

**ECP-2008-DILI-518001**

**BHL-Europe**

# **Annual Report**

**1 May 2010 – 30 April 2011**

**[www.bhl-europe.eu](http://www.bhl-europe.eu)**

<b>Deliverable number/name</b>	<i>D1.7</i>
<b>Dissemination level</b>	<i>Public</i>
<b>Delivery date</b>	<i>10 May 2011</i>
<b>Status</b>	<i>Final</i>
<b>Author(s)</b>	<i>Henning Scholz</i>



***eContentplus***

This project is funded under the *eContentplus* programme<sup>1</sup>,  
a multiannual Community programme to make digital content in Europe more accessible, usable and exploitable.

---

<sup>1</sup> OJ L 79, 24.3.2005, p. 1.

## 0 Document History

### 0.1 Contributors

Person	Partner
Henning Scholz	MfN
Melita Birthälmer, Jana Hoffmann	MfN
Lola Obajuluwa, Chris Sleep, Adrian Smales	NHM
Boris Jacob	RMCA
Jiri Kvacek	NMP
Tine Mallaerts	RBINS
Bernd Sproger	AIT
Wolfgang Koller	NHMW

### 0.2 Revision History

Revision Date	Author	Version	Change Reference & Summary
20 Apr 2011	Henning Scholz	0.1	Initial draft version for PMG review
27 Apr 2011	Henning Scholz	0.2	Draft for external and internal review
2 May 2011	Henning Scholz	0.3	Draft taking external review into account
3 May 2011	Henning Scholz	0.4	Draft taking final external review into account
10 May 2011	Henning Scholz	1.0	Final version with recent updates

### 0.3 Reviewers

This document requires the following reviews and approvals.

Name	Position	Date	Version
Martin Gordon	Project Manager, RBB	2 May 2011	0.2
Martin Gordon	Project Manager, RBB	2 May 2011	0.3
BHL-Europe consortium		4 May 2011	0.4

#### **0.4 Distribution**

This document has been distributed to:

<b>Group</b>	<b>Date of issue</b>	<b>Version</b>
Martin Gordon	28 April 2011	0.2
BHL-Europe consortium	28 April 2011	0.2
Martin Gordon	2 May 2011	0.3
BHL-Europe consortium	3 May 2011	0.4
BHL-Europe consortium	10 May 2011	1.0

## 1 Table of contents

<b>0</b>	<b>DOCUMENT HISTORY .....</b>	<b>2</b>
0.1	CONTRIBUTORS .....	2
0.2	REVISION HISTORY .....	2
0.3	REVIEWERS .....	2
0.4	DISTRIBUTION.....	3
<b>1</b>	<b>TABLE OF CONTENTS .....</b>	<b>4</b>
<b>2</b>	<b>PROJECT OBJECTIVES .....</b>	<b>5</b>
2.1	BACKGROUND, PROBLEM ADDRESSED AND PROJECT OBJECTIVES .....	5
<b>3</b>	<b>PROJECT RESULTS/ACHIEVEMENTS.....</b>	<b>6</b>
3.1	PERFORMANCE INDICATORS .....	6
3.2	DELIVERABLES LIST .....	8
3.3	PROJECT COMMUNICATION .....	8
3.4	PROJECT REVIEWS.....	8
3.5	BUSINESS PLAN.....	9
3.6	EXTENSION OF CONTENT PROVIDER NETWORK .....	9
3.7	BEST PRACTICE GUIDE .....	9
3.8	BHL-EUROPE ACCESS ROUTES .....	10
3.9	GLOBAL REFERENCES INDEX TO BIODIVERSITY (GRIB) .....	11
3.10	GERMAN PROTOTYPE.....	11
3.11	BHL-EUROPE ARCHITECTURE .....	11
3.12	BHL-EUROPE CONTENT UPLOAD AND STORAGE.....	12
3.13	HARMONISATION OF METADATA .....	12
3.14	EUROPEANA CONTENT INTEGRATION AND COLLABORATION .....	13
3.15	USER REQUIREMENT SURVEY.....	13
3.16	AWARENESS AND DISSEMINATION .....	13
<b>4</b>	<b>TARGET USERS &amp; THEIR NEEDS .....</b>	<b>16</b>
<b>5</b>	<b>UNDERLYING CONTENT .....</b>	<b>17</b>
<b>6</b>	<b>SUMMARY OF ACTIVITIES.....</b>	<b>17</b>
6.1	IMPORTANT PAST ACTIVITIES.....	17
6.2	IMPORTANT FUTURE ACTIVITIES .....	19
<b>7</b>	<b>IMPACT &amp; SUSTAINABILITY .....</b>	<b>19</b>
<b>8</b>	<b>CONCLUSION.....</b>	<b>20</b>
<b>9</b>	<b>FURTHER INFORMATION.....</b>	<b>21</b>
	<b>APPENDIX 1 CONSORTIUM .....</b>	<b>22</b>

## 2 Project Objectives

### 2.1 Background, problem addressed and project objectives

The libraries of the European natural history museums and botanical gardens collectively hold the majority of the world's published knowledge on the discovery and subsequent description of biological diversity. As yet, this wealth of knowledge is only currently available to those few people who can gain direct access to these collections. The body of biodiversity knowledge is thus effectively withheld from use for a wide range of applications, which include research, education, taxonomic study, biodiversity conservation, protected area management, disease control, and maintenance of diverse ecosystems services. Much of the early published literature is rare or has limited global distribution and is available in only a very few libraries. From a research perspective, these collections are of exceptional value because the domain of systematic biology depends – more than any other natural science – upon historic literature. The cited “half-life” (period of relevance) of natural history literature is longer than that of any other scientific domain and its “decay-rate” (rate at which it becomes irrelevant) is much slower than in other fields (cf. biotechnology). In order to positively identify a rare specimen, a working biologist may still have to consult a 100 year-old text, because that was the last time the organism was found and described.

Currently, numerous natural history institutions in the world are digitising this biodiversity literature in an open access manner. Since 2007, ten major biodiversity libraries have collaborated in making the biodiversity knowledge accessible on an open access Creative Commons basis to a wide spectrum of end-users via the Biodiversity Heritage Library (BHL) project. Two European institutions are participating in the BHL project: Natural History Museum (London, UK) and Royal Botanic Gardens, Kew (Richmond, UK). The BHL is making more than 90,000 volumes available to date and the corpus of digital literature is continuously increasing. In contrast to BHL, BHL-Europe is not funded to digitise biodiversity literature, but to make existing digital collections of biodiversity literature interoperable. A large number of projects are currently digitising biodiversity material in numerous institutions across the EU to make literature access more open, but the corpus will still be seriously fragmented. Two examples of European projects are Gallica<sup>2</sup> and AnimalBase<sup>3</sup>. These scattered and disparate projects do not use common standards or interfaces and are not interoperable.

Having in mind the large but disparate corpus of digital biodiversity content in European countries, BHL-Europe aims to make biodiversity knowledge available to all interested parties by improving the interoperability of European biodiversity digital libraries. BHL-Europe reviews and tests different approaches to establish and manage digital multilingual biodiversity libraries based on the experiences of the partners involved in the project. The consortium has established a best practice approach and promotes the adoption of standards and specifications for the large-scale implementation in a real-life context. BHL-Europe focuses upon providing a multilingual access point for search and retrieval of digital content through Europeana.

---

<sup>2</sup> <http://www.gallica.bnf.fr>

<sup>3</sup> <http://www.animalbase.uni-goettingen.de>

In addition, it establishes a robust multilingual portal with sophisticated search tools to facilitate the search for taxon-specific biodiversity information. The project also develops operational strategies and processes for long-term preservation and sustainability of the data produced by national biodiversity digitisation programmes. BHL-Europe is already generating activities to raise awareness and to ensure that the project outputs are known and used by the target users, and also that the proposed approach directly addresses user needs. BHL-Europe experience and best practice will be shared with the wider digital library community. BHL-Europe facilitates open access to taxonomic literature for a large number of target users including the general public. It will also facilitate and enable the initiation of scanning initiatives in European countries not yet involved in digitisation programmes and will improve the infrastructure for digital libraries in all EU countries. This also includes the negotiation with rights holders to enable access to in-copyright content.

### 3 Project Results/Achievements

#### 3.1 Performance Indicators

With most of our indicators we are on track or have at least the processes in place to reach the numbers soon. As BHL-Europe is currently in the phase of testing the ingest procedure, a lot of data and content are in various stages of processing. This can not be reflected in the indicators properly. More details on some indicators is provided below.

**Amount of metadata sets to be imported into the GRIB (in million):** This is the number of de-duplicated records in the GRIB from the library catalogues FUB-BGBM, MfN, NAT, NHM and BHL. The number is much lower than expected. The level of data quality caused difficulties during the de-duplication process and slowed down the ingest process. Library catalogues of 16 more providers are in progress to be ingested over the next weeks which will increase the GRIB dataset.

**Number of interconnected repositories:** This is the number of BHL-Europe content providers from whom we have harvested metadata into our prototype. As we are currently re-factoring the prototype and testing the new Pre-Ingest component, we have currently not further increased the number of interconnected repositories. However, three additional content providers which have not been harvested for the prototype have now either successfully passed the mapping procedure (RMCA, NMP) or are in progress to be ingested in Europeana (UCPH). This shows that interconnection of repositories is currently implemented at various levels due to the varying implementation and development status of system components.

**Number of portal languages:** Seven languages are currently implemented in the development version of the portal: Czech, English, German, French, Italian, Portuguese, Spanish.

**Page views through BHL-Europe Portal:** As BHL-Europe has no working portal except the prototype (which is not aimed at the public), we are not recording usage. However, we are recording usage of [bhl-europe.eu](http://bhl-europe.eu) since January. 1,065 absolute unique visitors were recorded in this period and 11,612 pageviews.

**Page views through Europeana Portal (in million):** For the page views through Europeana, the Google Analytics of the BHL Portal [www.biodiversitylibrary.org/](http://www.biodiversitylibrary.org/) were evaluated. 44,998 page views of the BHL Portal between 19 March 2010 and 18 April 2011 were generated by Europeana users. These page views were generated by Europeana users following the link to

BHL content (e.g. “View in original context”). In addition, the Europeana logfiles were evaluated as well to identify those users that have not clicked through to BHL. In this way we also identified nonBHL content of BHL-Europe in Europeana (LANDOE, NAT). Altogether, 62,480 page views can be counted for the full BHL-Europe content to date. However, this number is still very low compared to the expected indicator. Search Engine Optimisation of Europeana is still in progress and this will hopefully have an effect on BHL-Europe usage statistics. The successive launch of several virtual exhibitions of BHL-Europe in 2011 will also help to promote our content in Europeana and increase the usage of the objects. We are collaborating very intensively with Europeana to better understand the behaviour of Europeana user to exploit it for our content policy and promotion activities.

Indicators	Expected vs Actual					
	Year 1 (exp.)	Year 1 (act.)	Year 2 (exp.)	Year 2 (act.)	Year 3 (exp.)	Year 3 (act.)
Number of total accessible pages of biodiversity literature (in million)	17	17.4	21	40.19	25	
Number of pages of biodiversity literature from European content providers to BHL-Europe (in million)	3.4	3.4	4.1	4.19	4.8	
Percentage of literature available through Europeana	20%	0%	50%	78.3%	100%	
Amount of metadata sets to be imported into the GRIB (in million)	0.15	0.15	2.5	0.3 <sup>a</sup>	4.0	
Number of interconnected repositories	7	14	20	16 <sup>b</sup>	30	
Number of content providers	20	21	25	25	30	
Number of portal languages	1	1	7	7 <sup>c</sup>	12	
Page views through BHL Portal (in million)	1.0	3.7	2.0	4.7	2.5	
Page views through BHL-Europe Portal	0.0	0.0	0.5	0 <sup>d</sup>	2.5	
Page views through Europeana Portal (in million)	0.25	0	1.0	0.06 <sup>e</sup>	3.0	
Case studies of successful usage of the material by non-scientists	5	5	10	10	15	
Agreements with Rights Holders / Publishers	2	7	4	86	6	

### 3.2 Deliverables List

Deliverable No	Deliverable title	Delivery due date	Actual date of delivery
D5.8	First user evaluation report	M15	M16, Aug 10
D1.4	Progress Report 3	M18	M19, Nov 10
D3.6	Release German prototype	M18	M19, Nov 10
D1.5	First overview of the business plan for long-term sustainability	M24	M25, May 11
D1.6	Progress report 4 including pre-financing request	M24	M25, May 11
D1.7	Annual report	M24	M25, May 11
D2.5	Final and enhanced Web-database for content management and collection analysis	M24	M25, May 11
D2.6	Delivery of the first version of the approved best practice guidelines and standards	M24	M25, May 11
D2.7	Content analysis and management status report 2 (metadata, page numbers, content providers)	M24	M25, May 11
D3.7	Key components documented for output of D3.5 e.g. BHL-Europe Portal, OCR demonstrators, distributed storage model, etc.	M24	M25, May 11
D4.2	Complete signed agreements with first group of rights holders to enable material to be used in the BHL Europeana, and established process for addition of further material.	M24	M25, May 11
D4.3	Deliver IPR framework to support long-term access and sustainability of the digitise material.	M24	M25, May 11

### 3.3 Project communication

The communication within the project is based on various mechanisms depending on the Work Package and target group for communication. Regular conference calls are held by the Project Management Group and the Technology Management Board. We use Google Groups and Google Docs for sharing knowledge in particular within the IT staff of the project. Sympa Mailing Lists are used to facilitate the communication with our stakeholders inside and outside the project. An internal Wiki is used to collect and distribute relevant project information to project members. Further mechanisms are in place to disseminate project news and outcomes, and are explained in more detail below.

To improve the project's internal communication, we have established a rigorous reporting procedure. Partners are required to report all their activities on a monthly basis and to provide a narrative report of their activities on a quarterly basis. This way we monitor partners work, we are able to identify potential issues as early as possible, and we get a much better insight into the progress of every individual partner's tasks.

### 3.4 Project reviews

BHL-Europe had two project reviews by the European Commission in the last year. The first was held in Vienna on 27 May 2010 and BHL-Europe passed with a yellow flag. Some deliverables were rejected during this review meeting by the EC and were successfully re-



submitted after revision. The second review meeting was held on 30 November 2010 in London to focus particularly on the revised deliverables, the infrastructure built in London and the BHL-Europe German Prototype. We passed this meeting with a green flag to continue our work as planned. Both review meetings were accompanied by content provider meetings and workshops of the Communication Working Group and the Technology Management Board.

### **3.5 Business plan**

BHL-Europe successfully finished the first overview of business plan for long-term sustainability of the project outcomes. This is a first step towards a plan for the future of BHL-Europe after the project terminates in April 2012. The networking and collaboration with new projects like OpenUp! and a closer alignment of the Europeana Group of Projects since autumn 2010 will potentially result in further opportunities for the implementation of project results. For more details on the sustainability it is referred to section 7 further below.

### **3.6 Extension of content provider network**

A new approach for content acquisition was identified in which our consortium will participate. For this purpose a 'BHL-Europe in a nutshell' document was prepared in collaboration with WP4 and was introduced during the Content Provider and Technical meeting in December 2010 in London. The document aims to be a very brief but informative document including the most important facts about BHL-Europe, benefits and IPR issues. 'BHL-Europe in a nutshell' has been translated by our consortium into four languages and is available in English, Spanish, French, and Russian<sup>4</sup>. The document is currently distributed to potential new content providers by our content providers and also helps to prepare for any ensuing negotiations. For more information on the underlying content see also section 5 below.

### **3.7 Best Practice Guide**

The Approved Best Practice Guidelines and Standards aim to provide the first standardised guidelines for processes used by BHL-Europe for the digitisation of biodiversity content. The Best Practice Guide is designed to be easily understood by all persons using them; in particular, it is designed to guide prospective and current content providers simply and clearly through a digitisation workflow from either a print or digital version of an original publication to the final digitised form of that publication in BHL-Europe.

The Best Practice Guide is of special interest to technology users – in particular libraries, digitisation centres and digital library networks. Both, existing and new content providers will find the Best Practice Guide useful as it will simplify and speed up the whole process of digitisation. Hence an efficient digitisation workflow will be ensured and their connection with Europeana and BHL-US will be enabled.

The Best Practice Guide is also a means of developing the case for long-term sustainability of BHL-Europe. BHL-Europe content providers will provide more than 25 million pages of biodiversity literature by the end of the project in April 2012. However, there are many more pages of potential content that could be included in BHL-Europe but cannot be, because of the limited timeframe of the project. Therefore, it is anticipated that new partners will join the digitisation process and in the future provide digitised biodiversity literature to BHL-Europe and thus to the European citizens. The Best Practice Guide recommends the most efficient

---

<sup>4</sup> see also <http://www.bhl-europe.eu/en/information-for-partners>

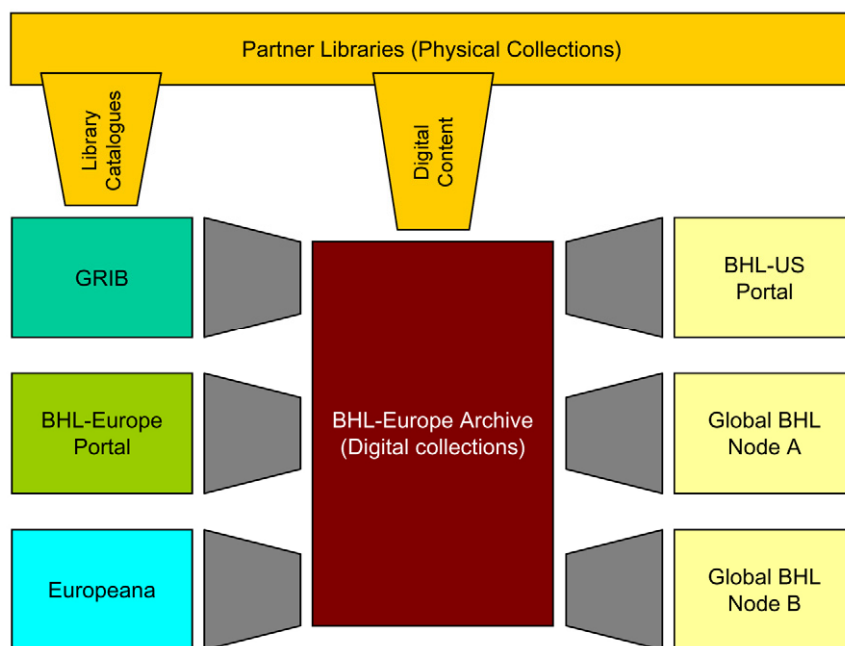
way to do so and aims not only to assist BHL-Europe content providers during the remaining project time, but also prospective content providers after the current BHL-Europe project has ended.

To summarise, this document unifies and simplifies the process of making literature available online. A first version of the Best Practice Guide is already finished. The approved and public version will be available in April 2012 as one of the final outcomes of the BHL-Europe project.

### 3.8 BHL-Europe access routes

BHL-Europe offers the user four routes to access the digital biodiversity literature – three European and one global (Fig. 1): (1) BHL-Europe portal and preservation and archive system, (2) the Global Reference Index to Biodiversity (GRIB), (3) Europeana and (4) Global BHL.

All these routes provide access to our digital library, but are self-contained applications working alongside the BHL-Europe preservation and archive system for the European digital literature. The BHL-Europe system and portal is the core product and outcome of the BHL-Europe project. The GRIB is a second major outcome of BHL-Europe, developed in collaboration with the EDIT project. Achievements and results with these two products are elaborated in the following sections below.



**Fig. 1.** The access routes to the digital biodiversity literature provided by BHL-Europe. Our partner libraries will provide catalogue data and digital content to the GRIB and the BHL-Europe archive. The content in the archive will be accessible through the GRIB, the BHL-Europe Portal, Europeana and any Global BHL Node including the BHL-US Portal. The library catalogues are only accessible through the GRIB to facilitate the digitisation management (see section 3.9).

### **3.9 Global References Index to Biodiversity (GRIB)**

The GRIB<sup>5</sup> is the joint literature index from the projects Biodiversity Heritage Library for Europe (BHL-Europe) and European Distributed Institute of Taxonomy<sup>6</sup> (EDIT). It was built and is maintained together with the Head office of the Common Library Network GBV<sup>7</sup> (VZG).

The index incorporates bibliographic data from library catalogues from natural history institutions, and thus shows, where biodiversity related publications are held. The data in the GRIB is de-duplicated which makes it easier to search and retrieve the publications. It also links through to already digitised publications found in BHL and later in the BHL-Europe portal. For those publications, that haven't been digitised yet, the GRIB offers the possibility to mark them for future digitisation.

The GRIB is supposed to serve two groups of users: Scientists and Librarians. Scientists in the need for online access to digitised literature can search the GRIB and nominate titles for digitisation that are not available online yet (once a BHL-Europe sign-on system is in place). Librarians on the other hand can use the tool to indicate the digitisation status of a title, within their libraries digitisation workflow.

The GRIB interface has several options for searching the database and sorting the results. It also gives access to the Digitisation Management tool, which consists of a customised JSON-API to modify the digitisation status of a record via web service and a JavaScript-based English language widget that is embedded in the GRIB user interface. The softlaunch of the GRIB is foreseen for May 2011 while more library catalogues are ingested into the database. An agreement is in place to keep the GRIB updated and maintained until the end of February 2020 the least.

### **3.10 German prototype**

The German Prototype of BHL-Europe was submitted to the EC in November 2010. A demonstration and presentation was given at the 2nd Intermediate Review meeting on 30 November in London (NHM). The Prototype was created purely as a demonstrator to show that we can deliver the technology required for the final system. It also demonstrates that we can ingest and harvest data. Finally, the German Prototype will be re-factored and integrated into the BHL-Europe community portal. Hence, future development will focus on other core features such as Taxonomic Intelligence Tools, OCR and Content Viewer.

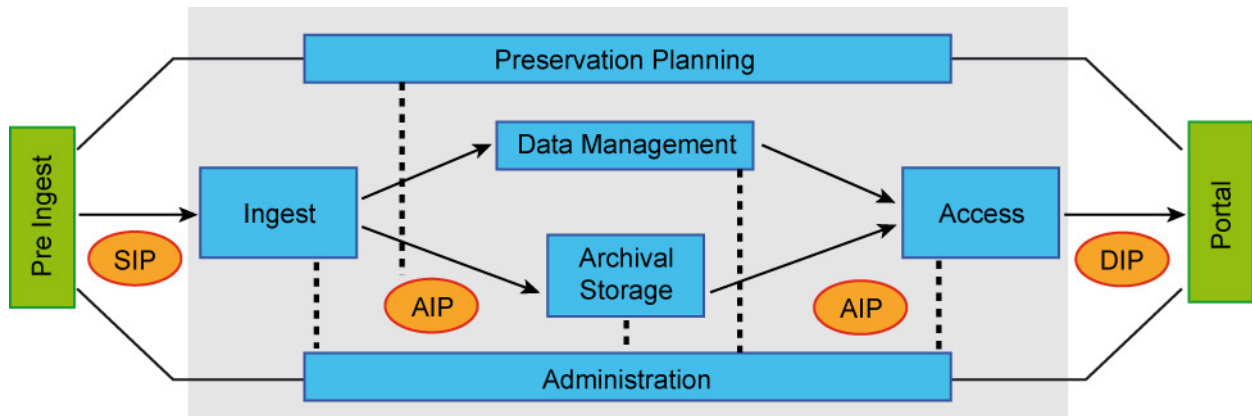
### **3.11 BHL-Europe architecture**

BHL-Europe is building an OAIS (Open Archival Information System) compliant system for archiving information (objects and metadata; see Fig. 2). The OAIS framework is today the most relevant standard in digital preservation. During the second year of the project, the implementation work of the various components was started after we agreed on the system architecture. At the moment, some components are available as demonstrators to be tested with the BHL-Europe content that is currently uploaded to the servers in London (NHM). Our Pre-Ingest component is deployed on the NHM servers and tests are in progress. Portal and data management demonstrators are also available for internal testing. The management process and implementation plan are in place to ensure a timely delivery of the BHL-Europe portal.

<sup>5</sup> <http://grib.gbv.de/LNG=EN/>

<sup>6</sup> <http://www.e-taxonomy.eu/>

<sup>7</sup> <http://www.gbv.de/vgm/info/biblio/01VZG/>



**Fig. 2.** High-level overview of the OAIS components relevant for BHL-Europe (in blue). The OAIS reference model differentiates between three kinds of information objects. The SIP, Submission Information Package, is being sent in by the data producers (content providers), the AIP, Archive Information Package, is preserved in the archive, and the DIP, Dissemination Information Package, is provided for the consumers of the archive.

### 3.12 BHL-Europe content upload and storage

A hardware infrastructure was built in the Natural History Museum of London (NHM) in year one of the project, in order to facilitate the ingest, management, storage, and dissemination of the digital objects and metadata. According to the requirements of our content providers and the functional and technical specifications, NHM installed the FTPS server and created for each content provider an account within the last months. Content providers are now asked individually to upload content to the NHM server. Ten BHL-Europe content providers have uploaded content to the servers including the scanned images and the corresponding metadata according to the BHL-Europe file submission guidelines. We are also about to finish the bulk transfer of the BHL-US content from the Woods Hole cluster to the NHM servers.

### 3.13 Harmonisation of metadata

In order to provide a consistent and sustainable system within BHL-Europe, a metadata schema is necessary to be able to display all information requested by the user. Based on our BHL-EMasterDataElementList, a BHL-Europe schema was established and finalised in the reporting period. The schema incorporates several standards and interconnects them so that they can be used to describe literature on any information level (monograph, serial, item, article, page, etc.). As this is a universal approach, the BHL-Europe schema is named Open Literature Exchange Format (OLEF). As of OLEF version 0.3, a stable namespace for the schema has been established using the BHL-Europe Web site. The current version of the schema can be found at <http://www.bhl-europe.eu/bhl-schema/v0.3/> (which is equal to the namespace). More details can be found in D3.7, available on the BHL-Europe Web site.

To date, the metadata of six BHL-Europe content providers have been mapped to the new OLEF schema and are ready to be ingested. Out of these mappings several standard mappings have been set up (like MARC21, MARCXML, RefNum, MODS and DC).

### **3.14 Europeana content integration and collaboration**

Since 10 June 2010 BHL-Europe content is available via Europeana. To date a corpus of totally 96,595 items can be retrieved by using the following search string: [http://www.europeana.eu/portal/search.html?query=europeana\\_collectionName%3A087\\*](http://www.europeana.eu/portal/search.html?query=europeana_collectionName%3A087*)

Europeana has harvested content from BHL-US and 10 of our European content providers to date: LANDOE, NAT, NHM, UBER, UCPH, UH-Viikki, RBGE, RMCA, CSIC and University Library Bielefeld.

The Project Coordinator was elected as the secretary of the Council of Content Providers and Aggregators in June 2010. He also sits on the Europeana Foundation Board, representing the European museums contributing to Europeana.

### **3.15 User requirement survey**

BHL-Europe carried out an extensive user requirement survey at the end of the last reporting period (15 March to 3 May 2010). Announcements for the user survey were sent to various institutional lists to reach a wide range of users. We were able to reach 1,877 users of the BHL-US portal and altogether 1,063 users successfully answered the questionnaire. The results of this survey were evaluated in the first half of this reporting period and published as D5.8 in the first days of August 2010<sup>8</sup>. The outcomes of this survey influenced to a large extent the use cases discussion in BHL-Europe, thus being a valuable source of information for the development of the BHL-Europe Portal. Some key suggestions from the user are:

- The search function should be improved.
- The set of results should be refined and metadata improved.
- The online viewer is important and should be improved.

For more details it is referred to the first user evaluation report (D5.8).

### **3.16 Awareness and Dissemination**

The BHL-Europe project Web site has been online since July 2009. BHL-Europe is now using Drupal as CMS to manage the Web site, its multilingual content and regular content updates. The Web site is currently available in eight languages: English, German, Spanish, Czech, Italian, Slovak, Russian and French. As another key source of information on BHL-Europe, we provide news on the project and related activities on our Weblog<sup>9</sup> and via Facebook<sup>10</sup> and Twitter<sup>11</sup>.

Over the last year, BHL-Europe has been very active in approaching various target users through official conferences and publications (see Table 1). Depending on the audience, presentations or posters were adapted accordingly. Three important and successful dissemination activities are mentioned particularly in this section. The first is the temporary anniversary exhibition of the Museum für Naturkunde Berlin, where BHL-Europe is present in a multimedia exhibit.

The second activity was the Conference „Deutsches Kulturerbe auf dem Weg in die Europeana“ (German Cultural Heritage for Europeana). From 4-5 October 2010, the German Europeana project partners, members of the German Digital Library, and about 200 members of German archives, museums, and libraries met in the Berlin State Library. BHL-Europe (MfN) co-organised the conference, chaired one session, gave a talk and presented flyers and

<sup>8</sup> <http://www.bhl-europe.eu/de/publikationen/dokumente>

<sup>9</sup> <http://bhleurope.blogspot.com/>

<sup>10</sup> <http://www.facebook.com/pages/BHL-Europe/151086001600041>

<sup>11</sup> <http://twitter.com/BHLEurope>

other printed material with information about the project. All information including abstracts are available online<sup>12</sup> (in German).

The third is the BioSystematics<sup>13</sup> conference hosted by the Botanic Garden and Botanical Museum Berlin-Dahlem (Freie Universität Berlin) and the Museum für Naturkunde Berlin in February 2011. BHL-Europe organised a symposium on 22 February 2011 entitled “Worldwide Access to Biodiversity Literature: Digital and Virtual Libraries for Taxonomists”. This symposium provided an overview of BHL, BHL-Europe and related activities as well as other digital and virtual library initiatives relevant for taxonomists. BHL-Europe also organised a workshop entitled “Biodiversity Heritage Library: Hands-on training on search and retrieval of digital literature”. BHL-Europe also sponsored the conference bags branded with the BHL-Europe logo.

**Table 1.** List of conferences and events attended by members of BHL-Europe in order to disseminate the project to the various audiences of the project.

Title	Start date	End date	Location
World congress of the International Association of Agricultural Information Specialists (IAALD) joined with the 17th annual meeting European Botanical and Horticultural Libraries group (EBHL)	26/04/2010	29/04/2010	Montpellier, France
CETAF meeting	27/04/2010	28/04/2010	Linz, Austria
Berliner Wirtschaftsgespräche – Forschung vor Ort	05/05/2010	05/05/2010	Berlin, Germany
STERNA follow-up meeting	19/05/2010	19/05/2010	Salzburg, Austria
ALA Annual Conference 2010	24/06/2010	30/06/2010	Washington, USA
8 <sup>th</sup> Palaeobotany Palynology Conference	06/07/2010	11/07/2010	Budapest, Hungary
EDIT Summer course	07/2010		Funchal, Madeira
IXth European Congress of Entomology	22/08/2010	27/08/2010	Budapest, Hungary
Prague Summer Conference on IP & Innovation	13/09/2010	14/09/2010	Prague, Czech Republic
Klasse, Ordnung, Art – 200 years Museum für Naturkunde (temporary exhibition)	14/09/2010	27/02/2011	Berlin, Germany
11 <sup>th</sup> Palaeontological Conference	14/09/2010	16/07/2010	Prague, Czech Republic
Final conference of Digital Extra: online exhibitions, low cost, big results	16/09/2010	17/09/2010	Brussels, Belgium
International Symposium Botanical Diversity: exploration, understanding and use	16/09/2010	18/09/2010	Meise, Belgium
iPres2010	19/09/2010	24/09/2010	Vienna, Austria
Digitale Wissenschaft 2010	20/09/2010	21/09/2010	Köln, Germany
BioIdentify - Tools for identifying biodiversity: progress and problems	20/09/2010	22/09/2010	Paris, France
Global BHL Technical Meeting	22/09/2010	24/09/2010	Woods Hole, USA
TDWG 2010	26/09/2010	01/10/2010	Woods Hole, USA
Europeana Group of Projects Meeting	29/09/2010	29/09/2010	The Hague, The Netherlands
Linnaeus Link Union Catalogue (LLUC) partners meeting	1/10/2010	2/10/2010	Geneva, CH
Deutsches Kulturerbe auf dem Weg in die Europeana	4/10/2010	5/10/2010	Berlin, Germany
Open Access Tage	4/10/2010	5/10/2010	Göttingen, Germany
CETAF	5/10/2010	6/10/2010	Brussels, Belgium

<sup>12</sup> <http://www.armubi.de/tagung2010>

<sup>13</sup> <http://www.biosyst-berlin-2011.de/>

Jahrestagung der Paläontologischen Gesellschaft	5/10/2010	8/10/2010	Munich, Germany
3rd meeting Scientific Publishing in Natural History Institutions	7/10/2010	8/10/2010	Copenhagen, Denmark
ISTC meeting (Information Sciences and Technology Committee )	7/10/2010	8/10/2010	Berlin, Germany
Council of Data Aggregators	13/10/2010	13/10/2010	Den Haag,, NL
Benelux Congress of zoology	22/10/2010	22/10/2010	Gent, Belgium
11. Oracle Bibliotheken Summit	27/10/2010	28/10/2010	Weimar, Germany
Internal meeting of workgroup electronic publishing at Humboldt-Universität zu Berlin	29/10/2010	29/10/2010	Berlin, Germany
Library Infrastructure projects	29/10/2010	29/10/2010	Brussels, Belgium
ANMS Annual Meeting	17/11/2010	19/11/2010	Ferrara, Italy
EuropeanaLocal Austria national conference 2010	19/11/2010	20/11/2010	Graz, Austria
Sterna final meeting	23/11/2010	23/11/2010	Leiden, NL
Entomology in Belgium 2010	3/12/2010	3/12/2010	Brussels, Belgium
African-European Archives Colloquium	15/12/2010	17/12/2010	Tervuren, Belgium
Meeting of the eContentPlus Project Mimo	11/01/2011	13/01/2011	Tervuren, Belgium
EDIT General Meeting 3 (Final Event)	17/01/2011	19/01/2011	Paris, France
Technical Meeting Bibliotheca Alexandrina	24/01/2011	27/01/2011	Alexandria, Egypt
Annual Staff Conference, RBGE	27/01/2011	27/01/2011	Edinburgh, UK
Biosystematics 2011 - 7th International Congress on Systematic and Evolutionary Biology (ICSEB VII) - 12th Annual Meeting of the Society of Biological Systematics (Gesellschaft für Biologische Systematik - GfBS) - 19th International Symposium "Biodiversity and Evolutionary Biology" of the German Botanical Society (Deutsche Botanische Gesellschaft - DBG)	21/02/2011	27/02/2011	Berlin, Germany
Master Internacional de Biodiversidad	March 2011		Quito, Ecuador
Vernetzungstage 2011: Wissen schafft Vernetzung: Kooperationen & Mehrwertdienste für Repositorien in vernetzten Umgebungen	3/03/2011	3/03/2011	Osnabrück, Germany
Biodiversity Science Group Annual Conference	4/03/2011	4/03/2011	Edinburgh, UK
OpenUp! Kick-off meeting	9/03/2011	11/03/2011	Berlin, Germany
XV Reunión Científica Barcarrota 2011	17/03/2011	18/03/2011	Barcarrota, Spain
4D4Life Third project meeting	27/03/2011	01/04/2011	Prague, Czech Republic
CCPA Legal Working Group Meeting	7/04/2011	7/04/2011	The Hague, NL
Drupal Government Days	8/04/2011	8/04/2011	Brussels, Belgium
CETAF	27/04/2011	28/04/2011	Linz, Austria

## 4 Target Users & their Needs

As presented above, BHL-Europe provides four routes of access to the digitised books to respond to the different needs of the content users (see Table 2). Libraries need a tool to manage the scanning process and to identify relevant content for scanning. They will use the GRIB to fulfil their needs. Scientists need a way to nominate content for digitisation and get an overview of the entire corpus of biodiversity literature held by the various libraries of the European natural history museums and botanical gardens. This need can also be covered by the GRIB. The direct online access to the biodiversity books stored in the BHL-Europe repository will be facilitated through Europeana and the multilingual BHL-Europe Portal. Users interested in community specific functionality (e.g. Taxonomic Intelligence) will use the BHL-Europe Portal. General interest readers also interested in the wider (cultural heritage) context of the literature will use Europeana as their primary route to the BHL-Europe content.

BHL-Europe has carried out one of two specific online user evaluations during the project. The results of the first survey were evaluated and published last summer (D5.8<sup>14</sup>). In addition to these large scale evaluations, we are in ongoing contact with individual users representing our target users (Table 2). We receive direct feedback from these users for the further development of our prototypes into the live system. All user requirements deliver input into the design of the BHL-Europe system and portal.

**Table 2.** BHL-Europe target users and their needs.

Target user description	Needs
1.1) European citizens	Direct online access to comprehensive information not currently publicly accessible to help raise the awareness and appreciation of biodiversity heritage
1.2) Scientists (e.g. Biology)	Taxonomic descriptions of species; biodiversity data of specific regions in the last centuries; full-text searching; taxonomic intelligence
1.3) Scientists (e.g. History, Cultural heritage)	Historical information on science and scientists
1.4) Citizen scientists / Hobby scientists	Search, read, download, and print articles about biodiversity in their area
1.5) Students of different levels (primary to academic)	Reliable and meaningful information and relevant images on biodiversity; minimal time to aggregate information from different sources; research resource
1.6) School teachers	Resource for teaching materials as complement to textbooks
1.7) Environmental and Conservation agencies / Government officials / Policy makers	Information on impact of climate change, environmental deterioration and human interventions
1.8) Artists	High quality images of animals and plants
2.1) Libraries	Information on the distribution of heritage material (metadata); new platform for presentation of content
2.2) Digitisation centres	Best practice guidelines for the digitisation of heritage literature; new platform for presentation of content
2.3) Digital library / Open Access networks	Best practice guidelines for the establishment of digital library networks; information about digital repositories; new platform for presentation of content
2.4) Universities / museums	Best practice guidelines for the digitisation of heritage literature; new platform for presentation of content

<sup>14</sup> <http://www.bhl-europe.eu/en/outcomes/documents/first-user-evaluation-report>



## 5 Underlying Content

Currently, BHL-Europe has 21 content providers involved as consortium members in the project: MfN, NHM, NMP, UGOE, LANDOE, HNHM, MIZPAS, UCPH, NAT, NBGB, RMCA, RBINS, BnF, MNHN, CSIC, MSN, RBGE, SIL, MOBOT, UH-Viikki, UBER (see Appendix for abbreviations). In addition to these consortium content providers, other partners provide further content during the project's lifetime. At the moment, four non BHL-Europe partners signed the Memorandum of Understanding to contribute to the digital corpus of BHL-Europe. These new content providers are the University Library Bielefeld, the Institute of Paleobiology of the Polish Academy of Science, the Gesellschaft für Biologische Systematik (GfBS) and the Landesbibliothekszentrum Rheinland-Pfalz – dilibri. Currently, all content providers have a total of about 40.19 million pages of digital biodiversity literature to contribute to the BHL-Europe project. This number is continuously increasing as scanning continues.

The content providers create a critical mass of high quality digital content representing the biodiversity domain. The content providers were selected on the basis of their ability to contribute key biodiversity and taxonomic literature (zoology, botany, palaeontology).

Content is not restricted by proprietary third-party rights or by any other constraints, which would limit its use in an open access Creative Commons<sup>15</sup> environment. The digital content is either in the public domain or otherwise the content contributors will have obtained permission from IP owners to allow open access under a Creative Commons license.

The initial focus on public domain material is not a limitation of the project, as systematic biology depends more than any other natural science upon historic literature. Another reason to focus on historical literature is that many old and important monographs are themselves inherently very rare, fragile or in need of conservation. This makes “hands on” access very difficult. This project substantially reduces the need for the physical handling of these rare and valuable materials.

## 6 Summary of Activities

### 6.1 *Important past activities*

In addition to the activities that have lead to the results presented in section 3 above, the following compilation highlights important past activities:

- **BHL ScanList:** The BHL ScanList is a tool to coordinate scanning efforts across biodiversity heritage organisations. The BHL ScanList allows users to browse and search titles held by BHL-Europe and BHL member institutions using advanced filtering, and also to propose items for scanning. The GRIB incorporates the functionality for future management of the digitisation process. Several of our project partners worked on improving the BHL-Europe ScanList. LANDOE, for example, enriched the list with items that have been scanned in their institution. The maintenance of the ScanList and the provision of enhanced features for our partners, such as a .csv export procedure, is carried out by NHMW. ScanList users can now view and export the current list on their screen of existing bids as a .csv file in order to

<sup>15</sup> <http://creativecommons.org/>

better coordinate scanning management. These features have been transferred from the test system to the live system.

- **Analysis of domain content:** During the year, much work has been done by our partners regarding analysis of domain content. Work has been done on the analysis and the preparation of monographs and serials relevant for the biodiversity community. Our content providers discussed how and which digital publications can be offered to BHL-Europe. We are currently working on a collection development policy in order to better understand the content to be considered by BHL-Europe. This will also help the content acquisition process and the extension of our content provider network.
- **Analysis and preparation of (Meta)data for Pre-Ingest:** An activity of the last months that is ongoing today is the preparation of the content and associated metadata by the content provider. After the content is uploaded to the NHM servers, the test content is then checked by AIT and by NHMW. AIT verifies that the file submission guidelines have been followed and NHMW starts data mapping to the OLEF schema creating a configuration for every content provider to accommodate the characteristics of the content provider data.
- **Memorandum of Understanding:** BHL-Europe is currently revising the existing MoU to adapt it for the use of content providers that are not part of the BHL-Europe consortium. This is part of the sustainability strategy to prepare for the time after the end of the project. The new MoU also takes into account the new development in Europeana (Data Exchange Agreement) and the continuous growth of the Global BHL network.
- **Globally Unique Identifiers (GUID):** The requirements for data management and access & storage require each object within the data repository to be uniquely identifiable. From the original requirements, page metadata needs to be uniquely addressable for example when a search is undertaken for taxonomic key words and we return the associated OCR text from the page. We now have a proposal for creating unique identifiers for the BHL-Europe content, which still needs to be implemented and tested.
- **Optical Character Recognition (OCR):** The improvement of the OCR is fundamental but very challenging for BHL-Europe. We need good OCR to facilitate the search for taxon names, for example, but we need experts to collaborate with. The IMPACT project (Improving Access to Text) is facing the challenge in Europe and is working on innovation in OCR technology. Over the last months, the collaboration between BHL-Europe and IMPACT has been intensified. We are investigating to what extent the IMPACT knowledge and tools can help BHL-Europe to improve the OCR of our documents.
- **Taxonomic Intelligence:** BHL-Europe need to improve the search for taxon specific information in the BHL-Europe portal. We decided already to use the uBio TaxonFinder to identify potential taxonomic names. This will be the BHL-Europe automatic 'name finding' component. However, the Catalogue of Life (CoL)<sup>16</sup> will provide a more elaborated service in terms of 'real' taxonomic intelligence. Identified 'names' in the BHL-Europe content, either by using the Taxon Finder or provided by

---

<sup>16</sup> <http://www.catalogueoflife.org/>

the content provider in the metadata, will be linked with the CoL to improve the recall of relevant literature. Technical implementations were already discussed during the last months and are in progress.

- **Virtual exhibition:** In order to promote the biodiversity heritage literature of BHL-Europe to the general interest reader, we are building virtual exhibitions on top of our content. Over the last months the concept was developed and the technologies implemented. For the first exhibition we decided to put the world of spices on display. Every spice is featured by several levels of information, including links to the scientific books where the spice plants are described in more detail. More exhibitions on different topics will follow in the next months using the same template.

## 6.2 Important future activities

After the delivery of the first prototypes it is now the main task to continue with the implementation work on the BHL-Europe system and portal and deliver a stable system in the third year of the project. This also includes the ingest of all BHL-Europe content and the delivery of that content to Europeana through our system. More content providers should be acquired and their content ingested to further complement the BHL-Europe corpus.

All system components should be tested on various levels and by various target users to ensure stability and usability. User evaluations will be carried out to support further system improvements. There is a simultaneous increase of dissemination activities including workshops with hands-on training for the users. Virtual exhibitions will illustrate the variety and use of the content provided by BHL-Europe.

Although the GRIB is finished now, the ingest of new data and the update and maintenance of the infrastructure will continue in year three of the project. Some new functionalities may also be implemented to further enhance the usability of the GRIB. BHL-Europe will establish a helpdesk to support new data provider.

A lot of documentation work will be carried out in the final project year. A few examples: we will finalise the technical documentation of components due for delivery; we will continue our work on the Best Practice Guide and publish this as a document for the digital library community; we will invest more time in our business development strategy to ensure a sustainable BHL-Europe.

Nine documents will be delivered by BHL-Europe at the end of the project in April 2012.

## 7 Impact & Sustainability

BHL-Europe contributes to the i2010 European Digital Library initiative of the European Commission to improve the online accessibility of digital content. The results of the project will remain accessible online also after the end of the duration of the project through various platforms. One of these platforms is Europeana, plans for which extend beyond the end of the BHL-Europe project.

BHL-Europe is also embedded in a global framework through BHL. The BHL community is currently growing and new regional partner projects are joining the community. The current partner projects include BHL-China, BHL-Australia, BHL-South America, and Arab Language BHL in addition to BHL and BHL-Europe. This quick growth underpins the

importance of BHL on a global scale and helps BHL-Europe to maintain a sustainable service in Europe for the future. This global community also helps BHL-Europe to bring together and repatriate that part of the European cultural heritage currently not available in European institutions, and to also provide a digital copy to BHL-Europe and Europeana.

It is important for BHL-Europe to have its own strategy for sustainable services beyond the end of the Best Practice Network in April 2012. The approach and necessary actions are elaborated in full detail in a separate document (D1.5) currently only available to programme participants. This document provides an analysis of five possible strategic directions for BHL-Europe and of six business components to realise the identified options. This takes into account four different access routes to the BHL-Europe digital archive (see also Fig. 1). To elaborate on our business strategy, the objectives and values proposed to our major stakeholders (content providers and end users) are also described.

For the Business Plan for long-term sustainability (D1.9) in M36 of BHL-Europe, funding options will be further investigated. We will elaborate on business strategies, refine them and identify European partners to take responsibility for future tasks. Details will be announced once we have agreed on the future direction.

## 8 Conclusion

BHL-Europe is currently in a very dynamic situation. We have successfully revised deliverables refused by the EC during the annual review in May 2010 and received a green light to continue our work. The first implementation work of the project is finished, the tests of these components and further implementation and development work are in progress. Our content providers have done significant work over the last year to prepare the content for the ingest process. Now the ingest process has started to align the work of the content providers with the system development work. We have put more effort in dissemination activities to communicate the outcomes to our target users and to prepare for the final roll-out of the project results. We have also intensified the collaboration with Europeana to ensure that content ingest, dissemination activities and strategic processes are aligned. There is much activity in Europe concerning the digitisation and preservation of our digital heritage, and Europeana is a very important player in this context. It is a very dynamic process and BHL-Europe is a central participant.

## 9 Further Information

Please consult the BHL-Europe Web site [www.bhl-europe.eu](http://www.bhl-europe.eu) for any further information on the project. You can register for the quarterly newsletter and can find all publicly available project results. You can also read our Weblog<sup>17</sup> and follow us on Facebook<sup>18</sup> and Twitter<sup>19</sup>. You can also contact the project office in Berlin below:

Dr. Henning Scholz  
BHL-Europe Project Coordinator  
Museum für Naturkunde - Leibniz-Institut für Evolutions- und  
Biodiversitätsforschung an der Humboldt-Universität zu Berlin  
Invalidenstrasse 43  
D-10115 Berlin  
Germany

Email: [bhl-europe@mfn-berlin.de](mailto:bhl-europe@mfn-berlin.de)

---

<sup>17</sup> <http://bhleurope.blogspot.com/>

<sup>18</sup> <http://www.facebook.com/pages/BHL-Europe/151086001600041>

<sup>19</sup> <http://twitter.com/BHLEurope>

## Appendix 1 Consortium

### **Museum für Naturkunde - Leibniz-Institut für Evolutions- und Biodiversitätsforschung an der Humboldt-Universität zu Berlin (MfN)**

With more than 30 million objects, the MfN is the largest natural history museum in Germany. The library of the MfN holds 175,000 items and currently subscribes to about 1,000 journal titles in the fields of zoology, palaeontology, and mineralogy.

**Role:** Project Coordinator, Work Package leader, Technology Provider, Library expert, Taxonomist/User, Disseminator

### **Natural History Museum (NHM)**

The Natural History Museum in London is one of the world's greatest museums, with over 3.9 million visitors and 13 million online visitors per year. The NHM is also an international leader in the scientific study of the natural world. The NHM Library has the largest collection of natural history material in the world, with over 1 million books (from 1469 onwards), 25,000 journal titles and 600,000 works of art. The NHM is a leading participant in the BHL project and an active player in the Encyclopedia of Life project.

**Role:** Work Package leader, Content Provider, Technology Provider, Library expert, IPR expert, Disseminator

### **Narodni muzeum (NMP)**

The National Museum is the largest museum and most distinguished leading public scientific institution in the Czech Republic with about 400 thousand visitors each year. It systematically enriches its collections including areas of natural and historical sciences from all over the world, but with particular interest to the Czech Republic. It conducts research in various fields of natural and historical sciences which it actively exhibits. It consists of five professional institutions: Natural History Museum, Historical Museum, The Naprstek Museum of Asian, African and American Cultures, Czech Museum of Music and National Museum Library. At present the National Museum houses almost 20 million items from the area of natural history, history, archaeology, arts, music and librarianship.

**Role:** Work Package leader, Content Provider, Library expert, Taxonomist/User, Disseminator

### **European Digital Library Foundation (EDL Foundation)**

The Stichting European Digital Library (EDL Foundation) is a cross domain foundation, under Dutch law, set up for the purpose of fostering collaboration between Museums, Archives, Libraries and Audiovisual Collections in Europe. It aims to provide access to Europe's cultural heritage by facilitating formal agreement across museums, archives, audio-visual archives and libraries on how to cooperate in the delivery and sustainability of a joint portal. It also provides a legal framework for use by EU funded projects to bring their research or content into the Europeana.

**Role:** Technology Provider, Library expert, Disseminator

### **Angewandte Informationstechnik Forschungsgesellschaft mbH (AIT)**

AIT is an Austrian software and research company founded in 1979. Research work is done primarily in the field of information management (e.g. distributed databases, collection management and knowledge engineering).

**Role:** Technology Provider, Disseminator

### **Atos Origin System Integration (ATOS)**

Atos Origin is a leading international IT services provider. Atos Origin is the Worldwide Information Technology Partner for the Olympic Games. At Atos Origin, Systems Integration is not just about integrating new solutions, but includes getting the most out of legacy applications to prolong returns from existing IT investment. Successfully combining new solutions with established ones can transform the complete enterprise architecture into a single, seamless business system. Our extensive experience in integrating people, processes and technologies enables us to design, build and operate practical and robust solutions.

**Role:** Technology Provider, Disseminator

**Freie Universitat Berlin (FUB-BGBM)**

The Botanic Garden and Botanical Museum Berlin-Dahlem (BGBM), with its extensive scientific collections of herbarium specimens (about 3.5 million) and living plants, is a centre of biodiversity research in Europe. It houses the most complete botanical library in Germany. The library holds a wide range of literature on plants from all over the world, in all printed languages and from five centuries, among them many precious and very rare books. BGBM has a separate department of Biodiversity Informatics with, at present, 20 staff members. Focal points of research and development activities are taxonomic information systems and networking of distributed primary biodiversity information.

**Role:** Technology Provider, Library expert, Taxonomist/User, Disseminator

**Georg-August-Universität Göttingen Stiftung Öffentlichen Rechts (UGOE)**

The EZOOLO/AnimalBase project is located at the Georg-August-Universität of Göttingen. It was initiated as a joint venture of Göttingen University Library (SUB) and the Zoological Institute of the university to provide free access to digitised versions of all taxonomically relevant early zoological work. In the first step (2003-2005) more than 100,000 pages were digitised from the earliest beginnings of scientific zoology in the 1550s until the year 1770 and 10,000 animal names were extracted and transferred to AnimalBase. In the second step, from 2008 onwards, literature until the 1820s will be covered, with approximately 50,000 animal names being extracted.

**Role:** Content Provider, Library expert, Taxonomist/User, Disseminator

**Naturhistorisches Museum Wien (NHMW)**

The collections with more than 30 million specimens, including hundreds of thousands of types, are the basis for any taxonomic work. Additionally a library with many historically important volumes is available. The library with c. 6,000 scientific journals and tens of thousands of books complement the National Library of Austria and the University's libraries nearby.

**Role:** Technology Provider, Library expert, Taxonomist/User, Disseminator

**Land Oberösterreich (Oberösterreichische Landesmuseen) (LANDOE)**

The Biology Centre in Linz-Dornach, with more than 6 million objects, represents the 2nd largest in Austria. It currently publishes the series *Stapfia* and *Denisia* and three other journals. It holds the biodiversity database ZOBODAT, founded in 1972 as ZODAT. The database today includes more than 3.3 million records, literature citations (more than 33,000), OCR scanned books (~150,000 pages) and until now bibliographies from about 4,000 biologists.

**Role:** Technology Provider, Content Provider, Library expert, Taxonomist/User

**Hungarian Natural History Museum (HNHM)**

HNHM holds more than 10 million natural history items. HNHM Library contains more than 300,000 volumes. The HNHM has published several natural history journals and books during its 200 years history. During recent years these have become available via the internet but there is a strong commitment by HNHM to digitise and provide free access to its own journals and books.

**Role:** Content Provider, Library expert, Taxonomist/User, Disseminator

**Museum and Institute of Zoology, Polish Academy of Sciences (MIZPAS)**

The library collection is of national importance including literature on zoology, especially systematic and zoogeography, entomology and ornithology. Recently it has increased its collections of publications concerning molecular biology. At present the Library comprises 243,271 volumes and 5,378 archival items.

**Role:** Library expert, Disseminator

**University of Copenhagen (The Natural History Museum of Denmark) (UCPH)**

The museum holds an estimated 12 million specimens of animals, plants, books, archives, fossils, minerals, and other natural history related items. Part of the museum are three libraries, botanical, zoological and geological. The libraries hold more than 250,000 bibliographic entities (books, journals, reprints).

**Role:** Technology Provider, Content Provider, Taxonomist/User, Disseminator

#### **Stichting Nationaal Natuurhistorisch Museum Naturalis (NAT)**

Naturalis was founded in 1820 and much of its collection dates back to the 19th and 20th century. The collections of zoological, palaeontological and geological objects are estimated to total about 12 million objects. Naturalis can rely on a strong and innovative department of information services, backed by natural history collections and archives which cover nearly 200 years of research and collecting.

**Role:** Technology Provider, Content Provider, Library expert, Disseminator

#### **National Botanic Garden of Belgium (NBGB)**

NBGB is a 'complete' botanical garden, integrating a living collection ('Hortus'; 18,000 species in cultivation) and a large museum ('Herbarium'; more than 3 million plants incl. fungi). The library holds 50,000 monographs including 2,500 valuable historical books, 5,000 periodicals and 25,000 reprints. Historical literature on Central African flora was kept in NBGB since 1890. Data repatriation to partners both in Africa and Latin America is a priority for NBGB. Drawings and colour paintings of flowering plants and fungi were digitised and linked to specimens kept in the BR herbarium.

**Role:** Technology Provider, Content Provider, Library expert, Taxonomist/User, Disseminator

#### **Royal Museum for Central Africa (RMCA)**

RMCA is a multidisciplinary institution with a special focus on Sub-Saharan Africa. The museum manages collections of about 10 million specimens of animals and 56,000 wood specimens from 13,600 different botanical species. The RMCA maintains an extensive library on African biodiversity, including the top scientific journals, but also a unique collection of rare, old colonial publications. Information on biodiversity is repatriated to African partners, suitable training in taxonomy is also provided.

**Role:** Technology Provider, Content Provider, Taxonomist/User, Disseminator

#### **Royal Belgian Institute of Natural Sciences (RBINS)**

The RBINS houses a diverse and exceptionally rich collection, comprising about 37 million specimens. The scientific library of the RBINS is the biggest documentary resource of natural history in Belgium. It offers a vast range of books (695,368 volumes) and has very specialised, often unique scientific magazines. RBINS has begun digitisation of the library catalogue and more than 185,000 titles are online.

**Role:** Content Provider, Taxonomist/User, Disseminator

#### **Bibliothèque nationale de France (BnF)**

BnF is one of the largest public and research libraries in the world and holds more than 50,000 monographs and around 3,000 titles of periodicals published in the field of natural sciences between 1801 and 1920. The BnF offers access to its digital library Gallica, [www.gallica.bnf.fr](http://www.gallica.bnf.fr), created through the library's commitment to digitisation of selected items of its collections. In spring 2008, the BnF launched a new version of Gallica with new, modern functionalities, drawing upon the most recent Web 2.0 experience. At a European level, the BnF is a founding member of The European Library consortium.

**Role:** Technology Provider, Content Provider, Library expert, Disseminator

#### **Museum national d'histoire naturelle (MNHN)**

The main activities of MNHN are research, education and training, enrichment of its collections (around 68 million specimens), providing expertise and diffusion of scientific knowledge. The central Library Department holds the world's third largest collection of literature, original drawings and manuscripts relating to natural history. The print collections include 20,000 periodical titles and 600,000 books. Digitisation plans are already on-going in full collaboration with BnF.

**Role:** Content Provider, Library expert, Disseminator

#### **Consejo Superior de Investigaciones Científicas (CSIC)**

CSIC is the largest National Research Institution in Spain. The participant institute, Museo Nacional de Ciencias Naturales (MNCN) houses the biggest natural history collections, library and archives in Spain. The public library of MNCN contains more than 62,000 volumes and more than 6,400 scientific journals as well as access to more than 9,000 electronic journals.

**Role:** Content Provider, Library expert, Taxonomist/User, Disseminator



**Universita degli Studi di Firenze (Museo di Storia Naturale) (MSN)**

With more than 10 million specimens, it is the most important natural history museum in Italy. The Museum houses specimens of extraordinary scientific and natural history value: XVI century herbaria, valuable XVIII century waxes, fossil elephant skeletons, brightly coloured butterflies, huge tourmaline crystals, Aztec artefacts, imposing wooden sculptures and the world's largest flower. A lot of ancient and rare books are also preserved in the Library (Biblioteca di Scienze).

**Role:** Library expert, Disseminator

**Royal Botanic Garden Edinburgh (RBGE)**

RBGE is an internationally renowned centre for botanical research and conservation work and holds one of the largest collections of living plant species in Europe, together with large collections of preserved plant and fungal material. It has one of the most important botanical libraries in the UK.

**Role:** Content Provider, Library expert, Disseminator

**Species 2000 (Sp2000)**

Species 2000 is a Network organisation which is creating an index of the world's known organisms. The programme reached production scale as an EC scientific infrastructure under the FP5 EuroCAT project. Its Catalogue of Life is a global service ([www.catalogueoflife.org](http://www.catalogueoflife.org)) recognised by the UN Convention on Biological Diversity, and presently comprises a synonymic species checklist of 1.1 million plants, animals, fungi and micro-organisms, about 2.5 million names and a comprehensive taxonomic hierarchy.

**Role:** Taxonomist/User, Disseminator

**John Wiley & Sons limited (Wiley)**

Wiley is a global publishing company founded in 1807 which markets its products to professionals and consumers, students and instructors in higher education plus researchers and practitioners in scientific, technical, medical and scholarly fields. Through the 2007 acquisition of Blackwell Publishing, Wiley has gained the Blackwell Synergy platform, home to over 850 Blackwell journals. Also during 2007, the company completed an initiative to digitise its entire historical journal holdings, making 8.2 million pages of content, dating back to 1799, available on Wiley InterScience.

**Role:** Content Provider, Disseminator

**Smithsonian Institution (SIL)**

The Smithsonian Natural History Museum is dedicated to inspiring curiosity, discovery and learning about the natural world through its unparalleled research, collections, libraries, exhibitions and education programs. At the centre of the Museum's exhibition and research programs are its expertly documented collections of more than 125 million natural science specimens and cultural artefacts. The BHL project is led from SIL.

**Role:** Content Provider, Library expert, Disseminator

**Missouri Botanical Garden (MOBOT)**

The mission of MOBOT is to discover and share knowledge about plants and their environment in order to preserve and enrich life. Founded by Henry Shaw and opened to the public in 1859, the Garden is a National Historic Landmark and widely considered one of the top three botanical gardens in the world. MOBOT is a founding member of the BHL project and is supporting the development of the system's infrastructure, application layers and interfaces.

**Role:** Technology Provider, Content Provider, Disseminator

**Helsingin yliopisto, University of Helsinki, Viikki Science Library (UH-Viikki)**

Viikki Science Library is the bioscience campus library of the University of Helsinki. The library is the largest resource library in Finland in bioscience, agriculture and forestry, pharmacy and veterinary medicine. The library also serves the Finnish Museum of Natural History.

**Role:** Technology Provider, Content Provider, Library expert, Disseminator



**Humboldt-Universität zu Berlin (UBER)**

The University Library and the Computer and Media Services of UBER have carried out several projects within the fields of e-publishing, digital preservation and the digital library.

**Role:** Technology Provider, Disseminator