



GBIF Work Programme 2009-2010

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¹ all terms in the text marked by [†] appear in the Glossary

I Overview: GBIF Work Programme 2009 -2010

Introduction

The 2009-2010 GBIF Work Programme, whilst continuing to implement the overall GBIF Strategic Plan 2007-2011 (within budgetary constraints), differs markedly from previous GBIF Work Programmes in structure and detail. These changes reflect the evolving *modus operandi* of GBIF in our second phase, one of moving to a more distributed[†] network of fully active Participants rather than activities being dependent largely on the capacity of the Secretariat and relatively few fully functional Nodes[†]. The Work Programme thus introduces a significant change in emphasis of the roles of the Secretariat and of the Participants, with a greater focus on 1) building Participant capacity for uptake and implementation, and 2) technologies for Participant data publishing and access and connectivity. In addition it is designed to provide for the inclusion of new biodiversity data[†] and information types and analyses, as well as significant increases in data volumes. Together, this drives the natural evolution of GBIF, as articulated in the Strategic Plan, of moving "from Prototype towards Full Operation"; it puts into effect the stated ambition of GBIF "doing for biodiversity data what the printing press did for the sharing of recorded information." It makes significant progress towards providing customisable access on every Participant desktop, irrespective of connectivity.

Background to the 2009-2010 Work Programme

GBIF achieved much in the first five-year phase (2002-2006), unquestionably providing 'proof of concept', in that it showed:

- a global network for mobilising biodiversity data[†] and connecting datasets and records from a broad diversity of data publishers[†] around the world, is feasible;
- barriers to data-sharing are largely social, not technical, and the majority of potential data publishers[†] are willing to share their non-sensitive data if simple and easy means are provided;
- a functional, distributed[†] network is dependent both on a connectivity infrastructure as well as on fully-capacitated, committed Participants;
- benefits from participation in, and contribution to a 'common good' accrue in direct proportion to the growth in participation and contributions.

The 2007-08 Work Programme, the first Work Programme of the second 5-year MoU[†] focussed on building on these first phase successes as well as addressing the critical gaps highlighted during the first phase review, including:

- growing and broadening participation;
- developing a more user-friendly, intuitive data Portal;
- improving and expanding the taxonomic backbone in the data Portal;
- mobilising greater geographic and taxonomic spread, type and depth of data;
- greater focus on developing the capabilities of Nodes; and
- greater focus on societal relevance, in particular in working with major end-user groups, including the biodiversity-related conventions, to identify key societal science and policy needs.

However, budgetary realities and the transitional state of GBIF through 07-08, not only between MoUs for Participants but with significant Secretariat staff changes, including the Executive Secretary, resulted in GBIF making less progress in these areas than

desirable. Cumulatively, this led to agreements at GB14 of much greater emphasis on the requirements of a distributed[†] network model for GBIF, whereby Participants take on greater responsibility for implementation and promotion of the agreed Work Programme, with less reliance on the limited capacity and budget of the Secretariat. The Secretariat role must evolve from '*proving* the concept' to its envisioned role as a facilitating mechanism for the creation and optimal functioning of a distributed biodiversity data and information network. The Work Programme for 2009-2010 focuses on the key components for implementation of and migration to this distributed[†] approach, learning from the more advanced Nodes and more successfully engaging with all Participants.

Key Changes in focus for 2009-2010

The 2009-2010 GBIF Work Programme description differs most from previous Work Programmes in being presented as:

- An organisational Work Programme, based on the premise that GBIF is an organisation of highly diverse, yet like-minded Participants in that each sees benefits from pooling resources into building a 'common good'. As such, the Work Programme imputes that, in its simplest form, the GBIF Secretariat is a *service-provider to the client* (the GBIF network[†] of Participants) who then take up the products and services for their own use.
- The substantive work of the Secretariat itself is integrated through *two Thematic areas*[†], based on the service-provider-to-client roles: Participation and Informatics (fully described in the following sections, and Figure 1),
- A summary of the overall strategies and larger-scale goals to be achieved by 2010 from across each Work area[†] coordinated by a Secretariat Programme Officer, as components of the overall organisational Work Programme,
- A clear indication of what is dependent on the Secretariat to implement, and what is dependent on resourcing, uptake and implementation by Participants, which together will enable attainment of the overall GBIF WP goals.²

Secretariat and Participant Roles and Responsibilities

The Work Programme emphasises that the GBIF Secretariat, whilst carrying out some of the activities, will increasingly play the key role in catalysing activities with and amongst Participants, with the goal of ensuring customisable outcomes that benefit Participants directly, based on ongoing needs analyses. As such, much of the envisaged product development, data mobilisation, etc. described will be driven and coordinated by the Secretariat but carried out amongst members of the network; it is dependent on further development, distribution and take-up of technical functions throughout the GBIF network[†] via fully-capacitated Nodes.

The level of success in attaining the planned outputs will depend on the level of involvement of all GBIF Participants in implementing this Work Programme. The ambitious outcomes in striving to move 'towards full operation' are premised on the understanding that all GBIF Participants are willing and committed to *active participation, investment and contribution* to the overall success of the network as a 'common good' from which all shall benefit more than working in isolation. The conservation, sound management and sustainable use of biodiversity, and benefit from such use, is a transboundary issue and cannot be achieved in national or organisational

² The WP does not include the levels of detail and timelines that characterised previous Work Programmes (but upon which it is based); these are available from the Secretariat if desired.

isolation. It is assumed that each Participant already incorporates this thinking and 'mainstreams' it within their own internal planning, resource-mobilisation and funding priorities in order to rapidly increase the ability of the GBIF network[†] to service the needs of the GBIF Participant community and society as a whole. Without this growing commitment, uptake and implementation from Participants, attainment of the Work Programme objectives, and GBIF's mission as a whole, will not be possible. Most importantly of all, without this uptake, Participants will not reap the benefits of having invested in this global mega-science initiative known as GBIF.

FINAL

II Summary: GBIF Work Programme 2009 -2010

Introduction

In further integrating the Thematic areas[†] of work proposed in the Strategic Plan 2007-2011, the Secretariat has sought to both clarify and integrate the Work areas[†] within the Secretariat, as well as the role of the Secretariat as a whole, in relation to Participants. This is represented in Figure 1, whereby the Secretariat was set-up as a service-provider to the client (Participants that initiated the establishment of GBIF), on the understanding that they stand to benefit from such a facility that synthesises and develops best practices and mechanisms to share biodiversity information across the globe. Within the Secretariat, the Participation Thematic area[†] acts as a proxy for the external Participants (who started, fund and comprise GBIF in the form of the GBIF network[†] and Governing Board[†]). The role of Participation is to increasingly engage directly with and interpret the needs of the Participants in terms of how to contribute to and benefit from being a Participant in GBIF and to direct these to the Informatics Thematic area[†] for development of the products and services required to meet Participant needs. These products and services are fed back to the Participants via the Participation Thematic area[†] or directly from Informatics. There is thus very much a one-to-one relationship between Participation and Informatics as client and service provider, and between the Participants and the Secretariat as client and service provider (see Figure 1).

This (greatly simplified) relationship has necessitated some changes in Secretariat operational relationships, with each programmatic Work area[†] described as an integral component of one of the two Thematic areas of Participation and Informatics. The 'Participation' Work areas of Nodes, Outreach, the new Training portfolio, Communications and Campaigns are aligned under the Participation Thematic area. The Work area of IDA (Inventory, Discovery and Access, formerly DADI³) joins the Content area (comprising ECAT and DIGIT Work areas[†]) within a broader recognition of the Informatics Thematic area in order to be better able to allocate technical resources to develop the relevant informatics products and services in response to Participant needs.

In order to keep this document as short but as meaningful as possible, the descriptions of each programmatic Work area[†] provide a summary of the much more detailed plans on which they are based (available from the Secretariat), with a brief:

- introduction, vision and rationale for the approach;
- strategic approach;
- list of goals each containing one to several activities (linkages to other programmatic Work areas, committees, etc are presented in brackets within each section's list of activities);
- budget for the goals and activities; and
- key outputs by the end of 2010.

This final section highlights those components that are critical objectives for 2009-2010 in terms of effecting a transition to a 'fully-operational', distributed[†] network. Most importantly, these are clearly separated into what can be expected from the Secretariat and what is required from Participants through to the end of this Work Programme period in order to have achieved the objectives.

³ The title IDA was selected to more accurately reflect the distributed architecture proposed for the GBIF network where an integrated system of metadata catalogues will enable users to discover and access data and services based on standardised interoperability mechanisms

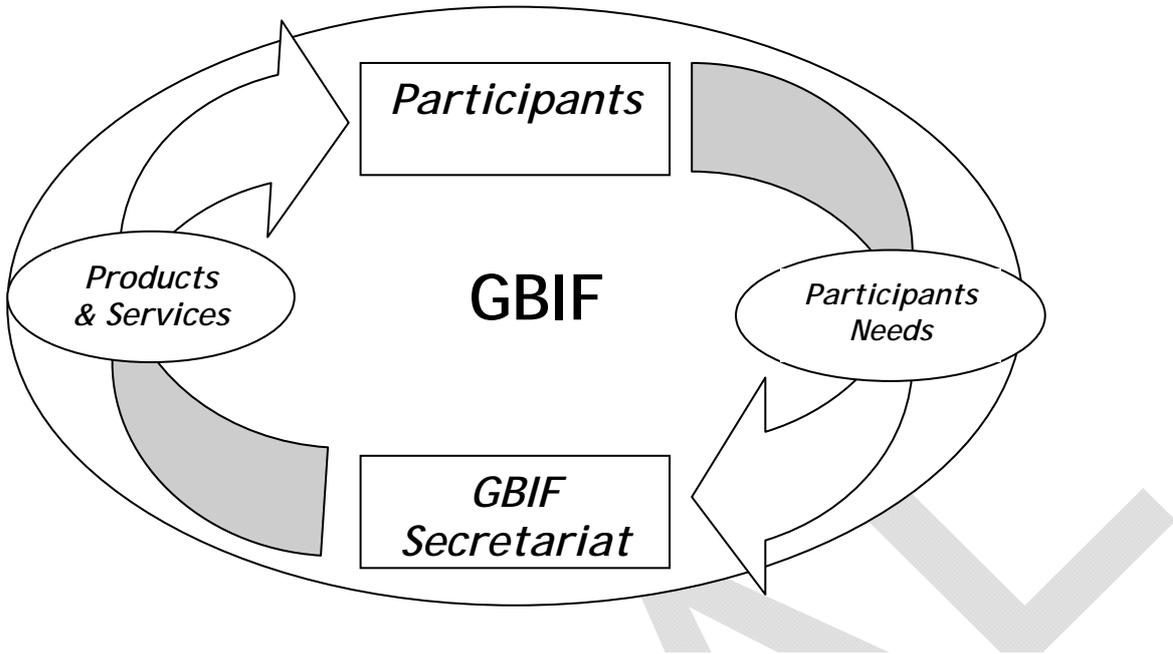


Figure 1a: The simplest depiction of GBIF, where the Secretariat is the service provider to the client (Participants) and drives the development of the network and its products and services to meet the needs of Participants, where adequate resources must be invested in take up of these products and services

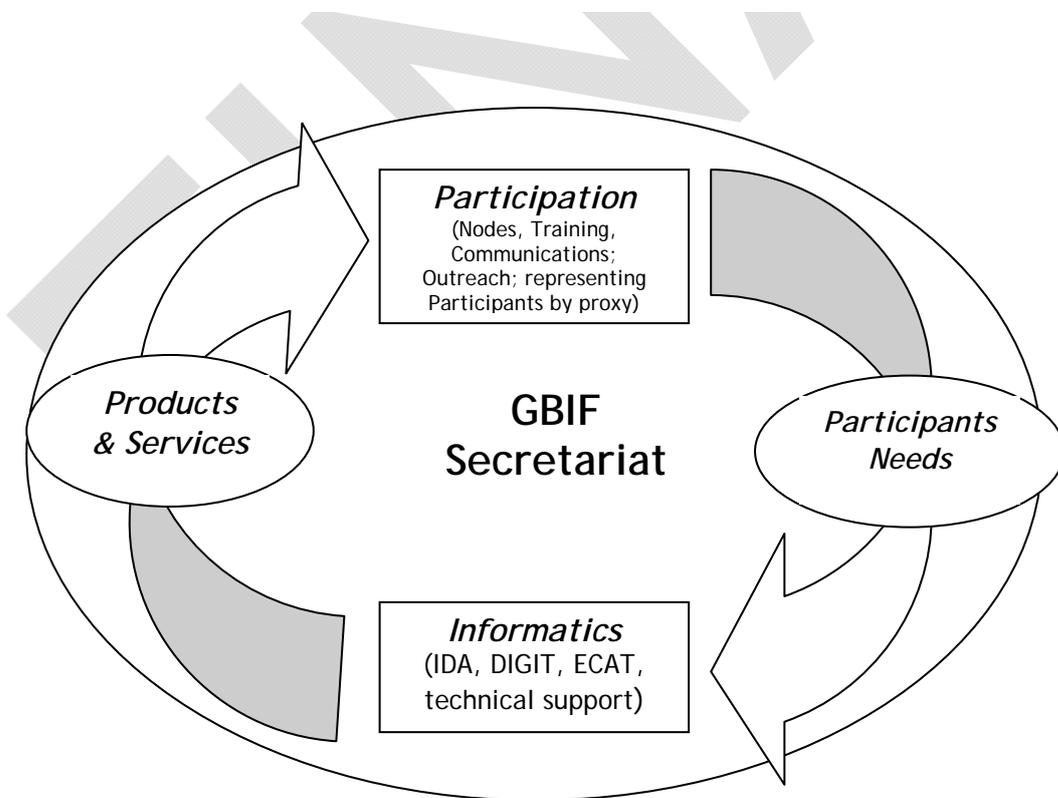


Figure 1b: The simplest depiction of the GBIF Secretariat structure, with the Participation Thematic area representing the Participants and ensuring Participants' needs are met through the Informatics Thematic area

Thematic Areas

1. Participation:

Through the new Head of Participation drive a much more robust process of raising GBIF's profile, raising public awareness and engagement with external stakeholders, coordinating across the various Participation Work areas[†] and providing more coherent Secretariat-Participant interactions:

- a. **NODES[†]**: Work directly with Participant Nodes[†] (including through the Nodes Committee[†]) to develop viable models for all Node levels. Key areas are identifying and providing Nodes with tools and training needed to function as national, regional or thematic organisational hubs/BIFs (NBIFs[†], ReBIFs[†], ThemeBIFs[†]), and with the ability to mobilise data publishers[†] and weave them into a functioning network at the Participant/national, regional and organisational levels.
- b. **Training[†]**: Work directly with Participants to understand their various capacity constraints and drive the development of a suite of e-learning[†] tools and curricula to complement face-to-face training. The e-learning[†] suite will provide a comprehensive, easily accessible, customisable and user-friendly set of training materials, in several languages, covering the full spectrum of GBIF Participant activities and capacity needs to allow both on-line learning as well as local training events led by Participants.
- c. **Outreach[†]**: Drive a robust, more visible outreach and recruitment strategy built around the benefits from participating in GBIF. Key objectives are to build a balanced geographic spread of GBIF national Participants, together with a broad spectrum of non-country Participants amongst relevant international organisations.
- d. **Communication, Media and Fundraising**: Develop a strategic communications and media portfolio designed to build GBIF's profile, grow the awareness of and participation in GBIF amongst countries, scientific institutions and others and particularly focused on customisable templates to enable Participants to develop in-country responses to needs analyses and provision of services. A key focus will be aggressively raising the GBIF profile to enable mobilising of new funding resources.
- e. **Strategic Applications and Campaigns**: In 2009-10 Seed funds will be used to address some of the key analytical questions sought by Participants from biodiversity data[†] to test how well the GBIF network[†] can provide such data and answers. Following review in 2009, Campaigns may in 2010 continue to be an additional mechanism for encouraging Participant activity and particularly mobilisation of resources in areas of particular interest to certain Participants and generally to the GBIF community.

2. Informatics:

In moving from 'prototype towards full operation', the Informatics work plan focuses on developing the full suite of IT infrastructure, architecture, services and tools to enable a fully-functional, scalable, distributed[†] network of Participants. Prioritisation of developments is designed to accord with expressed priority Participant needs.

- a. **IDA[†] (DADI)**: Focus at a higher (metadata[†]) level by facilitating the development of inventory tools and web services[†] to substantially improve the ability to discover and access relevant biodiversity datasets worldwide. Provision of improved dataset descriptions will foster user confidence in fitness-for-use[†] while standards-based

services e.g. Open Geospatial Consortium[†] (OGC[†]) web services will enable interoperability; this metadata strategy includes the provision of simpler data publishing software for contributors to index, connect and share datasets.

- b. **Content:** Focus on improving the quantity, quality and usability of the data being indexed through the data portal, as well as to accommodate a greatly expanded variety of data types, in ways responsive to expressed Participant needs by:
- i. **DIGIT[†]:** Catalyse the technical and sociological mechanisms to assist Participants to mobilise the volume, depth and density of primary biodiversity data[†] to allow useful and credible analyses using the portal and web services[†]. Critical is the focus on developing the network's capacity to discover and mobilise a greatly expanded array of primary biodiversity data[†] types beyond specimen and observational records. Accordingly, the DIGIT acronym now represents the broader "Digitisation and Mobilisation of Primary Biodiversity data[†]".
 - ii. **ECAT[†]:** Develop a Global Names Architecture[†] (GNA[†]) comprising a comprehensive index of known organism names cross-referenced to a directory of authoritative taxonomic data. The GNA will enable all information (captured to the relevant standards within the GBIF network) relating to taxa to be discovered, accessed, and organised via the same principles by which taxa are organised.
- c. **Informatics Infrastructure and GBIF Portal[†]:** Based on ongoing feedback from Nodes on priority requirements, and incorporating the data types of both Content Work areas[†] (i.e. DIGIT & ECAT) and using IDA technical recommendations, the Informatics team will focus on improving the integrated data publishing tools and web services[†] to allow Participants to assess and improve the quality and fitness-for-use[†] of the data they serve and use.

The GBIF Portal[†] will continue to be developed and improved as the service front-end through the period of this Work Programme. It is through the portal that most users will interact with the GBIF network[†]. The portal is a significant IT infrastructure that manages the metadata[†] and data index for the whole network, and supports data publishers[†] in getting their data online, and users accessing and downloading from across the network.

In moving 'towards full operation' of a fully distributed[†] network architecture, the key focus in portal design will be to enable customisation by Participants to their local needs, through appropriate and user-friendly tools. Particular focus will go on simplifying the process of publishing data as well as to improve the indexing frequency of data.

Conclusion

The 2009-2010 Work Programme is based on greater coordination across the Work areas[†] of the Secretariat, in an effort to produce products and services as organisational outputs rather than individual Work area[†] outputs. The ambitions are to significantly expand the scope of content mobilisation and discovery and to couple this with a distributed[†] network model based on customisable tools to better meet the needs of disparate Participants. Addressing both metadata[†] and data allows for top-to-bottom scaling in data

discovery and access. Overall, this incorporates the need stressed in the 3rd year review and the Strategic Plan 2007-2011 to move rapidly beyond natural history specimen data and observational data, to a broader array of biological data types such as multimedia, literature and metadata[†], as well as to include analytical tools such as spatial analysis, for combining different data types to enhance decision-making.

To facilitate this access to new data types and tools is the need to build the capacity across the network to enable Participants to benefit fully from these innovations. The Work Programme thus also provides for development of the tools and services to move GBIF 'towards full operation' as "the primary World Wide Web source for all data and information about biodiversity through building registries and indices that allow searching across interoperable sources of information from molecules through ecology" (GBIF Vision; Strategic Plan 2007-2011).

The 'mission critical' issue to be emphasised is that the extent to which GBIF makes progress 'towards full operation' depends largely upon investments and uptake at the Participant level in getting Participant Nodes[†] fully functional and mobilising their biodiversity communities and their data of all types. The Secretariat role is to provide the thought-leadership and facilitate the development of the mechanisms, products and services, in simple-to-use, customisable formats, to enable this. As such, the WP clearly differentiates under each section the responsibilities for contribution and delivery from both the Secretariat and the Participants. The key deliverables by end 2010 (or earlier) are summarised in Table 1 below (please see following sections for full descriptions):

Table 1: Summarised Key Outputs by end 2010

Participation		
Nodes	Secretariat	<ul style="list-style-type: none"> • Online Resource Centre[†] for Nodes providing documents, best practices and customisable toolkits. • Comprehensive Training Portfolio for Nodes • Regional partnership programme to support capacity building for Nodes • Fully functional distributed[†] Helpdesk for Nodes
	Participants	<ul style="list-style-type: none"> • Mobilise the technical capacity and funds to establish functional Nodes[†] to fully engage data publishers[†] and address end-user needs within their domain • Full participation in the Nodes Committee[†] and through this contribute to implementation of the WP • Contribute content to the Online Resource Centre[†] • As regional partners, provide technical support and guidance to other Nodes • Actively collaborate with other Nodes, especially via formal mentoring plans
Training	Secretariat	<ul style="list-style-type: none"> • Online Resource Centre[†] for Training with annual training plans/curricula and roll-out of associated training activities • E-learning[†] classrooms for Participants • Customisable e-training tools
Training	Participants	<ul style="list-style-type: none"> • Develop and share customised training modules for inclusion in the e-learning[†] classrooms • Submit training activities information to the Online Resource Centre[†] for Training • Participants and regional partners mobilise additional resources for meeting national or regional training needs

Outreach	Secretariat	<ul style="list-style-type: none"> • Significant growth and geographic balance in GBIF participation • Key Participants identified and mobilised as Outreach Task Group to expand outreach activities • Agreements signed with relevant conventions to mobilise data and tools to assist countries to meet their obligations • Major conservation NGOs use and share data via GBIF • A database with access to relevant information on IPR[†] and citation issues
	Participants	<ul style="list-style-type: none"> • Active participation in the Outreach Task Group to mobilise new Participants (countries, organizations, etc.) • Associate Participants move to Voting Participation • Provision of relevant information on IPR[†] and citation issues for the online database
Communi- cations, Media & Fund-raising	Secretariat	<ul style="list-style-type: none"> • Develop and roll-out a comprehensive communication strategy • Develop digital media products for various audiences - online videos etc. • Develop and roll-out a comprehensive fund-raising strategy
	Participants	<ul style="list-style-type: none"> • Contribute to and use promotional materials on GBIF to raise funds for national needs and interaction with national stakeholders • Use materials to promote GBIF to the widest possible audience
Strategic Applications & Campaigns	Secretariat	<ul style="list-style-type: none"> • Seed funds used for strategic application projects using GBIF mediated data[†] and addressing priority user needs
	Participants	<ul style="list-style-type: none"> • Initiate projects in strategically relevant areas using GBIF mediated data[†] • Participate in and successfully roll-out existing Campaigns • If a call is made in 2010, propose new Campaigns with Participant leadership and funding
Informatics		
IDA	Secretariat	<ul style="list-style-type: none"> • Develop a metadata[†] catalogue system as part of the Global Biodiversity Resources Discovery System (GBRDS[†]) for discovery of all kinds of biodiversity resources both digitised and undigitised • Promote development and uptake of standards for exchange of data and metadata[†] • Promote development and uptake of standards for web services[†] that enable data sharing
IDA	Participants	<ul style="list-style-type: none"> • Install, populate and maintain a metadata[†] management system • Promote the use of and provide high quality/complete metadata[†] for all datasets under their ownership and /or custodianship
DIGIT	Secretariat	<ul style="list-style-type: none"> • Coordinate development of strategies and action plans for rapidly mobilising all types of primary biodiversity data[†] • Provide best practices on data standards, quality assessment, data cleaning and rescue and archive of unhosted datasets • Assist the uptake of the GBRDS[†] and Integrated Publishing Toolkit (IPT)[†] to significantly increase the amount of mobilised data

		<ul style="list-style-type: none"> • Develop a strategy for scientific publishers and funding agencies to register metadata[†] of datasets
	Participants	<ul style="list-style-type: none"> • Rapidly increase investments in and rate of data discovery and mobilisation • Mobilise metadata[†] covering up to 5bn records for the GBRDS[†] and up to 2bn primary records through the IPT[†] • Contribute to a Content Needs Assessment study and development of consequent strategies and action plans • Actively work on improving 'fitness for use' of primary biodiversity data[†] for multiple users
ECAT	Secretariat	<ul style="list-style-type: none"> • Tools and infrastructure that enable taxon name and concept data to be served to the GBIF network[†] • Names portal comprising a complete online catalogue of organism names • Network architecture that supports the visibility and promotion of providers of names and name-services • Tools, applications, and services that utilise the electronic catalogue of names to assist those who serve or access primary biodiversity data[†].
	Participants	<ul style="list-style-type: none"> • Refine and adopt standards for format and exchange of names data[†] • Inventory, register and provide taxon name and concept data to the GBIF network[†] • Implement / utilise globally unique identifiers (GUIDs[†]) for names and concepts • Support the development of impact factors and other metrics of support for names providers
Informatics Infrastructure & GBIF Portal [†]	Secretariat	<ul style="list-style-type: none"> • Provide an informatics suite of tools to meet Participants' needs • Develop and roll-out a strategy for a distributed[†] GBIF network[†] infrastructure, including the required standards and customisable tools for data sharing • Improve the GBIF Portal[†] with the inclusion of discovery services (e.g. GBRDS[†]) and portals (e.g. Metadata, Names and Data Portal) to provide quicker and simpler access to content
Informatics Infrastructure & GBIF Portal [†]	Participants	<ul style="list-style-type: none"> • Make use of the GBIF informatics suite to optimise benefits • Adopt the decentralisation strategy and mobilise investment in, and uptake thereof • Index nomenclatures, metadata[†], and primary biodiversity data[†] within the new distributed[†] model • Customise tools and services to meet own needs and also provide these freely to the network

III Work Programme 2009 -2010

Thematic Areas

This section provides greater detail on the focus, goals, activities and key outputs for each WP Work area[†] comprising the two Thematic areas[†] of Participation and Informatics. Each activity has significant cross-sectional linkages within the Secretariat (and elsewhere), and these are listed in brackets (or a short table) after each section; it is important not to view each Work area[†] in isolation but as a contributor to the GBIF organisational WP as a whole.

1. Participation

Building on the significant changes in 2007-08, in particular the appointment of a full-time Training Officer early in 2008 and the establishment of a new Head of Participation portfolio in late 2008, the WP09-10 is firmly premised on an ongoing consolidation of the Participation Thematic Area[†] through 09-10 to better allow the Secretariat to directly engage with and service Participants, in order to rapidly move 'towards full operation'. In addition, a much more visible portfolio of external communications on awareness-raising and profile-building across a broad spectrum of sectors is planned. The WP thus reflects the intention for improved coordination of all Participation focal areas, divided between external interactions (including external communications and liaison, media, outreach, direct interactions with Participants, direct interactions with Nodes, the Nodes Committee[†], etc., and all aspects of training and capacity building) and internal interactions with the broadened Informatics Thematic Area[†] as the service provider to Participants (as depicted in Figure 1).

1.1. NODES

Introduction

Participant Nodes[†] play the key role in implementing GBIF as a truly decentralised[†] global network. Nodes must thus increasingly become involved in a wide range of activities essential for the successful move to 'full operation' of GBIF, from the engagement of thousands of data holders and the mobilisation of billions of biodiversity records to the development of added-value applications that effectively respond to their end-users' needs. In this way, Nodes become the conduit by which GBIF Participants meet their own biodiversity information needs, while benefiting from and contributing to the GBIF network's mission and goals.

Moving GBIF from prototype to full operation can be achieved only if most GBIF Participants are actively involved, which means, among other things, establishing and maintaining functional Nodes[†] with a long term perspective. By September 2008, fewer than a third of GBIF Participants have functional Nodes[†]. Increasing the number of active Nodes[†] is a top priority. In this context, and according to the GBIF Strategic Plan 2007-2011, the NODES Work area[†] has been designed primarily to help: a) GBIF Participants to develop and maintain functional Nodes[†], and b) Participant Nodes[†] to perform their role easily and cost-effectively.

Vision

By the end of 2010 all GBIF Participants are in the process of establishing or furthering the development of functional Nodes. Participant Nodes will effectively and efficiently

respond to the Participant's needs and priorities, while benefiting from and contributing towards the decentralisation, sustainability, and overall GBIF mission.

Rationale

With the understanding that the greatest responsibility in the establishment of a functional Node is borne by each GBIF Participant, having access to the adequate technical assistance, guidance, documentation and tools for effective and efficient implementation is critical. The GBIF WP, particularly through the NODES Work area[†], seeks to ensure that such level of assistance is readily available for any GBIF Participant at any stage of development, and that Participant Nodes[†] can share their capacity and expertise in support of GBIF as a global network.

Strategies

The NODES Work area[†] objectives are based on three inter-linked strategies focused on rapidly growing the active participation of Nodes as the key cogs in the decentralised[†] network:

a) Increase the relevance of GBIF for its Participants

- by working with GBIF Participants on identifying how best the “GBIF solution” helps to meet their own biodiversity information needs
- by promoting the activation and further development of Nodes based on the Participants' motivations, needs, and priorities, and using the GBIF infrastructure and services to facilitate and speed-up such processes
- by ensuring that the views, needs, and expectations expressed by Nodes (chiefly through the Nodes Committee[†]) are adequately taken into account and addressed

b) Make the work of Nodes simpler, easier, and faster

- by providing relevant tools, documentation, and training
- by providing easy access to technical assistance and guidance, including support from key partners at the regional or thematic level

c) Promote Node-to-Node collaborations

- by ensuring that “advanced” Nodes have the extra capacity to help others, and do so, particularly via formalised mentorship programmes
- by building capacity and facilitating interactions among Nodes at the regional level, or among groups of Nodes sharing similar thematic needs and interests

Goals and Activities

The NODES Work area[†] comprises three key goals and 10 primary activities (key synergies with other Work areas[†] and groups are indicated in brackets):

Goal 1. GBIF Participants give the necessary institutional and financial support to Nodes for their effective implementation as co-ordinating units of national, regional, or thematic biodiversity information facilities (NBIFs[†], ReBIFs[†], or ThemeBIFs[†] respectively)

Activity 1: Secretariat-Node strategic planning sessions for individual GBIF Participants to assist development at the Participant level (Outreach, Nodes Committee[†]).

The development and consolidation of a minimum of 12 Participant Nodes[†] is activated and ramped-up in response to individual planning sessions involving the Participant's Delegation, the Node's team, partner institutions, and the GBIF Secretariat.

Activity 2: Raise the visibility of GBIF Nodes (Communications, Outreach, Training, Nodes Committee[†])

Nodes gain national and international visibility and recognition thanks to their supported participation in international fora (e.g. e-Biosphere 2009).

Goal 2. Nodes have access to adequate assistance, tools, documentation, training, and guidance to facilitate their implementation and overcome barriers

Activity 1: Promote and facilitate the participation of Nodes in the development, testing, and deployment of the GBIF Informatics Infrastructure (Informatics; Training; Nodes Committee[†])

The informatics solutions developed by GBIF effectively respond to the needs of GBIF Participants, and are effectively deployed at the Participant level

Activity 2: Further the development of an Online Resource Centre[†] for Nodes in full integration with the GBIF Portal[†] (Informatics, Communications, Training, Outreach, Nodes Committee[†])

Participant Nodes[†] have access to documents, best practices, tools, and links for their implementation and daily work via the Online Resource Centre[†] for Nodes.

Activity 3: Develop and deploy a comprehensive training portfolio for Participant Nodes[†] (Training, Nodes Committee[†])

A comprehensive Training Portfolio for Participant Nodes developed and implemented, with 100% of active Nodes[†] involved in at least one training activity during the 2009-2010 period.

Activity 4: Assist the development of national biodiversity information facilities (NBIFs[†]) and Participant Nodes[†] through GBIF's Capacity Enhancement Programme for Developing Countries (CEPDEC[†]) (Outreach, Training, Nodes Committee[†]).

Two CEPDEC[†] Projects successfully completed or nearly complete (leading to the establishment of at least 5 new GBIF Participant Nodes[†]), and one new CEPDEC project in preparation (funded through Supplementary Funds[†]).

Goal 3. The expertise of Nodes and the services they provide are openly shared and constitute an integral strategy of GBIF as a global network.

Activity 1: Grow the role of the Nodes Committee[†] in assisting to direct the implementation of the GBIF Work Programme, particularly in relation to promoting the successful development of Participant Nodes[†] (Nodes Committee[†]; Outreach)

Nodes actively participate in the Nodes Committee[†] to help develop the GBIF Work Programme in ways that appropriately reflect the needs, motivations, and expectations of GBIF Participants.

Activity 2: Formalise regional partners (Outreach, Training, Nodes Committee[†]).

Regional capacity building partners, including more advanced Participants will be engaged to provide technical assistance to speed up the development of functional Participant Nodes. Through the regional capacity building partners, GBIF Participants will have ready access to technical support and guidance from within their own regions in matters related to the sharing, publishing, and using of primary biodiversity data.

Activity 3: Enhance the GBIF Mentoring Programme, particularly to complement the support provided to Nodes by the regional partners (Training, Outreach, Nodes Committee[†])

Node-to-Node collaborations and partnerships are effectively promoted and facilitated by means of a well-established mentoring programme that complements the capacity building support provided by the GBIF Secretariat and the regional partners

Activity 4: Develop an online forum and helpdesk system to enable communication and sharing of knowledge and expertise among Participant Nodes and their networks of biodiversity data holders and users (Informatics, Nodes Committee[†])

Participant Nodes[†] share their know-how and expertise via an online, multilingual forum and helpdesk system fully integrated to the Online Resource Centre[†] for Nodes (as part of the Informatics Helpdesk suite; see Informatics 1.3). Through this system Participant Nodes get ready support from the community and the GBIF Secretariat on a wide range of topics. Questions and answers shared via this system are a core component of the collective knowledge-base of Participant Nodes.

Budget

	Goal / Activity	2009	2010
Goal 1	Participant Nodes have the support, recognition and visibility to develop their full potential	€20,000	€10,000
Activity 1	Strategic planning sessions to activate individual GBIF Participants	€10,000	€10,000
Activity 2	Activities to raise the visibility of GBIF Nodes (e.g. e-Biosphere 09)	€10,000	€0
Goal 2	Participant Nodes have access to the right level of technical assistance and guidance	€35,000	€40,000
Activity 1	Participation of Nodes in the development of the GBIF Informatics Infrastructure	€10,000	€15,000
Activity 2	Further development of the Online Resource Centre for Nodes	€15,000	€10,000
Activity 3	Development and deployment of a comprehensive training portfolio for Nodes ⁴	€10,000	€15,000
Activity 4	Consolidation and expansion of the CEPDEC strategy (non-core budget; Supplementary funds)	-	-
Goal 3	Strengthening the Nodes Network	€70,000	€105,000
Activity 1	Grow the role of the Nodes Committee	€20,000	€20,000
Activity 2	Formalisation and activation of regional partners	€25,000	€65,000
Activity 3	Enhancement of the GBIF Mentoring Programme	€15,000	€30,000
Activity 4	Implementation of the distributed Helpdesk for Nodes (with Informatics)	€10,000	-

⁴ Additional funding will be provided through the Training Work area. Thus the complete budget covering the training activities for Nodes is not included here

	TOTAL	€125,000	€165,000
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Output by end 2010

By end 2010, the GBIF Participants will comprise a decentralised[†] global network facilitated by functional Participant Nodes[†], a critical mass of which actively help mobilise data, develop applications, build capacity, and contribute to the overall implementation of the WP. At least 60% of GBIF Participants will have and maintain functional Nodes[†], while the remaining 40% will be actively involved in the process of setting up and developing their own Nodes and biodiversity information networks.

The Nodes Committee[†] will effectively communicate Participants' needs, priorities, and expectations. As a result, Nodes will have ready access to the tools, documentation, and guidance to perform their duties and overcome barriers easily and cost-effectively. Such level of support will be coordinated by the GBIF Secretariat through regional partners and other Nodes, focussing on capacity building and help-desk functions at the regional level.

Through a cascade effect, data holders and users will receive effective assistance from their respective Nodes to easily share, publish, and use biodiversity data. GBIF Participants will recognise the implementation of functional Nodes[†] as one of the most important tangible benefits from their participation in GBIF.

Key GBIF Secretariat Outputs:

- A successfully implemented plan of strategic planning meetings and workshops with individual Participant Nodes[†]
- An Online Resource Centre[†] for Nodes that provides access to documents, best practices, tools, and links relevant for Nodes including a comprehensive, easy-to-use, set of documentation, tools, and guidance on how to set-up a GBIF Node (Introductory Package for Nodes)
- A comprehensive Training Portfolio for Nodes developed and implemented, with 100% of active Nodes[†] involved in at least one training activity during the 2009-2010 period
- Mechanisms to actively engage Participant Nodes[†] in designing, testing, developing, and deploying informatics solutions produced by the Secretariat
- Activities to raise the visibility of Participant Nodes[†] regionally and globally implemented, chiefly through promoting participation in international fora
- An effectively implemented plan to promote and facilitate the participation of Nodes in the Nodes Committee[†].
- A well established mentoring programme, fostering Node-to-Node collaborations and synergies
- A group of regional partners selected and engaged in supporting capacity building activities for Participant Nodes[†]
- An online forum and helpdesk system for Participant Nodes[†]
- Two CEPDEC[†] Projects successfully completed (leading to the establishment of at least 5 new GBIF Participant Nodes), and one new CEPDEC project in preparation.

Key GBIF Participant / Network Outcomes / Contributions:

GBIF Participants provide the institutional and financial support required to establish and maintain functional Nodes[†] that effectively serve the Participants' needs while contributing to the overall implementation of the GBIF WP. It is therefore expected that Participant Nodes[†] will, in close liaison with the Secretariat:

- Actively use the Nodes Committee[†] to help implement the WP in ways that appropriately reflect their needs, motivations, and expectations
- Effectively engage in the process of designing, developing, and deploying informatics tools, providing feedback on improvements to existing tools and gaps requiring new developments
- Design and implement strategies to address their end-users' needs
- Mobilise the technical capacity to engage and support data holders within their domain, assisting them with the implementation of GBIF informatics solutions and best practices to expedite the publication of relevant biodiversity content
- Actively contribute to improve and increase the contents of the Online Resource Centre[†] for Nodes by sharing their own experiences, best practices, publications, training materials, etc.; Participant Nodes[†] use this resource centre as a primary source of GBIF-related documentation
- Participate in the selection and engagement of regional capacity building partners; regional partners will provide ready access to technical support and guidance from within their own regions in matters related to the sharing, publishing, and using of biodiversity data[†]
- Actively establish Node-to-Node collaborations and mentorships, especially regionally; advanced Nodes readily share their capacity and help others in their implementation process
- Get activated and move towards consolidation and expansion in response to the individual planning sessions carried out involving the Participant's, the Node's team, and partner institutions.

1.2. Training

Introduction

With almost every new tool, functionality or concept developed by GBIF, a need for training has arisen. The need for a Training Officer to implement a coordinated training schedule was highlighted in the 2007-2011 Strategic Plan, and the Governing Board[†] endorsed such an appointment at GB14. This new Work area[†] enhances both the effectiveness and benefits of participation in GBIF.

Vision

By the end of 2010, Training is a formalised component of core GBIF Participant activities and is perceived as one of the key tangible benefits of participating in GBIF.

Rationale

Effective and sufficient training is a key element to the successful implementation of the GBIF WP, and growing the participation in GBIF. Greater provision of training resources and improved access to training requires making resources more readily available as well as customisable to local needs.

GBIF has to date organised successful training activities, both at the national and the global level. The approach was based on:

- **Face-to-face courses/workshops:** Held in various locations, usually annually with a limited number of participants and topics addressed.
- **Manuals and guides:** Most are documents commissioned by the GBIF Secretariat on topics of high interest for GBIF members. They are made available in English. Some national Nodes[†] have provided translations into their national languages.

The global face-to-face approach allows a very limited reach (number of people trained due to space or language limitations) and has a high cost.

Therefore, the main objectives of the Training Work area[†] in this 2009-2010 Work Programme are to increase exponentially the number of people benefiting from GBIF training activities (through a *train-the-trainers* approach) and at the same time increase the awareness and the value associated with the GBIF training efforts.

Strategies

The new Training Work area[†] will focus largely on e-learning[†] tools to extend the scope of GBIF training initiatives throughout the network. The strategy is to develop a comprehensive, coordinated training programme in order to:

- Expand the list of training topics presented.
- Capacitate regional, thematic and national Nodes with general e-learning[†] tools so they can easily develop and run their own customised training activities.
- Rapidly roll-out e-learning[†] tools, increasing cost-effectiveness and reaching larger audiences.
- Involve the wider GBIF community in taking an active role in training activities (*train-the-trainers* approach)
- Provide training materials in several languages.

Goals and Activities

The new Training Work area includes two key goals and six primary activities.

GOAL1: Develop an integrated training platform for GBIF

Activity 1: Create a GBIF Online Resource Centre[†] for Training

The Online Resource Centre[†] for Training is complementary to the Online Resource Centre for Nodes (see Nodes), and both will be integrated as a part of the GBIF website. All information about training in the GBIF network[†] will be accessible in a unified way: calendars, opportunities, requirements for participants, procedures to organise / participate in training events, etc. (Informatics, Communication, Nodes, Outreach).

Activity 2: Develop e-learning[†] classrooms within the Online Resource Centre[†] for Training

GBIF Nodes, data publishers and users will use this e-learning[†] approach to get trained in the topics of their interest. It will be based on open-source technologies so it can be reused easily by GBIF Participants implementing e-learning activities: national, regional or thematic. The development and use of complementary open-source tools to develop training contents and materials will be promoted.

Activity 3: Development of annual training plans and associated activities

The annual training plans will be based on the needs of the GBIF network, with priorities identified by users, data holders and Nodes. Every topic in these annual training plans

will have an associated training strategy/roadmap describing the projected activities and materials. Topics to be addressed during the next two years will include:

- *GBIF Metadata[†] Catalogue System* (IDA),
- *Integrated Publishing Toolkit* (IDA , DIGIT , NODES),
- *GBIF Web services[†]* (IDA),
- *Global Names Architecture[†]* (ECAT),
- *Mobilisation of Observations/Monitoring and Multimedia data* (DIGIT),
- *Nodes Introductory Package* and
- *Training Portfolio for Nodes*
- *Subject areas such as Ecological Niche Modelling (ENM), Georeferencing and IPR[†] will be continued and additional topics added as required.*

A set of training course packages compatible with the e-learning[†] portal will be produced for all of the above. Additions to the Supplementary Funds[†] will be sought to finance new training activities as required.

GOAL 2: Develop a GBIF training resources network

Activity 1: Creation of a training experts network

The objective is to create a network of experts to act as trainers (mostly at the regional and national levels) and to participate in a distributed[†] helpdesk. Highly experienced candidates for this will be constantly sought throughout the GBIF network[†] (Informatics, Nodes, Outreach).

Global face-to-face training events will be restricted to innovative topics and will be used as a specialised complement to on-line training. These events will serve to ensure that a base of experts is grown to act as trainers (*train-the-trainers* approach) and to participate in the network of experts (Nodes, Outreach).

Activity 2: Creation of a language resources network related to training

Set up a language resources network to help in the production or coordinate the translation of training materials. Additional funds will be sought for this activity (Nodes, Outreach and Participants).

Activity 3: Interest raising among training consumer groups

It is essential to raise the visibility of GBIF training and to increase the participation in training activities. This includes using the GBIF Secretariat communications portal (www.gbif.org), the Nodes' portals and other relevant media to promote training activities. This approach will include the production of training outreach materials and other activities. Materials will be made readily available on-line, including general information, training plans, tools, courses, etc. (Nodes, Outreach).

Budget

	Goal / Activity	2009	2010
Goal 1	Develop an integrated training platform for GBIF	€70,000	€100,000
Activity 1	Create a GBIF Online Resource Centre [†] for training	€0	€0
Activity 2	Develop e-learning [†] classrooms	€25,000	€0
Activity 3	Develop annual training plans and associated activities	€45,000	€100,000
Goal 2	Develop a GBIF training resources network	€10,000	€10,000
Activity 1	Training experts network in GBIF topics	€2,500	€2,500

Activity 2	Language resources network related to training	€2,500	€2,500
Activity 3	Interest raising among training consumer groups	€5,000	€5,000
	Advisory Task Groups	€10,000	€10,000
	TOTAL	€90,000	€120,000

Output by end 2010

A comprehensive, coordinated training programme suite will be developed and readily available to all Participants, in particular through innovative use of web and digital technologies. GBIF users, data publishers and Nodes will have access to training materials in all key GBIF topics no matter their location, resources and capabilities. Nodes will have readily customisable tools to easily develop their own training activities and to produce and use training materials in their local languages. New national and regional Nodes[†] will benefit from a faster launch of their training activities thanks to training inputs from appropriate experts and partners throughout the GBIF network[†].

Key GBIF Secretariat Outputs:

- An implementation plan and full suite of training courses and on-line training resources to meet the needs of Nodes in moving 'towards full operation' and promoting primary biodiversity data[†] sharing and use.
- An Online Resource Centre[†] for Training based on user needs and specifications, ensuring that the most up-to-date information on GBIF training is always publicly available, including the GBIF annual training plans.
- A common set of tools and standards, providing the means for the start of e-learning[†] activities and the production and sharing of contents for the GBIF e-learning[†] portals. The GBIF Secretariat will maintain one of these e-learning[†] portals, with a global scope.
- The technical means for the effective set-up and maintenance of the expert and language networks.
- Work with GBIF Participants to develop customised training needs assessments and appropriate training activities.
- Metrics on the success of different training modules and approaches.

Key GBIF Participant / Network Outcomes / Contributions:

- A network of GBIF Participants' experts and resources supports the development of training materials in several languages, providing much of the content for the GBIF virtual learning portals.
- Participate in the Online Resource Centre[†] for Training providing relevant information from their experiences and resources (training opportunities, resources available, etc.)
- Participants and regional partners will take responsibility for assessing their training needs and mobilising the resources to meet these needs to fully benefit from GBIF. They will make use of the tools provided and/or promoted to develop their e-learning[†] initiatives and portals.
- Participants will promote the widest possible participation in GBIF Training activities, and support the *Train-the-Trainers* approach.
- Participants and users provide feedback on materials and their needs for the further development of the training portfolio, courses and materials.

1.3. Outreach

Introduction

GBIF is intended to be a global organisation, open to all countries and international organisations interested in contributing to and benefiting from the joint endeavour of mobilising and making accessible biodiversity data[†] from all over the world. Currently significant geographical gaps in membership exist and therefore a robust set of outreach activities is required to rapidly fill these. The goal over the next two years is to increase participation, particularly in Africa, Asia, Eastern Europe, Latin America and the Caribbean, and the Pacific Islands. Priorities for Outreach are to understand needs, make the linkages to the uses of GBIF-mediated data[†], and showcase the successful experiences of current members, in a sufficiently coherent 'marketing package' to attract greater participation in GBIF.

Vision

By the end of 2010 GBIF is a more inclusive, participatory and global network with a balanced geographical membership across all regions.

Rationale

The challenges to achieving the conservation and sustainable use of biodiversity cannot be overcome via isolated actions, but rather through the concerted efforts of the global community, through both individual countries and international organizations. As a global common-good organisation, GBIF seeks a greater level of involvement and active engagement from across the globe, particularly from biodiversity-rich countries, to assist in developing the strategies to overcome these challenges.

Even though there is free access to GBIF-mediated data[†], there are significant additional benefits for Participants by joining GBIF – such as access to tools, support and training that can help the participating countries better manage their own biodiversity data[†], better address key biodiversity-related socio-economic concerns such as climate change, disease risks, invasive species and agricultural production and improve reporting to international environmental conventions. As more Participants join the network, all Participants benefit from additional data, information, best practices and expertise.

Strategies

- a. **Promote the engagement of new members based on meeting their primary biodiversity data[†] needs:** GBIF-mediated data are relevant to the needs of scientists, the conservation community, and decision-makers at all levels. Outreach materials which show this for individual users, countries etc need to be developed on an ongoing basis to encourage publication of biodiversity data.
- b. **Identify useful tools and products:** Actively engage with relevant user groups on their requirements for analytical tools (e.g. national policy and planning, and for reporting to the multilateral environmental conventions) which could be produced or facilitated by the GBIF network[†].
- c. **Use Outreach Task Group to expand outreach activities:** Enhanced levels of outreach will be attained through the active engagement of key Participants in GBIF Outreach activities to share their experiences on the benefits of participating in GBIF. (An Outreach Task Group was established in late 2008 to drive this process).

- d. **Engage with the conservation community:** The conservation community is an important source and user of primary biodiversity data[†], tools and products. A focused effort is needed to understand the needs and services required to encourage participation by key organisations such as IUCN[†], WCMC[†], Conservation International and BirdLife International.
- e. **Improve awareness of key IPR[†] concepts:** New educational/information materials developed by GBIF are easy to understand and allow for a greater engagement of data users and providers, including where IPR[†] issues exist. Data use/sharing agreements, citation and attribution systems need to be in place.

Goals and Activities

Goal 1: GBIF promotes the active engagement of countries, has a broad, balanced geographic participation and representation; voting membership is increased by a minimum 15% in 2009 and 20% in 2010.

Activity 1: Use in-country data needs assessments to help refine Outreach activities (DIGIT, Informatics, Nodes, Training).

Activity 2: Widely publicize achievements and showcase uses of GBIF data[†] (link to key socio-political policy requirements eg. climate change, invasive alien species); produce new promotional materials which highlight the advantages of being a GBIF member; use strategic projects and Campaigns to develop high-profile outputs (Nodes, Training, Informatics).

Activity 3: Use the collaboration with Denmark and France under the CEPDEC[†] programme to reach out to developing countries to join GBIF whereby these countries will receive training, mentoring and Node development assistance. Invite additional development agencies to join the CEPDEC[†]. (Training, Nodes).

Activity 4: Engage country Participants to carry out strategic outreach activities - supported by tailored materials - to evaluate needs of Associate Participants countries (AP), review benefits and develop a strategy, including focused visits, to promote AP moving to Voting Participation level (VP) (Nodes, Informatics).

Activity 5: Engage current Voting Participants (VPs) to assess and respond to the level of satisfaction and expectations in order to ensure VPs continue to participate in GBIF based on the benefits received (e.g. through the Outreach Task Group, meeting with HoDs, information from Nodes reports, surveys, etc.); (Nodes, Training, Informatics).

Goal 2: GBIF assists countries in meeting national obligations under biodiversity-related conventions.

Activity 1: Working with the CBD[†] Secretariat, assess data needs for national implementation and develop specific areas of collaboration (e.g. CHM[†], target and indicators for 2010 and beyond, climate change, Global Strategy for Plant Conservation, Global Taxonomy Initiative, Pollinators). Specific project annexes to existing MoC[†] with CBD[†] Secretariat are jointly developed (Informatics).

Activity 2: Work with Secretariats of other biodiversity-related conventions (e.g. CITES[†], CMS[†] and Ramsar[†]) and relevant national and international bodies to assess data needs

and identify possible areas of collaboration. Use GBIF infrastructure and services to address implementation at the national level (Informatics, Nodes, Training).

Goal 3. Engage with international organisations, in particular the Conservation Community.

Activity 1: Engage with relevant international organisations to grow Associate Participant membership in GBIF; engage current AP members to assess and respond to the level of satisfaction and expectations in order to ensure APs continue to participate in GBIF based on the benefits received. (ECAT, DIGIT, Nodes)

Activity 2: Based on the agreed open access policies of IUCN[†] (and others in the Conservation Commons[†] (CC[†])), work to encourage participation by IUCN[†] (and other CC[†] partners) in GBIF (e.g. Species Information System, Red Data List, Amphibian and Mammal Assessments and World Database on Protected Areas) and to meet IUCN[†] data needs (Informatics, ECAT, DIGIT; Nodes).

Activity 3: Promote the use by the conservation community of the distributed[†] GBIF network (national, regional, thematic levels) for access to and mobilise new types of data (e.g. molecular, type specimens, local and national datasets not readily available etc.)(Informatics, DIGIT, Nodes, Training).

Goal 4: GBIF provides a transparent and robust framework to address IPR[†] and citation issues.

Activity 1: Produce easy to understand education/dissemination materials to demystify IPR[†] and citation issues and the implications within a GBIF context (Nodes, Training).

Activity 2: Work with the Pro-bono legal expert group to develop documents on relevant IPR[†] best practice and principles (Nodes, Training)

Activity 3: Update data use and sharing agreements, citation and attribution mechanisms (Informatics, Nodes)

Activity 4: Provide an on-line forum through the GBIF web site[†] to address members' FAQs and concerns (Informatics, Nodes)

Activity 5: Build an accessible database on the GBIF website on how specific IPR[†] cases are dealt with by the network (Informatics, Nodes, Training)

Budget

	Goal / Activity	2009	2010
Goal 1	Increase country membership by a minimum of 15% in 2009 and 20% in 2010	€25,000	€20,000
Activity 1	Conduct country data needs assessments	€15,000	€10,000
Activity 2	Widely publicise achievements and showcase uses of GBIF-mediated data [†]	-	-
Activity 3	Use the CEPDEC [†] project framework to reach out to developing countries to join GBIF	-	-
Activity 4	Engage Outreach champions to carry out strategic liaisons	€10,000	€10,000
Activity 5	Ensure that current VPs continue to participate	-	-

Goal 2	Assist countries in the national implementation of biodiversity conventions	€10,000	€15,000
Activity 1	Working with the CBD [†] Secretariat, assess data needs for national implementation and develop specific areas of collaboration	€10,000	€15,000
Activity 2	Work with Secretariats of other biodiversity-related conventions to assess data needs		
Goal 3	Engage with international organisations, in particular the Conservation Community	€5,000	€5,000
Activity 1	Grow AP membership in GBIF. Ensure current APs are satisfied and continue to participate	-	-
Activity 2	Facilitate participation by IUCN (and other Conservation Commons partners) in GBIF	-	-
Activity 3	Conservation community uses the distributed GBIF network (national, regional, thematic levels) for access to new types of data	-	-
Goal 4	Provide a transparent and robust framework to address IPR [†] and citation issues	€10,000	€15,000
Activity 1	Produce education / dissemination materials to demistify IPR and citation issues	€5,000	€5,000
Activity 2	Work with the Pro-bono legal expert group to develop documents on relevant IPR best practice and principles	-	-
Activity 3	Update data use and sharing agreements, citation and attribution mechanisms	-	-
Activity 4	Provide an on-line forum through the communications portal to address members' FAQ's and concerns.	-	-
Activity 5	Build an accessible database on how specific IPR cases are dealt with by the network	€5,000	€10,000
	Advisory Task Groups	€10,000	€20,000
	TOTAL	€60,000	€75,000

Output by end 2010

The GBIF network infrastructure, GBIF-mediated data[†] and analytical tools are relevant to a broad range of communities (scientific, decision-makers, conservationists, policy-makers, environmental planners and managers, etc) and assists them to meet their needs. As a result, GBIF has an increased geographical presence and membership and a minimum of 17 new VP members. At least 2 Associate Participants move to Voting Participant level annually. Based on assessed country needs GBIF is able to serve data that helps in the national implementation of biodiversity-related conventions. GBIF products and services are relevant to the needs of key policy issues of the international community, as a result of which increasing numbers of countries and organisations seek to engage in GBIF. Relevant IPR[†] and citation issues are satisfactorily dealt with through the GBIF mechanisms and recommendations.

Key GBIF Secretariat Outputs:

- Updated materials, promotional work, activities and strategies effectively communicate the benefits of becoming a GBIF member and as a result GBIF attains a significant increase in VP and AP membership.
- Scientific data needs from existing and potential GBIF members are identified and used to develop targeted information products and services.
- Data uses and members' achievements and experiences are widely publicised (web, newsletter, scientific events, congresses, etc) and promote a greater visibility and recognition of GBIF's work.

- Agreements are signed with biodiversity convention Secretariats (CBD[†], CITES[†], CMS[†], Ramsar[†]) to mobilise data and tools that help meet national implementation needs and reporting obligations.
- Agreements are signed with key members of the Conservation Commons[†] community (e.g. IUCN[†]) to share data via GBIF.
- Guidelines and recommendations on IPR[†] and citation issues are provided to help overcome existing barriers regarding data use and sharing.

Key GBIF Participant / Network Outcomes / Contributions:

- Participants actively participate in the Outreach Task Group; Participants share their successful experiences in participating in GBIF which helps attract new Participants
- Additional countries and international organizations sign the GBIF MoU[†] and assist with implementing the GBIF Work Programme.
- Associate Participants respond positively to a strategy for moving to Voting Participation during 2009-2010 and facilitate visits at the Governmental level where required.
- Participants proactively collaborate with the Secretariat in the identification of scientific data needs, priorities, and solutions.
- Participants mobilise and use GBIF-mediated data to address national needs particularly regarding the implementation of biodiversity conventions.
- Conservation NGOs use GBIF to share and use conservation-related data to achieve the goals of conserving and sustainably using the world's biodiversity.
- Participants proactively contribute to the guidelines and recommendations on IPRs and citation of data shared via the GBIF network[†].

1.4. Communication, Media and Fund-raising

Introduction

GBIF is a 'public-good' global initiative designed to provide ready access to biodiversity data[†] for all and any users and contributors. GBIF's profile to date has remained very much within the sector, for good reasons – GBIF is a young initiative with limited resources for achieving its stated ambitions and needed to first establish 'proof-of-concept' via a 'product-line' before fully entering the market. However, GBIF is now well-established, many products are being used by an ever increasing number of 'consumers', and feedback[†] on improvements is constantly sought and responded to. GBIF now needs to develop a full suite of professional communication and media strategies to raise awareness of, and participation in GBIF in order to both broaden the contributor and investor base as well as the beneficiaries. A scientifically sound, admired and visible profile based on a solid track-record of efficiency, cost-effectiveness, good governance, transparency, inclusivity and delivery needs to be turned into a successful fund-raising portfolio.

Vision

By the end of 2010, GBIF will be a 'household' name in terms of where the scientific community in general, and policy community in particular seek biodiversity data with assurance of its quality and reliability, to effect sound decision-making. As a result, significant financial resources raised against this profile enable the GBIF network to make rapid strides 'towards full operation'.

Rationale

In moving 'towards full operation' GBIF has to raise our public profile and engage more with a far wider audience across the 'end-user' spectrum, from scientific institutions, to national and international agencies, to governments, to non-governmental organisations and with society in general in order for them to be exposed to, and take up, the products GBIF has and is developing, to their own benefit. In order to do so, GBIF needs a highly professional public relations and media portfolio, built around industry-best practice standards for product launches, media relations and media releases, in order to both raise awareness of and participation in GBIF, as well as mobilise the significant additional financial resources required.

Strategies

Prior to the WP09-10 being rolled-out, the Secretariat will have employed a highly skilled professional in the post of Head of Participation (HoP) to bring the above into effect. The strategy encompasses both much greater and more focused coordination of all of the external liaison activities required, in particular engagement with Participants, media and funders, as well as for the HoP to lead the development and implementation of the planned activities to achieve the stated goals and vision.

Goals and Activities

Goal 1: Develop and roll-out a comprehensive Communications strategy

Activity 1: Develop a comprehensive Communications strategy and roll-out

Activity 2: Lead on the revision of the design and population of content of the GBIF website (communications portal) to ensure it is an exemplary use of the technology

Activity 3: Develop a plan for a regular submission of high quality scientific articles, publications and media releases across the literary media

Activity 4: Develop and roll-out a plan for creation of high quality digital media products for various audiences, including on-line videos etc

Goal 2: Develop and roll-out a comprehensive Fundraising Strategy

Activity 1: Develop and roll-out a comprehensive strategy for innovative fund-raising approaches, including Campaigns, based on the successful track record and reputation GBIF has earned in developing products which meet user needs

Activity 2: Establish a fund for digitisation of primary biodiversity data[†] to support the Global Strategy and Action Plans

Activity 3: Expand the number of development aid agencies participating in CEPDEC[†]

Budget

	Goal / Activity	2009	2010
Goal 1	Develop and roll-out a comprehensive Communications strategy	€30,000	€30,000
Goal 2	Develop and roll-out a comprehensive Fundraising strategy	€10,000	€10,000

	TOTAL	€40,000	€40,000

Output by end 2010

By the end of 2010, GBIF will be a 'household name' amongst the scientific and policy communities to which biodiversity informatics is relevant, based on the successful communication of the credible, high quality and user-oriented nature of the products and services developed through the GBIF network[†]

Key GBIF Secretariat Outputs:

- Comprehensive communications and fund-raising strategies developed and rolled-out
- Robust, professional and comprehensive suite of communications products customised for various target audiences, including amongst Participants
- State-of-the-art, user-friendly and award-winning communications portal
- Significant income raised from new funding sources

Key GBIF Participant / Network Outcomes / Contributions:

- Ongoing, detailed and useful feedback on GBIF products and services to enable upgrades and customisation
- Promotion and support of GBIF endeavours, in particular to raise additional funds from new sources
- Playing significant promotional roles in all interactions with key stakeholders, in particular in-country with national funding agencies

1.5. Strategic Applications and Campaigns

Strategic Applications

In the start-up phase of GBIF, relatively few datasets were available to demonstrate utility of a global architecture and interoperability. GBIF therefore made so-called Seed Funds available to catalyse the mobilisation of data to the network - mobilising 'low hanging fruits' by assisting potential data publishers[†] with small grants to quickly digitise and edit datasets to the required standards. Subsequently Seeds Funds were used more strategically to develop and support networks of data publishers[†] within a subject area to obtain a critical mass of data more relevant for end users as it allowed useful analyses. In 2007-08 the call for Seed Funds focussed on the data needs of specific issues of global or regional interest - climate change, pollinators, invasives and the 2010 target - rather than purely data mobilisation.

In addition in the early years GBIF funded a small number of 'demonstration projects' to demonstrate the potential use of GBIF-mediated data for planning and decision purposes.

As GBIF Participants increasingly take up the tools and mobilise data, it is imperative that GBIF use any additional funds for developing state-of-the art analytical tools showing the uses to which such data can be put. In 2009 -2010 the Seed Funds will be made available only for high-level, promotional strategic applications using GBIF-mediated data.

Campaigns

According to the GBIF Strategic Plan 2007 - 2011, a Campaign is a large, time-bound project, or set of projects, that brings together a range of collaborators with a goal of developing a specific product(s) that meets the needs of a well-defined user group. The purpose of a Campaign is to achieve, through collaboration, mobilisation of resources and outcomes that could not have been achieved independently.

A GBIF Campaign should directly contribute to the core mission of GBIF and should encompass key aspects of the Work Programme; they are primarily envisaged to mobilise additional Participant activity and investment. The products can be taxonomically, thematically, and/or geographically focused. They should include a biodiversity informatics component, increase in primary biodiversity data[†] content available through GBIF, facilitate the organisation of data publishers[†] and users into communities, and promote changes in standard practices to take advantage of new technologies. The objectives, work and contributions of a Campaign should be seen as a complementary way of supporting the GBIF Work Programme and the needs of individual Participants, through self-led and self-funded activities initiated external to the Secretariat and the GBIF core funds[†]. The Campaign concept is a key shift towards a more self-reliant decentralised[†] network model.

Whilst the Secretariat may provide limited 'seed' funding for a start-up phase if required for a Campaign, they go far beyond GBIF's traditional Seed Fund projects by not only aiming to increase content, but are also intended to leverage a wider range of benefits, impacts, partnerships, and technical solutions at a global or broad regional level.

It is a prerequisite that a GBIF Campaign has a Participant country or organisation that provides leadership and has secured the commitment of sufficient funding in advance to effectively drive the Campaign. Thus a Campaign has to be Participant-driven and financially self-sustaining to be considered. Campaigns require involvement and funding from multiple partners, including GBIF Participants and external sources such as private foundations and/or government agencies as interested 'customers' of the products. Funding commitments must be clearly spelled out before a Campaign can be approved.

The Strategic Plan sets a goal of at least one funded Campaign each year from 2007 to 2011. In 2007 the Governing Board[†] approved (and provided start-up funds to) four Campaigns; as a result and to learn whether the Campaign concept is a viable one, no call for Campaigns was issued in 2008, nor will be in 2009. The Science Committee will in 2009 review the success criteria for Campaigns in order to assess the viability of the concept. Depending on the outcome of this review, a new call may be made in 2010.

Any Campaign proposals received in the event of future calls will be reviewed and decided upon by the Science Committee[†] at their biennial meetings. For 2009 and 2010, €200,000 has been budgeted for each year for Strategic Applications development, which may, in 2010, include start-up funds for one or more Campaigns.

Budget

	Goal / Activity	2009	2010
Goal 1	Strategic application projects	€200,000	€200,000
	TOTAL	€200,000	€200,000

2. Informatics

Building on the significant IT developments in 2007-08, in particular the new data portal, and in moving from 'prototype towards full operation', the Informatics Thematic area[†] for 09-10 focuses on developing the full suite of IT infrastructure, architecture, services and tools to enable a fully-functional, scalable, distributed[†] network of Participants. In order to bring this into effect, the IDA, DIGIT and ECAT Work areas[†] have been consolidated within a broader Informatics remit to ensure adequate and coordinated allocation of resources to develop the wide range of products envisaged under the full Informatics area. In addition, the WP ensures that Informatics as a whole prioritises development in accordance with the needs expressed via the Participation Thematic area[†] on behalf of Participants, in a 'service-provider to client' relationship (see Fig. 1).

2.1. IDA (Inventory, Discovery, Access)

Introduction

In meeting one of its core informatics challenges, that of designing a scalable, distributed[†] architecture and implementing it according to best practices, GBIF must ensure that it adheres to international standards for data exchange formats and protocols to enable the maximum degree of interoperability across heterogeneous, distributed[†] data holdings and applications. In addition, large distributed[†] networks featuring numerous providers and consumers of data require that the key activities of inventory, discovery and access are well coordinated through provision of registries and metadata[†] catalogues. IDA will drive the design of the GBIF metadata[†] cataloguing system and its linkage to the Global Biodiversity Resources Discovery System (GBRDS[†]), and inform developments across Informatics through recommendations on appropriate standards.

Vision

By the end of 2010 the metadata[†] architecture, services and tools to enable Participants to rationalise participation in GBIF as the preferred global facility for discovery and access to primary biodiversity information will be in place.

Rationale

The design of the GBIF data portal[†] is currently strongly tied to mobilising and making directly accessible primary species occurrence data delivered as Darwin Core[†] or ABCD[†] records. The emphasis has been very much focused on providing access to individual data records rather than describing, and making accessible in a metadata[†] catalogue, general information on the parent datasets to which those records belong. However, to share data effectively and facilitate re-use in ways not envisaged at the time of collection requires that the datasets are well documented. This can be achieved by the addition of a metadata[†] cataloguing system fully integrated within the GBIF distributed informatics infrastructure.

In addition, the network must expand to offer many types of web services[†] for delivering data to users, and client applications that can use the data in novel and specialised ways that supplement the mapping/visualisation and ecological niche modelling applications already available.

Participants in GBIF include both publishers and users of data (often the same individuals assuming different roles). Both participate in inventory, discovery and access. In order to make biodiversity datasets readily discoverable, publishers will have to prepare - to agreed standards - an inventory (or catalogue) of their biodiversity data[†] resources in the

form of a metadata[†] catalogue with one metadata document to describe each resource. The metadata catalogue can then be shared through indexing in a central metadata repository and made available through a metadata portal within the existing GBIF Portal[†]. For example, a potential data publisher[†] would be able to check the catalogue to see what standards for data exchange formats and protocols are available for use with particular classes of data, including standards-based interfaces (web services[†]) for providing access to them. A user of primary biodiversity data would be able first to search for biodiversity resources that match particular metadata[†] criteria (e.g. data exchange standard[†]; institutional provider; multimedia type; taxonomic, temporal, geospatial coverage) and find out how to download or access the original primary data through web portals or web services[†]. It is recognised that many actors participating in the GBIF network[†] will already have metadata systems in place. Therefore, a key task for IDA is to ensure that interoperability measures through metadata schema crosswalks and harvesting protocols are developed and deployed.

Strategies

The strategies of the IDA Work area[†] will be to focus on three main technical areas to support development of the distributed[†] GBIF network and associated web services[†], all based around the need for biodiversity metadata and interoperability standards:

1. Standards for data / metadata[†] exchange formats;
2. Standards for communications protocols;
3. Standards for web services[†] (see Goal 2 below).

A further four broad topic areas have a cross-cutting relationship with the three technical areas:

1. Design of the GBIF metadata[†] catalogue system;
2. Development of standards based web services[†] for sharing biodiversity data[†];
3. Coordination of relationships between GBIF and other major international database networks;
4. Close liaison with Biodiversity Information Standards (BIS[†])/TDWG[†] and other relevant standards bodies.

The IDA area of work will contribute to the design of a metadata[†] portal while its implementation and integration with the GBIF Portal[†] will be the responsibility of the Informatics Infrastructure and Portal (IIP) Work area[†].

The IDA Work area[†] is therefore predominantly cross-cutting other areas of work and provides advice on standards to the entire GBIF Informatics Thematic area[†]. IDA also depends on other Work areas[†], in particular ECAT and DIGIT, for input on requirements for particular standards to support the tools and applications relevant to their content areas. In addition, IDA will liaise closely with the Training Work area on the development and delivery of training modules relating to the metadata[†] catalogue system, GBRDS[†], web services[†], and biodiversity standards, as well as with the Nodes and Outreach Work areas[†] to develop and promote these technologies amongst GBIF partners. The main outputs expected from the IDA Work area are outlined below.

Goals and Activities

Goal 1: Design the GBIF Metadata Catalogue System

Drive the design of the GBIF metadata[†] catalogue system (so called "Metadata Portal") based on best practice and advise the Informatics technical team on its integration with

the broader GBIF Portal[†]. For such a system to become useful, it requires uptake and content provision by Participants.

Activity 1: Develop a GBIF metadata profile for describing biodiversity information resources⁵

There is a requirement for a set of metadata[†] descriptors that adequately describe the biodiversity information resources mobilised by the ECAT and DIGIT Work areas[†]. IDA will coordinate the review and development of a metadata[†] standard[†] for GBIF-mediated biodiversity resources by surveying GBIF partners, reviewing related standards and working with dedicated task groups to meet Participant needs for resource discovery, including descriptions of data standards, protocols and web services[†]. Issues around multilingual aspects of metadata will also be investigated.

Activity 2: Develop a metadata management tool

Participant Nodes[†] and other data publishers[†] require a tool that is easy to install and use that will allow them to manage (e.g., edit, store, revise, publish) metadata[†]. This tool will be developed by the GBIF Informatics team as an integral part of the Integrated Publishing Toolkit (IPT[†]) and will be cross-linked with the Biodiversity Collections Index (BCI[†]). IDA will coordinate testing to ensure that end user requirements are met through adopting an iterative process of development in which early prototypes are made available to Participant Nodes[†] for evaluation and feedback, and will liaise with Training to develop a training module on installation and use of the tool.

Activity 3: Facilitate the inclusion of semantically rich content in metadata

The inclusion of semantically rich content derived from controlled vocabularies, thesauri and ontologies ensures that the metadata[†] carry meaning, structured searching is enhanced, and the metadata and data are amenable to machine processing. IDA will undertake a review of controlled terminology with recommendations for developing and integrating look-up tools for controlled terminology in the metadata management system.

Activity 4: Develop interoperability mechanisms with other biodiversity metadata networks

Many national and international organisations already maintain, or plan to develop, metadata systems. A mechanism to develop interoperability between the GBIF metadata cataloguing system and other metadata networks should ensure wide unified access to discovery of biodiversity resources. IDA will convene a Metadata Database Interoperability Task Group to advise on how existing metadata systems can be made interoperable to allow cross-database searching. A requirements document will be prepared for Informatics to inform development of architectural and implementation plans for interoperability. The interoperability mechanism will be implemented with selected major networks.

Key Linkages	
Informatics	Design and implement the metadata catalogue system / metadata portal in accordance with requirements prepared by IDA
ECAT	Identify input on datatypes and metadata descriptors for data; identify role of metadata in data publishing process; identify suitable candidate metadata networks; identify resources for controlled content in metadata
DIGIT	Identify input on datatypes and metadata descriptors for data; identify role of

⁵ Biodiversity resources in this context refers to data, datasets, collections, names, etc

	metadata in data publishing process; identify suitable candidate metadata networks; identify resources for controlled content in metadata
Nodes/Outreach	Engage with Participant Nodes on metadata requirements; promote importance of metadata amongst Nodes; promote metadata for data quality/fitness-for-use; promote role of metadata in data publishing process; identify suitable metadata networks
Training	Develop training modules on metadata management and delivery; promote the value of data custodians working with a trained digital librarian to prepare metadata.

Goal 2: Develop standards-based Web services[†]

Data publishers[†] require tools to make their data easily accessible on the internet, whether through TDWG[†]-defined protocols such as TAPIR[†], or through more generic web services[†] such as those from the Open Geospatial Consortium (OGC[†]). Data users, in turn, require applications that access the data via web services[†] and are used to solve a particular problem, e.g., delineate/manage a protected area boundary, or run a climate change scenario.

Activity 1: Develop a strategy on deployment of OGC[†] web services[†]

Open Geospatial Consortium (OGC[†]) web services[†] are the *de facto* standard[†] for interoperability on the “geospatial” web. Deployment of such services will enable integration of a variety of biodiversity data both within the GBIF network[†] and with other networks such as GEOSS[†]. IDA will convene a task group on OGC[†] web services[†] to formulate a strategy document on deployment of OGC[†] web services[†] on the GBIF network including recommendations on integration of OGC[†] Web Map and Web Feature Server functionality in the Integrated Publishing Toolkit (IPT[†]), and an OGC[†] web services[†] client in the Nodes Portal Toolkit[†].

Activity 2: Provide recommendations on additional web services[†]

IDA will prepare a requirements document based on requests for additional/enhanced web services[†] in the GBIF Portal[†]. For example IDA will be instrumental in assisting the Informatics technical team in the development of new REST-based[†] web services[†] as well as their integration within Rich Internet Applications. Such coordination from IDA will be critical in the 2009-2010 period when the GBIF network[†] is expected to grow in terms of data volume and usage.

Key Linkages	
Informatics	Develop the Integrated Publishing Toolkit and Nodes Portal Toolkit ensuring that standards-based web services and client functionality are implemented in accordance with requirements prepared by IDA
ECAT	Input on user requirements for web services and web clients; development of ECAT as a web service
DIGIT	Input on user requirements for web services and web clients
Nodes/Outreach	Promotion of web services/ web clients amongst Participant Nodes
Training	Develop training modules on web services for data delivery and web clients for data consumption

Goal 3: Coordinate with other Networks

GBIF is not the only large-scale biodiversity informatics initiative. New projects and networks are continually being created. However, it is essential to encourage the adoption of common standards to ensure interoperability across the biodiversity domain. GBIF, as a megascience initiative, is in a strong position to undertake a coordination role

for the integration of biodiversity data and can draw on its experience to engage and collaborate with other projects.

Activity 1: Strengthen relationships between GBIF and other major biodiversity networks to enable GBIF to act as broker/integrator of biodiversity data[†]

IDA will coordinate participation in and provide leadership in appropriate advisory groups and workshops (e.g. LifeWatch, Encyclopedia of Life[†], ILTER[†] - International Long Term Ecological Research), within relevant Global Earth Observation System of Systems (GEOSS[†]) fora e.g., Architectural Implementation Pilot, Biodiversity Observation Network) and in appropriate European Union funded projects (e.g. EuroGEOSS[†]), and promote uptake of relevant standards.

Key Linkages	
ECAT	Work with ECAT to maximise role of GBIF as integrator/broker of all kinds of biodiversity data
DIGIT	Work with DIGIT to maximise role of GBIF as integrator/broker of all kinds of biodiversity data
Nodes/Outreach	Promote network interactions at Node/country level; provide examples to Participant Nodes of GBIF-mediated data in use
Training	Provide use cases, demos that can be used in training modules

Activity 2: Liaison with BIS[†] (TDWG[†]) and other standards bodies to contribute to the development of standards relevant to GBIF's work.

With its remit to promote the development and adoption of biodiversity standards, it is essential for IDA to liaise closely with relevant standards organisations including BIS[†] (TDWG[†]) to help establish and contribute to the development of standards relevant to GBIF's work. IDA will coordinate GBIF representation on the TDWG[†] Executive Committee, participate in, and provide leadership in TDWG[†] task groups, convene sessions on appropriate topics for the annual TDWG[†] conference, and drive the process of standards development and uptake by convening special task groups and workshops. IDA will convene a Life Science Identifier (LSID[†]) Task Group to review the status of LSID[†] uptake and devise a strategy for wide deployment of LSIDs[†] or other Globally Unique Identifiers (GUIDs[†]) and will also organise workshops on the Species Profile Model (SPM[†]) uptake. IDA will work through TDWG[†], or directly, as required, to make representation on biodiversity standards to other relevant bodies such as the OGC[†] and International Organization for Standardization (ISO[†]).

Key Linkages	
Informatics	Integrate functionality for GUID deployment in tools such as the Integrated Publishing Toolkit in accordance with recommendations provided in the LSID strategy document prepared by IDA.
ECAT	Work with ECAT to ensure that content providers adopt GUIDs; citation mechanism based on GUIDs
DIGIT	Work with DIGIT to ensure that content providers adopt GUIDs; citation mechanism based
Nodes/Outreach	Promote Participant Nodes as data publishing centres; promote use of GUIDs amongst Participant Nodes, including use of GUIDs for citation mechanism
Training	Training modules in deploying GUIDs and using BIS (TDWG) standards

Budget

	Goal / Activity	2009	2010
Goal 1	Design the GBIF Metadata [†] Catalogue System	€50,000	€20,000
Activity 1	Develop a GBIF metadata profile for describing biodiversity information resources	€7,000	-
Activity 2	Develop a metadata management tool	€15,000	€6,000
Activity 3	Facilitate the inclusion of semantically rich content in metadata	€14,000	
Activity 4	Develop interoperability mechanisms with other biodiversity metadata networks	€14,000	€14,000
Goal 2	Develop standards based Web services [†]	€40,000	€40,000
Activity 1	Develop a strategy on deployment of OGC web services	€40,000	€40,000
Activity 2	Prepare requirements document on additional web services	€0	-
Goal 3	Coordinate with other Networks	€10,000	€40,000
Activity 1	Strengthen relationships between GBIF and other major biodiversity networks to enable GBIF to act as broker/integrator of biodiversity data	€0	€15,000
Activity 2	Liaison with BIS (TDWG [†]) and other standards bodies to establish and contribute to the development of standards relevant to GBIF's work.	€10,000	€25,000
	Advisory Task Groups	€10,000	€10,000
	TOTAL	€110,000	€110,000

Output by end 2010

By the end of 2010, the GBIF network[†] will support comprehensive discovery and access to biodiversity information resources through the wide uptake amongst Participant Nodes of the GBIF metadata[†] catalogue system.

Web services[†] based on OGC[†] and other standards will be deployed widely and customised web clients / applications for working with data mediated by the GBIF network[†] will be available. Such specialised applications are essential to allow end users to access data to solve particular problems.

GBIF will have become a key player as broker/integrator of biodiversity data through actively coordinating relationships with other major biodiversity networks. The standards to improve the sharing of biodiversity data both within the GBIF network and with other networks will be augmented and their uptake promoted.

Key GBIF Secretariat Outputs:

- a GBIF metadata[†] profile for datasets,
- a requirements document for the software components of the GBIF metadata[†] catalogue system,
- a strategic plan and requirements document on an interoperability mechanism with other metadata[†] networks,
- a strategic plan and requirements document on deployment of OGC[†] web services[†],
- integration of the GBIF network[†] with other major networks such as GEOS[†],
- a strategic plan with recommendations on the deployment of LSIDs[†] or other GUIDs[†] on the GBIF network[†].

Key GBIF Participant / Network Outcomes / Contributions:

- active participation in the Metadata interoperability , LSID[†] and other Task Groups
- uptake and deployment of the GBIF metadata[†] catalogue system at the appropriate level, whether country, regional or thematic; this will involve installing and maintaining the metadata[†] management system developed
- provision of high quality, complete metadata[†] for all datasets under their ownership and/or custodianship,
- deployment of OGC[†] web services[†] for their datasets; this will involve installing and maintaining OGC[†] compliant web servers and making data available through them,
- development and sharing of customised web clients/applications,
- uptake of GUIDs[†] to uniquely identify their biodiversity information resources,
- uptake of SPM[†] to share species level information.

2.2. Content**2.2.1. DIGIT (Digitisation and mobilisation of primary biodiversity data[†])****Introduction**

The GBIF second phase 'from prototype to full-operation' calls for a significant change in approach in the DIGIT (data capture, digitisation and mobilisation) Work area[†] activities. The 'distributed[†] architecture' and 'decentralised[†] implementation' mode of operations for data resources discovery and data access requires a shift in focus from being seen as activities 'for GBIF' to activities for the benefit of the broad GBIF community and other relevant partners. GB14 endorsed the target of 1 billion data records by end 2008, understanding that "full-operation" requires a volume, density, and coverage of data that would allow meaningful and useful analyses for all Participants. Implementing DIGIT is thus catalytic. Additional funds and resources must be mobilised by Participants to achieve the targets envisaged by the DIGIT Work area[†].

Vision

By the end of 2010, the increase in digitisation and access to "fit-for-use" primary biodiversity data[†] available through the GBIF network[†] enables Participants to make more effective decisions regarding management and use of their biodiversity.

Rationale

Currently approximately 150 million primary biodiversity data[†] records are indexed through the GBIF network[†], most of which are specimen and observation records. With the majority of data publishers[†] and datasets mobilised from institutions and research groups from northern hemisphere and developed regions, these data represent an uneven distribution, thus this existing quantity and quality of mobilised data are inadequate for definitive 'local-to-global' scale analysis. Therefore, the DIGIT Work area[†], in close collaboration with the inventory, discovery and access functionalities being developed in the IDA Work area[†], is designed to increase access to various types of primary biodiversity data[†] by orders of magnitude such that these gaps can be filled. In addition, "fitness-for-use[†]" of GBIF mobilised data must be addressed, enhancing the access to reliable data that are fundamental for scientific analysis and for planning and decision making.

Strategies

The following strategies should ensure that the ambitious goals of the DIGIT Work area are achieved and risks are minimised:

- Communicate with GBIF Nodes, potential data publishers[†] and partner networks about DIGIT being the Work area[†] by and for the GBIF community and its relevant partners to mobilise their data (Nodes, Outreach).
- During 2008, focussed Task Groups are working to conceptualise, and recommend approaches for mobilising new data types; these approaches will be rolled out in 2009-10.
- Promote the use of the Global Biodiversity Resources Discovery System (GBRDS[†]) and Integrated Publishing Toolkit (IPT[†]) for increased and expedited resources discovery and mobilisation (IDA, Informatics, ECAT, Nodes, Training).
- Drive the recognition of primary biodiversity data[†] resource discovery and data records mobilisation as a valid scientific publishing activity for which providers obtain suitable scientific accreditation (Governing Board[†], Science Publishers, Science Funding Agencies)
- Engage, partner and collaborate with untapped networks and data publishers[†] and select “low hanging fruits” amongst untapped data publishers[†] (Nodes and other Networks)
- Leverage industry experience of industrialising digitisation and mobilisation of data through collaborations and partnerships with industry players (IDA, Informatics, and Industry Players)
- Build strategic alliances and leverage current political attention to science issues to mobilise increased data through the GBIF network[†] (Governing Board[†], Global Initiatives, Outreach, and Nodes)
- Sketch big-picture biodiversity informatics opportunities through community-driven exercises such as thematic Global Strategy and Action Plans for mobilisation of primary biodiversity data[†] (Natural History Institutions, Outreach, Nodes, Science Societies, large-scale infrastructure initiatives and Science Funding Agencies)
- Synthesise the strategies and explore opportunities for additional funding for increased and expedited mobilisation of primary biodiversity data[†] (Governing Board[†], Participation, Funding Agencies)

Goals and Activities

Goal 1: Assessment of contents needs of user communities, and facilitating discovery of datasets holding up to 5 billion primary biodiversity data[†] records

Activity 1: Contents Needs Assessment

Through user surveys, understand the needs of various user communities, together with their requirements for data volume, depth and density, degree of precision, accuracy, authenticity, and fitness-for-use[†] for varied purposes. Identify the taxonomic, geographic, temporal, qualitative gaps in GBIF mobilised data through data analysis and synthesis of user surveys, resulting in prioritisation of expedited data mobilisation through the GBIF Participants.

Activity 2: Develop a Global Strategy and Action Plan for mobilisation of Natural History Collections data (GSAP-NHC)

Encourage national, regional and thematic stakeholder communities in countries with significant natural history collections to develop national, regional, and thematic “blue prints” for digitisation and mobilisation of natural history collections data. Evolve guidelines and criteria for undertaking such consultations. Facilitate synthesis and

analysis of these national, regional and thematic blue prints to develop a “Global Strategy and Action Plan for mobilisation of Natural History Collections data”.

Activity 3: Develop a Global Strategy and Action Plan for mobilisation of Observation/Monitoring, Ecological, Multimedia, and other types of primary biodiversity data (GSAP-OEM)

Encourage custodians and existing and potential providers of observation/monitoring, ecological, multimedia and other types of primary biodiversity data[†] holders to develop national, regional and/or thematic action plans for mobilisation. Also involved would be strategies for mobilising ad-hoc and non-primary biodiversity data, e.g., species occurrence data collected during environmental impact assessments, in-situ and ex-situ studies, etc. Evolve guidelines and criteria for undertaking such an exercise. Through a group of experts, facilitate synthesis and analysis of such action plans to develop a ‘Global Strategy and Action Plan for mobilisation of data types other than natural history collections’.

Activity 4: Promote national, regional and thematic implementation and use of the Global Biodiversity Resources Discovery System (GBRDS[†])

Encourage national, regional, and thematic implementation and enrichment of the GBRDS[†] to facilitate decentralised[†] discovery of all biodiversity datasets world-wide. Capitalise on enthusiasm generated through GSAP exercises as well as progress made by the Biodiversity Collections Index (BCI[†]) and other metadata[†] cataloguing exercises (e.g. Knowledge Network for BioComplexity, ILTERNet[†], LifeWatch[†], etc.) to expedite and enrich the GBRDS[†] content and volume of datasets discovery. In order to further facilitate this, encourage national, regional, and international science funding agencies, as well as GBIF Participants to adopt and implement recommendations to make registering metadata[†] of datasets mandatory.

Goal 2: Facilitate mobilisation of up to 2 billion primary biodiversity data[†]

Activity 1: Encourage national, regional, and thematic use of the Integrated Publishing Toolkit (IPT[†]) through training

Encourage decentralised[†] implementations and use of the Integrated Publishing Toolkit (IPT[†]) by existing and new data publishers[†]. In collaboration with Training, GBIF Participants and other data networks develop multi-lingual training manuals, e-learning[†] tools and hold training courses and help-desk services to enable uptake of the IPT[†]. Improve and expand scalability of the IPT[†] to discover and mobilise various types of primary biodiversity data[†] such as multimedia, ecological, etc.

Activity 2: Promote development and implementation of a “technical, social and policy framework” for publication of primary biodiversity data[†] as a “research data management chain”, and credits/attribution to data contributors/providers

Convene a Task Group to develop recommendations on a local-to-global scale (technical-social-policy) research data management framework essential for exponential discovery of data sets, and provider-friendly, cost-efficient, as well as scalable publication of primary biodiversity data[†]. Promote the use of the GUID[†] and/or appropriate mechanism to ensure due credits/attribution to data publishers.

Activity 3: Develop strategies for industrialisation of digitisation and mobilisation of multiple data types

Through e-conference and meetings of data producers, custodians, digitisation and ICT[†] industry leaders develop strategies for industrialising capture, digitisation and mobilisation of primary biodiversity data[†]. Encourage development, training, and use of tools, equipment, processes, software and infrastructure to industrialise digitisation and mobilisation of all types of primary biodiversity data[†].

Activity 4: Improving “fitness-for-use[†]” of GBIF mobilised data

Together with ECAT, IDA, Training and Nodes portfolios, and external experts develop a catalogue of data quality assessment, quality control, data cleaning tools, standards, protocols and procedures for various types of primary biodiversity data[†]. Develop criteria for assessing “fitness-for-use[†]” of GBIF mobilised data. Commission white papers, best-practice guides, and e-learning[†] tools. Develop (new) and /or improve (existing) tools for enhancing fitness-for-use[†] and implement contracts for assessing and improving fitness-for-use[†] of GBIF mobilised data.

Activity 5: Develop guidelines for Data Hosting Centres to rescue, archive, host and maintain unhosted data sets

Commission a concept paper to develop guidelines for “data rescue activities”. Develop a best practice guide for implementation and uptake by Participants.

Goal 3: Targeted outreach and enhancement of capacity of existing and un-tapped custodians and providers

Activity 1: Develop Training Manuals and Modules

Through Training develop training manuals and e-learning[†] modules dealing with digitisation and mobilisation of observational/monitoring, multimedia and other primary biodiversity data[†] types, improving fitness-for-use[†], data rescue, uptake of GBRDS[†] and IPT[†], etc.

Activity 2: Capacity building and outreach to potential data publishers[†]

Through Training, Nodes and Outreach, develop and revise curricula for training for digitisation and mobilisation of all types of primary biodiversity data[†]. Encourage organisation of regional “train-the-trainer” activities. Implement targeted outreach through meetings with data custodians, data publishers[†], aggregators, scientific societies, funding and donor agencies as well as scientific publishers.

Activity 3: Develop a strategy for a Global Fund for digitisation of Primary Biodiversity Data[†] to support the Global Strategy and Action Plans

Through the HoP portfolio, explore and encourage establishment of a Global Fund for digitisation of primary biodiversity data[†]. Evolve criteria and strategies for contributions to such a fund, expenditure plans, accountability measures, and outreach strategy to potential donors.

Budget

	Goal / Activity	2009	2010
Goal 1	Assessment of contents needs of user communities, and facilitating discovery of datasets holding up to 5 billion primary biodiversity data [†] records	€40,000	€50,000
Activity 1	Conduct Contents Needs Assessment	€10,000	€10,000
Activity 2	Develop Global Strategy and Action Plan for mobilisation of Natural History Collections Data	€20,000	€20,000

Activity 3	Develop Global Strategy and Action Plan for mobilisation of Observation/Monitoring, Multimedia, and other types of primary biodiversity data [†]	€10,000	€20,000
Activity 4	Promote national, regional, and thematic implementation and use of the Global Biodiversity Resources Discovery System (GBRDS [†])	-	-
Goal 2	Faciliate mobilisation of up to 2 billion "fit-for-use" primary biodiversity data [†] records	€45,000	€75,000
Activity 1	Promote national, regional and thematic implementation and use of the Integrated Publishing Toolkit (IPT [†])	€5,000	-
Activity 2	Promote development and implementation of a "technical, social and policy framework" for mobilisation of primary biodiversity data [†]	€10,000	€10,000
Activity 3	Develop strategies for industrialisation of digitisation and mobilisation of multiple data types	€10,000	€15,000
Activity 4	Improving "fitness-for-use [†] " of GBIF mobilised data	€10,000	€30,000
Activity 5	Develop criteria for Data Hosting Centres	€10,000	€20,000
Goal 3	Targeted Outreach and enhancement of capacity, infrastructure and increased support to potential existing and un-tapped custodians and providers	€30,000	€30,000
Activity 1	Develop Training Manuals and Modules	-	-
Activity 2	Activate Capacity Building and Outreach to potential data publishers [†]	€30,000	€30,000
Activity 3	Develop a strategy for a Global Fund for mobilisation of primary biodiversity data [†]	-	-
	Advisory Task Groups: DIGIT	€20,000	€20,000
	TOTAL	€135,000	€175,000

Output by end 2010

The DIGIT Work area[†] will have facilitated the mobilisation of sufficient (up to 2 billion) 'fit-for-use' primary data records to enable credible analysis on key issues in most geographic regions, as well as the discovery of datasets holding up to 5 billion primary data records from the GBIF community and other partner networks. Providing access to primary biodiversity data[†] (through the GBIF network[†]) should be recognised as a valid publishing activity and an integral part of the research data management chain, as a result of activities proposed through this work area[†].

Key GBIF Secretariat Outputs:

- Promotion and uptake of the GBRDS[†] and IPT[†] to enable Participants to jointly achieve the targets of 'up to 5 billion records discovered' and 'up to 2 billion records mobilised' respectively
- Convene and coordinate Task Groups for Contents Needs Assessments and Global Strategy and Action Plans.
- Work with the Governing Board[†] and Science Committee[†] in drafting an appeal to scientific publishers, and science funding agencies to make it mandatory that authors register metadata[†] of datasets and their GUIDs[†] be provided.
- Convene a Task Group to develop recommendations on the necessary technical, social and policy framework for mobilisation of primary biodiversity data[†] as a research data management chain, and credits/attributions to data contributors/providers.
- Commission a strategy document on "industrialising digitisation of primary biodiversity data[†]", and promote tools, equipment, processes and software that would expedite the process of data digitisation.

- Commission further best practice papers on data standards, quality assessment and control, data cleaning, etc.
- Commission a concept paper on “data hosting centres” and evolve criteria for endorsing/designating potential “Data Hosting Centres”.
- Implement targeted outreach to potential providers of primary biodiversity data[†].

Key GBIF Participant / Network Outcomes / Contributions

- Deployment of national, regional, and thematic installations and use of the GBRDS[†] and IPT[†], and contributing to discovery of datasets holding up to 5 billion data records, and mobilisation of up to 2 billion ‘fit-for-use’ primary biodiversity data[†] records.
- Contribute fully to a Contents Need Assessment survey, and encourage a variety of other potential users to respond to the survey.
- Actively participate in the various DIGIT Task Groups and in the uptake of the recommendations.
- Undertake the national, regional and thematic “blue prints” exercise to facilitate timely completion of the Global Strategy and Action Plans.
- Adopt and implement the strategies for industrialising the mobilisation of primary biodiversity data[†].
- Designate suitable national, regional, and thematic agency/institution(s) as “Data Hosting Centre(s)” and actively engage in rescuing orphaned, unhosted and potentially orphaned datasets
- Actively engage, promote and coordinate infrastructure and capacity building activities in their countries or within thematic areas to ensure that “fitness-for-use[†]” of the primary biodiversity data could be improved for a variety of users.
- Actively participate in seeking financial contributions to the Global Fund for digitisation of biodiversity data

2.2.2. ECAT (Electronic Catalogue of Names of Known Organisms)

Introduction

GBIF has supported the development of taxonomic content while the necessary infrastructure required to access, display, distribute, and utilise it, remains relatively undeveloped. A names-oriented infrastructure, and the tools and services that can be built upon it, are the focus of the ECAT Work area[†]. GBIF has spent the past year establishing a framework for building such an infrastructure in partnership with others who can either contribute to, or benefit from it. This includes the Catalogue of Life[†], the Encyclopedia of Life[†], components of EDIT[†], PESI[†], and a range of taxonomic and nomenclatural databases, who seek to develop the means for mutual discovery and exchange of information about names and taxa. Access to a range of authoritative taxonomic and nomenclatural (names) data, via such an infrastructure, is critical within the GBIF network[†] to ensure that information relating to species can be discovered and effectively collated for use.

Vision

By 2010, a global taxonomic infrastructure will provide a complete resolution service of all taxon names for the GBIF network[†] and Portal.

Rationale

*"The key to modern biological information is the scientific names of organisms"*⁶

GBIF has expressed a vision to be "the primary World Wide Web source for all data and information about biodiversity through building registries and *indices* that allow searching across inter-operable sources of information from molecules through ecology". "*Indices*" provide a key means to discover information and are familiar as lists of words and associated page numbers in the backs of books. Scientific names form the key "words" associated with species information and these names "serve as a link to what has been known in the past and what we today add to the body of knowledge."⁷ It is the collective index of names, linked to the sum of all biodiversity information mobilised through the GBIF network[†] that forms the foundation for a complete catalogue of organism names. To effectively access all primary biodiversity data[†], this vast index must be reconciled to sources of taxonomic and nomenclatural information that will allow it to be organized and retrieved in ways that make biological, regional, or thematic sense. Through effective cross-referencing and infrastructure, GBIF can also inform initiatives engaged in developing authoritative taxonomies, of disparities and gaps, that when addressed, will increase the utility and relevance of these initiatives by embedding them as a critical organization framework within the GBIF network[†].

The resultant Global Names Architecture[†] (GNA[†]) will enable information originating anywhere within the GBIF network[†] to be found via vernacular names. It will enable users of the GBIF network[†] to organise information around one or multiple taxonomies, a regional or national species checklist, or a thematically organised species list such as a red-list or checklist of invasive species. It will cross-reference these resources against authoritative nomenclators and taxonomies to ensure that information can be accessed even if it is labelled with different synonyms or misspellings. This framework will be inclusive of all taxon names, support multiple taxonomic viewpoints and provide a series of staged components to ensure a pathway to full and authoritative resolution.

Content will be collated from a wide range of resources and accessible via consistent data structures and services. This will enable tools and applications to be built that will revolutionise data discovery and contribute to the refinement of future taxonomy and data mobilisation. GBIF will continue to engage key partners through demonstrating the benefits of participation and promoting a policy of inclusiveness.

Strategies

*"Names, whether they are scientific binomials or common names, provide the first point of entry to most species and species-occurrence databases."*⁸

The strategy to achieve this vision divides the ECAT Work area[†] across three major conceptual components.

1. Developing the underlying infrastructure in accordance with GBIF's decentralized strategy and refine incentives for engaging strategic partners
2. Create tools and services that utilise the resultant infrastructure to service users of the GBIF network[†]
3. Build **applications** from the tools and services that serve the needs of GBIF Participants

⁶ GBIF Strategic Plan 2007-2011

⁷ Grimaldi D. & Engel M.S. 2005 Evolution of the Insects, Cambridge University Press, 2005. P34

⁸ Chapman A. 2005 Principles and Methods of Data Cleaning. GBIF

Infrastructure developments will focus on:

- Refining the standards and protocols used to document and serve taxonomic and nomenclatural information.
- Working with Informatics to incorporate these components into the Integrated Publishing Toolkit (IPT[†])
- Promoting the use of the IPT[†] for accessing names data[†] among Participants and coordinating its use with Training
- Developing the framework for indexing and collating federated data about names. This explicitly addresses and resolves three separate components of taxon names:
 - Names as 'text strings' to ensure that names are logically and accurately grouped no matter how much variation in spelling of names or authorship.
 - Names as 'nomenclatural acts' with a focus on assigning globally unique identifiers (GUIDS[†]) via an array of partnering nomenclators in order to reconcile all names to GUIDs.
 - Names as components of taxon concepts. We will promote and facilitate use of name GUIDS[†] within taxon concepts and the application of similar taxonomic identifiers with biodiversity data. This provides the essential framework for embedding taxonomic expertise into the global cyber-infrastructure for all biology.

These three components will form the basic scaffolding for a 'Names Portal' within the GBIF network[†] that will link all names to multiple authoritative resources. Tools and Services will be derived from this infrastructure that will enable Participants to better identify taxon names within their content and reconcile them to relevant authoritative sources.

These include but aren't limited to:

- "Dictionary" files of taxon names that can be built into a range of applications derived from services among partnering authoritative nomenclatural and taxonomic initiatives or via a collation of them.
- Collective nomenclatural reference resources such as a catalogue of all homonyms that include the means to distinguish them, and a catalogue of all genera organized within a management hierarchy
- 'Name Services' both local, and via partners, that parse taxon names, enable "fuzzy" matching, and provide synonymy, classifications, and common names.

Applications will be built upon these tools and services that provide Participants with practical solutions to better locate, manage, and integrate biodiversity information resources. This includes:

- Data mining tools that can facilitate the inventorying and discovering of biodiversity datasets, literature, and web resources.
- Applications that enable the creation of new taxonomic checklists from indexed datasets.
- Plug-ins for existing collections management software, editorial tools, etc. that verify nomenclature and taxonomy and facilitate cross-referencing.
- 'Alert Services' for biologists that utilise taxonomic, regional or thematic checklists as the basis for being informed of new information relevant to these domains.

Goals and Activities

ECAT activities comprise three major goals which support the primary objective, namely that global biodiversity data discovery and integration is enabled for all species information by the electronic catalogue of names of known organisms

Goal 1 Develop the core components of the Global Names Architecture[†]

The Global Names Architecture (GNA[†]) will provide a framework, developed in concert with partners, to mobilise, expose, and access taxonomic and nomenclatural information. GBIF will use this framework to index and collate these data into a comprehensive names portal that enables discovery and subsequent utility of these resources.

Activity 1: Expand the capacity for partners and Participants to share data about names. Coordinate development of the Integrated Publishing Toolkit (IPT[†]) with relevant partners and Participants. Workshops among these partnering initiatives will refine and expand existing data and exchange standards and establish a plan for registering and serving data. These will also establish the scope of resources that will be included, and define additional tools required to develop them.

Activity 2: Address social barriers to sharing data about names.

Significant issues impede the flow of taxonomic information and must be addressed. Task Groups and workshops will focus on identifying these issues, and document both procedural and technical recommendations for addressing them. Address barriers to engage partners to make names data[†] available.

Activity 3: Access and utilise the mobilised resources

In order to utilise mobilised names data[†] we will ensure that these datasets are appropriately accommodated within the developing metadata[†] profile and properly registered within the GBRDS[†]. Task Groups will ensure that the profile and registry are thoroughly informed. Additional work will focus on effectively collating taxonomic and nomenclatural data accessed through these processes within both global and regional data portals.

Key Linkages	
IDA	Coordination of data format and exchange standards for taxonomic, nomenclatural data and refinement of metadata profile
Informatics	Local development of data models, infrastructure for collating and caching indexes resources according to IIP, coordination with GBRDS [†] development
DIGIT	Coordination with development of impact factors and other aspects of social barriers to data sharing
Nodes/Outreach	Needs assessments from Participants relating to 'names' datasets, testing and refinement of IPT [†] for checklist and common names data [†] .
Training	Develop training modules on the use of IPT [†] tools and the implementation of standard procedures and formats for sharing names data [†] .

Goal 2 Utilise the Global Names Architecture[†] to develop a GBIF names portal with supporting tools and services.

A 'names portal' in this context is an integrated catalogue of authoritative taxonomic and nomenclatural resources, regional and thematic checklists that are served and cached in one or more locations. Such portals may exist at the global or national level among Participants and external partners. This activity will focus on developing an underlying

model, services and tools for integration within the GBIF Portal[†] and serve as a model for implementation among Participants.

Activity 1: Build an ECAT names portal that provides access to authoritative taxonomic and nomenclatural treatment for ALL names, a comprehensive, multi-lingual and virtual catalogue of common names, and a repository for regional and thematic species checklists.

This activity will combine informatics development with coordination among Participants in defining the core structure and services of the ECAT names portal. Develop a names management hierarchy that is inclusive of all taxon names and serves as support for more authoritative taxonomies.

Activity 2: Develop tools and services that utilise the names portal

Identify existing and new tools and services to couple with the names portal data such as taxonomic name services, dictionary files, name parsing and matching services, etc. Coordinate with Informatics to distribute the development work among internal and Participant resources.

Coordinate Participant needs through Nodes regional meetings to outline the scope and intent and capabilities of the names portal and gain feedback for identifying services and tools that will address user needs. Develop strategies for cataloguing regional and thematic species checklists.

Key Linkages	
IDA	Ensure that services developed are registered with GBRDS [†] and are standards compliant
Informatics	Coordinate internal and external development and IIP compliance
DIGIT	Ensure services and tools contribute to content mobilisation and quality assurance/control
Nodes/Outreach	Develop strategies to engage participants in scoping and developing tools and services
Training	Training materials as needed for new tools and services that utilize names portal.

Goal 3. Build and document applications that utilise tools and services derived from the names portal to address Participant needs.

The names portal will reference a wide range of authoritative taxonomic and nomenclatural resources and cross-reference these with a vast range of dataset and content within the GBIF network[†]. This, combined with associated tools and services will provide an abundance of opportunities to develop integrated applications that will have significant impact and utility to Participants.

Activity 1: Develop methodologies that enable interchange and interoperability among indexed databases.

The Global Names Architecture[†], composed of a range of taxonomic resources, will provide the basis for evaluating relationships among content within these resources. This activity will focus on tools and methodologies that increase the integration, visibility, and coordination among these resources in ways that benefit Participants.

Activity 2: Promote the development of tools and interfaces for constructing new integrated taxonomic catalogues and checklists based on indexed resources

This activity will support cybertaxonomic processes that utilise the range of taxonomic and nomenclatural datasets indexed within the portal for constructing taxonomic

revisions and new checklists. This includes the refinement of existing GBIF-supported checklist integration tool and checklist builders, and facilitating the integration of this functionality among partnering initiatives.

Activity 3: Promote the development of tools and methods for web sites to exploit the constructed catalogue(s) and GNA[†]-mediated resources for their own organisations and uses.

A major application of a complete catalogue of organism names is its use in facilitating access to biodiversity information wherever it is served. This activity will support the development of applications that utilise the catalogue for a range of high-impact applications such as data mining, natural language processing, name discovery tools and name-services embedded in collections management workflows, etc.

Linkages	
IDA	Coordinate API [†] (Application Programming Interface) documentation
ICT	Coordination of application development work
DIGIT	Promote the utilization and application development to DIGIT content providers
Nodes/Outreach	Needs assessment through coordination with NODES to Participants
Training	Generalized training modules on developing applications via the portal APIs as well as specific usage of applications

Budget

	Goal / Activity	2009	2010
Goal 1	Develop the core components of the Global Names Architecture [†]	€20,000	€20,000
Activity 1	Expand the capacity for partners and Participants to share data about names	€5,000	€10,000
Activity 2	Address social barriers to sharing data about names	€5,000	€5,000
Activity 3	Access and utilize the mobilized resources	€10,000	€5,000
Goal 2	Utilize the Global Names Architecture [†] to develop a GBIF names portal with supporting tools and services.)	€40,000	€30,000
Activity 1	Build an ECAT names portal that provides access to authoritative taxonomic and nomenclatural treatment for ALL names, a comprehensive, multi-lingual and virtual catalogue of common names, and a repository for regional and thematic species checklists.	€20,000	€20,000
Activity 2	Develop tools and services that utilize the names portal	€20,000	€10,000
Goal 3	Build applications that utilize tools and services derived from the names portal that address Participant and provider needs.	€30,000	€65,000
Activity 1	Develop methodologies that enable interchange and interoperability among indexed databases.	€10,000	€10,000
Activity 2	Promote the development of tools and interfaces for constructing new integrated taxonomic catalogues and checklists based on indexed resources	€15,000	€25,000
Activity 3	Promote the development of development tools and methods for web sites to exploit the constructed catalogue(s) and GNA [†] -mediated resources for their own organisations and uses.	€5,000	€30,000
	Task Groups ECAT	€10,000	€10,000
	TOTAL	€100,000	€125,000

Output by end 2010

By the end of 2010 the GBIF community will have ready access through the GBIF Portal[†] to a dynamically updated and collated set of global, regional and thematic taxonomic checklists, mapped to authoritative nomenclatural records. The portal will provide rapid redirection to source databases as well as to a range of existing applications and tools built from the portal itself. The tools and services will support a range of applications that support biodiversity data discovery, management, mobilisation and access. They ensure that names entered into collections and observational systems are linked to authoritative taxonomy and nomenclature. They enable rapid, simple, and accurate access to biodiversity data in all forms via taxonomic, regional, or thematic contexts that reflect the way users actually organise themselves.

This Global Names Architecture[†] (GNA[†]) will provide an organisational framework that is inclusive of all names found within biodiversity content and thus make accessible for the first time, a truly comprehensive catalogue of names of known organisms that can be quantified against the collective and authoritative treatment of those names and realize the vision of GBIF as a facilitator to all biodiversity information.

Key GBIF Secretariat Outputs:

- the tools and infrastructure that enable taxon name and concept data to be served to the GBIF network[†],
- a names portal that utilises the tools, standard[†] exchange formats and protocols, and web services[†] to enable a complete online catalogue of organism names;
- a communal architecture that supports the visibility and promotion of providers of names and name-services; and
- tools, applications, and services that utilise the electronic catalogue of names to assist those who serve or access biodiversity data[†].

Key GBIF Participant / Network Outcomes / Contributions:

- Contribute to the refinement of standardised data and exchange formats for names and taxon concepts
- Adopt and implement data exchange standards for taxon names and concepts within their own database,
- Inventory, register and provide taxon name and concept data to GBIF
- Refine and test provider tools and registration systems
- Define and refine service, tool and application needs ,
- Implement or utilise globally unique identifiers for names and taxon concepts;
- Support the development of impact factors and other metrics of support for providers of names and concepts data.

2.3. IIP (Informatics Infrastructure and GBIF Portal[†])

Introduction

The GBIF mission is to make the world's biodiversity data[†] freely and universally available via the Internet. As a megascience initiative, GBIF aims to provide an essential global informatics infrastructure for biodiversity research and applications worldwide. In 2008, GBIF informatics infrastructure enables access and discovery mechanisms to more than 147 million primary biodiversity records from hundreds of data publishers[†].

In the context of the GBIF Work Programme 2009-2010, the primary challenge for the IIP area of work is to meet the requirements of Participants in terms of:

- **growth** through richer content (e.g. specimen and observations, names/nomenclatures, metadata[†] etc.),
- **scalability** through a GBIF informatics distributed[†] architecture and decentralised[†] services,
- **capacity** through the provision of appropriate tools, products and services
- **visibility** through access to a powerful and user-friendly GBIF Portal[†] and other vehicles (e.g. Nodes, thematic portals, Rich Internet Applications).

Vision

By the end of 2010, the GBIF distributed[†] architecture and decentralised[†] services will provide the technical means to enable GBIF Participants to publish, share, discover and access primary biodiversity data[†] without technical constraints.

Rationale

GBIF's primary objective is to facilitate the sharing and use of primary biodiversity data[†] by building an informatics infrastructure that makes those data openly and freely available to everyone. To achieve this, GBIF promotes the use by its data publisher[†] network of state of the art standards and protocols for exchanging biodiversity data[†]. Through its current Data Portal, GBIF provides a one-stop-shop entry point to rich biodiversity data while also enabling other portals to access the same data and apply to those data whatever analytical and synthetic tools they wish for the purpose of informing, for example, policy makers.

However, the current Data Portal is just one facet of what GBIF has been tasked to achieve as a megascience project. The GBIF Work Programme 2009-2010 aims at accelerating the rate, range and volume of mobilised biodiversity data[†]. For example, two additional portals, namely the Metadata[†] (IDA) and Names[†] (ECAT) portals, will be implemented and enrich the existing infrastructure. The GBIF UDDI[†] will be upgraded with the inclusion of the Biodiversity Collections Index (BCI[†]) services to become the Global Biodiversity Resources Discovery System (GBRDS[†]). The GBRDS[†] will be for GBIF what the Domain Name Servers (DNS) are for the Internet: it will enable the registration and unequivocal resolution of institutions and collections as well as services, standards and other essential components required for the proper discovery of large amounts of data resources within and outside the GBIF network[†] (e.g. LSID[†]).

The rate of indexing of biodiversity data[†] is expected to increase exponentially during the 2009-2010 period. Already today, the centralised GBIF Informatics Infrastructure faces limitations such as in managing the existing large amounts of indexed information shared by more than 250 data publishers[†] or 7480 datasets (source: GBIF Data Portal[†], September 2008). A rapid upgrading of the informatics architecture to leverage the potential of fully functional Nodes[†] is required. A fully distributed[†], scalable infrastructure whereby Participant Nodes[†] will effectively contribute in the technical mobilisation efforts requires further development in terms of network design, infrastructure, standards and tools as well as partners' responsibilities. More importantly, such decentralisation is critical for the GBIF Participants and Nodes to enable them to make use of the vast information resources mobilised by the GBIF network[†] (e.g. repatriation of data, development of indicators for 2010 Biodiversity Targets, etc.).

Strategies

In order to meet the challenges set by the GBIF Work Programme 2009-2010, the strategies for this area of work will be focused on three main technical areas primarily aimed at supporting the progressive upgrade of the GBIF Informatics Infrastructure and Data Portal:

- **The provision of integrated tools** enabling the indexing of specimen/observation, names/nomenclatures, and metadata[†] information. These tools are aimed at serving all areas of work in the GBIF Work Programme 2009-2010 and ensure a coordinated approach to multiple but similar informatics needs.
- **The design of a distributed[†] architecture** that empowers Participants and Nodes to fully contribute to mobilisation and use of a larger amount of biodiversity data[†]. Such architecture will operate through an improved registration and identification mechanism for data publishers[†], institutions and collections as well as individual biodiversity records shared in the GBIF network[†].
- **The development of decentralised[†] services, Rich Internet Applications and portals** enabling discovery, access and use of biodiversity information by multiple end-users community. These developments will address the most urgent and critical needs by accessing and refactoring services/applications enabling the development of innovative solutions.

These main outputs are the Informatics response to the Participation Thematic area[†]. They respond directly to the most urgent needs expressed by Participants and Nodes. For example, the Integrated Publishing Toolkit (IPT[†]) is aimed at being the GBIF infrastructure cornerstone upon which all data publishers[†] can share a wide range of biodiversity information (e.g. specimen/observation to names/nomenclatures as well as metadata[†] records). The development of Rich Internet Applications (e.g. analytical and visualisation tools) designed to operate within a distributed[†] architecture and decentralised[†] services will also enable the creation of richer and more complex portals and applications responding to a wider variety of end-users.

Goals and Activities

Goal 1: Develop and promote GBIF integrated tools

Data publishers[†] require tools to make their data easily accessible on the Internet through the GBIF Informatics infrastructure.

Activity 1: Develop an Integrated Publishing Toolkit (IPT[†])

As requested by data publishers[†] and Nodes, in 2008 the development of an integrated GBIF tool to support the easy mobilisation of indexed biodiversity information was initiated. The IPT[†] is aimed at being the cornerstone of all information-publishing mechanisms within the GBIF network[†]. The IPT[†] will not only enable the indexing of specimen and observation data but also names/nomenclatures and metadata[†] in an integrated manner. The IPT[†] is also aimed at assisting data publishers[†] in data cleansing activities (e.g. major taxonomic reviews or map projections/national boundaries).

Activity 2: Develop a Nodes Portal Toolkit (NPT[†])

Developed mainly using the existing GBIF Data Portal[†] code as well as other resources, the NPT[†] is a response to the most urgent informatics needs expressed by Participants and Nodes. In order to become fully functional, Nodes require to be actively engaged with data holders by assisting them in publishing biodiversity data[†]. The NPT[†] is aimed at providing a set of informatics tools enabling Nodes not only to be active in terms of data

indexing but more importantly in promoting and facilitating the development of portals, applications and services serving directly their end-user needs (e.g. policy makers, researchers, general public).

Activity 3: Provide Informatics helpdesk to data publishers[†] and Nodes.

IIP is committed not only to deliver state of the art informatics tools (e.g. IPT[†], NPT[†]), but also to support GBIF Participants to fully participate in the implementation of the GBIF WP. Such a helpdesk is in particular aimed at supporting the Nodes Work area for example in its efforts to strengthen the effective participation of data publishers[†] in the GBIF network[†].

Goal 2: Distribute the GBIF informatics architecture

IIP will drive the design and implementation of the GBIF distributed[†] informatics architecture. In particular it will ensure that Participants and Nodes are enabled to fully contribute in the growth of the GBIF informatics infrastructure.

Activity 1: Develop a global informatics strategy for the further distribution of the GBIF informatics architecture

An informatics strategy for the further distribution of the GBIF infrastructure will be developed in close consultation with GBIF Participants, Nodes as well as other GBIF areas of work. The strategy will leverage the role of fully functional Nodes[†] as models for the GBIF community. This strategy will provide practical solutions for the future growth of the GBIF network[†] in terms of content, scalability, and flexibility through distributed[†] global services and end-users visibility through the GBIF Portal[†] as well as Nodes portals. This strategy will also be articulated around an action plan involving all Participants. The informatics tools developed by IIP (e.g. IPT[†] and NPT[†]) in support of the entire GBIF Work Programme 2009-2010 will form the key pillars. Particular attention will be given to the needs of data publishers[†] and Nodes in order to ensure that the new informatics architecture is meeting their most critical needs. The strategy will also address the critical challenge of persistent identification of biodiversity information through the use of GUID[†]/LSID[†] in order for example to ensure effective re-use of the data by end-users.

Activity 2: Develop the GBIF Global Biodiversity Resources Discovery System (GBRDS[†])

In order to enable the GBIF infrastructure to operate as a fully distributed[†] architecture, the existing Universal Description, Discovery and Integration (UDDI[†]) mechanisms will be upgraded to include additional services such as the ones of the Biodiversity Collection Index services (BCI[†]) and the management of LSIDs[†]/GUIDs[†]. The new service will be called GBRDS[†] and form the core service of the GBIF architecture. More information about the GBRDS[†] functionalities is available in the IDA and DIGIT areas of work.

Activity 3: Support the distribution of the GBIF architecture

Special technical support will be provided to a number of fully functional Nodes[†] with the objective to assist them in effectively contributing to the progressive distribution of the GBIF network infrastructure.

Goal 3: Manage and improve the GBIF Portal[†]

Data publishers[†] and end-users require access to the millions of biodiversity data records being shared via the GBIF network[†]. The GBIF Portal[†] provides such a “one stop shop” entry point. This critical service has to be further empowered with Rich Internet Applications that provide e.g. better integrated searching and visualisation of data as well as the means to apply analytical and synthetic analysis. Particular attention will be

given to the provision of comprehensive statistics reports regarding usage of the data to Nodes and data publishers[†].

Activity 1: Develop the GBIF Metadata[†] Portal

The IDA Work area will design and implement the GBIF Metadata[†] Catalogue System and the IIP will be responsible for its implementation and integration with the GBIF Portal[†] as the Metadata[†] Portal. This Portal will be closely integrated with the GBRDS[†] as well as the Data and Names Portals. More information about the GBIF Metadata[†] Catalogue System is available in the IDA area of work.

Activity 2: Develop the GBIF Names Portal

The foundation of the Global Names Architecture[†] (GNA[†]) and the building and integration of the electronic catalogue of organism names rely on the development of informatics components, namely the:

- development and testing of publishing tools for cataloguing and serving checklist data based on the Integrated Publishing Toolkit (IPT[†])
- development of ECAT cataloguing software for names data[†]
- catalogue web service[†] development and integration into the Names Portal[†]
- coordination of Rich Internet Application development utilising ECAT web services[†]

More information about the GBIF Names Portal is available in the ECAT area of work.

Activity 3: Manage and improve the GBIF Data Portal[†]

The GBIF Data Portal[†] provides access to specimen and observation data. While constantly being enriched with new functionalities, linkages with other strategic information systems/platforms will be explored:

- CBD[†] Clearing-House Mechanism (CHM).
- UNEP-WCMC[†] - World Database on Protected Areas (WDPA).
- IUCN[†] - Red List of Threatened Species.
- RAMSAR[†] - Sites database.
- CITES[†] - Species database.
- CMS[†] Global Registry of Migratory Species (GROMS).

The Portal will also be enriched with a set of new features such as:

- User-friendly search functionalities based on user needs surveys.
- Advanced GIS[†] visualisation tools
- Improved integrated data mining and download functionalities
- Improved OGC[†] and REST[†] Web services[†]
- Improved access to meta-data information about data publishers[†]

In addition, appropriate services will be provided for the simple monitoring and management of data indexing by contributors throughout the planned distributed[†] architecture. These services will also be integrated within the Nodes Portal Toolkit (NPT[†]). Particular attention will be given to ensure that reports on use of the data are produced and reported to Nodes and data publishers[†].

Activity 4: Strengthen the GBIF networked service and application layer

In 2007, the GBIF informatics developed a set of rich REST[†] Web services[†] to facilitate rapid access to the GBIF Data Portal[†] index. The availability of such critical services has triggered a large amount of initiatives such as the creation of community specific portals as well as Rich Internet Applications (e.g. recent GBIF-WCMC[†] widget allowing the cross

visualisation of specimen and observation data within given protected areas). As noted by many observers, such services are becoming critical to promote the use of GBIF-mediated data[†] and will become a fundamental mechanism to bridge the gap between availability and use of the data. In 2009-2010, IIP will pay particular attention to the harmonisation of these web services[†] as well as in the development of additional ones aimed at providing to the end-user community a larger spectrum of reusable services. A network service layer will therefore be developed providing a unified access to these services through the GBRDS[†] as its service discovery mechanism. Finally, the IIP will develop a collection of Rich Internet Applications consuming these services and providing advanced visualisation of the GBIF mediated data[†] for specific needs (e.g. protected areas monitoring, niche modelling, statistical and graphical analysis, data transformation, data cleansing, etc.).

Goal 4: Manage the Informatics Infrastructure of the Secretariat

IIP will also drive the technical development of the GBIF core Informatics Infrastructure and ensure that it responds to the needs of the core Secretariat operations and various areas of work.

Activity 1: Manage the GBIF Secretariat core IT infrastructure

Since 2002, GBIF has acquired its own computer park in order to enable the establishment of its core Informatics Infrastructure. IIP will ensure that all Informatics services required by the Secretariat are operational and sustained. More importantly, IIP will explore options for the further distribution of its core computing architecture by leveraging for example on fully functional Nodes[†] and/or on new technologies such as Elastic Computer Cloud. Particular attention will also be given in exploring innovative solutions for the management of very large data warehouses.

Activity 2: Manage the GBIF Secretariat core information systems

The core information systems of the GBIF Secretariat are composed of a) the website (Communication Portal; <http://www.gbif.org>), b) the Document Management System (DMS) and c) the Information Management System (IMS). IIP will ensure that these components are meeting the needs of the GBIF comprehensive Communications strategy and rolled out as outlined in the "Communication, Media and Fund-raising" area of work.

Activity 3: Support specific IT requirements from other GBIF areas of work

As outlined in the other Work areas (e.g. Training, Nodes), a series of ICT[†] requirements would have to be supported such as the "Online Resource Centres"[†]. IIP is committed to meet these needs as part of the Secretariat mandate to manage and sustain the core Informatics Infrastructure.

Linkages

The IIP Work area[†] underpins other Work areas[†] by delivering the following components and services, as detailed in other sections in the 2009/2010 Work Programme:

Participation
<i>Nodes</i>
Online Resource Centre [†] (for Nodes)
Data Portal enhancements
Informatics suite (incl. Integrated Publishing and Nodes Portal Toolkits)
Global strategy for the further distribution of the GBIF informatics architecture
Help desk support for Nodes

Training
Online Resource Centre [†] (for Training)
Content provision for informatics training materials
Outreach
Analytical tools for specific areas of collaboration (e.g. CHM [†] , indicators, biodiversity-related conventions)
Communication, Media and Fund-raising
Communication infrastructure (including Communication Portal, IMS and DMS)
Online Resource Centre [†]
Informatics
IDA (Inventory, Discovery, Access)
Metadata [†] Catalogue System and management tool (as a module of the IPT [†] linked to the Metadata [†] Portal)
Global Biodiversity Resources Discovery System (GBRDS [†]) development
Interoperability mechanisms with other networks (metadata [†] , standards and web services [†] - OGC [†] and REST [†])
DIGIT (Digitisation and mobilisation of primary biodiversity data[†])
Integrated Publishing Toolkit (IPT [†])
Global Biodiversity Resources Discovery System (GBRDS [†]) software components
ECAT (Electronic Catalogue of Names of Known organisms)
Tools for checklist toolkit (as a module of the IPT [†])
Catalogue of software for names data [†]
Global Biodiversity Resources Discovery System (GBRDS [†])
Catalogue of web services [†] and integration into GBIF Portal [†] (including Names Portal)
Rich Internet Application using ECAT web services [†] (as part of the IIP service and application layer)

Budget

Goal	Activity	2009	2010
Goal 1	Develop and promote GBIF integrated tools	€ 110,000	€ 65,000
Activity 1	Develop an Integrated Publishing Toolkit (IPT [†])	€ 40,000	€ 15,000
Activity 2	Develop a Nodes Portal Toolkit (NPT [†])	€ 55,000	€ 25,000
Activity 3	Provide Informatics helpdesk to data publishers [†] and Nodes.	€ 15,000	€ 25,000
Goal 2	Distribute the GBIF informatics architecture	€ 42,000	€ 60,000
Activity 1	Develop a global informatics strategy for the further distribution of the GBIF informatics architecture	€ 15,000	-
Activity 2	Develop the GBIF Global Biodiversity Resources Discovery System (GBRDS [†])	€ 12,000	€ 10,000
Activity 3	Support distribution of the GBIF architecture	€ 15,000	€ 50,000
Goal 3	Manage and improve the GBIF Portal[†]	€ 68,000	€ 145,000
Activity 1	Develop the GBIF Metadata [†] Portal	€ 12,000	€ 12,000
Activity 2	Develop the GBIF Names Portal	€ 14,000	€ 28,000
Activity 3	Manage and improve the GBIF Data Portal [†]	€ 20,000	€ 30,000
Activity 4	Strengthen the GBIF networked service and application layer	€ 22,000	€ 75,000
Goal 4	Manage the informatics infrastructure of the Secretariat^[1]	-	-
Activity 1	Manage the GBIF Secretariat core IT infrastructure	-	-
Activity 2	Manage the GBIF Secretariat core information systems	-	-
Activity 3	Support specific IT requirements from other GBIF areas of work	-	-

	Advisory Task Groups	€ 10,000	€ 10,000
	TOTAL	€ 230,000	€ 280,000

^{†††} (Covered in core secretariat budget)

Output by end 2010

By the end of 2010, through successful development and uptake of a set of customisable toolkits for Participants, the GBIF architecture will have evolved progressively to a distributed[†] model. Participants and Nodes as the primary actors will play a leading role in facilitating the exponential growth of the GBIF network[†]. During the same period, the GBIF Portal[†] will progressively be enriched with the successful launch of the Nodes, Names and Metadata[†] Portals. In 2010, the GBIF network[†] will be strengthened with the creation of a solid network of services and applications bridging the gap with the end-users communities. Participants and Nodes will be instrumental in the uptake of these resources towards full implementation of the truly GBIF distributed[†] architecture.

Key GBIF Secretariat Outputs:

- An informatics suite of tools (e.g. IPT[†], NPT[†]) is developed in support of data publishers[†] and Nodes[†].
- An informatics help desk is established supporting data publishers[†] and Nodes.
- A global informatics strategy for the further distribution of the GBIF informatics architecture is agreed.
- An informatics help desk support is provided to a set of functional Nodes[†] enabling them to fully contribute to the implementation of the GBIF distributed[†] architecture.
- The GBRDS[†] is established as the core GBIF discovery mechanism and replaces the existing UDDI[†] services.
- The GBIF Data Portal[†] is enriched with the creation of two additional components: the Metadata[†] and Names Portals.
- The GBIF network[†] is enriched with the creation of a set of services and Rich Internet Applications in support of end-users communities.

Key GBIF Participant / Network Outcomes / Contributions:

- Adoption of the new GBIF informatics suite (e.g. IPT[†], NPT[†]) by Nodes and their rapid diffusion down to the data publishers[†].
- Active contribution to the constant improvements of the GBIF informatics suite.
- Use of the informatics help desk in the adoption of the GBIF informatics suite.
- Contribution to and adoption of a global informatics strategy for the further distribution of the GBIF informatics architecture.
- Active contribution of fully functional Nodes[†] in the implementation of the global informatics strategy, in particular in the further mobilisation of biodiversity data.
- Register existing institutions, collections, resources and other discovery information in the GBRDS[†] in order to strengthen the GBIF discovery mechanisms.
- Use of the GBIF networked service and application layer in the development of national, regional and thematic Portals/Applications.
- Ensure that by end 2010 at least 12 Nodes are fully contributing to the GBIF distributed[†] architecture.

Annex 1

Preliminary draft Work Programme Budget Summary 2009-2010		
	Approved budget for WP 2009-2010	
	EUR 2009	EUR 2010
Total	2.700.000	2.950.000
All Themes (Goals and advice)	1.090.000	1.290.000
All implementation	1.610.000	1.660.000
Participation	1.055.000	1.160.000
NODES: Participants Data Service Units	125.000	165.000
Goal 1: Improve Nodes effectiveness and visibility	25.000	15.000
Goal 2: Increase Nodes capabilities to assist data providers	30.000	35.000
Goal 3: Strengthening the Nodes Network	50.000	95.000
Advisory committees: NODES	20.000	20.000
Other		
TRN: Training	90.000	120.000
Goal 1: Developing an integral training portfolio for GBIF	70.000	100.000
Goal 2: Developing a GBIF training resources network	10.000	10.000
Advisory task group: Training	10.000	10.000
Other		
OTC: Outreach	60.000	75.000
Goal 1: Increasing participation	25.000	20.000
Goal 2: Increase support to Conventions by facilitating country reporting	10.000	15.000
Goal 3: Increase Conservation Communities engagements with GBIF	5.000	5.000
Goal 4: Develop the IPR framework to address IPR issues	10.000	15.000
Advisory task groups: Outreach	10.000	20.000
Other		
CPF: Communication, Promotion and Fundraising	40.000	40.000
Goal 1: Communication	10.000	10.000
Goal 2: Promotion	20.000	20.000
Goal 3: Fundraising	10.000	10.000
SPC: Strategic Projects & Campaigns	200.000	200.000
Goal 1: Strategic Projects	100.000	100.000
Goal 2: Start up support to new campaigns	100.000	100.000
Implementation		
Implementation (Nodes, TRN, OTC, CPF)	540.000	560.000
Informatics	1.645.000	1.790.000
IDA: Data Inventory, Discovery and Access	110.000	110.000
Goal 1: Develop the GBIF Metadata Catalogue System	50.000	20.000
Goal 2: Develop of standards based Web Services	40.000	40.000
Goal 3: GBIF to increase its coordinating role with other biodiversity networks	0	15.000
Goal 4: Strengthen the role of GBIF in standardizing bodies (BIS, TDWG etc.)	10.000	25.000
Advisory groups: IDA	10.000	10.000
Other		
DIGIT: Digitisation and Mobilisation of Primal Biological Data	135.000	175.000
Goal 1: Identify needs of participants and intensify resource discovery	40.000	50.000
Goal 2: Data mobilization	45.000	75.000
Goal 3: Outreach to potential data providers	30.000	30.000
Advisory Task groups: DIGIT	20.000	20.000
Other		
ECAT: Electronic Catalogue of Names of Known Organisms	100.000	125.000
Goal 1: Mobilize datasets for the the Global Names Architecture (GNA)	20.000	20.000
Goal 2: Develop the Electronic catalogue of organism names based upon the GNA	40.000	30.000
Goal 3: Develop the ECAT services taxonomic and nomenclatural purposes	30.000	65.000
Advisory task groups: ECAT	10.000	10.000
Other	0	0
IDP: Infrastructure and Data Portal	230.000	280.000
Goal 1: Development of tools for Nodes	110.000	140.000
Goal 2: Decentralisation the GBIF network infrastructure	40.000	40.000
Goal 3: Improving & maintaining the data portal & Secretariat network	70.000	90.000
Advisory Task groups: IDP	10.000	10.000
Other	0	0
Implementation		
Implementation (IDA, DIGIT, ECAT, IDP)	1.070.000	1.100.000

Annex 2 - Glossary

ABCD

The Access to Biological Collection Data (ABCD) Schema is the product of a joint TDWG and CODATA initiative to develop a standard for distributed data retrieval from collection databases. The schema seeks to cover data exchange for all kingdoms and for both specimen and observation records.

Active (Participant) Node

A GBIF Participant Node is active when - independently of its current level of development - it is a) supporting the Participant in the establishment, coordination, or maintenance of a biodiversity information network or facility in the context of GBIF, and b) moving towards becoming fully functional. According to this definition any functional Participant Node must be active, but an active Node is not necessarily fully functional (e.g. a Node in an early stage of development).

API

Application Programming Interface - en.wikipedia.org/wiki/API.

BCI

The Biodiversity Collections Index (BCI) is building a central index to biodiversity reference collections. By issuing a globally unique identifier (GUID) for every natural history collection researchers will be able to unambiguously identify the location of specimens they work on, and curators will be able to track usage of collections. BCI is thus a core component of the global infrastructure for biodiversity informatics and will be integrated in GBIF's Global Biodiversity Resources Discovery System (GBRDS). www.biodiversitycollectionsindex.org

BioCASE

The Biological Collection Access Service (BioCASE) Protocol is derived from the DiGIR protocol and supports web-based searches for XML data. It has been used in particular for data exchange using the ABCD schema - www.biocase.org.

Biodiversity data

Biodiversity data refers to any data which presents information about the world's biodiversity, including species/observation data, general resource data and names data.

BIS, TDWG

Biodiversity Information Standards (formerly known as the Taxonomic Database Working Group -TDWG) is an international body established to define standards for use in biological data projects - www.tdwg.org.

CBD

Convention on Biological Diversity - www.biodiv.org

CEPDEC

Capacity Enhancement Project for Developing Countries (GBIF Strategic Plan 2007-2011).

CHM

Clearing House Mechanism of the Convention on Biological Diversity - www.biodiv.org/chm.

CITES

Convention on International Trade in Endangered Species of Fauna and Flora - www.cites.org.

CMS

Convention on the Conservation of Migratory Species - www.cms.int.

CoL, CoLp

The Catalogue of Life partnership - www.catalogueoflife.org.

Conservation Commons, CC

The Conservation Commons is an international endeavour with the goal of promoting conscious, effective, and equitable sharing of knowledge resources to advance conservation - www.conservationcommons.org.

Core funds

Financial contributions made by GBIF Voting Participants to the GBIF Budget. These funds used as stipulated in the Budget approved by the Governing Board.

Darwin Core

The Darwin Core is a federation schema used in the search and retrieval of natural history collections and observation databases. It includes only core data elements which are likely to be available for the vast majority of specimen and observation records - www.tdwg.org/activities/darwincore.

Data provider

see Data Publisher.

Data publisher

Individual, institution or network that facilitates discovery and access to primary biodiversity data or metadata through national, regional, thematic or global networks such as GBIF. Earlier GBIF Work Programmes referred to these contributors as 'Data Providers'.

Decentralised (implementation)

Refers to the implementation/carrying out of activities remotely from the Secretariat (in GBIF-speak, NBIFs, ReBIFs, ThemeBIFs, i.e. via Participant Nodes in general).

DIGIT

Digitisation and mobilization of primary biodiversity data. One of the GBIF Work areas presented in this Work Programme.

Distributed (network architecture)

Arrangement of networked computers that are capable of working both independently and jointly as required. IT infrastructure to enable a global network (of networks), as GBIF is.

E-learning

E-learning is the use of information and computer technologies to create learning experiences. e-learning can be presented in the form of standalone courses, virtual-classroom courses, learning games and simulations, embedded e-learning in software, blended learning (mix of traditional and digital learning strategies), mobile learning or knowledge management, among others.

ECAT

Electronic Catalogue of Names of Known Organisms, one of the GBIF Work areas.

EDIT

European Distributed Institute of Taxonomy - www.e-taxonomy.eu.

Encyclopedia of Life, EoL

The Encyclopedia of Life - www.eol.org.

EuroGEOSS

A project proposal in the EU 7th framework addressing a European approach to developing sustained operational capacities for GEOSS (see GEOSS).

Fitness-for-use

Suitability, effectiveness or usefulness of GBIF mediated data in delivering accurate, authentic, replicable, as well as scientifically valid analysis and forecasting for user defined conservation and natural resources management purposes.

Functional (Participant) Node

A GBIF Participant Node is considered as functional when it effectively helps the Participant to establish, coordinate, and maintain an active biodiversity information network or facility, using for that purpose the general framework, principles and infrastructure of GBIF. Among other roles, a functional Participant Node: a) helps the GBIF Participant to assess and address its own biodiversity information needs, b) actively engages data holders and users within the Participant's domain, c) assists the data holders to share and publish biodiversity data, d) helps build biodiversity informatics capacity at the Participant level, e) promotes and facilitates the development of applications to serve end-user needs, f) shares its capacity and experience with other Participant Nodes, particularly those in early stages of development, g) helps to implement and deploy the GBIF informatics infrastructure, and h) actively contributes to achieve GBIF's mission, targets, and goals.

GBIF network

The GBIF network is the entire network of people, computers and infrastructures which comes together to provide the common pool of biodiversity data accessible via GBIF.

GBIF Portal

The GBIF Portal is a unified access point to all the data shared using the GBIF network. It has three components: data, metadata and names (the two later to be developed as parts of this Work Programme) - data.gbif.org.

GBIF mediated data

Primary biodiversity data or its metadata discovered and/or accessed through the GBIF network using GBIF promoted data interoperability, exchange/sharing standards.

GBIF web site

The GBIF web site, also known as the GBIF Communications Portal, provides news, articles, events, documents and other linkages of use to the GBIF community - www.gbif.org.

GNA

The Global Names Architecture (GNA) is a term used to refer to the activities of the GBIF ECAT programme in concert with other collaborating initiatives to develop a common methodology for discovering and accessing sources of taxonomic and nomenclatural data. These data can be collated and employed to provide syntactic and semantic information regarding names that facilitate discovery and access to biodiversity data and enable more effective linking of these data to relevant taxonomic concepts.

GBRDS

GBIF's Global Biodiversity Resources Discovery

System (GBRDS) can be viewed as an extended Universal Description, Discovery and Integration (UDDI) registry. In addition to the standard UDDI business information (e.g. names, addresses, service URLs), it also acts as a registry for globally unique identifiers (GUIDs) that have been issued for biodiversity specific information. Many cross-references can be set up by means of the registry, e.g. datasets can be linked to metadata, to standards' definitions, to web service URLs, and to various GUIDs.

GEOSS

Global Earth Observation System of Systems - www.earthobservations.org/geoss.shtml

GIS

Geographic Information Systems (GIS) are computer systems and software which allow the combination of multiple georeferenced data layers, each providing information about some characteristics of a geographic area. Such systems provide tools for mapping and analysing the data.

Governing Board, GBIF Governing Board

The highest executive body of GBIF, comprising representatives of all GBIF Participants who have signed the MoU, both Voting and Associate and which meets on an annual basis.

GUID

A Globally Unique Identifier (GUID) provides an unambiguous reference to an object in a software application. LSIDs are one implementation of a GUID system.

ICT

Information and Communications Technologies

IDA

Inventory, Discovery and Access. One of the GBIF's work areas presented in this work programme. This work area was known as DADI in previous GBIF Work Programmes.

ILTER

International Long Term Ecological Research - www.ilternet.edu

Informatics

The use of ICT to make data and information automatically available via the Internet. In this text, one of the Thematic areas of the GBIF Work Programme.

IPR

Intellectual Property Rights. In law, particularly in common law jurisdictions, intellectual property or IP refers to a legal entitlement which sometimes attaches to the expressed form of an idea, or to some other intangible subject matter.

IPT

The GBIF Integrated Publishing Toolkit (IPT) allows for efficient and easy publishing (sharing and hosting) of organism occurrence data, taxonomic and nomenclatural information, and general dataset metadata.

ISO

International Organisation for Standardization - www.iso.org.

IUCN

The World Conservation Union - www.iucn.org.

Lifewatch

Lifewatch is a European project within the 7th Framework Programme that aims to create a virtual laboratory for the analysis of the biological

diversity of the European environment -
www.lifewatch.eu

LSID

Life Science Identifiers (LSIDs) are a Globally Unique Identifier (GUID) system designed specifically for the Life Sciences and adopted by BIS/TDWG as the GUID system of choice for biodiversity resources. LSIDs provide a way to persistently and uniquely identify biological data resources on the internet. Resolving an LSID returns a metadata description of the resource. LSIDs provide the means to discover, track and relate information on all kinds of biological entities, e.g., specimens, observation events, taxon names, taxon concepts, Barcodes, datasets, collections, collectors, institutions - lsids.sourceforge.net.

Metadata

Metadata are data records that provide descriptive information about other data. In the context of GBIF, metadata provides information about the suppliers of biodiversity data and about the origins and purpose of those data.

Metadata profile

A metadata profile is a recommended subset of the elements of a metadata standard for use by a particular community of users.

MoC

Memorandum of Cooperation

MoU

Memorandum of Understanding

Names data

Names data refers to structured data providing information about taxonomic names and their relationships.

National Node, NBIF

An NBIF, or National Biodiversity Information Facility is defined as the institution mandated by a country to be the national focal point/liaison on all things GBIF, and the national network coordinating institute, representing a de facto 'mini-GBIF Secretariat' in its role and functions, such as provision of training. Ideally such institutes should have a nationally mandated role of facilitating mobilisation of biodiversity data and information for the country.

Node

see Participant Node.

NODES

In uppercase, one of the Work areas described in this Work Programme.

Nodes Committee

The GBIF committee comprising the managers of all Participant Nodes.

Node Portal Toolkit

The Node Portal Toolkit (NPT) is a suite of tools aimed at facilitating the easy indexing of occurrence data, taxonomic and nomenclatural information, and general dataset metadata (e.g. published by the IPT or other similar tools). The NPT is aimed at supporting in particular the work of the Participant Nodes to fully participate in the GBIF distributed network.

NPT

see Nodes Portal Toolkit

OGC

The Open Geospatial Consortium, Inc. (OGC) is a non-profit, international, voluntary consensus standards organization that is leading the

development of standards for geospatial and location based services.

www.opengeospatial.org.

Online Resource Centre (for Nodes and Training)

Specific sections of the GBIF web site where all the information about Nodes and Training are centralised, so all information about those topics is organised and accessible from a single point.

Participant Node, Node

A GBIF Participant Node is a unit, agency or institution designated by a GBIF Participant to coordinate the development and activities of a biodiversity information network or facility at the Participant's level (e.g. national, regional, or thematic). The main role of a Participant Node is to promote, coordinate, and facilitate the mobilisation and use of biodiversity data among all the relevant stakeholders within the Participant's domain, primarily to help address the Participant's information needs and priorities. Participant Nodes serve as communication gateways among GBIF Participants and the Secretariat. They are also the conduit by which GBIF Participants contribute to and benefit from the central services, infrastructure, and capacity provided by GBIF as a globally decentralised network of networks. This definition of a Participant Node expands and complements the one provided in the current GBIF Memorandum of Understanding (GBIF MoU 2007-2011). See also NBIFs, ReBIFs and ThemeBIFs, all of which are 'Participant nodes'.

PESI

Pan-European Species Directories Infrastructure -
<http://www.eu-nomen.eu/pesi/>

Primary Biodiversity Data

Primary Biodiversity Data is defined as: Digital text or multimedia data record detailing facts about the instance of occurrence of an organism, i.e. on the what, where, when, how and by whom of the occurrence and the recording.

Ramsar

The Convention on Wetlands, signed in Ramsar, Iran, in 1971 - www.ramsar.org.

Regional Node, ReBIF

A ReBIF, or Regional Biodiversity Information Facility is defined as an institution/organisation mandated by two or more countries in a region to be the regional focal point/liaison on all things GBIF, and a regional network coordinating institute, representing a de facto 'mini-GBIF Secretariat' in its role and functions, such a provision of training, especially where one or more countries locally do not have the capacity to establish NBIFs. Ideally such institutes should have a politically regionally mandated role of facilitating mobilisation of biodiversity data and information for the countries of the region.

REST

Representational State Transfer -
en.wikipedia.org/wiki/Representational_State_Transfer

Science Committee, GBIF Science Committee

A formal Standing Committee of the GBIF Governing Board, comprising elected representatives from Participants and with a mandate to oversee the scientific basis for all GBIF activities.

SPM

The Species Profile Model (SPM) is a standard under

development by BIS/TDWG as part of their LSID vocabularies. It is designed to allow a user to publish facts/statements about a particular taxon in a way that facilitates discovery, access and re-use, and is based on a simple model featuring a subject (taxon) having properties whose content can be free text or terms from a controlled vocabulary - wiki.tdwg.org/SPM.

Standard, Data Standard, Metadata Standard

Technical standards define a set of properties that a product or service should have. Standards are laid down by an organisation, such as OGC, ISO, BIS/TDWG and GBIF, that brings together representatives of producers and users of the type of product or service to establish the standard(s) in question.

Supplementary Funds

Additional financial contributions made by Voting Participants, Associate Participants or other funding agencies to fund specific parts of the GBIF Work Programme, or for other special purposes agreed by the Governing Board. These contributions are held by the GBIF Secretariat, kept separate from other contributions, and used only for the purposes specified by the Participants making them.

TAPIR

TDWG Access Protocol for Information Retrieval is the "next generation" protocol for primary biodiversity data exchange which combines the capabilities of BioCASE¹ and DiGIR

TDWG

see BIS.

Thematic area

Thematic Areas in this WP context refer to the two major focus areas within the GBIF Secretariat, namely Informatics, and Participation, which coordinate a number of defined Work areas within GBIF.

Thematic node, ThemeBIF

A ThemeBIF, or Thematic Biodiversity Information

Facility is defined as an institution / organization / initiative with a mandate to be a Secretariat, network coordinating institute, or similar role for a given thematic area, either regionally or globally, and thus potentially representing a de facto 'mini-GBIF Secretariat' in its role and functions for such a thematic area. Ideally such institutes should have a mandated role of facilitating mobilisation of biodiversity data and information for the thematic area.

UDDI

Universal Description, Discovery and Integration (UDDI) is a registry technology and protocol available for use in creating web-based registries of web service implementations - www.uddi.com.

User feedback service

The GBIF network allows users of its data services to provide feedback to the data providers. This function is implemented as the User Feedback Service, a web service offering an interface to pass a text message to the provider of any data item. This message is transmitted to the relevant Data Provider administrator as an e-mail.

WCMC

UNEP World Conservation Monitoring Centre - www.unep-wcmc.org.

Web services

A web service is any computing service which is published and accessible across the Internet and offers a standardised XML interface allowing users to invoke its function. Most of the web services discussed in this document provide access to biodiversity data.

Work areas

Specific subject areas identified by GBIF as requiring attention and usually with a dedicated Programme Officer employed at the Secretariat; combinations of Work areas make up each Thematic area of the GBIF WP.