	0.05	0.1			0.2
3.a.i		0.1				0.1
3.a.ii		0.05				0.05
3.a.iv		0.1				0.1
3.a.v	0.15	0.1				0.25
3.a.vi		0.05				0.05
3.b.i		0.2				0.2
3.c.i	0.1					0.1
3.c.ii	0.05					0.05
3.c.iii	0.05					0.05
3.d.i		0.15				0.15
3.d.ii	0.2	0.05				0.25
3.e.ii	0.1					0.1
4.a.i		0.3				0.3
4.a.ii		0.05				0.05
4.a.iii		0.05				0.05
4.b.i		0.05	0.3			0.35
4.b.ii			0.4			0.4
4.b.iii		0.15	0.1			0.25
4.b.iv	0.2	0.1	0.1			0.4
4.c.i		0.2	0.3			0.5
4.c.iii		0.05	0.2			0.25
5.a.i	0.15					0.15
5.a.iii	0.1					0.1
5.a.iv	0.05	0.05				0.1
5.b.i		0.05				0.05
5.b.ii		0.15				0.15
5.c.i			0.2			0.2
5.c.ii		0.05	0.1		0.1	0.25
5.d.i	0.2			0.2		0.4
5.d.ii			0.05			0.05
5.d.iii	0.05		0.05			0.1
<b>TOTAL</b>	<b>3.85</b>	<b>3.2</b>	<b>3.85</b>	<b>2.5</b>	<b>0.5</b>	<b>13.9</b>

