

European Network for Biodiversity Information

ENBI

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Description of Work

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1. PROJECT SUMMARY

The European Network for Biodiversity Information (ENBI)

Problems to be solved

Biological diversity is essential to maintain life on earth and has important social, scientific, educational, cultural, recreational and aesthetic values. However, most existing biodiversity information is distributed and not dynamically accessible in digital format. To be able to use biodiversity information to its full potential, for both scientific and societal applications, it will be crucial to digitise our primary biodiversity data and to make these data available in an integrated shared information infrastructure. This is a complex task and there are many organisations involved. Co-ordination, to align efforts and to avoid overlap and duplication, is therefore the major problem to be addressed. It is also essential to co-ordinate and prepare for exciting future applications when biodiversity data can be studied in combination with data from other information domains such as molecular sequences, climate, or geography.

Scientific objectives and approach

The business plan of the Global Biodiversity Information Facility (GBIF) gives priority to the vast objective to make primary biodiversity data globally available. In first instance the GBIF work programme is restricted to taxonomic data and to biological collection and specimen data, as well as to promoting the common access and interoperability between these databases. ENBI, as the European contribution to GBIF, follows these priorities by concentrating on databases at the European scale and on activities that need co-operation at a European level. ENBI also explores the potential of tools to apply the biodiversity data as such, or in combination with other categories of data. In addition, ENBI will focus on the market of end-users with special attention on processes to develop specific products and services. The major objective of ENBI is to establish a strong network that will identify biodiversity information priorities to be managed at the European scale. Members of the network are the co-ordinating institutes of past and current EU biodiversity projects, and the (designated) institutes that act as, or host, the national GBIF-nodes. Other objectives are the establishment of communication platforms to inquire the needs of end-users and to disseminate biodiversity expertise to professionals and policy makers. ENBI co-ordinates its activities with those of the European Community Clearing-House Mechanism as both give top priority to the easy access to biodiversity data.

Expected impacts

ENBI will enhance the communication and co-operation between GBIF-nodes, biodiversity institutes and relevant initiatives in Europe. It will identify priorities with respect to mobilizing biodiversity information and establish provisions for joint approaches at the European scale. The network is expected to evolve into a consortium with a core set of activities that will address and co-ordinate the variety of databases, interoperability, services, dissemination and legal and financial issues at a European level.

2. SCIENTIFIC / TECHNICAL OBJECTIVES AND INNOVATION

Introduction

The European Network for Biodiversity Information (ENBI) has the general objective to manage an open network of relevant biodiversity information centres in Europe and other countries of the western European palearctic region. ENBI, in particular, includes all European national nodes of the Global Biodiversity Information Facility (GBIF) and all relevant EU-funded projects (see table I, chapter 8). By offering European researchers access to a European-wide pool of technical and human resources and to information on biodiversity expertise and know-how, the network provides a complete view on European biodiversity. ENBI will provide access to biodiversity data and information at the European biogeographical scale (incl. marine biodiversity). As Europe holds the world's richest and most important biodiversity collections, literature and other relevant data, and as much of this information relates to parts of the world other than Europe, the network will also provide important information to users outside Europe. The sharing of these non-European data will happen mainly through GBIF.

Objectives and expected achievements

The objectives and expected achievements can be grouped into four main clusters. The deliverables of ENBI will in general have the format of reports, web services, and established expert platforms. The network will perform some selected feasibility studies to test or demonstrate its conclusions and recommendations.

I. Co-ordinating activities.

- Development of a strong network structure with identifiable centres of excellence, including the establishment of a platform for national nodes to support GBIF-related discussions and decision-making on scientific issues that are better handled at a European level.
- Establishment of strategies for sustainability and continuity of the network activities by developing a European approach, building upon Member States initiatives.
- Identification of priorities with respect to biodiversity information, information management, and applications, that require a common approach and are more efficiently managed at the European scale.
- Dissemination of information and expertise about data contents and data management methodologies as well as best practice procedures, to inform both institutional staff (including new generations of scientists), and policy makers.
- Publishing of recommendations with respect to the legal and financial implications of sharing and dissemination of biodiversity information.

II. Maintenance, enhancement and presentation of biodiversity databases.

- Development of routines and mechanisms to update, validate and ensure sustainability of European biodiversity databases that are not expected to be maintained at the national level.
- Identification of gaps in knowledge and information, and strategies to solve these.
- Contribution to a common biodiversity information infrastructure so that the various networks and institutions can efficiently and without duplication of effort share and reuse information.

III. Data integration, interoperability and analysis.

- Identification of new emerging technologies and trends to anticipate upon and to organize a critical mass of European efforts.
- Integration of standards and protocols (metadata) for taxonomic, specimen, collection, and survey data in a common interoperability structure.
- Distributed information management requirement analysis for ENBI.
- Analysis of the application of Grid's in order to integrate distributed primary data into end-user oriented products.
- Inventory of biodiversity database analysing software systems (existing and in development), and the identification of common (exchangeable) approaches (especially for GIS based analyses).
- Contribution to a common biodiversity information infrastructure in collaboration with other initiatives, e.g. those of the European Environmental Agency (EEA) and current EU database projects, in such a manner that information providers and users have a common platform for information interchange.

IV. User needs: Products and e-services.

- Establishment of communication platforms to support the development of common procedures to meet end-user priorities with respect to high quality products and e-services.
- Establishment of the best ways of institutional co-operation throughout Europe to provide species-level and collection-based biodiversity data to end-users, with special attention for sharing biodiversity data with end-users in the countries where these data originate from.
- Development of dictionaries of biodiversity terminology in different (8) European languages, to be integrated in existing machine translation services.
- Co-ordination procedures with other European level projects, initiatives, and services, in particular the European Community Clearing-House Mechanism (EC CHM), and with the Secretariat of the Convention on Biological Diversity (CBD), in particular the Global Taxonomy Initiative (GTI).

Innovative aspects

Tackling complexity

Several Member States and EU projects are working on the development of biodiversity databases. Some of these perform activities at a global scale, for example the development of

a catalogue of species names that will serve as the main directory for all biodiversity databases (Species 2000). All these projects keep close contact to avoid overlapping activities and to learn from each other. However, Europe is still missing an organizational structure to promote a common approach to identify gaps in data, to share biodiversity information of different kinds, and to disseminate best practices and integrated end-user services. ENBI brings together the major stakeholders in a structure that will tackle the issues that need an approach at a European level.

Much of the information that exists regarding the diversity of life on Earth is in the form of printed books and journals or on labels of millions of specimens in various collections. The information is recorded in several languages and is of variable quality. Consequently, most of the paper based knowledge of biodiversity and ecosystems is inconsistent, incomplete, isolated, and thus difficult to access. It is also complex in nature due to two causes:

1. The underlying biological complexity of the organisms and ecosystems themselves;
2. The additional complexity due to the variability of the data held about them.

At the same time, unknown amounts of electronic data have been captured by technologies such as card systems and extinct electronic data sets that have not been updated or remain solely within the memory or files of specialists. It is important to convert this knowledge base from a static form to a dynamic form. Modern electronic biodiversity databases are highly diverse and heterogeneous, ranging from genomic databases, to specimen databases (the primary resource for understanding the distribution of species), to ecological and ecosystem databases. To understand and manage biodiversity, the different varieties of data must be combined and analysed together. Biological databases have also often grown and evolved through the independent efforts of scientists. Even when community-wide database services have been developed, they have often been focused on the needs of a particular group of users with little attention to the needs of other users. All these issues shall be approached within ENBI.

Biodiversity Informatics

Biodiversity Informatics is a very young discipline that brings together the capabilities in biodiversity information, (biodiversity) information management, and informatics. A major scientific challenge is the need to bring 25 decades worth of accumulated information into an electronically available and analysable format. The nature of biodiversity science is that it is cumulative and research results do not rapidly outdate. On the contrary, the value of biodiversity baseline data often increases in time. However, in order to collate information from all these sources, analyse and combine data and metadata into new knowledge, and to generate new predictions and correlations new software tools (including data visualization) and more effective hardware components for computation, storage and backup are required. New standards need to be developed for data preservation as well as automated techniques for data sharing and conversion of old “legacy” data. There are many developments in Member States with respect to biodiversity informatics. It is essential to promote interoperability and to build on common standards where necessary. ENBI brings these activities and initiatives together to achieve a critical mass for major developments that are also in the interest of GBIF. This approach will allow to study how the management and analysis of large scale distributed databases can build on Grids, another European priority.

European efforts: Towards a shared information infrastructure

There exists a variety of running efforts in Europe in relation to biodiversity information and biodiversity informatics. The science of taxonomic biodiversity is historically well established in Europe, which has resulted in the largest biological collections and related

libraries in the world. Besides this multitude of data sources, there is also a multitude of organizational networks that work with biodiversity in Europe. The major networks include CHM, EEA/EIONET¹, and now GBIF. They are and remain separate entities with their own goals.

The informatics revolution has promoted the digital capture of data, and the development of different approaches to analyse and apply these data. The challenge is now to provide access to all databases located at different sites into a unified environment. A single system is inconceivable, as it makes no sense to bring all databases together in a single uniform master database. There are different kinds of data, and the conditions for access at the various sites are not similar. The basic idea is to facilitate a change from private one-to-one data deliveries to open one-to-many information services. It will lead to a beneficial reuse of information and removal of overlapping data collection networks. A passive information provision role is, however, not sufficient here. We are also talking about demand-driven data interchange mechanisms between research institutions and administrations. This brings ENBI close to the ideas of *e-Europe*, in particular its *e-Government* action. Human networks have to speak directly to each other, but for communication computer networks need an underlying information infrastructure.

All the major biodiversity information networks, EC/CHM, EIONET and ENBI interact closely and directly with each other. They will promote that each technological solution communicates via a shared information infrastructure addressing issues such as common tools, shared data definitions, agreed data interchange formats, public application protocols, directories of resources, group collaboration areas and electronic marketplaces and data repositories. To bring these computer and human networks together, ENBI has communicated with EC/CHM and EIONET to co-operate towards a shared European biodiversity information infrastructure.

The Global Biodiversity Information Facility

ENBI will contribute to the objectives of the Global Biodiversity Information Facility. GBIF was established in March 2001 and wants to promote the development of an interoperable network of biodiversity databases and information technology tools that will enable users to navigate and put to use the world's vast quantities of biodiversity information to produce national economic, environmental and social benefits. More specifically, the purpose of establishing GBIF is to promote, co-ordinate, design and implement the compilation, linking, standardization, digitisation and global dissemination of the world's biodiversity data, within an appropriate framework for property rights and due attribution. GBIF is designed to work in close co-operation with established programmes and organizations that compile, maintain and use biological information resources (see also image below).

The information domain of GBIF consists of four major fields: The Catalogue of Life, Specimen Data, Species Bank, and Literature. The aim of GBIF is to share the distributed wealth of information in a common digital environment.

¹ The European Environment Information and Observation Network (EIONET) is the network of organizations through which Member Countries work with the European Environment Agency (EEA) to enable the provision of high quality information to support the environmental policy process and sustainable development, and for the assessment of environmental achievements and outcomes. The European Community Biodiversity Strategy states in its article II/21 that the EEA and EIONET should consolidate and further develop the Community CHM in order to become an efficient vehicle for promoting and facilitating technical and scientific co-operation.

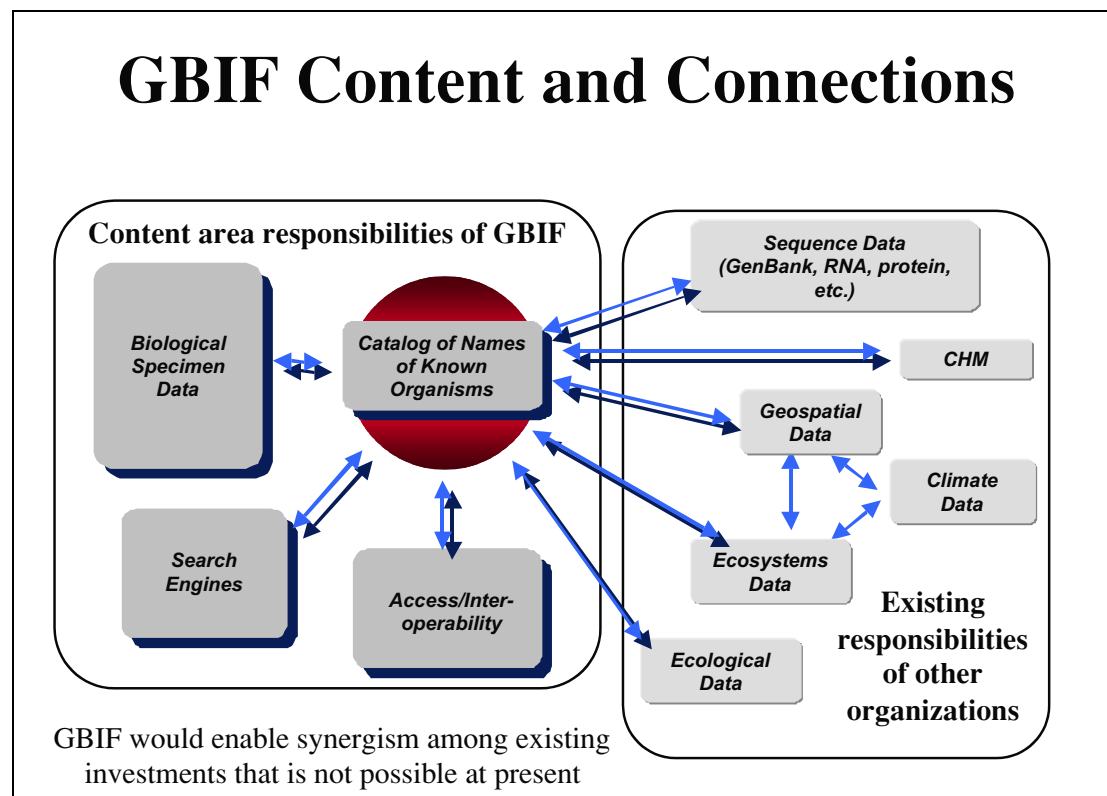


Image from: <http://www.gbif.org/>

ENBI contributes to the initial priorities in the GBIF business plan, which are defined in its work programmes:

- Data Access and Database Interoperability
- Electronic Catalogue of Names of Known Organisms
- Digitisation of Natural History Collections
- Outreach and Capacity Building

In relation to the existing European efforts and interests, the specific contribution of ENBI goes further than the initial GBIF work programmes.

All ENBI activities contribute to GBIF in various ways:

- Organizational, by promoting that new European countries will sign the GBIF Memorandum of Understanding.
- With respect to data content, to promote the availability of those databases that only can be generated at the European Scale, with special attention for making non-European biodiversity data in European repositories globally available.
- Studies on the development of generic IT tools for data management, access and analysis.
- Providing platforms for communications between European biodiversity data providers and with the communities of end-users.

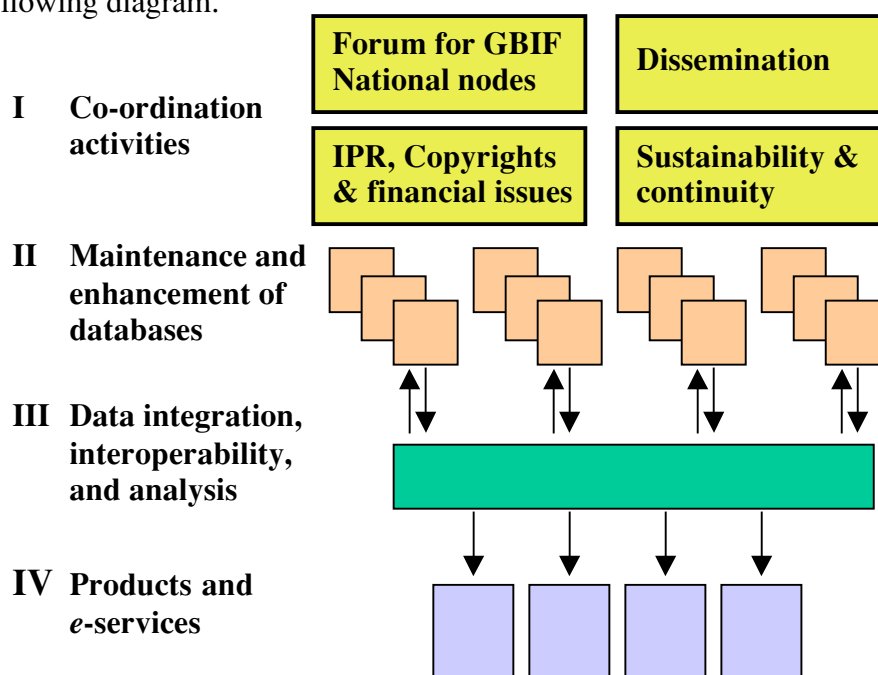
3. PROJECT WORKPLAN

Introduction and graphical presentation of the projects components

ENBI is organised as a Thematic Network, which implies that it will not undertake research projects. Its main objective is to bring together the existing European expertise in biodiversity information and biodiversity informatics. ENBI acts as the platform to identify issues of common concern that need an approach at the European level, to promote or undertake feasibility studies in priority areas, and to share and disseminate (new) expertise and information at a European scale.

As ENBI will shape the European contribution to GBIF, it is as such concerned with the business plan of GBIF. This business plan (see previous page) gives priority to the objective to make primary biodiversity data globally available. In first instance the GBIF work programme is restricted to taxonomic data and to biological collection and specimen data, as well as to promoting the common access and interoperability between these databases. ENBI, as the European contribution to GBIF, follows these priorities by concentrating on databases at the European scale, and on activities that need co-operation at the European level. ENBI also explores the potential of tools to apply the biodiversity data as such, or in combination with other categories of data. In addition, ENBI will focus on the market of end-users with special attention on processes to develop specific products and services. Within the limits of the available funding, and funding period of three years, ENBI selected a number of activities that will strengthen the joint European efforts, and contribute to GBIF on specific issues.

Presently a number of European and partly EU funded projects are already involved in these themes, often in a leading position. Most of these projects concentrate on building databases and/or on data management. ENBI will not restrict itself to database contents and management, but will place these in an output-oriented programme in relation to European priorities. This approach requires special attention with respect to a number of co-ordination activities, such as priority setting, promoting mutual benefits, and dissemination. In this regard, the work plan of ENBI is based on a clear design, and can be summarized in the following diagram.



- I. A number of co-ordinating activities makes sure that Europe develops a biodiversity information network in a wise and proper way. ENBI provides a platform for various forums that will address these issues. Other important topics are related to dissemination strategies, both in terms of sharing expertise throughout the European institutes, and promoting the use of digital biodiversity data in science and society. This Co-ordination cluster also illuminates any legal and financial implications, and provides provisions for the sustainability of ENBI.
- II. The maintenance, enhancement and presentation of biodiversity databases is a basic requirement for the European contribution to GBIF. ENBI will not build databases but facilitates the development of a common strategy which is fundamental for providing a service to the scientific community and other end-users. In the Framework Programmes 4 and 5 a number of relevant major projects were supported. It is now crucial to bring these projects, both past and present, together. It is necessary to identify and solve the imbalance of knowledge and information with respect to various taxa or specimen data. A further activity is the development of routines and mechanisms to update, validate and ensure sustainability of these databases.
- III. Large scale (virtual) distributed systems, such as biodiversity databases, require novel approaches towards data integration, interoperability and opportunities for analysis. The integration of distributed primary data to end-user oriented products is studied with an interface approach between these two domains, based on standards and protocols (metadata) utilizing bandwidth, and applications for generic tools. This includes the potential for linkages between species level, specimen level, and other database categories outside the GBIF information domain.
- IV. Products and e-services are in the interest of end-users. The scientific community requires high quality services with respect to size and speed, and to quality. Societal end-user priorities are being addressed with respect to the facilitation and promotion of the sharing of biodiversity data, particularly when those data originate from developing countries. ENBI identifies priorities that require a common approach at the European scale. Common access, with attention to multi-lingual access is a key issue. The work package studies the mechanisms to organise joint efforts to mobilize biodiversity information in relation to selected end-user requests, for which a few feasibility studies are envisaged.

Detailed project description

The European Network for Biodiversity Information is organised on a project (work package) basis. There are four main clusters of work packages, allowing that the interaction between closely related work packages can be managed in an efficient way.

Cluster I Co-ordinating activities.

1. Network co-ordination / Co-ordination with GBIF / Sustainability and continuity of European activities
2. ENBI Forums & Inventory of state-of-art.
3. Dissemination.
4. IPR, copyrights & financial issues.

Cluster II Maintenance, enhancement and presentation of biodiversity databases.

5. Co-operation of pan-European checklist and 'Species bank' database projects.
6. Co-operation of pan-European databases on biological collections and specimens.
7. Observational survey data.

Cluster III Data integration, interoperability and analysis.

8. Data management in large distributed biodiversity database systems.
9. Interoperability and common access.
10. Generic analysis tools and data mining.

Cluster IV Products and e-services.

11. Multi-lingual access
12. Information services on European biodiversity data.
13. Making non-European biodiversity data in European repositories globally available.

Cluster I: Co-ordinating activities

The co-ordinating activities constitute the basic and central work packages of ENBI to make sure that the collation and dissemination of biodiversity information and expertise in Europe is well organized, and is placed in an appropriate legal and financial context. These activities may not finish after the life time of this EU Thematic Network. Mechanisms are developed to support the continued involvement of the ENBI members and end-users, and of relevant Member State and EU bodies, with the objective to promote continuity and sustainability of the network.

Cluster II: Maintenance, enhancement and presentation of biodiversity databases

Biodiversity datasets are fragmented and dispersed in heterogeneous systems established by diverse organisations. A number of horizontal aggregations and interoperable systems have already been started by the EC and others, but there remains a major need for co-ordination and standards for content, and the creation of a common access system that may bring all together with vertical integration in a European gateway.

It is against this background that ENBI starts to co-ordinate common access to the various layers of knowledge, to assist with data standards within these layers, and to assess and plan remedies for both gaps and disparities in coverage for all organisms. As in other areas, it is important that ENBI uses and builds on what is already being done at the European level. Each work package deals with issues within the database layer, such as assessing coverage of organisms, evolving data standards and 'best practice' for management, strategies for sustainable enhancement, and the remedying of gaps and disparities. They also deal with horizontal integration, calling on assistance from work packages 8, 9 and 10 (cluster III) in pilot projects, and building on existing projects to create a common access for the layer.

Cluster II brings together the main players in three fundamental layers of biodiversity datasets.

Cluster III: Data integration, interoperability and analysis

The work plan aims to promote the exchange of knowledge, know-how and ideas that are currently available and to achieve a common code of practice, (meta) data standards and generic communication protocols to facilitate access to, and interoperability between, various 'layers' of biodiversity information sources on the Internet. Since the amount and variety of data stored and managed within the bio-diversity community is very large, and since IT tools for analysis, identification and geographic presentation require computationally-intensive processing, the demands for performance, robustness and scalability for the communication framework and ICT facilities are high.

The work in cluster III deals with generic applications of information and communication technologies enabling Internet access to the network of biodiversity databases and tool providers in the framework of the desired interoperable functionality and direct practical use of the information (analysis, information products and services).

Cluster IV: Products and e-services

The work plan is focused on user needs, and on making European biodiversity information available for the end-users. The users include government agencies, decision makers, legislators, scientists, companies, and citizens. Also non-European users are very dependent on access to European information, because many data in European repositories originate from non-European (often developing) countries. Understanding the needs of all these kinds of users is paramount for the dissemination of biodiversity knowledge resources, and common access, with attention to multi-lingual access (WP 11), is a key issue.

Work package descriptions

WP 1. Network co-ordination / Co-ordination with GBIF / Sustainability and continuity of European activities

Start date or starting event:	Month 0
Name of partner responsible:	University of Amsterdam
N° of the partner responsible:	P1
N°s of other partners involved:	P2, P3, P4
Person-months per partner:	(P1: 49)

Introduction

WP 1a: Network co-ordination

ENBI is large network with 13 work packages and many linkages to related initiatives. It is a major co-ordination task to manage the network and to ensure a fruitful interaction with a timely delivery of results. It is essential that the communication and interaction with GBIF is well established, such as to promote synergy in work plans. The co-ordinator will establish a Bureau to support the co-ordinating activities and to keep in contact with each network member. The Bureau organises the procedure to follow when new organisations request membership of the network. Co-ordination also includes interaction with the EC CHM, the EPBRS², and other adjacent services in order to avoid overlap and duplication of effort.

The management of the network is further supported by a structure with

- a Steering Committee, consisting of the persons in charge of each work package (the contractors),
- a Management Committee, consisting of the overall co-ordinator and the sub-co-ordinators of the clusters of related work packages,
- *ad hoc* Advisory Groups where necessary.

These bodies will also assist in drawing up the (half) yearly reports and financial statements.

WP 1b: Sustainability and continuity

ENBI is not intended to exist for just a few years. ENBI has the objective to strengthen and to integrate biodiversity information related activities all over Europe, and to build a strong consortium of institutes and their interrelated scientific activities in biodiversity information.

The ENBI co-ordinator, together with the network members, will develop a European approach building upon initiatives in Member States and current EU-funded projects.

Although ENBI is not a database custodian and will not manage software tools, the network studies alternative plans to maintain a European infrastructure of interoperable databases and software tools.

Many initiatives on a project basis live only a short time, often without any perspective on continued funding to guarantee, for example, updates of databases. A fundamental question is to which extent these databases and software tools belong in the public domain with public funding, or should be regarded as commodities that have to find their position in the commercial market place. The market position and the business set-up of activities to exploit biodiversity information, both in the public and private domain, need study to conclude about possible strategies. As the network has no expertise in this field, these studies will be

² European Platform for Biodiversity Research Strategy, a forum of scientists and policy makers representing the EU countries.

performed by a subcontractor that is experienced in the domain of setting up new biological enterprises (for example in biotechnology).

ENBI communicates with other European (biological) database services, and with national and European authorities to define a policy. Strategies are developed to promote a well-balanced involvement of national and European interest and support, as well as a strong position in the public and private economic market. Legal and financial implications are taken into account (WP 4). Conclusions and recommendations will be reported as part of the Technology Implementation Plan (TIP) to provide guidance for national and European authorities, as well the database custodians. This also includes the existence and continuity of ENBI. The network is expected to evolve into a consortium with a core set of activities, addressing the variety of database, interoperability, service, legal and financial issues that need European co-operation, and whose results have to be disseminated amongst all stakeholders. A wider platform of institutes and end-users will promote the involvement of important stakeholders.

This work package contributes to the GBIF business plan with respect to the work program "Outreach and Capacity Building".

Objectives

Network functioning

- Optimal interaction of the activities of the network partners in relation to the work plan and workpackages
- Establishment of the management structure
- Monitoring of the progress of the network performance

Communication

- Promotion of information exchange between the different European biodiversity information projects and initiatives
- Establishment of communication mechanisms with GBIF, EC CHM, EPBRS and other adjacent services

Continuity and sustainability

- Securing the continuity and sustainability of the network after its initial 3 years lifetime
- Identification of realistic mechanisms to secure such continuity and sustainability, as part of the TIP

Administrative issues

- Definition of budget policy and securing accountability
- Arrangement of financial and other administrations
- Reporting of progress and results, including editing the final report

Methodology and description of work

Network functioning

- Installing of the Network Bureau
- Distribution of formats for reports by Work package co-ordinators
- Organisation of half-year Management Committee meetings, incidental advisory meetings, the start-up conference, and a final 'dissemination' conference

Communication

- On-line database with announcements of events, automatic reporting service, and on-line agenda, and digital performance management tool (in co-ordination with wp2)
- Publication of the activities and results of ENBI in brochures, posters, the ENBI web-site, and proceedings of visited conferences (in co-operation with wp2 and wp3)

Continuity and sustainability

- Organisation of discussion meetings with various stakeholders, national and European bodies to address alternative public and/or private approaches for the sustainability of activities in the ENBI network
- Hiring consultancy (for not available expertise in the network) to address selected issues with respect to sustainability policies and activities (market position and the business set-up)

Administrative issues

- Handling administrative procedures relating to the European Commission
- Collecting data and text, and editing of reports

Deliverables		Month
No.	Title	
D1.1	Establishment of Network Bureau	3
D1.2	Half year management reports (every 6 months) and yearly scientific & technical reports (every 12 months) for the European Commission	1-36
D1.3	Interim Report with conclusions and recommendations on the continuity of ENBI	20
D1.4	Final Technology Implementation Plan (TIP)	33
D1.5	Final report of ENBI	36

Corresponding milestones		Month
No.	Title	
M1.1	First general ENBI meeting agrees on policy document, based on further elucidation of the work package activities	2/3
M1.2	ENBI web site functioning with communication tools (is related to M2.1 of WP2)	2
M1.3	Meeting to agree an a preliminary common view on the future of ENBI	16

WP 2. ENBI forums / Inventory of state-of-art
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Start date or starting event:	Month 0
Name of the partner responsible:	CSIC (Spanish Scientific Research Council), Spain. Real Jardín Botánico — Museo Nacional de Ciencias Naturales
N° of the partner responsible:	P2
N°s of other partners involved:	P1, P8, P12, P16, P17, P18, P19, P23, P26, P29, P32, P33, P34, P36, P38, P39, P40, P44, P47, P49, P50, P52, P53, P58, P67
Person-months per partner:	(P2: 32) (P12: 3) (P67: “travel” and “other costs” only)

Introduction

The different work packages of ENBI will bring together the experts and end-users in specific fields of interest. Obviously it is also essential to have a work package to organize general meetings to discuss and promote the exchange of opinions on issues of common concern. The meetings provide a platform for the national GBIF nodes and other stakeholders for discussion on common issues. Input comes from the other ENBI work packages. In relation to providing an ENBI Forum, it is necessary to provide a frequently updated on-line service on all existing related activities and initiatives in Europe, including the co-ordinates with respect to contact persons etc. Apart from that, this overview will easily provide an insight on the state of activities in Europe.

ENBI Forums is an instrumental work package within ENBI. It should provide other ENBI work packages and users with a communication space, and consolidate the outcomes of this communication as an information resource open to everybody.

The large number of partners in this WP without a budget or person-months are included here as contributors, consultants and participants in the virtual community, *e*-conferences and workshops.

ENBI Forum will be implemented in close co-operation with the European Environment Agency that already provides an infrastructure through the CIRCA³, EIONET Portal, and the EC CHM Portal.

This work package contributes to the GBIF business plan with respect to work program “Outreach and Capacity Building”, as well to the GBIF Standing Committee of node managers.

³ The Communication and Information Resource Centre Administrator (CIRCA) is a generic web-based environment, funded and developed, initially for Eurostat, under the European Union IDA (Interchange of Data between Administrations) Programme. CIRCA has been extended by the European Environment Agency for the use of EIONET

Objectives

- Provide a forum for GBIF-related discussion and decision-making on scientific issues that are better handled at a European scale than at a national one
- Building a communication platform for European GBIF nodes and biodiversity information stakeholders and strengthen co-operation among them
- Provide an entry point for directories of for EU biodiversity information stakeholders
- Bring together expertise for communication among biodiversity information experts and communication between experts and information users
- Provide updated technical information (software, methodologies, standards, etc.) to biodiversity information providers and users.

Methodology and description of work

- Compile entry point to for EU biodiversity information stakeholders (database + collection of links)
- Setting up an ENBI Virtual Community (VC) with several groups of interest
- Organize and carry out 3 electronic conferences and 3 associated workshops. The selection of topics for the workshops will be derived from the issues raised during the *e*-conferences and decided by the project's steering committee in consultation with experts as necessary.
- Setting up a library of documents, (ENBI) reports and relevant pieces of information produced and /or compiling as a result of electronic conferences and workshops

Deliverables	Partner responsible	Month
No.	Title	
D2.1	Online database of ENBI stakeholders	p2 2-36
D2.2	ENBI WP2 Website	p2 1-36
D2.3	Online State of the Art database	p12 2-36
D2.4	Documentation produced and compiled from the 1st <i>e</i> -conference available via ENBI VCs document repository	p2 6
D2.5	1st Workshop report and documents available via ENBI VCs document repository	p2 7
D2.6	Documentation produced and compiled from the 2nd <i>e</i> -conference and workshop available via ENBI VCs document repository	p2, p67 18
D2.7	2nd Workshop report and documents available via ENBI VCs document repository	p67 19
D2.8	Documentation produced and compiled from the 3rd <i>e</i> -conference available via ENBI VCs document repository	p2 30
D2.9	3rd Workshop report and documents available via ENBI VCs document repository	p2 31
D2.10	WP2 final report	p2, p12 p67 33

Corresponding milestones	Month	
No.	Title	
M2.1	Initial forum instruments in place (ENBI WP2 Website, State of the art database on line, ENBI VCs in place)	2
M2.2	ENBI 1st <i>e</i> -conference	4
M2.3	ENBI 1st workshop	6
M2.4	ENBI 2nd <i>e</i> -conference	16
M2.5	ENBI 2nd workshop	18
M2.6	ENBI 3rd <i>e</i> -conference	28
M2.7	ENBI 3rd workshop	30

WP 3. Dissemination

Start date or starting event:	Month 0
Name of the partner responsible:	Mediterranean Agronomic Institute of Chania
N° of the partner responsible:	P3
N°s of other partners involved:	P1, P2, P14
Person-months per partner:	(P3: 36)

Introduction

In the broad sense, biodiversity informatics refers to all aspects of information gathering and handling concerning the identification, conservation and sustainable use of plant, animal and micro-organism diversity at the genetic, organismic and ecological levels. There is a chronic shortage of trained personnel with a combination of skills in appropriate aspects of both biological science and computer science as well as a lack of awareness of biodiversity information resources amongst the public at large. This work package addresses this problem by ensuring the dissemination and transfer of expertise developed within ENBI to current and future generations of taxonomists and all those involved in or responsible for biodiversity informatics in the broadest sense.

This work package contributes to the GBIF business plan with respect to work program “Outreach and Capacity Building”.

Objectives

The overall objective of this Work package is the collection of the appropriate information emanating from other ENBI Work packages and its dissemination to appropriate parties. The focus is primarily internal, with emphasis on the transfer of expertise to new generations of skilled experts in biodiversity informatics. However, public awareness will be addressed with lectures, posters and other publicity material. In order to achieve its objectives, this Work package is comprised of three main parts:

- Within ENBI, it will play a co-ordinating role in the collection of information for dissemination. This involves soliciting for content from providers (most of the ENBI Work packages) and requirements (from end-users) and generally liaising with the other work packages producing the source information for the purpose of assembling that information in ways suitable for dissemination to members of the scientific community, officials involved in dealing with biodiversity issues, and to the public at large, as indicated below.
- Providing a structural framework for the dissemination of information obtained as above, including establishment of paper- and web-based dissemination protocols (Journals, *e*-Journals, including a general informative ENBI Brochure). This aspect will involve collaboration with WP2.
- On the basis of the above, it will be responsible for the production, either directly or by subcontracting, of the literature (both hard copy text and on line via the web) that is produced to this end and for the organisation of the requisite meetings and workshops for dissemination of the information to the target groups.

Methodology and description of work

Dissemination of Basic Information. Basic training in such matters as data management, interoperability and taxonomic standards in general on a European scale (i.e. the basic activities of ENBI) will be the subject of a short course (repeated in several centres) and by the production of literature (both on paper and in electronic form) advising on curriculum development in these areas, including the development of guidelines and recommendations for syllabus content. The content will be developed from the recommendations arising from other ENBI Work packages.

Dissemination of Specialised Information. Seminars will be organised for project personnel on e.g. taxonomic data standards, best practice for taxonomic knowledge management, protocols, networking and inter-operability, co-ordination mechanisms, image and map processing. Again, the final content will be developed from the recommendations at ENBI forums and arising from other ENBI Work packages. Courses will bring together

experts selected by ENBI, local representatives from the host centres and participants involved in all aspects of biodiversity information. The seminars will concentrate on giving European added-value to existing and future EU and nationally funded projects by providing rapid dissemination of standard and recommended protocols. An important aim is to avoid personnel involved in different projects within Europe each “re-inventing the wheel”. The courses will be supplemented by appropriate literature (in both paper and on-line editions).

Official Awareness. The role of this part of the work package will be the co-ordination and preparation of materials for ensuring awareness of officials handling biodiversity issues. It will organise the running of a small number of one-day courses for briefing such officials. (e.g. on European research projects, European involvement in GBIF; sources of biodiversity information; how to access biodiversity information when required).

Procedure for organisation of courses and workshops. The dissemination via courses will involve one day workshops (Basic Training; Official Awareness) as well as longer seminars (Specialised information), as well as exchange visits as appropriate. The procedure for establishing the topics and timing, along with other organisational matters, will be resolved at the regular six-monthly ENBI management meetings of the Work package leader with the ENBI Co-ordinator and the co-ordinators of the ENBI clusters. Input from ENBI Forums will be taken into account.

Deliverables		Month
No.	Title	
D3.1	ENBI Brochure, outlining the function and structure of ENBI and the way interested parties can contribute to or benefit from ENBI.	2
D3.2	Literature and publicity material for engendering public awareness.	13-34
D3.3	Update ENBI Brochure.	20
D3.4	Dissemination seminars and literature providing ‘basic’ training. (one seminar repeated in three countries).	13-24
D3.5	Three specialist seminars (with accompanying literature) to be held in geographically suitable centres and at Centres of Excellence	18-34
D3.6	Workshop and associated literature for official awareness (one workshop repeated in three countries)	30
D3.7	Online specialist bio-informatics information	12-34

Corresponding milestones		Month
No.	Title	
M3.1	Establishing an on-line co-ordinating structure for receiving information for the dissemination of expertise and views	8
M3.2	Establishment of web and paper based dissemination protocols (Journal, e-Journal).	12
M3.3	Establishment of timetable and organization of the agreed meetings and workshops (times to be agreed at ENBI Forums).	12

WP 4. IPR, copyrights & financial issues

Start date or starting event:	Month 9
Name of the partner responsible:	Royal Botanic Gardens, Kew
N° of the partner responsible:	P4
N°s of other partners involved:	P1, P6, P10, P12
Person-months per partner:	(P4: 9)

Introduction

The utility of baseline biodiversity research databases depends on open access to all the data and in publicly funded collaborative projects the open science model has generally been used which creates an IPR-free zone. The importance of maintaining open access to information for use in basic science needs to be emphasized since without it little data will be available to develop conservation strategies or sustainable use of species. However, the open science model is not sustainable if one partner claims ownership of data.

ENBI has to look for ways to ensure agreed and legal practices in Europe in relation to the distribution, sharing, adapting, and exploiting of databases from various sources. This does not only refer to legal rights but also to any financial implications of the conditions set by the database owners.

Presently there are, not only in Europe but all over the world, few institutional policies with respect to rights to access baseline data held in herbaria or museums, and even fewer policies on the extent to which access is free or requires payments. The Memorandum of the Global Biodiversity Information Facility (GBIF) summons its members (participating countries) to put their biodiversity data in the public domain but there is no common practice or an obligation to do so.

European museums and herbaria have a very significant proportion of the historical and modern data from specimens collected in developing countries and since the signing and ratification of the Convention on Biological Diversity more of these developing countries have requested that these data be shared (repatriation). Few museums or herbaria have policies in this area.

In this work package, problems, both legal and institutional, will be identified, categorized and discussed, so that a realistic attempt can be made to draft recommendations for common policies.

These issues are presently not yet a short-term priority in the GBIF business plan.

Nevertheless, they are essential, and the input from ENBI may show the way to proceed with these issues on a global level.

The results and products from this work will be used by the partners to enable exchange of data in a manner that will protect the intellectual property of partners and allow any benefits accrued to be shared with countries from which the specimens originated.

Objectives

The principle incentive of Intellectual Property Rights (IPR) ownership is income generation for the database owners since there is a (costly) need constantly to update, verify and maintain the database. In this regard, the objectives of this WP are:

- Disseminate information on IPR and financial issues to partners
- Interact with and learn from other related EU networks in this area and
- Enable partners to work freely together by drafting a model contract
- To work towards a common European understanding of IPR, copyrights and financial issues as they apply to GBIF-related issues

Methodology and description of work

- The collation and analysis of IPR and financial data from workshops with partners and from the analysis of existing data from a variety of sources
- An analysis of database law, copyright law on the creation of databases and their contents, and the policies on asking fees to get access to the data (this will also take into account the fact that laws are significantly different in the USA, the EU and possibly the NAS) and this can have an impact
- The employment of external legal consultants, as necessary, to support the analysis of database law, copyright law on the creation of databases and their contents, and the policies on asking fees to get access to the data
- Categorisation of issues for a structured discussion of members and invited experts
- Together with information from the workshops all data will be used to build the framework of a model contract for partners. This contract or an adapted version of it will be used in permitting the sharing of data particularly to third parties
- This work package will look at the issue of IPR and data repatriation in the light of the attitudes of some mega-diverse countries.

Deliverables		Month
No.	Title	
D4.1	Run workshop 1 to disseminate information on IPR, financial issues to partners and data sharing (repatriation) including a short report on the current state of data sharing in relation to the Convention on Biological Diversity	12
D4.2	Report on the results of the workshop to include analyses of database law and copyright law and on the issue of data sharing	13
D4.3	Determine (based on Workshop 1) and report on IPR priority issues for partners	16
D4.4	Run workshop 2 to present the final results of the analyses of database law and copyright law and data sharing and discuss the list of priority issues; workshop to include a report on recent changes to IPR laws in ENBI partner countries	18
D4.5	Draft and circulate a set of common policy guidelines and a draft model data sharing Memorandum of Understanding	20
D4.6	Run workshop 3 to discuss and agree the draft common policy guidelines and a draft model data sharing Memorandum of Understanding	24
D4.7	Report from workshops on IPR issues and on model data sharing Memorandum of Understanding (based on Workshop 3)	30
D4.8	Report on the Common Policy guidelines and a model data sharing Memorandum of Understanding (based on Workshop 3)	35

Corresponding milestones		Month
No.	Title	
M4.1	Draft model data sharing Memorandum of Understanding	20
M4.2	Common Policy guidelines and Model data sharing Memorandum of Understanding agreed	36

WP 5. Co-operation of pan-European checklist and 'Species bank' database projects

Start date or starting event:	Month 4
Name of the partner responsible:	The University of Reading
N° of the partner responsible:	P5
N°s of other partners involved:	P1, P25, P35, P37, P41, P43, P61, P62
Person-months per partner:	(P5: 33) (P25: 9)

Introduction

Taxonomic databases are important in two different ways. They provide synonymised species checklists that are needed by ENBI and other organisations (including especially the GBIF and the EEA) as the central indexes to biodiversity knowledge. They also provide a resource, the 'Species Bank' or encyclopaedia of basic descriptive, illustrative and distributional data about taxa. Cultivated plant taxonomy is included here.

The first stage of the work plan of this work package is to examine the pan-European taxon list being put together by the EuroCat (Species 2000 Europa) project from its three component databases. The three systems cover Higher Plants (Euro+Med), Terrestrial Macro-Fauna (Fauna Europaea), and Marine organisms of all groups (ERMS, European Register of Marine Species). Careful assessment of content is needed, both because of major gaps, because of a number of overlaps, and because of substantial differences in depth of treatment. A pilot will study limited common access with the assistance of WP 9. A further feasibility study will propose how to inter-relate the infra-specific cultivated plant taxonomy used in agriculture and horticulture with the species level taxonomies used by the European Taxonomic Databases.

In the second stage the feasibility of linking taxon databases that are rich data sources ('Species banks') will be established.

This work package contributes to the GBIF business plan with respect to the work programme "Electronic Catalogue of Names of Known Organisms". It also addresses the development of "Species banks", in depth databases with species related information, an important component of the second batch of GBIF work programmes.

Objectives

- Establish the feasibility of providing an integrated gateway to the European Taxonomic Databases and European 'Species Bank' systems,
- Identify the gaps in taxonomic coverage, associated core data, and associated descriptive data, and identify ways of filling them,
- Establish the feasibility of introducing cultivated plant taxonomy to the databases dealing with European & Mediterranean plants.

Methodology and description of work

Task 5.1. Locate the gaps in coverage of European native taxa among the taxonomic databases contributing to the pan-European taxon list, and organise potential solutions: (led by partner 5)

- Gap analysis of taxa not covered, and develop a strategy to identify potential partners
- Establish disparities in coverage of core data across the different databases and identify areas of priority for data amplification

Task 5.2. Establish feasibility of linking rich data sources ('Species Banks'): (led by partner 5)

- Assessment of existing electronic rich data sources ('Species Banks')
- A design and prototype project to interlink these rich data sources with common access

Task 5.3. Feasibility study for linking cultivated plant taxonomic checklist database components into the pan-European taxon list (partners 5 and 25)

- Structure, data standards and protocols for doing this
- Prototype linkages to be tested in a demonstrator

Deliverables		Partner responsible	Month
No.	Title		
D5.1	Report on gap analysis in coverage of species	5	21
D5.2	Report on disparities in levels of core data coverage with proposals for possible solutions	5	21
D5.3	Report on areas of priority for gap fitting (taxon) and data amplification	5	21
D5.4	Report on assessment of existing electronic rich data sources ('Species Banks')	5	13
D5.5	Feasibility report for access to 'Species Banks'	5	21
D5.6	Pilot demonstrator for access to 'Species Banks'	5	32
D5.7	Feasibility report for cultivated plant taxonomy linked to the pan-European taxon checklist	25,5	21
D5.8	Pilot demonstrator for cultivated plant taxonomy linked to the pan-European taxon checklist	25,5	32

Corresponding milestones		Month
No.	Title	
M5.1	Gap analysis in coverage of species completed	12
M5.2	Disparities in levels of core data coverage identified	21
M5.3	Areas of priority for gap filling and data amplification identified	21
M5.4	Assessment of existing rich data sources completed	12
M5.5	Design proposal for access to 'Species Banks'	12
M5.6	Demonstrator for access to 'Species Banks' operational	21
M5.7	Design proposal for linking cultivated plant taxonomy to the pan-European taxon list	21
M5.8	Demonstrator for cultivated plant taxonomy linked to the pan-European taxon checklist operational	32

WP 6. Co-operation of pan-European databases on biological collections and specimens.

Start date or starting event:	Month 2
Name of the partner responsible:	The Natural History Museum, London
N° of the partner responsible:	P6
N°s of other partners involved:	P1, P4, P5, P7, P22, P24, P26 P27, P45, P49, P54, P60, P66
Person-months per partner:	(P6: 15,4) (P22: 12) (P24: 1) (P27: 11)

Introduction

Specimen databases provide the securely documented unit biodiversity records for the occurrence of organisms in space and time. Collections databases enable users access to the breadth of species represented by specimens in biological and mineralogical collections. Such collections hold the only extensive material resources to provide baseline data for distributional and historical surveys and the many related data presentation projects. Europe has a unique global inheritance in this respect. Its collections span not only this continent, but also the globe. Collectively, the scientific and educational value of these collections is immense. But the full impact of this European value will be realized only if the information content is integrated and made accessible. With the establishment of GBIF, there is now an international body with a specific biodiversity requirement through which the exceptional European content in collections will add fundamental value. Other EU-supported initiatives that are dedicated to achieving a common access system to biological information in collections in Europe include BioCISE⁴ (which is concerned with *collections* metadata), ENHSIN⁵ (*specimen* metadata), and BioCASE⁶ (both specimen and collections metadata). ENBI will help extend and integrate outcomes or developments from these projects. WP6 will address two areas that add a specifically European dimension to GBIF on natural history collections. It will do so in two ways: first, by helping to integrate the network (of institutions, their scientists and collections managers), that has developed, and continues to develop, in Framework Programme 5; and second, by producing material deliverables that will help cement the tangible gains made in FP5. WP6 will: 1) broaden the network of European specimen databases; and 2) develop standards and best practice for the databasing and digital imaging of reference ('type') specimens. In 1), the work plan will build on the current EU infrastructure projects by integrating efforts to extend common policies on standards, interoperability and maintenance of specimen databases. It will achieve this goal by linking specimen databases to the evolving operational system. Such linkage will utilize and extend the results of an existing study on a second generation prototype involving the new global data specification being developed by CODATA/TDWG (Committee on Data for Science and Technology/Taxonomic Database Working Group). Further biodiversity information in Europe is stored in specialist collections archives, notably index card archives – each card being equivalent to a specimen. A large card archive to species will be used as a general demonstrator of a system constructed to enable digital access to such data, which is of a kind being used in Flora Europaea, Fauna Europaea, and EuroCat. In 2), the focus is on type

⁴ Biological Collections Information Service for Europe

⁵ European Natural History Specimen Information Network

⁶ Biological Collections Access System for Europe

specimens, in particular the methods by which digital images of them are produced and made accessible. As name bearers, types are the primary reference specimens of species. Significantly, European institutes house a large proportion of the world's types, so Europe is the world's predominant reference region for this special material. WP6 contributes directly to the GBIF business plan with respect to work programme "Digitisation of Natural History Collections". WP6 will also address the question of how such databases will be maintained.

Objectives

- Organize and integrate networks of European natural history specimen databases and develop strategies to update and maintain key European specimen databases.
- Materially broaden the network of European specimen databases.
- Develop standards and best practice for the databasing and digital imaging of reference ('type') specimens.

Methodology and description of work

- Build particularly on selected EU infrastructure projects by integrating efforts to extend common policies on standards, interoperability and maintenance of specimen databases.
- Facilitate dialogue and integrate efforts across various kinds of natural history collection databases.
- Adapt the common access system, produced by ENHSIN/BioCASE, through the CODATA/TDWG initiative, to link selected existing specimen databases into a distributed European network.
- Feed experience with IPR issues into WP4.
- Interact with WP7 (observational data) on common issues.
- Assess current European work on digitising type data and images to create common standards using samples of specimens from at least three model taxa.
- Provide Internet access to a large demonstrator sample of index cards bearing basic biodiversity data, by constructing a search facility to species names using a combined manual/OCR data conversion system.

Deliverables		Partner	Month
No.	Title	responsible	
D6.1	Functional network of 100 European specimen databases installed on prototype	22, 24	27
D6.2	Demonstrator type-specimen database with records/images of primary type specimens of selected key taxa from European research and reference collections to demonstrate technical standards agreed	27, 6	33
D6.3	Document for databasing standards and rules of best practice for processing and for digital publication of information on type specimens	27, 6	30
D6.4	Internet access to sample taxonomic card archive database	6	7
D6.5	Report from general workshop on the selection of key taxa and standards and methods for digital imaging of type specimens	6	15
D6.6	Report from technical workshop on key issues for digital imaging and the examination and plans for dissemination of results	6	23

Corresponding milestones			Month
No.	Title		
M6.1	Assess general design of common interoperability approach on which deliverable D6.1 depends and test wrapper (D6.1)		9
M6.2	50 specimen databases installed to prototype (D6.1)		15
M6.3	100 specimen databases accessible on prototype (D6.1)		27
M6.4	General workshop to select key taxa and to explore standards and methods for digital imaging of type specimens (D6.2 & 6.3)		13
M6.5	Technical workshop to resolve key issues in digital imaging and to examine results and means to disseminate them (D6.2 & 6.3)		21

WP 7. Observational survey data

Start date or starting event:	Month 4
Name of the partner responsible:	University of Turku
N° of the partner responsible:	P7
N°s of other partners involved:	P1, P5, P6, P8, P9, P19, P21, P47
Person-months per partner:	(P7: 30)

Introduction

Observational databases created by surveys provide very extensive datasets, many very recent, and many with exact timeframes suitable for monitoring and modelling activities. Observation (survey) data consists of two major sources: systematic and directed surveys done by agencies, institutions, special interest groups and individual researchers, and more random observations usually done by amateur ornithologists, botanists, entomologists, and similar. This part of information is probably orders of magnitude bigger than the collection and specimen databases, but goes often largely unrecorded.

There are many reasons why the coverage of observation databases needs to be improved in Europe. Several species are sensitive climate change indicators and changes in their distribution are important to know.

The focus of this work package will be on designing and promoting of common standards (survey, representation, geographical) for access and operability of observational data. A second task is to define methodologies linking taxonomic, collection and specimen databases with the observational data

A feasibility study will design the prototype for a standard system that could be used for collecting observations from large numbers of field observers to online web databases. Such a system must have several easy user interfaces for mobile users. It needs to have serious quality checking procedures to ensure the correctness of the data. It must be based on open source components and be easily manageable. In addition, it must meet sufficient reporting features and standard data interchange formats that allow communication to major European databases such as Natura 2000 and EUNIS⁷.

These subjects are presently not covered by the GBIF work program. Nevertheless, as these databases are well developed in a number of European countries and these are very important to analyse biodiversity changes, ENBI will study the options for access to the distributed databases with observation data.

Objectives

- Develop strategies and networks for common European standards analysing and presenting biodiversity data that is based on observations, systematic sampling or surveys
- Definition of methodologies linking taxonomic, collection and specimen databases with the observational data (WP5 and WP6)
- Establish links with existing projects and programmes that analyse and promote the use of combined GIS and remote sensing for spatial biodiversity data analysis and presentation (WP10)

⁷ European Nature Information System

Description of work and methodology

- Design of common standards for building meta databases on existing and future biodiversity data sets created by systematic surveys, sampling or by using various observation methodologies
- Organise a network linking the major institutions, organisations and interest groups involved in management of observational data
- Analyse the applicability of various types of observational data as tools for environmental monitoring
- Explore means to create extensive multi-theme databases on biodiversity patterns at different areal scales

Deliverables

No.	Title	Month
D7.1	Network of organisations, institutions and specialised interest groups that hold, analyse and present spatial, observation-based biodiversity data	9
D7.2	Document for databasing standards and rules of best practice for processing and making available observational biodiversity data	12
D7.3	Report of analysis of observational biodiversity information needs and products to support the European Biodiversity Strategy and parallel activities	12
D7.4	Definition of methodologies linking taxonomic, collection and specimen databases with the observational data	24
D7.5	Document that will demonstrate the applicability of combined GIS and remote sensing approach as a means for spatial biodiversity data analysis and presentation. The deliverable will be developed jointly with WP8 and WP10 using ArcInfo and other GIS platforms	34

Corresponding milestones

No.	Title	Month
M7.1	Reference list on IT needs for specimen and observation biodiversity data completed	24

WP 8. Data management in large distributed biodiversity database systems

Start date or starting event:	Month 3
Name of the partner responsible:	University of Amsterdam
N° of the partner responsible:	P1
N°s of other partners involved:	P5, P6, P7, P8, P9, P56
Person-months per partner:	(P1: 15) (P5: 2) (P8: 4) (P9: 5) (P56: 4)

Introduction

This work package primarily aims at the analysis and design of a co-operative federated information management system inter-linking and integrating the varied biodiversity information types (e.g. on taxonomy, collections, observation, etc.) that are distributed among different databases. This goal will be achieved in close collaboration and based on the common interoperability approach of WP9. As such, the WP8 will analyse and introduce an integrated / unified data description (schema) and a federated database management architecture, in order to integrate the wide variety of information, where in fact WP9 addresses the diversity of data sources through an approach for adaptation and harmonization using a common interoperability approach. The first step towards the achievement of WP8 objectives will be an analysis, identification, and characterization of the distributed information management requirements for the ENBI biodiversity application domain. The identified requirements will include both the modelling constructs (entities and concepts) and the functional (access and manipulation) requirements for the target federated information management architecture. As a part of this feasibility analysis stage, a study of related development approaches (e.g. Java, CORBA, XML, WSDL), and data description models in the biodiversity domain will be carried out. Based on the identified distributed information management requirements, the individual components of the federated database architecture will be specifically designed and tailored to the ENBI application domain. The federated architecture will be based on the definition of an integrated database schema that constitutes a coherent "view" of the information represented and handled in all nodes. Data can be imported/exported through this integrated schema, but the proper access rights are defined locally at every node to precisely specify the rights of external nodes. In this way, end-users and applications are able to issue global queries on the integrated schema in order to access any data for which they are authorized to retrieve. This work package will explore the potential of GRID technology as the base communication infrastructure. For instance, if one or more nodes in the ENBI network are GRID-enabled, the utilization of this high-performance infrastructure can be exploited by the internal federated architecture components for transfer of large data sets among different biology databases. This work package will also evaluate the applicability of the concept of Virtual Organizations (VOs) in ENBI, to support advanced collaborations within clusters of biodiversity organizations. A VO represents a (temporary) alliance of these organisations that come together to share skills, core competencies and resources in order to achieve common goals. In the context of ENBI, biodiversity research centres, institutes, and related information service providers may need to collaborate in a VO framework in order to provide specific value-added services or products which would not be feasible if these organisations were working independently, as single entities. In this scenario, a GRID-based federated information management approach would effectively support the secure sharing and exchange of large amounts of information among collaborating authorized VO-member organizations. The design of the architectural components described above will be regarded as part of a single Collaborative Information

Management System. This work package contributes to the GBIF business plan with respect to parts in the work program “Data Access and Database Interoperability”.

The design of the architectural components described above will be regarded as part of a single Collaborative Information Management System.

This work package contributes to the GBIF business plan with respect to parts in the work program “Data Access and Database Interoperability”.

Objectives

- Identify the information management requirements of the ENBI bio-informatics application domain with respect to biodiversity databases.
- Evaluate the suitability of the federated database architecture to support the information management requirements of ENBI.
- Explore the potential of applying GRID technology to support the exchange of data from distributed databases for high-performance bio-diversity information services.
- Evaluate the applicability of Virtual Organization concepts to support advanced collaborations within clusters of biodiversity organizations.
- Analysis and design of a Collaborative Information Management System (CIMS) foreseeing the integration with the components designed in work package 9 and work package 10.

Description of work and methodology

- Analysis of distributed information management requirements for the ENBI application domain using input from Cluster IV (user requirements)
- Collaboration with WPs 5, 6 and 7 (of Cluster II) to achieve a proper characterization of the various existing biodiversity database schemas.
- Explore the potentials of GRID, VO and CIMS for ENBI
- Designing a single modelling framework for integration of different database schemas in the biodiversity domain (e.g. taxonomy, collections, observations databases).
- Analysis and design of a federated architecture for the Collaborative Information Management System, in collaboration with WP 9, to ensure integration with the interoperability components
- Develop a general design of the CIMS integrated database and data access functionalities including analysis and visualisation tools (WP 10).

Deliverables		Partner	Month
No.	Title	responsible	
D8.1a	Draft report on Distributed Information Management Requirement Analysis for circulation in, and obtain feedback from, ENBI network.	1	8
D8.1b	Final report on Distributed Information Management Requirement Analysis, including characterization of ENBI database schemas.	1	12
D8.2a	Status report and guidelines on the potential of GRID for circulation in ENBI network.	1	15
D8.2b	Status report and guidelines on the potential of VO for circulation in ENBI network.	1	18
D8.2c	Status report and guidelines on the potential of CIMS for circulation in ENBI network.	1	21
D8.3a	Report of preliminary design of federated architecture	1	25
D8.3b	Final design document of federated architecture in relation to interoperability.	1,5,8, 9,56	35

Corresponding milestones		Month
No.	Title	
M8.1	Meeting between Cluster II en III and the EuroCat project (kick-off) <i>outlining survey document D8.1a</i>	7
M8.2	Cluster III workshop <i>finalizing D8.1b and aligning this deliverable with D9.1 and D10.1</i>	12
M8.3	Cluster III workshop with respect to <i>finalizing D8.2a, b, c and aligning this deliverable with D9.2 and D10.2</i>	25
M8.4	Co-ordinative meeting between Cluster II and III coinciding with EuroCat workshop” <i>presentation of D8.3a</i>	34
M8.5	Definitive design document published	36

WP 9. Interoperability & Common Access

Start date or starting event:	Month 0
Name of the partner responsible:	Expert Center for Taxonomic Identification
N° of the partner responsible:	P8
N°s of other partners involved:	P1, P5, P6, P7, P9, P22, P56
Person-months per partner:	(P8: 14.8) (P1: 5) (P5: 3) (P9: 5) (P22: 1) (P56: 10)

Introduction

Common access to (and from) biodiversity information systems, require generic approaches for interoperability between sometimes very different kinds of databases, with different principles with respect to concepts and structure. Mostly in the framework of the international Taxonomic Database Working Group, initiatives are running to tackle the problems, however, these are restricted to separate domains (e.g. plants, animals, bacteria, fungi). ENBI will provide the opportunity to bring together the European expertise in this field to analyse, study and design more generic solutions. In collaboration with CI II and CI IV (and the EuroCat project) priority sectors will be identified (based on practicalities and user requirements) to test agreed standardization and protocols on ± 10 selected databases from various domains. These efforts will add value from the European expertise to GBIF. Work on interoperability and common access will focus on: 1) preparation of general interoperability standards, protocols and architecture at the computer science level, taking into account the established and developing systems (incl. CORBA, SOAP, XML); 2) preparation of specialised interoperability data standards and functional protocols for taxon checklist contributors to the pan-European taxon checklist component of WP 5. One particular priority will be to create a design for a common gateway to the EC-funded taxonomic and biodiversity systems already under development for European marine organisms, terrestrial plants and terrestrial animals (e.g. ERMS, Fauna Europaea, EuroCat). This will enable a user to make seamless enquiries about European plants and animals through a single gateway; 3) preparation of specialised interoperability data standards and functional protocols for access to unit-collections data systems in WP6, taking into account the current work in other projects and the TDWG/CODATA Working group on Collections Data Standards & Protocols; 4) preparation of generic interoperability data standards and protocols for linkage and data inheritance for rich data sources that use different taxonomic concepts, taking into account existing programmes. This work package contributes to the GBIF business plan with respect to parts in the work program "Data Access and Database Interoperability".

Objectives

- Make an inventory of existing interoperability tools in the various domains of biodiversity databases and data collections, to enhance common protocols and approaches
- Build a library of functions to support an overarching architecture for interoperability and common access based on elements and efforts existing in the biodiversity informatics community (Species2000, SPICE⁸, BioCase, ALLSpecies, etc)
- Develop a design for a prototype to demonstrate the feasibility of an interoperable system with common access to selected databases and the EuroCat project in collaboration with work package 8.

⁸ Software for species 2000 project has established common access to a large array of taxonomic databases as a part of the Species 2000 Programme.

Description of work and methodology

- Perform a survey of existing interoperability tools, protocols and data models in the various biodiversity data domains
- Analyse the requirements for data standards and (exchange) protocols that need to be addressed for the design of a common access point to various biodiversity databases
- Define protocols and standards to support the interoperability within and between the various domains of databases and data collections, in particular: taxon databases (WP 5), collection databases (WP 6), observation databases (WP 7) making use of available European expertise (in collaboration with e.g. Species2000, SPICE, BioCase, EuroCat)
- Work with WP 5, 6, 7 for to develop a design that allows for proper integration of the various existing biodiversity data resources and interoperability solutions, including taxonomy, collections, observations and others

Deliverables		Partner	Month
No.	Title	responsible	
D9.1a	Questionnaires on methodology for survey in ENBI network	8	4
D9.1b	Analysis report on common interoperability tools, and on user requirements for common access point	8,56	10
D9.1c	Draft guidelines on protocols and datamodels in biodiversity domain for feedback from network	8,1,56	12
D9.1d	ENBI guidelines on protocols and datamodels in biodiversity domain	8,1	15
D9.2a	Draft design for proper integration of the various existing biodiversity data resources and interoperability solutions, including taxonomy, collections, observations and others available for feedback network	56,8,1,22	21
D9.2b	General design document on the interoperability approach between the different layers of biodiversity data sources (month 24) and general architecture design for common access system and functional links to analysis tools (month 25)	56,8,1,9	24/25
D9.3a	Report on feasibility study for prototype common access system	56,8,1	32
D9.3b	Prototype common access system linking selected databases	56,8,1,9	36

Corresponding milestones			Month
No.	Title		
M9.1	Meeting between Cluster II en III and the EuroCat project (kick-off) <i>outlining survey document D9.1a</i>		7
M9.2	Cluster III workshop <i>finalizing D9.1 and aligning this deliverable with D10.1</i>		12
M9.3	Cluster III workshop with respect to <i>finalizing D9.2 and aligning this deliverable with D10.2</i>		25
M9.4	Co-ordinative meeting between Cluster II and III coinciding with EuroCat workshop, <i>presentation of draft D9.3a</i>		34
M9.5	Prototype common access system available		35

WP 10. Generic analysis tools and data mining

Start date or starting event:	Month 6
Name of the partner responsible:	Oberoesterreichisches Landesmuseum
N° of the partner responsible:	P9
N°s of other partners involved:	P1, P5, P6, P7, P8, P10, P12, P13, P38, P46
Person-months per partner:	(P9: 9) (P1: 5) (P8: 4) (P13: 1) (P38: 8) (P46: 2)

Introduction

Interoperability between the heterogeneous database systems and common access to all biodiversity information will create the opportunity to perform analysis on the large amount of European data available in the various layers of the biodiversity information domain. Analysing tools are mostly installed within single biodiversity information systems. Several initiatives (e.g. in Israel and Austria) already include useful standard analysis tools like GIS into their application systems and make them available over the Internet; these tools will be used as a model in ENBI. This work package will make an inventory of the most useful and advanced tools, will define data standards and exchange protocols, and will design a demonstrator system that can serve as a model for national GBIF nodes to implement it for their country needs. Cluster IV (products and *e*-services) will provide necessary user requirement input for the type of analysis tools needed. Cluster II will provide a map of the various types of available databases in ENBI, and WP 8 will define the integrated database approach. Primary focus of this work package will be on geographic analysis and presentation/visualisation tools. The demonstrator system defined by WP 10 will be web-based and include at least: a geographic mapping tool (utilizing a GIS), a tool that is able to draw phaeology diagrams, and a query tool that will return data organized according to user defined ranges and criteria. The options for data mining in such systems will be explored. Tools to analyse biodiversity data are as such not yet part of the current GBIF business plan. Nevertheless, it is for ENBI a priority to study the existing initiatives in Europe in this regard, and to identify those tools for which Europe can contribute at a wider scale as a contribution to further efforts in the framework of GBIF. WP 10 will produce a prototype demonstrator, analysing the data in 3 to 10 example databases, working in unison with the common access system (WP 9) and integrated ENBI databases (WP 8). The demonstrator system will be running in 3 different locations (mirror sites), providing an analysis of the databases of WP6.

Objectives

- Explore and select potential applications of generic analysis tools that can be used with the common access interoperable system defined under WP 9 and WP 8.
- To ensure that these tools are able to analyse a variety of biodiversity data and combine or plot these data with a-biotic information (weather, geology, etc.)
- Explore the application of selected analysis tools in a web environment.
- Design description of the integration of these functional analysis tools with the common access system for interoperability of databases as provided by WP 8 and 9 and to provide a demonstrator system.

Description of work and methodology

- Define the scope and priorities of analysis tools (using user requirements input from Cluster IV, WP 12 and 13)
- Explore and select available software tools for data analysis, data mining and visualisation
- Define data standards and exchange protocols, and develop a design for web-based functional tools working with the common access system (WP 9) and integrated databases (WP 8)
- Define and develop a GIS based demonstrator system working with interoperable system of WP 8 and WP 9

Deliverables		Partner responsible	Month
No.	Title		
D10.1a	Report on available analysis tools and proposed choices for ENBI network	9,38	12
D10.1b	Report on proposed data standards and protocols with respect to analysis tools	9,38,1	15
D10.2a	Design document for mapping tools to work with common access system	9,38 (1&8)	18
D10.2b	Design document for phaenology diagram tools to work with common access system	9,38 (1&8)	21
D10.2c	Design document for query tools to work with common access system	9,38 (1&8)	24
D10.3a	Draft design document for developing demonstrator system	9,38	25
D10.3b	Design document for developing demonstrator system	9,38	28
D10.4	Demonstrator system of the chosen tools	9,38,13,46, (1&8)	36

Corresponding milestones		Month
No.	Title	
M10.1	Meeting between Cluster II en III and the EuroCat project (kick-off) <i>outlining survey document D10.1a and b</i>	7
M10.2	Cluster III workshop <i>finalizing D10.1a, b and aligning this deliverable with D9.1b, c</i>	12
M10.3	Cluster III workshop with <i>presentation of D 10.3a, preparatory work for finalizing D10.3b</i>	25
M10.4	Co-ordinative meeting between Cluster II and III, coinciding with EuroCat workshop: <i>presentation of D10.3b</i>	34
M10.5	Demonstrator system available	36

WP 11. Multi-lingual access

Start date or starting event:	Month 2
Name of the partner responsible:	Institute of Marine Research at the University of Kiel
N° of the partner responsible:	P11
N°s of other partners involved:	P1, P8, P15, P21, P31, P42, P48, P51, P62
Person-months per partner:	(P11: 24)

Introduction

Multi-lingual access will be provided to European biodiversity sites through a user-friendly interface on the World Wide Web. As the working language of GBIF and ENBI is English, a precondition to wide use is translation into other European languages (Dutch, French, German, Greek, Italian, Portuguese, and Spanish). This need is explicitly recognized in the Call for Proposals under ENBI. Given the amount (several terabytes) and dynamic (constant updating) of the information foreseen for GBIF, traditional 'manual' translation is not an option. Rather, machine translation on demand has to be applied, such as is currently available, e.g. in the 'Babel Fish' tool of the AltaVista web portal (<http://babel.altavista.com/tr>). The quality of machine translation varies greatly depending on the language pair and on the topic. Results can be drastically improved if specialized dictionaries are available for the topic in question, and certain terms are excluded from translation.

The Translation Service of the European Commission (SDT) has developed its own machine translation system, starting in the 1970s and building on the Systran engine, currently supporting 8 European languages and 18 language pairs. The service provides machine translation of documents for registered users. SDT plans to add machine translation of web pages to its services in 2002. ENBI intends to work closely with SDT in providing multi-lingual access to biodiversity data.

This work package will create special biodiversity dictionaries to be integrated in the machine translation service of the European Commission. It will improve access to biodiversity information through vernacular instead of scientific names. And it will provide a glossary explaining unfamiliar biodiversity terms in 8 European languages. European biodiversity web sites can avail of this service by showing a 'Translate' button on their pages.

The activities in this work package will provide vernacular names to the GBIF Electronic Catalogue of Names and multi-lingual access and glossaries in support of the GBIF Outreach & Capacity Building sub-committee.

Objectives

- Identify biodiversity terms (biology, morphology, taxonomy, geography, genetics) that need special dictionaries for proper translation, as indicated by unsatisfactory translation by the existing service
- Translate these terms into 8 European languages in a format that can be used efficiently for machine translation
- Explore options to build a prototype biodiversity glossary that can be used by European biodiversity web sites
- Explore options to significantly improve access to biodiversity information through vernacular names
- Define recommendations on how to tackle these issues in subsequent dedicated work packages, including finding a long-term host for the biodiversity translation service

Description of work and methodology

Year 1:

- Identification of biodiversity terms that need special dictionaries for proper translation
- Exploration of usefulness of existing public-domain glossaries
- Exploration of options for providing vernacular names to the GBIF Electronic Catalogue of Names
- A workshop will train partners in how to translate biodiversity terms and phrases and enter them into special dictionaries
- Small author contracts to experts to translate biodiversity terms and phrases

Year 2:

- Integration of dictionaries with SDT machine translation.
- Development of prototype of biodiversity glossary
- Proof of concept of providing vernacular names to GBIF
- Connect, test and improve machine translation of ENBI web sites
- Finally, a 3 day workshop to examine further efforts relating to multilingual public access to ENBI/GBIF information, and subsequent further plans/proposals

Deliverables		Month
No.	Title	
D11.1	Workshop on how to translate dictionaries conducted	6
D11.2	Report from workshop on how to translate dictionaries	7
D11.3	Beta version of translation service	18
D11.4	'How to proceed' workshop conducted	24
D11.5	Report from 'How to proceed' workshop	25
D11.6	Online service for quality translation of biodiversity web pages	26
D11.7	Recommendations and prototype for biodiversity glossaries	26
D11.8	Recommendations and prototype for access to biodiversity information through common names	26
D11.9	Document with recommendations on how to further develop multi-lingual access to biodiversity data	26

Corresponding milestones		Month
No.	Title	
M11.1	Collaboration agreement with EC Translation Service	3
M11.2	Author contracts for all languages in place	11
M11.3	Beta version of translation service available online (D11.3)	18
M11.4	Recommendations and prototype for biodiversity glossaries available (D11.7)	26
M11.5	Recommendations and prototype for access to biodiversity information through common names available (D11.8)	26
M11.6	Online service for quality translation of biodiversity web pages available (D11.6)	26

WP 12. Information services on European biodiversity data

Start date or starting event:	Month 0
Name of the partner responsible:	Verlag fuer Interaktive Medien
N° of the partner responsible:	P12
N°s of other partners involved:	P1, P4, P10, P11, P21, P28, P30, P52, P57, P59, P63, P65
Person-months per partner:	(P12: 20) (P28: 6)

Introduction

To achieve a broad utilisation of available data on European biodiversity, it is necessary to reveal, by a market study, the different specific needs and demands of end-users (e.g. government agencies, customs, excise officials, private companies, NGOs, academic institutions, museums, botanical and zoological gardens, the interested public). This study will not cover content analysis only, but design and usability of services as well. The task will be approached in two ways: an advisory panel including several representative European institutions will identify priorities of specific user groups. The panel includes end-users involved in European policy with regard to the implementation of multilateral environmental agreements (with the restriction that, ENBI is not directly involved in policy making, but will provide the delivery of primary data). Secondly, institutions with major websites will be integrated to obtain copies of their internet server log files, which then can be analysed according to user-group interests and ways of data recruitment. For this a special measurement tool will be developed to evaluate priorities of products and services of European biodiversity data. Basically, this tool is a server based piece of software to analyse frequency and duration of visits concerning selected categories of information combined with adapted interrogation forms. In addition a few feasibility studies and design for selected priorities will be supported.

Knowledge and ideas gathered during the above mentioned activities will be exchanged and lead to the establishment of an organisational and technical infrastructure for a first prototype of a European Dictionary of Domesticated and Utilized Animals.

This work package contributes to the GBIF business plan with respect to parts in the work program "Outreach and Capacity Building". In ENBI connections and interactions exist to WP 4 (IPR, copyrights & financial issues), WP 11 (Multi-lingual access) and WP 13 (Making non-European biodiversity data in European repositories globally available).

Objectives

This work package will fulfil two tasks:

- Provide information about needs of European users of biodiversity data
- Exchange knowledge and ideas that lead to the establishment of an organisational and technical infrastructure to elaborate a first prototype of a European Dictionary of Domesticated and Utilized Animals

Description of work and methodology

Year 1

- Construction of an address database of European biodiversity information users (in co-operation with the whole ENBI-team)
- Establishment of an advisory panel including institutional representatives that will provide the contacts to local data/service-suppliers and to end-users
- Organisation of a workshop to identify the priorities of specific user groups
- Presentation, discussion and decision which feasibility studies and design will be supported by ENBI in WP 12

- Presentation, discussion and decision which institutions with major websites and large numbers of end-user will be evaluated (and with which method)
- Conception and establishing of a measurement tool to evaluate priorities of products and services (server based software to analyse frequency and duration of visits concerning selected categories of information combined with adapted interrogation forms)
- Comparison of the accessibility of domesticated and utilized animals in existing information systems

Year 2

- Execution, description, interpretation and documentation of the market study, e.g. analysing of log files as to user-group interests and behaviour (with the help of the measurement tool)
- Execution of feasibility studies and design to improve European biodiversity information services
- Establishment of a first prototype of an European Dictionary of Domesticated and Utilized Animals to support interoperability and user friendliness

Year 3

- Presentation and discussion of the results of executed and evaluated feasibility studies and design (by means of a workshop)
- Presentation and discussion of the model procedure for European institutional co-operation to identify specific user needs

Deliverables		Partner responsible	Month
No.	Title		
D12.1	Address database of European biodiversity information users with list of links (end-user, EU, GTI, private sector, etc)	12	3
D12.2	Report (from workshop) with identification of priorities of specific user groups	12	9
D12.3	Tool (server based software + survey) to assess user-friendliness of biodiversity information services	12	11
D12.4	Report on the accessibility of domesticated and utilized animals in existing information systems.	28,12	24
D12.5	A database with a first prototype of a dictionary for domesticated and utilized animals in Europe to support their interoperability and user friendliness	28,12	24
D12.6	Report on results of executed feasibility studies and the market study	12	26
D12.7	Report on user needs (e.g. recommendations, draft checklist for project evaluation)	12	30

Corresponding milestones		Month
No.	Title	
M12.1	Workshop to identify priorities of specific user groups (meeting of wp partners + advisory panel)	8
M12.2	Start execution of the internet based market study	11
M12.3	Start execution of the feasibility studies and design	13
M12.4	Report on existing information systems and a first prototype of a dictionary for domesticated and utilized animals in Europe	24
M12.5	Evaluation workshop (meeting of wp partners + advisory panel)	28

WP 13. Making non-European biodiversity data in European repositories globally available

Start date or starting event:	Month 0
Name of the partner responsible:	University of Copenhagen
N° of the partner responsible:	P10
N°s of other partners involved:	P1, P4, P15, P55, P64
Person-months per partner:	(P10: 24)

Introduction

Although one of the rationales for ENBI is the scientific (bio geographical) coherence of Europe (in the widest sense), there also is scope for ENBI activities that reach beyond this region. Notably, because of many European countries' pasts as colonial powers, a disproportionately large share of global biodiversity information, especially from developing countries in the tropics, resides in European databases (including museum and botanic garden collections). With a still very fragile infrastructure for taxonomy in tropical developing countries and a very limited number of well-trained taxonomists, there is a great need for high quality collections-based information among local (para)-taxonomists, conservationists and other users of floristic and faunistic information. International sharing of biodiversity data (repatriation of information) thus becomes a particular European responsibility. Data sharing may take the form of making available (visible, downloadable, analysable) on the Internet, current names, digitised images and collecting data of selected specimens, for which there is an urgent information need in the developing countries. In order to identify, extract and promote areas for future focus of work on data sharing, which may be particularly relevant to address on a European scale, user needs will be identified by comparative studies of existing data sharing activities. In addition, users will be presented with a number of feasibility studies on which they can provide feedback regarding their needs. The work will be undertaken in close co-operation with the Global Taxonomy Initiative (GTI) under the Convention for Biological Diversity. Topics for feasibility studies will be selected from the list of pilot projects submitted to the GTI and/or other projects, e.g.:

- Database and digitised images of selected groups of critically identified Euphorbiaceae, currently kept in the major European Herbaria.
- Distributional data of endemic organisms in S.E. Asia.
- Bee pollinator and plant data for South Africa.
- Information and identification tools for pest insects.

ENBI will develop a vehicle to make at least a convincing start with this data sharing process at the European level. The comparative studies and feasibility studies, and subsequent user feedback, will allow fine-tuning of the European data sharing vehicles.

This work package contributes to the GBIF business plan with respect to parts in the work programs "Digitisation of Biodiversity Data" and "Outreach and Capacity Building".

Objectives

Improving electronic sharing of biodiversity data in European collections by:

- Identifying and compiling sources of **existing information on user needs** from programmes, institutions, and other sources, such as BioNET International and DIVERSITAS⁹, and analysing degrees of commonality
- Assessing and analysing **existing models of active data use** by relevant end-users, e.g. INBio¹⁰ and CONABIO¹¹, and their potential applicability to other situations involving European sourced data
- Exchanging and compiling information about **mechanisms for active data sharing** from those organisations (most probably as partners of ENBI) known to be currently meeting some needs of (or working with) developing countries in this field

Description of work and methodology

- Consultation with appropriate data providers and identification of needs of recipients (potential and current) for the identification, investigation and use of any evaluations from existing products or end-user surveys of (web-based) data sharing initiatives
- Characterisation of end-user wishes and priorities for taxonomic information, as defined in the framework of the CBD
- Design, implementation and presentation to end-users of a modest number of websites featuring feasibility studies on electronic data sharing. The models will be planned and evaluated – together with comparable existing resources – through a questionnaire and workshops. Feedback based on user responses, to developers of these data sets within ENBI

Deliverables		Month
No.	Title	
D13.1	Preliminary report on user needs, data use and data sharing	8
D13.2	Report from experts workshop presenting conceptual feasibility studies	12
D13.3	Report on existing information on user needs from programmes, institutions, and other sources	18
D13.4	Report on existing models of active data use, and existing mechanisms of electronic data sharing	18
D13.5	A small number of interactive and searchable websites featuring feasibility studies of biodiversity data sharing via the Internet	20
D13.6	Interim report on feasibility studies (report from evaluation workshop)	26
D13.7	Report on responses to websites with selected feasibility studies regarding requirements for web-based access to digitised collections data	33

Corresponding milestones		Month
No.	Title	
M13.1	Workshop, with invited experts from developing countries in the tropics, to select and discuss structure and content of feasibility studies to be initiated	10
M13.2	Reports on user needs (D13.3), data use and data sharing (D13.4) presented	18
M13.3	Feasibility studies (Deliverable 13.5) on-line	20
M13.4	Small workshop to evaluate outcome and continuation of comparative and feasibility studies	24
M13.5	Report on responses to websites with selected feasibility studies (D13.7) presented	33

⁹ DIVERSITAS is an international global environmental change research programme.

¹⁰ The Instituto Nacional de Biodiversidad is a scientific institution with social orientation (Costa Rica).

¹¹ Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (Mexico).

Project planning and time table

Flow chart showing the duration and major deliverables for each work package:

year month			Year 1												Year 2												Year 3											
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Cluster I	Wp1	Start/end co-ordination	[Dark Grey Bar]																																			
		Steering + managem. commit. meetings	1st			2nd						3rd						4th						5th						6th								
	Wp2	Start/end	[Dark Grey Bar]																																			
		VC, www site, inventory state-of-art ENBI e-conferences/workshops	[Light Grey Bar]			e-c			Ws			[Light Grey Bar]						e-c						Ws						[Light Grey Bar]								
	Wp3	Start/end	[Dark Grey Bar]																																			
Dissemination workshops		[Light Grey Bar]																																				
Wp4	Start/end	[Dark Grey Bar]																																				
	IPR workshops	[Dark Grey Bar]						1st						2nd						3rd						[Dark Grey Bar]												
Cluster meetings		1st			[Dark Grey Bar]						2nd						[Dark Grey Bar]						3rd															
Cluster II	Wp5	Start/end	[Dark Grey Bar]																																			
		Construct. Demonstr. 'Species Banks' Construct. Demonstr. cultivated plants	[Dark Grey Bar]																		[Light Grey Bar]						[Light Grey Bar]											
	Wp6	Start/end	[Dark Grey Bar]																																			
		Demonstr. taxonomic card archive Databases installed on prototype (no. of) Demonstr. type-specimen database	[Light Grey Bar]			[Light Grey Bar]						(50)						(100)						[Light Grey Bar]														
Wp7	Start/end	[Dark Grey Bar]																																				
Cluster meetings		1st			[Dark Grey Bar]						2nd						[Dark Grey Bar]						3rd															

Continuation flow chart

			Year 1												Year 2												Year 3											
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Cluster III	Wp8	Start/end	[Dark Grey Bar]																																			
		Analysis phase	[Light Grey Bar]																																			
		Models (GRID, VO, CIMS)	[Light Grey Bar]																																			
		Design federated architecture	[Light Grey Bar]																																			
Cluster III	Wp9	Start/end	[Dark Grey Bar]																																			
		Inventory and standardizing	[Light Grey Bar]																																			
		System design	[Light Grey Bar]																																			
		Demonstrator common access	[Light Grey Bar]																																			
Cluster III	Wp10	Start/end	[Dark Grey Bar]																																			
		Standards and tools	[Light Grey Bar]																																			
		Design phase	[Light Grey Bar]																																			
		Demonstrator system	[Light Grey Bar]																																			
Cluster meetings/workshops			mt												Ws												mt											
Cluster IV	Wp11	Start/end	[Dark Grey Bar]																																			
		Online translation service	[Light Grey Bar]																																			
	Wp12	Start/end	[Dark Grey Bar]																																			
		Execution market study	[Light Grey Bar]																																			
Execution feasibility study Prototype dictionary domestic. animals		[Light Grey Bar]																																				
Wp13	Start/end	[Dark Grey Bar]																																				
	Feasibility studies data sharing	[Light Grey Bar]																																				
Cluster meetings			1st												2nd												3rd											

Work package list

Work-package No	Work package title	Responsible participant No	Person months	Start month	End month	Deliverable(s) No
WP 1	Network co-ordination / Co-ordination with GBIF / Sustainability and continuity of European activities	1	49	0	36	D1.1 – D1.5
WP 2	ENBI forums / Inventory of state-of-art	2	35	0	36	D2.1 – D2.10
WP 3	Dissemination	3	36	0	34	D3.1 – D3.7
WP 4	IPR, copyrights & financial issues	4	9	9	36	D4.1 – D4.8
WP 5	Co-operation of pan-European checklist and ‘Species bank’ database projects	5	42	4	32	D5.1 – D5.8
WP 6	Co-operation of pan-European databases on biological collections and specimens	6	39.4	2	33	D6.1 – D6.5
WP 7	Observational survey data	7	30	4	34	D7.1 – D7.5
WP 8	Data management in large scale distributed biodiversity database systems	1	30	3	36	D8.1 (a,b), D8.2 (a,b,c), D8.3 (a,b)
WP 9	Interoperability & common access	8	38.8	0	36	D9.1 (a,b,c,d), D9.2 (a,b), D9.3 (a,b)
WP 10	Generic analysis tools and data mining	9	29	6	36	D10.1 (a,b), D10.2 (a,b,c), D10.3 (a,b), D10.4
WP 11	Multi-lingual access	11	24	2	26	D11.1 – D11.9
WP 12	Information services on European biodiversity data	12	26	0	30	D12.1 – D12.7
WP 13	Making non-European biodiversity data in European repositories globally available	10	24	0	33	D13.1 – D13.7
	TOTAL		412.2			

Deliverables list

Deliverable No	Deliverable title	Delivery date ¹²	Nature ¹³	Dissemination level ¹⁴
D1.2	Half year management reports (every 6 months) and yearly scientific & technical reports (every 12 months) for the European Commission	1-36	R	RE
D2.2	ENBI WP2 Website	1-36	O	PU
D2.1	Online database of ENBI stakeholders	2-36	O	PU
D2.3	Online State of the Art database	2-36	O	PU
D3.1	ENBI Brochure, outlining the function and structure of ENBI and the way interested parties can contribute to or benefit from ENBI.	2	O	PU
D1.1	Establishment of Network Bureau	3	O	RE
D12.1	Address database of European biodiversity information users with list of links (end-user, EU, GTI, private sector, etc)	3	O	RE
D9.1a	Questionnaires on methodology for survey in ENBI network	4	O	RE
D2.4	Documentation produced and compiled from the 1st e-conference available via ENBI VCs document repository	6	R	RE
D11.1	Workshop on how to translate dictionaries conducted	6	O	RE
D2.5	1st Workshop report and documents available via ENBI VCs document repository	7	R	RE
D6.4	Internet access to sample taxonomic card archive database	7	D	PU
D11.2	Report from workshop on how to translate dictionaries	7	R	RE
D8.1a	Draft report on Distributed Information Management Requirement Analysis for circulation in, and obtain feedback from, ENBI network.	8	R	RE
D13.1	Preliminary report on user needs, data use and data sharing	8	R	RE
D7.1	Network of organisations, institutions and specialised interest groups that hold, analyse and present spatial, observation-based biodiversity data	9	O	RE
D12.2	Report (from workshop) with identification of priorities of specific user groups	9	R	RE
D9.1b	Analysis report on common interoperability tools, and on user requirements for common access point	10	R	RE

¹² In month number

¹³ R = Report, P = Prototype, D = Demonstrator, O = Other

¹⁴ PU = Public, RE = Restricted to a group specified by the consortium (including the Commission Services).

Deliverable No	Deliverable title	Delivery date¹²	Nature¹³	Dissemination level¹⁴
D12.3	Tool (server based software + survey) to assess user-friendliness of biodiversity information services	11	O	RE
D3.7	Online specialist bio-informatics information	12-34	O	PU
D4.1	Run workshop 1 to disseminate information on IPR, financial issues to partners and data sharing (repatriation) including a short report on the current state of data sharing in relation to the Convention on Biological Diversity	12	O	RE
D7.2	Document for databasing standards and rules of best practice for processing and making available observational biodiversity data	12	R	PU
D7.3	Report of analysis of observational biodiversity information needs and products to support the European Biodiversity Strategy and parallel activities	12	R	PU
D8.1b	Final report on Distributed Information Management Requirement Analysis, including characterization of ENBI database schemas.	12	R	RE
D9.1c	Draft guidelines on protocols and datamodels in biodiversity domain for feedback from network	12	R	RE
D10.1a	Report on available analysis tools and proposed choices for ENBI network	12	R	RE
D13.2	Report from experts workshop presenting conceptual feasibility studies	12	R	RE
D3.4	Dissemination seminars and literature providing 'basic' training. (one seminar repeated in three countries).	13-24	O	RE
D3.2	Literature and publicity material for engendering public awareness.	13-34	O	PU
D4.2	Report on the results of the workshop to include analyses of database law and copyright law and on the issue of data sharing	13	R	RE
D6.5	Report from general workshop on the selection of key taxa and standards and methods for digital imaging of type specimens	15	R	RE
D8.2a	Status report and guidelines on the potential of GRID for circulation in ENBI network.	15	R	RE
D9.1d	ENBI guidelines on protocols and datamodels in biodiversity domain	15	R	PU
D10.1b	Report on proposed data standards and protocols with respect to analysis tools	15	R	RE
D4.3	Determine (based on Workshop 1) and report on IPR priority issues for partners	16	R	RE
D5.4	Report on assessment of existing electronic rich data sources ('Species Banks')	16	R	PU
D3.5	Three specialist seminars (with accompanying literature) to be held in geographically suitable centres and at Centres of Excellence	18-34	O	RE
D2.6	Documentation produced and compiled from the 2nd e-conference and workshop available via ENBI VCs document repository	18	R	RE

Deliverable No	Deliverable title	Delivery date¹²	Nature¹³	Dissemination level¹⁴
D4.4	Run workshop 2 to present the final results of the analyses of database law and copyright law and data sharing and discuss the list of priority issues; workshop to include a report on recent changes to IPR laws in ENBI partner countries	18	O	RE
D8.2b	Status report and guidelines on the potential of VO for circulation in ENBI network.	18	R	RE
D10.2a	Design document for mapping tools to work with common access system	18	R	RE
D11.3	Beta version of translation service	18	P	PU
D13.3	Report on existing information on user needs from programmes, institutions, and other sources	18	R	RE
D13.4	Report on existing models of active data use, and existing mechanisms of electronic data sharing	18	R	PU
D2.7	2nd Workshop report and documents available via ENBI VCs document repository	19	R	RE
D1.3	Interim Report with conclusions and recommendations on the continuity of ENBI	20	R	RE
D3.3	Update ENBI Brochure.	20	O	PU
D4.5	Draft and circulate a set of common policy guidelines and a draft model data sharing Memorandum of Understanding	20	O	PU
D13.5	A small number of interactive and searchable websites featuring feasibility studies of biodiversity data sharing via the Internet	20	O	PU
D5.1	Report on gap analysis in coverage of species	21	R	PU
D5.2	Report on disparities in levels of core data coverage with proposals for possible solutions	21	R	PU
D5.3	Report on areas of priority for gap fitting (taxon) and data amplification	21	R	PU
D5.5	Feasibility report for access to 'Species Banks'	21	R	RE
D5.7	Feasibility report for cultivated plant taxonomy linked to the pan-European taxon checklist	21	R	RE
D8.2c	Status report and guidelines on the potential of CIMS for circulation in ENBI network.	21	R	RE
D9.2a	Draft design for proper integration of the various existing biodiversity data resources and interoperability solutions, including taxonomy, collections, observations and others available for feedback network	21	R	RE
D10.2b	Design document for phaenology diagram tools to work with common access system	21	R	RE
D6.6	Report from technical workshop on key issues for digital imaging and the examination and plans for dissemination of results	23	R	RE
D4.6	Run workshop 3 to discuss and agree the draft common policy guidelines and a draft model data sharing Memorandum of Understanding	24	O	RE

Deliverable No	Deliverable title	Delivery date¹²	Nature¹³	Dissemination level¹⁴
D7.4	Definition of methodologies linking taxonomic, collection and specimen databases with the observational data	24	R	PU
D10.2c	Design document for query tools to work with common access system	24	R	RE
D11.4	'How to proceed' workshop conducted	24	O	RE
D12.4	Report on the accessibility of domesticated and utilized animals in existing information systems.	24	R	RE
D12.5	A database with a first prototype of a dictionary for domesticated and utilized animals in Europe to support their interoperability and user friendliness	24	P	PU
D9.2b	General design document on the interoperability approach between the different layers of biodiversity data sources (month 24) and general architecture design for common access system and functional links to analysis tools (month 25)	24/25	R	RE
D8.3a	Report of preliminary design of federated architecture	25	R	RE
D10.3a	Draft design document for developing demonstrator system	25	R	RE
D11.5	Report from 'How to proceed' workshop	25	R	RE
D11.6	Online service for quality translation of biodiversity web pages	26	O	PU
D11.7	Recommendations and prototype for biodiversity glossaries	26	O	PU
D11.8	Recommendations and prototype for access to biodiversity information through common names	26	O	PU
D11.9	Document with recommendations on how to further develop multi-lingual access to biodiversity data	26	R	RE
D12.6	Report on results of executed feasibility studies and the market study	26	R	PU
D13.6	Interim report on feasibility studies (report from evaluation workshop)	26	R	RE
D6.1	Functional network of 100 European specimen databases installed on prototype	27	O	PU
D10.3b	Design document for developing demonstrator system	28	R	RE
D2.8	Documentation produced and compiled from the 3rd e-conference available via ENBI VCs document repository	30	R	RE
D3.6	Workshop and associated literature for official awareness (one workshop repeated in three countries)	30	O	RE
D4.7	Report from workshops on IPR issues and on model data sharing Memorandum of Understanding (based on Workshop 3)	30	R	PU
D6.3	Document for databasing standards and rules of best practice for processing and for digital publication of information on type specimens	30	R	PU
D12.7	Report on user needs (e.g. recommendations, draft checklist for project evaluation)	30	R	PU

Deliverable No	Deliverable title	Delivery date¹²	Nature¹³	Dissemination level¹⁴
D2.9	3rd Workshop report and documents available via ENBI VCs document repository	31	R	RE
D5.6	Pilot demonstrator for access to 'Species Banks'	32	D	PU
D5.8	Pilot demonstrator for cultivated plant taxonomy linked to the pan-European taxon checklist	32	D	PU
D9.3a	Report on feasibility study for prototype common access system	32	R	RE
D1.4	Final Technology Implementation Plan (TIP)	33	R	RE
D2.10	WP2 final report	33	R	RE
D6.2	Demonstrator type-specimen database with records/images of primary type specimens of selected key taxa from European research and reference collections to demonstrate technical standards agreed	33	D	RE
D13.7	Report on responses to websites with selected feasibility studies regarding requirements for web-based access to digitised collections data	33	R	PU
D7.5	Document that will demonstrate the applicability of combined GIS and remote sensing approach as a means for spatial biodiversity data analysis and presentation. The deliverable will be developed jointly with WP8 and WP10 using ArcInfo and other GIS platforms	34	R	RE
D4.8	Report on the Common Policy guidelines and a model data sharing Memorandum of Understanding (based on Workshop 3)	35		PU
D8.3b	Final design document of federated architecture in relation to interoperability.	35	O	PU
D1.5	Final report of ENBI	36	R	PU
D9.3b	Prototype common access system linking selected databases	36	P	PU
D10.4	Demonstrator system of the chosen tools	36	D	PU

Risks avoidance

There are three kinds of potential risks for ENBI: internal network risks; external risks; and risks in relation to the continuation of the network.

Internal network risks

Size of the network.

The ENBI network is very large because all the major stakeholders have to be represented. The management of the network has to keep all activities focussed and executed in time, but individual partners can complicate this. The management set-up of ENBI will avoid such complications. The work packages are clearly separated with a single partner acting as contractor for that work package. The group of WP leaders constitute the management core of the network, and meet regularly in their joint capacity as Steering Committee. Each WP leader has organized its sub-network of co-operating institutes. Generally, this WP leader will only reimburse costs of partners in the sub-network, if their contribution is in detail agreed.

Diverging interests of partners.

Another potential complication of the large network is the growing risk that one or more partners show diverging interests while the project is running. As a matter of fact, this would be interesting in itself, as it will learn the joint network on how to promote a common European approach. For ENBI as a whole, as well as for the different work packages, discussion platforms are established for communication and to define co-operative priority efforts. The WP-leaders are committed to these priorities, but other partners may retreat from the open network of ENBI. In such cases, this will be reported to the Commission with the reasons of retreat.

External risks

Non-congruent priorities with the EC-CHM, and with GBIF.

It is very important that ENBI and the EC-CHM have congruent priorities. Already in an early stage the EEA has contributed to the preparation of the ENBI plan in order to promote synergy between activities. As a result, a Memorandum of Understanding was agreed that is attached to this Description of Work (Annex II). The MoU reconfirms each other's position and responsibilities, and defines how EEA and ENBI will contribute to each other's interests. This does not exclude other forms of co-operation, which can be identified and agreed upon during the work of ENBI. Although ENBI is meant to shape the European contribution to GBIF, it may happen that both networks have different priorities on specific subjects. By including the national GBIF-nodes in Europe as partners in ENBI, it is not likely that such diverging priorities will emerge. Also by involving other important European stakeholders in ENBI, whose employees often act in their national GBIF delegations, a strong interaction between ENBI and GBIF is promoted. After the formal start of ENBI, the ENBI management committee will communicate with representatives of the GBIF Governing Board to reconfirm the common interests, and to address the role of ENBI in the GBIF structure. Nevertheless, ENBI already has identified some work priorities that go beyond the present issues in the GBIF business plan. Europe may define priorities in its own right, especially on issues that are very relevant for Europe and build on typical European strengths.

Diverging interests with end-users.

The ENBI work packages 12 and 13 shape the interaction with end-users in order to identify end-user priorities and to study the mechanisms to address these. A few feasibility studies will develop these mechanisms. There can be a variety of potential diverging interests, especially since ENBI itself is not a database custodian and will not act as a service organisation. The typical position of ENBI is that it provides a European platform for communication and will promote common approaches. Diverging interests between end-users requests and the position of individual partners in or outside ENBI may relate to legal (copyright) issues, cost recovery issues, and the interest in or available expertise for a specific subject. The procedure to follow in such cases will be subject of the work packages 12 and 13, in which the mechanisms to address end-users request will be studied. This will also provide input for work package 4 on IPR and copyrights. The issue of financial constraints is relevant to learn which financial facilities are necessary to build or maintain different kinds of databases and users services.

Continuation of the network

ENBI is not meant as a short-term activity. As it shapes the contribution to GBIF at the European scale, it should continue to bring together the different existing and new initiatives. This however, depends on the continued involvement of the stakeholders in ENBI on one side, and on the interest of the European Commission on the other side. The involvement of stakeholders is possible as ENBI is an open network, allowing new partners to join easily. To promote an efficiently managed network it will evolve into a consortium of core players, and a wider platform of other interested institutes. With its recommendations on ways to achieve continuity of European efforts, ENBI wants to attract the interest of the European Commission. This includes the analysis of mechanisms to promote financial continuity for the variety of activities that are covered by ENBI.

4. CONTRIBUTION TO OBJECTIVES OF PROGRAMME / CALL

ENBI addresses the Call QoL/ENV-2001-ENBI, published on 31 May 2001.

The European Network of Biodiversity Information intends to add value to the contribution of the national nodes and other European contributions to the Global Biodiversity Information Facility (GBIF). Building upon its European dimension, ENBI complements and contributes to the objectives of GBIF and clearing house mechanism through the synergies derived from the pooling of participants' resources, expertise and know-how. The network provides a forum for GBIF-related discussion and decision-making on scientific issues that are better handled at a European scale than at a national one. The scope of ENBI is at the European biogeographical scale, including the marine environment. This EU financed ENBI network creates no new data, but promotes access for researchers and other end-users to a Europe-wide pool of information and expertise especially in the information domain of GBIF. ENBI also studies mechanisms to organise specific requests for the sharing/repatriation of biodiversity data from Europe, and where desirable, facilitate and promote the sharing/repatriation in an appropriate manner. With this approach, ENBI is a unique undertaking to bring together all major stakeholders in Europe for the common goal to present primary biodiversity data in a common environment to end-users, and share these with other data globally through GBIF.

Science and policies in regard to biodiversity in Europe depend on a good knowledge of its components. Community interest is supported, as ENBI contributes to the EU commitments with respect to the Convention on Biological Diversity, by bringing together all initiatives to document European diversity in digital format. It thus also contributes to the Clearing House Mechanism and the Global Biodiversity Information Facility (GBIF). ENBI contributes to the European Community Biodiversity Strategy by bringing together the existing initiatives to identify and catalogue the components of biodiversity in databases on European taxonomic diversity.

Apart from the availability of validated information, Biodiversity Informatics is a prerequisite to develop advanced and user-oriented facilities in the public and private sector. As such, the efforts of ENBI are a typical example of the application of novel applications in the information society, and promotes the competitive European position by developing innovative IT tools to collate, share, search and analyse biodiversity data.

In line with the objectives of the European Research Area, the Call of the European Commission to establish the European Network for Biodiversity Information asking for developing a European approach building upon Member States and EU-funded initiatives in the context of international research activities, this plan has the objective to strengthen and integrate biodiversity related activities on the taxonomic level all over Europe, and to build a strong consortium of institutes and their interrelated activities in biodiversity information.

5. COMMUNITY ADDED VALUE AND CONTRIBUTION TO EU POLICIES

Global Biodiversity Information Facility

On March 1st 2001, the Global Biodiversity Information Facility (GBIF) was established. Countries and other economies may become a voting Member of GBIF by signing the Memorandum for the establishment of GBIF, by contributing financial support (in relation to their gross national product), and by developing a national GBIF node to share biodiversity data internationally with GBIF. It is also possible to become an Associate (non-voting) Member, without contributing with financial support. The European Union became an Associate Member. The European Commission published the Call for proposals with respect to ENBI, to establish a mechanism for communication amongst the key European centres, and to contribute to the objectives of GBIF with efforts on the European scale. ENBI presents the organisation of a strong network with focussed work packages in relation the requirements of the Call of the Commission.

Community Biodiversity Strategy

The European Commission has published at an earlier stage the Community Biodiversity Strategy that provides the framework for developing Community policies and instruments in order to comply with the Convention on Biological Diversity. The strategy recognises the current incomplete state of knowledge at all levels concerning biodiversity, which is a constraint on the successful implementation of the Convention. It asks for establishing networks between European centres of excellence in biodiversity research. One of the main themes in the Strategy is the need to have access to structured information about the components of biodiversity. ENBI addresses this priority by bringing together the major initiatives and stakeholders in this area. As such, it provides support for the Clearing House

Mechanism, the prime vehicle for international information exchange on biodiversity, managed by the European Environment Agency (EEA).

Standardization

The ENBI work plan is strongly focussed on contributing to standardization of meta databases, and to interoperability of distributed databases, which is a priority in European policies. By involving the key organisations in Europe, as represented in ENBI, this work plan will also foster European wide scientific exchange, and interaction with GBIF programmes. The network partnership covers almost all European countries which will allow for the success of dissemination strategies.

Priority for end-user needs

ENBI puts strong emphasis on promoting the development of products and *e*-services with respect to specified biodiversity information requirements of end-users. Although ENBI will not invest in product development itself, its work plan studies mechanisms for the international sharing of biodiversity data (repatriation of information). The ENBI partnership has interacted with the Global Taxonomy Initiative (GTI) under the Convention for Biological Diversity about the way European institutes may contribute through ENBI to provide biodiversity data to selected GTI pilot projects.

European Research Area

ENBI has the objective to strengthen and to integrate biodiversity information related activities all over Europe, and to build an effective network of key institutes and their interrelated scientific activities. ENBI will develop a European approach building upon initiatives in Member States and current EU-funded projects. The co-operation of major players builds a strong consortium, and as such contributes to the European Research Area.

6. CONTRIBUTION TO COMMUNITY SOCIAL OBJECTIVES

Biodiversity is relevant to policy objectives in many areas of Community interest. The Community policy and action on biodiversity says: "Biological diversity is essential to maintain life on earth and has important social, scientific, educational, cultural, recreational and aesthetic values". Such policies and actions depends on the availability and accessibility of quality information. Research infrastructures on biodiversity information and informatics are then essential to biodiversity policies. ENBI brings together all important organisations and projects to realize this objective.

Community interest is supported as the Fauna Europaea project will contribute to the EU commitments with respect to the Convention on Biological Diversity (CBD), especially with regard to provide information about the European biological diversity. It thus contributes to the Community Clearing House Mechanism and EIONET. The CBD also asks its parties attention for the international biodiversity. ENBI studies effective ways for the international sharing of biodiversity information in the framework of GBIF, with a focus on repatriation of collection information.

ENBI also contributes to Community social objectives by promoting new *e*-services for a variety of end-user groups, such as

- government law-making agencies and environmental authorities on various administrative levels, including public and private water, air and soil management agencies,
- the conservation community, and related to conservation also services for sustainable land-use,
- customs and other law-enforcing agencies
- governmental statistics agencies,
- the agricultural, forestry, fisheries and eco-tourism industries,
- the plant protection, veterinary, and human health services,
- biodiversity collection and information management agencies (e.g. museums, herbariums, information centres), as well the ecological sciences,
- popular scientific publishing community and the teaching community.

7. ECONOMIC DEVELOPMENT AND S&T PROSPECTS

Economic development

The support for biological research infrastructures is primarily a public function. ENBI work packages develop disseminating activities, both with respect to the professional community, as to end-users. A service on biodiversity information may have significant economic value and provide opportunities for the economic exploitation. As biodiversity and nature are a decreasing resource, the information about biodiversity is becoming an important economic factor, and ENBI will define its position in this arena. An example is the huge economic value of the use of species data and digital species identification tools to deal with control of pest species and their economic costs. Also in relation with other databases, such as with respect to molecular sequences, the linkage of such genetic data with species data have potential economic impact. Strategies will be studied to promote a well balanced involvement of national and European interests, as well as a strong position in the public and private economic market. The appropriate sector beneficiaries in the public and private sectors are engaged in the process. Legal and financial implications are taken into account. ENBI develops recommendations for institutions, governments and the European Commission on how to act with respect to these issues. In this regard, it will interact with related networks such as EMBNet.

Scientific prospects

The scientific prospects of the activities within ENBI are important, not only with respect to new methods for data processing and presentation, but also to the related information sciences. The interaction between scientists in the ENBI network will generate interdisciplinary activities and scientific progress. But also the growing availability of new large-scale and interoperable biodiversity databases will promote the development of new scientific opportunities.

Technological prospects

Biodiversity databases are highly diverse and heterogeneous. Their inherent complexity offers a challenge for technological approaches to manage these databases and to make them

interoperable. In addition, to understand and manage biodiversity, the different varieties of data must be combined and analysed together, which also requires innovative technical solutions. ENBI will underpin the competitive European position by promoting the development of innovative IT tools for data collation, management, search and common access. ENBI closely interacts with GBIF to promote that the international community can share in new developments.

8. THE CONSORTIUM

The participants

The ENBI consortium covers organisations from EU member, associate, and candidate countries in the European western palearctic bio-geographic region. The network allows new (associate) members to join, while taking into account the objectives and tasks of the consortium.

The consortium has promoted a strong participation from

- the (designated) institutes that act as, or serve as host of the national GBIF-nodes,
- the co-ordinating institutes of past or current EU project that are relevant for ENBI,
- other established and major research centres and private organisations in biodiversity information and/or biodiversity informatics.

The organisations involved in ENBI are listed below per country (table I). Table I also lists the national GBIF nodes and co-ordinators/hosts of EU funded biodiversity projects as well as the task of the participants within ENBI.

The European Environment Agency (EEA) and the related European activities with respect to the Clearing House Mechanism are to some extent related to the objectives of ENBI. To frame each other roles and tasks, and to define the contributions to each other, the EEA and the ENBI members have agreed on a Memorandum of Understanding (Annex II).

Table I: Participants ENBI

Country	Nr.	Acronym - Organisation Department	GBIF nodes ¹⁵	Co-ordinator / Host EU Biodiversity projects	ENBI Task
Austria	P.9	OOEL - Oberoesterreichisches Landesmuseum Biologiezentrum des OOE Landesmuseum	Technical advisor to national GBIF node		Contractor WP 10 Contribution to WP 7,8,9
	P.13	NHMW - Naturhistorisches Museum Wien Department of Botany	Scientific advisor to national GBIF node		Member WP 10
Belgium	P.14	RBINS - Royal Belgian Institute for Natural Sciences International Relations			Member WP 3
	P.15	RMCA - Royal Museum for Central Africa Department of African Zoology			Member WP 13 Contribution to WP 11
	P.64	NPB / JBN - National Botanic Garden Belgium Biodiversity			Member WP 13
Cyprus	P.16	ARI - Agricultural Research Institute National Herbarium / National Genebank			Member WP 2
Czech Republic	P.17	IEAS - Academy of Sciences of the Czech Republic Institute of Entomology Department of Ecology			Member WP 2
	P.18	UK - Karlova Universita v Praze (Charles University in Prague) Department of Botany	National node		Member WP 2
	P.67	BUAVCR - Academy of Sciences of the Czech Republic Institute of Botany			Member WP 2
Denmark	P.10	UKBH - University of Copenhagen Zoological Museum (ZMUC)	National GBIF node		Contractor WP 13 Contribution to WP 4,10,12
Finland	P.7	UTURKU - University of Turku Centre for Biodiversity / Department of Biology			Contractor WP 7 Contribution to WP 5,6,8,9,10
	P.19	UH - University of Helsinki Finnish Museum of Natural History (FMNH)	National GBIF node		Member WP 2 Contribution to WP 7

¹⁵ No distinction is made between voting- and associate GBIF participants.
National nodes are designated biodiversity nodes not yet represented in GBIF.
Some of the GBIF participants have not yet designated a host for their national GBIF node.

Country	Nr.	Acronym - Organisation Department	GBIF nodes ¹⁵	Co-ordinator / Host EU Biodiversity projects	ENBI Task
France	P.21	MNHN - Muséum national d'histoire naturelle Institut de Systématique Service de Systématique Moléculaire		Host EC Biodiversity Topic Centre	Member WP 11 Contribution to WP 7,12
Germany	P.11	IfM - Institute of Marine Research at the University of Kiel	GBIF sub-node		Contractor WP 11 Contribution to WP 12
	P.12	VIM - Verlag fuer interaktive Medien GbR			Contractor WP 12 Contribution to WP 2,4,10
	P.22	FUB - Freie Universitaet Berlin Botanic Garden and Botanical Museum	GBIF sub-node	Co-ordinator BioCase (Biological Collections Access System for Europe) and formerly BioCISE (Biological Collections Information Service for Europe)	Member WP 6 Contribution to WP 9
	P.23	BSM - Botanische Staatssammlung Muenchen Department of Mycology	GBIF sub-node		Member WP 2
	P.24	DSMZ - Deutsche Sammlung von Mikroorganismen und Zellkulturen GmbH	GBIF sub-node	Co-ordinator EBRCN (European Biological Resource Centres Network)	Member WP 6
	P.25	IPK - Institute of Plant Genetics and Crop Plant Research Department of Genebank	GBIF sub-node		Member WP 5
	P.26	UBER - Humboldt University at Berlin Institut fuer Systematische Zoologie	GBIF sub-node		Member WP 2 Contribution to WP 6
	P.27	SMNS - Staatliches Museum fuer Naturkunde, Stuttgart Department of Entomology	GBIF sub-node		Member WP 6
	P.28	ZADI - German Centre for Documentation and Information in Agriculture Information Centre for Genetic Resources (IGR)	GBIF IT-node		Member WP 12
	P.29	ZSM - Zoologische Staatssammlung Muenchen	GBIF sub-node		Member WP 2
	P.30	Kolleg - Kolleg fuer Management und Gestaltung nachhaltiger Entwicklung gGmbH			Member WP 12
Greece	P.3	MAICh - Mediterranean Agronomic Institute of Chania Department of Natural Products		Co-ordinator Medusa project (Conservation and Sustainable Use of Wild Plants of the Mediterranean Region). Partly EU funded.	Contractor WP 3

Country	Nr.	Acronym - Organisation Department	GBIF nodes ¹⁵	Co-ordinator / Host EU Biodiversity projects	ENBI Task
	P.31	IMBC - Institute of Marine Biology of Crete Department of Management of Marine Environment-Technology			Member WP 11
	P.32	NKUA - National and Kapodistrian University of Athens Department of Biology			Member WP 2
	P.63	GNHM - The Goulandris Natural History Museum Greek Biotope Wetland Centre (EKBY)			Member WP 12
Hungary	P.33	HNHM - Hungarian Natural History Museum Department of Zoology	National node		Member WP 2
Iceland	P.34	IINH - Icelandic Institute of Natural History Department of Systematics and Collections	National GBIF node		Member WP 2
Ireland	P.35	EcoServe - Ecological Consultancy Services Limited		Co-ordinator ERMS (European Register of Marine Species)	Member WP 5
	P.36	TCD - Trinity College Dublin ¹⁶ Department of Botany			Member WP 2
	P.37	NUIG - National University of Ireland, Galway Martin Ryan Institute Botany Department			Member WP 5
Israel	P.38	HUJI - The Hebrew University of Jerusalem Institute of Life Sciences Evolution Systematics and Ecology	National GBIF node		Member WP 10 Contribution to WP 2
Italy	P.39	DISA - University of Tuscia Department of Environmental Sciences			Member WP 2
	P.40	Fimsiel - Fimsiel Consulenza e Applicazioni Informatiche S.p.A. Fimsiel Territorio e Ambiente			Member WP 2
	P.41	INRC - Istituto Nazionale per la Ricerca sul Cancro Servizio Biotecnologie		Host of CABRI (Common Access to Biological Resources and Information)	Member WP 5
	P.42	CNR / IRPEM - Consiglio Nazionale delle Ricerche Istituto di Ricerche sulla Pesca Marittima			Member WP 11

¹⁶ Full name: The Provost, Fellows and Scholars of the Holy and Undivided Trinity of Queen Elizabeth near Dublin Hereinafter T.C.D.

Country	Nr.	Acronym - Organisation Department	GBIF nodes ¹⁵	Co-ordinator / Host EU Biodiversity projects	ENBI Task
	P.43	UCEA - Ufficio Centrale di Ecologia Agraria			Member WP 5
	P.65	ENEA - Ente per le Nuove Tecnologie, L'Energia e l'Ambiente Department of Bio-technology (BIOTEC)			Member WP 12
	P.66	IPGRI - International Plant Genetic Recources Institute		Host of EURISCO (European PGR Search Catalogue)	Member WP 6
Lithuania	P.44	IE - Institute of Ecology Department of Terrestrial Ecosystems			Member WP 2
	P.45	BIL - Institute of Botany Laboratory of Flora and Geobotany Laboratory of Mycology			Member WP 6
Poland	P.46	MIZPAN - Polish Academy of Sciences Museum and Institute of Zoology			Member WP 10
	P.47	WU - Warsaw University Faculty of Biology	National GBIF node		Member WP 2 Contribution to WP 7
Portugal	P.48	LMG / IMAR - Laboratorio Maritimo da Guia / IMAR - Institute of Marine Research			Member WP 11
Slovakia	P.49	IB SAS - Institute of Botany, Slovak Academy of Sciences Department of Vascular Plant Systematics	National GBIF node		Member WP 2 Contribution to WP 6
Slovenia	P.50	ZRC-SAZU - Scientific Research Centre of the Slovenian Academy of Sciences and Arts Jovan Hadzi Institute of Biology			Member WP 2
Spain	P.2	CSIC - Consejo Superior de Investigaciones Cientificas Museo Nacional de Ciencias Naturales - Real Jardín Botánico	National GBIF node		Contractor WP 2 Contribution to WP 1,3
	P.51	ICM - Instituto de Ciencias del Mar, CMIMA, CSIC Departemento de Recursos Marinos Renovables			Member WP 11
Sweden	P.52	SMNH - The Swedish Museum of Natural History Research Department	National GBIF node		Member WP 2 Contribution to WP12
Switzerland	P.53	SANW - Swiss Academy of Sciences Swiss Biodiversity Forum	Contact point GBIF		Member WP 2

Country	Nr.	Acronym - Organisation Department	GBIF nodes ¹⁵	Co-ordinator / Host EU Biodiversity projects	ENBI Task
The Netherlands	P.1	UVA - Universiteit van Amsterdam Zoological Museum Amsterdam Institute of Informatics		Co-ordinator Fauna Europaea	Co-ordinator ENBI Contractor WP1 Contributions to all WPs Contractor WP 8 Contributions to WP 9,10
	P.8	ETI - Expertisecentrum voor Taxonomische Identificaties	National GBIF node		Contractor WP 9 Contributions to WP 2,5,8, 10,11
	P.54	PRI - Plant Research International B.V.		Co-ordinator EPGRIS (European Plant Genetic Resources information Infra- Structure)	Member WP 6
	P.55	NHN - Nationaal Herbarium Nederland			Member WP 13
United Kingdom	P.4	RBGKew - Royal Botanic Gardens, Kew The Herbarium Department / Keeper's office			Contractor WP 4 Contribution to WP 1,12,13
	P.5	UREADBO - The University of Reading Centre for Plant Diversity and Systematics		Co-ordinator Euro + Med Plantbase	Contractor WP 5 Contributions to WP 7,8,9,10
	P.6	NHM - The Natural History Museum, London The Department of Entomology		Co-ordinator ENHSIN (European Natural History Specimen Information Network)	Contractor WP 6 Contribution to WP 4,7,8,9,10
	P.56	UWC - University of Wales, Cardiff Department of Computer Science			Member WP 9 Contributions to WP 8
	P.57	NERC - Natural Environment Research Council Centre for Ecology and Hydrology		Co-ordinator EU / Rioforum	Member WP 12
	P.58	RBGE - Royal Botanic Garden, Edinburgh			Member WP 2
	P.59	FWL - Freshwater Biological Association FreshwaterLife			Member WP 12
	P.60	UESSEX - University of Essex Department of Electronic Systems Engineering			Member WP 6
	P.61	CABI - CAB International Biosystematics and Molecular Biology			Member WP 5
	P.62	Sp2000 - Species 2000 Species 2000 Secretariat			Member WP 11 Contributions to WP 5

Procedure for admittance of Associate Members

As it is not effective that a new contract has to be signed for each new member, the procedure will be based on the admission of “Associate Members” that are not part of the contract. Associate Members participate in agreed ENBI activities on the same basis as the existing members, however with no financial support. The ENBI co-ordinator may decide on a case-by-case basis whether a representative of an Associate Member will be supported financially as an Invited Expert.

The procedure to admit Associate Members is as follows:

- a.** Proposals to add Associate Members to the network will come from specific organisations, or will be recommended by present members of the network. Any proposal has to be sent to the general co-ordinator of ENBI, and with specified information. The information should include (1) the status of the organisation, (2) its activity programme relevant to ENBI, (3) a justification of the added value for ENBI, and (4) a description of the way the organisation will contribute to the objectives of ENBI and through which ENBI work packages(s).
- b.** The relevant WP co-ordinator(s) will be asked for advice, and will have to specify - in communication with the proposer - the task(s) of the potential Associate Member.
- c.** These advices will be discussed in the ENBI management committee (meeting of general co-ordinator with cluster co-ordinators).
- d.** After hearing the opinions and considerations in the ENBI management committee, the general ENBI co-ordinator will decide about admitting the proposed Associate Member.
- e.** A Memorandum of Understanding (comparable with the text for membership Agreements) will be drawn up, and signed by the ENBI co-ordinator and the authorized person in the associate member organisation.
- f.** The European Commission, and all the ENBI members, will subsequently be notified about the Memorandum of Understanding.

Remark: The admission of new members will not affect the total size of the ENBI budget

9. PROJECT MANAGEMENT

Work packages and their Contractors

The ENBI network comprises of a large number of members with different tasks. Some of these will be strongly involved in some work packages, others will benefit from participating in and contributing to the discussion forums. The management of the network activities requires a strong management to keep focus on the key issues and the timely delivery of results. This implies the establishment of an organisation with clear lines of authority and responsibility, while avoiding bureaucracy.

The ENBI network organisation of all institutional participants is organized in the 13 work packages. For each separate work package is assigned a participant that acts as leader for the task, and will act as Contractor for that work package. For the assigned work package, these Contractor responsibilities include:

- the technical management
- adherence to the agreed time-lines for delivering milestones
- adherence to the budget plan
- two-way communication with all other members of work package
- preparation of the agreed technical and financial reports.

Members of the Thematic Network

All other participants ('members' in the terminology of Thematic Networks) are linked to a work package, depending on their tasks in or contributions to the work package. The total group of members was carefully composed in relation to the objectives of ENBI.

Clusters

There are four clusters of closely related work packages:

- I Co-ordinating activities.
- II Maintenance, enhancement and presentation of biodiversity databases.
- III Data integration, interoperability and analysis.
- IV Products and *e*-services

One of the leading partners of the work packages in each cluster acts as cluster co-ordinator, with the special task to manage the required interaction between the related work packages.

Decision making and advisory structures

This layered structure is also reflected in management organisation.

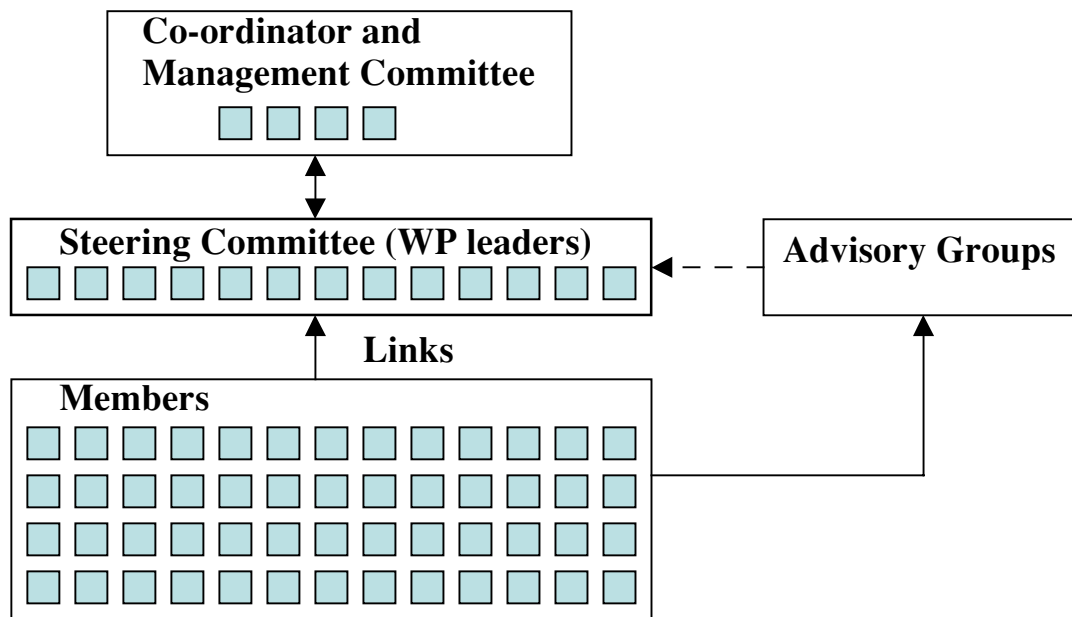
• The **General Co-ordinator** of ENBI has the general co-ordination and supervision on the progress of work, the interaction between all work packages, and reporting to the European Commission. The General Co-ordinator also takes care of the interaction between the ENBI activities in relation to those in GBIF. The responsibilities further include:

- chairing of Steering and Management Committees (see below) which will trouble-shoot in the event of any problems arising with the work plan
- submission of the financial statement prepared by the partners (as received from the partners) and the reporting on the use of financial resources to the Commission and the partners.
- distribution of funds to partners' accounts
- maintenance survey of consolidated time expenditure and financial records
- final preparation and submission of reports and other deliverables
- maintenance of a project timetable and register of project events

• The work package leaders (13 persons) together act as a **Steering Committee**, responsible for taking overall decisions about the progress of work.

• The smaller group of cluster co-ordinators (drawn from the Steering Committee) constitute the Management Committee. This **Management Committee**, including the general ENBI co-ordinator and the appointed ENBI manager (in charge of the day-to-day co-ordination of the network), acts as the body that will keep track of the general ENBI management issues, and monitors at a regularly basis the delivery of agreed results, and proposes decisions to be made with respect to the progress of work.

• *Ad hoc* **Advisory Groups**, drawn from the members and/or invited experts and end-users, will be consulted where necessary.



Communication

The communication flows between all participants and management bodies are supported by various mechanisms.

1. Meetings of member participants within work packages and clusters of work packages, as well as in the Steering Committee and Management Committee. The network budget will cover all essential meetings.
2. Half year status reports, and yearly progress reports, prepared by a standardized structure that also will allow for monitoring the progress of work.
3. All communication supported by the ENBI web site with different digital communication tools.

The General Co-ordinator at the co-ordinating University of Amsterdam will establish a Network Bureau, dealing with all day-to-day managing issues, instructions for the university administrative and financial services, preparation of reports, and providing guidance to network members in their activities.

Quality assurance measures

The mechanisms above with respect to meetings, monitoring, and reporting will support a process of interaction and communication to improve the quality of the results. The work package leaders are in first instance responsible for the quality and progress of the work in the individual packages. They will report on progress in the work plan to the co-ordinator, who will keep track of the overall project progress by careful monitoring of the intermediate milestones and the production of deliverables. The standardized structure also will allow for monitoring the progress of work. It will be the responsibility of the work package leaders to report immediately on anything that might significantly delay any part of the work.

End-user's involvement

ENBI is fully aware of the importance to meet end-user needs. For this reason a separate cluster of related work packages was designed that will focus on user needs and involvement. This cluster IV (Products and *e*-services) includes information services on biodiversity data, available in European databases, and on opportunities for multi-lingual access. The work packages have provisions for a variety of mechanisms to identify, to interact with, and to meet end-user needs. Apart from this, end-users are invited for *ad hoc* Advisory Groups where appropriate.

Annex I. Acronyms and abbreviations used.

ALLSpecies	Non-profit foundation dedicated to the complete inventory of all species of life on Earth within the next 25 years - a human generation
ArcInfo	GIS software
BioCASE	Biological Collections Access System for Europe
BioCISE	Biological Collections Information Service for Europe
BioNET int.	BioNET-INTERNATIONAL, the Global Network for Taxonomy, is dedicated to creating sustainable mechanisms to assist developing countries to overcome the Taxonomic Impediment by becoming self-reliant in taxonomy.
CABRI	Common Access to Biological Resources and Information
CBD	Convention on Biological Diversity
CHM	Clearing-House Mechanism
CIMS	Collaborative Information Management System
CIRCA	Communication and Information Resource Centre Administrator
COBRA	Common Object Request Broker Architecture
CONABIO	Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (Mexico).
DIVERSITAS	An international global environmental change research programme sponsored by the International Council for Science (ICSU), SCOPE (Scientific Committee on Problems of the Environment), IUBS (International Union of Biological Sciences), IUMS (International Union of Microbiological Societies) and UNESCO-MAB (Man and the Biosphere)
EBRCN	European Biological Resource Centres Network
EC	European Commission
EEA	European Environmental Agency
EIONET	European Environment Information and Observation Network
EMBNet	European Molecular Biology network
ENBI	European Network for Biodiversity Information
ENHSIN	European Natural History Specimen Information Network
EPBRS	European Platform for Biodiversity Research Strategy
EPGRIS	European Plant Genetic Resources information Infra-Structure
ERMS	European Register of Marine Species
EU	European Union
EUNIS	European Nature Information System
EURISCO	European PGR Search Catalogue
EuroCat	Acronym for Species 2000 Europa
Euro+Med	European and Mediterranean Plant Database
Fauna Europaea	EC financed project to assemble a database of the scientific names and distribution of all living multicellular European land and fresh-water animals.
Flora Europaea	Database of all the national and regional Floras of Europe (CD-ROM)
GBIF	Global Biodiversity Information Facility
GIS	Geographic Information Systems
GRID technology	Grid Technology enables the sharing and co-ordinated use of services and resources across distributed, heterogeneous dynamic virtual organizations irrespective of geographical location.
GTI	Global Taxonomy Initiative

ICT	Information Communication Technology
INBio	Instituto Nacional de Biodiversidad, a scientific institution with social orientation (Costa Rica).
IPR	Intellectual Property Rights
IT	Information Technology
Java	Programming language expressly designed for use in the distributed environment of the Internet.
NAS	Newly Associated States (Cyprus, Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia)
Natura 2000	Natura 2000 is the EU network of sites designated by Member States under the Bird Directive and under the Habitats Directive.
NGOs	Non-Governmental Organizations
OCR	Optical Character Recognition
PGR	Plant Genetic Resources
SDT	EC Translation Service
SOAP	Simple Object Access Protocol
Species2000	Species 2000 has the objective of enumerating all known species of plants, animals, fungi and microbes on Earth as the baseline dataset for studies of global biodiversity.
SPICE	Software for Species2000 (a flexible architecture for integrating autonomous databases to comprise a distributed catalogue of life)
TDWG/CODATA	Taxonomic Database Working Group/Committee on Data for Science and Technology
TIP	Technical Implementation Plan
VC	Virtual Community
VO	Virtual Organisation
WP	Work Package
WSDL	Web Services Description Language
XML	eXtensible Markup Language

Annex II. Memorandum of Understanding ENBI-EEA.

See next page. The Memorandum was originally an annex to the ENBI proposal.



Memorandum of understanding between ENBI and EEA

ENBI

European Network of Biodiversity Information (ENBI) is a research infrastructure development project proposed under the EU 5th Framework Programme for Research, Technological Development and Demonstration Activities. It has the objective to manage an open network of relevant biodiversity information centres in Europe and other countries of the western European palaeartic region, and in particular to include all European national nodes of the Global Biodiversity Information Facility (GBIF). Its objective is to develop a network that is capable of organizing the complementary activities of its members in order to add value to the contribution of the national nodes and other European contributions to the GBIF. ENBI work is categorised under the following four clusters:

1. The establishment of a strong biodiversity information network, including the provision of a platform for national nodes, the development of dissemination strategies in relation to its legal and financial implications, resulting in policies for sustainability of ENBI.
2. Best practices for the development and maintenance of biodiversity databases with specimen, collection, taxonomic, and survey data (development of routines and mechanisms to update, validate and ensure sustainability of these databases). In addition the identification of gaps in knowledge and information, and strategies to solve these.
3. Integration and interoperability of large scale distributed database sites, including the provision of analysing opportunities. The development of standards and protocols (metadata), and the application of Grids in order to integrate distributed primary data into end-user oriented products.
4. Contribution to a common biodiversity information infrastructure in collaboration with other initiatives, e.g. those of EEA and Fauna Europaea, such that information providers and users have a common platform for information interchange. Procedures to meet end-user priorities with respect to high quality products and electronic services.

EEA and EIONET

The European Environment Agency (EEA) and the European Environment Information and Observation Network (EIONET) have been set up by Council Regulation 1210/90. EIONET is the network of organizations through which Member Countries work with EEA to enable it to provide high quality information to support the environmental policy process and sustainable development.

EIONET consists of National Focal Points (NFP), National Reference Centres, and European Topic Centres (ETCs). EIONET works in 28 EU member and candidate countries as well as in other participating countries and the number of nominated member organisations is over 800. e-EIONET is the electronic network of EIONET and accessible at <http://www.eionet.eu.int/> with servers at all the NFPs, connecting all the members to a group collaboration and data flow network. The ETC for Nature Protection and Biodiversity (ETC/NPB) is one of the six existing ETCs.

The European Community Biodiversity Strategy states in its article II/21 that the European Environment Agency and EIONET should consolidate and further develop the European Community Clearing-House Mechanism in order to become an efficient vehicle for promoting and facilitating technical and scientific co-operation. This should be needs-driven, decentralised and allow for provision of information useful for meta-data levels of analyses. The provision of information by the CHM is of particular importance for the compilation of national and Community reports and for information on progress in implementing concrete measures for biodiversity.

The Community CHM should establish links to the Member States CHM focal points. The EC-CHM Portal has now been established by EEA with the support of the IDA Programme and operates a portal at <http://biodiversity-chm.eea.eu.int/>.

Framing of co-operation

The ENBI advance notice /2001/C 53/08) 20.2.2001 states that ENBI will depend on information provided by national nodes (of GBIF), the European Environment Agency and its topic centres, and other relevant sources. It also states that EC CHM will provide metadata on national expertise and resources, data not included in GBIF scope, and other information on national policies and initiatives. ENBI will not duplicate these functions. Moreover, all the relevant European networks are encouraged to participate in ENBI activities.

The EEA mandate includes streamlining of reporting of environmental information and avoiding of duplication of effort where possible and appropriate. According to its new strategy, EEA promotes the emergence of a shared information infrastructure for environmental reporting, which is recognised as a relevant approach for ENBI as a research infrastructure project.

According to its general policy and due to the budgetary rules of the European Community, EEA does not directly participate in EU research projects. However, EEA contributes to the goals of the relevant projects through its Work Programme using its own resources and executing parallel activities that will be closely coordinated with ENBI. EEA is also a user of ENBI results and participates in user forums of the identified work packages and the entire project.

EEA contributions to ENBI

EEA contributes to the work packages (numbers) of ENBI as indicated below. This does not exclude other forms of co-operation, which can be identified and agreed on during the work.

- WP2. ENBI Forum will be implemented in close co-operation between EEA and ENBI using initially the already existing CIRCA-based EIONET group collaboration infrastructure. CIRCA is the European Community legacy groupware system, and EEA has invested heavily into its customisation for EIONET needs. Further customisations for ENBI needs can be arranged by EEA, depending on user requirements analysis and available resources. ENBI can use EIONET support services for CIRCA and can install its own CIRCA services or use those of EIONET as agreed. EIONET Portal Toolkit, which underlies also EC CHM portal services is available in a similar fashion. These activities do not exclude ENBI from evaluating and eventually choosing other solutions, if deemed appropriate and not available from EIONET, and if duplication of effort can be avoided.
- WP7. EEA is interested in accelerating the flow of survey data to its assessments and participates in design and evaluation of the survey data project.
- WP8. EEA has some expertise in the area of data management in large distributed database systems. Among the solutions evaluated here, one such architecture to be investigated is the EDEN/INFOSLEUTH architecture already piloted for inland waters and hazardous waste by the EEA and its collaborators.
- WP9. EEA is a major operator of environmental data flows. Facilitating interoperability via common standards, which is the aim of the WP 9, is one of EEA's main interests in ENBI. EEA will participate in preparation of the general interoperability data standards and protocols that are proposed here that would allow linking data sources that use different taxonomic concepts, taking into account existing programmes.
- WP12. In WP 12 the dataflows in European reporting are analysed and re-engineered to align with the emerging concept on a European biodiversity information infrastructure so that the data is made available and reused from nationally managed dynamic web services. An example of such content is

on-line redlists of species for which EEA needs access. The activities in WP 12 will be closely coordinated with the dataflow practices of the EEA Topic Centre of Nature Protection and Biodiversity.

ENBI contributions to EEA and EC CHM

ENBI contributes from its workpackages (numbers) to the tasks of EEA (numbers) as indicated below. This does not exclude other forms of co-operation, which can be identified and agreed on during the work.

WP1. EEA is a user of ENBI results. Any of the products of ENBI will be released to EEA and EIONET use without charge and with documented source code.

ENBI seeks to avoid overlap and duplication of effort with regard to EEA and EIONET services and data collection. In particular, actions that would add to the reporting burden of Member States in areas where EEA already works will be avoided.

WP2. ENBI information services will be made available, with the appropriate recognition, from the EC CHM portal.

ENBI will contribute to the EEA coordinating tasks with respect to the web services of EC CHM so that overlap is minimised and gaps in information coverage are filled where possible. This entails regular meetings with the teams operating the services and harmonisation of content where appropriate.

WP3. ENBI will organise a special 'dissemination' event for EEA and its appropriate topic centres to inform key staff about current and emerging developments in biodiversity information and biodiversity informatics.

WP12. EEA will be invited to contribute to activities in WP 12 (Information services on European biodiversity data).

All The EUNIS (European Nature Information System) databases maintained for EEA/EIONET by the ETC/NPB and made public via the web contain some key information on species that are of European interest (in annexes of conventions and directives) and is a reference information source for EEA work. ENBI will collaborate with the EUNIS on emerging problems with respect to taxonomy, synonyms and species information, which will take place in the relevant work packages.