

Annex 1

Description of Work ***(Best Practice Networks)***

[ECP 518001]

Biodiversity Heritage Library for Europe
BHL-Europe



eContentplus

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0 Project Summary

The lack of access to the published biodiversity literature is a major obstacle to efficient research and a broad range of other applications, including education, biodiversity conservation, protected area management, disease control, and maintenance of diverse ecosystems services. This literature also has cultural importance as a resource for the study of the history of science, art and other non-science applications. Currently, a large number of small projects are digitising biodiversity material in numerous institutions across the EU to make access more open, but the corpus will still be seriously fragmented. These projects do not use common standards or interfaces and are not interoperable. In alignment with the EC i2010 initiative, BHL-Europe aims to make the biodiversity knowledge available to everybody who is interested by improving the interoperability of European biodiversity digital libraries.

BHL-Europe will review and test different approaches for such libraries based on the experiences of the partners involved in the project. The consortium will establish a best practice approach and promote the adoption of standards and specifications for the large-scale implementation in a real-life context. BHL-Europe will provide a multilingual access point for search and retrieval of digital content through EUROPEANA. In addition, it will provide a robust multilingual portal with sophisticated search tools to facilitate the search for taxon-specific biodiversity information. The project will also develop operational strategies and processes for long-term preservation and sustainability of the data produced by national biodiversity digitisation programmes. BHL-Europe will generate activities to raise awareness and to ensure that the project outputs are known and used by the target users and that the proposed approach directly addresses user needs. BHL-Europe experience and best practice will be shared with the wider digital library community.

1 Rationale and Objectives

1.1 Description of the issue addressed and the current situation (baseline)

1.1.1 Background: the importance of biodiversity literature

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 scientific 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.

Once the collections of biodiversity literature are freely available on the Internet, this will be of great value to scientists, and also to a much wider public. Amateur naturalists (citizen scientists) who lack affiliation with major research institutions will be able to search, read, download, and print articles that were previously unavailable to them. Designers and artists will be able to use the detailed illustrations integral to many taxonomic works as motifs or design concepts in their work. Educators guiding students in how to do biological research will have access to a wealth of examples to incorporate into lesson plans and assignments. Historians and social scientists will have access to the stories and background information on the development of the natural sciences and to ever-developing scientific theories and understanding.

The greatest diversity of the biota exists in tropical and developing countries, yet the literature documenting this biodiversity is overwhelmingly held in a small number of European and North American libraries. Digitising this literature and making it freely available on the Internet is an act of significant knowledge transfer, thus helping the EU to achieve its commitments under Article 17 of the Convention on Biological Diversity (CBD).

In addition to the scientific value of this literature, the taxonomic literature is also part of our cultural heritage. Taxonomists study and describe the organisms and biodiversity of particular areas. These areas

commonly are cultural landscapes or parts of cultural landscapes. Cultural landscapes "represent the combined works of nature and of man" and reflect the evolution of human society over time in relationship to its ecological context. Thus cultural landscapes are part of the cultural heritage according to Article 1 of the UNESCO World Heritage Convention. As part of this cultural landscape, information on nature and biodiversity will be combined with information on archaeology and ethnology through the lead project of the European Digital Library Foundation, EUROPEANA. Descriptions and documentations of natural phenomena, of plants, and of animals, should be considered as part of the European cultural heritage.

BHL-Europe directly addresses the overall aim of *eContentplus*, "to make digital content in Europe more accessible, usable, and exploitable" and to do this in the context of key information sources for biodiversity. More specifically it focuses on **Action 5.1. Best Practice Networks for interoperability of digital libraries** with the objective of improving the interoperability of digital libraries held by 15 natural history museums and botanic gardens and two institutional archives, and libraries across 13 EU Member States, and will be progressively extendable. We will establish standards-based interoperability between digitised documentation and the collections, ensuring the interoperability of the systems and multilingual and cross-cultural search and retrieval of the digital content, and facilitate user access through the common user interface of EUROPEANA.

1.1.2 EUROPEANA and the European Digital Library Foundation

EDLNet has created EUROPEANA – a single cultural portal for digital materials for Europe. The European Digital Library Foundation has been set-up to develop a sustainable and secure future for this portal and the underlying digital objects. EDLNet has taken the lead in establishing best practice and standards for the creation of digital objects and for the development of appropriate metadata, leading to a large-scale distributed Portal model. We will integrate fully with this model using best practice and standards from EUROPEANA and BHL.

Currently, the majority of material in EUROPEANA is from the arts and humanities. However, the European Digital Library was set up to also include science. The biodiversity heritage literature is an excellent candidate for the first major corpus of science material to join EUROPEANA – the literature has both scientific value and major cultural importance. These biodiversity texts are the core to any study of the history of the development of scientific thought in Europe over the last three centuries.

BHL-Europe will cooperate closely with EUROPEANA at a technical level – database systems, metadata schemas, harvesting protocols, interface development, etc. – to ensure full transparent interoperability. Additionally, the NHM will provide IPR advice and support for both projects, ensuring a consistent relationship with Rights Holders across the major EU digital library initiatives.

By developing BHL-Europe systems, EUROPEANA will be able to significantly augment its holdings of digital biodiversity content because the application will be developed to interface with and ingest from the current Biodiversity Heritage Library Portal. This implies that the European content currently digitized as part of the American-UK led BHL will be able to be incorporated as part of the application development. These will be European biodiversity texts that will not have to be rescanned by European libraries.

1.1.3 Background to the global Biodiversity Heritage Library (BHL) Project

Since 2007, ten major biodiversity libraries have collaborated in digitising the biodiversity literature (main focus on English language literature) in an open access manner 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). Preliminary commitments have also been received from the Australian government and Chinese Academy of Sciences to digitise their own biodiversity literature. The global BHL project is predominantly funded by grants from large US foundations and the operating budgets of the member institutions.

The main aim of the BHL project is to make the biodiversity knowledge accessible on an open access Creative Commons basis to a wide spectrum of end-users. Optical Character Recognition (OCR) techniques will be used to extract the relevant information from digitised objects. Taxonomic intelligence tools are used to overcome the issue of changing names, names using local languages and plurality of names for the same object (synonyms). A research scientist, student or member of the public, who has access to the Internet anywhere in the world, will be able to search for specific information in all of the literature relevant to biodiversity and transparently link the documentation to taxonomic, geographic, biographic, or other relevant databases.

It is essential that BHL should be a global partnership because, while many libraries have collected biodiversity materials, no single library holds the complete corpus of legacy literature. The BHL Portal is available at www.biodiversitylibrary.org.

1.1.4 Issues addressed by BHL-Europe

The BHL is a global project and it is vital that Europe contributes its biodiversity literature to the project and that European users have access to the global BHL project. Some of the important English language literature of Europe is already part of the BHL. It is essential that the very significant amount of biodiversity literature held in other European languages – German, French, Dutch, Spanish, and others – is also integrated and becomes far more widely accessible to users. This requires a European effort to establish BHL-Europe as a dynamic component that will be both valuable in itself and also contributes to a global effort.

We will manage the acquisition, digitisation, and hosting of the material contained in European institutions and will significantly improve the interoperability of these currently disparate and developing European digital libraries. The material in each European nation will be made accessible through **EUROPEANA** (European Digital Library Foundation). We will manage the process by which each nation digitises its biodiversity material and ensure that this is done efficiently and effectively. The efficient coordination and management of ‘commitments to digitise’ is vital (some of the material is available in several different locations in Europe) and duplication must be avoided.

We will review and test different approaches, standards and specifications for biodiversity digital libraries based on the experiences of the partners involved in the project. The consortium partners will agree on a best practice approach to be used for the large-scale implementation in real-life context.

We will manage the relationship with the global BHL project and with the national and European partners. European experience in multilingual and multicultural database technology will add considerable value to the BHL Portal by providing multilingual access. Our experience in distributed data management will be vital to the long-term sustainability of the whole BHL project.

BHL-Europe is a project that will mobilise funding in individual EU nations in order to undertake and complete essential scanning work. Several of the partners have already indicated that their government will promote national scanning initiatives once a large coordinating project like BHL-Europe is in place.

1.1.5 Benefits of BHL-Europe

- 1) Enabling access to ~25 million pages of scientific literature on biodiversity to EUROPEANA will have a significant impact on the breadth and depth of European culture covered. Specifically, the action will:
 - begin the fulfilment of the scientific dimension of the EUROPEANA cultural arena
 - demonstrate the global importance of European scientific endeavour in biological sciences
 - provide tools and information for the study of the history and sociology of European science
 - provide access to culturally-important documents – from Darwin, Linnaeus, von Humboldt, Wallace, Cuvier, Merian, etc.
 - provide access to many beautiful and culturally-important images – botanical drawings, zoological drawings, watercolours, etc.
- 2) Providing access to the biodiversity literature (images and text) using a common global portal with integrated and sophisticated search tools will produce a number of long-term benefits for the European and global biology communities. These outcomes include:
 - improving the efficiency of research in the biology domain
 - improving access to biodiversity information for non-museum biologists
 - repatriation of species information in developing countries back to those countries via the Web
 - capacity building in the developing world (reducing taxonomic knowledge gaps, supporting taxonomists training programmes)
 - preservation of rare and fragile materials
- 3) The project mobilises 28 partners (23 of which may be literature providers) from 13 EU countries (of which 3 are New Member States). It is a consortium of museums, botanic gardens, universities, commercial companies, the BHL (represented by the Smithsonian Institution Library – SIL), the EDL

Foundation, and other EU projects e.g. EDIT (European Distributed Institute of Taxonomy), SYNTHESYS (Synthesis of Systematic Resources), etc.

1.2 Description of the project objectives

The project aims to make Europe's biodiversity information, which is locked in many disparate libraries or scattered in many digital repositories, available for everybody with interest in biodiversity through a global portal (BHL) with specific biological functionality (e.g. taxonomic intelligence) and to a wide European cultural audience through EUROPEANA.

More precisely, BHL-Europe aims to:

- (1) review and test approaches for the establishment and management of multilingual biodiversity digital libraries
- (2) improve the interoperability of European biodiversity digital libraries by the innovative application of proven technologies
- (3) promote the adoption of best practice, standards and specifications for the large-scale implementation of such repositories
- (4) facilitate the open access to taxonomic literature for a large number of target users including the general public
- (5) provide a multilingual access point for the search and retrieval of biodiversity content through at least two portals (EUROPEANA and BHL)
- (6) raise awareness and ensure that the project outputs are known and used by the target users and that the proposed approach directly addresses user needs
- (7) develop operational strategies and processes for long-term preservation and sustainability of the data produced by national biodiversity digitisation programmes
- (8) facilitate and enable the initiation of scanning initiatives in European countries not yet involved in digitisation programmes and improve the infrastructure for digital libraries in all EU countries
- (9) negotiate with Rights Holders to enable access to in-copyright content

1.3 Expected results

The proposed project will produce the following specific and measurable results:

- (1) a robust biodiversity community portal with open, distributed architecture to provide multi-language access to the digital content
- (2) ~ 25 million pages of biodiversity literature from a large number of EU Member States for display through the EUROPEANA Portal
- (3) tested and validated best practice methods, standards and specifications for technology platforms, digitisation and image storage
- (4) tested and validated methodology for content enrichment
- (5) tested and validated best practice workflow on implementing BHL-Europe architecture
- (6) sustainable and persistent digital curation of biodiversity heritage literature; preservation and conservation of rare and fragile material
- (7) the integration of Taxonomic Intelligence Web tools to facilitate the search for taxon-specific biodiversity information
- (8) improved efficiency of research in the biology domain; improving access to information to non-museum biologists; building public engagement, awareness and participation
- (9) permission from publishers to digitise previously published in-copyright content
- (10) a metadata repository and collection analysis tool for all the leading libraries involved
- (11) strategies, plans and processes for long-term preservation and sustainability of the data produced by national biodiversity digitisation programmes as part of BHL-Europe

1.4 List of participants

The partners for BHL-Europe include most important natural history museums and botanical gardens in Europe because they have large biodiversity libraries. All are domain experts, and will be disseminators of the project's outcomes through their extensive participation in related community networks and their contacts with the target user groups. Several of the selected partner institutions combine their domain and library expertise with a strong expertise in biodiversity informatics and related IT issues making them ideal for the technological implementation of the project (e.g. NHM, FUB-BGBM, NAT, RMCA, and NHMW). The IT expertise of BHL-Europe is completed by two commercial companies (AIT, ATOS), both of whom are highly experienced in the development, adaptation, and implementation of digital archives and libraries. These commercial companies are full partners of the network and are responsible for most of the technical integration of the digital content.

List of Participants

AP No ¹	Participant name	Partic. short name	Country	Role in the project ²	Date enter project	Date exit project
1	Museum für Naturkunde - Leibniz-Institut für Evolutions- und Biodiversitätsforschung an der Humboldt-Universität zu Berlin	MfN	DE	Project coordinator, (Content provider), Technology provider, Disseminator, Domain / Language expert	M1	M36
2	Natural History Museum	NHM	UK	Content provider, Technology provider, Disseminator, IPR expert, Domain / Language expert	M1	M36
3	Narodni muzeum	NMP	CZ	Content provider, Disseminator, Domain / Language expert	M1	M36
4	European Digital Library Foundation	EDL Foundation	NL	Technology provider, Disseminator	M1	M36
5	Angewandte Informationstechnik Forschungsgesellschaft mbH	AIT	AT	Technology provider	M1	M36
6	ATOS Origin Integration France	ATOS	FR	Technology provider	M1	M36
7	Freie Universität Berlin	FUB-BGBM	DE	(Content provider), Technology provider, Disseminator, Domain / Language expert	M1	M36
8	Georg-August-Universität Göttingen Stiftung Öffentlichen Rechts	UGOE	DE	Content provider, Domain / Language expert	M1	M36
9	Naturhistorisches Museum Wien	NHMW	AT	(Content provider), Technology provider, Domain expert	M1	M36
10	Land Oberösterreich	LANDOE	AT	Content provider, Domain expert	M1	M36
11	Hungarian Natural History Museum	HNHM	HU	Content provider, Domain / Language expert	M1	M36
12	Museum and Institute of Zoology, Polish Academy of Sciences	MIZPAS	PL	(Content provider), Domain / Language expert	M1	M36
13	University of Copenhagen	UCPH	DK	Content provider, Domain / Language expert	M1	M36
14	Stichting Nationaal Natuurhistorisch Museum Naturalis	NAT	NL	Content provider, Disseminator, Domain / Language expert	M1	M36
15	National Botanic Garden of Belgium	NBGB	BE	Content provider, Domain / Language expert	M1	M36
16	Royal Museum for Central Africa	RMCA	BE	Content provider, Technology provider, IPR expert, Domain / Language expert	M1	M36
17	Royal Belgian Institute of Natural Sciences	RBINS	BE	Content provider, Disseminator, Domain / Language expert	M1	M36
18	Bibliothèque nationale de France	BnF	FR	Content provider, Domain / Language expert	M1	M36

¹ Participant number 1 is the Coordinator. The remaining participants are beneficiaries.

² The main operational role that the participant plays in the proposed project. For example: content provider, technology provider, pedagogical expert, standardisation body, evaluation, dissemination etc.

19	Museum national d'histoire naturelle	MNHN	FR	Content provider, Disseminator, Domain / Language expert	M1	M36
20	Consejo Superior de Investigaciones Cientificas	CSIC	ES	Content provider, Domain / Language expert	M1	M36
21	Università degli Studi di Firenze	MSN	IT	(Content provider), Domain / Language expert	M1	M36
22	Royal Botanic Garden Edinburgh	RBGE	UK	Content provider, Domain expert	M1	M36
23	Species 2000	Sp2000	UK	Domain expert	M1	M36
24	John Wiley & Sons limited	Wiley	UK	(Content provider)	M1	M36
25	Smithsonian Institution	SIL	USA	Content provider, IPR expert, Disseminator, Digital library expert	M1	M36
26	Missouri Botanical Garden	MOBOT	USA	Technology provider, Digital library expert	M1	M36
27	Helsingin yliopisto	UH-Viikki	FI	Content provider, Domain / Language expert	M1	M36
28	Humboldt-Universität zu Berlin	UBER	DE	Disseminator, Digital library expert	M1	M36

Potential content providers that have no digital content at the moment but potentially in the future are given in brackets.

2 Contribution to programme objectives

BHL-Europe focuses on **Action 5.1. Best Practice Networks for interoperability of digital libraries** with the objective of improving the interoperability of digital libraries currently held by 15 natural history museums and botanic gardens, two institutional archives, and libraries across 11 EU Member States and will be progressively extendable.

We will

- establish standards-based interoperability between digitised documentation, text, metadata and the collections, thus ensuring the interoperability of the systems for
 - enabling the use of the multilingual and cross-cultural search and retrieval of the content
 - facilitating user access through EUROPEANA
- establish highly interoperable databases of the biodiversity-related content held by museums, archives and libraries
- enable the actual content to be accessible and retrievable at item level by users across the European Research Area (ERA) and beyond in developing countries
- take full account of the users and their needs and extend the range of users

We will bring a large amount of new material to EUROPEANA – and this material will be from a major science domain.

The biodiversity literature collections in Europe are spread across a large number of institutions. Inevitably, there is much duplication of content. While each national government will be expected to fund scanning in their own country, it will be critical that we avoid scanning the same material in multiple locations. Duplication would waste European financial resources and deliver a very confusing set of Web sites for the user. Coordinating the scanning process at the European level will maximise the benefit of the funds for scanning, and amortise the cost of developing this collection across the whole of the community. The BHL project will be scanning materials globally and it is critical that overlap and duplication is avoided in BHL-Europe. Technical solutions for duplication control will be established using in particular the experiences of present large scanning initiatives at NHM, UGOE, LANDOE, BnF, and SIL.

Established skills in database creation and the Web site development, currently only available in a few partner institutions (e.g. AIT, ATOS, EDL Foundation, FUB-BGBM, NAT, NHM, RMCA, UBER), will be shared across the project. This will lead to rapid development of the project, and skills development in all partner institutions.

The BHL has already agreed full access to content (including in-copyright material) with over 50 organisations. A project of this scale will be able to negotiate with rights holders to obtain more material for integration into BHL-Europe and EUROPEANA on an open access basis.

It is critical that this material – once scanned – is maintained in a sustainable way and is available in perpetuity. It is unlikely that any one country or institution will be able to manage this. Sustainability will be achieved by a consortium of major European and international institutions committed to work as a group to provide a sustainable infrastructure in the long-term.

BHL-Europe addresses the objectives of the i2010 digital library initiative of the European Commission. It represents a key link between our cultural heritage and our scientific heritage. The digital material available through BHL-Europe directly complements the digital content of EUROPEANA. The project also addresses the objectives of the Action Plan for Biodiversity of the European Commission. In which the Commission considers it vital to substantially strengthen the knowledge-base for conservation and sustainable use of biodiversity, which requires strengthening the European Research Area (ERA) and communication and interoperability of data. We will make research data on biodiversity interoperable and accessible to all interested parties. Interoperability and accessibility of existing environmental data and information is a challenge addressed by the Shared Environmental Information System (SEIS). SEIS is a collaborative initiative of the EC and the European Environment Agency to establish an EU-wide environmental information system. According to the SEIS Task Force, they are currently preparing a legal instrument to underpin the development of the EU eReporting module of SEIS. The current objectives of the legal instrument includes a provision for the set up of a scheme allowing other information systems like BHL-Europe to connect to the SEIS infrastructure. Details of the connections will be discussed during the technical set up of BHL-Europe.

3 *European dimension*

The project has the premise of making large amounts of scanned biodiversity literature freely available over the Web, and indexed with semantic tools. The outlets for this material will include national portals, the BHL Portal and, most importantly, EUROPEANA. The process of making significant scientific content ‘more accessible and usable and exploitable’ will transform EUROPEANA from a predominantly arts and humanities portal into a broad European cultural resource incorporating a, currently under-represented, scientific dimension. An improved understanding of multi-language documents and multi-language OCR techniques will also result from work in this project, and will be available to all similar projects.

We will adopt and use established standards wherever possible to ensure full interoperability of biodiversity literature with other systems and services. Established standards are produced by EUROPEANA, the BHL and international standards bodies like TDWG (for biodiversity informatics standards), OCLC/RLG (for bibliographic standards), or DRIVER (for digital library standards). The consideration and integration of these standards is facilitated by many consortium partners being involved in TDWG (e.g. NHM, FUB-BGBM), OCLC/RLG (e.g. UBER, NHM, BnF), and DRIVER (UBER, RBINS). Metadata standards and file formats for scanned literature are already well established – NHM data is already harvested by both BHL and EUROPEANA – and these standards need consolidating and communicating within BHL-Europe.

The addition of biodiversity materials in many European languages will point to the significance of European science over the centuries. The 18th and 19th century tradition of scientific investigation and expeditions, together with our colonial history, means that our literature collections contain some of the most significant and important material in the world. These collections contain vast amounts of material on the biology of the developing world, and making this material freely available on the Web will enable people in the developing world to gain access to this knowledge for the first time. This will help the EU respond to its commitments to the Convention on Biological Diversity (CBD) – a key aspect of the CBD is the exchange of information ‘that shall include exchange of research results and repatriation of information’ to the developing world.

4 *Content*

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

The content will not be restricted by proprietary third-party rights or any other constraints, which would limit its use in an open access environment using Creative Commons <http://creativecommons.org/licenses>. The digital content must either be in the public domain or else the content contributors must have permission from IP owners to give open access under Creative Commons.

The initial focus on public domain material is not a limitation of the project because systematic biology depends more than any other natural science upon historic literature (see section 1.1.1). 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 will substantially reduce the need for handling of these rare and valuable materials.

4.2 IPR issues

The consortium has the necessary licensing and clearing arrangements in place for the Intellectual Property Rights (IPR) arising from the proposed project and this will ensure the far wider use and dissemination of the project output across all 27 EU Member states.

The NHM has extensive experience of managing IP issues in a range of EU and other projects – for example SYNTHESYS, EDIT, BHL, etc. – and has a dedicated IP officer, who will work on this project, and will also provide IP support to WP2 of EUROPEANA. We have pro forma documents and agreements available already, and would be able to start making further agreements with rights holders as soon as the project starts. The NHM IP Officer will work with BHL-Europe, EUROPEANA and the BHL to ensure that all IPR issues are managed in a consistent way, with consistent documentation, and identical statements about the Rights. All these open access projects will use one of the common open access licensing approaches – probably the Creative Commons Share Alike (CC by-sa) licence <http://creativecommons.org/about/license/>.

All digitised material will have associated metadata showing the IPR status of the object and where it was digitised. BHL-Europe will digitise material that comes under two main groupings/categories:

Public domain – where the IPR on the material has expired. Conditions vary from country to country within the EU and we will ensure that material is definitely out of copyright before digitising it. We will ensure that any public domain materials will remain public domain and available on an open access basis. Public domain material can be reused or exploited by anyone who wishes to use it including educational, non-commercial, and commercial users.

Rights held by other organisations – where the IPR for material is still owned by an organisation or individual. The English language BHL project has already been successful in persuading 49 not-for-profit organisations, learned societies, and institutional publishers to allow 50+ different journals containing many thousands of pages to be made available through the BHL. This material will be available on an open access basis. Many more titles are currently under negotiation. Rights agreements reached by BHL-Europe will be for global open access – thus including BHL and EUROPEANA – and will be managed through Creative Commons (CC) licences. The Rights Holder will retain some rights in the material – as managed by the CC license agreed – but this will only set conditions on commercial reuse in a few cases e.g. CC by-nc-sa.

Sustainability beyond the life-time of the project:

In the nature of open access cultural repositories and portals (such as EUROPEANA and BHL), it is difficult to develop a sustainable business model which is dependent on income from the content and services created. It is the very nature of this content model that opportunities for exploitation will lie with the users, not the creators of the service. We will look closely at the options for a sustainable business model. Possible solutions might include:

- establish an EEIG – European Economic Interest Grouping. The purpose of the grouping is to facilitate or develop the economic activities of its members by a pooling of resources, activities, or skills. This will produce better results than the members acting alone
- obtain commitments from natural history institutions to pay a ‘fee’ or subscription to sustain the service for their scientists and others
- seek committed funding from national governments or the EU (facilities such as EMBL, ESA, etc.)
- establish an endowment and use the income to maintain access

There is a strong dependency with WP3 to ensure that these activities are aligned with the long-term storage and service concept for BHL-Europe. Following Month 24, work in WP2 on service costs and WP3 on technical costs will lead to a cost model and enable WP1 to begin to assess the options for sustainable funding.

Assuming none of the above possible solutions will work and the search for other options fail, the backup option for sustainability is institutional funding. The two leading partners of the project (MfN, NHM) would be responsible for the financial support of the BHL-Europe after the end of the Community funding. NHM has a strong commitment to ensure the technical sustainability as NHM has the technological lead during the project (WP3) including the establishment of an efficient hardware system. The Museum für Naturkunde Berlin has the option to negotiate for governmental funding due to its integration in the well established German biodiversity network from 2009 onwards. Thus, MfN would maintain the work of WP2 in the future by ensuring the delivery of new content and monitoring the work of all other connected scanning projects and digital repositories.

4.3 Multilingual and/or multicultural aspects

The biodiversity literature is available in many languages – predominately European in origin. This is particularly true for the old literature, which is the core of the current project. For instance, before 1829 the most common languages in biodiversity literature are Latin (28%), German (28%), French (14%), Swedish (9%), English (9%), Danish (6%), Dutch (3%), Italian (2%), and Spanish (1%) (n=1787, taxonomic publications before 1829 considered for EZOOLO/AnimalBase project at UGOE). Besides being available in these original languages, this corpus of literature must now be made retrievable in many more European languages. Local users of the literature will, wherever possible, use the EUROPEANA or BHL Portal in their own language in order to gain full access to the literature (which will remain in its original language). Differences in language, geography, population, and social and economic conditions are significant factors affecting the ability of users to exploit the BHL resource. European skills and experience in managing multi-language and multilingual resources gives BHL-Europe the ability to make this material available as widely as possible. The following key multilingual components are foreseen to make the literature retrievable in many European languages: Multilingual Web sites, Multi-language OCR, Multilingual indexes (Taxonomic Intelligence).

Multilingual Web sites

The most immediate impact will come from translating the Portal interface into other languages. Portal languages anticipated by the end of the project are Czech, Danish, Dutch, English, French, German, Hungarian, Italian, Polish, Portuguese, Spanish, and Swedish. The same languages are already considered for the EUROPEANA Portal. However, the ability to exploit documents in multiple languages will need the design and development of excellent portal tools and improved optical character recognition (OCR) systems (see below for details on OCR). OCR processing of scanned images will identify key words, names, relevant terms, etc. and these will be stored as metadata. Therefore, the search and other Portal utilities will be multi-language, but results will be returned in the original language of the document. It is not the intention to translate original texts into multiple languages at this stage, but this may be technically possible later.

A deep level of language integration is also necessary within the indexing system, such that a user will have the facility to search for a biological species, say *fox*, in either Latin = *Vulpes vulpes* or their local language i.e. Dutch = *vos* and return a page originally written in Portuguese = *raposa* (see below for details on multilingual indexes).

Multi-language optical character recognition (OCR)

Currently the parsers for OCR work in a single language. It is possible to load two languages into a parser – for example, English and Latin – but this becomes unmanageable with the large number of languages used within the EU. We will have to ensure that the metadata for each document contains appropriate language markers and that the appropriate, separate language parsers are used to OCR each document. This approach is not widely used at present, and we will work with partners in related networks and projects to investigate how to optimise this approach to OCR. We will have the opportunity to test and use a variety of appliances and services developed by the EU-funded IMPACT project (Improving Access to Text), as part of their outreach activities from 2010 onwards. Effective use of OCR will enable 'deep' access to documents through the actual text of the original. Successfully implemented, this technology will have high value to other EUROPEANA projects that encompass digitisation and OCR of large quantities of material.

Multilingual indexes

The digitisation of a major corpus of biodiversity literature will advance world biodiversity initiatives significantly, but only to the extent that users can find relevant content. In biodiversity, the key elements of the searchable metadata are the names of organisms, biological groups, and named locations. Names of organisms annotate content about species. Unfortunately, the use of names for information retrieval is impeded because names are neither stable nor consistent. One organism may have more than one name. Indeed, about 1% of names change each year, such that the many-names-for-one-organism (synonyms) problem accumulate with time and will be particularly severe with heritage literature. This prevents simple automated indexing services from bringing together complementary data. Moreover, ecological and taxonomic class names represent scientific concepts, thus parallel partly-overlapping hierarchies may exist between different semantic and ontological sets. Visitors to traditional biodiversity scanning projects who know organisms by their colloquial (common) names may be unable to find content unless they know the names used in the source documents. These issues will reduce the utility of the millions of pages of primary

biodiversity information generated by the BHL without the addition of tools. The uBio team www.ubio.org/index.php?pagename=general from the Marine Biological Laboratory/Woods Hole Oceanographic Institution – a partner in the BHL Project – has assembled an array of taxonomic services called 'Taxonomic Intelligence' (TI) designed to overcome these problems. These open access tools are a form of thesaurus that provides a common resource for both indexing of content and for the Portal's user interface (e.g. a convenient taxonomic browser instead of free text fields). The thesaurus will be powerful enough to deal with various semantic relations such as synonyms and hierarchies. Currently, TI has a preponderance of scientific Latin binomials and some vernacular names, mainly English. It is critical that a true multilingual version should now be developed. BHL-Europe, through its many language partners, will be able to add many more local non-English names to the TI database. AIT and ATOS, for example, will support these language partners with their proven expertise in the implementation of multilingual thesauri. Eventually, we will enable the corpus of biodiversity material to be searched in any European language using local names for species and locations.

5 Impact

5.1 Analysis of demand

A conference in London in 2005 identified the lack of access to the published literature of biodiversity as one of the principal obstacles to efficient and productive research, outreach, and education. As most of the biodiversity literature is held in a few specialist libraries, and is only available to a few scientists, this literature is effectively unavailable for wider use by a broad range of potential users (research, education, taxonomic study, biodiversity conservation, protected area management, disease control, and maintenance of diverse ecosystems services).

Currently the study of these distributed collections is difficult, time-consuming, and expensive. Requests for help and support in obtaining access to literature are frequently received by partner libraries, which do not have the facilities to meet them. Researchers and students from developing countries are particularly disadvantaged, yet in many ways their need is greater since both biodiversity, and the threats to it are much higher in developing countries than anywhere else.

Recent analysis of demand (Deliverable 5.18 of EU-funded EDIT project) indicates that biodiversity and biological scientists need a multilingual interface to the literature, with sophisticated search and filtering functionality providing an online repository of references together with the original text content of articles. Users clearly want to have access to the literature itself. This is also indicated by numerous BHL user comments. As species names are an integral part of the biodiversity information in the literature, search, and filter functions of the interface should include name-finding tools. At the moment, other European projects and networks established in the biodiversity community focus on species names (GBIF, Species 2000), data standards for biodiversity information (GBIF, TDWG) or catalogues of content (EDIT – ViTaL).

In addition to these large-scale projects, smaller digitisation projects exist in a number of EU states (see content analysis above). Users of this digitised material are appreciative of the service, as demonstrated by the tenfold increase of visitors to related Web sites (e.g. Naturalis, AnimalBase). The BHL Portal at www.biodiversitylibrary.org has over 13,000 unique visitors per month. BnF reports of 200,000 visitors per month for Gallica www.gallica.bnf.fr. However, to date there is no coordinated effort in Europe which combines the above approaches while providing full-text access to taxonomic literature via a multilingual Web interface.

At the moment, a quantitative analysis of demand for non-scientists is not available. However, user feedback and statistics for the BHL Portal indicate an increased use of this service by non-scientists. The percentage of users referred to the portal by Google and Wikipedia increased significantly during 2008 (from 24% to 58%), whereas the percentage of direct traffic remained fairly constant. The access of the portal via Wikipedia particularly suggests the involvement of a wider audience of non-science users.

5.2 Target users and their needs

Two main user groups have been identified as beneficiaries of the project.

The first group of users (content users) – European citizens – will be interested in the content itself. They will include natural scientists interested in taxonomic information and the distribution of species through space and time. Social scientists and historians interested in the history of science, and background information about famous and significant scientists of the past. Artists may adapt the artistic representations

of plants and animals. For hobby scientists, hobby gardeners, and regional conservation organisations the literature is an inexpensive and easy available resource of information about animals, plants, and fossils occurring in their area. Policy makers on various levels (from local to governmental) need the literature as base and background information for their decisions (through SEIS, for example). Students and learners on various levels (from school to university) need the content as a primary source for their studies. Teachers will now be able to complement the content of textbooks by downloading historical and original texts of Charles Darwin, for example. These texts may be used as a teaching resource, since many of those historical texts contain important biological concepts and theories still valid today. These classic and scientifically important contributions help to put the results of modern research projects into context. Eventually, every European citizen who is interested in biodiversity, and has access to the Web is a potential user. These target users are manifested by the visitors to the large natural history museums that are now able to get background information on topics and objects present in museum exhibitions. The need for such background information is illustrated by the Darwin Year 2009. Many museums will have exhibitions highlighting various aspects of the life of Darwin, the cultural and sociological frameworks for his research, and the scientific arena of the 19th century including numerous historical documents and information that may be retrieved by every visitor of these exhibitions through BHL-Europe and EUROPEANA.

The museums that are consortium partners will identify user groups amongst their visitors and engage this large group of target users with the project. The selection procedure for this user testing group will be defined as part of the user evaluation activities (WP5).

The second group (technology users) – in particular libraries, digitisation centres, and digital library networks – are interested in the technological outputs from the project, the best practice approach, and the quantity and quality of content. Thus, BnF as a large and esteemed library is an end-user of the consortium's technical output, as well as a content partner. New partners, to be involved in a later stage of the project, are also end-users of the technological solutions and best practice guidelines. They will be able to adopt our established standards and best practice; ensuring efficient scanning, and enabling their connection with EUROPEANA and BHL. Digital library networks like OA-Netzwerk and DELOS may adopt our approach and distribute to partners in other domains of digital libraries.

In addition to target users in Europe, the content of BHL-Europe is also available for users in the developing world. We expect access to this material to provide substantial benefit to scientists, teachers, policymakers and other groups in developing countries. This material has never before been available to developing countries, and will have a huge impact on capacity building and development. The open access to taxonomic primary literature via the Web will reduce current knowledge gaps and will help to support training programmes for taxonomists. This will help to overcome the "taxonomic impediment" through the GTI (Global Taxonomy Initiative) thus fostering the implementation of the CBD www.cbd.int/.

WP5 will focus on communicating the existence of this new biodiversity content to a range of potential users. EUROPEANA and the natural science networking projects (EDIT and SYNTHESYS www.synthesys.info/) will give us access to a wide number of potential users. However, it will be a challenge to reach the general public and education communities and we will be developing a detailed exploitation plan to reach all these user communities.

One of the tasks of the BHL-Europe Communications Working Group (see section 9.1.5) will be to establish a communications strategy, so as to assure that the project will reach all its target users. In addition to contributing to the communications plan, each project partner will be expected to exploit the content and results locally, and help identifying related networks or organisations that might be interested in using BHL-Europe content or services.

Target user description	Needs	Involvement & Role	Country coverage
1.1) European citizens	Direct online access to comprehensive information not currently publicly accessible to help raise the awareness and appreciation of biodiversity heritage	End users included in the user testing group	Consortium member states
1.2) Scientists (e.g. Biology)	Taxonomic descriptions of species; biodiversity data of specific regions in the last centuries; full-text searching; taxonomic intelligence	Involved as partners of the consortium	Consortium member states, ERA, global

1.3) Scientists (e.g. History, Cultural heritage)	Historical information on science and scientists	End users accessing biodiversity literature through EUROPEANA	Consortium member states, ERA, global
1.4) Citizen scientists / Hobby scientists	Search, read, download, and print articles about biodiversity in their area	End users included in the user testing group	Consortium member states, global
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	Academic students working in the partner museums will be included in the user testing group. Non-academic students will be targeted through dissemination activities.	Consortium member states
1.6) School teachers	Resource for teaching materials as complement to textbooks	Targeted through dissemination activities	Consortium member states
1.7) Environmental and Conservation agencies / Government officials / Policy makers	Information on impact of climate change, environmental deterioration and human interventions	Directly involved after the establishment of the connection between BHL-Europe and SEIS	Consortium member states, ERA
1.8) Artists	High quality images of animals and plants	End users included in the user testing group	Consortium member states, global
2.1) Libraries	Information on the distribution of heritage material (metadata), new platform for presentation of content	Involved as partners of the consortium	Consortium member states, global
2.2) Digitisation centres	Best practice guidelines for the digitisation of heritage literature	Current and new content providers of the consortium	Consortium member states, global
2.3) Digital library / Open Access networks	Best practice guidelines for the establishment of digital library networks, information about digital repositories (distribution, availability)	Already involved through the networking activities of some of the consortium partners. More networks will be targeted through dissemination activities.	Consortium member states, global

5.3 Critical Mass

BHL-Europe will include a variety of content providers representing different institutions, countries, and languages. They are ready to provide digital content (see Table in section 4) subject to a wide range of workflows and processing techniques. This helps to draw valid conclusions from the implementations planned during the proposed project. BHL-Europe is poised to find best practice guidelines for data standards, semantic enrichment, multi-language issues, and integration of digital content in BHL-Europe. Once the system is working and ingestion procedures are established, further increase of digital content will be significant.

5.4 Added Value

BHL-Europe's added value lies in its integrative role. There are currently a large number of small projects digitising biodiversity material in numerous institutions across the EU. These projects are not using common standards or interfaces and are currently not interoperable. This is extremely confusing for the user and is a very inefficient use of resources, since it is certain that the same text is being scanned in a number of different centres.

BHL-Europe will provide integration and interoperability by:

- establishing, and communicating common standards for the digitisation of biodiversity materials in Europe
- making that material available through at least two portals – EUROPEANA and the BHL – and thereby simplifying the situation for end-users
- developing value added tools – taxonomic intelligence, multilingual interfaces, improved OCR, etc. – and making these tools available to the community

- supporting European institutions in their national bids for funding for digitisation of biodiversity materials
- linking with the global BHL project to ensure that these biodiversity materials are available globally, and availability is sustainable in the long-term

6 Networking

6.1 Networking Capacity

At present, the BHL-Europe consortium brings together 28 institutions from 13 EU Member States and the USA. The most important European institutions for the scientific community and the public interested in biodiversity (i.e. large national history museums) are included from the beginning in the consortium. This significantly helps to raise awareness and promotes the uptake of the project results from the majority of the 27 EU Member States.

Major players in other domains and specific digital library networks, initiatives or projects are already included in the consortium. These networks or projects include EUROPEANA (EDLNet – European Digital Library Network), CETAF (Consortium of European Taxonomic Facilities), GBIF (Global Biodiversity Information Facility), TDWG (Biodiversity Information Standards), ENBI (European Network for Biodiversity Information), EDIT (European Distributed Institute of Taxonomy), SYNTHESYS (Synthesis of Systematic Resources), Catalogue of Life (Species 2000), STERNA (Semantic Web-based Thematic European Reference Network Application), ENRICH (European Networking Resources and Information Concerning Cultural Heritage), DINI (Deutsche Initiative für Netzwerkinformation), DRIVER (Digital Repository Infrastructure Vision for European Research), BHL (Biodiversity Heritage Library), and EOL (Encyclopedia of Life). In addition to this existing integration of the proposed project, we are already in contact with other important projects like Key2Nature and IMPACT (Improving Access to Text). The further development of our networking capacity is driven by the extensive network of contacts brought by the project partners. Some partners have accumulated large contact lists during their involvement in national and international projects, and integration with existing networks and activation of existing contacts will guarantee BHL-Europe an effective dissemination of project results.

BHL-Europe builds on biodiversity literature and should be a comprehensive resource for biodiversity information. Thus, the increase of content and the attraction of further content providers is an essential component. There is an important task in WP2 dealing with that issue (see section 8). Based on the analysis of content, gaps in the record of biodiversity literature corpus will be identified. Using the network and contacts mentioned above, institutions and organisations which hold the missing corpus of literature will be identified. WP2 will assist these potential partners in the sourcing of funds and implementation of their scanning operations to enable their contribution of content to our digital repository. At the moment, we are in contact with several institutions that are interested in contributing at a later stage in the project. These institutions include the Stockholm University, the Swedish Museum of Natural History, the National Herbarium of the Netherlands, the Conservatoire et Jardin botaniques de la Ville de Genève, Amsterdam University, the National Library of Latvia, and the National Natural History Museum and Botanical Garden of Portugal. Additional travel expenses are foreseen in the current budget for the 2nd and 3rd year of the project to allow future content providers attending BHL-Europe meetings. This travel and subsistence budget is managed by the Project Coordinator.

6.2 Clustering Activities

The BHL-Europe project has a strong interest in a number of the broader agenda items being addressed by the Commission and can contribute to clustering activities through:

- supporting the work of European scientists by making resources and expertise more readily available through the Web. This could be achieved by providing support for training of taxonomists in the EDIT and SYNTHESYS projects.
- establishing standards for Web access to biodiversity and related cultural materials. These will be disseminated through EUROPEANA and other digital library programmes at a European and national level.
- providing expertise in developing models for sustainability of important datasets; hosting critical scientific datasets at the European level. This will involve working with large-scale projects which

will need to store substantial quantities of data for the long-term e.g. LifeWatch, ESA, D4Science, etc.

- providing experts to assist with capacity building and information sharing with the developing world. We will link with key institutions in developing countries to optimise and sustain this process, and also with individual government-supported capacity building activities. Many consortium partners are also actively involved in the implementation of the GTI, facilitating the link between BHL-Europe and various capacity building activities in developing countries.
- exploiting European skills in languages to improve the communication of Web sites with non-English speakers. We will engage with developing trans-national clusters of language groups, where our experience is relevant.

7 Performance monitoring

7.1 Success indicators

The success indicators 1 and 6 are quantified using the experiences and Web statistics of consortium partners (SIL, MOBOT, BnF, UGOE, and NAT). Indicator 2 and 7 are based on data available from EDL Foundation. Indicator 3 is estimated based on the nature of the repositories of the partners and the languages present. Indicator 4 is based on our contact with potential content providers that are not ready yet to join the consortium. Indicator 5 is based on the language providers present in the consortium and the common languages of historic biodiversity literature. Between 1526 and 1829 a significant amount of literature (18%) is published in languages not important in science currently (Dutch, Swedish, and Danish).

Indicator No.	Objective/expected result	Indicator name	Expected Progress		
			Year 1	Year 2	Year 3
1	Robust biodiversity community portal	Number of accessible pages of biodiversity literature	17,000,000	21,000,000	25,000,000
2	Biodiversity literature for display through EUROPEANA	Percentage of literature available through EUROPEANA	20%	50%	100%
3	Improve the interoperability of digital libraries	Number of interconnected repositories	7	20	30
4	Facilitate and enable the initiation of scanning initiatives	Number of content providers	20	25	30
5	Provide a multilingual access point	Number of portal languages	1 ¹	7 ²	12 ³
6	Ensure that the project outputs are known and used by the target users	Page views through BHL Portal	1,000,000	2,000,000	5,000,000
7	Ensure that the project outputs are known and used by the target users	Page views through EUROPEANA Portal	250,000	1,000,000	3,000,000
8	Ensure that the project outputs are known and used by the target users	Case studies of successful usage of the material by non-scientists	5	10	15
9	Negotiate with Rights Holders	Agreements with Rights Holders / Publishers	2	4	6

¹ English; ² + French, German, Italian, Portuguese, Spanish; ³ + Danish, Dutch, Czech, Hungarian, Polish, Swedish

7.2 Performance measurement and evaluation

The most difficult part of performance measurement is the target user evaluation and the use of the project results (indicators 6-8). BHL-Europe is targeting a large number of different users ranging from libraries over various types of scientists to the general public. There is no universal evaluation method to cover this range of target users in detail. However, two instruments will be established for a general survey of project results and their use:

- (1) Web analytics will be used to quantify the use of the portal (visits, unique visitors, page views, referring sites, country coverage).
- (2) We will encourage the users to drop feedback messages either using our online discussion forum or using the online contact form. These two instruments will be used continuously during the project.

In addition to this general evaluation procedure, specific evaluation will be carried out twice during the project, the first time at the end of Month 12 to enable the analysis of demand and service elements of the project. This will be fed into WP3 to ensure that we focus on those key components that support user needs. The second evaluation in Month 24 will test and validate the impact of the project. It will identify key features which are highly valued by users and will feed into the final revised set of best practice guidelines and components, implemented by WP3 and published by WP2. We will develop (online) questionnaires for this user evaluation procedure to identify user requirements, preferences, experiences, benefits, and unmet needs. We will identify the characteristics and needs of the different target user groups during this process.

Libraries and digital library networks are targeted individually (ideally using existing contacts of consortium partners) to fill the questionnaire and to evaluate and validate the project approach in interviews. A large number of professional scientists will be encouraged to fill the online questionnaire. The two evaluation periods will be announced to the scientific community through the staff members of the consortium partners and the existing networks e.g. EDIT to reach a large number of people and get a sound evaluation result. In addition, we will identify test users and request quantitative and qualitative feedback from them. Test users among scientists may be easily recruited for example from a group called "Junge Systematiker" that is established in the "Gesellschaft für biologische Systematik" in Germany. This group of young scientists are already users of the BHL Portal and are easily accessible through staff members at MfN.

The most complicate target user group to evaluate is the group of non-scientific users (citizen scientists, artists, students, wider audience). Therefore, a PR campaign, a number of public events, demonstrations in schools and natural history museums will mark the beginning of the two evaluation periods. This will help to encourage people to investigate and test the Portal. In addition, we will randomly select a number of visitors of the museums involved in the project as user testing groups for the evaluation and validation of the project approach. These people will perform defined tasks using the BHL Portal, and evaluate the experience and the outputs. User interaction logging will be used, supplemented by the completion of our questionnaire, in order to better understand the usage patterns.

8 Project work plan

8.1 Description of work and roles

The project life cycle encompasses four phases, which are described below in more detail.

Phase 1: Horizon scanning and analysis of current technical environment (Months 1-3)

Initial work will consist of evaluation of the technological solutions available, and assessment of the requirements of each content provider. We need to review the state-of-the-art technologies used by EUROPEANA and BHL for processing digital content, and we will include some of our experienced technology partners (e.g. NHM, AIT, ATOS, NAT, RMCA, UBER) in that process. Simultaneously, each content provider will provide their specific requirements: what do they expect from BHL-Europe; how the digital content should be handled (technically, scientifically, and legally); what data standards and specifications they use. This information will fill out the data provided already in 4.1. This technology and content-related information will be analysed in order to get a comprehensive picture of the variety of implementation approaches, their advantages, and their disadvantages. A Technology Management Board (TMB) will be established with responsibility for recommending technical standards, processes, technology solutions, and implementation plans.

In Phase 1, we also need to start developing the prerequisites for the management of the content, i.e. the content analysis tools and bibliographic databases. These databases will show the current position of each of

the national scanning initiatives and, by merging the metadata from each partner, create a virtual taxonomic library database.

While WP2, WP3, and WP4 are analysing the state-of-the-art technologies and content holder requirements, WP5 will be working on the communication plan. As a result of the first phase, the project's Web site will be published including a multimedia presentation and newsletter. Furthermore, a Communications Working Group (CWG) will be established, responsible for revising dissemination strategies and deciding on activities related to communication of project's outcomes.

Phase 1 will end with a meeting of all content providers, the TMB and the PMG to agree upon the constitution of the two special working groups (TMB, CWG) and to summarise the content holder requirements to prepare for the consensus building in phase 2 of the project (M1.3).

Phase 2: Consensus building, standards, and processes agreement (Months 4-6)

In the second phase, the recommendations identified in the previous analysis, will be discussed in the consortium. During discussions with each partner, we will establish: a consensus of best practice guidelines; how to process biodiversity literature metadata; and how to ingest the metadata and files into the Portals. Ultimately, we will have identified the best practice workflow and data model, interoperability standards, and we will agree the Memorandum of Understanding (MoU), technical hardware and software standards, and IPR working documents. Consensus building is also important for the communication activities. Therefore, a plan will be developed during this phase and consortium partners will agree the communication plan at the end of Phase 2. Phase 2 will end with a consensus on content and technology to start content enrichment (M2.1, M3.1). At this point we have our first set of best practice guidelines for internal use and test procedures.

Phase 3: Initial content aggregation and test of implementation approach (Months 7-24)

With our best practice guidelines in place, we can start harvesting content from the content providers. We will build a prototype system, based on the data from the consortium partners who have large amounts of German language content available now (e.g. UGOE, LANDOE, HNHM, UCPH, BnF, and SIL). This will test that the implementation approach works for metadata and digital content which has been subjected to a wide range of workflows and processing techniques. This will be the first test of the model in a real-life context (M3.2). The German language prototypes key technical components (including hardware and software) will be delivered at month 18. There will be a status review and progress report delivered at month 12. The review at month 12 will allow for the assessment of current designs and progress against the plan so that issues may be addressed before finalisation.

It is important to eliminate duplication during the scanning process. Therefore, several tools and databases including technical solutions for duplication control will be developed to analyse the content and support the management of the scanning initiatives of each partner. Recent analyses have shown that existing tools are insufficient for the scale required by BHL-Europe. Thus, the adaptation and enhancement of these tools and databases will take about nine months before a working prototype is delivered to the project. Eventually, a bibliographic database will contain information on monographs and serials that have been scanned in the past and are available in the format defined in the MoU, which are to be included in EUROPEANA and BHL-Europe. In addition, information will be provided about biodiversity literature in the process of being digitised and identifying who is the partner responsible for scanning that material. Eventually, the database will contain information on all relevant literature that needs to be scanned, and will identify the partner who will be responsible for providing the material in the future. If there is no consortium partner with some of the critical content, appropriate content holders will be identified and encouraged to join the consortium to provide this content. This system ensures that every content provider and even potential content providers can check before they start digitisation to see if the material is already in the queue. The local digitisation processes can be planned accordingly and duplication is reduced to a minimum, ensuring the effective use of the local resources available in each partner institution.

The partner network will need to be extended to fill gaps in the biodiversity literature corpus. In addition, learned societies and commercial publishers that are interested in providing their content or parts of their content through EUROPEANA and BHL-Europe will be identified. This process will start after we have a first overview of content already present in each partner library and the content required but not present in any of the consortium libraries (gap analysis). The content analysis and content management processes will continue through Phase 4 of the project.

A first user evaluation will be carried out before the release of the German prototype. The results of the review of the evaluation report (M5.2) will be used for the implementation of the prototype.

Phase 4: Evaluation, validation, exploitation, and demonstration (Months 25-36)

Although there will be some continuation of the work in Phase 3 (notably continuing scanning and data ingest of new scanned texts, Phase 4 will mainly focus on evaluation, validation, exploitation, and demonstration of BHL-Europe. This work will be based on preliminary work done in Phase 1 of the project with the establishment of the communications strategy, and the development of online evaluation questionnaires. After the release of the key components, the online questionnaires will be completed by a number of users from all target user groups. The evaluation of the questionnaires will help to validate the best practice agreed, and show where to improve the outputs (from a user perspective) of the partners (M5.3). The results of the evaluation process will be fed into the subsequent development of the EUROPEANA and BHL Portals. Having reviewed the practical implementation, we will publish our tested and validated best practice approach and technical solutions for use in other projects. Large-scale demonstration activities at important conferences and public events, as well as workshops for particular target users, will increase the community and public awareness of BHL-Europe. Based on the sustainability strategy, technical solutions will be developed to ensure long-term sustainability and accessibility of the metadata and content beyond the end of the project.

8.2 Technologies and Standards

We have encapsulated the main themes for consideration for the technical interpretability and aggregation below. This is not designed to be an exhaustive list, but principles that should extend into global considerations.

Purposes for Metadata

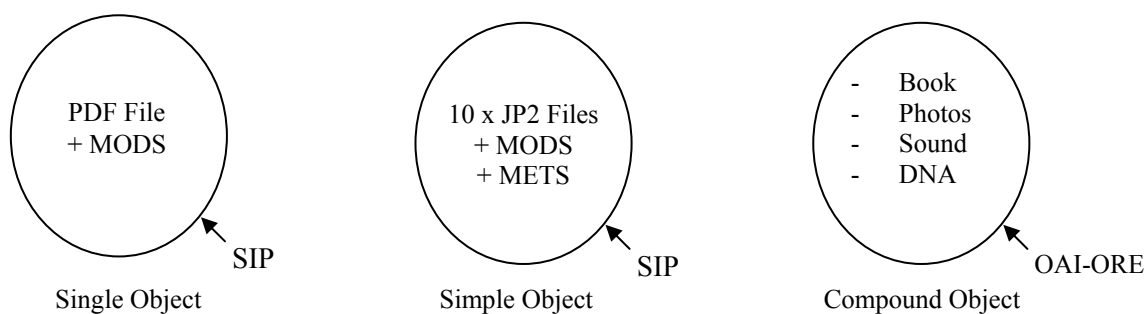
There are many reasons to create and store metadata; the main purposes are outlined below:

Purpose	Standard
Descriptive	MODS
Administrative	Existing BHL Framework
Technical	EXIF, XMP, VRA Core
Preservation	PREMIS
Resource Discovery	MODS, Dublin Core
Security	MD5
IPR	Existing BHL Framework

The main reason for adopting standards is to provide interoperability between systems and organisations.

Creating Metadata

Metadata can be created a number of ways, where ever possible standards should be employed to develop automated processes. JHOVE provides functions to perform format-specific identification, validation, and characterisation of digital objects.



MODS:	Metadata Object Description Schema
SIP:	Submission Information Package
METS:	Metadata Encoding & Transmission standard
OAI-ORE:	Open Archives Initiative – Protocol for Object Reuse and Exchange
OAI-PMH:	Open Archives Initiative – Protocol for Metadata Harvesting

Submitting Objects and Metadata

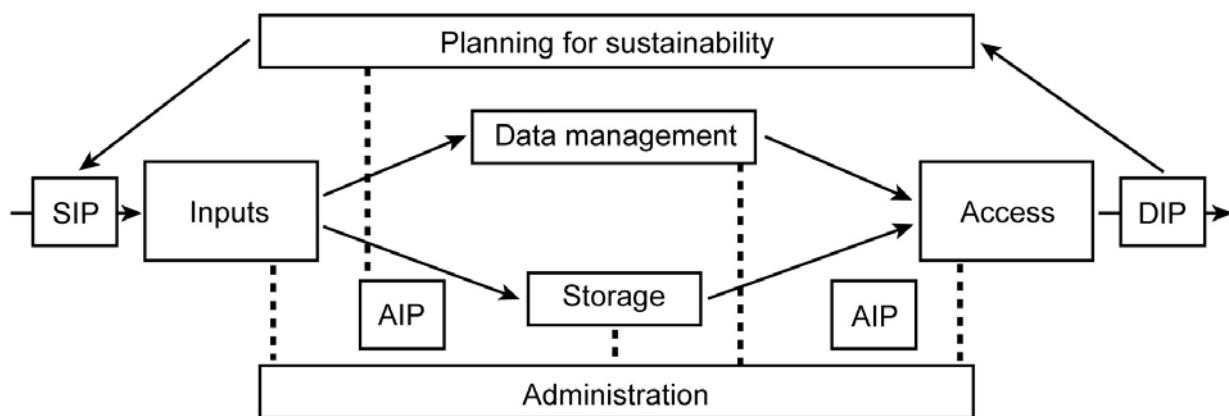
The process for submission of an object into a repository must include the appropriate metadata as outlined above. The level of metadata required is dependant on the object being submitted and must meet the mandatory minimum. There are 3 levels for metadata information.

1. **Mandatory:** The object will be rejected if it does not meet this requirement; it has insufficient contextual information to be of subsequent use or will not be found during a search.
2. **Recommended:** The preferred level of metadata that will enhance the objects use within searches; the object will not be rejected if it does not meet this requirement.
3. **Optional:** This provides data capture opportunity for existing metadata that exceeds or is different to the requirement of the Mandatory or Recommended informational level for metadata.

An Application Profile (AP) will be published by BHL that will allow all participating organisations to comply with the object submission process (Ingest) into the repository.

Storing Metadata

Once the object and metadata have been transformed into the appropriate format the information (object and metadata) must be stored in an appropriate repository. The ISO 14721:2003 specifies a reference model for an open archival information system (OAIS). The purpose of this ISO 14721:2003 standard is to establish a system for archiving information, both digitalised and physical, with an organisational scheme composed of people who accept the responsibility to preserve information and make it available to a designated community such as BHL and EUROPEANA.



OAIS Compliant Storage Model:

- SIP: Submission Information Package
- AIP: Archival Information Packages
- DIP: Dissemination Package

The standard ISO 14721:2003 compliant storage platform is the Fedora platform; it is logically divided into four major functional areas that reflect its first principles: (1) Repository services, (2) Preservation services, (3) Semantic services, and (4) Enterprise services.

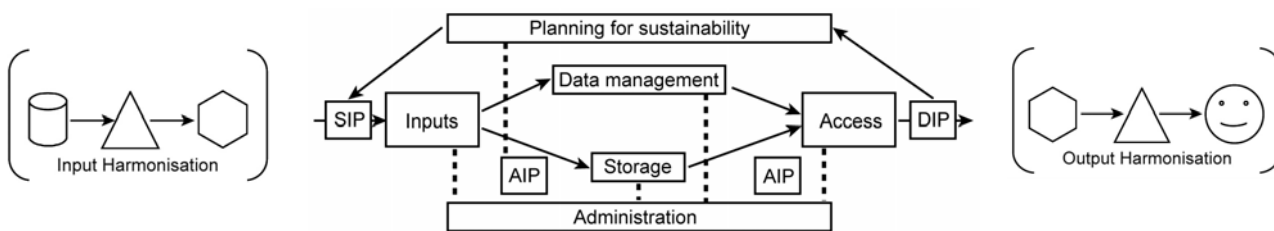
Using a standards-based, service-oriented architecture, the Fedora platform provides an extensible framework of service components to support features such as Open Archives Initiative – Protocol for Metadata Harvesting (OAI-PMH), search engine integration, messaging, workflow, format conversion, bulk ingest, and others. In addition, features such as authentication, fine-grained access control, content versioning, replication, integrity checking, dynamic views of digital objects, and more are incorporated into the Fedora repository service. Fedora provided services can be seamlessly integrated into an organization's existing infrastructure, protecting and prior investments.

Fedora integrates semantic technologies into its services for describing and inter-relating digital objects, providing a simple, practical way to begin using these new capabilities.

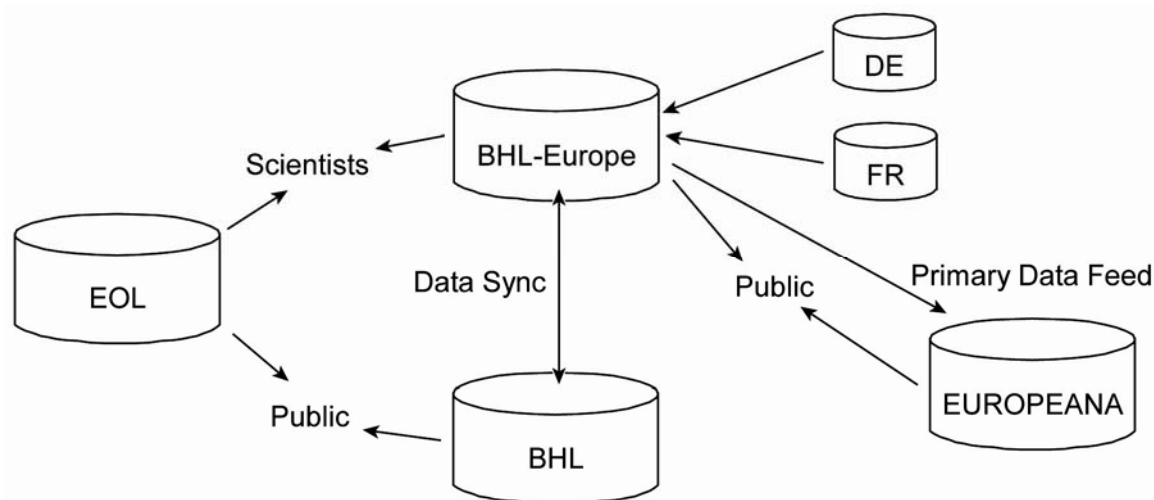
Metadata Harmonisation

The technical details of the 3 stages within the input harmonisation process depend on the format and volume of data to be ingested. Extract, Sort and Preparation are the 3 stages required to create the SIP for ingest into the repository from the submitting organisation. The preparation stage is based on the published ingest Application Profile (AP) of BHL-Europe. Input harmonisation will be an ongoing process due to the volumes and diversity of current formats of metadata stored within Europe. New object creation will be standardised using the technical standards laid out elsewhere in this document.

Output harmonisation will be required in the short-term, however as systems are constantly revised and updated, harmonisation of the output requirements will be driven to only a few formats. The standardisation of output formats and requirements will provide the highest levels of interoperability.



Metadata Input and Output Harmonisation



BHL-Europe Interconnect Relationships

Technical/operational framework

Each nation or language group may have one or more scanning centres where original material will be scanned and then processed. OCR and various tools will extract and match relevant data in order to build a set of metadata that will allow for the development of multilingual and taxonomic intelligence tools within various portals.

The data will then be harvested and stored in an aggregated data centre, which provides resilience for the service and copies of all data for disaster recovery purposes. In addition to the aggregated data, Web services will be utilised or developed to allow access to this data for inclusion in various portals including EUROPEANA and BHL. This model would allow for any future, and as yet undefined, portals or Web sites

to access these Web services and the data. This will also allow maximum flexibility in the delivery of services from either national centres or the aggregated repository. Thus, on a case-by-case basis, it would be possible for the aggregated repository to either directly provides the data and content or to act as a broker (aggregator) and request the data from one or more national centres for display through the portals.

Sustainability considerations, including cost and technology-related local and global economic variables, as well as current technology formats, will play a major role in the technology decision-making process. Depending on the prevalent economic circumstances, it may be more favourable to rent, buy or lease hardware and/or facilities – leading to **the potential for sub-contracting**. Data transformation processes will have to be carried out from time-to-time to provide continued access to the data in the repository, as formats and standards change over time.

8.5 Work package description

Work package Description

Work package number :	1	Start date:	M1	End date:	M36
Work package title:	Project Coordination and management				

Objectives

Administrative objective: Ensure adherence of the consortium to the rules, regulations, and financial guidelines of the *eContentplus* programme; establish the project in the European biodiversity community.

Technical objective: Implement the project as set out in the work plan; ensure exchange of information and communication between partners; ensure progress of the project; guarantee timely deliverables.

QA objective: Ensure verifiable progress of the project and be committed to high quality output that has tangible impact on *eContentplus* programme objectives.

Description of work

Task 1.1 – Administrative coordination

1.1.1 – Resource planning (financial, personnel, material), monitoring and controlling.

1.1.2 – Liaison between the Commission, consortium members, EUROPEANA, BHL, and external experts; effective communication with the consortium members, Work Package leaders, the Commission, and interested external parties; coordination of meetings and progress reviews.

1.1.3 – Production and consolidation of periodic external reports, including cost-statements; internal quality assurance; set-up of the Web-based project management portal.

1.1.4 – representing the project.

Task 1.2 – Technical coordination

1.2.1 – Work-package and task coordination.

1.2.2 – Project plan maintenance; monitoring of project progress and milestones; identification and trouble shooting of technical and organisational problems.

1.2.3 – Timely production of deliverables.

1.2.4 – Quality control against the technical and contractual aspects; coordination with EDL Foundation Office.

Task 1.3 – Quality assurance: Definition and communication of quality assurance procedures via project management portal, coordination of quality assurance process (internal as well as external review procedures for the various project results and deliverables).

Task 1.4 – Business plan

1.4.1 – Investigate services that help the sustainability of project results

1.4.2 – Identify related networks or organisations interested in the implementation of project results

1.4.3 – Develop a business plan for long term sustainability with WP2 and WP3

Task 1.5 – Networking and clustering activities

1.5.1 – Coordinate with relevant partner networks; Identification of new important networks as potential disseminators of project results; Identification and analysis of stakeholders

1.5.2 – Contribute to the clustering activities of the EC.

Milestones¹ and expected result

Responsibility: MfN (Project Coordinator) and all other consortium partners

M1.1 Kick-Off Meeting (M 0)

M1.2 Project management portal including agreed quality assurance procedures (M 3)

M1.3 Agreement on TMB and CWG (M 3)

M1.4 Annual (Technical) Review 1 (M 12)

M1.5 Annual (Technical) Review 2 (M 24)

M1.6 Final Review (M 36)

Deliverables

D1.1 Progress Report 1 (M 6)

D1.2 Progress Report 2 including pre-financing request (M 12)

D1.3 Annual Report 1 including first ideas for BHL-Europe business plan (M 12)

D1.4 Progress Report 3 (M 18)

D1.5 First overview of the business plan for long-term sustainability (M 24)

D1.6 Progress Report 4 including pre-financing request (M 24)

D1.7 Annual Report 2 (M 24)

D1.8 Progress Report 5 (M 30)

D1.9 Business plan for long-term sustainability (M 36)

D1.10 Implementation of results of BHL-Europe in other projects (M 36)

D1.11 Progress Report 6 and Final Report including Financial Statement (M 36)

D1.12 Final Report (M 36)

Work package Description

Work package number :	2	Start date:	M1	End date:	M36
Work package title:	Analysis of domain content and management of the content acquisition process				

Objectives

IT objective: Establish bibliographic database systems, metadata repositories and Web-based content management systems.

Management objective: Ensure that all relevant biodiversity literature is listed to be scanned following a priority list; ensure that all content providers agree on the technical architecture of the project; ensure effective scanning in all content providing institutions; ensure linkage to EUROPEANA; ensure extension of the content providing network.

¹ A milestone is a scheduled event marking the completion of a major part of the project work. It is used as a project checkpoint to validate how the project is progressing and revalidate work. Milestones numbers indicate the work package they relate to (e.g. M2.1 is the first Milestone of work package 2).

Description of work

Task 2.1 – IT Development

- 2.1.1 – Establish a bibliographic database system and metadata repository for monographs and serials based on the Virtual Taxonomic Library developed in EDIT, and also the experiences of the BHL.
- 2.1.2 – Develop and enhance deduplication tools for monographs and serials based on BHL technologies.
- 2.1.3 – Develop a Web database to support analysis of domain content and management of the scanning process based on 2.1.1 and 2.1.2 (database of the taxonomic literature that indicates (a) the portion that is already available in digital form, (b) the portion that is in the process of being digitised, and (c) the portion for which plans have been created for digitisation).

Task 2.2 – Analysis of domain content

- 2.2.1 – Establish a list of monographs and serials that are relevant for the biodiversity community.
- 2.2.2 – Use of the Web-database to identify the distribution of this relevant literature in the libraries of the content providers.
- 2.2.3 – Identify responsibilities for content contribution (which institution should provide the identified content under consideration of technical qualification, data standards, IPR).

Task 2.3 – Management of the content acquisition process:

- 2.3.1 – Identify content holder requirements; develop the Memorandum of Understanding.
- 2.3.2 – Assist partners in implementation and evaluation of scanning operations; control duplicate scanning of literature (using results of task 2.2); discussion and distribution of data standards and specifications; work with individual donors and governments to facilitate the funding of the scanning; attracting new content providers.
- 2.3.3 – Coordinate with EUROPEANA, BHL and national scanning projects to ensure that material scanned by BHL-Europe is available through these portals.
- 2.3.4 – Addressing IPR issues in cooperation with WP4.
- 2.3.5 – Take into account multicultural and multilingual aspects.

Milestones¹ and expected result

Responsibility: MfN (Work Package Leader) and all consortium content providers. The labour effort distribution among the partners was calculated mainly based on the amount of content and the current status of the digital repository of the particular consortium partner. Partners with large but less well developed repositories have more hours on the project than partners with small but easy to harvest repositories. However, once the connection between the repositories is established, it is not very time-consuming to maintain the connection and to ensure a constant delivery of content to the portal. In addition to this task, each content provider contributes to the enhancement of the content database. Depending on the extent of own scanning initiatives this is more or less time-consuming.

M2.1 Memorandum of Understanding signed by all content providers (M 6)

Deliverables

- D2.1 Catalogue of content holder requirements (quality, quantity, accessibility, standards and specifications of content and metadata) (M 3)
- D2.2 Prototypes of deduplication tool and bibliographic database system for monographs and serials (M 9)
- D2.3 Prototype of Web-database for content management and collection analysis (M 12)
- D2.4 Content analysis and management status report 1 (metadata, page numbers, content providers) (M 12)
- D2.5 Final and enhanced Web-database for content management and collection analysis (M 24)

¹ A milestone is a scheduled event marking the completion of a major part of the project work. It is used as a project checkpoint to validate how the project is progressing and revalidate work. Milestones numbers indicate the work package they relate to (e.g. M2.1 is the first Milestone of work package 2).

D2.6 Delivery of the first version of the approved best practice guidelines and standards (M 24)
D2.7 Content analysis and management status report 2 (metadata, page numbers, content providers) (M 24)
D2.8 Content analysis and management status report 3 (metadata, page numbers, content providers) (M 36)
D2.9 Delivery of the final revised best practice guidelines and standards (M 36)

Work package Description

Work package number :	3	Start date:	M1	End date:	M36
Work package title:	Technological implementation				

Objectives

Management and coordination of technological development and associated standards to allow for a pan-European, distributed and multilingual BHL-Europe. The technological implementation will concentrate on the innovative application of proven technologies to deliver stable and sustainable solutions.

Description of work

Task 3.1 – Technological implementation (Overall Coordination)

- 3.1.1 – Management of the technical development team.
- 3.1.2 – Adaptation of EUROPEANA and BHL data model, workflow, harvesting procedure, standards, specifications.
- 3.1.3 – Definition of own standards for images, metadata, harvesting according to partner requirements (consensus-building).
- 3.1.4 – Liaise with scanning centres of the national initiatives for post-processing of content.
- 3.1.5 – Development and adaptation of specific tools; implementation and adaptation of taxon finder and name recognition tools; improvement and implementation of OCR techniques.

Task 3.2 – Technical integration with EUROPEANA, BHL and national platforms

- 3.2.1 – Ensure that the standards for data management and image formats are consistent with international requirements and specifically the EUROPEANA and BHL, adoption of EUROPEANA Semantic Elements (ESE).
- 3.2.2 – Develop a distributed data model which will allow countries to retain control of their data, while enabling the material to be available through EUROPEANA, the BHL Portal (with Taxonomic Intelligence tools), and any national portals.
- 3.2.3 – Build a prototype distributed data system for the German language material, and integrate with the BHL Portal.

Task 3.3 – Addressing distributed access and storage – long-term sustainability: Develop a distributed access and storage system to enable national and international storage of the scanned materials; to develop the storage system in such a way that long-term sustainability of the data is secured.

Task 3.4 – Enabling BHL Portal access in European languages – interfaces, usability, and mobility

- 3.4.1 – Work with the EUROPEANA to create multiple language access to the BHL Portal.
- 3.4.2 – Create a prototype portal in German to allow access to the BHL Portal.
- 3.4.3 – Apply the model to the key European languages (English, French, German, Italian, Portuguese, Spanish, Danish, Dutch, Czech, Hungarian, Polish, Swedish), enabling access to the BHL Portal throughout Europe.

Milestones¹ and expected result

Responsibility: WP3 will be led by NHM London. It is important that this work package is led by a partner institution that has capacity and experience in delivering this type of technical project. The NHM's leadership role in BHL and EOL as well as its contribution to other related projects e.g. EUROPEANA, EDIT, SYNTHESYS, Key2Nature, makes it a suitable candidate.

Each sub-work package in WP3 will have a specific structure, starting with production of an options appraisal and assessment papers that will review standards and technologies. This will enable the technology development team/board to agree standards policy or implementation plans for specific products under each heading.

M3.1 All sub-work packages produce options appraisals for all products/work streams and detailed implementation plans agreed for years 2 and 3. This would include the issuing of all standards, data models, technology standards, preferred technologies, etc. required for implementation (M 6)

M3.2 Technology review based on German prototype instantiation (M 12)

Deliverables

D3.1 Deliver composition of Technology Management Board and initial meeting (M 3)

D3.2 Document agreed standards, best practice and system components (M 6)

D3.3 Plan for managing interoperability issues, data harmonisation and the integration of the content into BHL-Europe, EUROPEANA and the BHL (M 6)

D3.4 Implement plans for all components in WP3, incl. data models, technology standards etc. (M 9)

D3.5 Technical architecture status and progress report with particular focus on the development of the German prototype (M 12)

D3.6 Release of German prototype (M 18)

D3.7 Key components documented for output of D3.5 e.g. BHL-Europe Portal, OCR demonstrators, distributed storage model, etc. (M 24)

D3.8 Sustainability policy for continuation of service e.g. hosting, future development, helpdesk provision for service users/content providers etc. (M 30)

D3.9 Live BHL-Europe system, with distributed storage and management and appropriate tools for the continued development of services and ingress of multilingual content (M 36)

Work package Description

Work package number :	4	Start date:	M1	End date:	M36
Work package title:	Intellectual Property Rights				

Objectives

Management and coordination of the intellectual property rights (IPR) framework for BHL-Europe and agreements with Rights Holders. Ensure that BHL-Europe, EUROPEANA, and the BHL are using common approaches and common agreements, such that data can be exchanged between these partners without further Rights activity.

N.B. The majority of the material being digitised by partners is public domain, and where the Rights have expired. This material will remain public domain and be freely available to all users.

¹ A milestone is a scheduled event marking the completion of a major part of the project work. It is used as a project checkpoint to validate how the project is progressing and revalidate work. Milestones numbers indicate the work package they relate to (e.g. M2.1 is the first Milestone of work package 2).

Description of work
<p>Task 4.1 – IPR Framework: Establish IPR working documents – including best practice guide, due diligence guide, pro-forma agreements, and process for formally agreeing rights management with rights holders; align the approach with EUROPEANA and BHL and maximise level of interoperability including Rights metadata exchange.</p> <p>Task 4.2 – IPR Agreements with Data Providers: Complete formal IPR agreements with data providers identified in WP2; keep records of all agreements secure.</p> <p>Task 4.3 – IPR Agreements on projects results and outcomes: Develop IPR framework for long-term sustainability and long-term access to the digitised content of BHL-Europe, and ensure that EUROPEANA and BHL have long-term access to the material and associated Rights.</p>

Milestones ¹ and expected result
<p>Responsibility: WP4 will be led by the NHM. The NHM has a dedicated IPR Officer and access to the advice of a law firm (Farrer and Co.) who are experts on IPR, together with pro bono service from the Electronic Freedom Foundation lawyers in San Francisco, USA.</p> <p>M4.1 A working agreement on IPR will be in place with EUROPEANA and BHL (M 9)</p>

Deliverables
<p>D4.1 Delivery of IPR working documents, including best practice guide, due diligence guide, pro forma agreements and process for formally agreeing rights management with rights holders. Complete agreement with EUROPEANA and BHL for reciprocal access and Rights metadata. (M 9)</p> <p>D4.2 Complete signed agreements with first group of rights holders to enable material to be used in the BHL or EUROPEANA, and establish process for addition of further material. (M 24)</p> <p>D4.3 Deliver IPR framework to support long-term access and sustainability of the digitised material (M 24)</p>

Work package Description

Work package number :	5	Start date:	M1	End date:	M36
Work package title:	Dissemination, Exploitation and Evaluation				

Objectives
<p>Dissemination objective: Develop dissemination strategy; raise awareness, understanding and action of the project among the community and stakeholders in EU member states; ensure effective dissemination of project goals and results to the target users; ensure good communication within the European scientific community</p> <p>Presentation and demonstration objective: Ensure dissemination of project results at conferences, public events and among the networks of the consortium members</p> <p>Exploitation objective: Ensure implementation of project results in other projects, initiatives, institutions, and countries</p> <p>Evaluation objective: Monitor the level of use of BHL-Europe; survey the users of the Web Portal</p>

¹ A milestone is a scheduled event marking the completion of a major part of the project work. It is used as a project checkpoint to validate how the project is progressing and revalidate work. Milestones numbers indicate the work package they relate to (e.g. M2.1 is the first Milestone of work package 2).

Description of work
<p>Task 5.1 – Establish BHL-Europe Communications Working Group</p> <p>Task 5.2 – Develop and establish Web environment</p> <p>5.2.1 – Plan, design, publish, maintain, and update BHL-Europe Web site for internal and external communication with publication of all relevant results and links to partner networks.</p> <p>5.2.2 – Develop a mailing list to facilitate communication of new developments (internal and external); update the list regularly to include all relevant parties.</p> <p>5.2.3 – Develop self-running demonstrators to illustrate BHL-Europe use and functionality.</p> <p>Task 5.3 – Develop and prepare promotional materials and newsletters, press relations</p> <p>5.3.1 – Develop, prepare, and update target group specific promotion kits (fact sheets, flyers, posters, presentations) and related printed matters (e.g. illustrated book on best practice guidelines and standards for the public).</p> <p>5.3.2 – Prepare a quarterly newsletter to be published online.</p> <p>5.3.3 – Ensure proper press relations; maintain the press review; distribution of articles for various types of print and online media (journals, newspapers, blogs).</p> <p>Task 5.4 – Demonstration and awareness raising</p> <p>5.4.1 – Prepare and update multimedia presentation (automatic demonstrator) as information about the project for the general public.</p> <p>5.4.2 – Maintain and update the database of conferences and public events relevant for BHL-Europe; identify consortium members to present the project at selected events.</p> <p>5.4.3 – Alignment of public awareness activities of related projects (e.g. EDIT).</p> <p>5.4.4 – Organise public events and talks.</p> <p>5.4.5 – Represent BHL-Europe at conferences and special events (responsibilities depend on conference location and theme).</p> <p>Task 5.5 – Plan and organise user evaluation activities</p> <p>5.5.1 – Put in place Web-based evaluation tools to survey users (to determine target group of the users, country of the users, most interesting content, page views, etc.).</p> <p>5.5.2 – Develop online questionnaires to identify user requirements, preferences, experiences, benefits, and un-met needs; document case studies of non-science usage of content.</p> <p>5.5.3 – Establishing user testing groups; evaluation of this group using interaction logging.</p> <p>5.5.4 – Plan and prepare the two special evaluation periods during the project.</p>

Milestones ¹ and expected result
<p>Responsibility: WP5 will be led by National Museum Prague. This museum has an experienced team for communications, public relations, and related issues. RBINS supports the alignment with EDIT dissemination and public awareness activities.</p> <p>M5.1 Agreed dissemination plan (M 6)</p> <p>M5.2 Review of the 1st evaluation report (M 15)</p> <p>M5.3 Review of the 2nd evaluation report (M 30)</p>

¹ A milestone is a scheduled event marking the completion of a major part of the project work. It is used as a project checkpoint to validate how the project is progressing and revalidate work. Milestones numbers indicate the work package they relate to (e.g. M2.1 is the first Milestone of work package 2).

Deliverables

- D5.1 Web site, including multimedia presentation (M 3)
- D5.2 BHL-Europe newsletter and mailing list (M 3)
- D5.3 Database of relevant conferences/events and ownership for BHL-Europe presentations (M 3)
- D5.4 Deliver composition of Communications Working Group and 1st dissemination plan (M 3)
- D5.5 BHL-Europe dissemination plan (M 6)
- D5.6 BHL-Europe promotion kit (M 6)
- D5.7 Online questionnaires for user survey (M 12)
- D5.8 First user evaluation report (M 15)
- D5.9 Second user evaluation report (M 30)
- D5.10 BHL-Europe multimedia presentation, final version (M 36)
- D5.11 Illustrated book on best practice guidelines and standards for the public (M 36)