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## **COORDINATION ACTIONS AND SUPPORT ACTIONS**

FP7-INFRASTRUCTURES-2007-3.3

**Full title: *a Pan-European Species-directories Infrastructure***

**Acronym: *PESI***

**Collective (sub)title: *EU-nomen: integrating authoritative taxonomic and nomenclature services in Europe.***

Date of preparation: 19 September 2007  
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## Summary Tables

Table 1a. Participants

No	Organisation	short name	Country	role
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2	University of Copenhagen	UKBH	DK	WP2 Leader, Zoological community coordinator, FaEu Focal Point
3	University of Trakya, Edirne	TU	TR	WP3 Leader, FaEu Focal Point
4	Natural History Museum, London	NHM	GB	WP4 Leader, FaEu Focal Point
5	Freie Universität Berlin, Botanic Garden and Botanical Museum Berlin-Dahlem	FUB- BGBM	DE	WP5 Leader, Euro+Med PlantBase coordinator, Botanical community coordinator
6	Flanders Marine Institute	VLIZ	BE	WP6 Leader, ERMS coordinator
7	Ecological Consultancy Services Limited	EcoServe	IE	ERMS Focal Point, FaEu Focal Point, Marine community coordinator
8	Society for the Management of European Biodiversity Data	SMEBD	IE	Sustainability and IPR strategy
9	Muséum National d'Histoire naturelle	MNHN	FR	FaEu Focal Point, GSD-network coordinator
10	Royal Botanic Gardens, Kew	RBG Kew (IPNI)	GB	Nomenclator
11	International Trust for Zoological Nomenclature	ITZN	GB	Nomenclator
12	CAB International	CABI	GB	GSD / Nomenclator
13	National University of Ireland, Galway	NUIG		GSD / Nomenclator
14	University of Helsinki - Finnish Museum of Natural History	FMNH	FI	E+M Focal Point

No	Organisation	short name	Country	role
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16	University of Seville	US Sevilla	ES	E+M Focal Point
17	Institute of Botany, Slovak Academy of Sciences	IBSAS	SK	E+M Focal Point
18	National and Kapodistrian University of Athens	NKMA	GR	FaEu Focal Point
19	National Museum of Natural History Naturalis	NNM	NL	FaEu Focal Point
20	Institute of Ecology of Vilnius University	IEVU	LT	FaEu Focal Point
21	Scientific Committee for the Italian Fauna	CSFI	IT	FaEu Focal Point
22	Swedish Museum of Natural History	NRM	SE	FaEu Focal Point
23	Comenius University in Bratislava	CUB	SK	FaEu Focal Point
24	The Museum of Natural history and Archaeology, Norwegian University of Science and Technology	NTNU	NO	FaEu Focal Point
25	State Museum of Natural History National Academy of Sciences of Ukraine	SMNH	UA	FaEu Focal Point
26	Museum and Institute of Zoology Polish Academy of Sciences	PAS- MIZPAN	PL	FaEu Focal Point
27	Swiss Systematics Society	SSS	CH	FaEu Focal Point
28	Biology Centre of the Upper Austrian State Museum	OOE.BZ	AU	FaEu Focal Point
29	Iliia Chavchavadze State University	ILAUNI	GE	FaEu Focal Point
30	Consejo Superior de Investigaciones Científicas	CSIC	ES	FaEu Focal Point
31	Slovenian National Institute of Biology	NIB	SL	FaEu Focal Point
32	National Museum of Natural History – Sofia	NMNHS	BG	FaEu Focal Point
33	myNature Association	MyNA	RO	FaEu Focal Point
34	University of Latvia	LU	LV	FaEu Focal Point
35	Hellenic Centre for Marine Research,	HCMR	GR	EMRS Focal Point
36	Israel Oceanographic and Limnological Research	IOLR	IL	EMRS Focal Point
37	Institute of Oceanology Polish Academy of Sciences	IOPAS	PL	EMRS Focal Point

## Proposal abstract

Because the correct use of names is essential for biodiversity management, the availability of taxonomically validated standardised nomenclatures (name databases) is fundamental for data infrastructures. A range of initiatives has been taken within the European Research Area (ERA) to develop information systems assembling and integrating biological species information for various purposes. Among these is *SpeciesBase*, attempting to provide accumulated species data sets in one web interface, as the European contribution to the *Global Species Information Systems* (GSIS). The *Life Watch* initiative will monitor Europe's biodiversity by bringing together observational and collection data in a single research system. *Species2000* prepares comprehensive catalogues of species names by incorporating the results of an array of autonomous federated taxonomic databases. A prerequisite of these initiatives is the support of scientists and infrastructures that provide standardised and authoritative taxonomic information. PESI will coordinate the delivery of this information through the inter-operation of the existing data infrastructures and networks of experts.

PESI is the next step in integrating and securing taxonomically authoritative species name registers that underpin the management of biodiversity in Europe. PESI will integrate the three main all-taxon registers in Europe, namely the *European Register of Marine Species*, *Fauna Europaea*, and *Euro+Med PlantBase* in coordination with EU based nomenclators and the network of EU based *Global Species Databases*. It is a standards based, quality controlled, expert validated, open-access infrastructure for research, education, and data and resource management. The activities of PESI are organised in five themes:

*International cooperation:* A crucial part of this project will be the involvement of the expert community to work collaboratively on the PESI tasks following common work formats accepted for the integrated European taxonomic workforce in the *European Network of Excellence on Taxonomy* (EDIT). The development of national and regional focal point networks assures the efficient access to local expertise. PESI also makes a start with the geographic expansion of the European networks to eventually cover the entire Palaearctic biogeographic region. As an important first step, the cooperation is intensified with partners from Turkey, Georgia, Ukraine and Russia.

*Pooling resources:* PESI integrates four major European taxonomic networks and their respective knowledge infrastructures, namely those of marine life, terrestrial plants, fungi and animals. The intensified cooperation within and among taxonomic expert networks results in an upgrade of the content and functionalities of important existing taxonomic information systems.

*Standardisation:* PESI will develop highly scrutinised taxonomic metadata standards by working along several lines, including a) methodological upgrading of the established pan-European checklists, b) the validation of the taxonomic data according to appropriate criteria, c) cross-reviewing against additional global and local resources and d) ensuring the commitment of international taxonomic societies to take responsibility for pertinent data files. Incorporation of European taxonomic metadata standards in the global and

European taxonomic e-infrastructures will follow the running initiatives for the creation of a *Global Names Architecture* for the efficient and unambiguous cross-referencing of taxon names, the progress on a joint *Internet Platform for Cybertaxonomy* within EDIT and the set up of a virtual workbench for web-based taxonomy. PESI will look after the participation of nomenclators, which are recognised as cornerstones of these developments.

*Sustainability:* The long-term maintenance of the taxonomic knowledge infrastructures is a major concern. The *Society for the Management of European Biodiversity Data* (SMEBD) was established to develop sustainable approaches to the databases themselves, the expert networks and the intellectual property rights of electronic taxonomic resources. The PESI initiative provides the necessary impetus and resources to realise these tasks.

*Accessibility:* The content of the major European taxonomic infrastructures will become accessible through a joint public web portal. Access to taxonomic information is further improved by including popular names of animals and plants and by adding sophisticated end-user services.

It is intended that PESI forms a component of a broader initiative to be known as ‘*EU-nomen*’ that will service the long-term needs of the biodiversity community in Europe on taxonomic data standards and by ensuring an integrated access to European and Palaeartic authoritative taxonomic digital resources, starting with the three main pan-European all-taxon registers.

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# 1 Scientific and/or technical quality

## 1.1 Concept and objectives

### PESI rationale

The urgency of global problems related to conservation and sustainable use of biological resources is generally acknowledged. The 'Convention on Biological Diversity'<sup>1</sup>, signed by 150 government leaders at the 1992 Rio Earth Summit, counts as a starting point to enhance international cooperation to preserve the Earth's diversity of biological resources. One obstacle to the implementation of the Convention and other regulations<sup>2</sup> concerning the development of environmental management systems is poor access to reliable information on biodiversity indicators. Part of this problem lays in the lack of standardisation in taxonomic reference systems. For instance, regulations concerning trade in wild plants and animals cannot be adequately enforced when the same species is known under different taxon names in different countries, or when the same name refers to a number of different species. Other parts of the problem concern the quality and completeness of taxonomic data sets, and the absence of an integrated access to taxonomic information.

Authoritative registers of species names are essential for quality control in species information systems, including those dealing with species of commercial, conservation and pest importance. Such registers are an essential requirement, if not a prerequisite, for taxonomy to be available on the internet. They also improve scientific practice by increasing awareness of changes in nomenclature, provide standards for interoperability of biodiversity data, and allow taxonomists to focus on describing new species instead of overlooking recently described species and correcting past nomenclatural confusion. Their production has added benefits in fostering collaboration between experts at a European and global scale. Easy access to species name registers allows ecologists and local experts to correct their use of taxonomic names, and encourages submissions of overlooked species to the list. In turn, this stimulates biogeographic and evolutionary research.

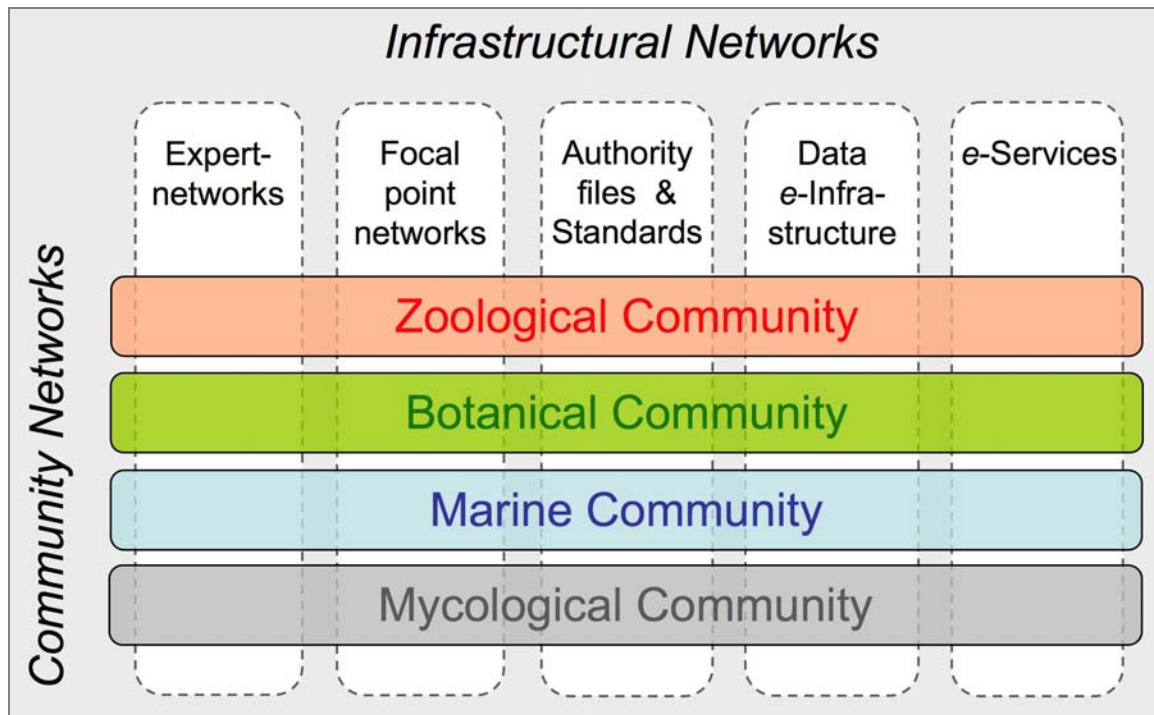
Europe leads the world in the production of taxonomically authoritative species name registers. The *European Register of Marine Species* (ERMS), *Fauna Europaea*, and *Euro+Med PlantBase* provide the largest and most comprehensive regional species inventory in the world with over 200,000 species. They were funded by the EU Fourth and Fifth Framework programs. More Global Species name Databases (GSDs) are based in Europe than anywhere else (see Fig. 9). In addition, building on the success of ERMS,

<sup>1</sup> <http://www.cbd.int/convention/>

<sup>2</sup> For instance: - **Sixth Environmental Action Programme** (European Commission, 2001)  
 - **EU Strategy for Sustainable Development** (for the Gothenburg Council, 2002)  
 - **The Community Biodiversity Strategy** (EU Commission 1998)  
 - **The 'Habitats' Directive** (Directive 92/43/EEC)  
 - **The 'Birds' Directive** (Directive 79/409/EEC)

a series of global databases of marine species are being compiled as a *World Register of Marine Species* (WORMS)<sup>3</sup>. Important species information systems that rely on the availability of these registers include *FishBase*, and the projected *Encyclopaedia of Life* (EoL) and *SpeciesBase*.

The establishment of Networks of Excellence (NoE's) on marine biodiversity (MarBEF) and taxonomy (EDIT) has brought leading institutes together to advance the integration of the European taxonomic effort within the *European Research Area* (ERA) and to build a world leading taxonomic capacity. PESI is a joint initiative of EDIT and MarBEF partners to establish an integrated taxonomic infrastructure. This will strengthen the scientific, social, political, technological and information capacities in Europe, needed for a proper biodiversity assessment. Effectuation of the PESI program, however, needs external funding.



**Fig. 1** Four community networks (horizontal) will be integrated in five categories of coordinational effort (vertical) in PESI. Community networks represent the FP4 and FP5 key programs on European taxonomic indexing: Fauna Europaea, ERMS, E+M PlantBase.

PESI enhances the quality and reliability of European biodiversity information by integrating the infrastructural components of four major community networks on taxonomic indexing into a joint work programme. This will result in functional networks of taxonomic experts and national focal points, which will collaborate on the establishment of standardised and authoritative taxonomic metadata. In addition PESI coordinates the integration of the European taxonomic information systems into a joint e-

<sup>3</sup> <http://www.marinespecies.org>

infrastructure and the set up of a common user-interface disseminating the pan-European checklists and associated user-services results.

### **PESI background**

At present European taxonomic research is in a world leading scientific position by having created a European (virtual) centre of excellence for biodiversity assessment. In March 2006 the *European Network of Excellence on Taxonomy* 'EDIT' was launched to promote the integration of taxonomic research, to strengthen the technological and information capacities, and to support the attainment and dissemination of taxonomic excellence.

It is a task of EDIT to respond to FP7 Calls and launch initiatives like PESI that will integrate the European taxonomic expert and expertise networks, and closely arrange the large taxonomic databases into a single distributed facility. This integration step improves the information services to the end-user community. In addition it facilitates spreading the collated taxonomic information through the global e-gateway in an efficient way. These information services, implemented in a 'cybertaxonomy' environment, will support e-taxonomy and e-science tools, GRID application and GSISs initiatives. PESI contributes to these objectives by involving EDIT's integrated *European taxonomic workforce* in the projected activities, by organising national or regional focal point networks and by developing the relevant information e-infrastructure to capture and disseminate taxonomic data.

Important groundwork on pan-European taxonomic indexing has been done within the EU fourth and fifth framework projects *Fauna Europaea*, *ERMS*, and *Euro+Med PlantBase*. These taxonomic checklists represent the state-of-the-art on European taxonomic indexing for most groups of organisms. PESI will secure the long-term maintenance of their data management systems and allied expert networks, so that the taxonomic information remains up-to-date and the associated European expert communities continue their activities.

A valuable infrastructural constituent of the next phase of the pan-European species registers to be further organised by PESI will be the arrangement of national and regional focal points into networks. These focal point networks will provide efficient access to local expertise and repositories content, compare the pan-European checklists against local resources and expertise to reach pan-European consensus, and support the policy input at the national and European level. The focal point networks will proceed from already initiated networks, like the *Fauna Europaea* national focal point network, the *Euro+Med PlantBase* regional focal points, and the recently initiated *Marine Biodiversity and Ecosystem Functioning network* (MarBEF) for the *European Register of Marine Species* (ERMS).

Within Europe a variety of taxonomic databases exist driven by one or more specialists working on a certain sector of the taxonomic classification. Because their geographic coverage is usually worldwide, these taxon databases are called *Global Species Databases* (GSDs). The EU fifth framework project 'EuroCat' (Species2000 Europa) initiated a distributed system of 23 European GSDs as a contribution to the *Catalogue of Life* (CoL). GSDs are important taxonomic knowledge systems to be taken

into consideration when attempting to reach completeness and agreement on taxonomic metadata. PESI supports the maintenance of the database systems of European GSDs. The GSDs will also be involved in the procedures for validation and quality control. Some GSDs, like *Index Fungorum* and *AlgaeBase*, play a role as 'nomenclator' (see below) as well.

There is a growing consensus among taxonomists that nomenclatural authority files, establishing and maintaining nomenclatural integrity, could serve as a single, objective reference point across federated information systems in a very efficient way. Specialised databases, called *Nomenclators*, regulate the submission of so-called nomenclatural acts. A nomenclatural act is a publication that affects the status of a previously published work, a scientific name, or the fixation of a name-bearing type, e.g. a type specimen. Because of their central role, Nomenclators are considered not only to play a constructive role in the future web-based taxonomy, but also to function as an objective cross-reference layer in the 'Global Names Architecture' developed by the GBIF, TDWG, GSIS initiatives (like the *Encyclopaedia of Life* (EoL) and *SpeciesBase*), and in library systems (see Fig. 10). It will be a challenge for the systematic community to have nomenclator services installed as mandatory registration systems of nomenclatural acts, including complete, authoritative records of all scientific names. This system will prepare Europe for emerging virtual workbench developments, notably web-based taxonomy. PESI will contribute to this ambition by enhancing the functionality of the respective nomenclators, supporting their integration within the 'Global Names Architecture', as well as supporting the standardisation and harmonisation of European taxonomic meta-data.

### **Flora-Fauna Palaearctica**

The Palaearctic is the largest biogeographic area of the world, containing a very rich flora and fauna within a vastly diverse environment of unique habitats. During the past two centuries the Zoological and Botanical Institutes in Russia and other members of the former Soviet Union and allied states accumulated extensive knowledge and huge collections of the fauna and flora of especially the (mid-) eastern and mid-southern (Caucasus) parts of the Palaearctic and adjacent seas. Integration of these data into existing global or European biodiversity data basing initiatives was hindered by incongruent taxonomic paradigms and the lack of suitable shared infrastructures. However, integration of the available taxonomic resources into a uniform system and the associated experts into a corresponding network will be necessary for comprehensive future biodiversity assessments. Within this context PESI will:

- Set up a network of specialists from relevant countries (Russia, Ukraine, Georgia) to extend the current European group of experts. This network will enable data collation and validation of (mid- and south-) eastern Palaearctic taxa and foster the social framework of European taxonomists. This will also intensify the international cooperation among the institutes involved.
- Improve, integrate and validate existing species databases in order to expand the current pan-European checklists with a (mid- and south-) eastern Palaearctic component, adding – as a pilot – around 20.000 accepted animal species names; establishing a so called 'Fauna Palaearctica' species index. Validation procedures of cross reviewing against the present species registers will support the process of

consensus amongst Palaearctic taxonomists.

- Support the further exploration, digitisation and on-line access of (mid- and south-) eastern Palaearctic data resources for the benefit of the global community by preparing additional fundraising for this purpose.

### **Coordination and integration of European expert networks (WP2)**

The strengthening and integration of European taxonomic communities has been progressing since the start of the mentioned taxonomic indexing EU framework programs *Fauna Europaea*, ERMS, and *Euro+Med PlantBase*. These initiatives built up expert networks to fulfil the project objectives, which significantly contributed to the de-fragmentation of the European taxonomic expertise. In addition *Fauna Europaea* and ERMS organised their expert resources in the *Society for the Management of European Biodiversity Data* (SMEBD)<sup>4</sup>. SMEBD was established to ensure the long-term ownership and management of the intellectual property rights (IPR) of the contributors of these databases. PESI will review and develop long-term strategies and plans for the sustainability of the involved systems in terms of ownership, IPR, and support of individual experts and institutions.

ERMS is currently also involved within the European Network of Excellence on marine biology 'MarBEF'. In parallel to these efforts, the EuroCat project organised a good number of European taxonomic teams producing GSDs into a network supporting the Catalogue of Life (CoL) ambitions. The European Network of Excellence on Taxonomy 'EDIT' contributes to a further integration of the European expert and expertise basis by supporting the preparation of relevant work programs and by searching for additional funding to start new initiatives. PESI is one of these initiatives. Some groups of organisms are still incompletely covered in Europe. These include freshwater and terrestrial algae, diatoms, charophytes, cyanobacteria, mosses, fungi, lichens and protists. In cooperation with the world experts in these taxa PESI will study how these gaps in the species directories can be filled.

Perhaps the most significant addition to the species registers from PESI will be the expansion of the network of expertise in eastern Europe. This is overdue considering the expansion of the EU, although *Fauna Europaea* did expand to include the Accession States. In addition to providing more comprehensive data for the pan-European species registers, this expansion will reverse the separation of knowledge and practice in taxonomy for many decades. Another addition could be a closer involvement of the taxonomic societies, especially on adopting relevant taxonomic sectors for long-term maintenance and upgrading.

A positive outcome of PESI will thus be the generation of taxonomic issues that may require further research to resolve.

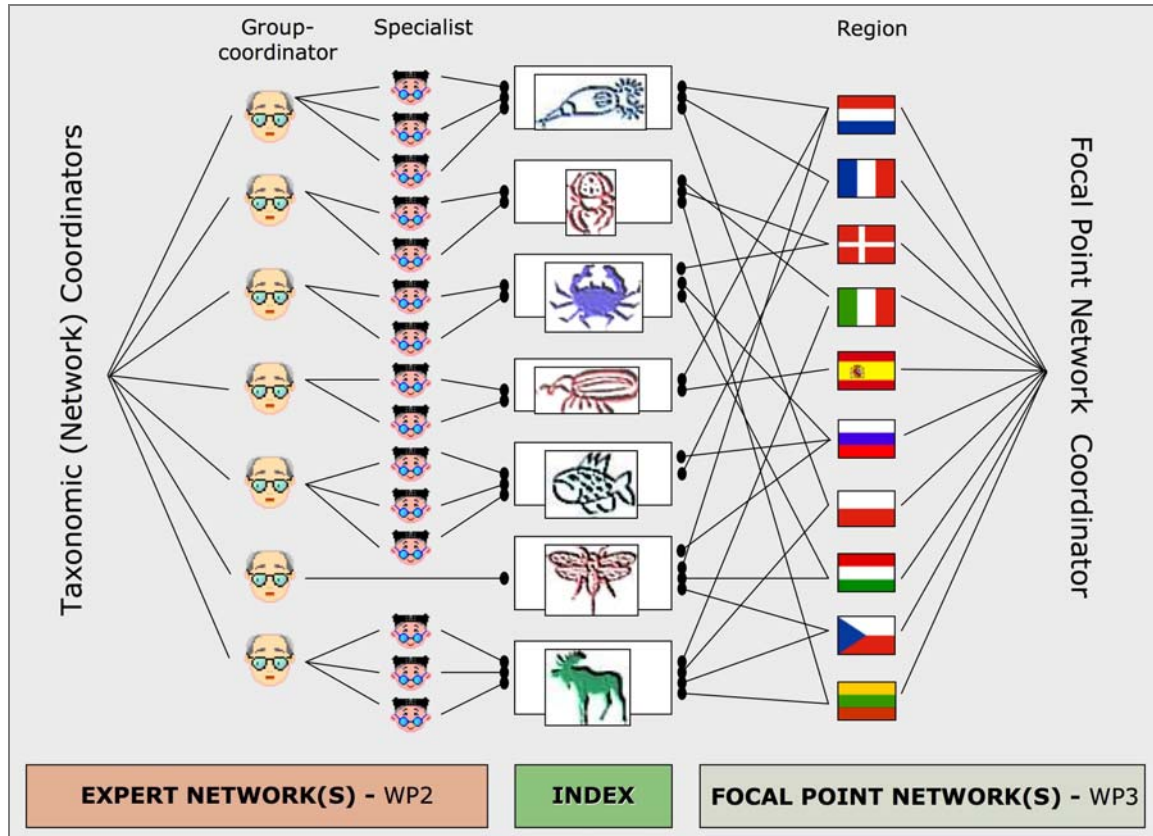
### **Coordination and integration of European Regional Focal Point networks (WP3)**

Regional (often national) focal points become increasingly important for the integrated

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<sup>4</sup> <http://www.smebd.eu>

and synergistic promotion of taxonomic expertise and data standards throughout Europe. In the case of Fauna Europaea, the NAS-extension programme dealing with the inclusion of EU new accession states designated a coordinating institute in each European country. This coordinating institution acted, and in most cases still acts, as a so-called Fauna Europaea Focal Point.



**Fig. 2 Representation of expertise organised in expert networks (left) and focal point networks (right) within Fauna Europaea showing a different, but complementary organisation of taxonomic expertise.**

With their geographical, national and regional focus, focal points differ from traditional expert networks that are organised around a taxonomic group of organisms (see Fig. 2). The Focal Points contribute to the organisation and management of European biodiversity information in a different, complementary way. Their activities include (1) the liaison with national governmental bodies on the implementation of European standards relevant to, for instance, national and European regulations and environmental monitoring, (2) the collection and transfer of local expertise and applied tools, (3) lobbying and public policy input at the national and European level, and (4) support for closer collaboration of scientific contributor and user communities across Europe. Focal points contribute country-specific information about species, relevant databases, local literature, experts, professional societies and major users such as government organisations.

PESI investigates models to establish a more formal, integrated structure of pan-European Regional Focal Points to enable joint activities. Following the recent EDIT

focal point meeting at Smolenice, PESI will give new energy to focal point activities, and search for mechanisms to secure resource commitments from national governments. The new Focal Points Networks will proceed from groundwork carried out in the pan-European checklist programmes. PESI provides a forum to discuss the involvement of focal points into the European taxonomic scientific and information infrastructure, and to coordinate their integrative role in the assignment and confirmation of taxonomic knowledge. These tasks include the coordination of the provision of additional expertise to the pan-European checklists and the arrangement of local commitment to focal point tasks.

In WP3 a reservation is made for seed money for Focal Point participants that will be used to involve them in coordination activities and the establishment of the network organisation. Such activities, e.g. workshops on data management or cooperation with national policy makers, will lead to the spread of best practices. Also, a Focal Point Handbook will be compiled documenting the methods and experiences of existing Focal Point organisations. The Handbook will facilitate the creation of new focal points, notably in the eastern Palaearctic, as well as assist the organisations and persons that in some cases take over the tasks of an existing focal point.

Because PESI builds on existing networks representing marine, zoological and botanical expert communities with different levels of geographic organisation (regional or national), parallel focal point networks for each of these communities are foreseen for the near future. However, the development of the work plan and performance of non community-specific tasks will be harmonised as necessary. The involvement of national focal points as providers of biodiversity data is already intended in several upcoming FP7 initiatives like Life Watch. Therefore by organising the focal points networks PESI would contribute substantially to the development of the European Research Area.

#### **Coordination of taxonomic metadata standard assessment (WP4)**

In the context of electronic information systems, *metadata* provide information that describe primary data and are used to facilitate the understanding, use and management of the data content. Metadata can be used to help bridge the so-called semantic gap, by telling a computer how data content items are related to each other and how these relations can be handled automatically. Therefore metadata are essential to assure information integrity within and between information systems.

Data *standards* in this respect are agreements between ICT-developers about the kind of metadata to be used within parallel information systems, so as to allow for interoperability and data aggregation. When data standards are developed by competent bodies taking into account views of stakeholders they are considered *authoritative*. If a community formally adopts a data standard, it is called *certified*.

In the field of biology taxon names provide the anchor to which information about organisms can be linked. A taxonomic name, typically a species name, is attached to every primary data object (field observation, specimen, genetic data, etc.) in any database that contains data about more than one organism. The formation and structure of taxonomic names are governed by strict rules, embodied in Codes of Nomenclature adopted by the Botanical, Zoological and Bacterial Communities. The relationship

between species and their grouping into a hierarchical classification scheme is the concern of the discipline of taxonomy. Therefore taxonomic classifications are understood as crucial metadata for biological information systems.

In actual use there are many challenges to integrating data sources that contain taxonomic names and classifications. Names may be badly formed or incomplete and so fail against searches based upon character matching. Names that are synonyms or no longer in current use may occur in museum and herbarium specimen catalogues or in legislative lists. There may also be disagreement amongst experts on the identity of specimens and on the taxonomic constituents of genera and the arrangement of classifications. The partners involved in PESI have long experience of such problems and it is the purpose of PESI to produce practical solutions to many of these issues.

The image shows a screenshot of the MyNature Romanian species portal for *Misumena vatia*. On the left, a dashed box labeled "Authoritative catalogues" contains logos for FAUNA EUROPAEA, ROYAL BOTANIC GARDEN EDINBURGH, and Catalogue of Life. A blue arrow points from this box to the main content area. The main content area is titled "Spread of taxonomic „excellence“ through wrapper functioning". It displays taxonomic details for *Misumena vatia* [valid *Misumena vatia*], including its classification (Thomisidae), distribution (15 inregistrari/records), and a list of references. A map at the bottom shows the distribution of the species in Romania. On the right, there are several small images of the spider.

Fig. 3 Example of the spread of taxonomic "excellence": the use of authoritative European and global checklists through wrapper function within the Romanian species portal of *MyNature*.

It is particularly important that authoritative taxonomic metadata standards are available for organisms that are directly important to society, either because they play a role in human or animal health or food production, or because they are subject to conservation and environmental control. PESI will promote harmonisation and certification of taxonomic metadata standards of prioritised taxa by establishing an advisory group of key-users and information system custodians. The scope of PESI will extend to

organisms that are listed in various EU regulations and legislative lists.

Accepted data standards need to be scrutinised for completeness, technical and logical correctness, consistency, and acceptance by an expert community. PESI will establish procedures for validation and quality control, checking the respective infrastructural taxonomic resources on their merits and cross-indexing.

PESI enriches the taxonomic information systems with vernacular (common) names. The absence of vernacular names indices of all European languages is currently hindering the general application of biodiversity information by non-expert users. With the cooperation of the national focal points, PESI implements multi-lingual thesauri of European vernacular names of organisms and surveys the application of informal group-names. This will greatly facilitate the access of the European citizens to biodiversity data.

### **Coordination and integration of information e-infrastructures (WP5)**

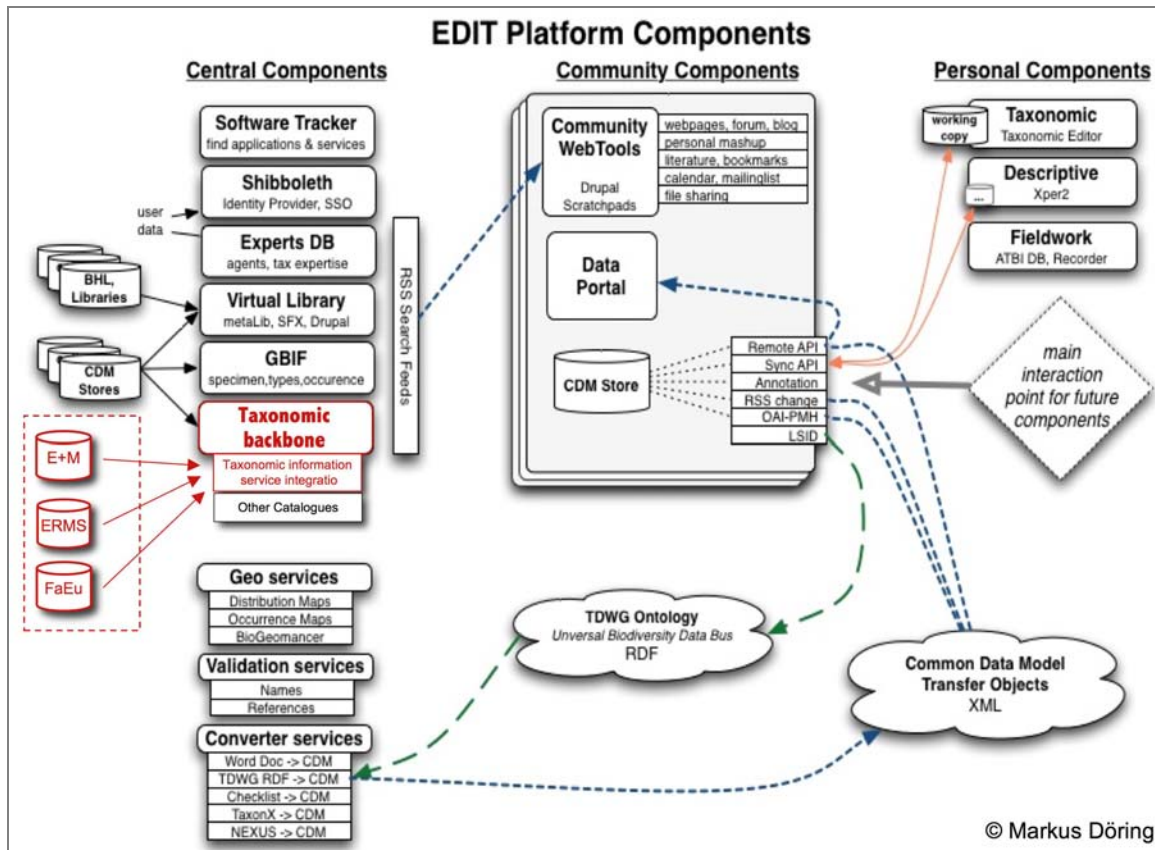
PESI integrates the pan-European species registers into an inter-operable *e*-infrastructure. PESI will establish mirror sites for ERMS, Fauna Europaea, and Euro+Med Plant Base, and thus elevate their services and content to a new level.

WP4 harmonises the taxonomic information concepts, and WP5 will then integrate the data proceeding from the EDIT 'Internet Platform for Cybertaxonomy' efforts (see Fig.4). WP5 will inter-operate these three databases into a joint information system that will be freely disseminated online through the e-services of WP6.

PESI will support the efforts of the respective taxonomic communities on upgrading the data content by maintaining and improving the available data access and data management tools to accommodate new functionalities and data types.

PESI will not only advance a closer integration of the pan-European checklists, but also brings the checklist digital infrastructure to the state-of-the-art level by implementing recent developments on biodiversity system integration, like the application of Life Science Identifiers (LSIDs), which supports the optimal dissemination of the results into the common globally developed e-gateways of GBIF, SpeciesBase, LifeWatch, EoL and the Catalogue of Life.

WP5 will also determine the financial and any other resources necessary to maintain the pan-European registers and GSD. This information will contribute to the sustainability strategy and business plan tasked in WP1.



**Fig. 4** Overview of the EDIT 'Internet Platform for Cybertaxonomy' components showing a joint access layer for the pan-European checklist databases (red box at the left-middle) as part of the Taxonomic backbone Central Component.

### e-Services for users and dissemination (WP6)

To develop species names services for the user community and to carry out the dissemination tasks, we will build an interactive, multilingual web portal. This will not be limited to a common portal where one can enter a scientific species name. It will also allow users to search by common names at species and higher taxonomic levels (e.g. blue-fin tuna, fish), browse down user-friendly as well as phylogenetic hierarchies, and support innovative tools that help users in their research, teaching, and management of environmental information. The standards and data schema, and protocols, necessary for these tools will be developed in WP4. Then, in WP6 free online tools will allow users to upload a species list and associated information to PESI and receive back a file certifying names that are correct, suggesting alternatives to (misspelt) names, classifying the names taxonomically, stating which are of conservation (e.g. in EU Habitats and Birds Directives) or economic (e.g. invasive pest, parasite, commercial fish species) importance, and stating what countries they have been recorded in.

PESI already knows who some of its users will be from the experience of previous projects. For example, copies of ERMS and Fauna Europaea have been licensed out at no charge for the use of individual researchers and the following organisations: the *European Environment Agency* (EEA), *International Council for the Exploration of the Sea* (ICES), *Rijkswaterstaat* (Netherlands), *Nature Protection Directorate* (Italy), *L'Inventaire national du Patrimoine naturel* (France), *IFREMER*, *Federal Environmental Agency* (Germany), *Akvaplan-NIVA* (Norway), *National Cancer Institute*, *Hellenic Centre for Marine Research* (Greece), *Stazione Zoologica Napoli* (Italy), *Joint Nature Conservation Committee* (UK) and so on. Organisations and researchers will benefit from access to the pan-European checklists databases and PESI will provide the species name standards for *Lifewatch* and other FP7 programs and as such be a leading contributor to the *European Research Area* in the area of biodiversity. However, rather than downloading the entirety of each database, PESI will develop web-services whereby registered users can automatically update their local name registers. In these ways, PESI will disseminate the wealth of authoritative knowledge on species names to more users in more useful ways than presently possible. We will also explore the potential of GRID applications for PESI and related biodiversity infrastructures. The WP6 leader institute is part of GRID.

PESI will also include other dissemination measures; including newsletters, a promotional video-clip, press releases, publications, and European contributions to a world conference on progress in online taxonomy and biodiversity informatics (a joint effort with EoL scheduled for 2009). Building the user community in coordination with the scientific experts, organisations, and informatics, is critical to the development of an online biodiversity informatics culture in Europe, and consequent financial support from institutions, countries and Europe.

Technology does not work in isolation, and requires parallel development in contributor and user practices. PESI will start and end with exploring user needs. This is not a simple task because users are often not good at explaining what they want, and appreciating how new tools can make their work easier or faster. An end-users forum and a user feedback system will allow the user to comment and provide feedback on the system performance, and will also allow other experts to communicate on the quality of the taxonomic data.

It is challenging to keep up to date on the latest publications in species taxonomy and distribution, and keep lists of experts current. At present, this is done through personal contacts, and editors following the literature. PESI will contact publishers to develop tools that will automatically notify taxon editors and data managers of who has published on certain taxa in Europe. This may adapt the latest notification services used by scientific journals, including RSS feeds. In addition, PESI will discuss with publishers the potential of developing online tools to provide quality control services for journals, such as checking the validity and spelling of species names. These tools could also facilitate authors publishing their raw data through systems such as GBIF and/or OBIS when they publish their analyses in the print media.

The past three decades have witnessed a decline in the opportunity to publish new records for the distribution of species. This is especially the case where the novelty is limited to new national or regional locations for species, or where the data only confirms the continued presence of a species. However, this data has increasing value over time,

and biodiversity informatics enables international collaboration and data management to be fast at low cost. Such location data could be published electronically such that it can be integrated with other data through GBIF. However, at present this approach lacks the prestige associated with the peer-review and quality control systems in scientific journals. In PESI, we will develop mechanisms with scientific journals for them to publish such data as electronic appendices in standard formats that will enable automatic publication and integration of the data in GBIF, OBIS, *Atlas Florae Europaeae* and similar systems. This will increase visibility for the journals and their authors, and thus their citation rates. More importantly it will help change science culture to embrace the role of online data publication. In this way, scientists will be motivated to contribute content to online databases.

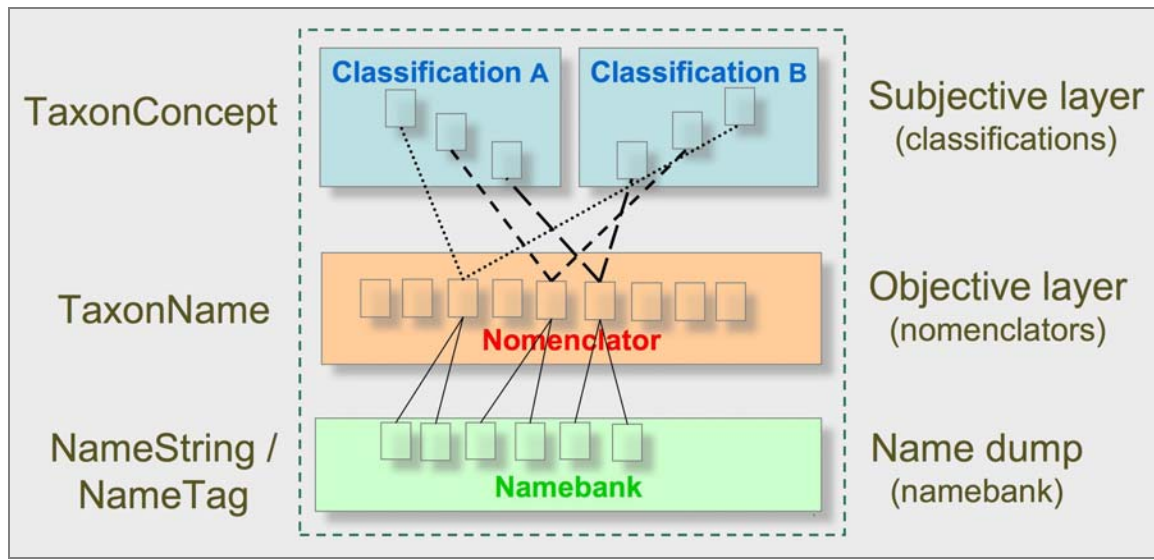
The website will also support WP1 (management) as it will be the *e*-platform of the project, providing an introduction to the aims and details of the work plan, a calendar for meetings, regular news headlines on progress, a section to download documents and a portal with information and contact details of the partners and members of the network, including details on taxonomic expertise.

## ***1.2 Contribution to the coordination of high quality research***

### *Towards a Global Names Architecture*

Names are the keyword that information in biology is linked to and which people use when searching for information related to organisms. However, for several reasons, species names are not stable. For instance in response to new insights, species concepts change through time, so several names may apply to one species, or one name to several species. Therefore a fundamental problem in biodiversity informatics is that up to now no reliable mechanisms exist to prevent wrong or ambiguous returns (of data objects) when searching databases for names. This situation persists despite the existence of some major species indexing projects and despite the consensus on many aspects of nomenclature.

Solving this problem is urgent and requires a transformation of the technical and social structures in which taxonomic knowledge is currently organised. In February 2007, a summit meeting, called Nomina 1, was held in Crete to discuss solutions for a 'Global Names Architecture'. During this meeting, sponsored by GBIF, TDWG and EoL Informatics, a consensus arose on the need for an intermediate objective layer of nomenclators serving as unique and persistent identifiers for cross-referencing among alternative names and taxonomic classifications (Fig. 5). A networking interface would allow for the mapping of names within all sorts of taxonomic relationships and interpretations. Participants of the Nomina 1 summit also agreed that the availability and application of authoritative taxonomic classifications would additionally significantly reduce disorder in taxonomic cross-referencing.



**Fig. 5 Draft structure of an agreed 3 layers cross-reference system to provide the relevant 'Taxonomic Intelligence' for a Global Names Architecture.**

PESI supports international efforts on the development of a 'Global Names Architecture' by building a common intelligent name-matching device in consultation with the principal initiatives (GBIF, TDWG, EoL, SpeciesBase). PESI contributes to the development of a unified cross-reference system and provides high quality taxonomic standards. PESI will further involve the Europe-based nomenclatural services and link the planned joint European taxonomic e-infrastructure middle-layer to the global e-gateway.

Against this background, PESI contributes to the coordination of research in the Life Environmental Sciences in the following ways:

#### *Reliable taxonomic databases*

High quality biological research and international policy assessments requires (meta-) data that are both reliable and as complete as possible. PESI help to fulfil this requirement by providing tools for the upgrading and validating of relevant taxonomic key-resources in a methodical manner, by connecting taxonomic databases of various kinds (national, taxon-oriented, terrestrial, marine, etc.), and by integrating expertise networks. Generally, information on distribution and biology of living species can only be reasonably complete if research efforts are coordinated on an international scale, ideally encompassing the species' entire distribution area. Many species that occur naturally outside Europe are economically important within the EU, including food, invasive pests, garden and aquarium trades, and health and therapeutic products.

#### *Standardisation of taxonomic reference*

PESI provides mechanisms to cross-link taxonomic databases, including the pan-European checklists Fauna Europaea, ERMS and Euro+Med PlantBase. Due to this system, information on the same species can be integrated even if it resides under

different taxon names in different sources. This is a prerequisite for e-science applications in the realm of biodiversity investigations, such as projected in, among others, the Life Watch initiative, and will further bridge the gap to the use of taxonomic data in the applied fields of nature conservation, fisheries, agriculture, medicine (e.g. parasites, pathogen vectors) and biotechnology.

*Coordination among research infrastructures*

PESI is a timely initiative to coordinate the efforts of the existing taxonomic infrastructures for plant life, terrestrial fauna, marine life and mycology. While these disciplines have long had their own traditions, they can profit from each other's experience in the field of data exchange and interoperability in state-of-the-art electronic environments. PESI is a framework in which experts from these disciplines can develop and implement best practices in close collaboration with associated information specialists.

*Coordination of the taxonomic work force*

PESI maintains the expert networks established during previous actions under FP5, FP6 and FP7, notably Fauna Europaea, ERMS, Euro+Med PlantBase, MarBEF, EDIT, SMEBD, and Species2000 Europe. Moreover, these networks are expanded to include (more) taxonomists from the eastern Palaearctic region, i.e. Turkey, Russia, Ukraine and Georgia.

### ***1.3 Quality and effectiveness of the Coordination and Work Plan***

#### **Overall strategy on Coordinating activities and Network integration**

The principal approach of PESI is to establish a network of networks by integrating the relevant taxonomic community networks into a common research infrastructure (Fig. 1). These networking activities aim at providing authoritative European taxonomic metadata for common use and general application. The networking approach will commence from the legacy of earlier taxonomic indexing EU framework programs (Fauna Europaea, ERMS, and Euro+Med PlantBase) and the GSD-network of Species2000 Europe. Integrative Coordination activities will include:

- The formation of *European taxonomic taskforces* to upgrade the pan-European checklists (WP2).
- The setup of *European National Focal Point networks* to improve the access to local expertise. The networks are furthermore expanded by the addition of new partners from Ukraine, Russia and Georgia (WP3).
- Joint effort to establish authoritative taxonomic standards based on multiple sources. This will improve the quality of the pan-European checklists, GSDs and nomenclators data content (WP4).

For the management of the above-mentioned community building activities, the following automated tools will be built upon:

- An on-line information system, which is being prepared in EDIT to present the European taxonomic expertise (WP2).
- An on-line information system developed within the framework of Fauna Europaea to present the National Focal Points (WP3).

The subsequent European coordination projects in the field of taxonomy have so far been very fruitful, but they are also characterised by a limited time span. In this light, the long-term preservation and maintenance of results is a major concern. The *Society for the Management of European Biodiversity Data* (SMEBD) was established specifically for the long-term management of European taxonomic expertise networks and the continuity of European taxonomic biodiversity data resources. SMEBD provides the secretarial means for this purpose, and develops models to assure the copyright of electronic biodiversity data, and the proper acknowledgement of the contributing scientists (WP2). It further authorises which organisation may host the primary copy of a database and finds hosts for orphaned databases.

PESI will resolve issues such as data ownership, intellectual property rights, and hosting of the database(s) through a consultative process with the institutions and individual scientists contributing to the species registers. One approach would be to expand the Intellectual Property model used for ERMS and Fauna Europaea whereby they are legally owned by the Society for the Management of European Biodiversity Data (SMEBD). All contributors to ERMS and Fauna Europaea are SMEBD life-members and elect a Council that selects editors and authorises an institute to host the top-copy of each



results through WP6 will support external networking activities. It will reduce redundancy in external information services and strengthen the personal relationships in the area of biodiversity research in a fundamental way.

Gantt chart of activities

WPs		Months					
		1-6	7-12	13-18	19-24	25-30	31-36
1	Management	Project management (including reports & meetings)					
		Liaison Board installed					Business Plan
2	European taxonomic workforce	Network building	Workplan established	Taxonomic workforce in operation			
		Standards and formats					
		Taxonomic network evaluation (gaps, etc.)					Policy Plan on gaps
					e-Data IPR Plan		e-Data managem. model
		Enlarge geographic scope					
3	European Regional Focal Point networks	Network building	Workplan established	Focal Point Network in operation and seed-money allocation			
			Focal Points Handbook				
		Add extra-European Palaeartic expert(ise) networks					
4	Taxonomic Standards and Authority Files	Define applicable standards	Report on standards	Application & promotion of standards			
			Consensus distribution & occurrence scheme				
				Consensus classification			
				Trial of applying GUIDs to taxonomic names			
							Report on impact of standards
5	European Taxonomic information e-infrastructure (data system integration)	Data management tools in operation					
		Criteria & routines for quality control					
			Database mirrors installed				Load balancing mechanism installed
		Data & resource structure reports	Design document	Consensus model implemented	Joint access layer functional	Joint e-infrastructure in operation	
			Workplan GSD-network sustain			Outline plan checklist databases	Joint business plan
6	Biodiversity e-Services & dissemination (web-portal)	Web portal technical Implementation plan	Web portal Functional description		Prototype on-line	Web-portal in operation	
		End-user forum in place					

*Table 1.3a. Work package list*

WP No.	Title	Activity type	Leading participant		Person-months	Start month	End month
			no.	short name			
WP 1	Management & coordination	MGT	1	UvA	61	1	36
WP 2	European taxonomic work force	COORD	2	UKBH	88	1	36
WP 3	Regional Focal Point networks	COORD	3	TU	39	1	36
WP 4	Taxonomic Standards and Authority Files	COORD	4	NHM	70	1	36
WP 5	Taxonomic information e-infrastructure	OTHER	5	FUB_BGBM	57	1	36
WP 6	e-Services for users and dissemination	OTHER	6	VLIZ	61	1	36
TOTAL					376		

*Table 1.3b. Deliverables in chronological order. The number in the left column reads as “WP.delivery”. Nature: R report, P prototype, D demonstrator, O other; Dissemination level: PU public, PP project participants (and Commission Services), RE restricted to a group specified by the consortium (including Commission Services), CO confidential, for members of the consortium (including Commission Services).*

No.	Name	WP	Nature	Dissemination	date
D2.1	Working plan, describing the European taxonomic work force, its tasks, activities and operational standards	2	R	RE	8
D3.1	Memorandum of Understanding of Focal Points Network work programme	3	O	PU	9
D3.2	Focal Point seed-money allocation plan		R	RE	12
D1.1	Yearly progress report I	1	R	PU	13
D4.1	Report on authoritative taxonomic standards from multiple sources suitable for deployment within European Research Area	4	R	PU	14
D1.1	Yearly progress report II	1	R	PU	25
D5.1	Joint e-Infrastructure for the dissemination of Pan-European checklists	5	P	RE	26
D2.2	Design of a mechanism to keep control of the continuity of European electronic (taxonomic) biodiversity data resources and expertise networks	2	R	RE	32
D3.3	Focal Point Handbook	3	P	PU	30
D4.2	Report on possible beneficiaries of EU taxonomic and potential impact.	4	R	RE	32
D2.3	Detailed plan of how to complete taxonomic gaps in the pan-European species registers, including experts and informatics resources	2	R	RE	34
D6.1	PESI web-portal in operation	1	D	PU	34
D1.2	Business plan	1	R	RE	34
D1.1	Yearly progress report III	1	R	PU	36
D1.3	Final report to the European Commission	1	R	PU	36

Table 1.3c Work package descriptions

<b>Work package number</b>	1		<b>Start date</b>					month 1
<b>Work package title</b>	<b>Management</b>							
<b>Activity Type</b>	MGT							
<b>WP Leader</b>	Dr. Yde de Jong							
<b>Participant number</b>	1	2	3	4	5	6	8	
<b>Participant short name</b>	UvA	UKBH	TU	NHM	FUB-BGBM	VLIZ	SME BD	
<b>Person months-per participant</b>	42	3	3	3	3	3	1	

**Objectives:**

- Realisation of the project deliverables and other output, with the required quality and within the constraints of time and cost.
- Coordination of WPs to avoid duplication of efforts.
- Report on progress to the EC.
- Communication with political partners and decision-making bodies to support the European implementation of biodiversity conventions.

**Description of work:**

- The Project management (secretariat) plans, coordinates, and supervises all activities of the project work packages on a daily basis and reports to the Steering Committee and the EC. Tasks included in this work package are:
  - Set up and maintenance of a decision making structure (Steering Committee, Advisory Groups & Liaison Board),
  - Supervision of executive tasks of all work packages, monitoring of the work progress and cost developments,
  - Organisation of regular project meetings,
  - Provide platforms for internal and external communication (helpdesk, e-forum, website, mailing lists, newsletters),
  - Prepare technical and financial reports according to FP7 standards with the use of a web based tool,
  - Give secretarial assistance to partners on financial procedures and appropriate reporting,
  - Liaison towards the European Commission.
- Liaison and external communication:
  - Interact with political partners on International Biodiversity Strategies,
  - Interact with related, external projects and initiatives,
- Business plan preparation:
  - Prepare a business plan to guarantee the long-term continuity and exploitation pan-European species directives infrastructure [SMEBD].

**Deliverables**

- D1.1 Yearly progress reports (months 13, 25, 36)
- D1.2 Business plan (months 34)
- D1.3 Final report to the European Commission (month 36)

**Milestones**

- M1.1 Project bureau in place (month 1)
- D1.2 Management protocol (report) and committees installed (month 3)
- M1.3 Established network of external partners (month 2)
- M1.4 Correct operations of the communication platforms (month 3)
- M1.5 Kick-off meeting (month 4)
- M1.6 Annual project meetings (months 14-26)
- M1.7 Final meeting (month 36)

<b>Work package number</b>	2		<b>Start date</b>		Month 1
<b>Work package title</b>	<b>European taxonomic work force</b>				
<b>Activity Type</b>	Coordination				
<b>WP Leader</b>	Prof. Dr Henrik Enghoff				
<b>Participant number</b>	2	5	6	7	8
<b>Participant short name</b>	UKBH	BGBM	VLIZ	EcoServe	SMEBD
<b>Person months- per participant:</b>	30	24	12	12	10

**Objectives:**

- Establish a pan-European taxonomic work force to deal with the updating and validation of the European species directories. Coordinate the expert community to work collaborate on the anticipated tasks under common research standards.
- Improve the involvement of international taxonomic societies in expert networking and in building consensus on taxonomic standards (e.g. being “host” of a particular taxonomic group).

**Description of work:**

- Establish a pan-European taxonomic work force:
  - Arrange the involved European taxonomic experts into a partnership structure, proceed from the integrated *European taxonomic workforce* established by EDIT,
  - Design a management approach for the intended work force,
  - Clearly describe the future activities of the taxonomic work force (maintenance, upgrading, validation of the European species lists and GSDs),
  - Prepare agreements on common research standards and formats.
  - Provide contact details of partners and taxonomic experts, using the integrated IMIS information database of VLIZ/MarBEF [VLIZ].
- Provide models for the long term use and archiving of electronic biodiversity data:
  - Govern the ownership and copyright of electronic biodiversity data, define procedures and conditions for data access (together with SMEBD),
- Enlarge the current geographic scope towards the whole Palaeartic:
  - Extend the taxonomic workforce to experts from outside Europe using the framework of WP4 so as to include electronic biodiversity data from the southern Mediterranean and northern Asia.

**Deliverables**

- D2.1 A working plan, describing the *European taxonomic work force*, its tasks and activities and operational standards [UKBH, BGBM, VLIZ, EcoServe] (month 8).
- D2.2 Design of a mechanism to keep control of the continuity of European electronic (taxonomic) biodiversity data resources and expertise networks [EcoServe] (month 32).
- D2.3 Detailed plan of how to complete taxonomic gaps in the pan-European species registers, including experts and informatics resources [EcoServe] (month 34)

**Milestones**

- M2.1 Include the involved experts into the EDIT expertise information service [UKBH, BGBM, VLIZ, EcoServe] (month 4)
- M2.2 Report on the structure, strengths and weaknesses of the collated Pan-European taxonomic workforce, its contributing experts and planned tasks [UKBH] (month 6)
- M2.3 Report on the government of copyright of electronic biodiversity data [SMEBD] (month 24)

<b>Work package number</b>	3	<b>Start date</b>	Month 1
<b>Work package title</b>	<b>Regional Focal Point networks</b>		
<b>Activity Type</b>	COORD		
<b>WP Leader</b>	Prof. Dr Nihat Aktaç		
<b>Participant number</b>	3	4, 7, 9, 17 – 37	
<b>Participant short name</b>	TU	see participants list	
<b>Person months-per participant</b>	39	0	

**Objectives:**

- Strengthen the national and regional focal point networks to improve the access to local expertise and supporting various tasks related to the infrastructure of European species databases.
- Expand the framework of focal point networks by adding partners from the Palaearctic region outside of the EU.

**Description of work:**

- o European Regional Focal points network structure:
  - Arrange the national and regional focal point networks into a partnership structure,
  - Define procedures for contribution to the validation of Pan-European checklists by cross-checking and reviewing against local resources and expertise,
  - Define procedures for enriching the European biodiversity data with vernacular names, detailed occurrence and phenology data and (local) conservation status,
  - Disseminate information on taxonomic standards to local database owners, e.g. by the means of workshops.
- o Extra-European Palaearctic expert(ise) networks:
  - Identify possible partners and financial resources for the geographic extension of the current Pan-European indexing databases so as to include Anatolia, the Caucasus, the southern and eastern Mediterranean, the Arabian peninsula as well as the Russian Arctic and eastern Palaearctic regions,
  - Organise an expert meeting to reconcile the western and eastern research traditions in taxonomic disciplines.
- o Prepare a Focal Point Handbook documenting experiences and best practices of established Focal Points. The Handbook facilitates the establishment of new Focal Points and assists persons and organisations becoming newly involved with the tasks of on established Focal Points.

**Deliverables**

- D3.1 Memorandum of Understanding of Focal Points Network working program (month 9)
- D3.2 Focal Point seed-money allocation plan (month 12)
- D3.3 Focal Point Handbook (month 30)

**Milestones**

- M3.1 Set up of a pan-European Focal Points Network Board (month 2)
- M3.2 Partnership agreement for Fauna Europaea focal point network (month 3)
- M3.3 Partnership agreement for ERMS focal point network (month 3).
- M3.4 Partnership agreement for Euro+Med PlantBase focal point network (month 3).
- M3.5 First Pan-European Focal Points Network joint meeting (month 4).
- M3.6 Draft pan-European Focal Points Network working program (month 5).
- M3.7 Define the criteria, procedures and mechanisms for quality control (month 7)

<b>Work package number</b>	4		<b>Start date</b>			Month 1
<b>Work package title</b>	<b>Taxonomic Standards and Authority Files</b>					
<b>Activity Type</b>	COORD					
<b>WP Leader</b>	Mr Charles Hussey					
<b>Participant number</b>	4	9	10	11	12	13
<b>Participant short name</b>	NHM	MNHN	RBG Kew	ITZN	CABI	NUIG
<b>Person months per participant</b>	41	13	1	5	5	5

**Objectives:**

- Prepare a road map (conceptual development and strategic plan) for the application of taxonomic standards within Europe, with the purpose of overcoming the instability and inconsistency of taxon names (and concepts) and attached data types. The work will address technical, linguistic, educational and legal barriers to progress in defining and implementing appropriate standards.
- Promote a close co-operation between the proposed pan-European Species-directories Infrastructure and other networks and organisations in order to optimise the cross-linking of European biodiversity resources using approved taxonomic data standards, and to improve data quality and consistency. This will facilitate discovery and exchange of biodiversity data, both within Europe, and between Europe and the rest of the world.

**Description of work:**

- Development of taxonomic standards:
  - Work closely with relevant standards organisations (principally Biodiversity Information Standards organisation - formerly TDWG, GBIF, CODATA, EoL and EDIT) to identify appropriate authoritative standards and schemas.
  - Build a controlled terminology for species status across disciplines (for instance, to distinguish between native and introduced species),
  - Investigate mechanism (GUIDs-resolvers and GUIDs resolution services) for assigning globally unique identifiers (GUIDs) to taxonomic names to allow automatic matching of equivalent taxa,
  - Investigate and report on possibilities for adding value to existing checklists to achieve enhanced harmonisation and utility (for instance, atomisation of data, presence of quality indicators).
- Integration of taxonomic standards
  - Assess the variety of taxonomic names in use across Europe, including national and Europe-wide legislative and conservation communities, and report on issues affecting integration,
  - Assist with provision of names to the ICZN ZooBank project and the introduction of a registration system for animal names,
  - Manage integration of vernacular names in different languages,
  - Derive consensus hierarchical scientific classification to provide consistent responses from searches of different biodiversity resources,

- Produce informal classification systems (hierarchical and non-hierarchical) suitable for non-experts (including general public) to increase accessibility of scientific data,
  - Involve the network of Global Species Directories produced in Europe with the PESI harmonisation and co-ordination efforts,
  - Investigate possibility of integrated access to nomenclators, to enable name validation, cross-referencing, and detection of homonyms,
  - Support and facilitate passing European taxonomic data to global initiative such as GBIF.
- Application and promotion of EU taxonomic standards (standardising naming):
- Work with WP3 Regional Focal Points and others to promote best practice,
  - Use standards, tools and validation resources to help data providers and checklist managers improve their data quality and consistency,
  - Extend use of taxonomic standards to major users of taxonomic names (for example invasive species projects; pest species information services; habitats directives; nature conservation programs).

#### **Internal deliverables**

- Consensus distribution and occurrence scheme for implementation within WP5 (month 14)
- Consensus scientific classification. (month 24)

#### **External deliverables**

- D4.1 Report on authoritative taxonomic standards from multiple sources suitable for deployment within European Research Area. (month 14)
- D4.2 Report on possible beneficiaries of EU taxonomic and potential impact. (month 32)

#### **Milestones**

- M4.1 Define applicable taxonomic standards (month 9).
- M4.2 Procedures and mechanisms for the functioning of nomenclators within the intended European taxonomic e-infrastructure approved (month 15)
- M4.3 Meeting to agree on consensus classifications (month 18)

<b>Work package number</b>	5	<b>Start date</b>	Month 1
<b>Work package title</b>	<b>Taxonomic information e-infrastructure</b>		
<b>Activity Type</b>	OTHER		
<b>WP Leader</b>	Prof. Dr Walter Berendsohn		
<b>Participant number</b>	5	1	6
<b>Participant short name</b>	BGBM	UvA	VLIZ
<b>Person months per participant</b>	48	3	6

**Objectives**

- Technical organisation of the database and middle layers of the joint information system for the interdisciplinary pan-European species directory.
- Support the incorporation of the PESI e-infrastructure into the running global and European initiatives.

**Description of work**

- Setting up the long-term data centres for the Pan-European directory
  - Install database mirrors of Fauna Europaea and ERMS at BGBM and Euro+Med at VLIZ,
  - Create a joint access layer for the three databases using the EDIT Common Data Model and EDIT 'Internet Platform for Cybertaxonomy' functionalities (in close collaboration with WP6),
  - Plan and implement load-balancing mechanisms for database access,
  - Integrate existing legacy data into the directory databases.
- Harmonising the information infrastructures
  - Implement the Consensus Distribution Model for species occurrences developed by WP4
  - Support data enrichment (adding and extension of available data types)
  - Work towards harmonisation of the data structures of the three databases
  - Design and begin the implementation of a common, EDIT-platform compatible information system for the European terrestrial and marine Fauna and Flora.
- Sustainability of Pan-European checklists:
  - Quantify financial and other resources necessary for the long-term maintenance and data management of pan-European checklists (supporting WP1)
  - Support continuation and development of available data access and data management tools, to generate, improve and update the content of the checklists (supporting WP2; UvA, VLIZ, BGBM for their respective communities).
- Sustainability of European GSDs:
  - Quantify financial and other resources to ensure long-term maintenance of European GSDs database systems (MNHN).

**Internal deliverables**

- Database mirrors installed (month 8)
- Joint access layer functional (month 24)
- Load balancing mechanism implemented (month 32)
- Euro+Med legacy data incorporated (month 12)
- Consensus distribution model implemented [UvA, VLIZ, BGBM] (month 18)
- Report on possibilities for data enrichment [UvA, VLIZ, BGBM] (month 6)
- Report on data structures [BGBM] (month 6)
- Design document [BGBM] (month 15)
- Financial data for long term maintenance as contribution to business plan [UvA, VLIZ, BGBM] (month 30)
- Document describing existing resources (month 6)
- Outline plan for development of resources [UvA, VLIZ, BGBM] (month 30)
- GSD component of business plan [MNHN] (month 32)

**External deliverables**

D5.1 Joint *e*-infrastructure disseminating Pan-European checklists (month 26)

**Milestones**

- M5.1 Pan-European species directories accommodating incoming data from installed expert(ise) networks coordinated by WP2 [UvA, VLIZ, BGBM] (month 6)
- M5.2 Working plan to support European GSDs maintenance and updating [MNHN] (month 6)
- M5.3 Define the criteria, procedures and mechanisms for quality control (month 10)

<b>Work package number</b>	6	<b>Start date or starting event:</b>			Mont h 1
<b>Work package title</b>	<b>e-Services for users and dissemination</b>				
<b>Activity Type</b>	Other				
<b>WP Leader</b>	Dr. Ward Appeltans				
<b>Participant number</b>	6	14	8	1	
<b>Participant short name</b>	VLIZ	FMNH	SMEBD	UvA	
<b>Person months per participant</b>	45	6	5	0	

**Objectives**

- Develop an integrated web-publication of the pan-European checklists and applied user services.
- Support the use of the pan-European species data in the e-science domain.
- Develop and disseminate project information and popular outreach material

**Description of work**

- Electronic publication of the Pan-European species directory:
  - Provide a web portal for the publication of an integrated European species list, allowing the users to search by species name or higher rank, common name, browse down formal and common name hierarchy, by geography (country, region, seas), by environment (marine, freshwater, land) and other attributes (e.g. food species, invasive, ...) using standards agreed in WP4 [VLIZ];
  - Develop the PESI project website, which will be the e-platform of the project, providing an introduction to the aims and details of the workplan, a calendar for meetings, regular news headlines on progress, a section to download documents and a portal with information and contact details of partners and taxonomic experts, using the online integrated IMIS information database, in collaboration with WP2 [VLIZ]
  - Include relevant supplementary data in the European checklists, like including the species occurrence details by applying dynamic links to EurOBIS, GBIF and Atlas Florae Europaeae [VLIZ & Helsinki];
  - Set up of a multi-lingual web interface [VLIZ];
  - Produce an annual edition of the Pan-European Species Checklist [VLIZ].
- E-science applications:
  - Survey the application of GRID networks [VLIZ];
  - Case study with Publishers about the use of RSS feeds, literature publications relevant to European and their authors [SMEBD];
  - Case study on the publication of data appendices by science journals in standard electronic formats that facilitate data integration (e.g. by GBIF, OBIS) [SMEBD].
- Data Delivery Services:
  - Provide web services used to maintain species registers at user locations [VLIZ];
  - Apply web-server and wrapper functionalities for dynamic linking and data transfer to other databases and services [VLIZ];
  - Provide an access service to European taxonomic meta data enabling semi-automated

- cross-referencing of taxonomic metadata [VLIZ];
- Provide technical documentation of machine interfaces for the directory portal and the underlying services [VLIZ];
- Provide a web service to Scientific Journals and biodiversity experts to create a notification system on nomenclatural acts [VLIZ];
- Outreach:
  - Distribute e-newsletter on latest developments and relevant news items, targeted to the network members and user community, on a regular (e.g. monthly basis) [VLIZ & UvA];
  - Contribute articles to science magazines and newsletters [SMEBD];
  - Issue press releases as appropriate, e.g. on launch of the PESI e-Services portal [SMEBD];
  - Develop an annual information brochure and report, outlining the network aims, and with useful statistics on EU biodiversity drawn from the pan-European species registers, which should encourage more experts to contribute to the objectives [SMEBD & UvA];
  - Develop a popular video-clip to promote biodiversity research to the general public, broadcasted on the website and other media (e.g. YouTube, GoogleVideo) [SMEBD, VLIZ];
  - Initiate cooperation with AthenaWeb (EC funded platform for dissemination to public) and Futuris (multilingual TV magazine programme produced with the EuroNews channel) to explain on line biodiversity informatics, the need for and role of authoritative species registers, and what these registers tell us about European biodiversity (e.g. most species rich taxa, rates of discovery of new species) [EcoServe];
  - Contribute to the organisation of a World Conference on online Taxonomic Data Infrastructures and Biodiversity Informatics in nearly 2009 in collaboration with EoL, GBIF, OBIS and others [SMEBD].
- User assessment:
  - With guidance from the Advisory Council, established an End-user Forum for user input on functional requirement and as a feedback mechanisms for quality assurance [VLIZ & UvA]

### **Deliverables**

D6.1 PESI web-portal in operation (month 34)

### **Milestones**

M6.1 End-user forum in place (month 6)

M6.2 Technological Implementation Plan (month 8)

M6.3 Web-portal functional description (month 18)

M6.4 PESI web-portal prototype on-line (month 24)

Table 1.3d. Summary of staff effort

Participant No.	Partic. Short name	WP1	WP2	WP3	WP4	WP5	WP6	Total person months
1	UvA	45	-	-	-	3	45	48
2	UKBH	3	30	-	-	-	-	33
3	TU	3	-	39	-	-	-	42
4	NHM	3	-	-	41	-	-	44
5	FUB-BGBM	3	24	-	-	48	-	75
6	VLIZ	3	12	-	-	6	-	66
7	EcoServe	-	12	-	-	-	-	12
8	SMEBD	1	10	-	-	-	10	21
9	MNHN	-	-	-	13	-	-	13
10	RBG Kew	-	-	-	1	-	-	1
11	ITZN	-	-	-	5	-	-	5
12	CABI	-	-	-	5	-	-	5
13	NUIG	-	-	-	5	-	-	5
14	FMNH	-	-	-	-	-	6	6
	<b>total</b>	<b>61</b>	<b>88</b>	<b>39</b>	<b>70</b>	<b>57</b>	<b>61</b>	<b>376</b>

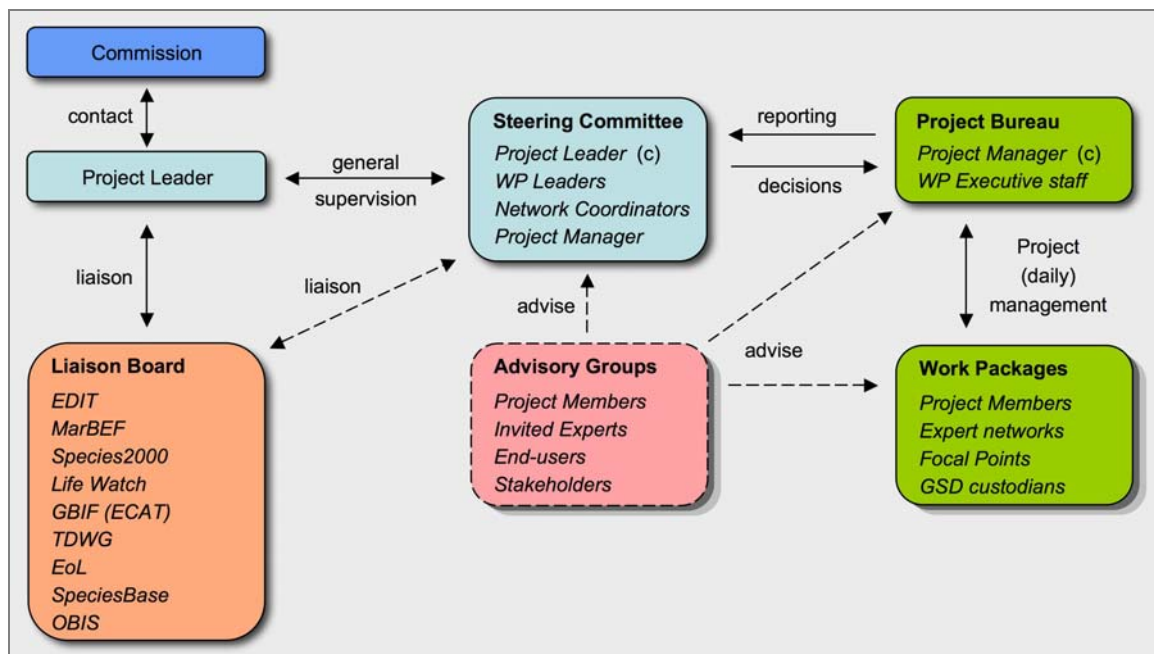
Table 1.3e Milestones at project level

No	Name	WPs	Date	Verification
M3.1	Set-up of a pan-European Focal Points Network Board	3	2	report
M2.1	Inclusion of the involved experts into the EDIT expertise information service	2	4	notification
M1.5	Kick-off meeting	1	4	report
M5.1	Pan-European species directories accommodating incoming data from installed expert(ise) networks	5	6	software tool
M4.1	Applicable taxonomic standards defined	4	9	report
M4.2	Approval of procedures and mechanisms for the functioning of nomenclators	4	15	report
M6.2	End-user forum in place	6	12	notification
M6.4	Web-portal prototype on-line	6	24	website
M1.7	Final meeting	1	36	report

## 2 Implementation

### 2.1 Management structure and procedures

The PESI management structure and procedures as outlined here are agreed upon by all participants, and will be formalised in the Consortium Agreement. The management of PESI is in the hands of the *Project Leader*, the *Project Bureau* and the *Steering Committee* (Fig. 7).



**Fig. 7 Outline of the proposed PESI management.**

#### *Coordinator and Bureau – project management*

The Project Leader is responsible for the general coordination and supervision of PESI and reports to the European Commission.

The Project Bureau consists of the Project Manager and the executive staff of each of the six work packages. The Project Manager is the chair of the Bureau. The Bureau is in charge of the daily management of the project on behalf of the Steering Committee. The Bureau's task is to coordinate activities among work packages, to propose any necessary adaptations of the planning and to ensure timely delivery within the framework of the project description and the allocated budget. The Bureau reports to the Steering Committee on the progress. Together the Project Leader and the Project Manager prepare yearly progress and financial reports with the assistance of the work package leaders. The tasks of the Project Leader and Project Manager are further detailed in the description of WP1.

The University of Amsterdam financial office has ample experience from the past FP5 and FP6 projects and will carry out the financial management according to the applicable FP7 financial regulations.

*Steering Committee – decision making*

The Steering Committee sets PESI policies to guide day-to-day management, and makes decisions concerning the project as a whole. This includes decisions on the allocation of tasks and budgets, possible entrance of new participants, and resolution of any internal disagreements. The Steering Committee is composed of the Leaders of the work packages, the Project Leader, the Project Manager and the coordinators of the respective expert(ise) zoological, marine, botanical and GSDs networks. The Steering Committee holds annual meetings. If relevant the Steering Committee prepares input for project evaluations. The Project Leader chairs the Steering Committee.

A Consortium Agreement will be included before the start of the project to formalise the Description of Work (DoW).

Committed Steering Committee members

Name	Role
Dr Yde de Jong	WP1 Leader – Project Leader
Prof. Dr Henrik Enghoff	WP2 Leader – Expertise networks
Prof. Dr Nihat Aktaç	WP3 Leader – Focal Point networks
Mr Charles Hussey	WP4 Leader – Taxonomic Standards
Prof. Dr Walter Berendsohn	WP5 Leader – e-Infrastructure integration
Dr Ward Appeltans	WP6 Leader – e-Services & dissemination
Prof. Dr Werner Greuter	Coordinator botanical community
Dr Mark Costello	Coordinator marine community
Prof. Dr Alexandro Minelli	Coordinator zoological community
Prof. Dr Thierry Bourgin	Coordinator EU-based GSDs network
{vacant}	WP1 Manager – Project Manager

*Work Packages*

PESI is organised in six work packages. All participants are linked to one or more work packages. For each WP a participant is assigned as *Work Package Leader*, acting as formal responsible for that WP. The WP leader has the general scientific and technical supervision of the WP and controls budget allocation. The WP leader is responsible for completing the objectives of the assigned work package according to the agreed time-line for milestones and deliverables. Further s/he maintains regular contact with the Project Coordinator and all participants of the WP. The WP Leader also prepares the agreed technical and financial WP reports and represents the WP in the Steering Committee.

*Advisory Groups*

The Steering Committee may form ad hoc Advisory Groups consisting of PESI participants, other experts, end-users or (potential) stakeholders, who can advise on specific matters. User-groups to be invited include: ICES, CBD, EU-directives, European topic centres (for instance EEA), IUCN (European red lists), EPPO (European pest organisms), and AQEM-STAR (European water quality).

*Liaison Board*

Representatives of related initiatives and programs populate a Liaison Board. The persons listed below have all declared themselves willing to have seat in the Liaison Board. Their commitment is documented in Letters of Support. Most of these are included as Annex 1 to this proposal.

Name	Liaison partner
Prof. Dr Simon Tillier	Networks of Excellence EDIT
Prof. Dr Carlo Heip	Networks of Excellence MarBEF
Dr Wouter Los	Life Watch
Prof. Dr Bisby	Species2000 (global team)
Dr David Remsen	GIBF-ECAT
Dr Stan Blum	TDWG
Dr David Patterson	EoL Informatics
Dr Ward vander Berghe	OBIS
Dr Rainer Froese	SpeciesBase
Prof. Dr Stefan Claesson	CETAF

*Communication flows*

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

1. A joint kick-off meeting and a final meeting.
2. Scheduled participant meetings dealing with work packages or specific activities.
3. The Steering Committee will meet at least annually. The Project Leader, the Project Supervisor and WP Leaders meet more often, whenever the project requires this.
4. The Project Bureau will communicate by tele- or video- conference call every 6 to 8 weeks, and meet in-person at least annually. It may meet more frequently depending on the project progress and business.
5. Half-year status reports, and yearly management reports, prepared in a standardised structure, for monitoring progress.
6. The Project Bureau keeps all participants informed about the progress of the project, document preparation and the interaction with other programs and initiatives. This will be done using email, a project website, discussion lists and a regular electronic newsletter.

*Risk analysis*

The experience of the applicants in developing all-taxon regional, and single-taxon global, species registers mitigates against problems arising that would compromise the success of this project. They all have experience in maintaining networks of experts as well as databases, and are closely connected with the external organisations with whom the project must cooperate. Should key people leading WP and the Steering Committee be unable to contribute there is sufficient knowledge and experience amongst other

members to continue the enterprise, including finding replacements.

Motivating scientists to participate is critical. This will be achieved by raising the visibility and prestige of contributors, and developing a larger user community such that the benefits of the species registers feedback into the scientific community, scientists employers, and national science funding agencies.

The open sharing and mirroring of the databases at different locations not only improves data access by spreading user load, but provides backup in case of data loss at one location. Because of the above experience and resources, any catastrophic problems will only delay this project by a few months.

## 2.2 Individual Participants

1	University of Amsterdam, the Netherlands (UvA)
<p>Short description</p> <p>The University of Amsterdam is a contract partner in the Netherlands consortium of Taxonomic Facilities (NL-TAF). The Zoological Museum of the University of Amsterdam manages a zoological collection as a large-scale research facility. The museum's research expertise is strong in pattern analysis and in speciation processes. The museum has a much expertise in Biodiversity Informatics projects as coordinator of the European Network for Biodiversity Information (ENBI) and Fauna Europaea and as work package leader within the Network of Excellence on Taxonomy (EDIT) and Species2000 Europe projects.</p> <p>The Faculty of Science in the University of Amsterdam contributes to the e-bioscience with a strong Informatics department, with large high performance computing facilities and its management of one of the strongest Internet hubs of Europe. The e-BioScience programme of the faculty aims at the integration of knowledge at various levels of biological organisation, ranging from molecules to entire ecosystems, and designs vehicles for “distributed large scale” science.</p>	
<p>Role / Commitment</p> <p>Leader of WP1 Management WP4 Information infrastructure: Fauna Europaea database maintenance.</p>	
<p>Qualifications, experience and knowledge</p> <p>Yde de Jong, Project Leader, is head of the department Biodiversity Informatics of the Zoological Museum Amsterdam and involved in the European Network of Excellence on Taxonomy (EDIT) as coordinator of the task force on integrating Europe's taxonomic information infrastructures. He is the executive manager of the Fauna Europaea project and involved (as work package manager) in the Species2000 Europe effort on establishing the ‘Euro-Hub’. He is a member of the GBIF subcommittee for the Electronic Catalogue of Names of Known Organisms (ECAT) and participates in several TDWG task groups.</p> <p>Louis Boumans holds a master’s degree in Arabic and biology and a PhD degree in linguistics. He initiated and managed the Dutch Bilingualism Database, a large collection of sound recordings. His current research interest is in molecular phylogeography. For EDIT, he prepares the development of a Fauna Palaearctica infrastructure.</p>	

2	University of Copenhagen, Denmark (UKBH)
<p>Short description: The University's Faculty of Science participates with its Natural History Museum of Denmark.</p>	
<p>Role / Commitment: Leader of WP2 Taxonomic Work Force</p>	
<p>Qualifications, experience and knowledge: The museum is Denmark's largest taxonomic research and collections centre, and houses the Danish GBIF node (DanBIF). The museum is founding member of CETAF and has participated, as work package leader, in several EU-supported projects: ENHSIN, Fauna Europaea, ENBI, SYNTHESYS, and EDIT. Professor Henrik Enghoff has published &gt;150 scientific papers, mostly on taxonomy, phylogeny and biogeography. He was director of the museum 1996-2007, leader of the consortium behind the successful Danish bid for the GBIF secretariat and has been work package leader in ENHSIN, Fauna Europaea, ENBI, SYNTHESYS, and EDIT.</p>	

3	University of Trakya, Edirne (TU)
<p>Short description The Biology Department of Trakya University is the main taxonomic research and collections centre of Turkish Thrace. TU has one of the largest taxonomic expert groups and collections of Insect and Mammals, as well as the unique herbarium of Turkish Thrace. Main research interests are: Biodiversity, geography and history of animals as well as their ecology, biology and conservation.</p>	
<p>Role / Commitment Leader of WP3 Focal Point Networks</p>	
<p>Qualifications, experience and knowledge The department is the member of Fauna Europaea, EDIT and OPTIMA. The department has a thorough research expertise on the conservation of biodiversity in Turkey. Professor Dr. Nihat Aktaç is the Dean of the Faculty of Science of Trakya University (Turkey). He was curator of the Museum of Istanbul University Biology Department from 1972 to 1984. He was head of the Biology Department of Trakya University during the year 1985-2003. He organized the 12th National Biology Symposium (mainly on Biodiversity of Turkey) with participation of 700 scientists in 1994. He has published over 40 scientific papers, mostly on taxonomy, ecology and biogeography. Main participant of one of the NATO Collaborative Linkage Grant project "Taxonomic and ecological revision of Turkish ant species" in the year 2002. Advisory board member of the <i>Turkish Journal of Zoology</i> since 1994. He is also member of nongovernmental societies such as the Turkey Entomological Society, the Turkish Biology Society. Teaching graduate and postgraduate students on taxonomy, biogeography of invertebrate animals (mainly insects). He is involved as Focal Point for Fauna Europaea and EDIT, and contributed to several meetings of these networks.</p>	

4	Natural History Museum, London (NHM)
<p><b>Short description</b>  The NHM is one of the foremost natural history museums in the world. In addition to its well-known public galleries, exhibition and education programmes, it employs over 300 researchers and curators who work with study collections of 70 million specimens and libraries holding more than 1 million books and 20,000 scientific journals. It has an excellent track record for delivering on EU-funded projects (BioCISE, BioCASE, ENHSIN, ENBI, among others). Its scientists sit on a number of international advisory groups and it welcomes visiting scientists through the SYNTHESIS programme.</p>	
<p><b>Role / Commitment</b>  Leader of WP4 Taxonomic standards involving collecting, developing, promoting and deploying standards to improve quality and consistency of biological naming across Europe.</p>	
<p><b>Qualifications, experience and knowledge</b>  The Work Package Leader, Dr Charles Hussey, has been employed at Museum since October 1973. He has held the position of curator/researcher in the Zoology Department (1973-1992), ICT and Facilities Manager in Zoology Dept. (1993-1998), Head of Collections Systems Development for NHM (1998-2001), Science Data Co-ordinator (2001 to present). He has extensive experience of developing collections management systems (CMS) and biodiversity-related databases. He manages the National Biodiversity Network Species Dictionary project (<a href="http://www.nhm.ac.uk/nbn/">www.nhm.ac.uk/nbn/</a>), which provides a nomenclator service for the UK  His project management experience includes a 3-year upgrade to collections systems, a 3-year UK Lottery funded project to build a web-based resource discovery tool for the general public (<a href="http://www.nhm.ac.uk/naturenavigator">www.nhm.ac.uk/naturenavigator</a>) and digitisation projects. He was a Work Package Leader for ENHSIN (Framework Programme 5), is the National Focal Point for Fauna Europea (Framework Programme 6) and is contributing to Work Packages 3, 5 and 6 of EDIT (Framework Programme 6). He is a member of the CODATA Task Group on Access to Biological Collections Data (<a href="http://www.bgbm.org/TDWG/CODATA/default.htm">www.bgbm.org/TDWG/CODATA/default.htm</a>).  The Research Assistant will be a new appointment, at Graduate or Post-Doc level. We shall be seeking skills/experience in data management and knowledge of biological nomenclature.</p>	

5	Freie Universität Berlin, Botanic Garden and Botanical Museum Berlin-Dahlem (FUB-BGBM)
<p>Short description</p> <p>The BGBM is a centre of biodiversity research in Europe, with extensive scientific collections of herbarium specimens (about 3.5 Million) and living plants in the Botanical Garden, the most important botanical library in the German-speaking area, and several internet information services of national and international importance.</p>	
<p>Role / Commitment</p> <p>Leader of WP5 Taxonomic information e-infrastructure Executive participant of WP2 Expert Networks</p>	
<p>Qualifications, experience and knowledge</p> <p>The BGBM recognized early the new role of natural history museums in the domain of electronic information. Today, the BGBM has a separate department of Biodiversity Informatics with, at present, twenty staff members (information scientists, botanists, zoologists, engineers, mathematicians, and technicians) from five countries. Its IT infrastructure includes 26 Linux and Microsoft servers, PostgreSQL, MySQL and SQL-Server dbms and 3 terabytes of server-side storage space. Broadband network capacity is available via a Gigabit backbone as well as a Gigabit connection to the European Scientific network GÉANT via GWIN. Data security is implemented local via cluster, local via backup for directly accessible data, and remote via the central archiving services of the university.</p> <p>The BGBM will be responsible for WP5. It is uniquely qualified for this task, in the light of previous specialisation in the development and implementation of protocols, data standards, and software for international networking of distributed and heterogeneous biodiversity information. The BGBM is currently coordinating the WP on the Internet Platform for Cybertaxonomy in the NoE EDIT, and will also lead the WP “Construction plan” in the ESFRI Life Watch preparatory phase project. Prominent products of past projects include the Biological Collections Access Service for Europe (BioCASE); the Euro-Mediterranean Plant Checklist (Euro+Med); and the European Mirror of the Global Biodiversity Information Facility (GBIF), providing access to 120 million natural history object and observation records.</p> <p>Prof. Dr. Walter Berendsohn has acted as coordinator for federal programmes in biodiversity informatics research in Germany, and is a member of the German delegation to the GBIF governing board. He also chairs the TDWG Biodiversity Information Standards organisation, the coordinators’ group of GBIF-Germany, and the GBIF Science Subcommittee for the Digitisation of Collections.</p> <p>Anton Güntsch (MSc Computer Science) worked for ZLV-Berlin in the area of GIS and database design. Since 1999, he has worked in the Department of Biodiversity Informatics and Laboratories of the Botanic Garden and Botanical Museum in Berlin; in 2003, he became head of the Biodiversity Informatics and Documentation section. He was responsible for the implementation of the BioCISE collection catalogue and the European Natural History Specimen Information Network Pilot system, an XML-based World Wide Web access system for distributed heterogeneous collection databases. Present project and committee memberships include: GBIF Germany IT commission (chair), Euro+Med computer working group, GBIF Science Subcommittee for Digitisation of Natural History Collection Data (DIGIT), and EDIT Information Science and Technology Commission.</p>	

6	Flanders Marine Institute (VLIZ)
<p>Short description</p> <p>The Flanders Marine Institute (VLIZ) is a modern, well structured European marine institute, which has not only regional but a very important international impact hosting the UNESCO/IOC Project Office for IODE and the Marine Board of the European Science Foundation. VLIZ has built the Flanders Marine Data and Information Centre, which assembles different types of data and information, implements international standards, and (re)distributes data nationally and internationally. VLIZ currently employs a permanent staff of 15, of which eight are scientists; four amongst these are holding a PhD. Much of the activities at VLIZ are done in the framework of projects; there are now 14 people employed on project funding. VLIZ currently employs seven full-time IT specialists.</p>	
<p>Role / Commitment</p> <p>Leader of WP6 e-Services</p> <p>Partner in WP2 Taxonomic Work Force : ERMS data manager, technical support on e-infrastructures</p>	
<p>Qualifications, experience and knowledge</p> <p>VLIZ is the National Oceanographic Data Centre (NODC) for Flanders, and is actively involved in several initiatives of the UNESCO/IOC Committee on International Oceanographic Data and Information Exchange (IODE). VLIZ leads the data integration work package in the FP6 EU NoE MarBEF. VLIZ hosts several national and international project websites (MarBEF, ERMS, WoRMS, MARS network, BIOMARE, MARBENA, SMEBD, WoRMS, SCAR-MarBIN, EURASLIC, ...). VLIZ has a long-term commitment in supporting biological data management and hosts and maintains a number of databases a.o. the European Register of Marine Species (ERMS), a number of Global Species Databases (see complete list at <a href="http://www.marinespecies.org">http://www.marinespecies.org</a>) and the European node of the Ocean Biogeographic Information System (EurOBIS).</p> <p>Dr Jan Mees is director of VLIZ since 1999 and is member of the MarBEF executive committee and vice-chair of the ESF/Marine Board.</p> <p>Mr Ward Appeltans is employed as project leader at the data centre of VLIZ and is currently WP leader for MarBEF data integration; he is member of the MarBEF executive committee and is data manager for ERMS, WoRMS and EurOBIS.</p> <p>Mr Francisco Hernandez is the data centre manager of VLIZ.</p> <p>Mr Bart Vanhoorne is IT specialist and is the technical assistant for ERMS, WoRMS and EurOBIS.</p>	

7	Ecological Consultancy Services Limited (EcoServe)
<p>Short description EcoServe is an SME company involved in ecological research and consulting providing technical environmental services, including interpretation and management of computerised data, with specialisation in marine and freshwater systems.</p>	
<p>Role / Commitment WP1 Member Steering Committee representing the Marine network WP2 Lead study on how to fill gaps in the pan-European species registers WP2 Taxonomic Work Force: representative of the Marine expert and focal point networks (with VLIZ)</p>	
<p>Qualifications, experience and knowledge EcoServe has been involved in most EU projects related to species information infrastructures, including being Coordinator of the European Register of Marine Species (ERMS) (MAST programme), and partner in BioCISE, BioCASE, BIOMARE, Fauna Europaea, MARBENA, Species 2000 Europa (EuroCAT), and the networks of excellence MarBEF and EDIT. It also coordinated the Concerted Action on sea-lice control on fish farms, and was a partner in the EU research projects Atlantic Coral Ecosystem Study (ACES) and COST-IMPACT, and has conducted many marine and freshwater ecological research and survey projects around Ireland over the past 10 years.</p> <p>The senior staff who would be involved in this project would be: Dr Mark J. Costello, Director and Senior Scientist brings expertise in biodiversity informatics and project management; Dr Roisin Nash, Managing Director and Senior Scientist leads outreach activities for the MarBEF (marine biodiversity and ecosystem function) network of excellence; Mr Chris Emblow, Director and Senior Scientist with 20 years experience has brought ecological, database and web site expertise to the above EU projects. Dr Costello is currently Chair of the Ocean Biogeographic Information System, Chief Editor of the European Register of Marine Species, Chair of the 'Society for the Management of European Biodiversity Data' (which owns ERMS and Fauna Europaea), Secretary General of the International Association for Biological Oceanography (member of the International Union of Biological Sciences), Member Editorial Board of the online Earth System Atlas as Subject Editor for Ocean Biodiversity. He lectures in Marine Ecology, Invertebrate Diversity, Biodiversity Informatics, and Marine Reserves. Previous Positions: Executive Director Huntsman Marine Science Centre, Canada; Managing Director EcoServe; and Fellowships at Trinity College Dublin, Napier University Edinburgh, Marine Laboratory Aberdeen and Marine Biological Association Plymouth. His current research centres on biodiversity informatics and related aspects of marine biogeography and ecology. He has been invited to speak at 39 conferences and as an invited expert to 19 workshops, organised over 20 international conferences and workshops, and trained 3 Ph.D. and 23 M.Sc. students (as primary supervisor), and 34 research assistants and 5 post-doc's. He has 76 peer-reviewed papers, 20 edited books and journal volumes, and over 140 other scientific publications including publications for industry and popular readers.</p>	

8	Society for the Management of European Biodiversity Data (SMEBD)
<p>Short description</p> <p>The Society for the Management of European Biodiversity Data makes scientifically authoritative biodiversity data publicly available for the benefit of science and environmental management (<a href="http://www.smebd.eu">www.smebd.eu</a>).</p>	
<p>Role / Commitment</p> <p>WP1 Business plan for the pan-European species registers and GSD          WP2 Sustainability strategy for expert networks          WP6 Public outreach tasks and dissemination via publications, press releases, etc.; lead case studies to develop interactions with science publishers regarding data publication, RSS feeds</p>	
<p>Qualifications, experience and knowledge</p> <p>SMEBD was established to own the intellectual property arising from the creation of the European Register of Marine Species. This novel approach to biodiversity data management had several benefits. It avoided one or more partners in the first ERMS project having ownership of material created by other participants, and perceptions that a few individuals or institutions may benefit from the work of others. The now shared ownership of the database means all contributors have a continued interest in maintaining their quality and expanding their content. It also allows the society to authorise editorial changes to the data, and disseminate the data in whatever way it feels appropriate, without further permission from each or any contributor. It was anticipated that this function may prove useful for other biodiversity databases, and indeed, Fauna Europaea similarly became part of SMEBD.</p> <p>To date, SMEBD's most important role has been in owning the European Register of Marine Species and Fauna Europaea on behalf of the scientists who created these knowledge-based infrastructures. SMEBD authorises institutions to host these databases, and has committees that are responsible for their day-to-day management. These committees find new taxonomic editors and approve loans of the databases to other organisations. The society also finds ways to maintain these and other databases, for example when a scientist can no longer support a database. SMEBD actively encourages and supports members in submitting new funding proposals that will develop these and other biodiversity databases.</p> <p>SMEBD is legally established as a not-for-profit company, with limited liability, and no shareholders, in Ireland. It has annual audits in compliance with company law, and as a partner in EDIT complies with European Commission contractual requirements.</p> <p>There are over 700 members from many organisations in Europe. Current Council members include the leaders of biodiversity informatics initiatives in Europe, including ERMS, Fauna Europaea, Euro+Med PlantBase, CETAF, MarBEF, EDIT, OBIS, GBIF, Species 2000, AlgaeBase, BioCISE, BioCASE, SpeciesBase, and LifeWatch; and representatives of the taxonomic community.</p>	

9	Muséum National d'Histoire Naturelle (MNHN)
<p>Short description The MNHN is a scientific institute dealing with biodiversity conservation. It is the scientific advisor of the French ministry for environment.</p>	
<p>Role / Commitment: WP4 taxonomic standards: coordinator of the GSD network WP3 Fauna Europaea Focal Point in France</p>	
<p>Qualifications, experience and knowledge Founded in 1793, the mission of MNHN is “to discover, understand, highlight and help preserve the earth’s natural and cultural diversity”, and its areas of activities is research, education and training managements and enrichment of its collection (Almost 80 millions of specimens), expertise and diffusion of scientific knowledge. The MNHN plays a key role in the organisation of the French information system on biodiversity and landscape, being the scientific coordinator of this national project. It also hosted the European thematic centre for biodiversity of the European environmental agency. In addition to international research collaboration at the individual level, MNHN plays important international roles. It has been and is heavily involved in various European programmes related to biodiversity:</p> <ul style="list-style-type: none"> <li>- The European Topic Centre on Nature Protection and Biodiversity is hosted by MNHN.</li> <li>- The French national GBIF, GTI and CBD nodes, the French Focal Point for the EU-funded BioCASE project are located in the MNHN.</li> <li>- Leading partner / work package leader in several past and on-going EU projects, including ParSyst, ColParSyst, Fauna Europaea, European Network of Biodiversity Information (ENBI) and EuroCAT/Species 2000 Europa, Synthesys 1, EDIT, MarBEF,</li> <li>- Partner as node of the FISHBASE consortium,</li> <li>- Location of several global databases and taxonomic reference systems like the CLEMAM database (the Mollusc part of the European ERMS (European Register of Marine Species) programme, RefTax AVES, FLOW (Fulgoromorpha List On the Web), COOL (CercOpoids On Line), etc, all linked to international initiatives as GBIF, Sp2000, Encyclopaedia of Life, Biodiversity Heritage Library,</li> <li>- Member of the Consortium for BarCode of Life.</li> </ul> <p>The value of Museum National D’Histoire Naturelle as a European infrastructure can be demonstrated by the EU support for three previous Access to Infrastructure awards since FPIV. The Service du Patrimoine Naturel coordinates the scientific inventories on biodiversity by providing taxonomic reference specimens and methodology for inventories and monitoring. It cooperates with both the academic and the associative sectors.</p> <p>The participation of the MNHN in PESI will be coordinated by one of its scientific units, the Direction des Collections in collaboration with the Service du Patrimoine Naturel (SPN) and the Division des Services Informatiques (DSI).</p> <p>Dr. Thierry Bourgoïn is assistant director of the MNHN Collections, and coordinator of the European-based GSDs. Olivier Gargominy is a taxonomist and malacologist and will be the contact person for the French FaEu focal point in France.</p>	

10	Royal Botanic Gardens, Kew
<p>Short description</p> <p>The Royal Botanic Gardens, Kew is fundamentally a scientific, amenity and educational organisation devoted to increasing knowledge and public understanding of plant and fungal diversity. Throughout its history, the Royal Botanic Gardens, Kew, has made important contributions to increasing the understanding of the plant kingdom and today is still first and foremost a scientific institution. Among its most important recent research achievements has been to lead a worldwide team to map the phylogeny of higher plants down to family level. The Kew Herbarium is one of the most comprehensive in the world, with a reference collection of over 7.5 million specimens of higher plants (including over 270,000 type specimens). The Millennium Seed Bank is a rapidly growing collection of seed of wild species from semi-arid and arid environments world-wide and aims eventually to conserve ex situ approximately 10% of the world's flora on behalf of a worldwide collaborative network of national government organizations. The Library has more than 750,000 volumes, representing a globally important reference source for botanical research.</p>	
<p>Role / Commitment</p> <p>WP4 standardisation support IPNI</p>	
<p>Qualifications, experience and knowledge</p> <p>Research is carried out by a complement of around 155 plant scientists, supported by another 445 staff of which about 200 are devoted to the cultivated plant collections. Increasingly Kew is broadening access to its collections by digitizing them and making them available over the Internet. Kew staff are involved in international collaborations and initiatives which seek to maximize the digitization of collections. This includes serving on Scientific Committees of Global Biodiversity Information Facility (GBIF); co-ordinating digitisation in major projects such as the Mellon Foundation funded African Plant Initiative; digitising texts as part of the Biodiversity Heritage Library and playing an active role relevant in EU funded projects such as the EDIT Network of Excellence.</p> <p>RBG Kew has been maintaining the Index Kewensis (predecessor to IPNI) since 1885. It has been one of the three partner organisations supporting and developing The International Plant Names Index (IPNI) since 1999 and the main site of technical development since 2005. It has taken the lead in developing LSID authority server and OAI services on IPNI and was one of the first implementations of the TDWG TaxonConcept data interchange standard.</p> <p>Sally Hinchcliffe has been doing technical project management on IPNI development since the project began. She is a member of the GBIF DADI (Data Accessibility and Data Integration) Science subcommittee and is an active participant in TDWG, most recently having worked on the development of the Taxon Concept standard. She has also overseen a number of other systems developed at Kew including SEPASAL, KBD, and the Plant Cultures website.</p>	

11	International Trust for Zoological Nomenclature (ITZN)
<p>Short description The "Trust" is the legal body that financially supports and administers the International Commission on Zoological Nomenclature (ICZN).</p>	
<p>Role / Commitment WP4 standardisation support ZooBank</p>	
<p>Qualifications, experience and knowledge ICZN (Executive Secretary since 2004: Dr Andrew Polaszek) is the internationally recognised regulator of zoological nomenclature. ITZN ("The Trust") is the UK-based charity dedicated solely to the funding of ICZN. In 2004 ICZN began a restructuring and modernisation programme to match the expanding capacity of ICT to underpin its service to the international scientific community. This restructuring began with the digitisation of the International Code of Zoological Nomenclature, now universally accessible through the internet, build its extensive website. ZooBank is an initiative, to provide a universal, open-access, register of species names, freely accessible via the World-Wide Web, was first published in the journal Nature in September 2005. Favourable comment followed in both the popular and more specialised science press, and the concept has since received the universal support of scientists and policy makers. A preliminary version of ZooBank, containing 1.6 million scientific names, was launched in August 2006 (<a href="http://www.zoobank.org">www.zoobank.org</a>) with the registration interface still under development. The ultimate achievement of ZooBank will mark the attainment of ICZN's major objective, to provide enduring stability in nomenclature. It will be of huge significance to taxonomists, present and future, and the sciences dependent on their work, but will not eliminate the permanent need for a regulatory commission (ICZN) to oversee the process, with powers to resolve the more complex problems. Andrew Polaszek is a research scientist studying the systematics and biology of parasitic wasps for more than twenty years. Most of that period was spent at the Natural History Museum in London, with four years on secondment at Wageningen Agricultural University, the Netherlands. He has published more than 100 scientific papers on Hymenoptera, as well as developing electronic identification tools. He was a participant in the Fauna Europaea project, supplying data on several groups of Hymenoptera, including bees. He led the ZooBank initiative in 2005 shortly after being appointed to head the Secretariat of the International Commission on Zoological Nomenclature.</p>	

12	CAB International (CABI)
<p>Short description</p> <p>CABI is a not for profit organization, specialising in scientific publishing, research and communication. CABI improves people's lives worldwide by providing information and applying scientific expertise to solve problems in agriculture and the environment. Our activities: Publishing - we are a leading publisher of abstract databases, books and multimedia tools. Microbial services - we provide a range of microbial services to businesses and academics. Projects and consultancies - we conduct research into agricultural and environmental issues and develop and share knowledge within all types of communities.</p>	
<p>Role / Commitment</p> <p>WP4 standardisation support Index Fungorum</p>	
<p>Qualifications, experience and knowledge</p> <p>Long established and significant contributions to biosystematics research on the fungi and mobilizing and making available biodiversity data (print and electronic delivery).</p> <p>Editor of Index of Fungi, Bibliography of Systematic Mycology; Senior editor of the Dictionary of the Fungi; Manager of Index Fungorum. Experienced user of database management systems (including applications development) and delivering database content on the web. Considerable working knowledge of the International Code of Botanical Nomenclature and familiarity with botanical Latin.</p>	

13	National University of Ireland, Galway (NUIG)
<p>Short description</p> <p>NUI Galway is an Irish government-funded university established in 1846, currently with 15,000 students. The Martin Ryan Marine Science Institute was set up in 1993 as a multidisciplinary teaching and research institute specialising in marine science and technology. It was funded by a private donor.</p>	
<p>Role / Commitment</p> <p>WP4 standardisation support algae Partner of WP6 e-Services</p>	
<p>Qualifications, experience and knowledge</p> <p>Professor Michael Guiry (<a href="http://www.seaweed.ie/guiry">http://www.seaweed.ie/guiry</a>) has &gt; 10 years' experience with the delivery of data on algae and other organisms on the web. Director and owner of <a href="http://www.algaebase.org">www.algaebase.org</a>. Former editor of <i>Phycologia</i>; former President of the International Phycological Society and the British Phycological Society. Published 4 books and &gt;190 scientific publications. <a href="http://www.seaweed.ie/guiry">http://www.seaweed.ie/guiry</a>. Leader of SeaweedAfrica (INCO-DEV).</p>	

14	University of Helsinki, Finland (UH-FMNH)
<p>Short description Finnish Museum of Natural History of the University participates with its Botanical Museum</p>	
<p>Role / Commitment Partner of WP6 e-Services</p>	
<p>Qualifications, experience and knowledge The Finnish Museum of Natural History is the centre of taxonomic research in Finland and houses the Finnish GBIF node. The botanical museum holds 3,5 mi specimens of plants and fungi and maintains large databases of Finnish and European vascular plants. The Secretariat of Atlas Florae Europaeae is located in the museum and Botanical Museum was a partner in the EU-supported project Euro+Med PlantBase. Professor Pertti Uotila has published more than 100 scientific papers, mostly on taxonomy, chorology, biogeography and treatments in scientific floras. He has been the director of the botanical museum since 1994 and he was the leader of the mapping work package in Euro+Med PlantBase.</p>	

15	Dipartimento di Scienze botaniche - Università degli Studi di Palermo (UNIPA)
Short description: The University of Palermo participates with its Department of Botany.	
Role / Commitment: WP3 E+M Focal Point. Coordination; Data management and checking; Examination of conflict case studies.	
Qualifications, experience and knowledge: The Department of Botany of the University of Palermo is one of the most important centre for the study of botany in Italy. Its staff, consisting of 35 academics and 31 technicians, is involved in plant taxonomy, biosystematics, plant geography, ethnobotany and applied botany in the Mediterranean Area. The Department of Botany of Palermo has a library, well furnished of old books as well as updated journals and monographs. It manages the Botanical Garden of Palermo (10 ha) and the Herbarium Mediterraneum Panormitanum (about 500.000 specimens from Sicily and the Mediterranean Area mainly). UNIPA was Coordinator of the EU founded project “Conservation in situ and ex situ of <i>Abies nebrodensis</i> ”, Coordinator of the INTERREG II C –ARCHI-MED project on the protection of endangered endemic species. Coordinator for Palermo of the Eu founded project Euro+Med plantbase, bibliographical data collection, preparation of the database, preparation of the checklist both in electronic and hard copy version. Raimondo Francesco Maria, Professor of botany since 1984. Director of the Botanical Garden of Palermo. Dean of the Faculty of Science of the University of Palermo. He is President , of the Organization for the Phytotaxonomic Investigation of the Mediterranean Area (O.P.T.I.M.A.), member of the Italian Botanical Society, of the Phytosociological Society of Italy, of the Sicilian Society of Natural Sciences and of the International Association for Plant Taxonomy (I.A.P.T). Editor of the botanical journal <i>Flora Mediterranea</i> , <i>Bocconea</i> and <i>Quaderni di botanica Ambientale ed Applicata</i> . He is author of more than 400 scientific papers and notes. Domina Gianniantonio (Dr.) is researcher of Applied botany since 2006. Phd in Plant resources in 2006, member of the International Association for Plant Taxonomy (IAPT), of the Organization for the Phytotaxonomic Investigation of the Mediterranean Area (OPTIMA), of the Società Botanica Italiana (SBI) and of the Sicilian Society of Natural Sciences. He belongs to the editorial staff of the Scientific journals <i>Flora Mediterranea</i> and <i>Bocconea</i> edited by the Herbarium Mediterraneum under the auspices of OPTIMA and of the <i>Quaderni di Botanica Ambientale ed Applicata</i> edited by the Department of Botany of Palermo. He is author of 52 scientific papers on taxonomy, data management, and applied botany.	

16	University of Seville, Spain (US)
Short description The University's Faculty of Biology participates with its Department of Plant Biology and Ecology	
Role / Commitment WP3 E+M Focal Point	
Qualifications, experience and knowledge The Department of Plant Biology and Ecology is one of the largest taxonomic research units in the country. The Department has a good tradition for floristic and taxonomic research, with a good staff in this area and which maintains the fourth most important herbarium in Spain. It has played an important role to the knowledge of the flora of the Mediterranean Region, particularly the Iberian Peninsula and NW Africa. Professor Benito Valdés Castrillón has published over 150 scientific papers, mainly on Plant Taxonomy and Floristics, and over 20 books or book chapters on Botany. Leader of a CEE project on the Floristic Biodiversity of N Morocco (1993-1996) and responsible for Sevilla for the EC Euro+Med Project (Contract No EVRI-CT-1999-2004). He has been leader of several research projects financed by the Spanish and Andalusian Governments. He has been head of the Department of Plant Biology and Ecology during 15 years.	

17	Institute of Botany, Slovak Academy of Sciences, Bratislava, Slovakia (IBSAS)
Short description: The Institute of Botany participates with its Department of the Vascular Plant Taxonomy	
Role / Commitment: WP3 Focal Point of E+M	
Qualifications, experience and knowledge: The Institute of Botany SAS is largest taxonomic research centre for the taxonomy of vascular and non-vascular plants. It houses the Slovak GBIF node and Global Taxonomy Initiative (GTI) national focal point. The Institute participated as partner institution in several EU-supported projects: Euro+Med PlantBase, ENBI, BioCASE, IntraBiodiv, ENSCONET and EDIT. Assoc. Prof. Karol Marhold has published >90 scientific papers, mostly on taxonomy, phylogeny and phylogeography of vascular plants. He is the representative of the Slovak Republic in the GBIF Governing Board, member of GTI Coordination mechanism for Central and Eastern Europe. He organised the participation of IBSAS in all above-mentioned EU-supported projects.	

18	National and Kapodistrian University of Athens (NKMA)
<p>Short description The zoological museum of the University of Athens NKMA is the oldest and richest natural history museum in Greece established 150 years ago.</p>	
<p>Role / Commitment Fauna Europaea Focal Point for Greece</p>	
<p>Qualifications, experience and knowledge The Museum is staffed by five research and teaching staff of the University, one scientific and managerial curator, two technicians and a number of post- and undergraduate students who are carrying out curatorial and scientific work. The research carried out in the Zoological Museum is centered on the study of the ecology, biogeography, systematics and conservation of the fauna of Greece. Emphasis is given to areas with relict and endemic fauna. A significant amount of work is dedicated to archiving and data basing of the Greek fauna. Molecular analyses for the assessment of genetic polymorphism, phylogeography and systematics are also carried out. Since 1992, the research has produced approximately 50 articles published in peer-reviewed journals and books. The museum has been involved in various national and international projects including Fauna Europaea (national node for Greece), European Register of Marine Species (ERMS), European Network for Biodiversity Information (ENBI), Biological Collection Access Service for Europe (BioCase), Delivering Alien Invasive Species Inventories in Europe (DAISIE), the Greek Habitat Project-Natura 2000, biodiversity surveys of national parks, creation of a database for the Greek fauna and more. It has also acted as coordinating institution for the application of the Convention on Biological Diversity in Greece. The person coordinating this part of the project, Dr. Anastasios Legakis, is curator for Terrestrial Invertebrates at the Museum and Assistant Professor at the University of Athens. His research is centered on the study of the ecology, systematics and biogeography of the ants of Greece and the conservation biology of threatened invertebrates. He is also responsible for the management of the archives and databases of the Museum. He has participated in 44 national and international research projects and acted as project leader in 31 of them. He has written 65 articles in peer-reviewed journals and books.</p>	

19	National Museum of Natural History Naturalis (NNM)
Short description Naturalis is a leading Dutch zoological museum, with a staff of 150.	
Role / Commitment Fauna Europaea Focal Point of the Netherlands	
Qualifications, experience and knowledge Naturalis has a main involvement in CETAF, EDIT and Fauna Europaea. The website Dutch Species Register ( <a href="http://www.nederlandsesoorten.nl">www.nederlandsesoorten.nl</a> ) provides quality information on all Dutch multicellular species. The content is provided by a network of specialists, both from Naturalis and other members of the taxonomic community in the Netherlands. Drs. Roy Kleukers is manager of the Bureau of the European Invertebrate Survey - The Netherlands. He is author of several faunistic publications, co-publisher of the book series <i>Nederlandse Fauna</i> , chief editor of the magazine <i>Nederlandse Faunistische Mededelingen</i> and project leader of the Dutch Species Register.	

20	Institute of Ecology of Vilnius University (IEVU)
Short description IEVU is an independent research institute, associated with Vilnius University. It is Lithuania's leading institution for ecology, zoology, animal physiology, ethology and parasitology; it also carries out research in some directions of genetics and microbiology.	
Role / Commitment Fauna Europaea Focal Point of Lithuania	
Qualifications, experience and knowledge The institute comprises three departments with nine laboratories with six field stations and experimental aquarium. It maintains specialised information systems (including GIS) for biodiversity and ecosystem data, covering the continental part of Lithuania and the marine ecosystems of the SE Baltic Sea. IEVU is involved in development of the national LTER (Long-Term Ecological Research) network. It has participated in several FP5, FP6 and other international projects, related to biodiversity and ecology. Eduardas Budrys, PhD (1989, Zoological Institute of RAS, Sanct Petersburg). He had 3-month research fellowships at the Natural History Museum, Washington in 1992, at the Natural History Museum, Leiden, in 1993, and at the Natural History Museum, London, in 1995. Short term (3 months) detached national expert at the European Commission (DG Research) in 2001-2002. Head of the Group of Insect Evolutionary Ecology at IEVU. E. Budrys was responsible person for Lithuanian partner in FP5 projects FAUNA EUROPAEA, BIOPLATFORM, ENBI, and FP6 projects EUMON and BIOSTRAT.	

21	Scientific Committee for the Italian Fauna, Italy (CSFI)
<p>Short description:  The Scientific Committee is a scientific association whose members are elected by the Italian Zoological Union and the Italian Academy of Entomology; it is hosted by the Department of Animal and Human Biology of the University 'La Sapienza' of Rome</p>	
<p>Role / Commitment:  Fauna Europaea Focal Point in Italy</p>	
<p>Qualifications, experience and knowledge:  Since 40 years CSFI is editor of the monographs of the Italian Fauna; editor in chief of the Checklist of the Italian Fauna; responsible of the database Ckmap including all the distributional data of the Italian Fauna through an agreement with the Italian Ministry for Environment, Territory Protection and Sea; is National Focal Point of Fauna Europaea.  Professor Augusto Vigna Taglianti has published 325 scientific papers, mostly on taxonomy, biogeography, phylogenetics and biospeleology. He is full professor of Zoology at the Department of Animal and Human biology at the University "La Sapienza" in Rome, Director of the Zoological Museum of the same University, and President of the Italian Entomological Society.  Doctor Fabio Stoch has published over 170 papers mainly on taxonomy, biogeography, distributional ecology and biospeleology. It is the curator of the Checklist of the Italian Fauna; manager of the databases on the Checklist and Distribution of the Italian Fauna as a former member of the Secretariat for Protected Areas of the Italian Ministry for Environment, Territory Protection and Sea.</p>	

22	Swedish Museum of Natural History (NRM)
<p>Short description</p> <p>The Swedish Museum of Natural History is the national coordinator for Swedish natural history museums, and a major research facility in natural history, including basic and applied biology and geology.</p>	
<p>Role / Commitment</p> <p>WP3 Fauna Europaea Focal Point in Sweden</p>	
<p>Qualifications, experience and knowledge</p> <p>The museum has been engaged in biodiversity informatics since the 1970s, with the Nordic Code Center, and is currently a national driving force in realizing full digitalisation of collections on a national scale. Many of the museums scientists are leading taxonomists in various animal taxa, and several students are concerned with taxonomic work that will contribute to the present project. The units directly involved in the present context are the Swedish national GBIF node, which has served as focal point for Fauna Europaea, and FishBase Sweden. Both units focus on biodiversity informatics development and development and management of major information systems.</p> <p>Sven O. Kullander is the team leader for both FishBase Sweden and GBIF-Sweden. He is a systematic ichthyologist, and among other projects authors the fish volumes of the forthcoming Encyclopedia of the Swedish Flora and Fauna. He is also active in biodiversity informatics, particularly as programmer and designer of collection management systems. He was coordinator for one EC RTD project (Ecocarp) and work package leader in two others (INCOFISH and FishTrace).</p> <p>Other specialists involved are Mickaël Graf, IT manager for GBIF-Sweden, specialist in database development (MySQL particularly) and programming. Helena Eklund, Node Manager for GBIF-Sweden has a PhD in systematic botany, and maintains the international and national contact network for GBIF-Sweden. Charlotte Johnzon has an MSc in Biology and works as support person for GBIF-Sweden. Anders Silfvergrip has a PhD in fish systematics, and maintains the occurrence database for FishBase Sweden. Fang Kullander has a PhD in fish systematics and works with international collaboration and systematic aspects for FishBase Sweden. Bodil Kajrup has a MSc in biology and works with imaging and database tasks for FishBase Sweden.</p>	

23	Comenius University in Bratislava, Slovakia (CUB)
<p>Short description Comenius University is the oldest and largest university in Slovakia.</p>	
<p>Role / Commitment Fauna Europaea Focal Point in Slovakia</p>	
<p>Qualifications, experience and knowledge CUB follows the university tradition of the Academia Istropolitana, one of the oldest universities in Central Europe, established in 1467. It is a research-based university with 13 faculties, covering the whole field of academic endeavour from science to law, theology and the arts. The Department of Zoology of Comenius University provides education of zoology at the B.Sc., M.Sc. and Ph.D. level of study for student of biology, environmentalistics and pedagogical branches of study. Staff of the Department has experience in dealing with basic and applied research on taxonomy of various groups, faunistics, morphology, ecology and zoogeography of terrestrial and freshwater animals (limnology, parasitology, entomology, ichthyology, ornithology and teriology). Comenius University is founder of the National Taxonomic Facility and leading institution in many fields including taxonomy and biodiversity research. The Department maintains the Databank of Slovak Fauna - an integrated information system on biodiversity and distribution of fauna in Slovakia (focal point for the Fauna Europaea project). Eduard Stloukal – limnologist and expert in biodiversity and the biodiversity informatics, specialised in fields of epiibiotic organisms (Ciliophora: Peritricha), freshwater Crustacea, and taxonomic and biodiversity databases, as well as in zoological nomenclature. Head of the Department of Zoology and Vice-Dean for Development and IT, Comenius University and manager of the Databank of Slovak Fauna. Leader, coordinator or expert in several international and national projects, responsible for national focal point of the Fauna Europaea and NoE EDIT (European Distributed Institute of Taxonomy), editor of the international journal for animal systematics and diversity <i>Acta Zoologica Universitatis Comenianae</i> and regional faunistic journal <i>Folia faunistica Slovaca</i>.</p>	

24	The Museum of Natural history and Archaeology, Norwegian University of Science and Technology, Trondheim Norway (NTNU)
<p>Short description: The Museum is a full part of the University with responsibility for research, education, public outreach and scientific collections. The permanent scientific staff in natural history comprises 15 –20 botanists and zoologists with specialities in systematics and conservation biology</p>	
<p>Role / Commitment: WP3 Fauna Europaea Focal Point in Norway, host university department for the Norwegian Biodiversity Information Centre.</p>	
<p>Qualifications, experience and knowledge: The staff of the Museum has been key experts in several taxonomical groups for four generations of national Red lists. For the recent version finished in November 2006, staff at the Museum chaired the expert group for Bryophyta and freshwater invertebrates. A new national species thesaurus and pilot project of national distribution maps are among the future projects at the Museum. A national vegetation atlas and a flora of Spitsbergen are among the handbooks made at the Museum. Senior curator and Associated professor Kaare Aagaard has worked with conservation biology, zoogeography and taxonomy for 30 years. He is head of the Natural history section at the Museum and has been the Norwegian representative in the Bern convention committee for invertebrates since 1986.</p>	

25	State Museum of Natural History National Academy of Sciences of Ukraine (SMNH)
<p>Short description. The museum is a chain in the scientific, research and organizing structure of the National Academy of Sciences (NAS) of Ukraine and a constituent part of the Department of General Biology of the NAS of Ukraine.</p>	
<p>Role / Commitment WP3 Focal Point of Fauna Europaea in Ukraine</p>	
<p>Qualifications, experience and knowledge The museum was established in 1870. Scientific collections (natural collections) of the museum amount to over 350 000 items. The museum holds over 250 holotypes. The museum is engaged in studying systematics and taxonomy, biological diversity and ecology of some groups of modern and fossil flora and fauna and developing scientific principles of natural history museology, creation, enriching and preserving its collections; conducting scientific, educational and popularizing activities. Associated professor Volodymyr Rizun has published 103 scientific papers, mostly on faunistics, taxonomy and ecology of ground-beetles (Carabidae) of the Ukrainian fauna. He is a leader of the laboratory of entomology in State Museum of Natural History National Academy of Sciences of Ukraine (SMNH) and head of Lviv department of Ukrainian Entomological Society. Leader of several national and executor in several international projects.</p>	

26	Museum and Institute of Zoology – Polish Academy of Sciences (MIZPAN)
Short description Museum and Institute of Zoology – Polish Academy of Sciences	
Commitment Polish Focal Point of Fauna Europaea	
Qualifications, experience and knowledge Our main research interests are: diversity, geography and history of animals as well as their ecology, biology and conservation using methods like DNA identification and GIS analyses (predictive mapping). The Institute has a modern molecular and biometric lab and the progress of hitherto existing research is marked by intensive international cooperation. We possess tissue collections and blood samples for DNA analyses. Our Museum owns one of the biggest and most valuable zoological collections in Europe (circa 6.500.000 specimens). We were participant of FAUNA EUROPEA, ENBI, EUROCAT, EURATOM, BIOCASE, SYNTHESYS and EDIT. Professor Wieslaw Bogdanowicz has published >50 scientific papers, mostly on taxonomy, phylogeny and morphology of mammals. He is a director of the Museum and Institute of Zoology, Polish Academy of Sciences (1999-present), and the deputy chairman of the Division of Biological Sciences, Polish Academy of Sciences (2003-present). He is also an editor-in-chief of Acta Chiropterologica. He was a leader in Fauna Europaea NAS-extension, and headed Museum and Institute of Zoology in several other EU programs, such as ENBI, Eurocat, Synthesys and Edit.	

27	Swiss Systematics Society (SSS)
<p>Short description</p> <p>The Swiss Systematics Society (SSS) is a scientific society open to both professionals and amateurs genuinely interested in Systematics, without restrictions about their groups of interest, favourite methodologies or field of work.</p>	
<p>Role / Commitment</p> <p>Fauna Europaea Focal Point in Switzerland</p>	
<p>Qualifications, experience and knowledge</p> <p>The Swiss Systematics Society (SSS) is a scientific society open to both professionals and amateurs genuinely interested in Systematics, without restrictions about their groups of interest, favourite methodologies or field of work.</p> <p>The SSS basic objective is to make sure that expertise in systematics is guaranteed in the long term in Switzerland. More generally the Society wants to become a compelling party whenever systematics-related questions are discussed in this country. The Society will represent systematists from all areas of biology, promote and defend systematics in the academic, and political circles, support the teaching of systematics at all educational levels, and encourage research and collections usage.</p> <p>The SSS sees itself as a specialized partner of the existing Societies in Palaeontology, Botany and Zoology and related fields in Switzerland. It aims at working with them, as well as with other foreign Societies who have similar interests.</p> <p>J. Mariaux is a zoologist with over 20 years experience in zoological systematics and about 70 papers and communications. He is a curator at the Museum of Natural History of Geneva, since 1995 in charge of the Invertebrates Dpt and has recently been appointed as an associated Professor at the University of Geneva. He has been active in the promotion of systematics and international networks through his involvement in the French Society of Systematics, GBIF Switzerland and more recently as a co-founder of the Swiss Systematics Society in 2005.</p>	

28	Biology Centre of the Upper Austrian State Museum (OOE.BZ)
Short description: The Biology Centre in Linz-Dornach, with its more than six million objects, represents the largest natural history collection in the province of Upper Austria and is the second largest in Austria, next to the Natural History Museum in Vienna.	
Role / Commitment: Fauna Europaea Focal Point in Austria	
Qualifications, experience and knowledge: The Biology Centre maintains the natural-science collections of the Upper Austrian Provincial Museums. The museum holds the biodiversity database ZOBODAT, which was founded in 1972 as ZOODAT. Today the database includes more than 3.3 Million records (ca. 38.000 species) on the distribution of animals and plants mainly from Austria but holds at least one record from 180 different countries. Furthermore we have included literature citations (more than 33.000) and bibliographies from about 4.000 biologists until now. DI Michael Malicky is the curator of the biodiversity database ZOBODAT since 1999 and assistant curator since 1991. He has published about twenty papers on biodiversity databases – mainly on practical use in nature conservation and for biologists. Besides his job as curator he is also chief information officer in the Upper Austrian State museum. He has studied Informatics at the Johannes Kepler University in Linz/Austria and has specialised on databases.	

29	Ilia Chavchavadze State University (Ilauni)
Short description: The University's Faculty of Life Sciences participates with its Biodiversity Research Centre.	
Role / Commitment: WP3 Fauna Europaea Focal Point in Georgia	
Qualifications, experience and knowledge: The Biodiversity Research Centre of the Faculty of Life Sciences, Ilia Chavchavadze State University, is a recently created system of laboratories (including Molecular Genetic Lab, GIS Lab, Morphometric Lab, and Field Studies Lab) aimed at the exploration of biological diversity of the Caucasus Biodiversity Hotspot, in particular refugial areas of the Western Caucasus with an especially high level of endemism. The Centre executes several research projects dealing with studies and revision of Georgian and Caucasian Biodiversity, supported by GRDF, Alexander von Humboldt Foundation, and BP Conservation Programme. Professor David Tarkhnishvili has published >70 scientific papers, mostly on evolutionary ecology, historical biogeography, and population ecology of vertebrates. He obtained a PhD degree in the Institute of Plant and Animal Ecology, Ekaterinburg, Russia. NATO-Royal Society Post-doctoral fellowship in the University of Wales at Bangor (1996-1997), Alexander von Humboldt fellowship in the Museum Alexander Koenig, Bonn (1999-2000 and 2002-2003). He is the dean of the Faculty of Life Sciences, head of the Centre of Biodiversity Studies and coordinator of the Georgian State Commission for Threatened Species.	

30	Consejo Superior de Investigaciones Científicas (CSIC)
<p>Short description</p> <p>The Consejo Superior de Investigaciones Científicas is the largest National Research Institution in Spain, participating in the proposal with its Museo nacional de Ciencias Naturales.</p>	
<p>Role / Commitment</p> <p>WP3 Fauna Europaea Focal Point in Spain</p>	
<p>Qualifications, experience and knowledge</p> <p>The Consejo Superior de Investigaciones Científicas (CSIC) with 116 institutes or centres throughout Spain, 3200 researchers and about 3802 pre and postdoctoral researchers is the largest National Research Institution in Spain.</p> <p>The Museo Nacional de Ciencias Naturales (MNCN) houses the biggest Natural History collections, library and archives. It comprises the most competitive research groups in Spain (70 research staff) working on biodiversity systematics, distribution modelling, palaeobiology, and conservation biology, among others, of different groups of animals. They are very successful in getting and managing research projects through competitive calls for tenders (97 current projects) and in training of PhD students. It leads the project <i>Fauna Ibérica</i>, which is probably the richest in Europe, involving researchers from the university and other foreign institutions. Is founding member of CETAF, co-coordinator of GBIF-España, provides scientific and technical support for the Spanish Ministry of Environment and for regional administrations in addressing biodiversity conservation.</p> <p>Dr. Marian Ramos, is the Vice-director for research of MNCN. She is the leader of the <i>Fauna Ibérica</i> research project, editor of this series of monographs and its online database (<a href="http://iberfauna.mncn.csic.es">http://iberfauna.mncn.csic.es</a>), former chair of the CETAF (Consortium of European Taxonomic Facilities), the leader of ES-TAF (the Spanish Taxonomic Facility, of the I3 project SYNTHESYS), the Spanish Focal Point for the GTI (Global taxonomy Initiative), Chair of the Bern Convention Group of Experts on Invertebrates (Council of Europe) and workpackage leader of of EDIT. She was member of the Steering Committee of ERMS (European Register of Marine Species) and constituting member of SMEBD. Her current research interest is in biosystematics and conservation biology of freshwater molluscs. Her curriculum including more than 130 papers and books, leadership of twenty competitively approved research projects</p>	

31	Slovenian National Institute of Biology (NIB)
<p>Short description: NIB is a leading biological institute in Slovenia, with research projects in the fields of ecology, taxonomy, physiology, toxicology.</p>	
<p>Role / Commitment: WP3 Fauna Europaea Focal Point in Slovenia</p>	
<p>Qualifications, experience and knowledge: NIB successfully participated in several projects under the framework programmes of the EU (AL:PE2 1994 MOLAR 1996 – 1999, EMEREGE 2000 – 2002, PASCALIS 2002 – 2005, Fauna Europaea NAS extension 2002 - 2003), in Interreg projects (ALPLAKES 2005 - 2007) as well as many national research projects. Dr. Davorin Tome regularly published scientific papers worldwide, mostly on the ecology of birds. He lectures on ecology at the University of Ljubljana. He acts as a focal point coordinator in Slovenia for Fauna Europaea.</p>	
32	National Museum of Natural History – Sofia (NMNHS)
<p>Short description The National Museum of Natural History – Sofia was established in 1889 as Royal Natural History Museum of King Ferdinand.</p>	
<p>Role / Commitment Fauna Europaea Focal Point for Bulgaria</p>	
<p>Qualifications, experience and knowledge Being the richest natural history museum in the Balkans, the NMNHS studies and preserves a significant collection of animals, plants and minerals from all continents. The museum collections number over 1,000 000 specimens, among which 400 mammal species, 1200 birds, hundreds of fishes, amphibians and reptiles and hundred of thousands of invertebrates. The museum has a branch (Palaeontological Museum) in Assenovgrad, which was created on the base of the large collection of fossils collected in the region of Rhodopes Mts, South Bulgaria. The collection is holding the largest Bulgarian collection of Neogene vertebrates, as well as corals, ammonites, fossil sea echinoids, remnants of fossil turtles, etc. Museum's employees are taking part in the following international and national projects: Fauna Europaea, NATURA 2000, Red Data Book of Bulgaria, Atlas of nesting birds in Bulgaria, Biodiversity and Ecology of Bulgaria, Important butterfly areas in Bulgaria, Chilobase - a world catalogue of centipedes (Chilopoda), Ecology, behaviour and population genetics of Bechstein's bat, Identification key for the amphibians and reptiles in Bulgaria, etc. Pavel Stoev is Head of the department Non-insect Invertebrates of the NMNHS. He is currently taking also the position of Scientific Secretary (Vice-Director) of the museum, Managing Editor of the Red Data Book of Bulgaria (vol. 2 – Animals) and the editor of the journal <i>Historia naturalis bulgarica</i>, the museum's coordinator of the project NATURA 2000 network assessment - Bulgaria, etc. He has published over fifty scientific publications mainly in the field of myriapod taxonomy. He has participated in more than twenty national and international research projects.</p>	

33	myNature Association (myNA)
<p>Short description myNature Association is a NGO with focus on developing informational infrastructure, data base and software in the acquaintance and study of the biodiversity and nature protection of Romania.</p>	
<p>Role / Commitment WP3 Fauna Europaea Focal Point in Romania</p>	
<p>Qualifications, experience and knowledge myNature Association was particularly assembled to legally represent of myNature Project, an effort for an inventory of Romanian Flora and Fauna. This project is involved in database development, online data dissemination and community building including professionals, amateurs, and public. To our knowledge this is the most developed Romanian open portal covering this subject. Adorian Ardelean is the president of myNature Association, founder and coordinator of the online myNature Project. He has a Ph.D in systematics, published scientific papers concerning invertebrates and was involved in the Romanian university educational system for several years. He is currently a biodiversity informatics researcher directly collaborating with an EU funded project in Germany (AWI - PlanktonNet) where he is the main software developer for this project. He was member of several well known projects in the biodiversity informatics field: Hexacorallians of the World (funded through the program Partnerships for Enhancing Expertise in Taxonomy by NSF and by National Oceanographic Partnership Program - at Kansas University-USA), uBio (Universal Biological Indexer) and micro*scope (Marine Biological Laboratory-USA).</p>	

34	University of Latvia (LU)
<p>Short description</p> <p>In cooperation with the research institutes of the University of Latvia the Faculty of Biology provides the higher academic, as well as professional education, and carries out research in the main sub-disciplines of biology.</p>	
<p>Role / Commitment</p> <p>Fauna Europaea Focal Point in Latvia</p>	
<p>Qualifications, experience and knowledge</p> <p>The Department of Zoology and Animal Ecology is the focal point of animal research in Latvia. The study work is assisted by the UL Museum of Systematic Zoology, which holds the largest and most interesting collections of insects and molluscs in Latvia. The Department collaborates with the LU Institute of Biology, Institute of Aquatic Ecology, Latvian Fisheries Research Institute, Institute of Forestry Research "Silava". Zoologists of LU are participating in international research and study projects with the biologists from Universities of Helsinki and Bremen, with the researchers from the Swedish University of Agricultural Sciences in Uppsala and others. Main fields of research work: systematics, ecology and ethology of animals; ecology of animal communities; protection of threatened species and habitats; research of hydro-ecosystems.</p> <p>Assoc. Prof. Voldemars Spungis, is a biologist, tutor of biology and chemistry, specialized in zoology, entomology, ecology. Education: Faculty of Biology of the Latvian University in 1972-1976, post-graduate student in entomology in 1977-1980, Candidate of Sciences 1981, Dr. biol. in 1992. Participated in the FP5 project Fauna Europaea. Current affiliation: Associated Professor in the Department of Zoology and Animal Ecology, Faculty of Biology, University of Latvia.</p>	

35	Hellenic Centre for Marine Research, Greece (HCMR)
<p>Short description  HCMR, which is supervised by the Ministry of Development, participates with its Institute of Marine Biology and Genetics (IMBG) and its Institute of Oceanography (IO).</p>	
<p>Role / Commitment  WP3 Focal point is for ERMS.</p>	
<p>Qualifications, experience and knowledge  IMBG conducts research in the fields of biodiversity, structure and dynamics of the ecosystem, ecosystem management and genetics of marine organisms.  HCMR is an active partner in many International, EU and National Projects:  -MedOBIS (USA), MARBENA, MARBLE, MarBEF (EU), National Project on Marine Biodiversity. IMBG also has track record in important research areas, such as new and/or improved products and organisms, as well as the authentication and origin identification of organisms and their products.  IO carries out open sea oceanographic research, coastal environmental research, and operational oceanography. IO is an active partner of the SeaDataNet Network of Excellence and coordinates the SESAMI Integrated Project.  Dr. Christos Arvanitidis (IMBG), marine biodiversity: involved in more that forty research and education projects, coordinator in four. More than 25 peer-reviewed scientific articles; member of the editorial board of the <i>Transitional Waters Bulletin</i>.  Dr. Georgios Kotoulas (IMBG), principal researcher with more than twenty years experience in population genetics, in parentage assignment, gene expression and mapping. Participated in more than fifty projects, coordinated several ones. With more than 25 peer-reviewed scientific articles. Dr. Elena Sarropoulou (IMBG), young researcher: functional genomics including evolutionary aspects. Dr. Sofia Reizopoulou (IO), marine ecology of the transitional waters with more than twenty peer-reviewed articles. Her focus is on the design of size distribution ecological indices. Involved in more than 25 research projects. Dr. Nomiki Simboura (IO): long track in coastal water soft bottom communities with particular focus on the design and experimentation with ecosystem health indices. With more than 25 peer-reviewed articles.</p>	

36	Israel Oceanographic and Limnological Research (IOLR)
Short description: IOLR is a national research institution (non-profit governmental corporation) established in 1967 to generate knowledge for the sustainable use and protection of Israel's marine, coastal and freshwater resources.	
Role / Commitment: WP3 regional focal point of ERMS	
Qualifications, experience and knowledge: The IOLR conducts scientific research in the fields of oceanography, limnology, mariculture and marine biotechnology. In fulfilment of its mandate as a national institution, much of IOLR's scientific effort is focused on research, monitoring and assessment of the environmental status of Israel's neighbouring sea areas (eastern Mediterranean and the Gulf of Aqaba/Red Sea) and inland water bodies (Lake Kinneret - the Biblical Sea of Galilee - and the Dead Sea) and predicting their response to human and natural perturbations. IOLR participates in regional and international research programs, provides assistance to developing countries within its fields of competence and represents Israel at the Intergovernmental Oceanographic commission of UNESCO (IOC) and the Mediterranean Science Commission (CIESM). Bella S. Galil is a Senior Scientist with the National Institute of Oceanography, Israel Oceanographic & Limnological Research, Haifa, Israel. Her main fields of study are alien species in the Mediterranean; the impact of anthropogenic changes on the benthic populations in coastal and deep waters along the Mediterranean coast of Israel; decapod crustacean taxonomy and biology (Polychelidae, Calappidae, Leucosiidae); and conservation of marine biodiversity. BG published more than 150 scientific papers, many of them taxonomic revisions.	

37	Institute of Oceanology Polish Academy of Sciences (IOPAS)
<p>Short description IOPAS is an Academy of Sciences institution with responsibility for research in the marine sciences. It employs about 150 persons, including 18 professors and 29 doctors and it is the largest institute of marine sciences in Poland.</p>	
<p>Role / Commitment WP3 regional Arctic &amp; Baltic Focal Point of ERMS</p>	
<p>Qualifications, experience and knowledge The area of main activity is the Baltic Sea region as well as North Atlantic and the European Arctic region. It operates its own research vessel R/V "Oceania", and edits the peer-reviewed, English language quarterly journal <i>Oceanologia</i>. IOPAS runs regular doctoral studies with 12 student positions – offered every year for new applicants. In 2002 IOPAS received the EU status of Center of Excellence in Shelf Seas Studies.</p> <p>The Institute participates in number of international research programmes like BASYS, BIOCOLOR, ESOP 2, ENRICH, MARINA BALT, PROWESS, VEINS, BIODAFF, ACSYS, BALTEX, IAPP, SeaWiFS, MARBEF and others.</p> <p>IOPAS was involved in integrated European marine biodiversity research since 1992. Since BIOMARE EU programme IOPAS is committed as coordinator of All Taxa Biodiversity Inventory in one of the six European Marine Biodiversity Sites (Hornsund, Svalbard).</p> <p>Jan Marcin Węsławski – professor, Malacostraca identification, works on climate change impact on coastal ecosystems. Maria Włodarska-Kowalczyk, PhD, Mollusca identification, works on disturbance effects on soft bottom faun. Joanna Legeżyńska, PhD, Malacostraca identification, works on amphipod ecology and biology. Lech Kotwicki, PhD, Harpacticoida identification, works on sandy littoral ecosystems. Piotr Kukliński, PhD, Bryozoa identification, Works on biotic interactions and colonisation patterns. Katarzyna Błachowiak, PhD, pelagic Ostracoda identification, works on biogeography and biology of pelagic ostracods. Sławomir Kwaśniewski, PhD, Calanoida identification, Works on climate change impact on pelagic Arctic communities. Marek Zajączkowski, PhD, Foraminifera identification, holocene paleoceanography, recent climate change indication. Józef Wiktor, PhD, microplankton and macrophytes identification, ice flora, ecology of macrophytes assemblages.</p>	

### 2.3 Consortium as a whole

PESI assembles the best possible consortium of partners to take the next step in the coordination and integration of knowledge infrastructures in the field of taxonomic meta-data assessment within Europe. Together Fauna Europaea (FaEu), the European Register of Marine Species (ERMS), and Euro+Med PlantBase (E+M) incorporate all major European taxonomic infrastructures concerned with plant and animal life. These infrastructures include not only the associated expert and expertise networks, but also the associated information systems, which play significant roles within the worldwide collaboration on biodiversity data gathering.

In geographic terms, the inclusion of the focal points of E+M and ERMS as well as the majority of the FaEu focal points warrants wide support for this next step in the integration of knowledge infrastructures and the spread of taxonomic excellence. In most cases regional focal points are housed in institutes having a leading position in regional or national biodiversity research and most of the participants have also participated in previous fruitful coordination actions supported by the EC.



**Fig. 8 Overview of the Fauna Europaea National Focal Point Network.** After: [http://www.faunaeur.org/focal\\_point.php](http://www.faunaeur.org/focal_point.php).

The implementation of PESI in conjunction with two major European Networks of Excellence (i.e. EDIT and MarBEF) provides a unique position within two principal European research networks on taxonomy. With these important EDIT and MarBEF institutions on board, PESI also brings together the best expertise in terms of institutional human resources.

The involved nomenclators ZooBank, IPNI, AlgaeBase, and Index Fungorum have been chosen for their authority on nomenclatural data standards, for their roles in taxonomic regulation, like the *International Commission on Zoological Nomenclature* (ICZN) for animals and the *International Botanical Congress* (IBC) and *International Association for Plant Taxonomy* for plants.

In view of their large number, the European-based GSDs are included as one joint

network, coordinated by Species2000 Europa, also a partner within EDIT (see also Fig.9).

The work package leaders have been chosen for their proven leadership in earlier EC or other projects and for their distinct knowledge specifically to the work packages. They are complementary in their expertise in that they range from plants to animals and from terrestrial to marine biodiversity, from taxonomy to biodiversity informatics, from western to eastern Palaeartic, and from procedural to conceptual overseeing. Each of these work package leaders has worked together with one or more of the others in existing EC projects.

In short, the PESI project presents the best possible capabilities to create the necessary cohesion in taxonomic community networking and taxonomic information integration.

#### *Subcontracting*

In view of the complementary qualifications of the PESI Participants, no significant subcontracting is foreseen for this project. However, a small number of accountant declarations will need external expertise.

## 2.4 Resources

The resources that enable the realisation of PESI are of three kinds: human resources, funding for staff and other costs, and the databases that will be integrated. The staff effort is indicated in section 1.3. In addition, a budget reservation of € 640.000,- is made in WP3 as seed money for focal point activities of FaEu, E+M and ERMS. This reservation will be allocated to staff and other costs of the focal point organisations at a later stage.

Other costs of PESI are for meetings (travel and subsistence); relatively minor costs are foreseen for accountant declarations, software tools and other equipment. These costs are detailed per work package in Table 4a.

Table 4 Costs other than staff

WP	Cost type	Amount	7% indirect costs	requested from the EC
1	meetings	167.200	11.704	178.904
1	accountant declarations	10.000	700	10.700
1	management tool (software)	30.000	2.100	32.100
1-6	other equipment (software and hardware)	50.000	2.100	32.100
3	focal point meetings	25.000	1.750	26.750
3	focal point reservation	440.000	30.800	470.800
<b>Total</b>		<b>722.200</b>	<b>50.554</b>	<b>772.754</b>

The most valuable resources committed to this project consist of the taxonomic databases and tools that have been created in the previous projects of FP6 and FP7: FaEu, EDIIT, E+M, ERMS, and which will be integrated in the PESI project. Altogether, these can be said to represent an economic value of several million euros. The most important of these are listed below.

### *Pan-European checklists and services*

Principal components of PESI digital taxonomic resources are the pan-European checklists databases and allied services:

- Fauna Europaea (FaEu) <<http://www.faunaeur.org>>. Hosted by the Academic Computer Centre of the University of Amsterdam, coordinated by the Zoological Museum Amsterdam.
- Euro+Med PlantBase (E+M) <<http://www.emplantbase.org>>. Hosted and coordinated by the Botanic Garden and Botanical Museum Berlin-Dahlem.
- Atlas Florae Europaeae. Hosted and coordinated by Finnish Museum of Natural History.
- European Register of Marine Species (ERMS) <<http://www.marbef.org/data>>. Hosted and coordinated by VLIZ (as part of the MarBEF network).

- European Ocean Biogeographic Information System (EurOBIS). Hosted and coordinated by VLIZ (as part of the MarBEF network). All pan-European checklists services have been established within previous EU framework programs and are connected to the running Networks of Excellence EDIT and MarBEF.

*Regional Focal Points local species information services*

A growing number of regional focal points have national checklists on-line, which will be integrated within PESI. A draft overview of regional (national) resources:

- Italy: Fauna Italia <<http://www.faunaitalia.it>>
- France: Inventaire National du Patrimoine Naturel <<http://inpn.mnhn.fr>>
- Netherlands: Nederlands soortenregister <<http://www.nederlandsesoorten.nl>>
- Portugal and Spain: Fauna Iberica <<http://www.fauna-iberica.mncn.csic.es>>
- Britain: NBN Species Dictionary <<http://nbn.nhm.ac.uk/nhm>>
- Slovakia: Databank of Slovak fauna <<http://www.dfs.sk>>
- Norway: Artdatabanken <<http://www.biodiversity.no>>
- Turkey: BIOCES <<http://www.bioces.tubitak.gov.tr>>
- Romania: myNature <<http://mybiosis.org>>
- Sweden: ArtPortalen <<http://www.artportalen.se>>
- Estonia: Estonian Species Register <[http://unite.ut.ee/temp/natmus\\_in.php](http://unite.ut.ee/temp/natmus_in.php)>

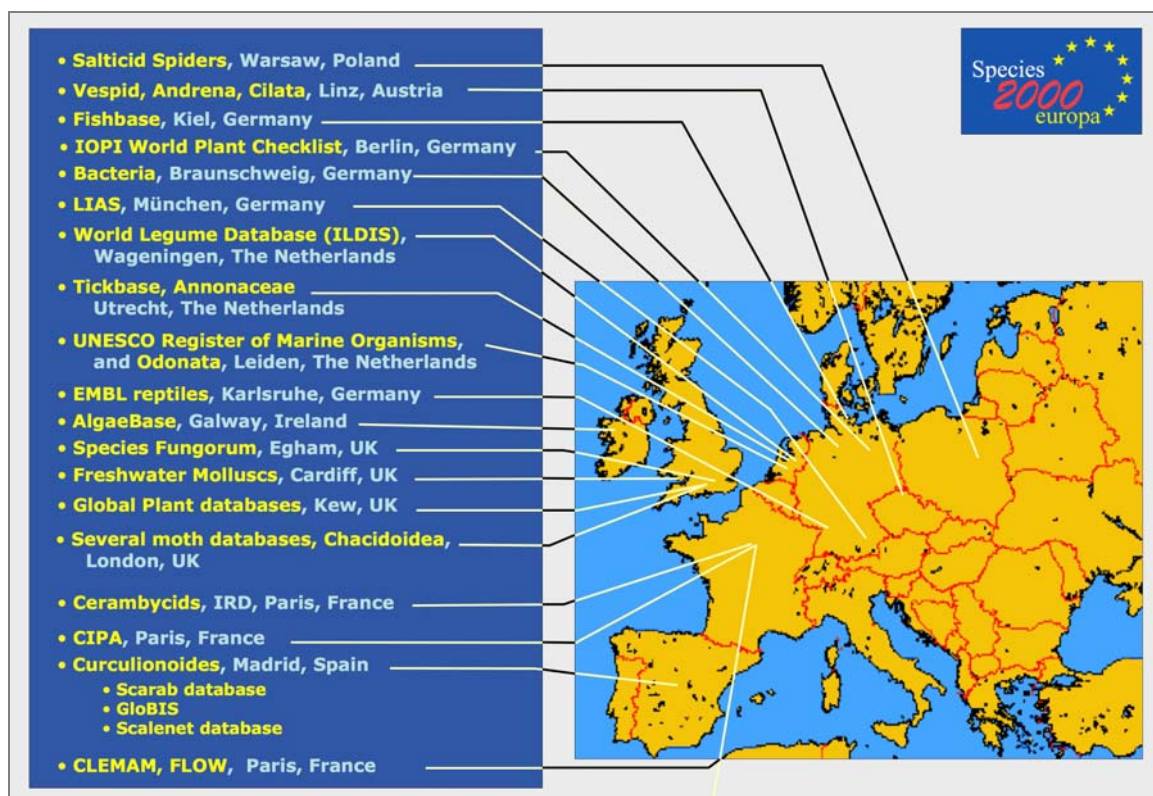


Fig. 9 Overview of Species2000 Europa network of European GSDs.

*Species2000 Europe GSD-network*

PESI will include Species2000 Europa as a partner. Species2000 Europe coordinates a network of 23 Global Species Databases hosted in eight European countries (see Fig. 9).

*European nomenclator services*

Nomenclators coordinated by PESI to reach an integrated European nomenclature service include:

- ZooBank <<http://www.zoobank.org>> World Register of Animal Names.
- IPNI <<http://www.ipni.org>> The International Plant Names Index.
- Index Fungorum <<http://www.indexfungorum.org>> World database of fungal names.
- AlgaeBase <<http://www.algaebase.org>> Listing the World's Algae.

## 3 Impact

### 3.1 *Expected impact*

#### *International cooperation*

PESI is a new step in a series of European initiatives to build state-of-the-art taxonomic and species distribution databases. This means that the existing international cooperation will be continued and intensified. With respect to the spread of knowledge, the continuation of Focal Points and the development of Focal Point Networks will be of utmost importance. Close contacts with locally active organisations allows for the dissemination of knowledge in both directions. The Focal Points provide the European infrastructures with local information, such as occurrence data and local species names and information of national regulations. Conversely, PESI gives national and local organisations access to authoritative taxonomic standards and reliable information from other sources, including other Focal Points. PESI organises meetings and other communication platforms in which Focal Point associates exchange their practical experience in data management and policy-related issues.

From a biological and geographic point of view, it is desirable to extend the European taxonomic infrastructure to comprise the entire Palaearctic region. Cooperation with experts and institutes from the newly independent states of the former Soviet Union needs to be further developed. These countries, as well as Turkey, hold major resources in terms of knowledge and expertise. Therefore, in anticipation of a future Flora-Fauna Palaearctica infrastructure, PESI intensifies the cooperation with Ukraine, Georgia and Turkey. In addition, the production of a Focal Point Handbook will pave the way for new Focal Points to become established.

European, and eventually Palaearctic, integration is an important step towards global integration of knowledge infrastructures. The applicants are very much aware of this perspective, and will therefore also intensify contacts and cooperation with partner initiatives from other parts of the world, notably in North and South America and Australasia.. This global cooperation will take place through the Liaison Board and Advisory Groups, as well as several GDS partners.

#### *Standardisation*

The worldwide application of taxonomic standards will require intense effort over many years to come, followed by regular updates. However, in the framework of the present coordination action, PESI will make a great leap forward in implementing appropriate standards in Europe.

The integration of infrastructures has a standardising effect in itself, as it will eliminate inconsistencies in reference systems and taxon names (e.g. misspellings). Because all major stakeholders in taxonomy will be involved, the standards as defined in WP4 of PESI are expected to have a profound impact. This includes the standardised naming of organisms as well as the technical standards that enable the interoperation of knowledge infrastructures (e.g. GUIDs). Equally important is PESI's contribution to the development and effectiveness of nomenclators. These organisations ensure that new species descriptions are immediately registered in a globally accepted reference system.

Highest priority will be given to organisms that figure in legislative texts and European and national policy documents. This will significantly improve the effectiveness of the various regulations referring to species.

With the involvement of Focal Points in the majority of EU and associated countries, standardisation will spread to all levels of organisation, from European infrastructures to national and local organisations.

#### *Pooling resources*

PESI will pool resources in Europe, both in taxonomic expertise, management experience, and informatics skills and tools, building upon what has been developed by ERMS, Fauna Europaea, and Euro+Med PlantBase. PESI will study how to fill gaps in these registers, particularly in microalgae and protists.

The formal organisation of the European taxonomic work force will be an indispensable support for scientists in this discipline. Taxonomy is a discipline with a long tradition that is facing new challenges and opportunities, not only with the emergence of molecular research but also due to the rapid development of e-Science. A well-organised taxonomic work force will establish best practices and standards, enabling more efficient communication and work and avoiding duplication of effort. Importantly, scientists' contributions to electronic data sources need to be acknowledged as scientific output. This necessitates a consistent registration of intellectual property rights, proper acknowledgement and attribution of data providers, a reliable reference system and also confidence in the sustainability of electronic data sources. Good organisation of these issues motivates researchers and biological recorders to continue contributing to established electronic species directories.

#### *Improved access and service*

This project will coordinate the delivery of a standardised name service for all species in Europe through the inter-operation of the existing data infrastructures and networks of experts, and EU based Global Species Databases. The data resources will become accessible through a single web portal. Some organisms occur in both the marine and terrestrial/freshwater databases. Integration will allow optimal use to be made of these resources. Possible inconsistencies between the databases will be resolved, and upgrades of ERMS, FaEu and E+M can proceed in a synchronised and harmonised manner.

An integrated access system allows for rapid retrieval of all authoritative species-related information. This includes taxonomic history, alternative names and classification, vernacular names in different languages, distribution in time and space, relations to other organisms, relevance to legal provisions, literature references, and names and addresses of specialists who can be consulted, etcetera. The benefits for researchers in the Life Sciences are obvious. However in addition, workers in applied sectors like food production, health and environment are dependent on accessible and reliable information. For instance, when a new disease vector is identified or suspected, the portal can deliver a quick and easy overview of all available information.

In this manner PESI will impact on both the European Research Area and all EU Directives and Policies involving species data, such as the Habitat, Birds, EIA, Water Framework Directives; and Fisheries and Agricultural Policies.

*Sustainability*

PESI will produce a business plan for the long-term maintenance and the regular upgrading of its content of the existing European infrastructures of Euro+Med PlantBase, ERMS and Fauna Europaea, as well as their integration into a Pan-European Species Directory. The necessity of a long-term vision for these infrastructures, which are, after all, the result of a tremendous investment of human and financial resources, is beyond doubt. General confidence in its sustainability adds much value to the infrastructure, as it encourages scientists to contribute to its content, while encouraging users to refer to it as an authoritative source of knowledge.

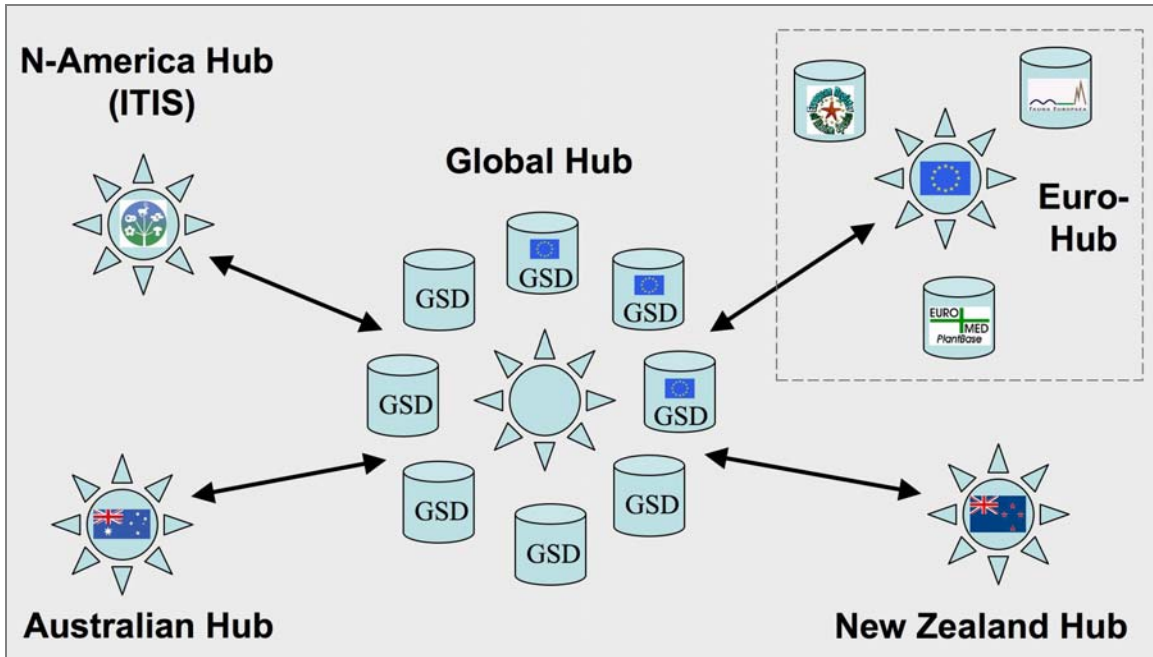
PESI will also develop sustainable approaches to the management and development of taxonomically authoritative species name systems (nomenclatures). One approach is to expand the mechanisms successfully implemented by ERMS and Fauna Europaea (namely the establishment of SMEBD and editorial boards), and FishBase (the formation of a consortium of organisations that agree to support the database indefinitely).

### ***3.2 Spreading of excellence, exploiting results, disseminating knowledge***

The services provided by the current infrastructures will be improved through increased cooperation and delivery of an online portal that will attract more users, and provide web-services to users requiring. This is achieved through WP4 (standards and protocols), WP5 (data integration) and WP6 (e-services and dissemination).

Users will include individual researchers, teachers, students, environmental managers, ecologists, environmental consultants. Organisations that will benefit as users include Species 2000 / Catalogue of Life, GBIF, OBIS, ICZN's ZooBank, and a wide range of European and national institutions that require standardised species nomenclatures for their own data management.

PESI promotes international cooperation by streamlining the delivery of species name services to global initiatives. PESI participates in the worldwide collaboration on the GBIF Electronic Catalogue of Names of Known Organisms (ECAT) program by providing complete, scrutinised taxonomic data sets of European species names. The project results of PESI will also be disseminated through the applicable e-gateways to other global cataloguing initiatives as well, like the uBio 'Taxonomic Name Server', the Catalogue of Life (Fig. 10), EoL, SpeciesBase and OBIS. Furthermore, PESI we will work with global standards development organisations such as TDWG and MMI and support the backwards upgrading of nomenclators like ZooBank when applicable.



**Fig. 10 Outline of the Catalogue of Life architecture showing the three pan-European checklists and the European GSDs as important data supplying constituents of the European and Global Hubs respectively.**

## 4 Ethical issues

The ethical issues as described in the Guide for Applicants do not apply to the present application.

## 5 The PESI Gender Balance and Age Structure Action Plan

From the start, two measures will be implemented to encourage women scientists. First, in order to facilitate attendance to PESI meetings for parents with children, a ‘work-life balance’ programme will be set-up. Consisting of grants for childcare while the parent is absent, this programme will try to support as many persons as possible, within the limits of the budget and the selection criteria. Second, to work towards achieving gender balance, when recruiting personnel, the PESI partner institutions will, as far as national legislation and institutional statutes allow, use gender balance as a criterion in case of choice between equally qualified candidates.

The age structure is a growing concern in the field of taxonomy, as the majority of taxonomic experts are over forty. Scarcity of career possibilities for young scientists now will have repercussions on the succession of retiring specialists later. Also for this reason, PESI intends to facilitate the participation of parents with young children, and consider age structure of the community when recruiting personnel

### *Gender balance and age structure*

- Women shall be encouraged to participate in the management and scientific committees to be established within PESI.
- Gender balance and age structure will be taken into consideration when recruiting personnel.

### *Family-friendly-policies*

- When possible, PESI will support service for crèche care at the meeting or training places of the project. For example, FUB-BGBM will be able to provide crèche care through its newly established family office.
- PESI will consider adapting timetables to make research conferences, training sessions and workshops more family friendly, such as enabling participants to return from such meetings on a Friday or Saturday morning rather than a Sunday.
- PESI will create a flexible and time efficient work setting to support the combination of work and family life through the optimal use of modern internet-communication facilities (e-mail, chatting, Skype, video-conferencing, etc.) and allow adaptable working time and locations.

## 6 Environmental awareness

In view of the impact of CO<sub>2</sub> emission on the climate and other negative environmental effects of air travel, PESI aims to use video conferencing whenever this is an appropriate alternative for meetings.

## Acronym list and glossary

CBD	Convention on Biological Diversity
CoL	Catalogue of Life, global checklist of species names published by Species 2000 on CD
ECAT	GBIF's Electronic Catalogue of Taxa
EDIT	The European Distributed Institute of Taxonomy (EU network of Excellence)
EoL	Encyclopaedia of Life, project for a web based interactive encyclopaedia of all species
E+M	Euro+Med PlantBase. Database of all European higher plants species
ERA	European Research Area
ERMS	European Register of Marine Species. Database of European marine species.
EuroCat	= Species2000 Europa, the European contribution to the global Catalogue of Life
FaEu	Fauna Europaea. Database of European terrestrial and freshwater animal species.
FP7	European Commission Seventh Framework Program
GBIF	Global Biodiversity Information Facility
GSD	Global Species Database
GSIS	Global Species Information Systems
GUID	Globally Unique Identifier: any system that provides mechanisms to identify and access data objects on the Web (i.e. LSID, DOI, Handles)
ICT	Information and communication technology
IPNI	The International Plant Names Index, a database of the names and associated basic bibliographical details of all seed plants, ferns and fern allies.
LSID	Life Science Identifier: a globally unique and persistent identifier system created to overcome current limitations of naming schemes. An LSID names and identifies data resources stored in multiple, distributed data stores.
MarBEF	Marine Biodiversity and Ecosystem Functioning (EU network of Excellence)
MMI	Man Machine Interface. Research group on the human-computer interaction of intelligent multi-modal systems for information and communication technology (Media and Knowledge Engineering).
Nomenclator	Database containing nomenclatural information.
NoE	EU Network of Excellence
PESI	Pan-European Species Directories Initiative
RSS feeds	Machine-readable metadata allowing the transport of pieces of software between WebPages.
SMEBD	Society for the Management of European Biodiversity Data, aiming to make biodiversity data available for the benefit of science and environmental management.
TDWG	Taxonomic Database Working Group: compilers of the Biodiversity
Part-B	

	Information Standards
uBio	Universal Biological Indexer and Organiser. A networked information service for biological information resources.
OBIS	Ocean Biogeographic Information System <a href="http://www.iobis.org">www.iobis.org</a>

## **Annex 1. Letters of Support**