



Project Acronym: **pro-iBiosphere**

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### D6.3.1 Report on diversity and strengths of existing business models and discussion of sustainability

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TABLE OF CONTENTS

<b>Introduction.....</b>	<b>6</b>
<b>Methodology.....</b>	<b>7</b>
A FIRST STEP.....	7
NEXT STEPS.....	8
KEY CONCEPTS.....	9
<b>Exploitation Plans.....</b>	<b>11</b>
INPUTS FROM PARTNERS.....	11
NATURALIS.....	11
NGBG.....	12
FUB-BGBM.....	13
PENSOFT.....	13
SIGMA.....	14
RBGK.....	14
PLAZI.....	14
MFN.....	15
SYNTHESIS OF EXPLOITATION PLANS TO DATE.....	15
<b>Business Models.....</b>	<b>18</b>
BUSINESS MODELS CURRENTLY IN USE BY PARTNERS.....	18
CONSOLIDATED REPLIES FROM PARTNERS.....	21
<b>Market Background.....</b>	<b>44</b>
MARKET DEFINITION.....	44
<i>The overall vision.....</i>	<i>44</i>
NATURALIS.....	44
NGBG.....	45
FUB-BGBM.....	45
PENSOFT.....	45
SIGMA.....	45
RBGK.....	45
PLAZI.....	46
MFN.....	46
<i>The steps to make it happen.....</i>	<i>46</i>
NATURALIS.....	46
NGBG.....	47
FUB-BGBM.....	48
PENSOFT.....	48
SIGMA.....	48

RBGK .....	48
PLAZI .....	49
MFN .....	49
<i>Platform management</i> .....	50
NATURALIS .....	50
NGBG .....	50
FUB-BGBM .....	50
PENSOFT .....	50
SIGMA .....	50
RBGK .....	51
PLAZI .....	51
MFN .....	51
<i>The benefits the integrated system will offer</i> .....	51
NATURALIS .....	52
NGBG .....	53
FUB-BGBM .....	53
PENSOFT .....	53
SIGMA .....	53
RBGK .....	53
PLAZI .....	53
MFN .....	54
SYNTHESIS OF THE VISION OF PRO-iBIOSPHERE PARTNERS ON MARKET DEFINITION .....	54
MARKET RESEARCH .....	57
<b>Annexes</b> .....	<b>61</b>

- ANNEX 1: REPORT PREPARED FOLLOWING THE RBGK - SIGMA MEETING OF DEC. 7, 2012 (INCLUDING THE QUESTIONNAIRE SENT TO PARTNERS)
- ANNEX 3: MAIN BIODIVERSITY PROJECTS AND INITIATIVES
- ANNEX 4: BIODIVERSITY RESEARCH PORTALS
- ANNEX 4: REFERENCES



## INTRODUCTION

The purpose of Task 6.3 “Evaluating business models currently in use by partners” is to detail the exploitation plans foreseen to date by each project partner (at its own level or at the one of the consortium) and the business models each partner has been currently referring to in its activities, and to put this information in the light of a “market context” or “market background” in the framework of which the project shall develop its activities.

The series of D6.3 Deliverables report on Task 6.3 achievements on a 6-month basis.

In order to gather inputs from project partners, a questionnaire has been finalized by RBGK and Sigma Orionis on the occasion of a meeting held on Dec. 7, 2012 (at project month 4) in RBGK premises (see Annex 1).

This questionnaire has been sent to all pro-iBiosphere consortium partners at month 5. It includes three parts, addressing respectively:

- Exploitation plans at the level of each organization,
- Business models currently in use by organization,
- Market context and sustainability perspectives.

These inputs have been consolidated, analysed and complemented with a desktop research by Sigma Orionis.

Successive versions of this deliverable with updated inputs from all consortium partners will be produced at months 12, 18 and 21. In addition, a plenary meeting: “Meeting to evaluate business models currently in use by partners and relevant non-partners” will be organised at month 14 and should allow making a significant step towards sustainability plans, which the last consolidated document produced at month 18 should confirm.

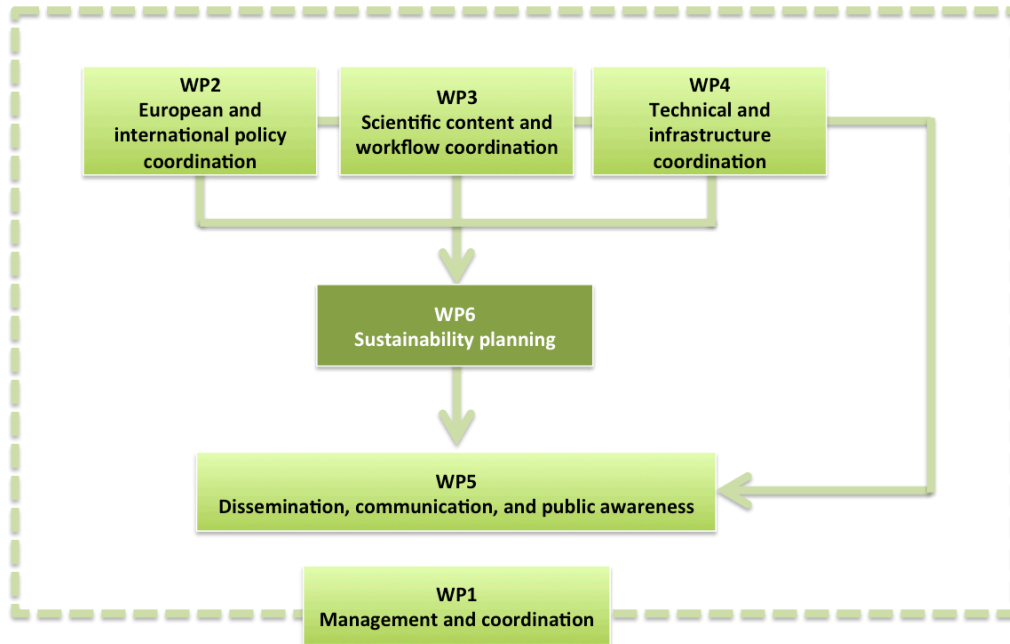
This deliverable logically includes three distinct parts following a structure similar to the one of the questionnaire:

- A first part presents the envisioned exploitation plans at each partner’s level: answers to the questionnaire and synthesis of the first inputs.
- A second part presents the business models at each partner’s level with a consolidated matrix presenting all inputs received from the partners, together with a first analysis.
- The last part is devoted to the market context, presenting the project partners’ vision, the obstacles, costs and benefits of managing the foreseen integrated platform, and finally the interim results of a desktop research conducted by Sigma in the first six months.

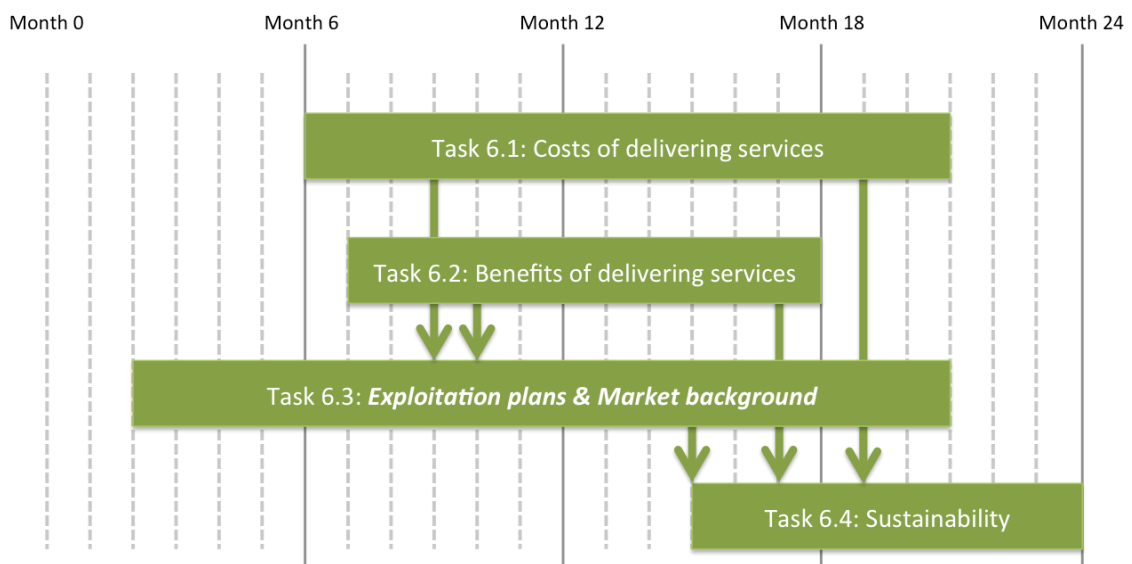
## METHODOLOGY

### A FIRST STEP

At the present stage of project development, only limited outputs can be used from the other WPs (namely WP2, WP3, and WP4). These outcomes are expected, in the strategy of the workplan, to feed WP6 analyses (see below illustration).



Furthermore, Task 6.1 (cost of services) and Task 6.2 (benefits of services) are also expected to feed Task 6.3 analyses but have not yet started (see below illustration).



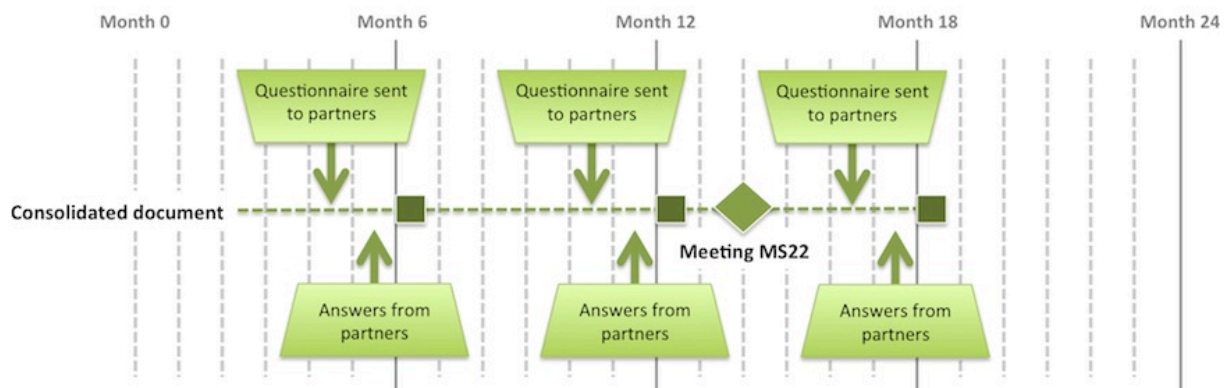
The present deliverable is based only on inputs from partners and on a desktop research performed by Sigma Orionis. Hence it should be seen as the basis for further work.

## NEXT STEPS

The methodology developed for Task 6.3 is detailed below.

In months 10 and 16, partners will be asked to update their answers to the three key questions addressed in the pro-iBiosphere questionnaire (i.e. on exploitation plan, business models, market context and project sustainability). This questionnaire will be updated by the Task leader based on inputs from WP2, WP3, WP4, Tasks 6.1 and 6.2, and from further desktop research. It is expected that the focus of the “business models” part of the questionnaire will switch from a present (business models currently in use) to a future perspective (business models concerning the integrated platform), thus providing a smooth transition towards Task 6.4 analyses.

In month 14, the plenary “Meeting to evaluate business models currently in use by partners and relevant non-partners” (project milestone MS22) should allow making a significant step towards the envisioned business models (at project level) and sustainability plans. The final report will be (D6.3) produced in month 18 .



A more detailed planning of Task 6.3 activities can be introduced as follows, seen from the Task leader perspective:

### Exploitation Plans

- **M10** Send current exploitation matrix to all partners and ask for updates
- **M11** Prepare updated matrix
- **M12** Integration of the matrix and of any related analysis into **D6.3.2**

### Business Models

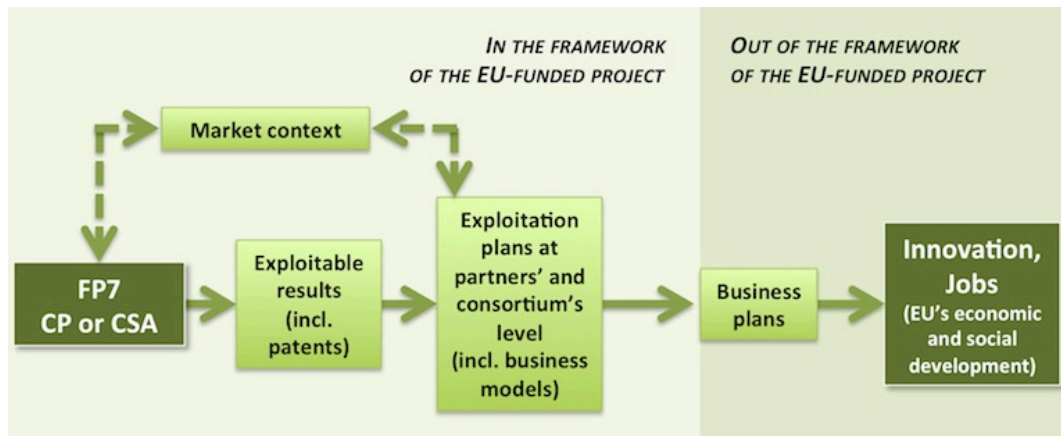
- **M10** Send current analysis of “business models currently in use” to all partners and ask for updates
- **M10** Integrate updates from partners and inputs from WP2/WP3/WP4 & Tasks 6.1 & 6.2
- **M11** Prepare updated business model analysis (for models currently in use and for relevant business models to take into consideration at project level)
- **M12** Integration of the analysis into **D6.3.2**

### Market Research

- **M10** Share updated version (further desktop research) of market context and project sustainability to all partners and ask for feedback
- **M11** Prepare updated analysis
- **M12** Integration of the analysis into **D6.3.2**

## KEY CONCEPTS

The different concepts of “exploitation”, “business model” or “business plan”, were not understood in the same way among project partners. As a result of this, the Task leader proposed a set of definitions and shared them with all partners done during the first 6-month period (see below).



STEPS FROM EU-FUNDED RESEARCH TO INNOVATION AND JOBS - © SIGMA ORIONIS 2012

### Exploitation plan

The European Commission pays a great attention to the fact that the results of research projects (or coordinated and support actions), funded through taxpayers’ money, are “disseminated” (i.e. communicated to a wide audience, not limited to the audience of project partners) and “exploited” (i.e. useful after project completion).

An “exploitation plan” is quite systematically requested from EU-funded projects, detailing how each project partner and the consortium as a whole intends to make use of research results, to take advantage of its activities in the project. Some partners will only foresee an increase of their expertise or level of publications while others may envision precise exploitation perspectives, based on more or less formalized business models.

A “market background document” may be useful to fine tune exploitation plans at partners’ or consortium’s level since an exploitation perspective may be inspired, identified, better formalized when considering the market environment: such a document will be made available at month 11 (i.e. August 2013).

### Sustainability

The European Commission also pays a great attention to the fact that the funding of a research project is only a step in the development of a more ambitious project by the consortium partners (or at least a sub-group of them). In some cases the research results can lead to a pre-commercial or even a commercial phase during which no EU funding will be necessary any longer. Suited business models allow full exploitation of project results, hence, ensuring the continuity of the partners efforts, and the sustainability of the overall project they had envisioned.

Obviously, since consortium partners are co-investing in the research project, they are expected to have a similar determination to exploit project results and ensure the sustainability of their overall project. A convincing sustainability plan is one of the key expected outputs of the project.

### Business model

A business model describes the precise way a stakeholder plans to seize a commercial (business) opportunity. The “Business Model Canvas” ([http://en.wikipedia.org/wiki/Business\\_Model\\_Canvas](http://en.wikipedia.org/wiki/Business_Model_Canvas)) based on Osterwalder’s work is often considered as a good reference framework to describe the various constituents of a business model: value proposition, customer relationship, channels, etc. In the pro-iBiosphere project, a detailed business model for iBiosphere (the envisioned integrated system) will logically be fine-tuned only by the end of the project, when all project activities exploring the context and conditions necessary to ensure a transition from pro-iBiosphere to iBiosphere will have provided main outputs.

However, project partners are in a position, at the start of the project, to describe the “business models currently in use in their organizations”, i.e. “which services (publications, access to data, expertise, etc.), for which users/customers, are they exploiting today (or could they exploit), and this under which cost-benefits model?”

These current business models are important to consider in developing the future possible iBiosphere business models, since iBiosphere, when compared to the present less integrated situation, offers in particular the possibility to deliver improvements on services that already exist and a broader range of new services.

### **Business plan**

A business plan comes after a business model. It is prepared by an organization targeting a business opportunity (made concrete through a business model) and precisely describes how the business will develop (addressing strategy, marketing, operations, human resources, legal aspects, etc.).

It is primarily intended to get a green light from the management of a company, banks or investors. Therefore, a business plan is typically out of the scope of a EU-funded project.

## EXPLOITATION PLANS

Partners were asked to describe the way they plan to exploit pro-iBiosphere in their organization or even at their own personal level, i.e. why they will consider by the end of the project that their involvement in it has been useful (e.g., taking advantage of the activities that have developed, making use of project results, etc.)? The questionnaire included the following suggestions:

*For this exercise, partners may only foresee an increase of their expertise, of the level of their publications, of their contact network, etc. They may also envision more commercial exploitation perspectives, based on more or less formalized business models, which they could describe there. This question is not about business models related to the envisioned iBiosphere integrated system but at partners' own level.*

## INPUTS FROM PARTNERS

### NATURALIS

Naturalis considers Biodiversity information core business. This institution holds a collection of more than 35 million specimens. The collection is being used for conducting research. The results of these studies are mainly distributed to the user community through scientific publications, such as articles in journals, books and flora and fauna series.

At present, Naturalis considers these publications as “necessary”, but they also realise that they are not the only way to disseminate biodiversity knowledge. Modern information technology provides ample options to disseminate and use the information in such publications in many different ways. Naturalis finds important to share biodiversity information with researchers and various users. The pro-iBiosphere activities will provide important steps to facilitate more effective and efficient use of that biodiversity knowledge.

Naturalis finds it very important that the project pays attention to the cooperation with other biodiversity institutes, with similar background, vision and challenges. Pilots on the mark-up of biodiversity information and knowledge and legacy literature (i.e. non digital born) are considered very important. Making available the wealth of information available in legacy literature is important because most information of species is not found on modern papers, but on Floras and Faunas that have been published in the past and mostly only available as hard copy format.

Based on their vision of open access, Naturalis does not anticipate significant commercial use of their information, but this is one of the topics that the project will monitor through subsequent questionnaires that will be distributed. Depending on the scope, duration, funding, the needs of the Flora/Fauna projects can be different. The editors/coordinators/leaders of the Flora and Fauna projects coordinated in Naturalis described their needs and/ or short term activities plans:

#### *Flora Agaricina Neerlandica (FAN):*

- *Generate a digital database of the collections featured in FAN*
- *Generate an increased value of the FAN collections*
- *Facilitate increased use of FAN collections, e.g. in systematic, ecological or phylogeographic works*
- *Facilitate access to literature, data and figures through open access data portal (e.g., FUB-BGBM), when allowed by copyright issues*
- *Develop e-tools and biodiversity information systems to provide tailor-made, customer driven information to stakeholders, such as the Dutch Mycological Society (NMV)*
- *Develop expertise in e-tools for capacity building*

#### *Flora of the Guianas project (FoG):*

- *Online publication: currently, the volumes of the Flora of the Guianas (FoG), which can include the taxonomic treatment of one or more families, are published only as hard copy. The FoG board wishes to have these taxonomic treatments, as well as upcoming ones, available online and with open accessibility. By participating*

*in e-taxonomy workshops and other activities offered by pro-iBiosphere, the editor and coordinator of the FoG expects to be better informed about the different possibilities and costs of online publication, and to find partners/funding to implement it. Online publication will increase the reach of the Flora and attract new contributors.*

- *Updating taxonomic information: based on the experience and information acquired through the pro-iBiosphere mark-up pilot and the e-taxonomy workshops that have been offered. The editor and coordinator of the FoG aims to use an e-platform that will allow the periodical update of the taxonomic data produced within the FoG project.*
- *Commercial exploitation perspectives are not foreseen within the FoG project activities.*

*Flora Malesiana project:*

- *Make optimal use of the physical collections*
- *Built optimally (monographically) validated and continuously updated information on Malesian plant diversity*
- *Develop e-tools and biodiversity information systems to provide tailor made, customer driven information to stakeholders*
- *To include all available information on uses, conservation status based on the label data*
- *Develop expertise for capacity building*

*Programme “Natuur van Nederland” For the next two years we have the following activities planned that might benefit from the results obtained by the pro-ibiosphere project:*

- *Connecting biodiversity literature to the taxonomic thesaurus of plants, animals and mushrooms of the Netherlands. The result of pilots 1 and 2 might increase our knowledge, or perhaps offer tools that can be used.*
- *Develop the Dutch Species Catalogue ([www.nederlandsesoorten.nl](http://www.nederlandsesoorten.nl)) to a national information hub with species information.*
- *Developing identification tools, mostly multi entry keys. Non-professionals are filling matrixes with species and their characteristics, which is very time consuming.*
- *Overall: knowledge is being disseminated via a cross medial approach, i.e.: (digitized) books & magazines, web-platforms and apps. . Users can access information in several ways, including all kinds of web services and api's.*

## **NGBG**

The NBGB will use this project in order to improve their staff skills, competencies and experience in taxonomic publishing. Many of their taxonomists want to use digital publishing, but have no experience and are unaware of current developments. The workshops of pro-iBiosphere will offer an excellent opportunity for training people in the use of these tools.

pro-iBiosphere will help developing communication and relationships between European institutions also interested in streamlining taxonomic publication. As a medium-sized institution it is important for the NBGB to collaborate with other institutions to benefit from economies of scale. The NBGB hopes that pro-iBiosphere will help them build links with other consortium institutions and other institutions that will be involved in the workshops, seminars, and meetings of the project.

These institutional ties will be developed to seek additional funding for digital taxonomic tools, management and infrastructure.

Some of the primary products that are produced by the NBGB are scientific, educational and opinion publications. All these outputs are necessary for fulfilling NBGB's mission of providing authoritative information on biodiversity. In order to increase productivity, the NBGB needs to find ways to increase their publication rate, reduce the overheads per publication and ensure ways that allow a faster publication of their outputs.

### FUB-BGBM

The Botanic Garden and Botanical Museum Berlin-Dahlem (BGBM), based at Freie Universität Berlin (FUB), provides a combination of international collaborative efforts and scientific production in both systematic research and biodiversity informatics. Research activities are focussed on 6 thematic areas addressed by the BGBM research groups Asterales, Caryophyllales, Diatoms, Cuba & Caribbean, Euro+Med, and Biodiversity Informatics.

Apart from conducting hypothesis-driven specific scientific studies, the BGBM research-groups are responsible for or contribute to a number of long-term initiatives compiling, managing, and publishing floristic information about specific taxonomic groups or geographic regions. This includes, for example, Euro+Med Plantbase, Med-Checklist, Flora of Cuba, Flora Hellenica, Flora of Cyprus, Dendroflora of El Salvador, AlgaTerra, and the International Cichorieae Network. BGBM is also a signatory to the MoU establishing the institutional partnership to create a World Flora Online, thus fulfilling target 1 of the Global Strategy for Plant Conservation, which was adopted by the Conference of the Parties of the United Nations Convention on Biological Diversity.

In all initiatives the issue of streamlining the processes of data acquisition, information management, and data publication in web portals and in printed form is crucial as taxonomic expertise is an (increasingly) rare and precious good and should be unburdened from tasks that can potentially be handled by methods provided by computer science and biodiversity informatics. pro-iBiosphere supports this approach and the FUB-BGBM expects to benefit from the project results in three areas:

- **Data acquisition:** presently, in almost all of the FUB-BGBM projects, the acquisition of greater amounts of data stemming from unstructured or semi-structured resources (e.g. printed floras, web-pages, MS-Word lists and tables) is handled by data import mechanisms lacking standardisation. Practically this means that data imports often have to be implemented on an individual basis which therefore makes them time consuming and expensive. The FUB-BGBM hopes that pro-iBiosphere activities in WP3 and WP4 will help to optimize this process by offering: i) standard software components for semantic mark-up of semi-structured source documents, ii) agreeing on standard target XML-schemas produced by mark-up activities, and iii) providing data import-software components implementing the agreed standards.
- **Data management:** the biodiversity informatics community has provided several software platforms which can be used for data management, two of them being the Scratchpad-system coordinated by the NHM and the EDIT Platform for Cybertaxonomy coordinated by the BGBM. In pro-iBiosphere, the FUB-BGBM expects to broaden the user-base of the EDIT-platform supported by cooperation and outreach activities in WP2 and WP5. In particular, they hope to be able to train a group of "power-users" in their institutions which will then be in the position to train and support external users beyond the funded pro-iBiosphere phase.
- **Data publication:** creating publications directly from data management platforms is a vision shared by almost all biodiversity information platforms. With pro-iBiosphere's activities for improving interoperability between infrastructures such as PLAZI, Pensoft, and the EDIT Platform for Cybertaxonomy, the FUB-BGBM hopes to be able to offer functionalities helping taxonomists to create research papers directly from their data management platform. They also expect to be able to improve data feedback mechanisms allowing data managers to re-integrate results from a publication review process in their scientific base data.

### PENSOFT

The exploitation of project results by Pensoft is directed towards:

- Automatisation of the registration process of new taxon names in Global indexers. Currently Pensoft is using semi-automated process of registration of new taxon names in electronic registers for species information (IPNI, Index Fungorum, MycoBank, ZooBank). Within pro-iBiosphere, Pensoft will develop a common XML-query model for automated registration of nomenclatural acts between publishers and the electronic registers for higher plants (IPNI), fungi (Index Fungorum, MycoBank) and animals (ZooBank). Pensoft will utilise the new model and develop a fully automated module for registration of nomenclature acts published in the journals Zookeys, PhytoKeys and Mycokeys.
- Pensoft will also benefit from the outcomes of Task 4.1 aiming to develop workflow linking the legacy and prospective biodiversity literature and data through mark-up standards and tools.

## **SIGMA**

Sigma Orionis specializes in services supporting collaborative research and global innovation in ICT. Therefore, the company does not envision to and will not directly exploit the project results.

However their involvement in an important and very visible project such as pro-iBiosphere, and their position as leader of WP5 (addressing dissemination) and Task 6.3 (on exploitation plans and business models) will significantly enhance their experience in e-Infrastructures developments, expertise in dissemination and exploitation activities, corporate image and international reputation, and extend their network of international contacts in the ICT domain.

For these reasons, their involvement in the pro-iBiosphere project will logically and notably increase the potential of the company concerning the following four services: technology and market research, promotion and exploitation of research projects, organization of cooperation and business events, support to the involvement in EU-funded programmes.

## **RBGK**

- Obtain information on the costs and benefits of Flora production including comparative data across partners
- Better understanding of audiences of floras and their requirements for information
- Increased ability to target products to audiences and to increase their use
- Better understanding of the costs of production and maintenance
- Better understanding of different business models and approaches for sustaining flora production and dissemination
- Identify opportunities for further funding (commercial and non-commercial)
- Identify opportunities for institutional collaboration in building, managing and disseminating floras and related tools and systems
- Ability to pool together information from floras and faunas and analyse data

## **PLAZI**

Plazi is promoting open access to scientific content. Its activities are centred on the legal aspects, access to content hidden in legacy publications, and ways forwards. Plazi also funded a SME to provide services to convert legacy publications into semantically enhanced documents, to build and maintain a treatment repository, to provide consultancy for publishers interested in converting from traditional journal production workflows into an XML based workflow. Plazi is also interested to develop legal language that will facilitate easier access to the scientific content.

This project will allow Plazi to obtain feedback for their operations, to talk to potential publishers, which might lead to business, and to gain a deeper insight into science publishing policies and how it is handled by the different partners in this project and those with whom they will cooperate to write the proposed reports.

The collaborations in WP4 will allow the creation of workflows from the printed document via conversion to content in the Plazi repository, to the Edit-platform, where it will be reused and complemented with new information and ending up in a journal article at Pensoft that will in future the import of the published content directly into repositories (a process that is already established) making the tedious markup step obsolete.

## MFN

In general, pro-iBiosphere will provide better access to and facilitate the use of taxonomic (legacy) information for scientists working at the Museum für Naturkunde. The use of modern workflows for taxonomy have the potential to increase the number and speed of taxonomic publications. Furthermore, they facilitate (international) community building and increasing the use of the museum's collections by facilitating the location of specimens of our collection. As a result, the taxonomic output of the institution can be disseminated in a more efficient way.

At the MfN scientists still follow the more traditional workflow for production of Faunas. Raising awareness that there are sophisticated online tools for data extraction, best practice workflows and yet unknown ways of collaboration will help to improve the efficiency in producing these faunas at MfN. The training of individual scientists in the use of these tools will not only increase the output and quality of work, but also change and modernise scientific workflows at the MfN. Respectively, this will enable scientists to undertake more challenging (large-scale) taxonomic projects in a reasonable time. Furthermore, new ways of scientific collaboration can be introduced to the MfN scientists, which may extend the (international) collaboration network of the museum.

pro-iBiosphere will enable sophisticated extraction and dissemination of taxonomic information from digitized legacy literature, which is a strong argument for pushing the digitization of Faunas and Floras and similar legacy literature at European institutions. Therefore, the BHL-Europe project, formerly coordinated by MfN, will benefit from pro-iBiosphere activities by a potential increase of digital content produced throughout Europe. The close collaboration of BHL-Europe with the pro-iBiosphere project will help to disseminate BHL-Europe workflows, standards, and best practises. Potentially, the collaboration of BHL-Europe and pro-iBiosphere will kick-off new development or improvements of the BHL-Europe technical architecture, which will allow a better integration and connectivity of services, developed by pro-iBiosphere. Consequently, the BHL-Europe portal users will gain better access to taxonomic information contained in legacy literature presented by BHL-Europe through the semantic mark-up tools provided by pro-iBiosphere.

As of late MfN is hosting the web platform of the Fauna Europaea. A business model and future perspectives for Fauna Europaea will be developed over the course of the next years at the MfN. At the moment the integration of Fauna Europaea with the EDIT Platform is underway. Therefore, a close alignment of Fauna Europaea and pro-iBiosphere activities will be beneficial for both initiatives/ projects.

## SYNTHESIS OF EXPLOITATION PLANS TO DATE

All project partners provided substantial inputs addressing various possible exploitation perspectives. An overview of these inputs is presented on next page under the form of a matrix. The matrix is based on three major exploitation outputs that are quite consistent and convincingly stated by project partners:

- **Expertise:** an increased expertise coming from the interaction between project partners, developed tools, project workshops, etc.
- **Cooperation:** extended cooperation perspectives thanks to potential partners, funding opportunities, institutional cooperation, international community building, etc.
- **Business:** improved business models, widened field of operations, impact on existing projects, etc.

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To be noted: some cells are empty because some partners did not have a clear answer to some of the questions, or not previously considered these issues. The second iteration on exploitation plans planned at month 11-12 will probably lead most project partners to update the matrix accordingly (beyond the fact they may update the matrix because their exploitation perspectives will have changed during the next 6 months).

PRO-iBIOSPHERE EXPLOITATION MATRIX AT MONTH 6

	Strengthened expertise	Extended cooperation	Improved business (as a result of pro-iBiosphere activities/outputs)
<b>BGBM</b>			Data acquisition (standardisation), data management (User-base of the EDIT platform) and data publication (directly from platforms, re-integration of feedback into base data)
<b>MfN</b>	Thanks to the training of MfN scientists to sophisticated online tools for data extraction, best practice workflows, ways of collaboration	International community building	Project outputs (better access to and facilitated use of taxonomic / legacy information) should increase the number and speed of taxonomic publications  Cooperation with the BHL-Europe and the Fauna Europaea projects are of mutual benefit
<b>Naturalis</b>  <i>(7 inputs)</i>	Expertise in tools for capacity building	Cooperation with other institutes of similar background and vision  Potential partners (e.g. for FoG) and funding opportunities	Extended distribution / share of knowledge through ICT (beyond traditional publications)  Increase value, access, use of FAN collections, benefit for the FoG and FM projects, and other projects (e.g. develop the Dutch species catalogue to a national information hub)  No planned commercial use (open access) so far
<b>NBGB</b>	Taxonomic publishing (staff training through project workshops)	With the perspective of economies of scale in taxonomic publication and funding	Increase our productivity (publication rate, reduced overheads, faster publication)
<b>Pensoft</b>			Automatisation of the registration process of taxon names in global indexers.  Mark-up standards and tools
<b>PLAZI</b>	Deeper insights into science publishing policies		Feedback on our operations Contact with potential publishers
<b>RBGK</b>	Including comparative data across partners	Institutional cooperation and funding opportunities	Improved business models (namely flora production & dissemination)
<b>Sigma</b>	e-Infrastructures and dissemination & exploitation	Extend our contact network in the ICT domain	Enhance corporate image & international reputation

## BUSINESS MODELS

### BUSINESS MODELS CURRENTLY IN USE BY PARTNERS

The answers to part 2 of the questionnaire will allow WP6 to establish baseline information for workflows related to the production/use/dissemination of Floras/Faunas currently being used by partners. The 40 questions it contains are grouped under five headings are based on the "Business Model Canvas" of Osterwalder & Pigneur (2009) and the "Reference Business Model" of Lambert (2012) This baseline information will later be compared with new models and & workflows.

The Unit of Analysis for this exercise is at the level of the individual partner organisation, the consolidated replies are given in the spread sheet reproduced at the next paragraph. 13 replies from 7 partners have been received, and these are generally from the perspective of an individual flora/fauna projects, or else a grouping of similar activities at the level of the organisation.

In the next few months of the "research and understanding" phase this spread sheet will be developed and refined, firstly by working together through any ambiguities that the respondents may have found in the phrasing of the questions, and by researching the areas where detail is currently lacking. New responses will also be solicited. A set of business models for each partner will then be developed from this table and further input from workshops, at a sufficient level of detail to ensure that links between the components of the models are explicit (e.g., between a value proposition and a user).

Pending the correction and filling of gaps in the data and proper analysis, a combined summary of responses is presented on page 19, which gives an overview of the commonalities between partners, and perhaps highlights areas for work.

The layout of the figure follows Osterwalder & Pigneur (2009), where the value proposition (VP) is central to the model. The customer sectors (CS), customer relationships (CR) and the delivery channels (CH) form the upper-right portion whereas the key activities (KA), key resources (KR) and key partnerships (KP) form the upper left part. The cost structure (C\$) and revenue streams (R\$) are at the bottom of the figure. This presentation tends to place the expenditure components to the left of the diagram and the revenue generating ones to the right.

The text from each set of replies was processed using the R-cran NLP software to generate 'commonality' plots (i.e., words most common in the replies placed centrally with larger font). These are overlaid on the model canvas.

To summarise initial results:

- The central Value Proposition (VP) is richly described and appears quite complex, though it lacks precise detail. It is to offer products and services, which deliver comprehensive, validated, biodiversity knowledge, but the precise form is not specified. The stated aim is to help the user find out information about species. The main business drivers given are statutory responsibilities, mission, reputation and sustainability. Cost reduction does not figure greatly here (which is perhaps surprising).
- As above, at the level of abstraction of a combined analysis, the Customer Segments (CS) are broadly defined: value is created for a wide range of scientists, data aggregators, students, citizens. The most important customers are conservationists, taxonomists, ecologists, students and publishers but the relationship between CS and VP is not resolvable. The current channels of delivery (CH) are mostly hardcopy, with some webportals, software, automated programme interfaces (APIs), apps and the like. Personal contacts, education and training and exhibitions also figure. The main established customer relationships (CR) include self-service, semi-automated or automated types, and consultancy.
- The key activities (KA) seem either taxonomic (curation, research, editorial) or software development (coding, documentation) a distinction that is not so pronounced in the VP, but which requires the key



resources (KR) scientific collections, literature, scientific staff, editors on one side and IT staff hardware, software, consultants, and administrators on the other . The delivery channels (CH) require publishers, designers, consultants, specialists funding of exhibits, infrastructure developers

- The key partnerships (KP) are with governmental and non-governmental organisations, universities, editors, taxonomists, referees, (software) developers. These partnerships provide (taxonomic) accounts, editorial, peer review and software.
- Very little information was gathered regarding financial aspects. Revenue from the sale of hard copy publications is a common theme but otherwise the details of the revenue streams (R\$) and cost structures (C\$) are unknown.





**CONSOLIDATED REPLIES FROM PARTNERS**

	Q	BGBM	MfN	Naturalis DF	Naturalis FAN	Naturalis FGU	Naturalis NAT	Naturalis FM	Naturalis FGa	Naturalis VT	NBGB	Pensoft	Plazi	RBGK
V P1	What are the business drivers for our institutes ?	Mission, statutory responsibilities (including higher education), sustainability, scientific excellence	Our mission (“Discovering and describing life and earth – with people, through dialog”) and vision (“As an excellent research museum and innovative communication platform, we want to engage with and influence the scientific and social discourse about the future of our planet – worldwide”)	Mission, statutory responsibilities, profit, sustainability, focus of collections, teaching opportunities, visibility, national expertise centre	Mission, statutory responsibilities, profit, sustainability, increased use and value of collections, teaching and research opportunities	Mission, statutory responsibilities, profit, sustainability, focus of collections, teaching opportunities, visibility	Mission, statutory responsibilities, profit, sustainability	Mission, statutory responsibilities, profit, sustainability, focus of collections, teaching opportunities, visibility	Mission, statutory responsibilities, profit, sustainability, focus of collections, teaching opportunities, visibility, scientific publications	<i>To describe, understand and explore biodiversity for the wellbeing of man and the future of our planet.</i>	Fulfilling our mission in custodians of scientific collections, scientific research, conservation, and education.	Sustainability, reputation, mission, profit	Mission, Vision, business, sustainability of services, ability to get grants,	Mission, statutory responsibilities, profit, sustainability MJ - don't agree with 'profit' above! I assume here we should spell out the main objectives of Kew rather than simply refer to 'mission' etc. e.g. a) better understand and conserve plant and fungal biodiversity b) increase use and impact of our information resources c) sustain our activities through increased generation of income



V P2	<i>What value do we deliver to the customer?</i>	Comprehensive and authoritative floristic information	Comprehensive and authoritative faunistic information (Recent and extant taxa)	Comprehensive and authoritative floristic information, validated reference collections	Comprehensive information, better access to literature, validated reference collections	Comprehensive and authoritative floristic information in the Guianas region, validated reference collections	Validated information, maintenance, continuity	Comprehensive and authoritative floristic information, validated reference collections	Comprehensive and authoritative floristic information, validated reference collections, IUCN Red Data list assessments, basic data on uses, vernacular names, key literature, improved quality of ecotourism holidays, high quality collection data to be used in biodiversity assessment and other studies or conservation actions	Knowledge on biodiversity	Authoritative information on all matter relating plants and fungi. Training in Botany. Ex-situ conservation of plants.	Comprehensive and authoritative faunistic, floristic and mycological information; popularisation of taxonomy, integration of taxonomic data and information	Well defined content (treatments); tools to convert legacy publications in semantic enhanced publications; advice; legal advice	Comprehensive and authoritative floristic information NB: We have an imperfect understanding of how our products are used and how well targeted, and look to this project to help us better understand and describe our audiences and the value we deliver to them.
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V P3	<i>Which one of our customer's problems are we helping to solve?</i>	Finding information about particular species (e.g. distribution, thread status, specimens).	Access to comprehensive (and easy-to-retrieve) information about the European fauna (Fauna Europaea, <a href="http://www.faunaeuropa.org/">http://www.faunaeuropa.org/</a> ), butterfly families (GloBIS, <a href="http://www.globis.insects-online.de/">http://www.globis.insects-online.de/</a> ), Rhopalosomatidae ( <a href="http://rhopalosomatidae.hymis.eu/">http://rhopalosomatidae.hymis.eu/</a> ) and others	Finding specific information about plant taxa; identifying plant specimens; compiling taxonomic and morphological information for complete taxa revisions;	Finding information about species of macrofungi found in the Netherlands and in Western Europe.	Finding specific information about species of plants in our focus area; compiling taxonomic and morphological information for complete taxa revisions	Finding trustworthy information about Dutch species. Identification of species.	Finding specific information about plant taxa; identifying plant specimens; compiling taxonomic and morphological information for complete taxa revisions;	Finding specific information about species of Malaysian plants; identifying plant specimens; compiling taxonomic and morphological information for complete taxa revisions; finding key literature; obtaining reliable biodiversity information; getting the correct name for a species/taxon	Information on biodiversity at the level of organisms, ecosystems and characters	Finding information about plants and fungi, such as knowing which plants to conserve.	Finding faunistic, floristic and mycological information, diminished value of taxonomic research, poor visibility of taxonomic data, lack of common platform for integrated taxonomic data	Access to treatments of taxa, data mining tools	Finding information about species of African plants NB: We have an imperfect understanding of our customer's problems and how floras are and could be used to resolve them, and look to this project to help us better understand and describe our audiences and their problems.
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V P4	<i>What bundles of products and services are we offering to each customer segment?</i>	Printed floras and checklists, web-based information systems, web-services, data management software, university courses (currently suspended)	Web portals for online search, (printed faunas, printed field guides)	Printed floras, web-based information systems and identification tools; species checklists for specific areas	Printed floras, web-based information systems and identification tools	Printed flora; species checklist (in development)	Books, magazines, digital species register, identification tools, identification services	Printed floras, web-based information systems and identification tools; species checklists for specific areas	Printed floras, web-based information systems and identification tools; species checklists for specific areas; high quality and georeferenced specimen database; identification expertise; simple guides for ecotourists;	Revisions, identification keys, analysis of distribution patterns and dynamics of distribution, character analysis, expert advice.	Floral works; improved accessibility to plant and fungi information; new knowledge on plants and fungi; training to students; ex-situ conservation of living plants and plant seeds.	Electronic and printed information on systematics, phylogeny, biogeography, ecology and biodiversity of animals, plants and fungi	Access to treatments and subsections (ie cited observations); tools, legal advice	Printed floras, printed field guides, web-based NB: We have an imperfect understanding of who uses our products and how well targeted are the different products and services we offer, and look to this project to help us better understand and describe our audiences and their needs.
V P5	<i>Which customer needs are we satisfying?</i>	Identification of specimens, nomenclature problems, describing plant distribution, describing plant characteristics, organising and maintaining scientific data	Access to information on species/ taxa, e.g. text description, geographic distribution, nomenclature variants (synonyms), common names, taxonomic status, type information (locality, material), hierarchical position, associated multimedia objects (species images, labels), experts contacts, associated references (including species protologues)	Identification of specimens, correct nomenclature, describing plant distribution, describing plant characteristics, indication of related taxa, indication of uses and conservation status, validation of observations	Identification of specimens, correct and updated nomenclature, systematic context (related taxa)	Identification of specimens, correct nomenclature, describing plant distribution, describing plant characteristics, indication of related taxa, indication of uses	Identification of specimens, nomenclature problems, describing distribution, describing characteristics, describing biology of species	Identification of specimens, correct nomenclature, describing plant distribution, describing plant characteristics, indication of related taxa, indication of uses and conservation status	Identification of specimens, correct nomenclature, describing plant distribution, describing plant characteristics, indication of related taxa, indication of uses, rareness and conservation status	All questions related to biodiversity (we are a brooker of information for those fields for which we do not have expertise ourselves)	Their need to get fast and reliable information on plant and fungal diversity; safeguarding plant diversity for future generations	Publication of all types of taxonomic information and data, dissemination of taxonomic content, popularisation of taxonomic outcomes, integration of taxonomic information and data	Aggregators (EOL, GBIF); webmasters, taxonomists,	Identification of specimens, nomenclature problems, describing plant distribution, describing plant characteristics NB: We have an imperfect understanding of our customer needs and how far these are being satisfied and look to this project to help us better understand this.



CS 1	<i>For whom are we creating value?</i>	Taxonomists, Students, Conservationists, Ecologists, Environmental Scientists, Policy Makers	Taxonomists, Conservationists, Ecologists, Environmental Scientists, Policy Makers, Citizen Scientists, Stakeholders	Taxonomists, Conservationists, Ecologists, Environmental Scientists, Policy Makers, Pharmacologists, Botanists, Foresters, Land use planners, Law makers, Plant growers, Eco-tourists, students, volunteer networks (natural history), Citizen Scientists, Agricultural scientists, Consultancies	Taxonomists, Conservationists, Ecologists, Environmental Scientists, Policy Makers, Land use planners, amateur mycologists, general public	Taxonomists, Students, Conservationists, Ecologists, Environmental Scientists, Policy Makers, Pharmacologists, Botanists, Foresters, Land use planners, Law makers, Plant growers, Eco-tourists.	Taxonomists (professional and non-professional), Nature Observers, Policy Makers, Conservationists, Educators, Ecologists, Environmental Scientists	Taxonomists, Conservationists, Ecologists, Environmental Scientists, Policy Makers, Pharmacologists, Botanists, Foresters, Land use planners, Law makers, Plant growers, Eco-tourists, students	Taxonomists, Conservationists, Ecologists, Environmental Scientists, Policy Makers, Pharmacologists, Foresters, Land use planners, Law makers, Plant growers, Eco-tourists, students	Taxonomists, Conservationists, Ecologists, Environmental Scientists, Other biologists, Policy Makers, general public, Professional amateurs, Commercial companies	Taxonomists, Conservationists, Ecologists, Environmental Scientists, Policy Makers, Schools & Universities, ethnobotanists, horticulturalists, the pharmacy industry, the general public.	Taxonomists, Ecologists, Environmental scientists, Conservationists, Bioinformaticians, Data managers, Genetists	Taxonomists, Conservationists, Ecologists, Environmental Scientists, Policy Makers, Aggregators	Taxonomists, Conservationists, Ecologists, Environmental Scientists, Policy Makers NB: We have an imperfect understanding of who uses our products, and look to this project to help us better understand and describe our audiences and their needs.
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CS 2	<i>Who are our most important customers?</i>	Taxonomists, Students, Conservationists	Taxonomists, Citizen Scientists, Policy Makers	Policy Makers? Conservationists, Ecologists, Taxonomists, students, citizen scientists, volunteer networks (natural history)	Taxonomists, Land use planners, amateur mycologists	Taxonomists, Ecologists, Foresters	Taxonomist, nature observers, policy makers, managers of nature reserves	Policy Makers? Conservationists, Ecologists, Foresters, Taxonomists	Policy Makers? Conservationists, Ecologists, Foresters, Taxonomists	Depending on field of expertise.	Policy Makers, Conservationists	Taxonomists, systematists, bioinformaticians, data managers, ecologists, genetists, conservationists	Aggregators, publishers, scientists	Policy Makers? Conservationists MJ - we ought to define 'importance' - are these the audiences we most want to target, or the audiences we think are the major current users?
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C R 1	<i>What type of relationship does each of our customer segments expect us to establish and maintain with them?</i>	Taxonomists (self service, automated services, community, co-creation) Conservationists (self service, automated services)	Citizen Scientists, Taxonomists – provider/ user relationship (provision of automated services for search and information retrieval, maintenance of community platforms); collaborator relationship (options for co-creation of content) Conservationists, Ecologists, Environmental Scientists – provider/ user relationship (provision of automated services for search and information retrieval, maintenance of community platforms) Policy Makers, Stakeholders – consulter, advisor, and partner relationship (provision of reliable information, information summaries, numbers, and statistics)	Taxonomists (self service, automated services, community, co-creation) Policy makers, Citizen scientists, volunteer networks (natural history) Foresters, Environmentalists, Conservationists & ecologists (self service, automated services, instant tailor made information on request)	self-service, automated services, tailor-made information on request	Taxonomists: self-service, individual cooperation or in a network Others (from row 1): self-service, automated services, specific information on request	Taxonomists & observers (self-service, automated services, community, co-creation) Policy makers & managers (self service, automated services)	Taxonomists (self service, automated services, community, co-creation) Policy makers, Foresters, Environmentalists, Conservationists & ecologists (self service, automated services, instant tailor made information on request)	Taxonomists (self service, automated services, community, co-creation) Policy makers, Foresters, Environmentalists, Conservationists & ecologists (self service, automated services, instant tailor made information on request) Ecotourists: simple local guides to wildflowers	Taxonomists (self service, automated services, community, co-creation) Policy makers, Foresters, Environmentalists, Conservationists & ecologists (self service, automated services, instant tailor made information on request)	Taxonomists (self service, automated services, community, co-creation) Conservationists & ecologists (self service, automated services)	All types of customers expect from us self-service and automated services	Taxonomists (self service, automated services, community, co-creation) Aggregators (API) Publishers (markup service and access provider for them) General users (self service, automated services)	Taxonomists (self service, automated services, community, co-creation) Conservationists & ecologists (self service, automated services) NB: We have an imperfect understanding of what our customers want from us, and look to this project to help us better understand this.
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C R 2	<i>Which ones have we established?</i>	Taxonomists (self service, community, co-creation) Conservationists (self service)	(Citizen Scientists), Taxonomists - automated services for search and information retrieval, community, co-creation Conservationists, Ecologists, Environmental Scientists - automated services for search and information retrieval	Taxonomists (self service, community, co-creation) Policy makers, Citizen scientists, volunteer networks (natural history)Foresters, Pharmacologists, Environmentalists, Conservationists & ecologists (self service, identification services)	Self-service, automated services,	Taxonomists: all mentioned above Others (from row 1): only self-service	Taxonomists & observers (self service, community, co-creation) Policy makers & managers (self service)	Taxonomists (self service, community, co-creation) Policy makers, Foresters, Pharmacologists, Environmentalists, Conservationists & ecologists (self service, identification services)	Taxonomists (self service, community, co-creation) Policy makers, Foresters, Pharmacologists, Environmentalists, Conservationists & ecologists (self service, identification services) Ecotourists: none?	Taxonomists (self service, community, co-creation) Conservationists & ecologists (self service)	Taxonomists (self service, community, co-creation) Conservationists & ecologists (self service) Schools & Universities (dedicated Personal Assistance, Self-Service) Funding agencies, governmental, foundations (self service, automated services, community, co-creation)	Taxonomists, data publishers, biodiversity scientists in general, biodiversity platforms, aggregators, bibliographies, indexers (self-service and semi-automated services)	Taxonomists (self service, community, co-creation) Aggregators (API, transfer protocol) Publishers (consultancy)	Taxonomists (self service, community, co-creation) Conservationists & ecologists (self service)
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C R 3	<i>How are they integrated with the rest of our business model?</i>	Taxonomists (close: community and co-creation relationships are part of the workflow)	Unknown	Unknown Others may provide data and collections as a corollary of their own work	Taxonomists (close: community and co-creation relationships are part of the workflow)	Taxonomists: close (part of the workflow) Others: not formally integrated, occasional may provide data and collections as a corollary of their own work	Taxonomists & observers (close: community and co-creation relationships are part of the workflow) Policy makers & managers (average: acting as stakeholders and funders)	Taxonomists (close: community and co-creation relationships are part of the workflow) Others may provide data and collections as a corollary of their own work	Taxonomists (close: community and co-creation relationships are part of the workflow) Others may provide data and collections as a corollary of their own work	Taxonomists (close: community and co-creation relationships are part of the workflow)	Taxonomists (haphazardly) Conservationists & ecologists (haphazardly) Schools & Universities (part of our mission)	Highly integrated (examples: EOL, GBIF, Dryad, Scratchpads, PubMedCentral, PubMed, CLOCKSS and others)	Taxonomists / Publishers provide content to make accessible to aggregators	Taxonomists (close: community and co-creation relationships are part of the workflow) MJ - not sure what this question really means!
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C R 4	<i>How costly are they?</i>	We usually do not have clearly delimited and defined capacities dedicated to “customer relations”. An exception is the BioCASE-helpdesk at the BGBM which is a half time tenured position dedicated to support both users and providers of specimen and observational data.	Unknown	Unknown	Unknown	? The customer relationships? Or the products we offer? I did not get.	There are more profits than costs. Taxonomists are volunteering to add. Observers use our tools and information	? The customer relationships? Or the products we offer? I did not get.	? The customer relationships? Or the products we offer? I did not get.	Unknown	Unknown	The key value of our services is that they are innovative and that they change the model of taxonomy publishing	We don't have an idea of how much the services are worthwhile since payment comes from grants (eg pro-iBiosphere)	? We do not have this information to hand and will need to consider how to assemble it.
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RS 1	<i>For what value are our customers really willing to pay?</i>	<p>Unknown. With the exception of printed products, CDs, etc., presently most electronic information systems and services provided by biodiversity informatics are freely available which makes it hard to place products which are not free. However, there are several software products (e.g. collection software, descriptive data tools) which are not free and found their market. Still, most of the software developments are open source products.</p>	Printed publications	< 100,000 Euro / year (mainly pertaining to invasive)	Unknown	Unknown	Policy makers act as stakeholders and are funding parts of our tools and information	< 100,000 Euro / year Flora of the Guianas: unknown	< 100,000 Euro / year Flora of the Guianas: unknown Florence du Gabon: training and capacity building; getting positive eco-attention (Total...); improved quality of holidays; expert identification; base-line inventory work (mining companies etc.)	Commercial partners pay about 1000 euro/day for advice; most customers, however, do not wish to pay significant amounts of money (except via taxes).	This needs investigation. Most customers expect information for free, or at a minimal cost. It is unlikely that many will pay if that was a requirement. Some of these customers also act as suppliers to the Botanic Garden so informally they are rewarded by free services. Some customers, however, are prepared to pay: mining companies, forestry companies, Policy makers are paying through funding projects.	High-quality papers published in a High-impact Factor technology advanced peer-reviewed journals that are widely disseminated and integrated automatically in various global databases	Publishers: make their content accessible, conversion Aggregators: access to content (e.g. GBIF, EOL) Legal issues: Grants (e.g. EU)	Unknown.
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RS 2	<i>For what do they currently pay?</i>	Hard copy publication.	Hard copy publication	Hard copy publication, field guides, CD-ROM, App Identification services, collection information, training	Hard copy publication	Hard copy publication, training	One-time funding for technical development and accessibility to species content (pollinators, invasive species).	Hard copy publication, field guides Identification services, collection information, training	Hard copy publication, field guides Identification services, collection information, training Flore du Gabon: also very limited salary costs	Hard copy publication, consultancy	Hard copy publication, though this barely covers publication costs; providing specific distributional data; ex-situ conservation of seeds or plants.	For publishing online and hardcopies, for advanced open access publishing, use of editorial online management system, editorial support	Access to treatments, conversion of documents, legal advice	Hard copy publication.
RS 3	<i>How are they currently paying?</i>	Journal fees. Regular purchase of books, etc., exchange of publications.	Unknown	Identification services Doublets of collections Access to data bases Training grants Hard copies, CD ROM's, Apps	Unknown	Unknown	Co-creation, funding, exposure	Would include exchange of publications and specimens which is one of the main forms of payment by Malesian flora users Identification services Doublets of collections Access to data bases Training grants	Would include exchange of publications and specimens which is one of the main forms of payment by Malesian flora users Identification services Doublets of collections Access to data bases Training grants Flore du Gabon: field expeditions, (limited) salary, preparation of drawings, production of outreach publication	Cash; some colleagues pay through services to the institute	In general by exchange of publications and specimens which is one of the main forms of payment by African flora; in the case of mining and forestry companies by funding projects.	Online credit card payment PayPal, bank transfers, checks, grants	Grants, consultancy, conversion	Purchases of publications. Would include exchange of publications and specimens which is one of the main forms of payment by African flora users in Africa



RS 4	<i>How would they prefer to pay?</i>	Unknown	Unknown	So far, in connection to legal obligations	Unknown	Unknown	Unknown	So far, in connection to legal obligations	So far, in connection to legal obligations? On project basis	Unknown	N/A	Pay Pall, Card transfer, cheques, bank to bank transfer	For a product (x amount of conversion of documents and x treatments accessible; policies)	Unknown
RS 5	<i>How much does each revenue stream contribute to overall revenues?</i>	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown Florence du Gabon: Total 110.000 Euro	Less than 5%	Very little	Alltogether, 100 % as the company is commercial enterprise	Together 100%	Unknown. Publication pricing is generally set to cover the costs of printing and publication, excluding authorship costs (MJ - is this true?)
CO 1	<i>What are the most important costs inherent in our business model?</i>	Personnel costs for scientific staff (taxonomists, computer scientists)	Unknown	Research, Expertise, training, e-tools, barcoding	Expertise, training, e-tools, DNA barcoding	Research, Expertise, training, e-tools, barcoding (not yet started)	Organisational and technical developments and maintenance.	Research, Expertise, training, e-tools, barcoding	Research (so, salaries!), Expertise, training, e-tools, digitization of collections, DNA barcoding, expeditions/field work, herbarium visits	Unknown	Salaries of taxonomists and qualified technicians. Publishing costs. IT support and infrastructure. Travel costs.	Salaries of editorial staff, office expenditure, printing costs, participation in international publishers' and bioinformatics meetings	Routine work, paperwork	Unknown. Major costs are probably associated with the gathering of information, authorship (including taxonomic research and decision-making); printing and publication; on going sustainability of web products.



C O 2	<i>Which key resources are most expensive?</i>	Personnel costs	Scientific and technical staff time	Human resource and expertise	Human resources and expertise	Human resource and expertise	Content, for example matrixes with species characteristics for identification tools.	Human resource and expertise	Human resources and expertise	Personnel, collection management and preservation, laboratories	Probably IT infrastructure and scientific equipment, expedition costs.	Human resources, IT infrastructure	Human resources	Unknown
C O 3	<i>Which key activities are most expensive?</i>	Unknown	Support of infrastructure, (scientific) information retrieval, quality assurance of data	Data basing, Bar-codes	Databasing (at present, none of the fungal collections are available in digital format), DNA barcoding	Unknown	Research and development, maintenance of systems	Data basing, Bar-codes	Atomizing data, expeditions/field work, Data basing, DNA Bar-coding, herbarium visits, editorial work	Research activities, collection management.	Primary taxonomic research and the collecting of resources required for this.	Programming and maintaining of the IT infrastructure	Conversions, writing code, maintaining infrastructure	Unknown
C O 4	<i>What controls/drives cost structures</i>	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Governmental control and the demands of funding agencies.	The market situation	Negotiations without any comparative values	Unknown



C H 1	<i>Through which channels do our customer segments want to be reached?</i>	Data: Hard copy publications, web-portals, workshops, individual communication, helpdesk Software: web-portals, workshops, and individual communication, helpdesk	Hard copy, web-portals, web services, mobile apps	Hard copy, web-portals, web services, mobile apps? Training	Hard copy, web-portals, web services, mobile apps, meetings / workshops	Hard copy, web-portals, web services, mobile apps, training opportunities, scientific meetings	Books, magazines, web-portals, web services, apps, exhibits	Hard copy, web-portals, web services, mobile apps? Training	Hard copy, web-portals, web services, mobile apps?! Training	Hard copy, web-portals, web services, mobile apps, personal advice.	Hard copy, email, web-portals, web services, mobile apps.	Open access online documents, email alerts, social networks, web-portals, web services, APIs, hard copies	Web, APIs	Hard copy, web-portals, web services, mobile apps? NB: We have an imperfect understanding of who uses our products and how, and look to this project to help us better understand and describe our audiences and their needs.
C H 2	<i>How are we reaching them now?</i>	Data: Hard copy publications, web-portals, workshops, individual communication Software: workshops, and individual communication	Hard-copy, web-portals, mobile apps	Hard-copy, web-portals, Training and education	Hard-copy, web-portals, meetings / workshops	Hard-copy, training, scientific meetings	Books, magazines, web-portals, web services, apps, exhibits	Hard-copy, web-portals, Training and education	Hard-copy, web-portals, Training and education, scientific and outreach publications	Hard-copy, web-portals, personal contacts	Hard-copy, web-portals.	Open access online documents, email alerts, social networks, web-portals, web services, APIs, hard copies	Web, APIs	Hard-copy, web-portals,



C H 3	<i>How are our channels integrated?</i>	Loosely	Currently no integration	Loosely	Loosely	Loosely	Loosely, f.e. taxonomic and biological content in books is placed on web-portals as well. Identification of certain species groups is published in magazines, on web-portals and apps, and will be accessible in exhibits.	Loosely	Loosely	Loosely	Loosely.	Well integrated	Tightly	Loosely and ad-hoc if at all
C H 4	<i>Which ones work best?</i>	Unknown	Unknown	Unknown	Unknown	Unknown	Not one, but cross medial	Unknown	Hard copy; verbally transmitted assessments of expertise	Personal contacts	Probably self-service web portals and services.	Pensoft's Online publishing system	Unknown	Unknown



C H 5	<i>Which ones are most cost-efficient?</i>	Unknown	Unknown	A mixture; Flora of the Guianas: hard copy publication,	Unknown	Unknown	Unknown. Investments in old media and new media are both expensive.	A mixture; Flora of the Guianas: hard copy publication,	A mixture; Flora of the Guianas: hard copy publication, Flore du Gabon, idem, as long as external researchers/honorary staff is offering manuscripts!	Unknown	We suspect internet based services are cheaper than printed literature, but this needs investigation, particularly in Africa.	Pensoft's Online publishing system	Once established all are cost efficient	Unknown
C H 6	<i>How do we best compliment &amp; support customer workflows?</i>	Unknown	Thorough assessment of customer's needs and workflows Interoperability of exchange standards	Currently unknown - likely through interoperability standards	Currently unknown - likely through interoperability standards	Currently unknown - likely through interoperability standards	Interoperability and usability	Currently unknown - likely through interoperability standards	Currently unknown - likely through interoperability standards	Currently unknown - likely through interoperability standards	By providing information in a standard format. By insuring the information we provide is widely dispersed, accessible and reusable, for example by not restricting use by copyright.	Through establishing interoperability links and standards (examples: Pensoft workflows established with GBIF, EOL, Scratchpads, PubMedCentral, Plazi, etc.)	API	Currently unknown. Interoperability standards will probably be important for integration into customer workflows.



CH7	<i>How do we provide customer support?</i>	Ad-hoc response, help-desk if sufficient resources are available (example: BioCASE).	Direct contact and communication (contact forms) Further collaborative work and partnerships	Further collaborative work and partnerships , ad hoc response, Training opportunities at all levels	Further collaborative work and partnerships, ad hoc response	Unknown	Further collaborative work and partnerships, ad hoc response	Further collaborative work and partnerships , ad hoc response, Training opportunities at all levels	Further collaborative work and partnerships, ad hoc response, Training opportunities at all levels	Further collaborative work and partnerships, ad hoc response	Informally, usually through direct contact and email.	Further collaborative work and partnerships, ad hoc response	Email, face to face meetings, Skype, google hangout	Further collaborative work and partnerships, ad hoc response
KR1	<i>What key resources do our value propositions require?</i>	Scientific and editorial staff, collections, literature, software, hardware	Scientific and editorial staff, collections, literature, software, hardware	Scientific and editorial staff, collections, literature, software, hardware	Scientific and editorial staff, staff for digitalization of the collections, literature, software, hardware	Scientific and technical staff, collections, literature, software, hardware	Scientific and editorial staff, communities, collections, literature, software, hardware	Scientific and editorial staff, collections, literature, software, hardware	Scientific and editorial staff, collections, literature, software, hardware	Scientific and editorial staff, collections, literature, software, hardware	Scientific and editorial staff, collections, literature, IT infrastructure, scientific apparatus.	Scientific and editorial staff, software, hardware	Coders, system administrators; people being able to do consultancies	Scientific and editorial staff, collections, literature
KR2	<i>What key resources do our distribution channels require?</i>	IT staff, IT infrastructure, designers, publishers	IT staff, IT infrastructure, designers, publishers	IT staff, IT infrastructure, designers, publishers	IT staff, IT infrastructure, designers, publishers	IT staff, IT infrastructure, publishers	Funding, IT staff, IT infrastructure, designers, publishers, exhibit developers	IT staff, IT infrastructure, designers, publishers	IT staff, IT infrastructure, designers, publishers	IT staff, IT infrastructure, designers, publishers	IT staff, IT infrastructure, designers, publishers.	IT staff, IT infrastructure, designers, publishers	IT staff, IT infrastructure, designers, consultant specialists	IT staff, IT infrastructure, designers, publishers



K R 3	<i>What key resources do our customer relationships require?</i>	staff for user training and helpdesk	Scientific staff, consultants	Market research, promotion of new services	Market research, promotion of new services	Unknown	Market research, communication, accessibility, feedback opportunities, participation, thinking along	Market research, promotion of new services	Market research, promotion of new services	Market research	Good physical access to collections. High quality curation.	Market research	Market research, personal contacts	Market research, MJ - if this question is about how we are now, then I would suggest that our customer relationships are vestigial but basically include science staff, publications sales support, IT support, etc.
K R 4	<i>What key resources do our revenue streams require?</i>	Fund raisers	Unknown	Fund raisers, financial backers, lobbyists, students	Fund raisers, financial backers, lobbyists, students, amateurs	Structured and steady publication, easy access and more flexibility in the delivery channels	Fund raisers, financial backers,	Fund raisers, financial backers, lobbyists, students	Fund raisers, financial backers, lobbyists, students	Fund raisers, financial backers	Biodiversity data and specimens (in case of exchange programs), money (in case of funded projects)	Online marketing , sales and payment infrastructure	Fund raisers, financial backers	Fund raisers, financial backers MJ - I don't agree with the above as they aren't about collecting revenue. I would say Sales, finance MJ - I don't think we respond to this section very well at present, and it is another area, which we will need to develop a better understanding of and think further about.



K A 1	<i>What key activities do our value propositions require?</i>	Problem solving (field work, curation, research, editorial) Production (scientific publications, software products)	Research in taxonomy, science history Study of collection material and retrieval of new collection material Adoption and further development of exchange standards and workflows Compilation of information and publishing (by publishers) Quality assurance of data	Problem solving (field work, curation, research, editorial), activities required to know we have a valuable product i.e., achieve scientific excellence, training and capacity building	Problem solving (fieldwork, research, editorial), activities required to know we have a valuable product i.e., achieve scientific excellence	Problem solving (field work, curation, research, editorial), activities required to achieve scientific excellence; training and capacity building	Problem solving (field work, curation, research, editorial), activities required to know we have a valuable product i.e., achieve scientific excellence	Problem solving (field work, curation, research, editorial), activities required to know we have a valuable product i.e., achieve scientific excellence, training and capacity building	Problem solving (field work, curation, research, editorial), activities required to know we have a valuable product i.e., achieve scientific excellence, training and capacity building	Problem solving (field work, curation, research, editorial), activities required to know we have a valuable product i.e., achieve scientific excellence	Producing novel scientific research.	Problem solving (field work, curation, research, editorial), activities required to know we have a valuable product i.e., achieve scientific excellence	Professional coding and documentation	Problem solving (field work, curation, research, editorial), activities required to know we have a valuable product i.e., achieve scientific excellence Production (acquisition and assembling of relevant information; creation of products; organisation of review) Problem solving (resolution of taxonomic questions)
K A 2	<i>What key activities do our distribution channels require?</i>	Production (publication, software), platform/network (dissemination)	Production (publication), platform/network (dissemination),	Production (publication), platform/network (dissemination)	Production (publication), platform/network (dissemination)	Production (publication), platform/network (dissemination)	Participation, design, production, testing, tuning, innovation	Production (publication), platform/network (dissemination)	Production (publication), platform/network (dissemination)	Production (publication), platform/network (dissemination)	Publishing, Peer review, Digitization	Production (publication), platform/network (dissemination)	Human machine interfaces, publications	Production (publication), platform/network (dissemination)



K A 3	<i>What key activities do our customer relationships require?</i>	?	Collaboration, counselling, support	PR, convincing examples	PR, convincing examples	Unknown	Participation, rewarding	PR, convincing examples	PR, convincing examples	Business development	Attending conferences, email communication, welcoming visiting researchers. Providing support for scientists in the developing world.	Participation in meetings, reaching customers online (e.g., through social networks, email alerts, RSS, etc.)	Good teaching capabilities, good abilities to understand the other side.	?
K A 4	<i>What key activities do our revenue streams require?</i>	Platform/network (stakeholder involvement, consortium building)	Unknown	Prove of clear accuracy and added value	Proof of utility and added value	Unknown	Communication, well developed proposals	Prove of clear accuracy and added value	Prove of clear accuracy and added value	Effective time management, good contacts with customers to have good knowledge of their demands	Lobbying; Writing grant proposals.	Increasing the volume of open access publications	?	?
KP 1	<i>Who are our key partners</i>	Contributing taxonomists, editors, biodiversity institute network, in-country counterparts, and software developers in international universities and collection facilities/institutions.	Contributing taxonomists, editors, biodiversity institute network	Contributing taxonomists and other botanists s.l., editors, biodiversity institute network, in-country counterparts	Contributing taxonomists, editors, biodiversity institute network, in-country counterparts	Contributing taxonomists and other botanists s.l., editors, biodiversity institute network, in-country counterparts	Taxonomists, non-governmental organisations, government	Contributing taxonomists and other botanists s.l., editors, biodiversity institute network, in-country counterparts	Contributing taxonomists and other botanists s.l., editors, biodiversity institute network, in-country counterparts, GO's and NGO's	Contributing taxonomists, editors, biodiversity institute network, in-country counterparts	Contributing taxonomists, editors, biodiversity institute network, in-country counterparts and international biodiversity projects.	Editors, referees, partnering projects (e.g., VIBRANT), initiatives (GBIF, EOL, TDWG, NCBI, BGI, natural history museums, libraries)	Contributing taxonomists, editors, biodiversity institute network, in-country counterparts	Contributing taxonomists, editors, biodiversity institute network, in-country counterparts



KP 2	<i>Who are our key suppliers</i>	?	N/A	ICT specialists with affinity for our work	IT specialists,	Unknown	Taxonomists, non-governmental organisations	ICT specialists with affinity for our work	ICT specialists with affinity for our work; taxonomists	Unknown	Academics in Africa, other Botanical Gardens.	Authors, editors, referees	?	? MJ - international herbaria (specimens) and libraries (literature)? Publishers?
KP 3	<i>Which key resources are we acquiring from partners</i>	Specimen exchange and loan, expertise, knowledge, access to web services	Expertise/ knowledge, specimen exchange and loan	Specimen exchange and loan, expertise, knowledge, artwork, ICT products	Specimen exchange and loan, expertise, knowledge, artwork	Specimen exchange and loan, expertise	Knowledge, images, literature, specimen, descriptions	Specimen exchange and loan, expertise, knowledge, artwork, ICT products	Specimen exchange and loan, expertise, knowledge, artwork, ICT products; taxonomic treatments	Specimen exchange and loan, expertise, knowledge, artwork	Specimen exchange and loan, access to data expertise, knowledge.	Expertise, knowledge	Specimen exchange and loan, expertise, knowledge, artwork	Specimen exchange and loan, expertise, knowledge, artwork
KP 4	<i>Which key activities do partners perform</i>	Nomenclatural services, specimen information services, research data publications	Editorial work	Drafting accounts, editorial work, development of e-tools, methods and systems	Drafting accounts, editorial work, development of e-tools	Drafting accounts, editorial work, development of e-tools, methods and systems	Research, validating, writing, editing, photographing, providing content, promoting, signalling	Drafting accounts, editorial work, development of e-tools, methods and systems	Drafting taxonomic accounts, editorial work, development of e-tools, methods and systems	Drafting accounts, editorial work	Taxonomic accounts, editorial work.	Authoring, peer-reviewing manuscripts, editorial work	Drafting accounts, editorial work	Drafting accounts, editorial work



<p>KP 5</p>	<p><i>What are the motivations for having partnerships</i></p>	<p>Optimization and economy-spreading the work, reduction of risk and uncertainty, acquisition of particular resources, expertise, and activities, specialisation</p>	<p>Optimization and economy-spreading the work, reduction of risk and uncertainty, acquisition of particular resources and activities</p>	<p>Optimization and economy-spreading the work, reduction of risk and uncertainty, acquisition of particular expertise, resources and activities, collections, data bases; increasing completeness of the task; adding critical mass</p>	<p>Optimization and economy-spreading the work, reduction of risk and uncertainty, acquisition of particular resources and data.</p>	<p>Optimization and economy-spreading the work, reduction of risk and uncertainty, acquisition of particular expertise, resources and activities, collections, data bases; increasing completeness of the task; adding critical mass</p>	<p>Knowledge, capacity, data, profiling, outreach</p>	<p>Optimization and economy-spreading the work, reduction of risk and uncertainty, acquisition of particular expertise, resources and activities, collections, data bases; increasing completeness of the task; adding critical mass</p>	<p>Optimization and economy-spreading the work, reduction of risk and uncertainty, acquisition of particular expertise, resources and activities, collections, data bases; increasing completeness of the task; adding critical mass</p>	<p>Optimization and economy-spreading the work, reduction of risk and uncertainty, acquisition of particular resources and activities</p>	<p>Optimization and economy-spreading the work, reduction of risk and uncertainty, acquisition of particular resources and activities.</p>	<p>Changing the landscape of biodiversity publishing, increase the role of open access wide dissemination of knowledge, financial benefits</p>	<p>Optimization and economy-spreading the work, reduction of risk and uncertainty, acquisition of particular resources and activities</p>	<p>Optimization and economy-spreading the work, reduction of risk and uncertainty, acquisition of particular resources and activities Access to complementary scientific expertise and literature and specimen resources necessary to achieve desired geographic and taxonomic coverage; availability of peer review to secure scientific quality; scientific credibility and authoritativeness.</p>
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## MARKET BACKGROUND

### MARKET DEFINITION

The first step in any effort to support a project development through market research (providing in particular a better knowledge of the market context or background) is of course to precisely define the market that the project targets.

This is why it is important at this initial stage of the project and in order to focus market research efforts in the upcoming period, to precisely agree among partners on (i) the overall vision of the project, (ii) the foreseen steps to make it happen, (iii) anticipated management issues related to an integrated platform, and (iv) the services the platform would deliver, etc.

These topics have been included into Part 3 of the questionnaire sent to partners at month 5 (another and last question asking them to recommend any platform they would know - running or under development - on which focused market research efforts could be done).

### THE OVERALL VISION

Partners have been asked if they agreed with the following overall vision of the project proposed by the Task leader:

*Succeed interconnecting, through e-Infrastructures, institutions from Europe (and beyond) collecting and processing core biodiversity data, thus leading to the possible implementation of an integrated system allowing each institution and/or all institutions collectively to offer improved or new services to a wide range of users (customers).*

Below are their answers:

### NATURALIS

Taxonomy is crucial to understand biodiversity, because taxonomic revisions are the primary source of validated biodiversity information. They comprise expert opinion, identification tools and information on morphology, distribution, ecology, uses and conservation. Current challenges in taxonomy are: (a) speeding up the generation and sharing of taxonomic information, (b) keeping the taxonomic information up-to-date; (c) facilitating and enhancing the application of taxonomic information by providing flexible information services for scientific and societal purposes; d) setting worldwide standards for sharing and deploying taxonomic content. In order to meet these challenges, we need to create a virtual taxonomic working environment for taxonomists, researchers in general, citizen scientists and users.

The virtual environment need to build upon an electronic taxonomy platform, i.e. a coordinated, open knowledge management system and information backbone for biodiversity. What is needed is the disclosure of high quality taxonomic, biological and geographical data and metadata of species. Such a virtual environment ensures a new and modern approach to taxonomy by facilitating information updates (from new classifications to missing data); allowing instant and specified output in many formats (from hard copy to electronic); enclosing all steps of the research work flow, including distant cooperation among researchers; accommodating various types of illustrations; allowing production of specific checklists or distribution maps directly based on specimen information; etc. Furthermore, we need to work towards a link between species and specimen information in the collections, GIS and DNA sequence databases (from other external sources), further increasing the usefulness and applicability of the data.

Beyond taxonomy, the e-platform also ensures breakthroughs in other research fields, simply by providing large volumes of well curated taxonomic data for the first time structured in a database format that allows data mining for

a variety of disciplines, such as paleontology and macro-evolution, phylogeography, macroecology, species distribution modelling, ethnobotany, nature conservation, etc. The increased possibilities of data mining, and the disclosure and re-use of primary biodiversity data in combination with other biological databases will promote the originality and innovative nature of the research programs.

*Additional inputs:*

*From the Flora Agaricina Neerlandica*

- *The multi-volume Flora Agaricina Neerlandica provides identification keys, extensive descriptions, and illustrations of all agarics and boleti occurring in the Netherlands, with data on their ecology and distribution, based on vouchered specimens deposited at Naturalis. Many fungal genera are species rich and are taxonomically challenging. The overall goal is to provide a reliable, flexible systematic framework macrofungi of Western Europe that can be constantly updated as more knowledge is being accumulated, e.g. via DNA barcoding, molecular phylogenetic and systematic studies etc.*
- *This constantly improved taxonomic database needs to be readily available to the scientific community as well as to the general public, including amateur mycologists etc. for data mining and resulting applications.*
- *The proposed digitalization and barcoding of the FAN will enhance ecological and taxonomic studies globally, thus resulting in a greater recognition of the NHN collections abroad. Generating sequences for types and other well-documented collections will create a reliable backbone for systematic studies.*

*From the Flora of the Guianas*

- *Yes, I agree with the overall vision. The Flora of the Guianas publishes family treatments of plant and fungi species occurring in the Guianas - French Guiana, Surinam and Guyana. Fascicles of the Flora may contain one or more families and are published as hard copy only. The participants of the Flora of the Guianas project share the overall vision of 1) generating accurate taxonomic data; 2) making it available for users in different formats, to address different needs; 3) keeping up with the dynamic nature of taxonomy through updates of the published data; and 4) promoting training and education. Items 2 and 3 cannot be achieved due to the structure of our current workflow.*

#### **NGBG**

I think an additional aspect is one of improving taxonomic workflows to benefit from the efficiencies of the IT infrastructure.

#### **FUB-BGBM**

Agreed. We would add as a second vision the digitisation of information not yet available in electronic form and the mobilisation of presently underutilized large volumes of biodiversity information held in semi structured formats (websites, documents, tables) to exploit their full potential in biodiversity information networks.

#### **PENSOFT**

Yes, we agree with such a statement.

#### **SIGMA**

We fully share this vision

#### **RBGK**

- *Almost certainly, but subject to the findings of the project with regard to appropriate business models and approaches to sustainability, and the points below.*

- We should define "processing core biodiversity data". Our assumption is we are concentrating on Floristic and faunistic data in this project.
- There may be merit in defining this more precisely through workshop discussion.
- The nature of the integrated system also requires investigation and better definition.

## PLAZI

Yes, I agree. But that's not the point. The important thing is how to initiate this transition and finally get our institutions to make a commitment and change their predominantly isolationist's attitude, that is historically understandable (a specimen or book cannot be shared but is part of the collection or library respectively), but is increasingly challenged by adding an additional layer of shared objects, such as a catalogue of the bibliographies to digital books and publications, images of specimen, etc., that can easily be shared. But shared objects need a home in which comes with costs that somebody has to take care of. Sharing needs a new form of collaboration that has to be established at social but also funding level.

## MFN

In general I agree with this statement. However the wording is pretty complex and not easy to understand.

### THE STEPS TO MAKE IT HAPPEN

Partners have been asked the following question:

*What are in your mind the main obstacles the pro-iBiosphere partnership will face towards the sustainability of its initiative? What would be the key developments to reach the envisioned integration by the end of the project? Which project activities should necessitate a more particular assessment of their progress?*

## NATURALIS

The quality of the customer services relies on (respect for) the expertise of the staff, recognized in the scientific community and leadership in taxonomic projects. The increased possibilities of data mining, and the disclosure and re-use of primary biodiversity data in combination with other biological databases will promote the originality and innovative nature of the research programs.

The report "Challenges for Biodiversity Research in Europe", from the League of European Research Universities (LERU) ([http://www.leru.org/files/publications/Biodiversity\\_final.pdf](http://www.leru.org/files/publications/Biodiversity_final.pdf)), indicates that it is necessary to invest in a European infrastructure for biodiversity data and research. According to the document, it is "disconcerting to see that taxonomy and the establishment of primary databases or collections are largely ignored in research agendas". The LERU report also suggests investments in modern web based biodiversity informatics to ensure that information is as widely available as possible. A large amount of data currently only found in hard copy publications needs to become available as open access and in a database format for the scientific community and society. Europe, as custodians of large biodiversity data sets with a global coverage, can assume an internationally leading position in this. The intended facility would provide a strong core for national LifeWatch activities. Furthermore, regarding hotspots of biodiversity, the threats of land use and climate change must be rapidly addressed. Timely elaboration and dissemination of information on plant diversity in these areas is crucial to identify, understand, use and natural resources

It is essential to unfold a new strategy for primary biodiversity data, i.e. the re-use of taxonomic data from other databases and the incorporation of scattered information resulting from other types of research or from citizen science. These are critical aspects in the light of the ever-decreasing pool of specialists concentrating on taxonomic

revisions. This new strategy will also require the development of a set of protocols on how to update and curate the data within the on-line facility.

*Additional inputs:*

*Flora Agaricina Neerlandica: in order to achieve the above goals, it is necessary to:*

- *Have the taxonomic information present in all published volumes of the FAN in a searchable electronic format (mark up and import into the database of volumes 1-6);*
- *Digitize corresponding collections at Naturalis so they can be mined, searched or browsed and located easily;*
- *Link the corresponding information to species list and distribution information as displayed at the NMV mapping websites, e.g. verspreidingsatlas.nl*
- *Provide links to molecular databases, such as NCBI, in addition to the automated connections to MycoBank, GBIF, EOL, etc.*

*From Flora of the Guianas*

*The main obstacle for the Flora of the Guianas is the fact that all data is available only in the hard copy publication. The pdf's might become available in near future (editorial office has got in touch with Kew publisher about that possibility, waiting for an answer). Main steps needed:*

- *Markup of published volumes*
- *Implementation of a database system that allows curation and update of content (taxonomic data)*
- *Link with collections database (Brahms)*

*Currently, there is no secure funding/ staff for these activities.*

*From Flora of the Netherlands*

*The Flora of the Netherlands is hampered by the presence of only a part time position, and the threat of losing technical support. The contributions of citizen science (e.g. 'waarneming.nl') is valuable, but needs extra scrutinizing, because it is in most cases not vouchered and therefore not verifiable and difficult to validate.*

*The main obstacles for Flora Malesiana*

- *Taxonomy is generally regarded as mainly the activity to map and describe new taxa. This is a step back to the 19th century when everybody was describing new species, whereas the strength of the 20th century was the monographic/revision approach, critically evaluating and testing species hypotheses in the context of the whole group (and cleaning up all chaos). The monographic approach needs to be re-installed in science policies and valued as such. This includes recognition of the fact that producing data is one thing; systematically validating them is another thing, much more time consuming and not a corollary of other activities. Funding will follow from that, as most and for all more research capacity is needed. It is rather a shame that the present scientific culture discourages young botanists to start a career in taxonomic flora research.*
- *We need a platform of our own with fully committed ICT people, to be independent of others for whom we do not have appropriate incentives.*
- *We face the problem of a multinational flora and the difficulties of commitment of counterparts, due to national funding, priorities and restrictions (permission to look beyond borders). Counterparts should share the responsibilities and eventually take these over.*

## **NGBG**

- To get taxonomists to work in a collaborative and structured manner.

- To ensure taxonomists can gain credit for their work and acknowledgement of their contribution, while at the same time aggregating knowledge. Taxonomists gain recognition from journal publications, and don't get additional recognition for digital publication nor for the licence they publish under. Digital publication needs to become part of institutional policy.
- To work in a polylingual world.
- To cater for the often conflicting requirements of the producers & consumers of knowledge. For example, the producers of knowledge might be interested in the minutiae of morphology, but the consumers just want to know which morphological characters distinguish two species.

#### **FUB-BGBM**

We see three major obstacles:

- A lack of standardisation hinders efficient data mobilisation as well as interoperability between platforms. The success of the various pilot implementations can be used to monitor progress of standardisation efforts in the project.
- Availability of help-desk functions. Resources for a dedicated pro-iBiosphere helpdesk have not been planned for the funded project itself and would be crucial for the sustainability beyond the project. pro-iBiosphere should take measures to build user-expert groups, which can act as a community-driven helpdesk as long as a formal helpdesk is not available.
- Institutional commitment: the aims have to be incorporated into the institutional priorities and policies, so that a dependable partnership is created, including long-term commitments of partners to fulfil certain specialised functions for the partnership and for the community at large.

#### **PENSOFT**

All products of pro-iBiosphere need to be tailored according to the specific exploitation needs of each partner organisation, especially to SMEs that will be primarily responsible for the valorisation and sustainable use of the product.

#### **SIGMA**

The pro-iBiosphere project aims to prepare (=pro) the ground for an integrative system (=sphere) for intelligent (=i) management of biodiversity (=bio) knowledge. It is expected that a relevant business model can be identified by the end of the project.

However, a "test implementation phase" (of this business model) will be necessary to fine tune the model and ensure the true sustainability of a "European Open Biodiversity Knowledge Management System". The core funding of this test phase can only come from the European Commission (even if other sources of funding will be investigated).

Time being critical (the duration of the pro-iBiosphere is only 24 months), it is thus important that the consortium can quickly finalize its first analysis on the feasibility and constraints of such system, in order to start building the new project.

The idea would be at the end to insure a smooth continuity of both projects without creating any discrepancy either losing the momentum.

#### **RBGK**

A - What are in your mind the main obstacles the pro-iBiosphere partnership will face towards the sustainability of its initiative?

- Lack of funding post-project
- Lack of clarity and agreement over project and post-project goals

- Lack of agreement between partners on priorities
- Lack of effective engagement with and understanding of actual and potential users of the integrated system
- Poor definition of supplier and user requirements
- Failure to establish viable business model(s)
- Divergent requirements
- Failure to establish convincing picture of actual and potential user demand
- Failure to integrate with complementary biodiversity information initiatives and resources

B. What would be the key developments to reach the envisioned integration by the end of the project?

- The deliverables related to sustainability (6.4)
- Mutual agreement on steps required to foster continued integration
- A plan with resourcing for post-project integration activities.
- A means of continuing communication, discussion and collaborations beyond this project.

If we are to develop an integrated system, then the specifications of that system need to be clearly defined, either in this project (not currently a deliverable) or in the initial stages of a future project.

C. Which project activities should necessitate a more particular assessment of their progress?

Too early to say for individual work packages, but

- A concern over how the outcomes of different Work Packages relate and are brought together into a coherent plan during this project and post-project
- Agreement between partners on preferred routes to integration and sustainability
- Pilots may give some insights as they develop.
- Need to check up on end user engagement.

## PLAZI

The lack of a convincing operating system that can be used to make a “fait accompli”, that is to be in a stage where the institutions will consider the system to be so vital that it will have to support it. The other part is to be part of a wider science community as opposed to being even a successful, but isolated domain. Floras especially are targeted towards applied sciences, conservation, forestry: If those fields would have an access so that the use of the data from floras and faunas are a daily routine, and we have a system to create and maintain the content that increasingly is linked to the assets of a botanical garden or natural history museum, then there might be chance. Ultimately, it is a mixture of good science and salesmanship, i.e. selling the new to those protecting or committed to continue the old traditions.

Probably within the pro-iBiosphere that assessment of the pilot studies needs particular assessment: Do they deliver? Do they really provide something new that will become mainstream because it adds to the tools of a working taxonomists or publisher?

## MFN

Obstacles:

- Lacking commitment of contributing partners, especially after the end of the project
- Disagreement on supported standards and procedures
- Scientists may not be using the produced products, services or platforms (lack of need or interest)
- Individual partner's interests is in conflict with project goals (change of focus)
- Insufficient dissemination of project goals and outcomes, especially in the participating institutions

Key developments:

- Good communication of project partners

- Dissemination project goals and outcomes
- Easy-to-use and well-integrated products for the target users
- Functional integrated system (including testing) and services
- Integration of produced systems and services in existing (external) services (spreading use)

Particular assessment:

- Unknown at the time of writing (needs further involvement in the project)

#### PLATFORM MANAGEMENT

Partners have been asked the following question

*How would such an integrated platform be managed? Should this management include all pro-iBiosphere partners, or just some of them, or new partners? What would be the main activities of this management body and which related running costs can be foreseen? Which investments would be necessary?*

#### **NATURALIS**

- It should at least include the owners of the information, editors of the information and the developers of the platform/systems.
- The platform should include the providers of data (taxonomists, editors and curators) and a team responsible for the IT issues (?).

Updating is a laborious work, depending on specialists and editors.

The virtual system is free software and all products generated by the investment will become immediately open access, thus the reach of the proposed facility is worldwide. Arrangements concerning property rights between the institute and the publishers of the Floras need to guarantee its free online publication. Access to the data will be as free as possible (e.g., for conservation purposes, some data may necessitate shielding). Adding or changing data will be a more restricted, two step procedure, to maintain the high quality of the database. Researchers can apply for writing permission and their data will always be screened by editors before added to the main body of the database. Ongoing research may be temporarily shielded from viewing, as species concepts will not be stable yet. Authors of future taxonomic treatments to be incorporated will have to adhere to common terms of agreement, but most of them are already well aware of the open access conditions, including data sharing and citations

#### **NGBG**

From the perspective of wishing to achieve goals as efficiently as possible a strong independent management would be preferable. However, it seems unlikely that taxonomists and institutions would devolve decision making to a central body without considerable incentive.

#### **FUB-BGBM**

Cannot be answered at this point. pro-iBiosphere would need a clearer vision or plan for this platform first.

#### **PENSOFIT**

The integrated platform should be managed by economically self-supporting organisation, not depending on state budget or irregular project funding.

#### **SIGMA**

The pro-iBiosphere project involves major European biodiversity organizations, including natural history museums, botanic gardens, and specialists in mark-up, dissemination and publishing.

It appears logical, that this integrated system involves the current pro-iBiosphere partners (depending on their interest and commitment), but also other EU and non-EU partners to reach a critical mass and ensure a suitable positioning in the international landscape.

A core group should ensure the governance of the platform.

Concerning the platform itself, a technical partner that could host, run and sustain this system, will probably be necessary.

#### **RBGK**

Too early to say - we don't want to pre-empt analysis of business models and cost benefit analysis

#### **PLAZI**

No clear answer to this yet – I think this need to be a task of the project itself.

Generally, I think the platform needs to be a vision statement of this project that follows analysis and needs of at least the institutions and scientists in this group, as well as the input from our various workshops. It then needs to move to "Somebody" that implements it with support from the "crowd". Somebody being a person / institution that has the commitment to make it happen, the crowd would be the management body.

At the moment, running costs would have to be established within this project. We might be able to provide figures for parts such as a treatment repository of running RefBank.

The investments can only be guessed if we have a vision on how this platform should look like, and what content it has to include.

#### **MFN**

The management of the envisaged platform can be a shared duty of the initial partners of the project, but could also be extended to new highly engaged partners. There has to be an (scientific and technical) advisory board, which is able to make decisions about future plans and development, but also deals with upcoming risks and issues. Each active partner should commit to the contribution in this board (personnel). However, it will be a major challenge to convince involved partners to agree on this for a long term.

Another possibility is the creation of a foundation, which should be self-sufficient but supported by the project partners (personnel or finances) or otherwise created income (see below). This foundation would then be responsible to open up new resources and funding, e.g. new grants, profits generated by specific services and products developed in the project.

#### THE BENEFITS THE INTEGRATED SYSTEM WILL OFFER

Partners have been asked the following question:

*Which benefits would such an integrated platform offer when compared to the present situation when institutions collecting and processing core biodiversity data are not, or not so efficiently connected? Which new or improved services could be offered, to which customers at what price, by each institution individually or collectively through the organization managing the platform?*

## NATURALIS

With user-friendly, reliable, and up-to-date taxonomic e-platforms, accurate information on species identification, distribution, ecology etc. can be readily and widely disseminated to a wide range of user groups, such as taxonomists, amateur mycologists, conservation professionals, ecologists, environmental scientists, policy makers, and the general public. Such wide accessibility of validated information increase the societal impact and relevance of biodiversity, hopefully resulting in increased weight in policy-making processes.

The efficient connection of data from different sources will add value to taxonomic research by increasing the possibilities of mining and reutilization of data. Institutes/ individual researchers do not have to do repeated work, they can optimize by sharing tasks.

During the last decade state-of-the-art computer tools have been developed to facilitate acquisition and update of taxonomic data. A growing demand for electronic and online taxonomic data has led to a proliferation of e-taxonomy projects. Such projects easily exceed the capacities and skills in a single institute or country; hence the development of biodiversity e-infrastructures needs to be addressed in European context as collaborative efforts. Moreover, now the infrastructures are there, it is of great importance to populate them with quality data, and to deploy them in an engaged community of experts and stakeholders: a true research facility, which facilitates access to the existing and the production of the new content. Interoperability of systems and data is still limited, needing further technical and semantic interoperability. Implementation of this platform will not only facilitate production of new information and updates of existing information, but will also increase publication possibilities (hard copy on demand, internet, smartphone). Moreover, it will also enable the addition of data scattered throughout existing literature (and consequently difficult to trace and retrieve), and the adoption of new standard best practice for taxonomic work flows.

The main results achieved as a result of the investment – innovation in the work flow of taxonomic research, remote collaboration among specialists (notably also those from developing countries) and the release of an enormous volume of primary biodiversity data - will serve as an unprecedented facility to support the local as well as global scientific community, conservationists, consultancy firms, policy makers, etc., to suit a wide range of tasks, among which biodiversity prospecting, species distribution modelling, impact of land use change on biodiversity. Also, since the greater part of the data proposed to be uncovered through this investment relate to tropical countries with a colonial past, Europe will play its role in the repatriation of primary biodiversity data to these countries as well as provide scientific training to the appropriate national and regional institutes. The fact that data will be generated and stored already in a database format, guarantees continuous update and provide possibilities for innovative (and tailor-made) data mining, especially when it is linked to other databases, such as our specimen database and DNA barcode database. The new structure will allow the following technological innovations in the field:

- Online publication and open access of legacy data and information.
- Remote collaboration between specialists in different institutes, speeding up publication.
- Extraction of taxonomic data/checklists/Floras/Faunas.
- Update and revision of (new) species, taxonomic treatments, identification keys, nomenclature, maps, images, ecological data.
- Disclosure of large amounts of high quality taxonomic data to biodiversity initiatives and/or other related databases such as TRY database ([www.try-db.org](http://www.try-db.org)), GBIF ([www.gbif.org](http://www.gbif.org)), JSTOR ([www.jstor.org](http://www.jstor.org)), Europeana ([www.europeana.eu](http://www.europeana.eu)), BHL Europe ([www.bhl-europe.eu](http://www.bhl-europe.eu)), TEEB ([www.teebweb.org](http://www.teebweb.org)), etc.
- Data mining and tailor-made queries for other scientific fields (e.g. studies on global climate change or resilience of ecosystem services).

The fact that the data concerned will be available as an open-access source will promote social change. A larger audience, including the general public, will have direct access to otherwise hidden aspects of the biological diversity on our planet as well as allow amateur botanists to identify plants (in the future also other organisms) they encounter all over the world. This will lead to a different attitude towards biodiversity in general and an exciting new way of experiencing nature. Imagine someone walking on the island of Java, and through the use of a smart phone being able

to identify a plant that caught the attention, thus obtaining its scientific and local names, its ecology, its rarity and threat, uses, etc. What a potential, also for the development of ecotourism in such regions.

#### **NGBG**

- Multilingual access for all
- Higher visibility for research
- Reduced costs
- A one-stop-shop for biodiversity information
- Better-coordinated environmental policy
- Closer ties with institutions in Africa

#### **FUB-BGBM**

Benefits include: improved re-usability of data, mobilisation of presently underutilized data, improved data quality, more efficient and secure data management, improved visibility of biodiversity data, streamlined publication processes.

Examples for new products: Interactive and dynamic biodiversity data interfaces (web-pages, mobile applications, etc.), services providing data access across institutions.

#### **PENSOFT**

The integration is based on standards and open access. Having both pre-condition in place means that the effort spent to collect, identify, describe, and summarise information of biodiversity will be multiplied by orders. In the future, for example, It will take minutes (now months or years!) to access any literature source on any taxon, to see images of it, to explore type specimens, to predict its ecological prevalences and distribution in the future and so on.

Collated and integrated data will be easily re-used to create new knowledge in dimensions that haven't been possible before.

#### **SIGMA**

Unknown

#### **RBGK**

- Pooling of resources
- Reduce duplication
- Sharing data
- Reducing institutional costs (economies of scale)
- Broader use of data
- Single source of truth / avoidance of competition

It is too early to properly understand what new services could be offered, but potentially these might involve improved access channels for human and machines; tailoring of content; products benefitting from broader geographical range; better connectivity with complementary biodiversity data; more dynamically updated products; improved interactivity; on-demand and tailored print products; improved customer support.

#### **PLAZI**

Sharing digital data means de-duplication of efforts and thus saving money. But it comes with an additional cost since the system is not yet part of a standard budget that might also mean that funds have to be relocated in-house. A typical service could be anything that means customization, creating more specific content, or offering a publishing service (for example for publishing Floras off the platform) or conversion of existing floras into a digitally harvestable form.

## MFN

### Benefits:

- Increase in scientific output, output speed
- Fostering across institution collaborations
- Visibility and efficient reuse of taxonomic data/ publications
- Access to a more comprehensive set of data
- Use of collected data also by third parties, external services

### Improved services:

- Semantic mark-up of legacy literature, digitizing institutions, for free (automated services)
- Tools for creating semantic mark-up of new taxonomic publications, author, page charge

## SYNTHESIS OF THE VISION OF PRO-iBIOSPHERE PARTNERS ON MARKET DEFINITION

It is easy to acknowledge, from the information presented through the previous pages, that all project partners have done real efforts to provide substantial inputs on market related aspects in general and on needed paths towards sustainability in particular, some partners (e.g. Naturalis) having even provided inputs from various groups within their organization, which is of course relevant when considering the nature of the exercise.

This information has been summarized through the matrix on next page, revealing that:

- The consortium does not yet share a common vision, which is quite logical at such an early stage of the project when project partners have not yet got time enough to fully interact, and when key project outputs (expected from WP2, WP3 and WP4 in particular) that will help clarifying this vision are not yet available,
- There are not many definite answers in the columns of the matrix but at least a lot of interesting questions or relevant information that constitute valuable “food for thought” for the coming months.

It is expected that the next iteration at month 11-12 will allow reaching a more substantial shared vision across each of the four columns.

SYNTHESIS OF THE VISION OF PRO-iBIOSPHERE PARTNERS ON MARKET DEFINITION

	<b>The vision</b> Succeed interconnecting, through eInfrastructures, institutions from Europe (and beyond) collecting and processing core biodiversity data, thus leading to the possible implementation of an integrated system allowing each institution and/or all institutions collectively to offer improved or new services to a wide range of users (customers).	<b>Main obstacles to be faced, key steps to make it happen?</b>	<b>How to manage such an integrated platform (who is in, investment &amp; running costs)?</b>	<b>Which benefits would such a platform offer? Which services to which customers and what price?</b>
<b>BGBM</b>	A second vision to add: digitisation of information + mobilisation of presently underutilized large volumes of biodiversity information	Three major obstacles: lack of standardisation and interoperability between platforms, availability of help-desk functions (need to quickly create a community-driven help-desk?), institutional commitment	Cannot be answered at this point	Benefits: improved re-usability of data, mobilisation of underutilized data, improved data quality, efficient and secure data management, visibility of biodiversity data, streamlines publication process New products: interactive and dynamic biodiversity data interfaces, data access across institutions
<b>MfN</b>	Agree in general but the wording is complex and not easy to understand	Obstacles: lacking of commitment from partners, disagreement on standards and procedures, lack of interest from scientists, conflict partners' - project's goals, insufficient project dissemination (namely in institutions)  Key developments: communication among partners, dissemination, etc.	Initial partners + new highly engaged partners  A S&T Advisory Board (members from each active partner) is necessary  A self-sufficient foundation supported by project partners?	Benefits: increase in scientific output, collaborations, efficient use of taxonomic data / publications, access to a more comprehensive set of data, external services  Services: semantic mark-up of legacy literature, digitizing institutions, automated services (free), tools for semantic mark-up, etc.
<b>Naturalis</b> <i>(7 inputs)</i>	FoG agrees with the overall vision (particularly because it allows addressing different needs and updating published data FAN: the vision is in line with FAN priorities	FoG obstacle: all data available only in hard copy publication  FoN: Developments needs in line with the LERU report	FoG: the team should include providers of data  FoN: Aspects linked to logical open access	FoG: increase of the possibilities of mining and reuse, no repeated work across institutions  FoN: a lot (difficult to summarize here)
<b>NBGB</b>	An additional aspect is improving taxonomic workflows to benefit from e-Infrastructures	Taxonomists working in a collaborative and structured manner and gaining recognition for digital work  Working in a multilingual world	An independent management is preferable but considerable incentive is necessary if we want taxonomists and institutions accepting external decision-making process	Multilingual access, higher visibility for research, reduced costs, a one-stop-shop, closer ties with institutions in Africa

<b>Pensoft</b>	We agree	All pro-iBiosphere products should be tailored according to the exploitation needs of project partners (especially SMEs)	Established with initial funding and turning it into an economically self-supporting organisation, e.g. through membership fees.	Benefits are tremendous: deep linking through various elements of biodiversity information and re-use of data to create new knowledge will be used by virtually all economic sectors and activities of mankind
<b>PLAZI</b>	Yes but... can institutions change their isolationist's attitude, can they share the needs for a collaboration at social and funding levels?	A convincing (vital) operating system  The feeling to be part of a wider science community  Pilot studies need to be thoroughly assessed	No clear answer yet: need to be a project tasks  Needs to be implemented by "somebody" committed to make it happen	Customization (more specific content, publishing services)
<b>RBGK</b>	Yes but subject to project findings + to be further discussed in a project workshop  We should better define "processing core biodiversity data" (floristic and faunistic data?), and "integrated system"	A lot has to be clarified during the present project (funding, agreement between partners, engagement of potential users, business models, etc.) and included in particular into 6.4 Del.  Important to check the coherence of the outcomes of the different WPs	Too early to say	Pooling of resources, resource duplication, sharing data, economies of scale, broader use of data, single source of truth (avoidance of competition)
<b>Sigma</b>	No comment (we've proposed this vision...)	A test implementation phase of the business model identified in pro-iBiosphere is necessary (= Biosphere funding by the EC)  Time is critical: a smooth continuity to be ensured between the 2 projects	Beyond committed project partners, other EU and non-EU partners to reach a critical mass  Governance through a core group  A technical partner to run the platform is necessary	No clear at this project stage

---

## MARKET RESEARCH

The “market definition” exercise will progressively lead, in the next months, to a clearer vision of the project positioning, to the identification of needed technological developments; clarification of services targeting a set of identified customers through given organizational and operational modes and of business models and sustainability plans the services would refer to.

In parallel a focused market research will be conducted, mainly resulting from collecting and analysing information from similar initiatives in the field of biodiversity or in other fields, in order to fine tune the pro-iBiosphere approach on all its mentioned aspects (technology, services, operations, business models, etc.).

At the end of the first 6-month period of the project the market definition exercise has not yet reached sufficient level in order to implement focused market research. However, the Task leader has made efforts, with the support of all project partners (particularly through the project wiki) to start identifying the main similar initiatives the research would focus on:

- Firstly, we started by identifying the main biodiversity projects and initiatives (developing their activities in the framework of the EU-funded research or not) – see Annex 2,
- Then we used this first list (also referred to for dissemination purposes in WP6) to start developing another list of biodiversity platforms more related to market research aspects – see Annex 3,
- From this second list we then selected a set of “mega-science platforms” that appeared the most interesting to study (i.e. from which a desktop research could collect and analyse information relevant to pro-iBiosphere) - see matrix on next page for the first synthesis of collected information.

On the occasion of the next deliverable related to Task 6.3, planned at month 12, updates of all these tables and more qualitative outputs of this research (addressing more platforms if needed) will be provided.



SYNTHESIS OF THE INFORMATION COLLECTED ON “MEGA-SCIENCE PLATFORMS” AT MONTH 6

	INSDC	CoL	GBIF	JSTOR Plant Science	BHL	iBOL	EOL
<b>Website</b>	<a href="http://www.insdc.org">www.insdc.org</a>	<a href="http://www.catalogueoflife.org">www.catalogueoflife.org</a>	<a href="http://www.gbif.org">www.gbif.org</a>	<a href="http://www.plants.jstor.org">www.plants.jstor.org</a>	<a href="http://www.biodiversitylibrary.org">www.biodiversitylibrary.org</a>	<a href="http://www.ibol.org">www.ibol.org</a>	<a href="http://www.eol.org">www.eol.org</a>
<b>Creation</b>	1992	2001	2001	2003	2005	2007	2007
<b>EU project</b>		<i>Species2000</i>					
<b>CONTENT – DATA</b>							
<b>Content and scope</b>	Specialized: Nucleic acid sequences	General: Taxonomic checklists	General Occurrences and records	Specialized: Type specimens, multimedia objects for plants	General: Biodiversity literature, multimedia objects	Specialized: DNA barcoding sequences	General: Knowledge data, species fact sheets, multimedia objects
<b>Data source</b>	3 platforms (EMBL Bank, GenBank;DDBJ)	115 taxonomic databases	420 data publishers	200 content partners and publishers	12 libraries, 60,000 titles and 100,000 volumes	BOL data system; 156,461 taxa species and 1,702,485 specimens	>220 partners and >62,000 members; >3.3 million pages
<b>Links with other platforms</b>		LIAS, Species2000, WoRMS, Species Fungorum, FishBase, LifeWatch, ELIXIR, GBIF, CBOL, IUCN, EoL	EDIT, BioCASE, CoL, EoL	BHL, GBIF			Catalogue of Life, GBIF, WoRMS, iBOL, BHL, INSDC
<b>Data quality management responsibility</b>	Author and/or institution	Peer review	Publishers	JSTOR + feedback mechanisms with providers	BHL consortium	Direct input and curation efforts of scientific community and researchers	Controlled by 300 active EOL curators on a voluntary basis
<b>USER AND SERVICES</b>							



<b>Target user</b>	Biodiversity science community	Research scientists Policy and decision-makers Citizen scientists	Biodiversity science community	Scientific institutions	Scientific institutions	Scientists Biodiversity science community	For everyone: students, teachers, scientists, lifelong learner
<b>Formats</b>	Online	Online CD-ROM CoL Annual Checklist published	Online	Online	Online	Online	Online
<b>Search display</b>	Results in the different databases Journals/articles, PubMed, Literature citations & abstracts, Books, Nucleotide/protein/genome/structure, Taxonomy	List of names Organised by rank, name status, group and database	List of names Different sections: Scientific names, Common names, Countries, Datasets Filter by Species / Subspecies / Genus / Variety	Results displayed by map and by list of names Filter by Title, taxonomy	Results displayed by Books/Journals, Authors, Subjects, Scientific names in lists Sort by Relevance, Title, Author, Year	Results displayed by Sub-taxa (species), BOLD stats (records), Contributors (Specimens and Sequencing), Imagery, Collection site, Taxon Occurrence (Map)	Results displayed in different sections by Details, Media, Maps, Names, Communities, Resources, Literature, Updates
<b>Functionnalités Services</b>	Amount and quality of openly and freely info (oldest platform)	Carefully controlled dataset Probably the most useful for accessing Life Science Indicators (LSIDs) for higher animal data	Taxonomic component of the database can be extracted Navigation through the indexes to the huge datasets in centralized locations	Taxonomic component of the database can be extracted Bioinformatics and biodiversity informatics tools for visualisation	Range of services and application programming interfaces (APIs) allowing to harvest source data files and reuse content for research purposes	Massive survey of sequence variation in standardised gene regions across large blocks of life	Large diverse system intended for a range of audiences. Caching functionality (instant archiving and backup) Creative Commons
<b>TECHNICAL</b>							
<b>Technical</b>		DiGIR and TAPIR	Integrated Publishing Toolkit (IPT)	JSTOR Plant Science SRU	TaxonFinder (developed by uBio.org)		Names-based cyberinfrastructure
<b>MANAGEMENT AND FUNDING</b>							



<b>Consortial structure</b>	EMBL ENA, NCBI-GenBank and DDBJ (USA)	Species2000 (UK) and ITIS (US, Canada and Mexico)	Intergovernmental organisation with about 60 nations and 50 international organisations. GBIF secretariat & advisory committee	NGO organisation funded and spearheaded by the Andrew W. Mellon Foundation	Consortium of 12 partners + global expansion with BHL nodes in China, Australia and Brazil	Central node in Canada, major nodes in China, Europe and US Several regional/ national nodes and partner organisations	GBIF, BHL, foundations in the USA and cornerstone institutions in the USA, Australia, China, Egypt and Mexico
<b>Funding source</b>		Grants and financial supports from Species2000	Voting participants (international organisations)	- Andrew W. Mellon foundation - Subscription fees	Grants from several foundations	- Ontario government - Canadian foundations - Genome Canada Association	16 institutions and 6 foundations
<b>Creation of content data</b>	National funding programmes	Volunteers and individual enthusiasts	National funding programmes	Backed by financial support - paid for digitalisation effort	BHL-US: Backed by financial support	Backed by financial support	Volunteers and individual enthusiasts



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## ANNEXES

### **ANNEX 1: REPORT PREPARED FOLLOWING THE RBGK - SIGMA MEETING OF DEC. 7, 2012 (INCLUDING THE QUESTIONNAIRE SENT TO PARTNERS)**



Project Acronym: **pro-iBiosphere**

Project Full Title: **Coordination & policy development in preparation for a European Open Biodiversity Knowledge Management System, addressing Acquisition, Curation, Synthesis, Interoperability & Dissemination**

Grant Agreement: **312848**

Project Duration: **24 months (Sep. 2012 - Aug. 2014)**

## OFFICE MEETINGS TO CLARIFY RELATIONSHIPS BETWEEN TASKS 6.3 AND 6.4 (MS 18) MEETING REPORT

**Deliverable Status:** Final

**Date:** December 2012

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**Dissemination Level:** Restricted

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<b>Naturalis</b>	Naturalis Biodiversity Center	Netherlands
<b>NBGB</b>	Nationale Plantentuin van België	Belgium
<b>FUB-BGBM</b>	Freie Universität Berlin	Germany
<b>Pensoft</b>	Pensoft Publishers Ltd	Bulgaria
<b>Sigma</b>	Sigma Orionis	France
<b>RBGK</b>	The Royal Botanic Gardens Kew	United Kingdom
<b>Plazi</b>	Plazi	Switzerland
<b>MFN</b>	Museum für Naturkunde - Universität zu Berlin	Germany

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## REVISION

Version	Author	Date	Status
1.0	Camille Torrenti, Sigma Orionis	13/12/2012	Creation
1.1	Soraya Sierra, Naturalis	17/12/2012	Draft
1.2	Don Kirkup, RBGK	19/12/2012	Final

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## TABLE OF CONTENT

	<i>PAGE</i>
<b>MEETING OBJECTIVES.....</b>	<b>5</b>
<b>MEETING REPORT.....</b>	<b>7</b>
<i>MAIN CONCLUSIONS.....</i>	<i>7</i>
<i>METHODOLOGY AND DELIVERABLES.....</i>	<i>7</i>
<b>ANNEX: QUESTIONNAIRE TO BE USED TO COLLECT INPUTS FOR T6.3 – T6.4 FROM EACH PROJECT PARTNER .....</b>	<b>9</b>

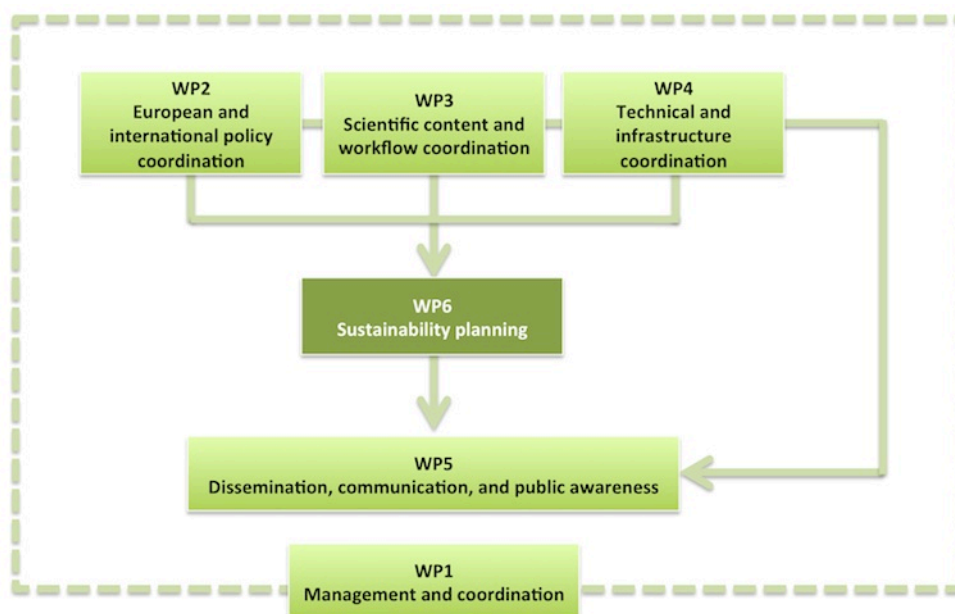
## MEETING OBJECTIVES

The aim of the pro-iBiosphere project is to prepare (= pro), through a coordination action, the ground for an integrative system (= sphere) for intelligent (= i) management of biodiversity (= bio) knowledge.

Once it becomes operational, the European Open Biodiversity Knowledge Management System will play a major role in facilitating the synthesis of core biodiversity data by creating an authoritative framework including, discovery of new species, naming of specimens and species, identification tools, descriptions, and various other basic types of information.

It will also facilitate the acquisition of high quality biodiversity data from various sources, including legacy data; the curation of the data; and at the same time it will optimize the delivery of those data to the various users.

Ensuring the sustainability of the pro-iBiosphere project is therefore a key objective of pro-iBiosphere activities. A “Sustainability planning” Work Package (ie. WP6) logically plays a central role in the WP structure of the project. WP6 will feed on inputs from three other WPs (i.e. WP2, WP3, and WP4), explore the context and conditions necessary to ensure a transition from pro-iBiosphere to iBiosphere, and provide inputs to WP5 aiming at outreach activities.

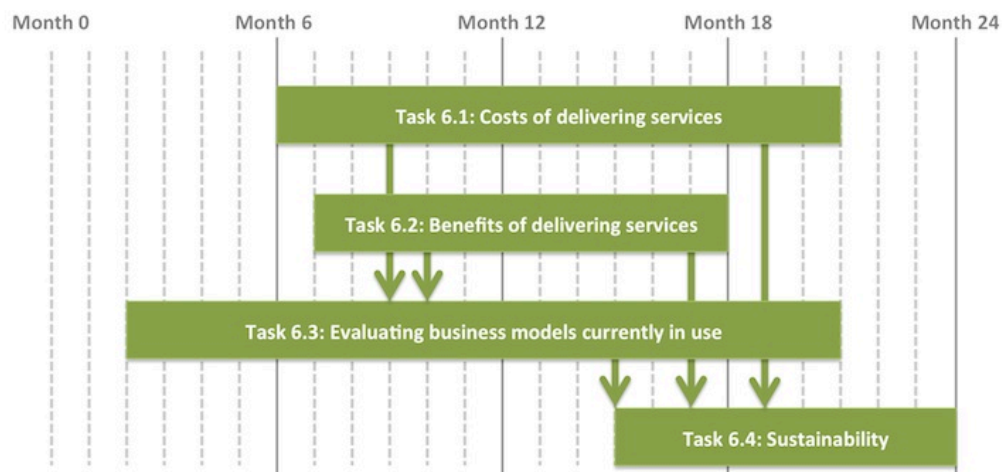


*WP Structure of the pro-iBiosphere project*

WP6 activities, led by RBGK, are developed through four distinct tasks:

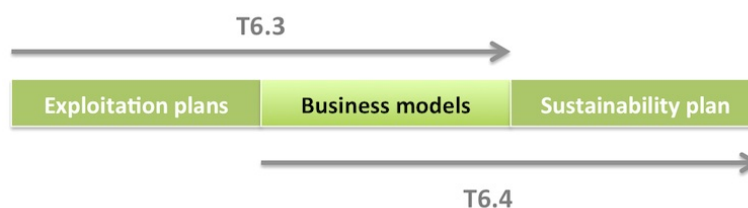
- Tasks 6.1 and 6.2 respectively explore the costs and benefits of delivering the services made available through the envisioned European Open Biodiversity Knowledge Management System;
- Task 6.3, led by Sigma, entitled “Evaluating business models currently in use by partners” addresses more precisely the exploitation plans at the level of each partner and of the consortium as a whole (including business models each partner would envision), and this, while taking into consideration the market context or background;

- Task 6.4, led by RBGK, entitled “Towards sustainability for services”, takes stock of the activities developed through the three other tasks, identifies alternative business models and concludes on iBiosphere sustainability plans and recommendations to policy makers.



*WP6 Task structure and interrelations*

The separation into two different tasks of the activities developed through T6.3 and T6.4 is logical. However, they both address business models even if primarily seen from different angles: T6.3 focuses on models envisioned today by each partners while T6.4 strives to reach a consensual view on a suitable business model for the integrated platform. Indeed, since T6.3 addresses exploitation plans and business models envisioned by project partners not only at their own level but also at the consortium level as a whole, it directly concerns issues addressed by T6.4.



*Issues addressed by T6.3 and T6.4*

In this context a close relationship has to be established between the leaders of these two tasks, Sigma Orionis and RBGK, to develop their activities and particularly the methodologies to be used to derive consensual views from inputs provided by the partners. This close relationship was foreseen at the proposal stage. In order to definitely clarify these relationships and enable a smooth development of WP6 activities, milestone (MS 18) was set at month 5 at the latest (i.e. January 2013) to definitely clarify these relationships, thus enabling a smooth development of WP6 activities.

The present document reports on the ad hoc meeting held at RBGK in London on December 7, 2012, that followed several online meetings organized since the project kick-off meeting (Leiden, Sept. 27-28, 2012) to prepare this face-to-face meeting.

## MEETING REPORT

Participated in the meeting:

- For RBGK: Bob Allkin, Don Kirkup, Alan Paton
- For Sigma Orionis: Roger Torrenti, Camille Torrenti

### MAIN CONCLUSIONS

At the start of the meeting RBGK and Sigma Orionis reassessed their common understanding of the meeting objectives introduced in the previous paragraph.

A lively exchange of viewpoints then developed in a friendly and constructive atmosphere and allowed to quickly reach the following main conclusion: in order to efficiently develop T6.3 and T6.4 activities and thus increase the chances to eventually reach a convincing business model for iBiosphere, it is necessary that RBGK and Sigma Orionis **jointly**:

- Request periodical inputs from partners (every 6 months, starting at month 6),
- Organize the meeting planned at month 14 “to evaluate business models currently in use by partners and relevant non-partners” (Project milestone MS22,i.e. October 2013).

### METHODOLOGY AND DELIVERABLES

Inputs from each pro-iBiosphere partner will be jointly requested by RBGK and Sigma Orionis, every 6 months, as planned in T6.3 but on issues related to T6.3 and T6.4 (not on T6.3 issues only), under the form of a questionnaire.

Since the profiles of project partners and the backgrounds of their representatives in the project are quite diverse:

- An introductory section of the questionnaire will remind the concepts referred to in the document (exploitation plan, business model, sustainability plan);
- All questions will possibly include some possible answers or examples so that they can be more easily answered;
- Each partner will be invited to consider the possibility that different persons in their organization can answer the questionnaire (for instance, the editor of a Fauna/Flora project, the person in charge of the e-taxonomy plan/activities for its institute, a researcher, a specialist of communication and marketing activities in the organization, etc.).

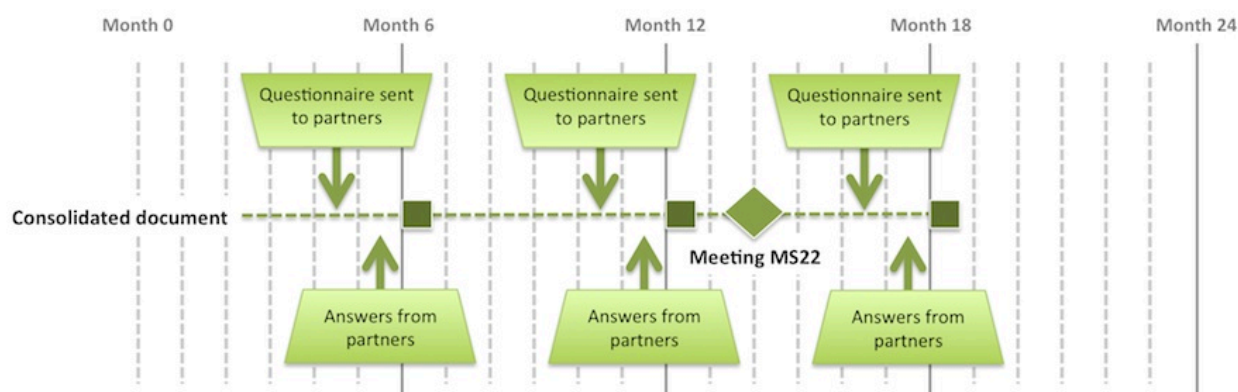
The questionnaire will include three parts:

- The first part is devoted to “Exploitation plans at the level of your organization”,
- The second part addresses “Business models currently in use in your organization”. This part has not to be understood in a project context. It is about today’s business at each partner’s level, from each partner’s viewpoint: “Which services (publications, access to data, expertise, etc.), for which users/customers, are you exploiting today (or could you exploit), and this under which cost-benefits model?”,
- The third part focuses on “Towards the sustainability of our joint initiative” and invites partners to contribute to a common vision of iBiosphere, to evaluate the costs and benefits of the envisioned integrated system, and to suggest other initiatives (open science initiatives, integrated knowledge platforms, etc.) to benchmark. Answers to this last question will allow preparing, within T6.3 and at month 12, a market background document based on these answers and some complementary desktop research (this document will be updated at month 18).

Answers to this questionnaire will be collected by RBGK and Sigma Orionis, analysed and returned to each project partner under the form of a consolidated document starting with a synthesis (aiming at reaching a consensual view) of Part 1 (prepared by Sigma Orionis), Part 2 (RBGK), and Part 3 (Sigma Orionis).

At months 12 and 18, partners will be asked to update their previous answers and another consolidated document will be sent again to each partner.

At month 14 (i.e. after the second iteration), the plenary “Meeting to evaluate business models currently in use by partners and relevant non-partners” (project milestone MS22) should allow to make a significant step towards sustainability plans, which the last consolidated document produced at month 18 should confirm.



*Overview of T6.3-T6.4 methodology*

The questionnaire prepared by RBGK and Sigma Orionis and to be sent to partners at month 5 is provided in Annex.

**ANNEX: QUESTIONNAIRE TO BE USED TO COLLECT INPUTS FOR T6.3 - T6.4 FROM EACH PROJECT PARTNER**

## PRO-IBIOSPHERE EXPLOITATION AND SUSTAINABILITY PLANS

### 1. Questions to each project partner

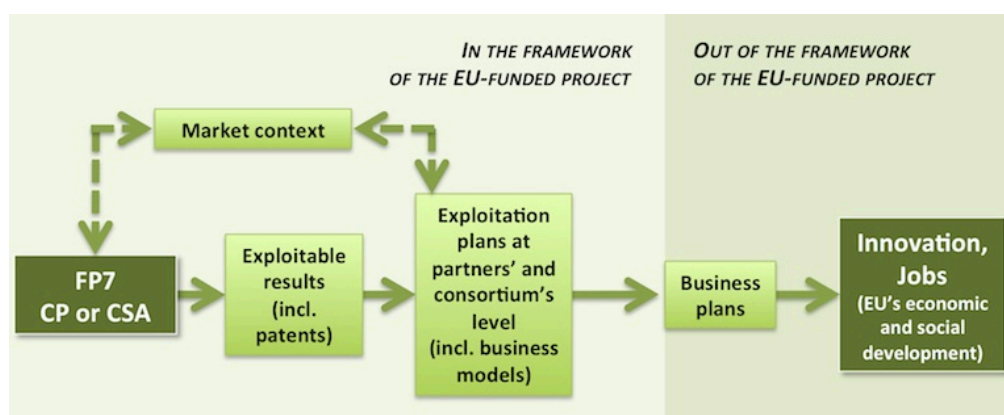
**To be filled in and sent back by email not later than January 15, 2013 to  
Don Kirkup (D.Kirkup@kew.org) and Camille Torrenti (camille.torrenti@sigma-orionis.com)**

This questionnaire has to be filled in every 6 months (until project month 18). From the next 6-month period on, you will only be asked to revise and update the questions you will have given 6 months earlier. Should you consider that several representatives from your organization may usefully fill in this questionnaire in order to provide the consortium with a better understanding of the way your organization foresees the exploitation and sustainability of the pro-iBiosphere project, their contributions are welcomed. You may also want to provide a consolidated view through answers provided collaboratively by different representatives of your organization.

Please indicate in the below table the name(s) of the representative(s) of your organization having provided answers to this questionnaire.

	Contributor 1	Contributor 2	Contributor 3
Full name			
Organization			
Position			
Email address			
Skype ID ( <i>to be provided only if you would kindly accept to be contacted should some of provided answers necessitate clarification from our part</i> )			

### 2. Introduction: some definitions of terms and concepts referred to in this document



*Steps from EU-funded research to Innovation and jobs - © Sigma Orionis 2012*

## EXPLOITATION PLANS

The European Commission pays a great attention to the fact that the results of research projects (or coordinated and support actions), funded through taxpayers' money, are "disseminated" (i.e. communicated to a wide audience, not limited to the audience of project partners) and "exploited" (i.e. useful after project completion).

An "exploitation plan" is quite systematically requested from EU-funded projects, detailing how each project partner and the consortium as a whole intends to make use of research results, to take advantage of its activities in the project. Some partners will only foresee an increase of their expertise or level of publications while others may envision precise exploitation perspectives, based on more or less formalized business models. **Part 1 of the present questionnaire** focuses on exploitation plans at each partner's level.

A "market background document" may be useful to fine tune exploitation plans at partners' or consortium's level since an exploitation perspective may be inspired, identified, better formalized when considering the market environment: such a document will be made available at month 11 (i.e. August 2013).

## SUSTAINABILITY

The European Commission also pays a great attention to the fact that the funding of a research project is only a step in the development of a more ambitious project by the consortium partners (or at least a sub-group of them), that research results can lead to a pre-commercial or even commercial phase during which no EU funding will be necessary any longer, the consortium partners having found a way (typically through suited business models likely to fully exploit project results) to ensure the continuity of their efforts, to ensure the sustainability of the overall project they had envisioned.

Obviously, since consortium partners are co-investing in the research project, they are expected to have a similar determination to exploit project results and ensure the sustainability of their overall project. **A convincing sustainability plan is one of the key expected outputs of the project.**

## BUSINESS MODEL

A business model describes the precise way a stakeholder plans to seize a commercial (business) opportunity. The "Business Model Canvas" ([http://en.wikipedia.org/wiki/Business\\_Model\\_Canvas](http://en.wikipedia.org/wiki/Business_Model_Canvas)) based on Osterwalder's work is often considered as a good reference framework to describe the various constituents of a business model: value proposition, customer relationship, channels, etc. In the pro-iBiosphere project, a detailed business model for iBiosphere (the envisioned integrated system) will logically be fine tuned only by the end of the project, when all project activities exploring the context and conditions necessary to ensure a transition from pro-iBiosphere to iBiosphere will have provided main outputs.

However, project partners are in a position, at the start of the project, to describe the "business models currently in use in their organizations" (**Part 2 of the present questionnaire**), i.e. "which services (publications, access to data, expertise, etc.), for which users/customers, are they exploiting today (or could they exploit), and this under which cost-benefits model?"

These current business models are important to consider the possible iBiosphere business models since iBiosphere, when compared to the present not (or less) integrated situation, offers in particular the possibility to deliver improved services that already exist.

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## **BUSINESS PLAN**

A business plan comes after a business model. It is prepared by an organization targeting a business opportunity (made concrete through a business model) and precisely describes how the business will develop (addressing strategy, marketing, operations, human resources, legal aspects, etc.).

It is primarily intended to get a green light from the management of a company, banks or investors. Therefore, a business plan is typically out of the scope of a EU-funded project.

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## **PART 1: “EXPLOITATION PLANS AT THE LEVEL OF YOUR ORGANIZATION”**

Could you describe (in ½ to 1 page if possible) the way you plan to, or may exploit pro-iBiosphere in your organization or even at your own level, i.e. why you will consider by the end of the project that your involvement in it has been useful (taking advantage of the activities you will have developed, making use of project results, etc.)?

*You may only foresee an increase of your expertise, of the level of your publications, of your contact network, etc. You may also envision more commercial exploitation perspectives, based on more or less formalized business models, which you could describe here. Please note that this question is not about business models related to the envisioned iBiosphere integrated system but at your own level.*

## PART 2: “BUSINESS MODELS CURRENTLY IN USE IN YOUR ORGANIZATION”

In order to gather information on the costs and benefits of producing and disseminating faunistic and floristic data, information and knowledge, WP6 “Sustainability Planning” has designed a questionnaire.

The answers to this questionnaire will allow WP6 to establish baseline information such as:

- (i) What workflows related to the production/use/dissemination of Floras/Faunas are being used by partners
- (ii) How can current workflows be improved (e.g. more efficient, less resource consuming, etc.); and,
- (iii) How to maximise benefits to support sustainability of workflows.

This baseline information will be compared with new models and & workflows.

### I. Documenting business models currently in use by partners (T6.3)

#### SOME GUIDANCE

The **Unit of Analysis** for this exercise is at the level of the individual partner organisation, **not the consortium**. If the workflows within a partner organisation are diverse, then analysis will be at the level of an individual project and a separate questionnaire will be required for each (for example, at RBGK one unit of analysis might be "African Flora production" since the workflows for the Flora of Tropical East Africa and Flora Zambesiaca are similar enough to be treated together).

The **conceptual focus** of the analysis is multi-faceted as we are interested in activities, delivery channels, value exchanges and customers. Hence the broad range of the questionnaire.

The basic elements that are needed to describe any business model are centred on the product, service, information (or combination of) that is offered to the customer. In Business Modelling jargon this is often referred to as the **Value Proposition** and we have adopted this nomenclature below.

In our particular context we might think of the Value Proposition a being the output from any particular workflow.

As partners operating both inside and outside of pro-iBiosphere a common component of the Value Proposition might be stated as something along the lines of " **provision of floristic and or faunistic data, information, knowledge and services**" but the detail would differ between each partner. Following the critical first task of defining what the Value Proposition is, there are five other basic business model elements that ask further questions about the Value Proposition:

<b>1. What is the value proposition?</b>	Value proposition, product, service, information or combination
<b>2. To whom is the value proposition offered?</b>	Customer segment or type
<b>3. What is received in return?</b>	Value in return such as rent, commission, sales revenue, advertising space, and future contracts. Within our particular sphere would also include publications, specimens.
<b>4. How is the value proposition offered?</b>	Channel of value transmission
<b>5. How is the value proposition created?</b>	Value adding processes and related activities, resources, capabilities, strategies and organisation structure
<b>6. What other entities contribute to creating and delivering the value proposition to the customer?</b>	Financiers, suppliers, allies and regulatory bodies

The questionnaire that follows is based on the "Business Model Canvas" of Osterwalder & Pigneur (2009). The questions are grouped under the five headings given in the table above, which is taken from Lambert (2012), as are the guidance notes (in blue) in the table below.

Many of the questions are quite easy to have a stab at. We've started entering some example answers (work in progress in red), which are loosely based on Kew's African Floras. We also found that it was helpful to construct a diagram of the workflow (appended).

For some questions it may only be possible to give a general answer or indicate "unknown" - the intention is that more detail can be added in future iterations.

## II. What is the Value Proposition?

### VALUE PROPOSITION

The object(s) of value offered to the customer. It can take the form of products, services, information or a combination of each. The channel through which it is offered can be an important part of the value proposition, e.g. there should be at least one value proposition per partner, based on their **current** provision of floristic/faunistic data, information, knowledge, services, tools.

<b>VALUE PROPOSITIONS</b>	<b>Characteristics</b> include: newness, performance, customization, "getting the job done", design, brand/status, price, cost reduction, risk reduction, accessibility, convenience/usability
<i>What are the business drivers for our institutes?</i>	Mission, statutory responsibilities, profit, sustainability
<i>What value do we deliver to the customer?</i>	Comprehensive and authoritative floristic information
<i>Which one of our customer's problems are we helping to solve?</i>	Finding information about species of African plants
<i>What bundles of products and services are we offering to each customer segment?</i>	Printed floras, printed field guides, web-based
<i>Which customer needs are we satisfying?</i>	Identification of specimens, nomenclatural problems, describing plant distribution, describing plant characteristics

### III. To whom is the value proposition offered?

#### CUSTOMER

The entity (entities) targeted with the value proposition. It can be a group of consumers or other businesses. Where differences exist in terms of demand or servicing requirements, a new customer group needs to be recognised.

<b>CUSTOMER SEGMENTS</b>	These might include Mass Market, Niche Market, Segmented, Diversified, Multi-sided Platform
<i>For whom are we creating value?</i>	Taxonomists, Conservationists, Ecologists, Environmental Scientists, Policy Makers
<i>Who are our most important customers?</i>	Policy Makers? Conservationists
<b>CUSTOMER RELATIONSHIPS</b>	These might include Personal assistance, Dedicated Personal Assistance, Self-Service, Automated Services, Communities, Co-creation
<i>What type of relationship does each of our customer segments expect us to establish and maintain with them?</i>	Taxonomists (self service, automated services, community, co-creation) Conservationists & ecologists (self service, automated services)
<i>Which ones have we established?</i>	Taxonomists (self service, community, co-creation) Conservationists & ecologists (self service)
<i>How are they integrated with the rest of our business model?</i>	Taxonomists (close: community and co-creation relationships are part of the workflow)
<i>How costly are they?</i>	?

## IV. What is received in return?

### VALUE IN RETURN

This is what the entity receives in return for the value proposition. It can be money (e.g. in the form of rent, sales revenue, commission) or other non-monetary elements of value (e.g. advertising space or future contracts). The Value in Return can be realised at different points of time.

<b>REVENUE STREAMS</b>	
<i>For what value are our customers really willing to pay?</i>	Unknown
<i>For what do they currently pay?</i>	Hard copy publication
<i>How are they currently paying?</i>	Would include exchange of publications and specimens which is one of the main forms of payment by African flora users in Africa
<i>How would they prefer to pay?</i>	Unknown
<i>How much does each revenue stream contribute to overall revenues?</i>	Unknown
<b>COST STRUCTURE</b>	
<i>What are the most important costs inherent in our business model?</i>	Unknown
<i>Which key resources are most expensive?</i>	Unknown
<i>Which key activities are most expensive?</i>	Unknown
<i>What controls/drives cost structures</i>	Unknown

## V. How is the value proposition offered?

### CHANNEL

The channel describes how the value exchanges take place. It transmits one, or more, of the value propositions and the value in return. More than one channel can be used to effect a transaction.

<b>CHANNELS</b>	<p>Channel phases:</p> <ol style="list-style-type: none"> <li>1. Awareness - How do we raise awareness about our company's products and services?</li> <li>2. Evaluation - How do we help customers evaluate our organization's Value Proposition?</li> <li>3. Purchase - How do we allow customers to purchase specific products and services?</li> <li>4. Delivery - How do we deliver a Value Proposition to customers?</li> <li>5. After sales - How do we provide post-purchase customer support?</li> </ol>
<i>Through which channels do our customer segments want to be reached?</i>	Hard copy, web-portals, web services, mobile apps?
<i>How are we reaching them now?</i>	Hard-copy, web-portals,
<i>How are our channels integrated?</i>	Loosely
<i>Which ones work best?</i>	Unknown
<i>Which ones are most cost-efficient?</i>	Unknown
<i>How do we best compliment &amp; support customer workflows?</i>	Currently unknown - likely through interoperability standards
<i>How do we provide customer support?</i>	Further collaborative work and partnerships, ad hoc response

## VI. How is the value proposition created?

### VALUE ADDING PROCESS

This element ties together the resources, activities, and capabilities of the entity to create the value proposition and/or the channel. It can be a manufacturing process, a retailing operation, or a service process. It describes how the value proposition is provided. At the most detailed level the value adding processes can be defined precisely (a process model can be constructed). However, at the external user and management levels, all that will be depicted, are the inputs and outputs of the value adding processes.

<b>KEY RESOURCES</b>	<b>Resources:</b> Include information technology hardware and software, intellectual property, financial, physical and human resources and may be provided by suppliers or generated internally. Include <b>Capabilities:</b> the expertise required by the entity to perform the activities. They are provided by resources (both human and other). Capabilities can be provided by an ally.
<i>What key resources do our value propositions require?</i>	Scientific and editorial staff, collections, literature, software, hardware
<i>What key resources do our distribution channels require?</i>	IT staff, IT infrastructure, designers, publishers
<i>What key resources do our customer relationships require?</i>	Market research
<i>What key resources do our revenue streams require?</i>	Fund raisers, financial backers
<b>KEY ACTIVITIES</b>	<b>Activities:</b> Are actions undertaken to convert resources into Value Propositions, or to operationalize a channel of transmission using the capabilities of the entity and its allies. Categories include <b>production</b> , <b>problem-solving</b> and <b>platform/network</b>
<i>What key activities do our value propositions require?</i>	Problem solving (field work, curation, research, editorial), activities required to know we have a valuable product i.e., achieve scientific excellence
<i>What key activities do our distribution channels require?</i>	Production (publication), platform/network (dissemination)
<i>What key activities do our customer relationships require?</i>	?
<i>What key activities do our revenue streams require?</i>	?

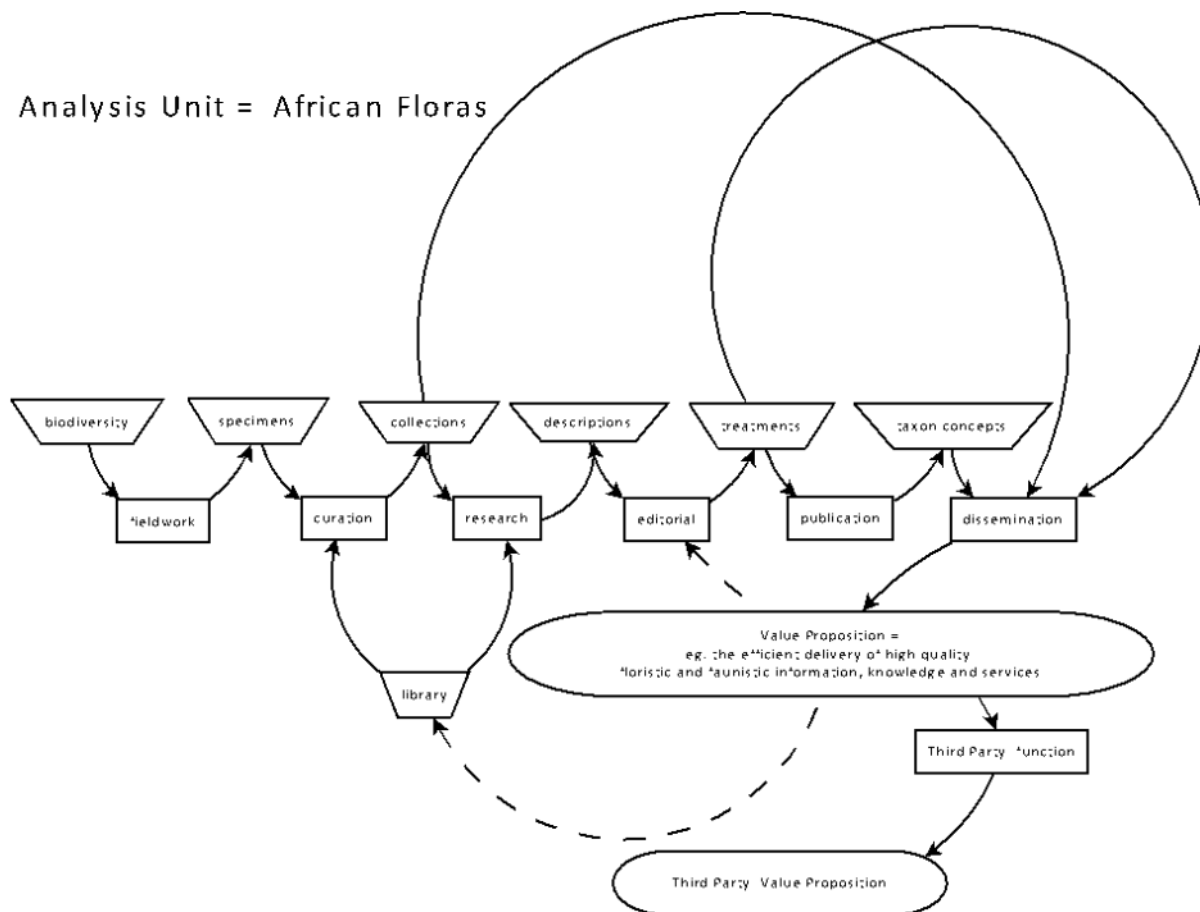
## VII. What other entities contribute to creating and delivering the value proposition to the customer?

### OTHER ENTITY

Other entities represent third parties that assist the enterprise to create or provide the value proposition to the customer, have some influence on how the enterprise creates or provides the value proposition, or they are involved with determining or providing the value in return. Common examples of other entities include suppliers of inventories, machinery and consumables and regulatory bodies that have some form of control over the operations of the enterprise. Other allies assist the entity in providing the value proposition to the customer, by providing the channel or becoming an outsourcing partner for various parts of the value adding process (Weill & Vitale 2001).

<b>KEY PARTNERS</b>	
<i>Who are our key partners</i>	Contributing taxonomists, editors, biodiversity institute network, in-country counterparts
<i>Who are our key suppliers</i>	?
<i>Which key resources are we acquiring from partners</i>	Specimen exchange and loan, expertise, knowledge, artwork
<i>Which key activities do partners perform</i>	Drafting accounts, editorial work
<i>What are the motivations for having partnerships</i>	Optimization and economy-spreading the work, reduction of risk and uncertainty, acquisition of particular resources and activities

Analysis Unit = African Floras



**Assets** (things of value)

- Biodiversity** - Animals, Fungi, Plants
- Specimens** - Samples of biodiversity with accompanying field notes
- Collections** - Curated repository of specimens
- Descriptions** - Characterisations of taxa
- Treatments** - Standardised descriptions (including nomenclature, distribution etc.), marked up legacy literature
- Taxon Concepts** - Authoritative taxon concept (reference)

**Functions** (activities with associated costs but which add value)

- Fieldwork** - collecting specimens, field observations, generalist, geographical or taxon focused, or project based.
- Curation** - access, digitisation, preservation, naming, systematic organisation, finding specimen related information.
- Research** - description, delimitation etc.
- Editorial** - scope definition, error checking, standards, mark-up of legacy literature.
- Publication** - making a citable reference
- Dissemination** - hard copy, web, mobile etc.

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## **PART 3: “TOWARDS THE SUSTAINABILITY OF OUR JOINT INITIATIVE”**

### **I. The vision**

Would you agree that the overall vision of the project is to succeed interconnecting, through eInfrastructures, institutions from Europe (and beyond) collecting and processing core biodiversity data, thus leading to the possible implementation of an integrated system allowing each institution and/or all institutions collectively to offer improved or new services to a wide range of users (customers)?

*Please indicate below any questions, comments, remarks, disagreements you may have on this assessment (no text limitation).*

### **III. The steps to make it happen**

What are in your mind the main obstacles the pro-iBiosphere partnership will face towards the sustainability of its initiative? What would be the key developments to reach the envisioned integration by the end of the project? Which project activities should necessitate a more particular assessment of their progress? (No text limitation)

### III. Platform management

How would such an integrated platform be managed? Should this management include all pro-iBiosphere partners, or just some of them, or new partners? What would be the main activities of this management body and which related running costs can be foreseen? Which investments would be necessary? (No text limitation)

### IV. The benefits the integrated system will offer

Which benefits would such an integrated platform offer when compared to the present situation when institutions collecting and processing core biodiversity data are not, or not so efficiently connected? Which new or improved services could be offered, to which customers at what price, by each institution individually or collectively through the organization managing the platform? (No text limitation)

### V. Benchmarking other initiatives

Would you have any recommendations concerning other open science initiatives / knowledge platforms to benchmark against pro-iBiosphere developments (in the domain of biodiversity or in other domains) in order to lead to more relevant business models for pro-iBiosphere (in particular to analyse how these initiatives answer to questions raised by Q3.3 and Q3.4)? (No text limitation)

## ANNEX 2: MAIN BIODIVERSITY PROJECTS AND INITIATIVES

### EU- FUNDED PROJECTS ON BIODIVERSITY

Project	Website	Description
<b>4D4Life</b>	<a href="http://www.4d4life.eu">www.4d4life.eu</a>	Distributed Dynamic Diversity Databases for Life
<b>agINFRA</b>	<a href="http://www.aginfra.eu">www.aginfra.eu</a>	A data infrastructure to support agricultural scientific communities promoting data sharing and development of trust in agricultural sciences
<b>ANAEE</b>	-	Structuring Infrastructures for the ANALysis and Experimentation on Ecosystem
<b>Biodiversa2</b>	<a href="http://www.biodiversa.org">www.biodiversa.org</a>	Cooperation and shared strategies for biodiversity research programmes in Europe
<b>BIOFRESH</b>	<a href="http://www.freshwaterbiodiversity.eu">www.freshwaterbiodiversity.eu</a>	To build a global information platform for scientists and ecosystem managers with databases of global freshwater biodiversity
<b>BioVeL</b>	<a href="http://www.biovel.eu">www.biovel.eu</a>	Virtual e-laboratory that supports research on biodiversity issues using large amounts of data from cross-disciplinary sources
<b>CReACTIVE-B</b>	<a href="http://creative-b.eu">creative-b.eu</a>	Coordination of Research e-Infrastructures Activities Toward an International Virtual Environment for Biodiversity
<b>EBONE</b>	<a href="http://www.ebone.wur.nl">www.ebone.wur.nl</a>	The project has developed a system or data collection that can be used for international comparable assessments.
<b>EDIT</b>	<a href="http://www.e-taxonomy.eu">www.e-taxonomy.eu</a>	Network of excellence gathering 28 major institutions devoted to knowing the living world better with the support of the EC
<b>EMBRC</b>	<a href="http://www.embrc.eu">www.embrc.eu</a>	European Marine Biological Resource Centre
<b>EUBrazilOpenBio</b>	<a href="http://www.eubrazilopenbio.eu">www.eubrazilopenbio.eu</a>	EU-Brazil Open Data and Cloud Computing e-Infrastructure for Biodiversity
<b>EUBON</b>	-	Assessing global biological resources: the European contribution to the Global Earth Observation Biodiversity Observation Network (GEO BON)
<b>EXPEER</b>	<a href="http://www.expeeronline.eu">www.expeeronline.eu</a>	Distributed Infrastructure for EXPERimentation in Ecosystem Research
<b>i4Life</b>	<a href="http://www.i4life.eu">www.i4life.eu</a>	Establishing of a virtual research community interlinking and harmonizing the taxonomic catalogues to create an enhanced list of the entire set of organisms
<b>iMarine</b>	<a href="http://www.i-marine.eu">www.i-marine.eu</a>	Hybrid Data Infrastructure service & Virtual Research Environments
<b>INCREASE</b>	<a href="http://www.increase-infrastructure.eu">www.increase-infrastructure.eu</a>	An Integrated Network on Climate Change Research Activities on Shrubland Ecosystems
<b>INTERACT</b>	<a href="http://www.eu-interact.org">www.eu-interact.org</a>	International Network for Terrestrial Research and Monitoring in the Arctic
<b>JERICO</b>	<a href="http://www.jerico-fp7.eu">www.jerico-fp7.eu</a>	Towards a Joint European Research Infrastructure Network For Coastal Observatories
<b>KNEU</b>	<a href="http://www.biodiversityknowledge.eu">www.biodiversityknowledge.eu</a>	Developing an open networking approach to boost the knowledge flow between biodiversity knowledge holders and users in Europe
<b>LifeWatch</b>	<a href="http://www.lifewatch.eu">www.lifewatch.eu</a>	E-Science European Infrastructure for Biodiversity and Ecosystem Research
<b>MARBEF</b>	<a href="http://www.marbef.org">www.marbef.org</a>	Marine Biodiversity and Ecosystem Functioning EU Network of Excellence
<b>PESI</b>	<a href="http://www.eu-nomen.eu/pesi">www.eu-nomen.eu/pesi</a>	A Pan-European Species directories Infrastructure
<b>SYNTHESYS</b>	<a href="http://www.synthesys.info">www.synthesys.info</a>	Produce an integrated European resource for research users in the natural sciences.
<b>TESS</b>	<a href="http://www.tess-project.eu">www.tess-project.eu</a>	Design of a transactional environmental decision support system, linking central policy planning to local livelihoods
<b>ViBRANT</b>	<a href="http://www.vbrant.eu">www.vbrant.eu</a>	To set up the means, tools and infrastructure to produce a more rational and a more effective framework for European biodiversity research
<b>WORLDIVERSITY</b>	-	Linking global species richness and beta diversity to individual species distributions at multiple phylogenetic and spatial scales

*OTHER BIODIVERSITY PROJECTS AND INITIATIVES*

Project	Website	Description
<b>Barcode of Life (BOL)</b>	<a href="http://www.barcodeoflife.org">www.barcodeoflife.org</a>	Identifying Species with DNA Barcoding
<b>Biodiversity Heritage Library</b>	<a href="http://www.biodiversitylibrary.org">www.biodiversitylibrary.org</a>	Consortium of natural history and botanical libraries that cooperate to digitize and make accessible the legacy literature of biodiversity
<b>BHL-Europe</b>	<a href="http://www.bhl-europe.eu">www.bhl-europe.eu</a>	Brings together existing EU digital collections of biodiversity literature and will provide access by a multilingual web portal
<b>BioNET</b>	<a href="http://www.bionet-intl.org">www.bionet-intl.org</a>	International initiative dedicated to promoting the science & use of taxonomy
<b>BioStor</b>	<a href="http://www.biostor.org">www.biostor.org</a>	BioStor provides tools for extracting, annotating, and visualising literature from the Biodiversity Heritage Library
<b>BISE</b>	<a href="http://www.biodiversity.europa.eu">www.biodiversity.europa.eu</a>	Biodiversity Information System for Europe is a partnership between the EC & the EEA. It is a single entry point for data & information on biodiversity in the EU
<b>CBD</b>	<a href="http://www.cbd.int">www.cbd.int</a>	The conservation, the sustainable use of the components of biological diversity, the fair and equitable sharing of the benefits arising out of the utilization of genetic resources
<b>CETAF</b>	<a href="http://www.cetaf.org">www.cetaf.org</a>	Networked consortium formed to promote training, research and understanding of systematic biology and palaeobiology
<b>DIVERSITAS</b>	<a href="http://www.diversitas-international.org">www.diversitas-international.org</a>	Integrating biodiversity science for human well-being
<b>Dryad</b>	<a href="http://www.datadryad.org">www.datadryad.org</a>	International repository of data, governed by a consortium of journals, underlying peer-reviewed articles in the basic and applied biosciences
<b>ELIXIR</b>	<a href="http://www.elixir-europe.org">www.elixir-europe.org</a>	Pan-European research infrastructure for biological information managing and safeguarding the massive amounts of data being generated every day by publicly funded research.
<b>eMonocot</b>	<a href="http://www.e-monocot.org">www.e-monocot.org</a>	eMonocot aims to create a global online resource for monocot plants.
<b>Encyclopedia of Life (EoL)</b>	<a href="http://www.eol.org">www.eol.org</a>	To increase awareness & understanding of living nature in an Encyclopedia of Life that gathers, generates & shares knowledge in a digital resource
<b>ERMS</b>	<a href="http://www.marbef.org">www.marbef.org</a>	European Register of Marine Species
<b>European Info<sup>o</sup> System for Alien Species</b>	-	To facilitate enhanced knowledge gathering and sharing and providing support to a European Invasive Alien Species (IAS) information system
<b>GBIF</b>	<a href="http://www.gbif.org">www.gbif.org</a>	GBIF promotes and facilitates the mobilization, free and open access, discovery and use of biodiversity information via the Internet.
<b>GBRCN</b>	<a href="http://www.gbrcn.org">www.gbrcn.org</a>	Global Biological Resource Centre Network
<b>Global Names US project</b>	-	
<b>IAPT</b>	<a href="http://www.iapt-taxon.org">www.iapt-taxon.org</a>	To promote all aspects of botanical systematics and its significance to the understanding and value of biodiversity
<b>iDigBio</b>	<a href="http://www.idigbio.org">www.idigbio.org</a>	Integrated Digitized Biocollections, the National Resource for Advancing Digitization of Biodiversity Collections (ADBC) funded by the US National Science Foundation
<b>Index Fungorum</b>	<a href="http://www.indexfungorum.org">www.indexfungorum.org</a>	
<b>IPBES</b>	<a href="http://www.ipbes.net">www.ipbes.net</a>	IPBES is an interface between the scientific community and policy makers that aims to build capacity for and strengthen the use of science in policy making
<b>IPNI</b>	<a href="http://www.ipni.org">www.ipni.org</a>	Database of the names and associated basic bibliographical details of seed plants, ferns and lycophytes
<b>Joint Nature Conservation Committee (JNCC)</b>	<a href="http://www.jncc.defra.gov.uk">www.jncc.defra.gov.uk</a>	JNCC is the public body that advises the UK Government and devolved administrations on UK-wide and international nature conservation.
<b>KeyToNature</b>	<a href="http://www.keytonature.eu">www.keytonature.eu</a>	Range of new, much easier and paper-free identification tools, for use within schools

		and universities across Europe
<b>LIAS</b>	<a href="http://www.lias.net">www.lias.net</a>	A Global Information System for Lichenized and Non-Lichenized Ascomycetes
<b>Marine Genomics</b>	<a href="http://www.marinegenomics.org">www.marinegenomics.org</a>	Web-based interface for public transcriptomic and genomic data and analysis tools
<b>Mycobank</b>	<a href="http://www.mycobank.org">www.mycobank.org</a>	On-line database aimed as a service to the mycological and scientific society by documenting mycological nomenclatural novelties and associated data
<b>Nordic LifeWatch</b>	-	Aiming at creating the e-science infrastructure for Biodiversity and Ecosystem Research. Funded by NordForsk
<b>Pl@ntNet</b>	<a href="http://www.plantnet-project.org">www.plantnet-project.org</a>	Plant Computational Identification & Collaborative Information System
<b>Plants2020 (GSPC)</b>	<a href="http://www.plants2020.net">www.plants2020.net</a>	A toolkit to support national and regional implementation of the Global Strategy for Plant Conservation
<b>Species 2000</b>	<a href="http://www.sp2000.org">www.sp2000.org</a>	Federation of database organisations working closely with users, taxonomists and sponsoring agencies to create a validated checklist of all the world's species
<b>SynBioSys</b>	<a href="http://www.synbiosys.alterra.nl">www.synbiosys.alterra.nl</a>	An information system for the evaluation and management of biodiversity among plant species, vegetation types and landscapes
<b>TDWG</b>	<a href="http://www.tdwg.org">www.tdwg.org</a>	Affiliated with the International Union of Biological Sciences & focusing on the development of standards for the exchange of biological/biodiversity data
<b>TRY Initiative on Plant Traits</b>	<a href="http://www.try-db.org">www.try-db.org</a>	Quantifying and scaling global plant trait diversity
<b>VertNet</b>	<a href="http://www.vertnet.org">www.vertnet.org</a>	Harnessing new technologies to meet the needs of both interdisciplinary science and research relevant to a changing world

### ANNEX 3: BIODIVERSITY RESEARCH PORTALS

Sequence databases		
Barcode of Life	<a href="http://www.barcodinglife.com">http://www.barcodinglife.com</a>	All public barcode data
International Barcode of Life (iBOL)	<a href="http://ibol.org">ibol.org</a>	Extending the geographic and taxonomic coverage of the barcode reference library
International Nucleotide Sequence Databases (INSDC)	<a href="http://www.insdc.org">www.insdc.org</a>	Composed of the 3 databases: DDBJ, ENA, and GenBank
International Transcriber Spacer 2 (ITS2)	<a href="http://its2.bioapps.biozentrum.uni-wuerzburg.de">http://its2.bioapps.biozentrum.uni-wuerzburg.de</a>	Ribosomal RNA Database
Global biodiversity databases		
Biodiversity Heritage Library	<a href="http://www.biodiversitylibrary.org">http://www.biodiversitylibrary.org</a>	Natural history and botanical libraries that digitize and make accessible the legacy literature of biodiversity
Biowikifarm.net	<a href="http://biowikifarm.net/meta/">http://biowikifarm.net/meta/</a>	Shared media repository, enabling synergies in re-using media content
D4Science.org Hybrid Data Infrastructure service	<a href="http://portal.d4science.research-infrastructures.eu/web/guest/welcome">http://portal.d4science.research-infrastructures.eu/web/guest/welcome</a>	Scientific community in the large
EDIT platform (European Distributed Institute of Taxonomy)	<a href="http://wp5.e-taxonomy.eu/">http://wp5.e-taxonomy.eu/</a>	Cybertaxonomy
Encyclopedia of Life (EoL)	<a href="http://eol.org/">http://eol.org/</a>	1 112 217 pages
ETI BioInformatics	<a href="http://www.eti.uva.nl/">http://www.eti.uva.nl/</a>	World Biodiversity Database, World Taxonomist Database) and Linnaeus II
European Bioinformatics Institute (EMBL-EBI)	<a href="http://www.ebi.ac.uk">http://www.ebi.ac.uk</a>	Building, maintaining and providing biological databases
GEO Portal	<a href="http://www.geoportal.org/">http://www.geoportal.org/</a>	1 057 results for Biodiversity
GBIF Data Portal (Global Biodiversity Information Facility)	<a href="http://data.gbif.org/welcome.htm">http://data.gbif.org/welcome.htm</a>	377 177 914 data records
Linnaeus II research tool	<a href="http://www.eti.uva.nl/products/linnaeus.php">http://www.eti.uva.nl/products/linnaeus.php</a>	Multifunctional research tool for systematists and biodiversity researchers
Mapping Life	<a href="http://www.mappinglife.org">http://www.mappinglife.org</a>	Knowledge-base and platform for species distribution map development
Plazi Taxon Search Portal	<a href="http://plazi.org:8080/GgSRS/search">http://plazi.org:8080/GgSRS/search</a>	20 223 treatments (1 476 documents)
Scratchpads	<a href="http://search.scratchpads.eu/">http://search.scratchpads.eu/</a>	Manage, share and publish taxonomic data online
Species 2000 Checklist / Catalogue of Life	<a href="http://www.catalogueoflife.org/annual-checklist/">http://www.catalogueoflife.org/annual-checklist/</a>	Validated checklist of all the world's species (plants, animals, fungi & microbes)
Species Base	<a href="http://www.speciesbase.org/">http://www.speciesbase.org/</a>	73 100 species
Species-ID	<a href="http://species-id.net/wiki/Main_Page">http://species-id.net/wiki/Main_Page</a>	Dynamic and authoritative open access resource for biodiversity information
uBio TaxonFinder web service	<a href="http://www.ubio.org/">http://www.ubio.org/</a>	11,106,374 Biological Names
ViBRANT	<a href="http://vbrant.eu">vbrant.eu</a>	A portal for users to centrally access publicly accessible biodiversity research information and literature
World Biodiversity Database (WBD)	<a href="http://wbd.etibioinformatics.nl/bis/index.php">http://wbd.etibioinformatics.nl/bis/index.php</a>	25 493 unique taxa
Xper2 platform	<a href="http://lis-upmc.snv.jussieu.fr/xper2/infoSxper2Bases/en/index.php">http://lis-upmc.snv.jussieu.fr/xper2/infoSxper2Bases/en/index.php</a>	Dedicated to taxonomic descriptions & computer-aided-identification
Regional databases		
Atlas of Living Australia	<a href="http://www.ala.org.au">http://www.ala.org.au</a>	Biodiversity data covering Australian species
BioCASE (The Biological Collection Access Service for Europe)	<a href="http://search.biocase.org/europe/">http://search.biocase.org/europe/</a>	Transnational network of biological collections of all kinds
Biodiversity data centre (BDC)	<a href="http://www.eea.europa.eu/themes/biodiversity/dc">http://www.eea.europa.eu/themes/biodiversity/dc</a>	Data and information on species, habitat types and sites of interest in Europe

DNA Data Bank of Japan	<a href="http://www.ddbj.nig.ac.jp">http://www.ddbj.nig.ac.jp</a>	
Dryades	<a href="http://www.dryades.eu">http://www.dryades.eu</a>	Identification tool devoted to plants, fungi and animals and to important databases on the biodiversity Italy
EUBrazilOpenBio	<a href="http://www.eubrazilopenbio.eu">www.eubrazilopenbio.eu</a>	e-Infrastructure of open access resources (data, tools and services)
EU BON	TBA	European gateway for biodiversity information, integrating a wide range of biodiversity data
European Nature Information System (EUNIS) database	<a href="http://eunis.eea.europa.eu/">http://eunis.eea.europa.eu/</a>	The species part contains information about more than 278 000 taxa
Integrated Digitized Biocollections (iDigBio)	<a href="http://www.idigbio.org">www.idigbio.org</a>	Data and images for millions of biological specimens are being made available in electronic format
LifeWatch	<a href="http://www.lifewatch.eu/fr">http://www.lifewatch.eu/fr</a>	E-Science European Infrastructure for Biodiversity and Ecosystem Research
<b>PESI portal</b> (Pan-European Species directories Infrastructure)	<a href="http://www.eu-nomen.eu/portal">http://www.eu-nomen.eu/portal</a>	European species
SinBiota	<a href="http://sinbiota.biota.org.br/">http://sinbiota.biota.org.br/</a>	Disseminating information about São Paulo State's biodiversity
SoortenBank	<a href="http://www.soortenbank.nl">http://www.soortenbank.nl</a>	Fauna, Flora and Fungi from the Netherlands
SynBioSys species checklist	<a href="http://www.synbiosys.alterra.nl/synbiosyseu/speciesviewframe.htm">http://www.synbiosys.alterra.nl/synbiosyseu/speciesviewframe.htm</a>	This checklist is a compilation of the most important Turboveg species lists of European countries
<b>SYNTHESYS</b> portal	<a href="http://www.synthesys.info/II-access.htm">http://www.synthesys.info/II-access.htm</a>	337,204,000 specimens
<b>Species databases</b>		
AlgaeBase	<a href="http://www.algaebase.org">http://www.algaebase.org</a>	Database of information on algae that includes terrestrial, marine and freshwater organisms
AmphibiaWeb	<a href="http://amphibiaweb.org">http://amphibiaweb.org</a>	Online system that provides access to information on amphibian
Animal Diversity Web	<a href="http://animaldiversity.ummz.umich.edu">http://animaldiversity.ummz.umich.edu</a>	Online database of animal natural history, distribution, classification, and conservation biology
Anthos	<a href="http://www.anthos.es">http://www.anthos.es</a>	Program developed to display information about the biodiversity of plants in Spain online
Biodiversity of Freshwater Ecosystems (BIOFRESH)	<a href="http://www.freshwaterbiodiversity.eu">www.freshwaterbiodiversity.eu</a>	To build a global information platform with databases of global freshwater biodiversity
Biodiversity Monitoring & Assessment Tool (BioMat)	<a href="http://eumon.ckff.si/biomat/1.2.php">http://eumon.ckff.si/biomat/1.2.php</a>	Monitoring schemes available: 633 / Species: 456 / Habitats: 177
BioSystematic Database of World Diptera (BDWD)	<a href="http://www.sel.barc.usda.gov:8080/diptera/names/searchre.htm">http://www.sel.barc.usda.gov:8080/diptera/names/searchre.htm</a>	Information about the World's flies
CATE-Araceae	<a href="http://www.cate-araceae.org/taxon.html">http://www.cate-araceae.org/taxon.html</a>	Taxonomy, biology, ecology and evolution of the Araceae
Cichorieae Portal	<a href="http://wp6-cichorieae.e-taxonomy.eu/portal/">http://wp6-cichorieae.e-taxonomy.eu/portal/</a>	90 genera comprising approximately 1400 species
Cybertruffle	<a href="http://www.cybertruffle.org.uk/eng/index.htm">http://www.cybertruffle.org.uk/eng/index.htm</a>	Cybertruffle databases (Cyberliber, Cybernome, Robigalia and Valhalla)
eMonocot	<a href="http://www.e-monocot.org">www.e-monocot.org</a>	Global online resource for monocot plants
Euro+Med Plantbase	<a href="http://www2.bgbm.org/EuroPlusMed/">http://www2.bgbm.org/EuroPlusMed/</a>	Euro-Mediterranean plant diversity
European Marine Biological Resource Centre (EMBRC)	<a href="http://www.embrc.eu">www.embrc.eu</a>	Access to marine biodiversity, its associated meta-data and extractable products
European Marine Observation and Data Network (EMODnet)	<a href="http://bio.emodnet.eu/portal/index.php">http://bio.emodnet.eu/portal/index.php</a>	Access to the marine biological data portal and metadata catalogue
Fauna Europaea	<a href="http://www.faunaeur.org/">www.faunaeur.org/</a>	All European land & freshwater animals brought together in one database
Freshwater Animal Diversity Assessment (FADA)	<a href="http://fada.biodiversity.be">http://fada.biodiversity.be</a>	FADA database is an information system dedicated to freshwater animal species diversity and distribution
Global invasive species database	<a href="http://www.issg.org/">http://www.issg.org/</a>	One Hundred of the World's Worst Invasive Alien Species
Global Lepidoptera Names Index	<a href="http://www.nhm.ac.uk/research-">http://www.nhm.ac.uk/research-</a>	Now includes all Lepidoptera superfamilies (290,099 names in total)

	<a href="#">curation/research/projects/lep/index/search/</a>	
Global plants initiative	<a href="http://gpi.myspecies.info">http://gpi.myspecies.info</a>	To support the digitisation of herbarium specimens
GrassBase - The Online World Grass Flora	<a href="http://www.kew.org/data/grasses-db.html">http://www.kew.org/data/grasses-db.html</a>	Good florastyle descriptions for all grass species
Index Fungorum	<a href="http://www.indexfungorum.org/names/names.asp">http://www.indexfungorum.org/names/names.asp</a>	473 871 records on-line
International Plant Names Index (IPNI) Database	<a href="http://www.ipni.org:80/ipni/plantnamesearchpage.do">http://www.ipni.org:80/ipni/plantnamesearchpage.do</a>	Names & bibliographical details of seed plants, ferns & lycophytes
iPlant Collaborative	<a href="http://www.iplantcollaborative.org/">http://www.iplantcollaborative.org/</a>	Community to enrich plant sciences through the dvpt of cyberinfrastructure
JSTOR Plant Science Collection	<a href="http://plants.jstor.org/">http://plants.jstor.org/</a>	1 250 000 digital objects
LIAS names and LIAS light	<a href="http://liasnames.lias.net">http://liasnames.lias.net</a>	A Database with Names of Lichens, Lichenicolous Fungi and Non-Lichenized Ascomycetes
MarBEF Data System	<a href="http://www.marbef.org/data/index.php">http://www.marbef.org/data/index.php</a>	ERMS taxonomic list of species occurring in the European marine environment
Marine Genomics	<a href="http://www.marinegenomics.org">www.marinegenomics.org</a>	Web-based interface for public transcriptomic and genomic data and analysis tools
Mycobank on-line database	<a href="http://www.mycobank.org/">http://www.mycobank.org/</a>	Total number of records: 463 700; total number of species: 160 362
Mycology Net	<a href="http://www.mycology.net">http://www.mycology.net</a>	Internet Portal for Scientists presenting Information about Diversity of Fungi
Neogene Mammal Mapping Portal (NeoMap)	<a href="http://www.ucmp.berkeley.edu/neomap/">http://www.ucmp.berkeley.edu/neomap/</a>	Distributed database system for paleomammalogy, designed to link databases by a common access portal
Palmweb	<a href="http://www.palmweb.org/">http://www.palmweb.org/</a>	Data compiled by palm diversity experts for all 2 400 palm species
Royal Botanic Gardens Kew (RBGK)	<a href="http://www.kew.org/science-research-data/databases-publications/index.htm">http://www.kew.org/science-research-data/databases-publications/index.htm</a>	Kew's collection databases, plant name resources, world checklists and other Kew publications.
Saccharomyces Genome Database (SGD)	<a href="http://www.yeastgenome.org">http://www.yeastgenome.org</a>	Budding yeast <i>Saccharomyces cerevisiae</i> with search and analysis tools
SeaLifeBase + FishBase	<a href="http://www.sealifebase.org/">http://www.sealifebase.org/</a> <a href="http://fishbase.sinica.edu.tw/search.php">http://fishbase.sinica.edu.tw/search.php</a>	114 700 Species
Species Fungorum	<a href="http://www.speciesfungorum.org">http://www.speciesfungorum.org</a>	
Try database	<a href="http://www.try-db.org/">http://www.try-db.org/</a>	Quantifying and scaling global plant trait diversity
Taxonomic Literature II	<a href="http://www.sil.si.edu/DigitalCollections/TL-2/search.cfm">http://www.sil.si.edu/DigitalCollections/TL-2/search.cfm</a>	Botanical publications and collections from IAPT
VertNet	<a href="http://www.vertnet.org">www.vertnet.org</a>	Four distributed database networks (MaNIS, HerpNet, ORNIS and FishNet) - vertebrates species
World Register of Marine Species (WoRMS)	<a href="http://www.marinespecies.org">http://www.marinespecies.org</a>	Authoritative & comprehensive list of names of marine organisms, including information on synonymy
ZooBank official registry of Zoological Nomenclature	<a href="http://zoobank.org/">http://zoobank.org/</a>	79 676 Nomenclatural Acts

## ANNEX 4: REFERENCES

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