**Creating a Network of Knowledge
for biodiversity and ecosystem services
in Europe**
www.biodiversityknowledge.eu

Overview of experts and requesters of a potential NoK: Mapping knowledge holders, identifying requesters and barriers on how to link them

(Deliverable 1.1 of the KNEU project)

Deliverable compiled with contributions from
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Contents

1 Outline and purpose of the Deliverable

The purpose of D1.1 in the context of designing a network of knowledge (NoK) on biodiversity and ecosystem services is to gain a first overview of knowledge holders and knowledge requesters who could get involved into a future NoK. For this, several approaches were chosen in the first 6 months of the project and work was prolonged for another 6 month as these appoaches required more time to be completed and to produce results.
D1.1 summarizes this work in 3 parts:

Part 1: Mapping biodiversity knowledge holders
Part 2: Interviews and overview of knowledge requesters
Part 3: Identification of communication and exchange barriers between knowledge holders and requesters from a requester perspective

Part 1 shortly summarizes a mapping approach of knowledge holders, which has been compiled in a database and serves as our main resource for contacting knowledge holders for the project. This part was conducted by partner RBINS, with support from all other partners.

Part 2 was conducted by partner ECNC (with support of RBINS and some other partners) and was based on some detailed interviews with potential requesters of the NoK.

Part 3 was conducted by partner ECNC, with support of some other partners. This third part puts the results from part 2 into a broader context of communication challenges between science and society. This analysis provides an important baseline for the further development of the NoK and its components and processes, which are further analysed in D1.2.

2 Part I: Mapping biodiversity knowledge holders

To build a network of knowledge in Europe, we need first to review the current biodiversity landscape in Europe in terms of experts, existing networks and knowledge holders and in a natural next step to understand the flows of knowledge within Europe, i.e. where is knowledge coming from, where does it go and who is playing a key role in this landscape. In addition, the objective is to identify candidates for "permanent knowledge nodes" for a NoK – organisations who can provide timely evidence-based answers to topical questions on current and emerging policy issues and establish with them long-term collaboration schemes in relation to the development of the Network of Knowledge prototype (See deliverable D2.1).
Faced with the complexity of the task, we chose to carry on in parallel two complementary approaches, a first approach using the KNEU project partners to identify and map the main actors for biodiversity knowledge (influencing knowledge flow or policy) and a second approach illustrating more in details how knowledge is generated and transferred between these key players making use of targeted individual interviews.

1/ Approach 1: Mapping of the knowledge landscape on biodiversity in Europe

As a first task, we created an overview of knowledge holders and experts in various fields of biodiversity in Europe: we basically tried to identify and map who are currently the key experts and knowledge holders? This mapping was organized in two phases and primary focused on scientific knowledge. These two phases results were compiled in a database of organizations at different scales (international, European and national) and ranked according their importance for/influence on the biodiversity knowledge flow (See Annex 1 and 2)

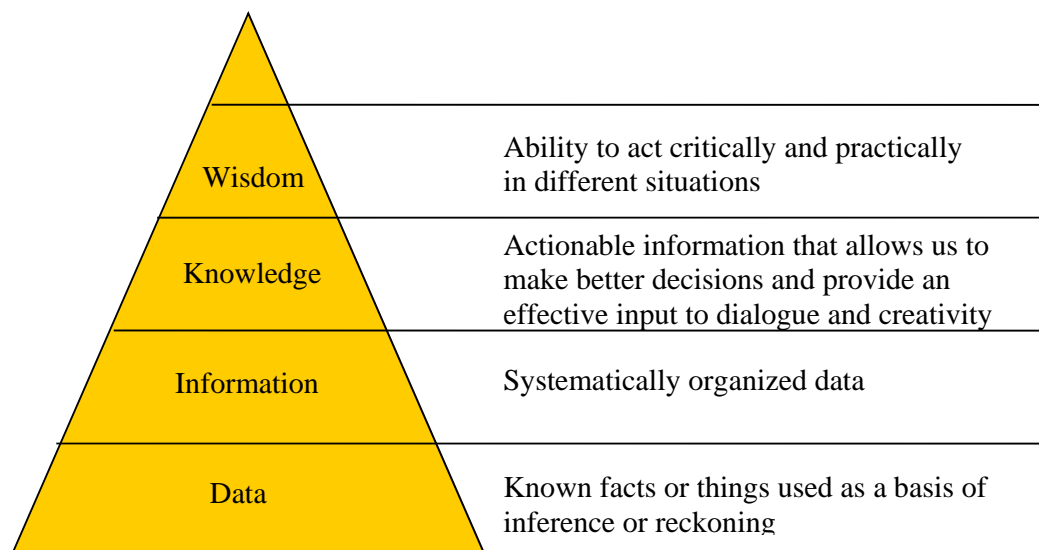### Phase 1: Overview of knowledge holders and experts on biodiversity by KNEU partners

This first phase consisted in a survey sent to every KNEU partner to identify national, European and international organizations (including Research Institutions, Projects, CSOs, etc.) working on biodiversity as either knowledge holders or knowledge users. This first mapping resulted in a list of numerous organizations and contact details that were compiled in a master excel file.

Phase 2: Prioritization

At European and International level, results were very satisfying and could be used as the basis for a prioritization phase. At national level, results were too diverse and unspecific making them difficult to process and use so phase 2 focused on some specific topics in relation to the case studies (i.e. Agriculture, Marine, Conservation).

Feedback from partners also highlighted the need to clarify terms such as knowledge, knowledge flow, knowledge hubs. For the second phase, we agreed to use a common definition of knowledge (see figure 1.1 below or figure 2.1 in Part 3).

Figure 1.1: Knowledge triangle (Magnuszewski et al., 2010)

Wisdom	Ability to act critically and practically in different situations
Knowledge	Actionable information that allows us to make better decisions and provide an effective input to dialogue and creativity
Information	Systematically organized data
Data	Known facts or things used as a basis of inference or reckoning

Phase 2 National level

At national level, Phase 2 consisted in narrowing down the results from phase 1 by asking all KNEU partners to explicitly identify the 4-6 "national knowledge hubs" that have

most influenced Biodiversity knowledge flow in the past 5 years, and that have most influenced policy related to biodiversity and ecosystem services in the past 5 years. They were supposed to identify these "influential" hubs for biodiversity and Ecosystem services in general, and for each of the case study theme: agriculture, conservation and marine. The objective was to identify the critical knowledge hubs in each country and their contact point. Up to now, we collected detailed information for Austria, Finland, Germany, Hungary, France, and Norway.

Phase 2 European and International level
     KNEU partners were also asked to choose 10 organizations among a list of 100 European/international organizations identified in the first phase as the most "influential" hubs for knowledge on biodiversity and ecosystem services. They had to grade these 10 hubs:
1= I am sure it is influential, I have experienced it
2= I am sure it is influential, but I have not experienced it
3= I suppose it is influential, but I have not experienced it
no vote was considered as the organisation being not influential

     The results of the voting for grade 1 in phase 2 are summarized in figures 1.2 and 1.3 (for acronymes meaning see Annex 1 and 2)

Figure 1.2: Non-exhaustive cloud of global (in green) and European (blue) biodiversity knowledge hubs, which received at last 1 vote 1 ("I am sure it is influential, I have experienced it"). SEE NEXT PAGE.

Global and European Knowledge hubs or Initiatives that have influenced most the knowledge flow on Biodiversity and Ecosystem Services in the past 5 years

GEO
ILTER
ITIS
MACIS
Species 2000
ECNC
EEA
GISP
ISEE
LifeWatch
SCB-ES
WFC
BirdLife International
DIVERSITAS
OBIS
Barcode of Life
ECBCHM
GBIF
ICARDA
MARBEF
UN bodies
ALARM
ICES
RUBICODE
Bioversity international
EBONE
GLORIA
SCB
ALTER-Net
CEE
CoML
EPBRS
IUCN IUCN Red List
WoRMS
BiodivERsA
ESSP
IBS
EDIT
SOILSERVICE
CBMP
EIS
ETCBD
GEO BON
IGBP
Bern Convention
CGIAR
IPCC
Smithsonian Institute
CABI
Encyclopedia of Life
ICSU (+ SCOPE)
IWC
WCS
FFI
TEEB
DAISIE
IIED
Euro Natur
GEF
IOC
Nature Serve
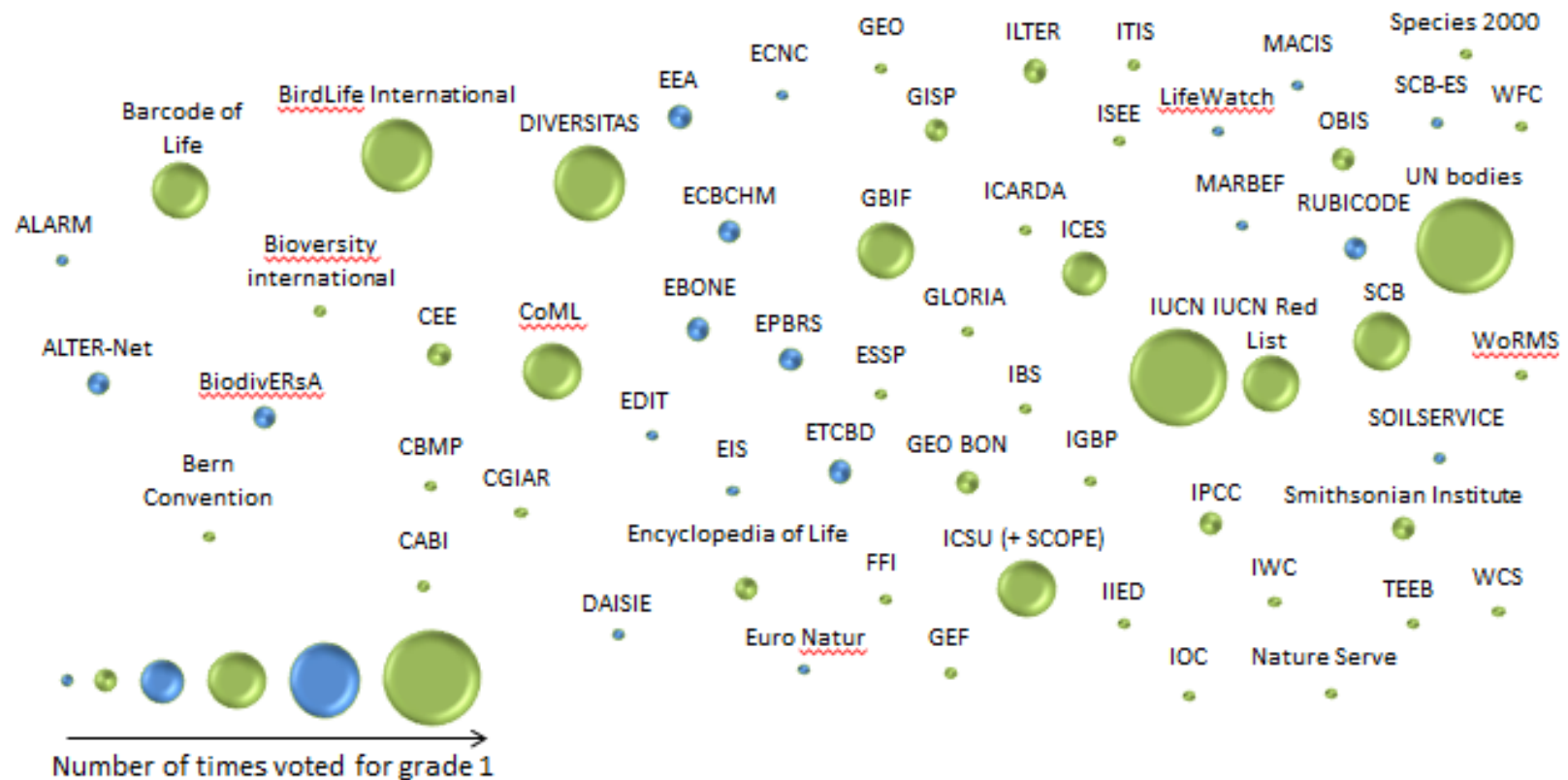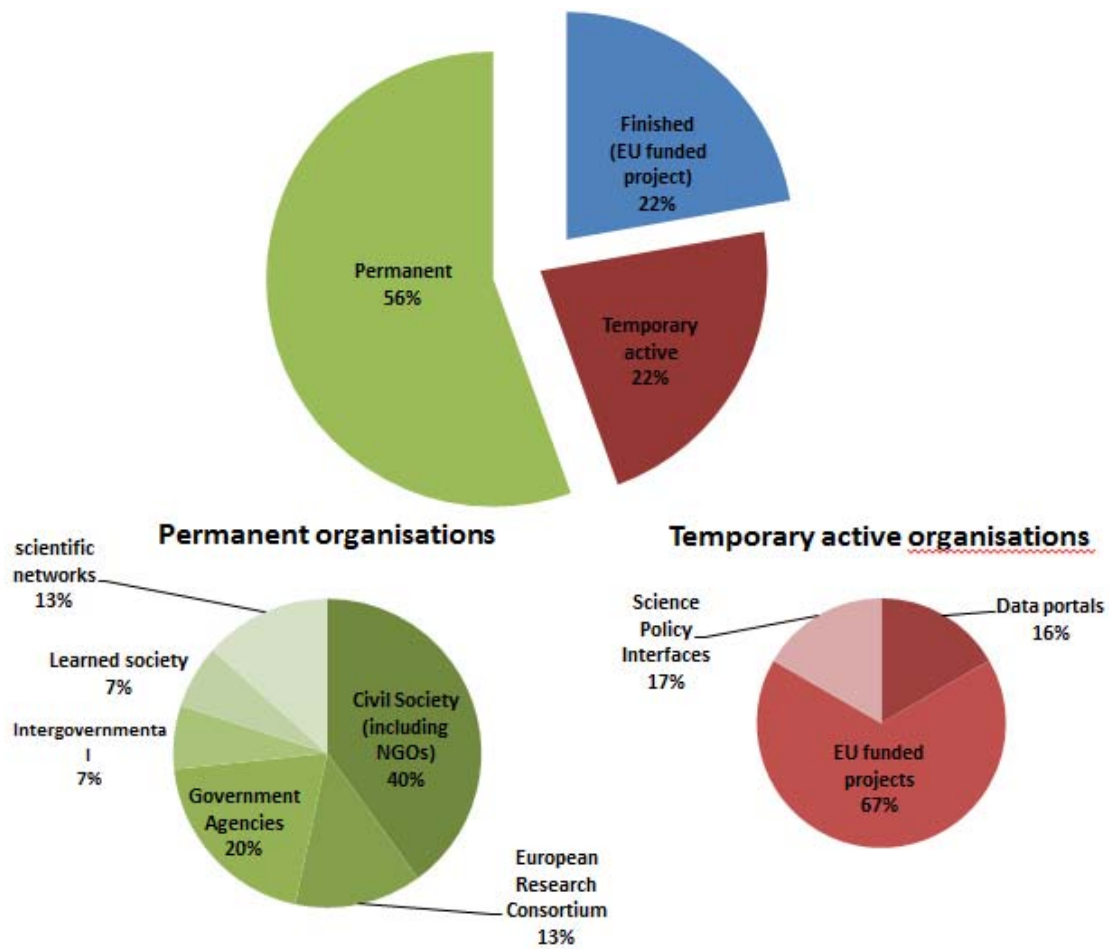
Number of times voted for grade 1

*Figure 1.3: Types of European organisations/initiatives which have been the most voted for (grade 1) as the most influential **European hubs** for knowledge on biodiversity and ecosystem services.*


As a general pattern, participants to the voting agreed more for global organisations than for European ones. They also graded more often 1 for the global organizations than for European ones, meaning that they might have more insights on/ experience and linkages with Global organizations. The most voted global hubs are IUCN and UN bodies (i.e.UNEP-WCMC, FAO, UNFCCC, UNDP, UNESCO); for Europe the EEA and EU funded project were mentioned most often.

From analysing the databases at the European scale (See figure 1.3), we can see that an important part of the knowledge on biodiversity is coming from temporary organisations among which half of them are not active anymore today but had obviously left important traces in the flow of knowledge. The main players within temporary organisation are EU funded projects. This reveals two important points: the importance to finance EU projects for generating and boosting the flow of knowledge and the importance to collect the findings of those project (i.e. the need to centralise the main findings of the EU project) as well as to maintain connections with these projects network after the official end of the project.

Among the permanent organisations, civil society is playing a major role in the flow of knowledge on biodiversity and ES, and especially international NGOs.

*Figure 1.4: Types of organisations/initiatives which have been the most voted for (grade 1) as the most influential **Global hubs** for knowledge on biodiversity and ecosystem services.*
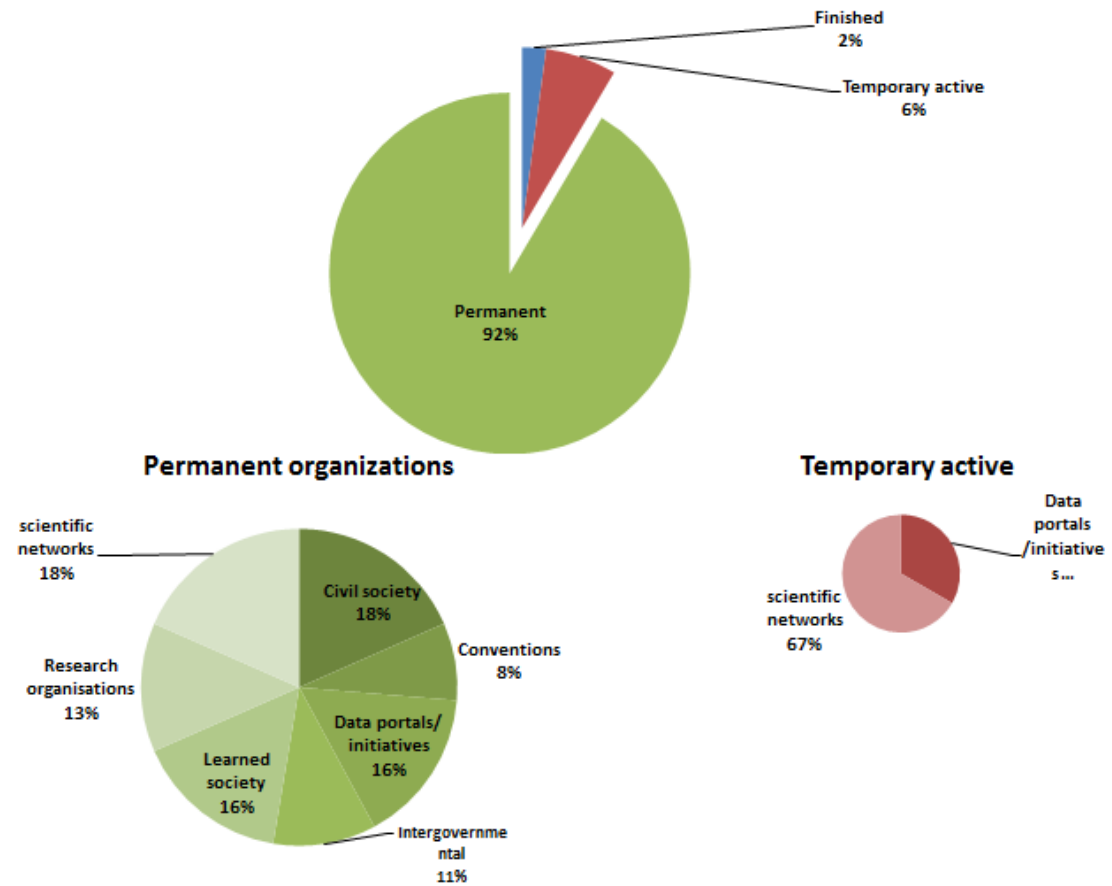
From analysing the database at global level, (see figure 1.4) most of the organisations/initiatives, which the participants are familiar/experienced with are permanent ones. These permanent organisations belong equally to civil society, data portals/initiatives, learned society, scientific networks and research organisations.

The next step (phase 3) currently undergoing, is to send the list of European and International hubs to the contact persons identified in the hubs that received votes. As their organisations have been judged influential either for the knowledge flow or for the policy point of view, it is likely their feedback would be valuable to identify additional hubs they might work with and make some key links between the most influential ones. As this step will be quite time consuming, we will send a first mailing to all contact persons and then contact them personally.

2/ Approach 2: Visualizing the flows of knowledge within Europe

By processing the results of the first approach (Phases 1 & 2), we realized that having a list of organizations, even if they are specific and linked to the case studies, will not be sufficient for developing the NoK prototype. **We also need to understand how these actors interact and work together to better identify the real nodes for biodiversity knowledge.** To build a network of knowledge we need to understand the flows of knowledge within Europe, i.e. where is knowledge coming from and where does it go?
It will also be necessary to establish a sort of "hierarchy" of the flow of knowledge through Europe and to highlight pure requesters of knowledge ("dead ends"), sources of knowledge (1st hand source? 2nd hand source?[...]) and relays of knowledge.
To analyze the current biodiversity knowledge flows, we chose to use an innovative "net-mapping" approach via interviews of key persons to get insights on the reality of how biodiversity knowledge is currently generated and communicated between people/ organizations. This complementary approach aims at visualizing the flows of biodiversity knowledge within Europe making use of this interview-based method and leads to a better understanding of the current landscape for developing an efficient and integrated NoK prototype in WP2 (see deliverable 1.2).

The Net-mapping method

The method is adapted from the interview-based mapping tool called Net-Map (Schiffer and Hauck, 2010). In order to establish the flows while highlighting key nodes on Biodiversity Knowledge, we are interviewing persons working on biodiversity issues in some of the influential hubs identified in the first approach. The main question asked to interviewees is:

 "Who do YOU KNOW has been strongly influencing biodiversity knowledge flow in Europe for the past five years? And how?"

The emphasis is on personal experience and NOT on assumptions or expectations.
The strict protocol we have been following for those interviews is as follows (see Schiffer and Hauck, 2010 for further information):

1) *Step 1: Understanding of the terms used during the interviews*

The main challenge of those interviews was to ensure that every interviewee understood the used terms the same way. For addressing this issue, we compiled a glossary of the main terms and asked each interviewee to read it before the interview. We also reserved some time at the beginning of each interview for discussing these definitions.

The definitions used were as follows (in addition to knowledge definition provided in figure 1.1):

Knowledge on Biodiversity:
Any information that has been processed to support dialogue on biodiversity management and to better decisions making.

This includes information from a wide range of disciplines, and from practical (management) and experience as well as from scientific knowledge, i.e mainly backed by peer-reviewed literature.

Providing knowledge:
People and institutions that possess relevant knowledge in various areas of expertise, including scientists from different fields, practitioners in biodiversity management, administrative bodies, companies, NGOs and indigenous and local people and which redistribute their knowledge (either generated themselves (source) or gained from a source (relay) or combined between new and gained knowledge) to either a restricted number or multiple users.

Knowledge requesting:
People and institutions responsible for the management and policy strategies on biodiversity and ecosystem services that are requesting knowledge related to their responsibility.

Funding:
Any institution that may have an influence on the knowledge provision or request through a flow of money

Knowledge hubs:
Any institution that is important for the flow of knowledge, i.e. main player in the knowledge production/provision or in the knowledge requesting, or in both.

2) Step 2: Identifying the interviewee's major players

The Interviewee was asked to give a maximum of 4-6 major players (e.g. NGOs, research institutions, projects, governmental agencies, ministries, scientific networks, advocacy groups, informal advisory groups of experts…) at different levels (national, European, international).

We eventually provided each interviewee with a copy of the updated database on Biodiversity knowledge holders and requesters, to give them an overview of the potential landscape.

For each given player identified by an interviewee, we recorded as much information as possible, as well as the form of knowledge flow (report, expert consultation, policy briefs…)

3) Step 3: Linking major players

Once the interviewee has provided its main players, we start the process of "linking" players. For each pair of players, the interviewee identifies their relationship related to biodiversity knowledge (1) is player A providing knowledge to player B (act as knowledge provider)? 2) Is player A requesting knowledge to player B (act as requester)? 3) Is player A funding player B (act as funder)?

Then, using the mapping tool, we can obtain a fairly good overview of the biodiversity knowledge network according to each interviewee.

4) Step 4: Prioritisation and weighting of the key players: the tower exercise

Once the mapping and linking steps are done, we collect some additional quantitative assessment as the interviewee is asked to weight the players who have most influenced biodiversity knowledge flow. He/she has to give a number of "rings" according to his estimation of the player's importance.

Interview planning and first results

The interviews have been carried out since April 2011 on European and International experts selected either for biodiversity knowledge in general or for a specific case study theme (i.e. the three demonstrate cases of the project: agriculture and biodiversity, marine and green infrastructure). About 40% of the interview partners were researchers, 30% policy officers and 30% consultant or project officers.

In addition, national experts in Belgium and in Germany are being interviewed to provide some information on how national players interact with European and international ones.

With the results of the first 19 interviews, we were able to highlight the overlaps between the interviews (number of times the same player was cited in interviews, see table 1.1), which are representing key nodes on biodiversity knowledge. We were also able to highlight the gaps, i.e. the missing links between organisations. In addition to mapping flows of biodiversity knowledge provision, the interviews also provided information on the network of requesters (officially requesting knowledge) and funders in Europe for the past five years.

Using the software Visualyzer, we were able to visualize and make some statistical analysis of the knowledge flow. The main two statistical measures are the degree centrality and the betweenness centrality. The degree centrality compares the number of incoming arrows to the number of outgoing arrows and therefore indicates whether a player is acting mainly as knowledge provider or as knowledge requester or has a more balanced role. While degree of centrality measures direct ties, the betweenness centrality measures indirect ties; i.e. how many times is a player on the way between any two other players.

First results of the Netmapping approach are illustrated in figure 1.5 below. Stars indicate organisations with a high betweenness, meaning that they are playing a key role in the knowledge flow paths between institutions, i.e. connecting institutions. Not surprisingly, this includes the Universities, the EC, the EEA and the recently released and quite influential UN-based TEEB study. Main providers of knowledge are in green, while major requesters are in pink.

The preliminary map also shows that some major knowledge hubs anticipated to be important during the planning of the KNEU project, like the national biodiversity platforms and learned societies don't appear at all in these exercise, while others like single research instutions or scientific networks and EU projects don't appear in promiment positions.

This mapping should be considered as a dynamic tool and will evolve over project duration as more interviews are planned.

Table 1.1 : Number of times the same player was mentioned, along with the expertise of the interviewees who were mentioning the players. In blue are the European hubs and in green are the global hubs.

Actors mentioned most often (out of 96 in total)	Number of mentions	Average influence (min 0; max 1)	Which case?
DG Environment	10	0,26	Agric; Conserv; Europ
EEA	10	0,21	Agric; Conserv; Europ; Mar
IUCN	8	0,21	Conserv; Agric; Mar; Europ
CBD	7	0,25	Europ; Conserv
DG Research	6	0,29	Conserv; Europ
UNEP	6	0,14	Conserv; Europ; Mar
International NGOs	5	0,12	Europ; Agric
UN body (general)	5	0,08	Europ; Agric
EPBRS	5	0,07	Conserv; Europ, Mar
DIVERSITAS	5	0,03	Europ

Preliminary conclusions from the exercises on the mapping for the development of the NoK prototype are:

- Well established ways of exchange of knowledge, especially via agencies towards policy bodies, should be analysed further and complemented by a NoK, rather than trying to compete with them
- Especially the needs from requesters from permanent bodies – on the global and the European level need to be discussed in more details (see Part II and III on this matter)
- The role of different forms of knowledge provision needs to be further reflected. Should a NoK only work on a very specific, request-driven basis, or should it also, like many organizations which are to some extend influential, develop tools and products that communicate knowledge broadly.
- Many potential knowledge hubs, especially with an academian background, or not well or not at all linked into the knowledge exchange. Pathways to improve this are unclear as "betweeners" which digest and further distribute knowledge are limited to official bodies like the EEA or the CBD, or come from the international level like global assessment processes (e.g. TEEB)

Figure 1.5: A Net-map of provision of knowledge on biodiversity and ecosystem services
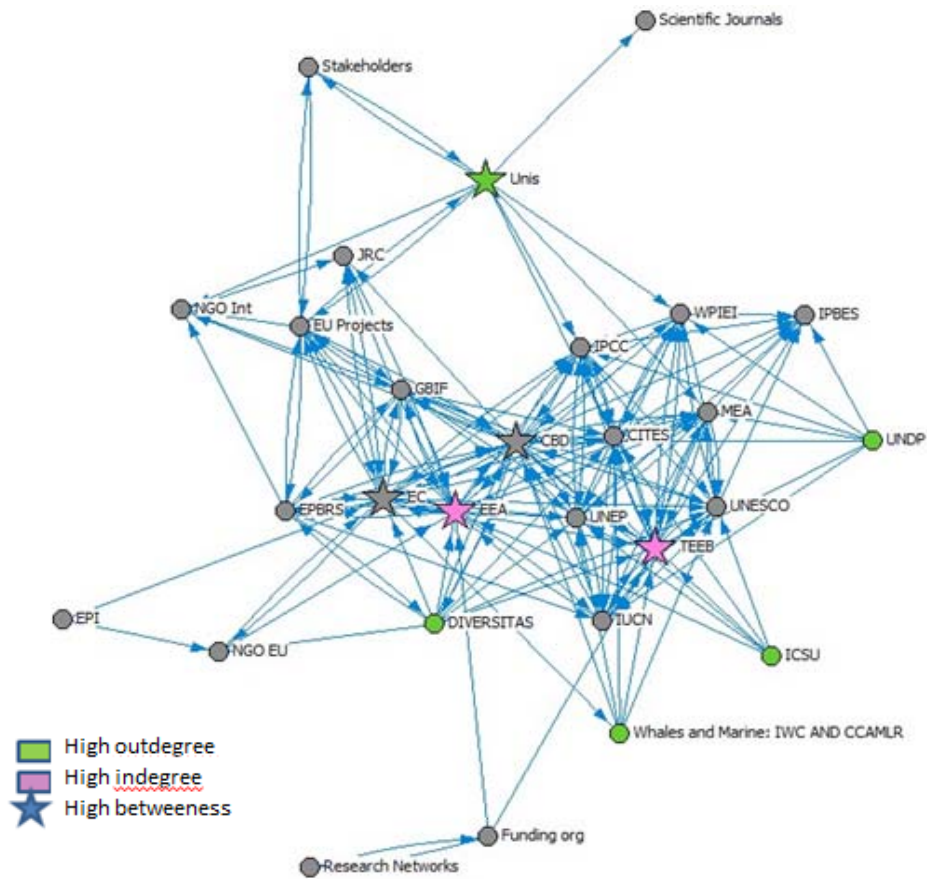
3   Part II: Interviews and overview of knowledge requesters

3.1   Introduction

Knowledge about biodiversity and ecosystem services is well advanced in the European scientific community and there have been a number of projects, research programmes and conferences that have taken these subjects forwards and sought solutions to the main issues. However, on the global as well as the European scale, there is a failure to communicate the knowledge gained to those involved in the policymaking process and to society as a whole. Such communication efforts must ensure that all relevant knowledge is accessible and that all existing biodiversity research communities and other knowledge holders are involved in a network structure that is linked to decision-making bodies.

The overall objective of this European Commission funded FP7 project is therefore to develop a recommended design for a scientific biodiversity Network of Knowledge (NoK) and to inform policymakers and other societal actors. This network shall be open, transparent, flexible, equally accessible to all, independent, scientifically- and evidence-based, and have a robust structure. It will develop links to relevant requesters to support the science-society interface in Europe and beyond. To achieve this, the project brings together expertise from all major biodiversity research fields (in the consortium and beyond).

Within Work Package 1 a structured analysis of stakeholders involved in biodiversity and ecosystem services issues has been performed in order to establish a list of potential requesters of the NoK. The analysis was undertaken with both a wider community of knowledge and information users and within a more thematically focused group of stakeholders who were specifically involved or relevant to the case-study areas.

3.2   Methods

Potential requesters of the NoK and/or biodiversity knowledge holders were identified by the individuals involved in Work Package 1 and its associated tasks together with input from the leaders of the case studies. In addition, participants in the process were able to suggest colleagues or members of their networks who might also be able to be involved. In total more than 45 individuals were sent an e-mail request for their participation; of these a total of 24 responded positively and were therefore included within the interview process.

Interaction with identified potential requesters and knowledge holders was established via phone and face to face interviews in order to get their views, needs and preferences regarding the NoK and to identify the barriers and impediments to knowledge exchange and network building. The summary of the interviews is compiled in this report. This process was systematised using a questionnaire whose content was agreed between project partners.

The following list of questions was therefore used as the basis for an interview with people who may be potential requesters of the NoK. It was framed in a logical sequence (beginning with general questions, moving on to knowledge and information needs and uses, communication barriers and solutions, likely preferences for an NoK, with the option for

additional comments at the end); in to order to get their views, needs and preferences regarding the NoK. The majority of the interviews were conducted in English (which was often not the mother tongue of the interviewees); the questionnaire therefore included prompts for the interviewer to help in communicating sense of each question to the interviewee. The information compiled will be used to assist in the design of the network.

Interviewee:
Interviewer:
Date:

Questions	Response/Notes
General	
Briefly, what are the roles and responsibilities of your current job?	
What kind of activities do you have in your work related to biodiversity?	
Describe one of your typical working days?	
[Prompt: Do you often get to meet and exchange knowledge/ information with people? For which occasion? How often?]	
Knowledge (differentiated from data and information)	Knowledge is a familiarity with someone or something; that can include facts, descriptions, information, and/or skills acquired through experience or education. It can refer to the theoretical or practical understanding of a subject. We are talking about tacit/ implicit knowledge here (as with practical skill or expertise).
What kind of knowledge do you need in your work?	
[Prompt: Is it based on your experience/ expertise/ studies/ research/ empirical/ practical experience; do you find it somewhere else – other people, etc? Is it scientific knowledge/ specific-general/ policy related/ to support decisions/Do you/your organisation have a relation with traditional knowledge holders? etc?]	
To what extent do you rely on/ are your decisions based on your own expert knowledge?	
[Prompt: not required.]	
To what extent do you rely on/ are your decisions based on the expert knowledge of others?	
[Prompt: which others/ other organizations; colleagues, Commission specialists, EEA, JRC, WCMC, etc.]	
How do you keep your expert knowledge up-to-date?	
[Prompt: verbal/ discussions with colleagues/ others; internal seminars; attending workshops and conferences, reading publications – which ones, e.g. scientific journals/ magazines/ newsprint; project reports, organizational reports (EEA, etc, as above), conference proceedings/ documents/ presentations/ etc; books; TV programmes; YouTube; internet.]	
How do you currently access the expert knowledge of others?	
[Prompt: verbal, face to face, phone; written; electronic, etc. Details will be requested below]	
Do you seek any validation of such expert knowledge? (Yes/No)	
[Prompt: If yes, how? How up to date; peer reviewed; comparative evaluation; from known	

Questions	Response/Notes
expert/ organizations (EEA, WCMC, etc)?]	
Accessing data and information	Differentiate from 'knowledge'; here we mean concrete, data and written information.
What kind of information/data do you need to support you in your work?	
[Prompt: mainly written/electronic information and data – not the knowledge that people have 'in their heads'.]	
How and where do you find information and data now?	
[Prompt: Websites (EEA, BISE, UNEP, CBD, IUCN, WWF, others); Google/ other search engines; scientific journals/ magazines/ newsprint; project reports, organizational reports (EEA, etc, as above), conference proceedings/ documents/ presentations/ etc; books.]	
How do you ensure that information and data are and remain valid over time?	
[Prompt: do you/ your contacts always use the same sources or when Google/search do you look for more recent references/sources?]	
How do you ensure coverage: information from the past, cross-lingual, cross-cultural?	
[Prompt: do you/ your contacts always use sources from the same language or do you try to find references/sources in different languages?]	
Barriers	
What are the main impediments/barriers that you find when searching for knowledge, information and data?	
[Prompt: personal conflict/ competition/ confrontation between scientists/ colleagues/ organisations/ institutions/ignorance of the existence and functioning of the other organisation; lack of experts / too busy experts with too few time; lack of personal contact; language; socio-cultural context/approach to science/issues/etc; time; search effectiveness – do you use Google as effectively as it could be; Do you have the necessary resources to acquire knowledge? etc.]	
Do you have any ideas for solutions to the barriers/impediments?	
[Do not prompt them for this question - but link to the list of barriers they have given for the above if they get stuck.]	
Preferences and expectations	
What are your preferences in relation to how and where you gain access to information and data?	
[Prompt: How (quick, fast, easy, free) and where would you like to find information and data; what do you like most now; what would you use more if it was available; etc? Link to above question about how and where they find information and data now - if they get stuck.]	
What kind of expectations would you have for a solution (such as that provided by this project)?	
[Prompt: How best to present, share and combine information? Open access/ restricted access/ password protected; free/subscription; up to date/ validated data and information; human/ avatar or machine based approach; etc.]	
What would be the key elements in such a solution?	
[Prompt: quick, fast, easy, free, network of experts; help desk; internet portal; FAQ; specialists/ specialist groups; etc.]	
Who should maintain / pay for a Network of Knowledge?	

Questions	Response/Notes
Who should be responsible for Science-Policy Interfaces (i.e. is 'science' responsible or 'policy')?	
Any other final questions/ comments to close the interview	
Have you heard of the concepts of adaptive management and evidenced based conservation?	
Evidenced based approach: Evidence-based management (EBMgt) is an emerging movement to explicitly use the current, best evidence in management decision-making. Its roots are in evidence-based medicine, a quality movement to apply the scientific method to medical practice. **Adaptive management** (AM), also known as adaptive resource management (ARM), is a structured, iterative process of optimal decision making in the face of uncertainty, with an aim to reducing uncertainty over time via system monitoring. In this way, decision making simultaneously maximizes one or more resource objectives and, either passively or actively, accrues information needed to improve future management. Adaptive management is a tool which should be used not only to change a system, but also to learn about the system. Because adaptive management is based on a learning process, it improves long - run management outcomes. The challenge in using adaptive management approach lies in finding the correct balance between gaining knowledge to improve management in the future and achieving the best short - term outcome based on current knowledge.	
Are you satisfied regarding the follow up of big research projects and regarding synergies and overview for the many separate events and projects? What should be improved?	
Do you/your organisation have a relation with traditional knowledge holders?	
Do you think that lack of data or that problems related to the knowledge flow are the primary obstacle for your work?	
Any final comments?	

A summary of the answers provided by the potential requester of the NoK during the telephone and face to face interviews is compiled in annex 3. The answers have been grouped thematically and cover the main responses, points of view and ideas put forward by the interviewees, but there is no attribution of the text to specific individuals. For this purpose, 'he' is used in all the cases. Interviewees are staff of UNEP, Council of Europe, EC (DG ENV, DG MARE), EEA, ETC/BD, national and regional Government agencies, European NGOs, research institutions and networks.

3.3 Summary of the responses

The following table provides an analysis of the responses made by the interviewees. The analysis is grouped in relation to the main headings of the questionnaire.

Section 1: General	
Questions	**Analysis/summary**
Briefly, what are the roles and responsibilities of your current job?	Whilst the roles of the 24 interviewees were unique to the individuals they also shared many components in common. Indeed, it proved possible to group them in three categories.
What kind of activities do you have in your work related to biodiversity?	1. **Briefers** This group actively engage in the policy agenda through a variety of mechanisms, in particular: attendance at meetings and workshops (often conditional on their being invited to give presentations or play a defined role in discussions, especially for those in more senior positions); and one-to-one or small group meetings with officials, decision- and policy-makers and politicians or their aides.
Describe one of your typical working days?	
	Presentations are often tailor-made for the audience and may be supported by specially prepared written material in the form of digests of information, short reports and briefings, printed leaflets and other documents.
	This group is mainly comprised of 'knowledge based' professionals who rely on a combination of skills and experience in strategic and interpersonal relations together with a level of background knowledge in the subject material. This can be specific (e.g. grassland ecology) and/or general (e.g. sustainable development, general ecological principles, etc). They can be described as "savvy"; often relying on their wits to manage their engagement with key stakeholders.
	Aside from engaging in the dynamic policy-making process they may "create and collate" information and knowledge for themselves or for others or, if they operate in organisations at a more senior level they may receive it in more digested form exclusively from others (including the provision of ready-made presentations, written and verbal briefings, etc).
	Typically they spend much of their time travelling to and attending meetings or, when they are in their offices, in front of their computers reading and responding to e-mails or on the phone (often with personal expert networks), or in briefings with staff.
	2. **Digesters** This group, while they may have some limited active engagement in the policy process (and there is indeed a level of overlap with the Briefers), tend to be mainly involved in "creating and collating". They therefore spend a lot of time collecting information and knowledge from a variety of sources and distilling it into concise, easily understood and readable form.
	They are highly reliant on their own specialist knowledge and their networks of experts/contacts which may be personal or formalised and associated with specific subject material or projects (and which are often administered by them/ their own organisations).
	Much of their time is spent on the phone, on e-mail and networking with colleagues and others in order to develop the content of briefing material which is provided to a variety of audiences including "briefers" and senior managers in their own organisations (often through verbal/face-to-face meetings), networks and policy makers (through internet links or mailing lists) and the interested public (via web sites and the publication of more 'popular' printed material).
	3. **Implementers** This group are likely to be involved in the direct implementation (at various levels: regional, national, international, etc) of specific policy

areas. This could include the Habitats Regulations, the Bern Convention and a variety of other Multilateral Environmental Agreements. This will require knowledge of, or access to knowledge how to implement the relevant legislation, best practice, case law, etc.

They will spend much of their time accessing information and knowledge about the implantation process via the internet (often in the form of specialist websites), written documentation and technical reports, 'horizontal' networks of colleagues in similar roles and experts and expert networks.

Section 2: Knowledge	
Questions	**Analysis/Summary**
What kind of knowledge do you need in your work? To what extent do you rely on/ are your decisions based on your own expert knowledge? To what extent do you rely on/ are your decisions based on the expert knowledge of others? How do you keep your expert knowledge up-to-date? How do you currently access the expert knowledge of others? Do you seek any validation of such expert knowledge? (Yes/No)	In terms of the three groups identified above, there is some overlap of knowledge needs. However, the broad classifications remain useful in terms of understanding how the groups operate in relation to their needs, use and management of knowledge. 1. **Briefers** Their knowledge comes from a number of sources. These include their "immersion" in the policy process (including meetings, workshops, ad hoc and organised discussions, etc) where knowledge is developed and communicated in a highly 'organic' and dynamic way and information (which supports the building of that knowledge) is largely conveyed verbally. Such communication – in the form of verbal exchanges is often supported by written digests and briefing notes and printed leaflets and presentational material. In such situations speed of thought and action are often of great importance. Strong knowledge and understanding of the policy context in the sphere in which they operate is vital for this group. This can include familiarity with key pieces of legislation (e.g. the Habitats Directive, the Water Framework Directive, Invasive Alien Species, climate change, socio-economic issues, ecosystem services, etc), policy papers, European Commission Communications, briefing notes and other documents. In addition they have to know how to maximise the impact of their engagement with key actors in the field; to know who those actors are, how to gain access to them and how to interact with them. This often requires establishing personal relationships with those people and a good level of interpersonal skills. They also have to know where to find supporting information quickly and efficiently; they must also know where to find people that can direct them to that information or who can provide it to them verbally or in written form. In terms of their day-to-day interactions across the science-policy interface the majority of their decisions and actions will be informed and driven by their own knowledge. However, they rely greatly on the knowledge of others to inform them in relation to the 'bigger picture' about trends, emerging issues, new and relevant information, etc. They often keep this knowledge up to date through their ongoing interaction with the process and the dynamic 'absorption' of relevant information and data. By definition, they will be involved in meetings, workshops and conferences where they will receive input of information that they can transform and inject into the science-policy interface thanks to their knowledge and skills. They access this knowledge via formal and/or personal networks,

briefings and written information from staff, e-mail and phone contact with key contacts. Frequently their points of reference are related to 'live' projects and their network partners. Internet is also used but more for direct information – not for knowledge, and is rarely the main source.

In terms of validation, they normally refer to trusted and known sources and networks.

2. **Digesters**
This group needs knowledge related to the basic subject material (information and data) required to develop briefs and digests. This will therefore relate to: the location of information (reports and grey literature, published papers, websites, newsletters and digests and briefs (produced by others). Their knowledge will also extend to specific contacts and individuals who have valuable knowledge and information, key networks, on-going and completed projects, etc.

They may often be key contacts and belong to important networks that are utilised by Briefers. Indeed, they may act as briefers themselves but their main role is as knowledge (and information) providers.

They know how to gather and collect, collate, summarise and present information in concise and easily accessed format. They will probably also have skills in presenting this to groups, meetings and conferences. They may also know what specific groups expect and prefer (including internal and external audiences) in terms of the presentation and format of information.

The efficiency and effectiveness they employ in preparing briefings and digests is based on their key skills, experience and knowledge. They rely on the knowledge of others to assist them in sourcing and providing information that they can integrate in their own analysis of policy situations and scenarios. They access the knowledge of others through networks, contacts, projects, meetings, workshops and conferences; through e-mails, telephone contact and face to face (often using colleagues). They are also adept at sourcing information through the internet and in finding grey literature and published material.

Their expert knowledge is largely kept up to date as a direct result of their main work related activities. However, they are likely to actively seek attendance at key meetings and workshops and are often involved as key partners in projects whose main goal is to push the boundaries of knowledge in any given field.

As for briefers, in terms of validation they normally refer to trusted and known sources of expertise and formal networks. Many of these sources will be actively engaged in the production of peer reviewed scientific papers and/or will be members of academic or scientific research institutions.

3. **Implementers**
This group are more likely to need practical knowledge in the form of how to implement process in relation to policy (e.g. habitats directive, WFD, EIA, infringement of legislation, etc). This could include, for example, case law, aspects of site designation, ecological knowledge, socio-economic knowledge and knowledge of the process of stakeholder engagement.

Their own knowledge may encompass many of these aspects and in some cases they may have specific expertise in the areas of ecology, law or some other related field. Quite often they are generalists who may have a degree level qualification in one of these fields but who would not describe themselves experts. Depending on factors such as their

experience and the size and structure of the organisations in which they operate, they may often make frequent reference to the expertise and knowledge of others; not only directly but also to interpret information and to guide them to sources of information and knowledge and other experts. Such individuals may operate in the same organisations as the implementers; carrying out specific support functions in terms of the provision of advice to their colleagues. They often belong to professional networks and attend work related workshops and meetings of fellow professionals where experience can be exchanged, and to which experts may be invited to present on particular topics.

They are often adept at sourcing information and expertise in relation to specific subject areas, to briefing senior managers and to 'multitasking' in dealing with a range of parallel, related issues (and to gathering relevant information).

They may be required to keep their knowledge up to date as part of their status as professionals in a given field. Mainly they will update their knowledge through their networks, contact with experts and through "on the job" learning and experience.

As for the other groups, for validation they normally refer to trusted and known sources of expertise and their professional networks.

Generic skills common to all groups include:
- Where to find things
- Where to find people who can find things/ provide information
- Networking

Other points of note include the increasing use of social media as a source of knowledge; in particular the high level of topicality of such reference points.

Section 3: Data and information	
Questions	**Analysis/summary**
What kind of information/data do you need to support you in your work?	Again, the three groups provide a useful division in terms of understanding information and data needs: 1. **Briefers** Members of this group use information to populate their presentations and to support positive (written and verbal) interventions in relation to supporting, changing or framing new policy. In particular they are interested in emerging issues, facts that illustrate particular points that they wish to make, the results of monitoring, trends and predicted future scenarios. However, such information is often provided to them by others and they are less likely to source it for themselves.
How and where do you find information and data now?	
How do you ensure that information and data are and remain valid over time?	
How do you ensure coverage: information from the past, cross-lingual, cross-cultural?	Whilst the information is clearly important to them they are more likely to be interested in what the impact of the information (e.g. in relation to the conservation status of protected areas and species, climate change, fragmentation of habitat, Article 17 reporting, etc) is likely to be in relation to current policy. From this assessment/analysis they are able to decide about their actions in relation to influencing the policy agenda. They will therefore be more interested in digested information and key elements/snapshots that provide power to their arguments. Thus, the information is often provided to them by staff, experts and other contacts in concise verbal (face-to-face or telephone contact) or written format (e-mails, texts and short briefing notes). Often newsletters related to projects, research institutions and organisations will provide useful information and even newspapers. As for knowledge, they normally refer to trusted and known sources

(such as their own staff or close contacts) and familiar and well used networks. They may also make use of reliable websites that contain digested factual information (e.g. EEA, Commission).

Very often this information is supplied to them by contacts that are located in a range of European countries (and beyond).

2. **Digesters**
Information and, to a lesser extent data, is central to the work of this group. In terms of data they utilise statistical, scientific and spatial data. In some cases they utilise raw data. The information they require is normally linked to policy issues and is from an extremely wide range of subjects. It may be environmental and social or economic; species or habitats related; marine, aquatic or terrestrial; about monitoring and indicators; progress in relation to targets; and can be highly specific or general.

The sources of information may be accessed through networks, contacts, projects, meetings, workshops and conferences (as for knowledge); through e-mails, telephone contact and face to face (often using colleagues). They are also highly skilled at sourcing information through the internet and in finding grey literature and published material (from scientific journals, articles, papers, etc). Google, Wikipedia, blogs, twitter are all used as well as custom-made databases. Projects (both past and present) may also be important sources of information and it is often important from a professional perspective to be linked in some way to the projects or to participants within those projects.

Many of the projects and other initiatives and networks that they belong to produce newsletters and other material that provides digests of important and useful information.

As for Briefers, they normally refer to trusted and known sources (such as their own staff or close contacts) and familiar and well used networks. They may also make use of reliable websites that contain digested factual information (e.g. EEA, Commission). In general it is important that published material is peer-reviewed and/or comes from reliable and trusted research and academic institutions and organisations with high reputations. Often they were experts in their own fields and were able to exercise judgement themselves about the quality reliability of information that they had sourced.

Many of these individuals speak a number of languages and are proficient in English. They also belong to networks or have colleagues who are able to provide them with information in a range of languages, often translated into English.

3. **Implementers**
This group often require data and information related to the use the practical delivery of, for example, legislation and regulations. They therefore seek information that is (for example) directly related to the use of legal and financial instruments, the status of particular species and habitats, methods in relation to ecological management, the delivery of ecosystem services, the valuation of biodiversity and the relationship of business to biodiversity.

The sources of information that they use may be accessed through networks, contacts, projects, meetings, workshops and conferences (as for knowledge and similar to the Digesters); through e-mails, telephone contact and face to face (often using colleagues). They may also source information through the internet and find published material (from scientific journals, articles, papers, etc). Google, Wikipedia, blogs, twitter are all used as well as specialist websites that provide information on, for

example, Natura 2000, LIFE+, etc.

Whilst in general they try to use reliable sources time constraints mean that they cannot always validate the information and data that they use. They therefore have to trust that the websites that they access and the written material that they find on the Internet is up-to-date and correct. They are often constrained to English or their native language when accessing such information.

Other points of note include the increasing use of social media as a source of knowledge; in particular the high level of topicality of such reference points.

Section 4: Barriers and solutions	
Questions	**Analysis/summary**
What are the main impediments/barriers that you find when searching for knowledge, information and data?	For both the barriers and solutions the responses (from the three groups) were generic and largely shared between the three groups. The main barriers were therefore: **Information overload**. There was a general feeling among the respondents that there is more production of scientific information and data than there ever has been; to the extent that it may reach the status of "pollution or noise". One of the by-products of this was that many interviewees believed that they are spending time reading irrelevant/out of date material at the expense of more useful and recent material that may simply be metaphorically "hidden from view". One respondent said that: "every week at least one relevant and significant piece of information emerges and it is simply not possible to keep track'. **Lack of time**. Almost every interviewee cited the lack of time as one of the major barriers to searching for and finding relevant knowledge information and data. Time pressure meant (for example): that searches were often restricted to the first one or two pages of references thrown up by Internet search engines, or even restricted to the first three to five references (when there may be better information lying further down the lists); that insufficient time was devoted to discussion with colleagues or with network contacts, etc, about where relevant sources might be found; and that reference was constantly made to the same (old and trusted) documents even though they may be known to be out of date and/or superseded. **Fragmentation of information**. Information is very scattered; whilst there have been some attempts to centralise the sources of information it remains highly dispersed. In addition there is often no link provided between existing portals (e.g. BISE with DAISY). It was also felt that there is no "streamlined starting point"; e.g. a portal or website where it is possible to find a range of different (but linked) sources. **Poorly signposted information**. It is often extremely hard to find information. Interviewees stated that they often know that something exists, a piece of data or information linked to a specific policy area or project, but that it is simply impossible to find it because it is insufficiently tagged for Internet searching. This may often apply to even basic information. A significant proportion of the interviewees were extremely critical of past and present funded projects; both in terms of their failure to make linkages with other, similar projects and in tagging the information for Internet searching. They also suggested that when and if these websites are found, then the information is not organised in a policy relevant way and is therefore hard to single out and. The point was also made that information on research projects is often difficult to access; and information, results and reports often "disappear" when the project is over.

Linked to this heading, it was felt by some that increasingly questions are becoming extremely specific and that it he is therefore increasingly difficult to find relevant information and material using standard search techniques on the Internet all when seeking experts who may have related information.

Restricted access. In many cases there is a financial barrier to gaining access to published information. Where a subscription and password is required this is sufficient to put off many individuals. Whilst open access is a high ideal that is frequently not realised in practice. Linked to this is the problem that data and information are owned by (research, institutional or project) groups who want to keep it confidential until the results are published. In other cases universities, private/public institutions want financial remuneration (or at the very least some sort of partnership in projects, etc) if they are going to have to share data. If there is no money available to compensate them they certainly will not share the data.

Lack of coordination/collaboration. Criticism was aimed at the lack of coordination between (potentially linked) projects and the data and information which they generate. In addition different institutions across Europe often do not know what others are doing; leading to a failure to exchange information among data producers and people working on a similar topic. Furthermore people in different departments/ ministries/ institutions simply do not talk to each other and it is therefore difficult to be integrated and horizontal. This even extends to poor exchange or internal information between people who work closely together.

The lack of coordination was also a problem in relation to coordination over subjects or processes that are the same or similar but which are dealt with in different ways in different places/institutions/organisation/ etc. Examples given included methodologies in relation to habitats, ecosystem restoration, ecosystem services, etc.

Lack of knowledge. Was cited as a barrier in relation to simply not knowing what is available. Examples included emerging issues, funding programmes, projects, leading-edge research, etc.

Lack of/availability of data. A number of points were made in relation to the difficulty that exists in finding data, a lack of available data and the difficulty in getting up to date data (most of it being 2-3 years old at best). National datasets are not fed into the EU level and there is often a problem in finding raw data, in particular where these relate to several countries and need approval from all of them for it to be made available. In this respect there are often legal constraints and barriers restricting access to data and data exchange.

Data dealing with sensitive issues are often not available or spread publicly. There can frequently be national resistance to giving certain data because of the unforeseen costs/implications of handing it over. Often there is a juridical problem where directives overlap that complicates data retrieval.

In addition verification of data and information often takes some time or, there may simply be no data or indicators in certain specific fields and no one to coordinate concerted effort to remedy such a situation.

Other. A number of other points were made including:

- Experts in a particular field are often not available and this acts as a barrier to information and knowledge exchange and access. Indeed, there may not be enough people dealing with a particular issue (all too many making it hard to identify useful sources).

	• Failure to learn from past lessons. This results in, for example, significant duplication of effort in relation to project formulation and implementation; dealing with directives *de novo* when similar directives have been dealt with successfully in the past, but no reference is made to this work. • A lack of political continuity often results in a reduction in the continuity within state sponsored organisations and institutes and that reduces the flow of data and information and the sharing of information.
Do you have any ideas for solutions to the barriers/impediments?	The solutions are derived from the drivers provided by the barriers listed above. Most respondents recognised that there are probably few solutions for the current time pressures that they face and that 'lack of time' is always likely to be an issue. However, it will be seen that many of the solutions are directly linked to increasing their efficiency and effectiveness of operation (and therefore are timesaving solutions). There was a general feeling that any solutions should be open environment, **open access** and delivered at no charge to the user. This was linked strongly to the idea that access to published information should largely be free. The following headings can be seen to be linked: **Centralisation/ streamlining of information**. This solution was suggested as a direct response to the barrier created by highly fragmented information. Many interviewees therefore felt that the information should be centralised and available on one or a small number of influential and highly visible websites. Such a site or sites should contain all the latest information and knowledge including information about the latest developments and newly published material. Such sites might also be equipped with search engines that were more selective than (e.g.) Google and able to discriminate information and discard unnecessary references. The proposal for streamlined starting points encompassed a number of other ideas such as a web-based information page which informed about new developments including alerts about new information recently published; a port of call for European biodiversity that linked to institutional/reputable sources of published work; and a European Commission website on EU policy. Linked to the idea of centralisation/streamlining, was the proposal that each country should have its own knowledge hub, institution, Ministry (or some such function) that would network between different organisations to make information accessible in a single place. The EEA was proposed as an organisation that could promote joined up thinking. In addition it was proposed that centres of excellence could be created. **Thematic presentation of information**. Linked to the centralisation and streamlining of information was the idea/strong hope that information should be presented thematically. However, it was clear that the majority of interviewees would want that any such themes should be directly related to the policy agenda. Thus information should be presented by topic or theme; and that the themes should be linked to existing 'hot policy topics' and emerging policy issues. Regardless of the creation of any new centralised portals/sources of information it was felt that this thematic approach should be applied to existing websites (e.g. BISE, EEA, etc).

	Digests/briefings. Linked to the thematic presentation of information (but also in relation to existing portals/ websites/ etc) information should be made available in concise, digested form and written in plain English. According to respondents "concise" could be anywhere from 1 to 2 pages of concise text to a 15 page document summarising a particular policy issue or topic. The majority tended towards the shorter (1 to 2 pages).
	Respondents were particularly positive in relation to the newsletters (of which there are many) produced by the commission, EEA and other organisations that provide regular digests of current and emerging issues.
	Filtered information. Another aspect of providing briefings/digests was to ensure that information is filtered at source. In other words what is available has already been through some form of editing/selection process to ensure that it is concise and relevant. Respondents criticised (for example) certain project and other websites for failing to provide summarised information which, in a time constrained situation, means that the searcher is unlikely to go any further.
	This point links to the one above about equipping sites with search engines that are more selective than (e.g.) Google and able to discriminate information and discard unnecessary references. It was also suggested that there could be a team working daily on filtering information (e.g. along the lines of the Science for Environment Policy newsletter).
	Tools/mechanisms for information exchange. The provision of knowledge hubs to exchange information was supported by a number of other suggestions. For example, one person could be dedicated to knowledge sharing in each Ministry (at a country level); networks that circulate important information should be maintained/set up and where appropriate could engage national experts; a reliable source could be established from which questions could be asked with replies being supplied over short time scales.
	Validation. The last point links to the issue of validation, and a desire that sources ensure the reliability and validation of the data and information that they provide (to avoid the searcher themselves having to carry out the validation).
	Database creation. Common portals for raw data (e.g. similar to the EMODNET initiative) should be supported and set up. The basic principle for their operation being that raw data can be supplied and brought together for processing and analysis by researchers; research institutions can take the data and provide processed data and information in report form (if necessary in short summarised format) to key information users.
	IT solutions. Many aspirations were expressed in relation to IT solutions including advanced search engines (already mentioned above), better knowledge and availability of systems for sharing reports, references, etc, visual thesauruses, increased efficiency of tools such as Google translate and use of technology such as videoconferencing and online meetings.
	Social media. Greater use of twitter and other social networks was advocated

Section 5: Preferences for and expectations of the NoK	
Questions	**Analysis/Summary**
What are your preferences in relation to how and where you	Clearly the solutions to the barriers outlined in section 4 provide an extremely important reference in relation to the preferences for, and expectations of the NoK expressed by the interviewees. These, together

gain access to information and data?	with the following notes should be utilised as a significant point of reference in terms of the NoK design and content. The following were therefore put forward, summarised under thematic headings:
What kind of expectations would you have for a solution (such as that provided by this project)?	**IT**. The system should be Internet-based.
What would be the key elements in such a solution?	**Open access**. The view that it should be open access was held by many interviewees. It should be pertinent to civil society. Linked to this it should have no login or registration requirements or password protection and should be available to external stakeholders in order that everybody should have the same level of information. (Although it should be noted that a minority of respondents suggested that there should be two types of access: restricted, for sensitive information and open for the rest of the information).

Functionality. In general it should be easily accessible, fast, simple and reliable. As far as possible it should offer full coverage/ completeness in relation to the topics it included. One or two interviewees said that it should be "something like BISE"

Specifically it should be a portal based approach, which provides clear and simple guidance on navigation to the user; supported by quality control and well-managed.

Content. It should be a central repository of information which collates the information around a number of key areas or clusters. Primarily these should be directly linked to the current, live or emerging policy agenda. Secondarily they could link to (e.g.) habitats, species, research topics, monitoring, etc.

As far as possible it should represent a "one-stop shop '. It should therefore be comprehensive in this coverage; and deliver a level of completeness (anything and everything about an available topic including policy, references, most up-to-date information, etc).

Other content related features might include:
- Compilations of news and important results, publications and ongoing projects.
- Up to date (and should be regularly updated)
- Say clearly what it doesn't provide, contain or cover.
- Validated at source.
- Multidisciplinary.
- Classified by topic.
- The issues should be layered, in concentric layers in order to extend a search working from detailed to more extensive and vice versa.
- The format should be user friendly and easy to the reader with clear illustrations/representation of information.
- Use language that can be related to the audience.
- Use visual and map based information.
- Provide a database of databases (and of what else might be available).

Links and networks. Where relevant it should also provide adequate links to websites featuring relevant live topics and information. It should also give details of key networks and projects (completed, ongoing and future) of relevance to the policy topics; and indicate clearly how they may be accessed.

It was felt that it might also provide a way to contact the right people quickly; by e-mail or chat.

Other features. Suggestions included:
- A helpdesk who could point at sources, provide a link to who has the

	information or answer the question directly. • Have help tool (i.e. like word) where it is possible to type a question and get a list of connected answers already elaborated. • FAQ are not required One interesting proposal was that it should take a social networking type of approach. From this perspective it could be organised (or include section) that resemble a social networks such as LinkedIn or Facebook.
Who should maintain/ pay for a Network of Knowledge?	In terms of who should maintain and pay for a network of knowledge there were a number of proposals which can be grouped as follows:
Who should be responsible for Science-Policy Interfaces (i.e. is 'science' responsible or 'policy')?	**Government/Government or European Institutions.** The European commission, national governments and government sponsored organisations (e.g. EEA, etc). **Research/academic institutions.** For those institutions that have knowledge management as their core business it was proposed that they should (e.g.) make the maintenance of a network of knowledge part of their internal strategy and therefore their core funding and that they should use it to secure more funding; this representing a highly pragmatic and achievable perspective. Such funding might come from government and/or European level. **Subscription-based.** Those that use the system (like polluter pays principle) and those that can pay should pay and would subsidise NGOs and other smaller institutions (criteria to be determined) who cannot pay or pay a genuinely low subscription fee. **Private sector.** Several interviewees mentioned that financing by the private economic sector should be avoided, but others considered that sponsoring options from innovative approaches of private economy should be checked and considered. In relation to the second question about who should be responsible for science policy interfaces there was again a variation in opinion. Thus: **Science policy organisations.** Were seen as having a specific role and responsibility for the interface because they know about both policy and science. Organisations that were seen to potentially fulfil this role included the EEA, IUCN (for species and ecosystems) and a number of research and/or academic organisations and institutions. **Science and policy working together.** Science would be responsible for content of the NoK and policy would be responsible for financing and infrastructure. Organisations such as those mentioned above could play a coordinating role in bringing science together with policy makers and practitioners.

Section 5: Other relevant questions/ comments	
Questions	**Analysis/summary**
Have you heard of the concepts of adaptive management and evidenced based conservation?	The great majority of the interviewees had heard of both concepts (19 out of 24 interviewed).
Are you satisfied regarding the follow up of big research projects and regarding synergies and overview	The great majority (21) were unsatisfied with the follow up of research projects and the visibility of on-going and completed projects. It was felt that very often, once the project is finished, there is no follow-up. In general it was felt that the products of the projects are not used

for the many separate events and projects? What should be improved?	after the project finishes. In order to address this follow up should be specified in the contract in order to force the project to keep running, at least on a small scale. Guidelines for follow up should be part of project results and every project should have an organisation in it that will take it on and continue to update it.
	When it is possible to find project contents then they are very often presented poorly. There is little effort or understanding of the need to present the information and data in order that it is directly relevant to policy issues (indeed, projects often tend to pursue non-policy relevant questions); and that it can be quickly and easily understood and accessed by policymakers or those who work with policymakers to brief and influence them. There is no common entry by topic, they rarely have executive summaries that are clear and accessible and the outputs that are available are too technical, too long and too complicated.
	It was very difficult to find the outputs of projects or their current websites; there is no effective database of projects and where they do exist they rarely have useful content (e.g. executive summaries, research reports and published papers) which has been tagged to appear on Google in relation to relevant searches. Publications and outputs of projects should be widely available in open access (but very often are not).
	Billions are spent (it was stated) but the dissemination systems are completely outdated. In many cases this results in duplication of effort in new projects and a waste of further funding. Furthermore there is very little sharing of information between the researchers and scientists who implement projects and fellow experts.
Do you/your organisation have a relation with traditional knowledge holders?	The majority of interviewees (14) did not have any relationship with traditional knowledge holders. 3 said it was indirectly related or marginal to their role and 7 replied positively.
	Of the positive responses, a number related to work with farmers and land managers who hold traditional knowledge, others were linked to volunteer work and citizens science whilst a small number actually worked with indigenous people (including the Saami people).
Do you think that lack of data or that problems related to the knowledge flow are the primary obstacle for your work?	The majority of respondents said that this was not a significant issue for them.
Any final comments?	A recurring theme related to the relationship of the Biodiversity Knowledge project to IPBES. A desire not to duplicate with existing systems (e.g. BISE) and build on existing systems (e.g. EEA and BISE) was also expressed. It would be good to include social sciences and economic aspects in relation to biodiversity within any NoK. Training linked to a special source of information (perhaps linked to the NoK) would be helpful for people who are entering field of science policy interface.

3.4 Summary and Conclusions

In total 24 individuals agreed to be interviewed as part of the project. Whilst they were each fulfilling a unique role with specific responsibilities, it was still possible to organise them into a number of distinct categories: 'Briefers', who as a group were most actively engaged in the

policy agenda; 'Digesters' who, while they may have some limited active engagement in the policy process (and there is indeed a level of overlap with the Briefers), tend to be mainly involved in "creating and collating"; and 'Implementers' who are more likely to be involved in the direct implementation (at various levels: regional, national, international, etc) of specific policy areas.

Their needs in terms of knowledge, information and data also varied according to their broad roles. Thus Briefers derive knowledge from a number of sources including their "immersion" in the policy process (including meetings, workshops, ad hoc and organised discussions, etc) where knowledge is developed and communicated in a highly 'organic' and dynamic way and information is largely conveyed (from and to them) verbally; Digesters tend to need their knowledge related to the basic subject material (information and data) required to develop briefs and digests; and Implementers are more likely to need practical knowledge and related information in the form of how to implement process in the context of national and international policy.

It was possible to identify a set of generic skills common to all groups including: where to find things; where to find people who can find things/ provide information; and well-developed networking skills.

For both the barriers and solutions the responses (from the three groups) were generic and largely shared between the three groups. The main barriers were therefore:

- Information overload.
- Lack of time.
- Fragmentation of information.
- Poorly signposted information.
- Restricted access.
- Lack of coordination/collaboration.
- Lack of knowledge.
- Lack of/availability of data.

The solutions were derived from the drivers provided by the barriers listed above. Most respondents recognised that there are probably few solutions for the current time pressures that they face and that 'lack of time' is always likely to be an issue. However, it will be seen that many of the solutions are directly linked to increasing their efficiency and effectiveness of operation (and therefore are timesaving solutions). The main suggestions included (see Part 3 on barriers for a more detailed discussion):

- Centralisation/ streamlining of information.
- Thematic presentation of information.
- Digests/briefings.
- Filtered information.
- Tools/mechanisms for information exchange.
- Validation.
- Database creation.
- IT solutions.

- Greater use of social media (e.g. Twitter, Facebook, etc).

Clearly the solutions to the barriers provided an important reference for the expressed preferences for, and expectations of the NoK. Thus the system should be Internet-based and it should be open access (and pertinent to civil society). Linked to this it should have no login or registration requirements or password protection and should be available to external stakeholders in order that everybody should have the same level of information. (Although it should be noted that a minority of respondents suggested that there should be two types of access: restricted, for sensitive information and open for the rest of the information).

In general it should be easily accessible, fast, simple and reliable. As far as possible it should offer full coverage/ completeness in relation to the topics it included. Specifically it should be a portal based approach, which provides clear and simple guidance on navigation to the user; supported by quality control and well-managed.

It should be a central repository of information which collates the information around a number of key areas or clusters. Primarily these should be directly linked to the current, live or emerging policy agenda. Secondarily they could link to (e.g.) habitats, species, research topics, monitoring, etc. As far as possible it should represent a "one-stop shop '. It should therefore be comprehensive in this coverage; and deliver a level of completeness (anything and everything about an available topic including policy, references, most up-to-date information, etc).

Where relevant it should also provide adequate links to websites featuring relevant live topics and information. It should also give details of key networks and projects (completed, on-going and future) of relevance to the policy topics; and indicate clearly how they may be accessed. It was felt that it might also provide a way to contact the right people quickly; by e-mail or chat.

Suggestions for other features included: a helpdesk who could point at sources, provide a link to who has the information or answer the question directly; a help tool where it is possible to type a question and get a list of connected answers already elaborated.

One interesting proposal was that it should take a social networking type of approach. From this perspective it could be organised (or include section) that resemble a social networks such as LinkedIn or Facebook. Indeed the prominence of social networks as a new and extremely topical source of information especially in terms of identifying and tracking emerging issues was an important and highly relevant finding.

There was no consensus on the means for funding and sustaining a NoK. The views were split between it being a role for the Commission or its institutions (such as the EEA), something to be maintained by one or more academic or research institutions as part of their core business or a role to be divided among a selection of both these groups.

Among the other comments made, specific criticism for the availability of data and information from funded projects (and solutions to this problem) featured prominently; the possibility of training for those new to the science policy interface was also raised.

4 Part III: Identification of communication and exchange barriers between knowledge holders and requesters from a requester perspective

4.1 Introduction

Knowledge about biodiversity and ecosystem services is well advanced in the European scientific community, and there have been a number of influential projects, research programmes and conferences that have taken the subjects forward. However, on the global as well as the European scale, there is a failure to communicate the knowledge gained to the policymaking process and society as a whole. Such communication efforts must ensure that all relevant knowledge is accessible and that all existing biodiversity research communities and other knowledge holders are involved in a network structure that is linked to decision-making bodies.

The overall objective of the Biodiversity Knowledge initiative, via the platform provided by the EU FP7 project 'KNEU: Developing a **K**nowledge **N**etwork for **EU**ropean expertise on biodiversity and ecosystem services to inform policymaking economic sectors' is to develop a recommended design for a scientific biodiversity Network of Knowledge (NoK) to inform policymakers and other societal actors. This network shall be open, transparent, flexible, equally accessible to all, independent, scientifically- and evidence-based, and have a robust structure. It will develop links to relevant requesters to support the science-society interface in Europe and beyond. To achieve this, the project brings together expertise from all major biodiversity research fields (in the consortium and beyond).

The broad range of disciplines and approaches in relation to biodiversity and ecosystem services results in expertise being widely scattered among research organizations and institutions as well as civil society organizations, which hold significant resources in relation to practical and empirical knowledge, business and administrations. Although a good basic overview exists on the science side from major networks and projects, this knowledge is rarely analysed with respect to its policy context and how it can be accessed. This applies even more to the practical knowledge held by Civil Society Organizations and other stakeholders which are also relevant for developing the NoK. As a starting point for setting up the NoK prototype it is essential to first produce an overview of this knowledge landscape. In addition, the means for involving this wide landscape into a NoK need to be assessed, through exploring potential barriers to the transfer of knowledge and also potential technological measures for a future use in this respect.

This issues will be addressed in Work Package 1 (WP1) of the project, which will provide an overview of expertise and knowledge holders on biodiversity and ecosystem services in Europe (Task 1.1); a mapping of the potential requesters/stakeholders of the NoK in relation to the various biodiversity fields and in particular to the content of the case studies (Task 1.2); an analysis of the barriers to knowledge transfer, specifically as a basis for defining the future structure and processes involved in maximising the effective functioning of the NoK

(Task 1.3); and a review of technological approaches to create structures to organize and access experts for different kinds of policy oriented questions (Task 1.4).

This report is part of Task 1.3 and will help to better understand current barriers to knowledge transfer and will make a specific contribution to defining the most effective and efficient organizational structure and processes required for overcoming these barriers in a fully-functioning NoK, being an important basis for setting up the prototype NoK in WP2.

The analysis of impediments to knowledge provision and barriers to communication has been the subject of significant previous work and study. This review is based on a number of useful pieces of work that have been published recently (for more details follow the links provided in the references chapter), and which provide a significant contribution to this report. In addition, this document has integrated: the results of Task 1.1 and Task 1.2; the interaction with identified requesters and knowledge holders via phone and face to face interviews to identify barriers and impediments to knowledge exchange and network building; and the results of the first workshop of the 'KYOTO - Knowledge Yielding Ontologies for Transition-based Organization' [1] FP7 project, which focused on environmental knowledge, transition and exchange, and which are summarized in the project deliverable 11.2.

4.2 Definitions

In the scope of this part III, the following definitions should be considered in addition to the definition in part I (pages 8-9):

Communication: is the activity of conveying meaningful information. Communication requires a sender, a message, and an intended recipient, although the receiver need not be present or aware of the sender's intent to communicate at the time of communication; thus communication can occur across vast distances in time and space. Communication requires that the communicating parties share an area of communicative commonality. The communication process is complete once the receiver has understood the message of the sender (Wikipedia, 2011). Some argue that the communication process is only complete when the receiver has not only understood the message of the sender but also acted on it.

Communities of Practice: groups of people who share a concern, a set of problems, or a passion about a topic and who deepen their knowledge and expertise in this area by interacting on a ongoing basis (Wenger et al., 2002 in Magnuszewski et al., 2010). The concept was originally developed for business environments, but in recent years it has also been used to analyse inter-organizational collaborations and extended peer communities in policy processes in general. Communities of Practice can be understood as social forms to manage and generate knowledge. One key advantage that prompts the establishment of such communities of practice is effective knowledge-sharing among their members (Magnuszewski et al., 2010).

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[1] http://www.kyoto-project.eu/

<u>Data</u>: (1) sets of information points, often quantitative or numerical and usually coded in a systematic way. In a scientific context, raw data are generally measurements from experiments or observation which may then be transformed in various ways (aggregated, sorted into categories, cleaned) (Conservation Commons, 2011). (2) Known facts or things used as a basis of inference or reckoning (Magnuszewski et al., 2010).

<u>Explicit knowledge</u>: or 'know that'. Knowledge that has been or can be articulated, codified, and stored in certain media. It can be readily transmitted to others (Wikipedia, 2011).

<u>Funding</u>: (1) any institution that may have an influence on the knowledge provision or request through a flow of money. (2) Funding is to provide resources, usually in form of money (Financing), or other values such as effort or time, for a project, a person, a business or any other private or public institutions. When a request for funding is made then fundraising is being attempted (Wikipedia, 2011).

<u>Information</u>: (1) the concept has a much looser meaning than data but may generally be thought of as implying descriptions of the world intelligible to others but not necessarily embodying a powerful conceptual or analytic framework (Conservation Commons, 2011). (2) Systematically organized data (Meadows, 2001 in Magnuszewski et al., 2010, see figure 1.1) or data that is endowed with meaning, relevance and purpose (Magnuszewski et al., 2010). (3) According to cognitivistic approaches information is data with meaning (Gazzaniga, 2002 in Magnuszewski et al., 2010).

<u>Knowledge</u>: (1) the concept of knowledge is taken to entail an understanding of processes, concepts and contexts (Conservation Commons, 2011). (2) Knowledge may be considered as 'actionable information' (Jashapara, 2004 in Magnuszewski et al., 2010, see figure 1.1) that allows as to make better decisions and to act on it. Knowledge may be divided into two kinds: tacit knowledge and explicit knowledge (Polanyi, 1967 in Magnuszewski et al., 2010).

<u>Knowledge brokering</u>: an intermediary activity that takes place between the spheres of science and policy. The term implies that knowledge is a commodity that can be brokered between parties. Knowledge brokering is often characterised either by describing specific processes and tools, general models of their functioning or the roles and functions of the individuals and organizations acting as knowledge brokers (Magnuszewski et al., 2010).

<u>Tacit knowledge</u>: or 'know how'. Knowledge that is difficult to transfer to another person by means of writing it down or verbalizing it (Wikipedia, 2011). One can gain tacit knowledge only through personal experience (Nonaka and Toyama, 2003 in Magnuszewski et al., 2010).

<u>Wisdom</u>: an ability to act critically or practically in a given situation, according to one's beliefs and values (Jashapara, 2004 in Magnuszewski et al, 201, see figure 1.1).

Data, information, knowledge and wisdom

Information, in its widest sense, exists in different forms such as words, numbers, symbols, images or artefacts, and can be stored in different places (e.g. paper, people's heads, electronic forms); it is held by many different kinds of people in different capacities and for

different purposes, which may include: personal interest; research (often leading to publication); resource management; because of some mandate; and as a public good (Jenkins, 2010). In this document, when talking about information, in its widest sense, we cover the concepts data, information and knowledge.

Data, information and knowledge tend to be separated as three different categories representing steps from observation to understanding, often entailing transformation from the numerical and quantitative to the verbal. For example, data might be a polygonal shape file representing the boundaries of a protected area; information might be a wide-ranging description of the area, including lists of species, description of vegetation and underlying geology, while knowledge might be an analysis of the importance of that area for biodiversity. However, data, information and knowledge cannot be separated. Data cannot exist without a conceptual framework, that is knowledge, within which it is held. In the same way, any kind of information embodies some understanding or conceptual framework about the world, that is more or less implicit body of knowledge (Conservation Commons, 2011). Wisdom is strictly related to how a person's ethical system influences their interpretation of information and use of knowledge (Magnuszewski et al., 2010, see figure 1.1).

4.3 Barriers

Communication is an essential part of human life. Humans communicate all day and every day to get things done. Very often they communicate with written or spoken words but just as often with gestures, facial expressions, symbols, colours or images. Individual human beings cannot function without communication and neither can groups. At a basic biological level, communication helps individuals fulfil the needs for food, shelter and safety. But individuals also need communication to fully develop their human potential. For groups of any size, from the family to the basketball team to the office or the nation, communication is essential as well. Like individuals, groups also use communication to maintain their identity and their cohesion, to develop knowledge and transfer it to new members and to structure their relationships with other groups (Jones-Walters, 2000).

One of the most disturbing elements in communication is 'noise' which prevents a message from being transmitted smoothly through the communication channel. Sometimes this is real noise (for example when a speaker cannot be understood because of heavy traffic outside the conference room), but bad quality printing that makes a text difficult to read or incompatibility of computer systems can also be called noise. Whatever it is, the effect is that the message does not come through as it was intended. In addition, in the real world messages never go from sender to receiver in a pure and 'uncontaminated' form. Their meanings are never completely clear, not even when the communication channel is working smoothly and there is no interfering noise. The sender and the receiver both construct the meaning of a message by using their own individual values, standards, convictions, interests and knowledge (Jones-Walters, 2000).

All groups, including international organizations, government offices, NGOs or multinational companies need to communicate to achieve their goals. In general, organizations communicate on two levels: externally, with groups and people outside the organization and

internally, with their own staff members. An organization communicates externally with other groups because it wants them to do something, to know something or because it wants to influence the attitude these groups have towards a specific issue. Internal communication is just as crucial. It is necessary to organize the work, steer the production process, transfer information that staff or members need and train staff to keep their skills up to date (Jones-Walters, 2000).

A biodiversity conservation organization/institution/agency is just as dependent on other people to get results as any other group. Neither government authorities nor NGOs can protect biodiversity on their own. They depend on the cooperation of a wide group of people and organizations whose actions directly or indirectly affect nature: land owners, visitors to protected areas, hunters, farmers, other government departments, local and regional authorities, foresters, tourism operators, politicians and so forth (Jones-Walters, 2000).

Regarding the communication and transfer of knowledge and data related to biodiversity and ecosystem services, information, in its widest sense, may be available to: the person(s) who collected it and their immediate colleagues or peers; more widely within a particular organization or institution; those outside the holder organization or institution under restriction (licenses, agreements, fees, conditions of use, etc.); and freely to anybody (Jenkins, 2010).

Information can be communicated to others through different mechanisms: orally, through person-to-person communication; through print and other physical media; and electronically. The extent to which information is actually accessible to anyone other than its originator depends on: whether a potential user knows that it actually exists; whether it is in a form and at a place that they can access it; whether it is incorporated into tools that increase its accessibility and value; whether the potential user can fulfil conditions placed on access by the originator (Jenkins, 2010).
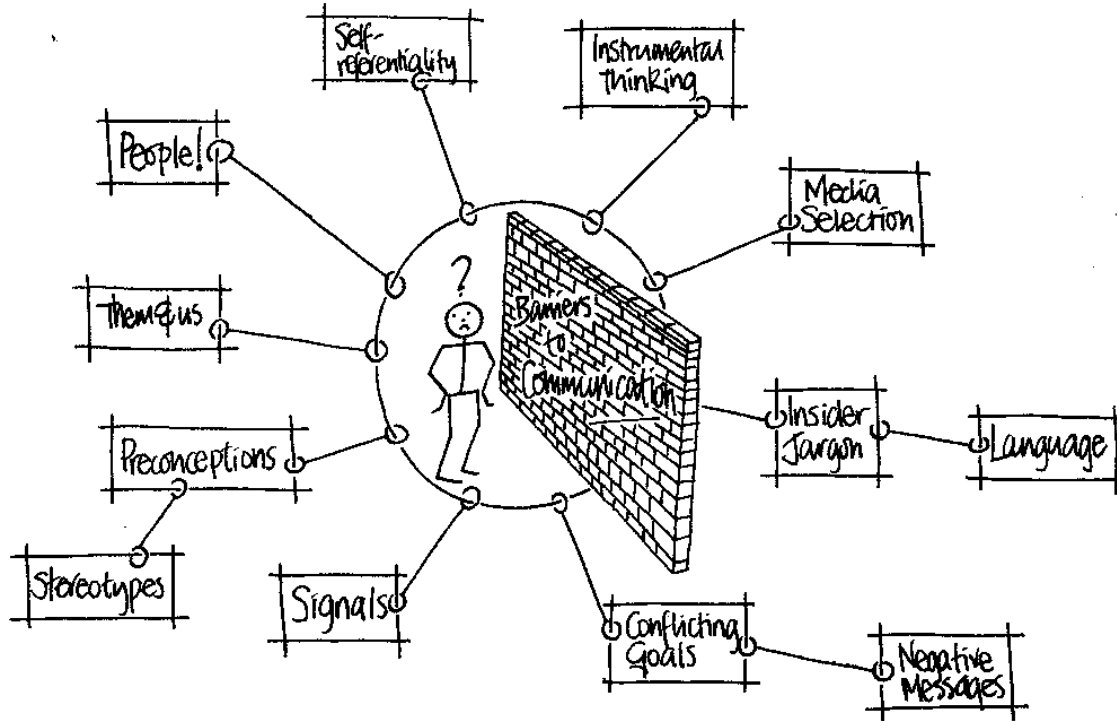
Impediments or barriers to the exchange of data, information and knowledge can be classified as follows (based on Jenkins, 2010; Conservation Commons, 2011; Jones-Walters, 2000; and the responses collected through the potential requesters of the NoK interviews):

- Behavioural: the reluctance to disclose, share or receive information
  - Scientific publication and academic careers: for academics sharing knowledge, without at first having extracted as much personal value as possible from it is unproductive or counterproductive in career terms.
  - Concerns about inappropriate use: people may be reluctant to share information because they are not confident about its quality, because they fear information may be misinterpreted, altered or used in ways which they do not agree with.
  - Sensitivity: information may be withheld because those in possession of it think there is a risk of harm occurring if they share it with others.
  - Concerns about fairness, recognition and attribution: those who do not share often sense that someone else will profit unfairly, or they will not be properly recognized for their work.
  - Perceived commercial value: information may be perceived to have direct commercial value. It may also be thought to have potential value.
  - Legal barriers: laws and regulations protecting copyright and other forms of intellectual property right; restriction to data exchange.
  - Intellectual property regime: the lack of a stable, uniform global regime on intellectual property certainly has an impact on willingness to share such property, for example electronically.
  - Privacy: the invasion of privacy and potential abuse of personal information is a growing concern for many people in their interactions with the internet.

- Stereotypes: some groups have such strong preconceived ideas that they may be inclined to stop listening even before the communication has started.
- No good news: many times nature conservation organizations communicate negative messages, restrict the development of projects or interfere with management practices, making people less interested in the information they communicate.
- Conflicting interests: organizations might have different aims and objectives that sometimes can be conflicting, making them reluctant to share information.
- Expert notion: some people see themselves as 'the experts' and tend to assume that the ideas from other people are not valid.
- Group perception: we do not want to share information with people that are not part of 'our group'.
- Personal conflict: people might have personal conflicts and not be willing to cooperate and exchange information.
- Competition: organizations or individuals competing for funding, publications or career advancement might be reluctant to share information.
- Economic compensation: some universities and public or private institutions will not share their data if there is no economic compensation.
- No learning from lessons; people do not learn lessons from previous experiences.
- Shyness: if you do not know people you might be shy to contact them.
- Lack of interest: if you are not interested in some specific information you just not listen to it.

- Related to the nature of the information itself
  - Languages and translation: the use of many different languages worldwide is the most obvious barrier to access information.
  - Standard vocabularies, taxonomies and classification systems: agreement on the use of terms or labels is needed both for organising information and so that different people have confidence that they are talking about the same thing. It can be hard to agree what we are referring to:
    - Taxonomies for organisms
    - Habitat and ecosystem terms and systems of classifications
    - Taxonomies of threats and impacts
    - Standard vocabularies and glossaries
  - Difficulties in applying norms and standards: suppliers of information may not wish to adhere to standards because they do not agree with them scientifically or because they do not fit well with their own information needs.
  - Comparability: there are many different initiatives/sources providing very heterogeneous data; there is a need for harmonization.
  - Contextual and explanatory information: some kind of context (metadata) is invariably crucial to the understanding of any piece of information or dataset, but metadata is often neglected.
  - Presentation is not appealing: sometimes the information is presented in a way that does not appeal to different user groups. Different users have different preferences regarding the way that information is presented (maps, charts, reports…).
  - Information is misunderstood: the receiver interprets the information in a different way than the sender intended.

- Technical and/or practical
  - Storage: the explosive growth in the generation of all kinds of information, but particularly electronic information, is creating problems of storage for all individuals and organizations dealing with information.
  - Finding information and data (Poorly signposted information and data): for information to be available to potential users they need to know that it is there and be able to find the particular pieces they are interested in. This requires a combination of effective searching and good organization of the information.
  - Transfer: effective ways of transferring data and information from one party to another, even within the same organization between colleagues.
  - Technological change: the pace of change can bring problems as without constant investment and updating it is easy for individuals or organizations to get left behind.
  - Restricted access: required subscriptions and restricted access may be a problem to obtain certain data and information (need to register, remember password…).
  - Information overload: an enormous amount of publications, articles, project results, conference conclusions and other documents are published every day. In many cases too much information is available and it is difficult to assess which are the relevant references, to filter the useful information according to the user needs and to keep the own knowledge up to date.
  - Lack of time: people do not have time to make an in depth search for the information they need and in many cases colleagues and experts are busy to provide input and exchange views.
  - People do not talk to each other: there is no communication, no exchange of information between people working at the same or different departments/organizations/institutions and it is difficult to be integrated and horizontal.
  - Experts' availability: experts on specific issues are not available.
  - Ignorance/lack of knowledge: much work is done, but many times people and institutions do not know what others are doing.
  - Information is scattered/fragmented: information on certain topics is highly dispersed; there is an absence of streamlined as starting points.
  - No common processes in place: for certain issues there is no common data collection in place or established procedures to analyse results.
  - Management experiences not available: results of implementation and management experiences are not disseminated and made available for decision makers.
  - Mobility of experts: when an expert leaves and organization he takes the information with him.
  - Project information is lost: data, information, project results and reports are not accessible anymore when the projects end.
  - Verification takes time: the process of verification of data and information often takes time and then data are outdated.

- Resource constraints
  - Cost recovery: it is difficult to get a fair price for environmental information and it is not easy to equitably allocate sums recovered between different providers.
  - Mandatory funding through taxation: there is inadequate attention to biodiversity data and its management on the part of governments and international agencies.

- Donor funding: many organizations that generate knowledge relevant to conservation rely heavily on donor funding to support their activities; therefore, knowledge management and dissemination are inevitably competing with other activities for funding.
- Financial barriers: lack of funding to cover costs of information transfer.
- Demonstrating value: it is often hard to demonstrate the impact of data and information activities and they have significant recurrent costs which donors are traditionally reluctant to defray.
- Voluntary contributions: it is difficult to direct effort where it is most useful or to control quality of inputs.
- National resistance: countries are reluctant to spend money to make the required measurements for the implementation of certain directives that require monitoring.

- Complexities arising from multiple communities of practice
  - Sharing across communities of practice: successful conservation requires engagement from an enormous range of individuals in different communities, requiring connections and cooperation across potentially wide gaps in understanding, perspective and behaviour. However, paradoxically, while communities can be successful at sharing information amongst themselves, this very success, by reinforcing a sense of community, may serve to isolate them from other communities.

- Political context
  - Lack of political continuity: changes in governments often result in a reduction in continuity within institutions that complicates data and information collection and exchange.
  - No policy need or driver: if there is no policy or legislative instrument (such as a Directive, multilateral agreement, legal statute, etc) that includes compulsory reporting and data delivery, the collection of data is not carried out.

Barriers	ECNC Communications Manual	Conservation Commons	Jenkins	KYOTO	Requester interviews
Behavioural					
Scientific publication and academic careers		x	x		x
Concerns about inappropriate use		x	x		
Sensitivity		x	x		x
Concerns about fairness, recognition and attribution			x		
Perceived commercial value		x	x		
Legal barriers		x			x
Intellectual property regime		x			
Privacy		x			
Stereotypes	x				
No good news	x				
Conflicting interests	x				

Barriers	ECNC Communications Manual	Conservation Commons	Jenkins	KYOTO	Requester interviews
Expert notion	x				
Group perception	x				
Personal conflict					x
Competition					x
Economic compensation					x
No learning from lessons					x
Shyness					x
Lack of interest					x
Related to the nature of the information itself					
Languages and translation		x	x	x	x
Standard vocabularies, taxonomies and classification systems	x	x	x	x	
Difficulties in applying norms and standards			x		
Comparability					x
Contextual and explanatory information (metadata)		x	x	x	x
Presentation is not appealing				x	
Information is misunderstood	x				
Technical and/or practical					
Storage		x	x		
Finding information and data(Poorly signposted information and data)		x	x		x
Transfer	x	x	x		x
Technological change	x	x			
Restricted access					x
Information overload				x	x
Lack of time				x	x
People do not talk to each other					x
Experts availability					x
Ignorance/lack of knowledge					x
Information is scattered/fragmented					x
No common processes in place					x
Management experiences not available					x
Mobility of experts					x
Project information is lost					x
Verification takes time					x
Resource constraints					

Barriers	ECNC Communications Manual	Conservation Commons	Jenkins	KYOTO	Requester interviews
Cost recovery		x	x		
Mandatory funding through taxation		x	x		
Donor funding		x	x		
Financial barriers					x
Demonstrating value		x			
Voluntary contributions		x	x		
National resistance					x
Due to complexities arising from multiple communities of practise					
Sharing across communities of practice		x	x		
Political context					
Lack of political continuity					x
No policy need or driver					x
Issues particularly highlighted in requester interviews: highlighted above					

Of the 52 barriers listed in the table above, 21 (approximately 40%) were unique to the responses given during the potential requester of the NOK interviews. Indeed a number of the issues that they mentioned were both unique to the interviews and were clear priorities for them, on the basis of the frequency with which people brought them up and the weight they gave to them during the discussion; (e.g. lack of time, scattered and/or fragmented information and data, etc).

So whilst confirming many of the previously identified barriers, this study delivered a level of innovation in terms of a range of new barriers linked to this particular group (which itself could be divided into three broad categories).

The following barriers, highlighted in the table above for ease of cross referencing, are elaborated in more detail below in order to give a flavour for the content of the interview responses, specifically in relation to these priority issues:

Information overload. There was a general feeling among the respondents that there is more production of scientific information and data than there ever has been; to the extent that it may reach the status of "pollution or noise". One of the by-products of this was that many interviewees believed that they are spending time reading irrelevant/out of date material at the expense of more useful and recent material that may simply be metaphorically "hidden from view". One respondent said that: "every week at least one relevant and significant piece of information emerges and it is simply not possible to keep track'.

Lack of time. Almost every interviewee cited the lack of time as one of the major barriers to searching for and finding relevant knowledge information and data. Time pressure meant (for example): that searches were often restricted to the first one or two pages of references thrown up by Internet search engines, or even restricted to the first three to five references (when there may be better information lying further down the lists); that insufficient time was devoted to discussion with colleagues or with network contacts, etc, about where

relevant sources might be found; and that reference was constantly made to the same (old and trusted) documents even though they may be known to be out of date and/or superseded.

Information is scattered/fragmented. Information is very scattered; whilst there have been some attempts to centralise the sources of information it remains highly dispersed. In addition there is often no link provided between existing portals (e.g. BISE with DAISY). It was also felt that there is no "streamlined starting point"; e.g. a portal or website where it is possible to find a range of different (but linked) sources.

Finding information and data (Poorly signposted information and data). It is often extremely hard to find information and data. Interviewees stated that they often know that something exists, a piece of data or information linked to a specific policy area or project, but that it is simply impossible to find it because it is insufficiently tagged for Internet searching. This may often apply to even basic information. A significant proportion of the interviewees were extremely critical of past and present funded projects; both in terms of their failure to make linkages with other, similar projects and in tagging the information for Internet searching. They also suggested that when and if these websites are found then the information is not organised in a policy relevant way and is therefore hard to single out and identify. The point was also made that information on research projects is often difficult to access; and information, results and reports often "disappear" when the project is over. National datasets are often not fed into the EU level which can create a problem in finding raw data, in particular where it these relate to several countries and need approval from all of them for it to be made available.

Linked to this heading, it was felt by some that increasingly questions are becoming extremely specific and that it is therefore increasingly difficult to find relevant information and material using standard search techniques on the Internet or when seeking experts who may have related information.

Restricted access. In many cases there is a financial barrier to gaining access to published information. Where a subscription and password is required this is sufficient to put off many individuals. Whilst open access is a high ideal that is frequently not realised in practice. Linked to this is the problem that data and information are owned by (research, institutional or project) groups who want to keep it confidential until the results are published. In other cases universities, private/public institutions want financial remuneration (or at the very least some sort of partnership in projects, etc) if they are going to have to share data. If there is no money available to compensate them they certainly will not share the data.

Legal barriers. In relation to the issue mentioned above of national datasets that may not be fed into the EU level, and which can create a problem in finding raw data, in particular where it these relate to several countries and need approval from all of them for it to be made available. In this respect there are often legal constraints and barriers restricting access to data and data exchange. Data dealing with sensitive issues are often not available or spread publicly and there is frequently national resistance to giving out later because of the unforeseen costs/implications of handing it over. Often there is a juridical problem where directives overlap that complicates data retrieval.

Personal conflict/competition/people do not talk to each other (Summarised as lack of coordination/collaboration). Criticism was aimed at the lack of coordination between (potentially linked) projects and the data and information which they generate. In addition different institutions across Europe often do not know what others are doing; leading to a failure to exchange information among data producers and people working on a similar topic. Furthermore people in different departments/ ministries/ institutions simply do not talk to each other and it is therefore difficult to be integrated and horizontal. This even extends to poor exchange or internal information between people who work closely together. The lack of coordination was also a problem in relation to coordination over subjects or processes that are the same or similar but which are dealt with in different ways in different places/ institutions/ organisation/ etc. Examples given included methodologies in relation to habitats, ecosystem restoration, ecosystem services, etc.

Ignorance/Lack of knowledge. Was cited as a barrier in relation to simply not knowing what is available. Examples included emerging issues, funding programmes, projects, leading-edge research, etc.

Other. A number of other points were made including:

- **Experts' availability**. Experts in a particular field are often not available and this acts as a barrier to information and knowledge exchange and access. Indeed, there may not be enough people dealing with a particular issue (all too many making it hard to identify useful sources).

- **No learning from lessons**. This results in, for example, significant duplication of effort in relation to project formulation and implementation; dealing with directives *de novo* when similar directives have been dealt with successfully in the past, but no reference is made to this work.

- **Lack of political continuity**. Often results in a lack of continuity in the flow of data and information within comment organisations and institute is that reduces the sharing of information.

4.4 Proposed solutions

Some suggestions for removing the barriers are listed below (based on Jenkins, 2010; Parr and Cummings, 2005; Arzberger et al., 2004. In some cases the responses of the potential requesters of the NoK during their interviews have been added to these suggestions. However, because they were quite specific in their responses to the barriers they raised, these are listed at the end.

- **Changes focused on publishers and publications:**
  – Providing background data and information: many journals already make it a requirement of publications that background data are made available, either as

subsidiary files and documents on the website, or by request from the authors. This should be further encouraged, with the former option generally preferable.

– Increasing open-access: in recent years there has been a considerable shift towards free-access web publications of academic articles, with some online journals entirely free and many others having partially free access.

– Releasing archives: old papers may contain useful information; most journals have now posted their archival copies, or a considerable proportion of them, online.

– Encouraging publication of 'data papers': one mechanism for creating incentives for academics to release data would be the creation of a 'data publishing framework' which would encourage and recognise investments and efforts by institutions and individuals towards management and publishing of primary scientific data potentially on a par with recognitions received for scholarly publications category of papers where data-sets would be described and analysed in a scholarly manner.

- **Changes focused on donors and others providing support:**
  – Making release of data a condition of funding: a minimum condition of funding of research or monitoring activities should be that data generated are made publically available unless they are compelling sensitive information.
  – Building knowledge management and dissemination into projects and programmes: donors of all stripes should be strongly encouraged to make it a condition of funding that all recipients have a knowledge management and dissemination plan built into the project or programme that is funded.
  – Getting commitment to long-term funding of knowledge management/dissemination: donors should be encouraged to adopt a longer-term approach in supporting knowledge management and dissemination activities.
  – Creating tools to enable the exchange of information: donors should support the creation of networks, websites or portals that centralize the information (streamlined starting points), organized by topic, and circulate it. They should be regularly updated, compiling new developments and publications and giving alerts about them.

- **Changes focused on academics and research institutions:**
  – Creating incentives for academics to increase access to data: creating incentives to make academics more willing to share their knowledge in all its forms is challenging, but should be attempted.
  – Enhance academic reward systems that favour data sharing: the value of data increases in proportion to its use by others, with direct consequences in perceptions of research importance and in objective measures (e.g. citation rate).
  – Developing mechanisms to acquire access to the 'long tail': a large proportion of the data generated in scientific research is produced as a result of small or medium sized projects with limited resources; this data is most likely to be stored in ad hoc forms and are difficult to discover.
  – Developing a mechanism that allows new people to get in the exchange network: there should be a scanning tool that allows to identify people which are not yet in the network and can provide new information.

- Getting to agreements on common standards: common, more consistent and comparable standards will facilitate the exchange of data and information and increase their use for different purposes.
- Accelerating data verification: develop systems that allow a rapid data and information verification.
- Preparing digests and good synthesis papers: prepare snapshot providing the entirety of the current picture in relation to a selected topic and ensuring that is relatively broad reaching).

- **Changes focused on governments:**
  - Encouraging commitment to freedom of information: governments find themselves under conflicting pressures to enforce or strengthen intellectual property rights on one hand and to enable open access to information on the other. They should be encouraged to follow the latter course as far as practicable.
  - Disseminating results of studies on open access effects: several studies and reports have documented the beneficial effects of open access to public data on social an economic progress at both the national and international level.
  - Encouraging continuation of funding for information resources: governments need to be reminded of the long-term importance of data and information and the value of more effective and efficient use of data, information and knowledge needs to be communicated.
  - Tying research permissions to the deposition of data and information: when funding or permission is given by anyone for research and monitoring activities, for example by a government or a protected area manager, that permission should be contingent on providing access to all related data, information and knowledge.
  - Encouraging the development of national laws and international agreements that can directly affect data access and sharing practices.
  - Developing legislation/instrumental requirements that force the provision of data and information by signatory states.
  - Creating hubs: each country should have a hub, institution, ministry, that networks between different organizations and makes information accessible.
  - Designating a person dedicated to knowledge sharing in each Ministry.
  - Engaging national focal points.
  - Creating initiatives that involve citizens.

The solutions below are derived from the drivers provided by the barriers listed by the interviewees (above). Most respondents recognised that there are probably few solutions for the current time pressures that they face and that 'lack of time' is always likely to be an issue. However, it will be seen that many of the solutions are directly linked to increasing their efficiency and effectiveness of operation (and are therefore timesaving solutions).

There was a general feeling that any solutions should be open environment, **open access** and delivered at no charge to the user. This was linked strongly to the idea that access to published information should largely be free.

The following headings can be seen to be linked:

Centralisation/streamlining of information. This solution was suggested as a direct response to the barrier created by highly fragmented information. Many interviewees therefore felt that the information should be centralised and available on one or a small number of influential and highly visible websites. Such a site or sites should contain all the latest information and knowledge including information about the latest developments and newly published material. Such sites might also be equipped with search engines that were more selective than (e.g.) Google and able to discriminate information and discard unnecessary references.

The proposal for streamlined starting points encompassed a number of other ideas such as a web-based information page which informed about new developments including alerts about new information recently published; a port of call for European biodiversity that linked to institutional/reputable sources of published work; and a European Commission website on EU policy.

Linked to the idea of centralisation/streamlining, was the proposal that each country should have its own knowledge hub, institution, Ministry (or some such function) that would network between different organisations to make information accessible in a single place. The EEA was proposed as an organisation that could promote joined up thinking. In addition it was proposed that centres of excellence could be created.

Thematic presentation of information. Linked to the centralisation and streamlining of information was the idea/strong hope that information should be presented thematically. However, it was clear that the majority of interviewees would want that any such themes should be directly related to the policy agenda. Thus information should be presented by topic or theme; and that the themes should be linked to existing 'hot policy topics' and emerging policy issues.

Regardless of the creation of any new centralised portals/sources of information it was felt that this thematic approach should be applied to existing websites (e.g. BISE, EEA, etc).

Digests/briefings. Linked to the thematic presentation of information (but also in relation to existing portals/ websites/ etc) information should be made available in concise, digested form and written in plain English. According to respondents "concise" could be anywhere from 1 to 2 pages of concise text to a 15 page document summarising a particular policy issue or topic. The majority tended towards the shorter (1 to 2 pages).

Respondents were particularly positive in relation to the newsletters (of which there are many) produced by the commission, EEA and other organisations that provide regular digests of current and emerging issues.

Filtered information. Another aspect of providing briefings/digests was to ensure that information is filtered at source. In other words what is available has already been through some form of editing/selection process to ensure that it is concise and relevant. Respondents criticised (for example) certain project and other websites for failing to provide summarised information which, in a time constrained situation, means that the searcher is unlikely to go any further.

This point links to the one above about equipping sites with search engines that are more selective than (e.g.) Google and able to discriminate information and discard unnecessary references. It was also suggested that there could be a team working daily on filtering information (e.g. along the lines of the Science for Environment Policy newsletter).

Tools/mechanisms for information exchange. The provision of knowledge hubs to exchange information was supported by a number of other suggestions. For example, one person could be dedicated to knowledge sharing in each Ministry (at a country level); networks that circulate important information should be maintained/set up and where appropriate could engage national experts; a reliable source could be established from which questions could be asked with replies being supplied over short time scales.

Validation. The last point links to the issue of validation, and a desire that sources ensure the reliability and validation of the data and information that they provide (to avoid the searcher themselves having to carry out the validation).

Database creation. Common portals for raw data (e.g. similar to the EMODNET initiative) should be supported and set up. The basic principle for their operation being that raw data can be supplied and brought together for processing and analysis by researchers; research institutions can take the data and provide processed data and information in report form (if necessary in short summarised format) to key information users.

IT solutions. Many aspirations were expressed in relation to IT solutions including advanced search engines (already mentioned above), better knowledge and availability of systems for sharing reports, references, etc, visual thesauruses, increased efficiency of tools such as Google translate and use of technology such as videoconferencing and online meetings.

Social media. Greater use of twitter and other social networks was advocated. Open access.

4.5   Summary and conclusions

The subject of barriers to communication in the context of the science policy interface has been explored in the past; much of this work has been brought together and collated in two of the documents that provided source material for this report (Conservation Commons, 2011 and Jenkins, 2010). Whilst a brief summary of much of that information has been given in previous sections of this document, it was not the intention to repeat or duplicate it here.

Clearly many of the barriers identified by previous work have some relevance to the KNEU project. However, it is interesting to note that of the 52 barriers listed in the table (based on the three main references, the KYOTO project and the requester interviews) *21 were unique to the results of the requester interviews*. In addition, whilst they shared 30 of the barriers certain of these (such as language, and many of the behavioural barriers) received less prominence from the interviewees then they were given in the source documents. The majority of interviewees identified barriers in relation to *'technical and/or practical' issues*;

lack of time and difficulties in finding information and data being two that figured most frequently.

Of course, this could be because of the nature of the questions and it is also certainly a reflection of the sample represented by the interviewees who volunteered for this exercise. However, given that the questions in relation to barriers and solutions were largely open, then the answers received should be allocated significant weight. It is also notable that whilst confirming many of the previously identified barriers, this study therefore delivered a level of innovation in terms of a range of new barriers linked to this particular group (which itself could be divided into three broad sub-categories[2], see Part2 of this document). The main barriers that they identified were therefore:

- Information overload.
- Lack of time.
- Information is scattered/ fragmented.
- Finding information (Poorly signposted information and data).
- Restricted access.
- Legal barriers.
- Personal conflict/competition/people do not talk to each other (Summarised as lack of coordination/collaboration).
- Ignorance/Lack of knowledge.
- Experts' availability.
- No learning from lessons
- Lack of political continuity

The solutions that they came up with were derived from the drivers (and thought processes) provided by the barriers listed above. Most respondents recognised that there are probably few solutions for the current time pressures that they face and that 'lack of time' is always likely to be an issue. However, it will be seen that many of the solutions are directly linked to increasing their efficiency and effectiveness of operation (and therefore are time saving solutions). The main suggestions included:

- Centralisation/ streamlining of information.
- Thematic presentation of information.
- Digests/briefings.
- Filtered information.
- Tools/mechanisms for information exchange.
- Validation.
- Database creation.
- IT solutions.

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[2] In total 24 individuals agreed to be interviewed as part of the project. Whilst they were each fulfilling a unique role with specific responsibilities, it was still possible to organise them into a number of distinct categories: 'Briefers', who as a group were most actively engaged in the policy agenda; 'Digesters' who, while they may have some limited active engagement in the policy process (and there is indeed a level of overlap with the Briefers), tend to be mainly involved in "creating and collating"; and 'Implementers' who are more likely to be involved in the direct implementation (at various levels: regional, national, international, etc) of specific policy areas.

- Greater use of social media (e.g. Twitter, Facebook, etc).

These solutions are highly pragmatic because they are directly related to the wishes and knowledge of specific user groups who make regular use of data and information. From this perspective they therefore have great relevance for the KNEU project and the way a NoK could be designed and which functions it might have.

They also reflect the focus of interviewees on technical and/or practical issues, as referred to above. Thus there is little in here about behavioural issues (linked for instance to the resistance to collaboration or cooperation, the general failure to communicate even between colleagues within offices, etc). However, this is not a significant problem for the NoK (indeed it is relatively helpful) because the NoK will itself be based strongly on technical and practical solutions to the provision of knowledge, information and data.

Clearly issues such as the thematic presentation of information, the production of digests and briefings in concise clearly written format, the filtering and validation of information all *suggest an infrastructure that would be largely based on human resources and effort*. Thus, it will require people to work to identify the themes based on topical and emerging policy issues, group information under those themes and prepare it in digestive format. This and other aspects of the proposals suggested above can therefore be linked to issues such as organisational infrastructure, funding and human resources. If they are fully integrated in the design and build of the NoK, the implications of the above results should result in a highly relevant and functional system.

5 CONCLUSIONS

This first deliverable is meant to lay the fundation to build a NoK, i.e. to settle the scene of existing knowledge holders and requesters and to explore current mechanisms of knowledge generation, transfer and use. The key objectives were:

- to identify the key actors of the network: the knowledge holders on biodiversity and ecosystem services, including those producing knowledge, those processing and transferring knowledge, and the knowledge requesters who are asking for, funding and using knowledge. These two categories being not exclusive of each other as the Netmapping analysis shows some organisation play both roles in the network.

- to investigate what the barriers to knowledge transfer are, and what possible solution can be implemented to improve this knowledge transfer.

The results of these mapping and analysing activities demonstrate how the biodiversity knowledge landscape is shaped: knowledge holders/providers on one hand and knowledge requesters on the other hand cover a wide scope of organisation types from public institutions, civil society, learned society, to research organisation, etc. Their role and functions are not clearly delineated, some are just sources of knowledge (generating knowledge) or relay of knowledge, or pure end-users, and some are cumulating these roles at various levels. An important aspect identified in the overview of knowledge holders is the influence of temporary iniatives such as the EU funded projects in generating and transferring knowledge. How these short-term structures and their results and products can be integrated in a long-term NoK is a major question – and also a question of ongoing discussions for quite some time.

In addition, we highlight the differences exisiting between knowledge holders in terms of their infuence on the knowledge flow. We could establish a sort of "hierarchy" of knowledge providers, i.e. they are more or less important for the knowledge flow, either directly influencing the the knowledge provision or by sitting in between organisations, i.e. without them the knowledge flow would be highly reduced. Results for these important hubs were not surprising as most of them are what we could qualify as "usual suspects", e.g. IUCN, UN, European Commission, EEA.

Regarding knowledge users three main categories were highlighted; the 'Briefers', who as a group were most actively engaged in the policy agenda; 'Digesters' who tend to be mainly involved in "creating and collating" although they may have some limited active engagement in the policy process (and there is indeed a level of overlap with the Briefers); and 'Implementers' who are more likely to be involved in the direct implementation (at various levels: regional, national, international, etc) of specific policy areas.

The challenge of the NoK will then be to help knowledge holders become systematically knowledge providers, to improve connections and exchanges among knowledge providers and between knowledge users and knowledge providers. The analysis provided in this first report will serve as a basis to implement facilitating procedures and to ensure the NoK addresses these challenges and answers to its users expectations and needs. Throughout these activities, we could see how dynamic the biodiversity knowledge landscape is and we will ensure that our mapping of biodiversity knowledge is maintained through the duration of the project to capture new developments.

6 References

Arzberger, P.; Schroeder, P.: Beaulieu, A.; 3, Bowker, G.; Casey, K.; Laaksonen, L.; Moorman, D.; Uhlir, P. and Wouters, P. (2004) An International Framework to Promote Access to Data. Policy Forum. Science and Government. Science 19 March 2004: Vol. 303 no. 5665 pp. 1777-1778.

Conservation Commons (2011) An analysis of the barriers to the sharing of biodiversity data, with recommendations of feasible measures to lower these. Available at http://biodiversity-l.iisd.org/news/conservation-commons-prepares-draft-on-barriers-to-biodiversity-data-sharing/ (draft of 26 July 2011)

Jenkins, M. (2010) An analysis of the barriers to the sharing of biodiversity data, with recommendations of feasible measures to lower these. Working draft of October 2010. Available at: http://www.slideshare.net/jatorre/presentation-at-the-master-in-global-environmental-change-by-jon-hutton (Accessed 30 August 2011)

Jones-Walters, L. (2000) Communication: the basics. In Rientjes, S. (Ed.) Communicating Nature Conservation. European Centre for Nature Conservation, Tilburg, the Netherlands. 7-26 (2003 – French version published with additional text and cartoons).

KYOTO project (2009) First Kyoto Workshop – Environmental knowledge transition and exchange. Deliverable 11.2, version 1, 25-Feb-09. Available at: http://www2.let.vu.nl/twiki/pub/Kyoto/WP11:Dissemination/D11.2_First_Workshop_v3.pdf

Magnuszewski, P.; Sodomkova, K.; Slob, A.; Muro, M.; Sendzimir, J. and Pahl-Wostl, C. (2010) Report on conceptual framework for science-policy barriers and bridges. PSI-connect – Policy Science Interactions: connecting science and policy. Deliverable No 1.1.

Parr, C. and Cummings, M. (2005) Data Sharing in Ecology and Evolution: Why Not? Trends in Ecology and Evolution, July 2005. Available at: http://hcil.cs.umd.edu/trs/2005-06/2005-06.pdf (Accessed 22 September 2011)

Schiffer, E and Hauck, J. (2010) Net-Map: collecting social network data and facilitating network learning through participatory influence network mapping. Field Methods 22 (3), 231-249.

Wikipedia (2011) Wikipedia, The Free Encyclopedia. Available at: http://en.wikipedia.org/wiki/Main_Page (Accessed 20 September 2011)

ANNEX 1: European Knowledge hubs or Initiatives that have influenced most the knowledge flow on Biodiversity and Ecosystem Services in the past 5 years

HUB/Initiative NAME	ACRONYM	Type of Organisation	Status
ALARM (2004 - 2009)	ALARM	EU funded projects	Finished
ALTER-Net (2004 - now)	ALTER_Net	scientific networks (e.g. MA network...)	Permanent
BiodivERsA	BIODIVERSA	EU funded projects	Temporary active
Biofresh	Biofresh	EU funded projects	Temporary active
COST	COST	Intergovernmental	Permanent
DAISIE	DAISIE	Data portals/initiatives	Temporary active
EBONE (2008 - 2012)	EBONE	EU funded projects	Temporary Active
EDIT (March 2006 - February 2011)	EDIT	EU funded projects	Finished
EUR-OCEANS	EOC	European Research Infrastructure Consortium	Permanent
EuroNatur - Naturschutz in Europa	EuroNatur	Civil Society (including NGOs)	Permanent
European Centre for Nature Conservation	ECNC	Civil Society	Permanent
European Community Biodiversity Clearing House Mechanism	ECB-CHM	Government Agencies	Permanent
European Environment Agency	EEA	Government Agencies	Permanent
European Invertebrate Survey	EIS	Civil Society (including NGOs)	Permanent
European Network for Biodiversity Information	ENBI	EU funded projects	Finished
European network of science centres and museums	ECSITE	scientific networks (e.g. MA network...)	Permanent
European Platform for Biodiversity Research Strategy	EPBRS	Science Policy Interfaces	Temporary active
European Topic Centre on Biological Diversity	ETCBD	Civil Society (including NGOs)	Permanent
International Association for Ecology	INTECOL	Civil Society (including NGOs)	Permanent
Joint Research Centre	JRC	Government Agencies	Permanent
LifeWatch	LifeWatch	European Research Infrastructure Consortium	Permanent
MARBEF	MARBEF	EU funded projects	Finished
RUBICODE	RUBICODE	EU funded projects	Finished
SCALES (2009 - 2014)	SCALES	EU funded projects	Temporary Active
Society for Conservation Biology - Europe Section	SCB-ES	Civil Society (including NGOs)	Permanent
SOILSERVICE (2008 - 2012)	SOILSERVICE	EU funded projects	Finished
The european society for ecological economics	ESEE	Learned society	Permanent

ANNEX 2: Global Knowledge hubs or Initiatives that have influenced most the knowledge flow on Biodiversity and Ecosystem Services in the past 5 years

HUB/Initiative NAME	ACRONYM	Fill in the Type of Organisation	Status
Barcode of Life	IBOL	Data portals/initiatives	temporary
Bern convention		convention	permanent
Bioversity International (Int. Plant Genetic Ressource Inst.)		civil society	permanent
BirdLife International		civil society	permanent
CABI	CABI	civil society	permanent
Census of Marine Life	CoML	scientific networks (e.g. MA network...)	permanent
Circumpolar Biodiversity Monitoring Program (CBMP)	CBMP	scientific networks (e.g. MA network...)	permanent
Collaboration for Environmental Evidence	CEE	scientific networks (e.g. MA network...)	Permanent
Conservation Commons	CC	Data portals/initiatives	permanent
Consultative Group on International Agricultural research	CGIAR		permanent
Convention for Biological Diversity	CBD	convention	permanent
Convention on International Trade in Endangered Species	CITES	convention	permanent
Diversitas		scientific networks (e.g. MA network...)	temporary
Earth System Science Partnership -ESSP	ESSP	scientific networks (e.g. MA network...)	permanent
Encyclopedia of Life	EoL	Data portals/initiatives	permanent
Fauna and Flora International (US, Australia)	FFI	Learned society	permanent
Global Biodiversity Information Facility	GBIF	Data portals/initiatives	permanent
Global Environment Facility	GEF		permanent
Global Invasive Species Programme	GISP		permanent
Global Observation Research Initiative in Alpine Environments	GLORIA	scientific networks (e.g. MA network...)	Permanent
Group on Earth Observations Biodiversity Observation Network	GEO BON		permanent
Integrated Taxonomic Information System	ITIS	Data portals/initiatives	permanent
Intergovernmental Group on Earth Observations	GEO	Intergovernmental	permanent
Intergovernmental Oceanographic Commission	IOC	Intergovernmental	permanent
Intergovernmental Panel on Climate Change	IPCC	Intergovernmental	permanent
Intergovernmental Platform on Biodiversity and Ecosystem Services	IPBES	Intergovernmental	To be launched
International Barcode of Life	IBOL		permanent
International Biogeography Society	IBS	Learned society	Permanent
International Centre for Agricultural Research in the Dry Areas	ICARDA	Research organisations	permanent
International Commission on Zoological Nomenclature		Learned society	Permanent
International Council of Scientific Unions	ICSU	Learned society	permanent
International Council for the Exploration of the Sea	ICES	Learned society	permanent
International Geosphere-Biosphere Programme	IGBP	scientific networks (e.g. MA network...)	permanent
International Institute for Environment and Development	IEED	Research organisations	permanent
International Long Term Ecological Research Sites Network	ILTER	scientific networks (e.g. MA network...)	permanent
International Society for Ecological Economics	ISEE	Learned society	permanent
International Whaling Comission	IWC		permanent
IUCN Invasive Species Specialist Group	ISSG		permanent
IUCN otter specialist group	IUCNOSG	Research organisations	Permanent
IUCN Red List of Threatened Species	IUCN	Research organisations	permanent
Millenium Ecosystem Assesment	MA	scientific networks (e.g. MA network...)	finished
NatureServe		civil society	permanent
Ocean Biogreographic information System	OBIS	Data portals/initiatives	permanent
Scientific Committee on Problems of the Environment (part of ICSU)	SCOPE	scientific networks (e.g. MA network...)	permanent
Smithsonian Institute (US)		Research organisations	permanent
Society for Conservation Biology	SCB	Learned society	permanent
Species 2000	sp2000	Data portals/initiatives	??
Species Survival Commission (part of IUCN)	SSC		
TEEB Initiative	TEEB	scientific networks (e.g. MA network...)	temporary
The World Conservation Union	IUCN		
United Nations (UNFCC, UNDP, UNESCO, FAO, UNEP)	UNEP	Intergovernmental	permanent
United Nations Food and Agriculture Organization	FAO	Intergovernmental	permanent
Wildlife Conservation Society (US)	WCS	civil society	permanent
World Fish Center (Malaysia)	WFC	research organization	permanent
World Register of Marine Species	WoRMS	Data portals/initiatives	Permanent

ANNEX 3: Compilation of the answers provided by the potential requesters of the NoK during the telephone and face to face interviews. The answers have been grouped thematically and cover the main responses, points of view and ideas put forward by the interviewees.

Questions	Response/Notes
General	
Briefly, what are the roles and responsibilities of your current job?	- Manage people and resources (agriculture, forests, EIS assessment and biodiversity) - Supervision of development, implementation and evaluation of the programme of work - Administration and human resources management - Management and political representation of the organization - Part of lead group/decision making of the centre - Engage in the political and technical arena where CBD and other biodiversity practitioners can exchange information - Observation of international developments related to nature conservation - International nature conservation affaires - Head of unit habitats and species - EU representative for federal state - Coordinate department on biodiversity and nature conservation of national environmental agency - National officer for CBD and IPBES - Coordinate and oversee EU (biodiversity) policy - Emerging issues - Involvement in European organizations and networks (e.g. ALTER-Net) - Cooperation and information exchange with neighbouring countries on nature conservation topics - Policy integration, integration of biodiversity concerns in cohesion policy and agricultural policy - Policy/advocacy work - Policy advise - Work towards a pan-European platform and equality/equity of knowledge (e.g. PEBLDS) - Secretariat of the European Habitats Forum (EHF), coordinating the voice, response and opinions of different NGOs among policy-makers and putting forward their recommendations - Member of steering group for monitoring and reporting related to EU Directives - Nature conservation topics in the Alpine Convention - Executive Secretary of the European agreement on disaster risk reduction - Science policy, FP7 projects, key topics and bring pieces together; translate into available text - Circulate information to 72 members across Europe - Use knowledge to support organizations and projects - Prepare and help national experts - Coordinate with other areas: tourism, regional planning, land use planning - Crosscutting issues (e.g. climate change, renewable energy) - Communication and cooperation with different disciplines (e.g. agriculture and forestry) - Legal work - Biodiversity and knowledge base - Responsible for biodiversity at national, European and international level - Responsible for national biodiversity campaign - Implementation of the Birds and Habitats Directives and Zoos Directive - Role of Natura 2000 and establishment of a European network

Questions	Response/Notes
	- Management, coordination and work related to protected areas and the Natura 2000 network - Biodiversity proofing system: funding streams in place and accessible in Member States and regions - Tools in place for the identification of EU funds - Biodiversity expenditure - Lead/initiate European biodiversity projects (e.g. for DG ENV, DG R&I) - Decide which projects to go for - Identify partners - Elaboration of project proposals - Coordination of projects related to conservation of species - Implementation of projects - Coordination of technical reports - Coordination of reporting for the Biodiversity Action Plan - Adviser for natural systems and vulnerability - Information about impacts and approaches to solve impacts (mitigation, compensation, etc) - Assessment analysis - Surveys - Follow up of policy documents and issues relevant to the development of indicators - Elaboration of assessments based on indicators - Management of projects related to indicators - Make methodological improvements to data sets and data updating - Identify data needs, monitoring and indicators - Coordination and elaboration of the European Red Lists - Collection of data from EC services (DG ENV, DG AGRI, DG REGIO, CAP expenditure); from external sources and datasets accepted by scientists and policy; and data from reporting from Member States - Find sources of data or create them - Responsible for agri-environmental indicators - Elaboration of new map based on Corine Land Cover 2006 - Ensure that marine data populate the EMODNET system - Assessment of ecological coherence of Marine Protected Areas (MPAs) form marine regions around Europe - Look at ecosystem services provision for marine systems - Development of spatial planning in marine regions - Coordination of writing and development of a report on the state of European coasts by 2012
What kind of activities do you have in your work related to biodiversity?	- Support to EU policies, Council of Europe and pan-European context - Collection of information in relation to policy processes, science, information or knowledge development. - Environmental policy - Implementation of international provisions - Policy advise - Engagement in the political and technical arena with CBD and other biodiversity practitioners - CITES - Run the Bern Convention: mediate infractions in relation to Convention species; commissioning reports on specific subjects (e.g. climate change and biodiversity, invasive species) - Cohesion policy - Present policies with their goals and objectives - Ensure that biodiversity is on the major policy agendas - Liaise with NGOs to lobby - CGBN groups and subgroups - Participate in bilateral negotiations - Public relations - Citizens information - Coordination of campaigns

Questions	Response/Notes
	- Internal coordination across Europe with colleagues
	- Governance studies
	- Case law research and analysis
	- Analysis of digested reports, executive summaries
	- Analysis of project opportunities, funding sources, calls for tender, potential partners
	- Organize the knowledge base for European agencies and institutions
	- Conduct meetings
	- Seminars
	- Presentations
	- Speeches
	- Fundraising
	- Promotion
	- Supervise tasks of ETC partners
	- Advisory role
	- Support internal requesters and SOER, environment of Europe
	- Project management, planning, implementation
	- Participate in EU twinning projects in the Balkan States
	- Write reports and texts
	- Input to reports (e.g. through review and editing)
	- Answer questions (e.g. from colleagues, journalists, parliamentary questions)
	- Prepare briefs (e.g. for people in higher positions)
	- Data and information gathering and dissemination
	- Biodiversity agenda set out in the new Biodiversity Strategy
	- Biodiversity Action Plan
	- Achievement of targets
	- Budget reform
	- LIFE funding line
	- State of the environment related to biodiversity
	- Whatever has impacts on biodiversity
	- Ecosystem services
	- Develop a Strategy on Green Infrastructure
	- Green infrastructure discussions
	- Implementation of the Habitats Directive at the national and international level
	- Further development of the Habitats Directive Article 17 reporting
	- Litigation in relation to Habitats Directive
	- Habitats regulations
	- Protected areas (research, inventory, policy advise, national legislation)
	- Natura 2000 management, implementation
	- Financing and investment for Natura 2000
	- Manage debate on Natura 2000
	- Make the estimation (abundance and diversity) of biodiversity easier
	- Assessment aspects: indicators, agri-environment
	- All aspects of biodiversity, a bit less genetic resources and marine
	- All, at the level of species, habitats and also at the policy level (EU Biodiversity Strategy)
	- Red lists
	- Climate change and biodiversity, climate protection and climate adaptation
	- Invasive alien species
	- Neobiota
	- Agriculture
	- Renewable energy
	- Bioenergy
	- Energy
	- Some connections with biodiversity, mainly with the setting of new goals for the CAP and the EU Biodiversity Strategy, trying to find links
	- Ecological coherence linked to the Marine Strategy Framework Directive (MSFD)

Questions	Response/Notes
	- Natura 2000 in the marine environment – gap analysis - Work with biodiversity people on Marine Protected Areas (MPAs) - Impact assessment on Integrated Coastal Zone Management (ICZM) and marine spatial planning - Coastal and marine accounting and development of marine assessments - Coastal and marine report writing - Marine activities in general - Fisheries - By-catch - Climate change, land and urban management, resource management - No field work
Describe one of your typical working days?	- Diversified working day, flexible and adjusted to priorities and emerging issues - Difficult to plan, based on incoming information, internal and external - Many on-going initiatives - Work to tight deadlines - Manage people and processes - Supervise people: consultation via e-mail, face to face, meetings - Give advice - Administration - Find ways to get European institutions to work together on biodiversity issues (e.g. EEA, JRC, Eurostat, ETC/BD) - Coordinate topic centres and get input; tease out key issues from them; involves a lot of dialogue - Orchestration of information flows; make use of and be aware of available information and needs - Observation of national and international developments - Follow discussions - Exchange of knowledge and information - Coordination/consultation within the unit and with other units/departments - Implementation of Natura 2000 related issues in Member States - Persuade EU countries to support PEBLDS in terms of finance and time, try to gain their ownership for the initiative - Advocacy - Project relations - Contact with partners - Citizens information - Networking (e.g. at European and country level; with experts) - Ecosystem assessment - Develop codes of conduct for invasive alien species - Desk work - Office work (not field work) - Follow up and read documents (reports received by e-mail or picked up in the internet) - E-mails - Correspondence - Phone calls - Give interviews - Internet search - Search information - Communication - Prepare a Communication from the Commission - Brief others (e.g. the director) - Prepare briefs - Prepare speeches (e.g. for a senior officer or a commissioner) - Prepare papers (e.g. how to evaluate EMODNET, improve policy framework for Bern Convention)

Questions	Response/Notes
	- Prepare terms of reference (e.g. for Atlantic Forum) - Answer questions (e.g. from commissioners) - Consultation - Project management and planning - Proposal writing/project development - Source data to validate issues - Get data layers in place including biodiversity - Brainstorm, meet and discuss with colleagues - Ensure preparation for meetings - Prepare and give presentations - Organize conferences - Meetings (e.g. internal, external, expert meetings) - Conferences - Workshops - Seminars - Events - Travel for missions/meetings
Knowledge (differentiated from data and information)	Knowledge is a familiarity with someone or something; that can include facts, descriptions, information, and/or skills acquired through experience or education. It can refer to the theoretical or practical understanding of a subject. We are talking about tacit/ implicit knowledge here (as with practical skill or expertise).
What kind of knowledge do you need in your work?	- Key players in Europe (e.g. institutions, persons, in policy) - Policy context, processes and developments (European, national, regional; e.g. Water Framework Directive, EU Marine Strategy) - How far policies are implemented and need for indicators - Achievement of objectives; are we meeting the goals? - Priority issues and trends in biodiversity from the policy or the scientific side - What is going on in different contexts in Europe, mainly related to indicators, need to know what happens, who is doing what and how, research projects of interest - Who is able to provide information and responsibilities of institutions/persons - Developments at the pan-European level and at the national level related to indicators: methodologies, main constrains - Position of member States on issues, who wants to do what, what are the pressing issues for them - Structured requests in relation to reporting from Member States - Events related to biodiversity - Latest news on the state of biodiversity - Platforms - Legislation - Legal knowledge - Monitoring and reporting requirements - Litigation - Funding opportunities - An idea about what is happening on the ground - Field examples - Social aspects and stakeholders - Bridge the gap between science and policy - Interface between science and ground knowledge - Scientific knowledge related to biodiversity - Pull the knowledge together from others (e.g. partners) and collate it/ make links to EU policy - How to inject knowledge into the policy agenda - Organizational skills linked to the role (policy/interpersonal/drafting, etc) - Concept development, try to put concepts together - Basic knowledge related to ecological and biological concepts - Get information into a framework of thinking

Questions	Response/Notes
	- Sift through expert knowledge and synthesize it - Understand Millennium Ecosystem Assessment including gaps in data and information - Spot inconsistencies - Frame content of contract work in order to deliver expertise - What data are available, how to use this data - Data and methodological gaps - Indicators - Structure and functioning of ecosystems and habitats - Zoological knowledge - Ecosystem services (ecological dynamics, geographical aspects, economics, valuation, financing, etc) - Biodiversity and ecosystem services; management links are not clear and needs synthesising - Special Areas of Conservation (SACs) and their management - Species, distribution, threats, conservation status, conservation measures - Impact of climate change on biodiversity - Invasive alien species - Island biogeography - Current scientific thought in relation to marine data and wider marine issues - Sea is three dimensional, spatial data is absent (bottom, water, column, benthos, etc) - Based on working experience - Interpersonal skills - Presentational skills - Administrative issues - Management - Project management - Organizational management/structure/politics - IT system for knowledge management - Computer skills - Internal organization knowledge ('internal requesters') - Need to be Leonardo da Vinci, answers to all questions, needs to know everything, all environmental components, which is not possible
To what extent do you rely on/ are your decisions based on your own expert knowledge?	- Have own expertise - 100% for well-known issues (e.g. biodiversity and ecosystem services); for less well known issues, rely on nearby experts (e.g. economics); policy makers (policy); colleagues (social aspects) - 70-80% based on own knowledge (happy to discuss, but many times there is no time). Rely on own opinion, but for sensitive political issues discusses with others. - Linked to day-to-day work and dependent on time pressure (with sufficient time involve others, when time is unavailable rely on own expert knowledge) - Mixed: joint decision making based on own expertise and expertise of others. - Mixed: very difficult to rely only on your own knowledge - Senior member of staff; decision making among responsibilities - Genuine combination of the two - Sound background and understanding is required - Important basis for decisions are the understanding of ecological processes and the practical implementation of legal requirements - Own expert knowledge more about conceptualising - Own knowledge about data and information which helps to know if something is available - Own expert knowledge in the field of policy advising - Own expert knowledge for decisions related to administrative issues or department coordination - Own expert knowledge in relation to legal directives and their

Questions	Response/Notes
	implementation - Own expert knowledge on protected areas - Make final decision but highly based on the input of national experts within membership organizations - Operational and organizational decisions - Operational decisions based on an assessment of knowledge and information received - Final decisions on policy content - Review of reports/documents adding own expert information - Review scientific papers and make conceptual analysis - Develop ideas and give them to others - Pull issues together - Mainly concept development - Mainly provide a bridge between science and policy and practical management measures - Very limited, mainly based on the expert knowledge of others - No direct indicators for ecosystem services provision; come up with proxies
To what extent do you rely on/ are your decisions based on the expert knowledge of others?	- Almost totally - To a large extent through meetings, phone calls, e-mails. - To a large extent: check what other organizations are doing. Regarding policy the references are WWF, BirdLife International, EEB. For more scientific issues the reference is scientific publications. - Relies heavily on expert knowledge: species, habitats, and ecosystems, marine and terrestrial experts. Internal but also many external - National offices across Europe; use of a range of expertise and knowledge of countries/biogeographic regions - Main skill is pulling together the knowledge of other experts and using it to frame policy statements and documents - As far as possible, depending on timescales in relation to the work required - Try as much as possible to confront own ideas with advice from others - Circulate reports for comments from experts - Information from trustable sources - Mainly for knowledge based decisions (internal and external experts) - For specific data/requests (e.g. experts from government agencies or NGOs) - Assessment and evaluation of detailed data and information - For things I do not know myself - Depends on which written information is available - Colleagues - Members - Experts (e.g. internal, in member organizations, external) - Networks (e.g. EEA networks; of specialized people in order to input specialised knowledge; networks that provide information and knowledge and bring it together, including NGOs, institutes, national experts; networks of experts often associated with EU funded projects, etc) - Task force - Working groups - NGOs - FP projects - Studies provided by others - Datasets provided by others - Policy briefs - ETC partners - Experience of contractors - Consultants - Marine Strategy

Questions	Response/Notes
How do you keep your expert knowledge up-to-date?	- Not enough time to read everything - Part of practical day to day work - Learning by doing (e.g. writing publications, briefings) - Connected to all the big debates that are going on - Read a lot - Internet - Blogs - Twitter - Forums - Media - Web portals - Topic related newspapers - Scientific papers/abstracts/literature - EC DG ENV Science for Environment Policy - Policy reviews - Briefs - Brochures - Distribution lists - Newsletters - Articles from members - Digested documents such as executive summaries, conclusions, recommendations - Reports (EU, EEA, ETC, experts…) - Publications - Conference proceedings - EU - EEA - Topic Centre - Internal circulation - Documentation received form colleagues, network contacts - Information sent spontaneously by people who are working on related subjects - Consultants and NGOs send reports and assessments or draw attention to new figures - Colleagues - Communications team - Exchange of information (e.g. with colleagues, other experts) - Verbal exchange - Discussions - One to one discussions on telephone - Own personal database; know who to ask for information - Networks - Experts (e.g. from Member States) - Through the EHF. It is very useful because it is a platform to share information that is already filtered - Based on communication - Involvement in projects - Expert/working groups (e.g. management of Natura 2000; birds; habitats; monitoring and reporting; marine data, European Habitats Forum) - Conferences - Workshops - Seminars - Meetings (with EC, experts…) - Follow up from meetings - Pick up ideas from meetings and follow them up on Google - Contracts - Preparing briefs - On top of the 100%! - Evenings, weekends - Piles of notes on the desk

Questions	Response/Notes
	- Challenging, difficult to know what is out there (e.g. project based reports, topical research) - Struggle - No external training or seminars
How do you currently access the expert knowledge of others?	- Internet - Google - Specific websites with recent news - EU - EEA - JRC - NGOs - Civil Society - Topic Centres - Internal information circulated in the organization - Gets information directly from experts/colleagues who know his interests/field of work - Stakeholders send documents and other related information - Network (organization, personal, experts, informal…) - Scientific publications/articles - Newsletters - Journals - Distribution lists - Portals - Forums - Briefings prepared by staff - Meetings - Expert meetings - Expert groups - Commissioning of experts - Working group (formal and informal; e.g. OSPAR/HELCOM, Forum for pastoralism and nature conservation) - Informal consultation - Exchange with colleagues - Conferences - Conference proceedings - Meeting results - Face to face contact (particularly valuable and important; group meetings or individually) - E-mail - Cascades of e-mails (send to one expert who will then contact others) - Phone - Consultancy contracts - Project information - Working together through projects - Filter knowledge (look at the forest but not at the leaves) - 'Me and the computer'
Do you seek any validation of such expert knowledge? (Yes/No)	- No time - Try to use known/reliable/trustable sources (well-known people, institutions with good reputation, known publishers) - Use information from institutions that already validate their information - Use information from DGs and Commission services, EEA, ETC/BD - Officially published sources - Use different sources - Depends on the source of knowledge - Reports: a reference is the organization behind - Projects: a reference is the funder - Peer reviewed publications/scientific literature - Social media; need to be careful but it is usually amazingly-up-to

Questions	Response/Notes
	date - Consultation (e.g. with international focal points) - Circulation around departments - Circulation to group of experts - Experts (e.g. nominated by Member States, selected by ETC/BD, selected through call for expression of interest) - Advisory steering committees (made up of external experts often supported by internal experts) which are normally a part of the report writing process for any major piece of work - Leading scientists in agencies - Colleagues - Ask a lot of questions; a form of legalistic interrogation or cross examination - Aggregating several answers - Get the opinion of a second expert - Sometimes it is difficult because there are very few experts in areas with a high degree of specialization - Try to crosscheck and find other opinions - Cross reference to other sources - Depends on the nature of the problem - In case of doubt - Factual information and knowledge can be followed up and validated - For policy check what different NGOs, Member States, organizations, commission officials are saying and take a balanced view based on this - Selection process for tenders - In the organization validation is part of quality assurance - Fit for purpose validation - Targeted on focused outwards - Opportunistic - Absolutely subjective
Accessing data and information	Differentiate from 'knowledge'; here we mean concrete, data and written information.
What kind of information/data do you need to support you in your work?	- Spatial data - Statistical data - Scientific data - Facts (e.g. to illustrate the topic in presentations) - Emerging issues - Impact assessment - Legislative frameworks and laws - Legal status - Policy facts - Policy briefs - Social and development data - Processed data, often presented in report form together with contextual information - International comparable and harmonized methods for the assessment and evaluation of targets - Focused on reports produced by partners (e.g. EFI, FAO, UFZ) - Screening production form research institutions, organizations, etc. - Elaborations of peer-reviewed science (e.g. think tanks) - NGOs data - Datasets from Member States - Country comparison - Reports (e.g. country reports, reports on specific subjects, synthesis reports) - Positive data - Headlines and one line messages that make an impact - Red Lists - EU Baseline - Article 17 reporting

Questions	Response/Notes
	- Conservation status - Species: distribution, abundance, conservation status, threats to species, species that are sensitive to climate change - Birds - Habitats - Land use and intensity of land use - Ecosystem services (quantitative, value allocation, geographic distribution) - SEBI - Protected areas - Natura 2000 - Data relevant to agriculture - Planning and building projects - Threats to species and habitats - Fragmentation - Climate change - Pollution - Expenditure per year, Member State, region - Market related data - Cost estimation of nature conservation activities - Information on valuation of ecosystem services and biodiversity - Mainly gap analysis and development of new indicators, search for data that are available - Have established own database - The more quantitative the best - Sometimes more specific data which are difficult to find - Data that are generally published and available - Whatever is available
How and where do you find information and data now?	- Ask colleagues who might know the data or point at the source - Internet - Google - Wikipedia - Blogs - Twitter - Databases - Web GIS applications - Reports- Publications - BISE - CBD - EC - EEA website/publications/reports/graphs - Topic Centres - Eionet - Eurostat - JRC - Member States - EEA countries - Administrative governmental organizations - NGOs - Civil Society - Millennium Ecosystem Assessment - IPCC - IUCN - Networks (e.g. of experts on species, informal, formal) - Experts - EU funded projects (although not clear how this kind of information will be updated) - Red Lists - Specific studies - Article 17 reporting - Article 11 monitoring and data management

Questions	Response/Notes
	- Natura 2000 standard data forms and management plans - Atlas of the Seas website - References from publications/reports - Consultancy contracts - Recent studies, also often part of projects (e.g. EU Sea Map) - Project information - Media - Newspapers - Newsletters (e.g. from projects, research institutions and organizations) - Mailing lists - Scientific journals/articles/papers - Authors of papers/articles (contact them directly because of costs of obtaining articles from publishers) - Internal notifications from hubs - Expert meetings - Expert groups - Own staff - Constant struggle
How do you ensure that information and data are and remain valid over time?	- Use well known/official/reliable sources (EEA, ETC, etc) - Data coming from European institutions with time series and a validation process - Annual update of basic data - Check date of publication - Try to use most up-to-date information - Use best available data - Use data from reports and databases - Regular data updates because of reporting obligations from legal directives - Obtain information from monitoring projects - Peer reviews - It should be 'quotable' - Use more than one source - Use data already filtered - When information is questionable use caveats and refer to the original source - Look actively for recent information, depending on the subject - National focal points - Member States must agree with data that is used for assessments (key issue for EU because agreements is often a political issue) - Heavily supported by legal requirements in relation to the marine directives; without them much information will not be collected or made available - This is a problem. For example there is an issue around coastal and marine habitats; there are not enough marine habitats in the habitats Directive - Using personal knowledge and experience
How do you ensure coverage: information from the past, cross-lingual, cross-cultural?	- Not enough time - Normally the work is at European level, with European data (mostly in English) - The standard scientific language is English - Apply knowledge to understand and assess the coverage of data - Work in multilingual organization - Translators in the house - International networks that synthesis information into English - Try to use national websites with national languages - Use personal language skills - Cooperation and personal exchange with colleagues and other experts - Help from colleagues from other countries/language skills

Questions	Response/Notes
	- Use country desk officers (provide entry point into national administrations and institutes) - With the help of literature - Personal assessment - If data are not easily accessible he does not use them - Can be problematic - Not always possible - Problem with publications and research of some countries that only publish in their own language - Difficult. Information published in other languages is unavailable and can relate directly to the field of work (e.g. Baltic countries publish on marine and coastal issues in their own languages) - Google translate

Barriers	
What are the main impediments/barriers that you find when searching for knowledge, information and data?	- Overload of (possible) information, which requires sufficient time and critical thinking for reliability. More scientific production now than ever; almost pollution/noise. Sometimes spend time reading not relevant things when other more relevant things are produced elsewhere - Every week one relevant and significant thing emerges, it is not possible to keep track - Time (lack of time), to search properly or discuss with colleagues - Language - Absence of streamlined as starting point - Information is very scattered. There are some attempts to centralize information, but it is still very disperse - Fragmentation of information - No link between existing portals (e.g. BISE with DAISY) - No good databases for European biodiversity (e.g. Red Lists are global) - Find information: sometimes you know that something exists but you cannot find it (insufficiently tagged for internet search) - Sometimes is difficult to find what you need - Difficulty to get basic information - Difficult to find relevant sources - Find relevant material, increasingly questions are extremely specific - Restricted access - Costs for information transfer - Financial barriers - Subscription and password required - Access to information: open access to public information. In many cases just an ideal and not realised in practice - Access to scientific journals (subscription often required) - People do not deliver data - Data and information are owned by groups who want to keep the data until they are published - Lack of knowledge related to emerging issues - Comparability, there are many different initiatives/sources providing very heterogeneous data; there is a need for harmonization - Coverage/completeness - Main difficulty is to find data - Data are not available - Lack of data - Difficult to get up-to-date data (mostly 2-3 years old) - National or subnational datasets are not fed into the EU level datasets - Problem with raw data (e.g. data that affect several countries and need approval to give them away) - Different institutions across Europe do not know what others are doing - Non exchange of information among data producers and people

Questions	Response/Notes
	working on a similar topic - People in different departments do not talk to each other and it is difficult to be integrated and horizontal - No good exchange of internal information between people who work closely - Lack of interest - Shyness; if you do not know people you might be shy to contact them - Number of people dealing with the issue - Availability of experts - Mobility of experts; when one expert leaves an organization he takes the information with him - No common processes in place (e.g. habitat or ecosystem restoration, no data collection about investment, activities, follow up, impacts) - Verification of data and information often takes some time - No data or indicators in some specific fields - Metadata accompanying data and information many times do not allow to make the best use of them - Information on research projects is difficult to access - Information, results and reports about projects disappear when the project is over - No policy need or driver - Getting data overlaps with policies; juridical problem where the directives overlap - Reporting responsibilities in relation to Multilateral Environmental Agreements - Legal barriers: data restriction and restriction to data exchange - Data dealing with sensitive issues are not available, not spread publically - National resistance to giving data because of unforeseen costs in handing it over (e.g. implementation of Water Framework Directive where monitoring requires measures that have costs) - Political terms: lack of political continuity often results in a reduction in the continuity within institutes and that is problematic for sharing of information - Nobody learns from lessons (e.g. issues from the implementation of the Water Framework Directive are coming back in the Marine Strategy Framework Directive) - Many universities, private/public institutions want a piece of the action if they are going to have to share data. If there is no money available to compensate them they will not share the data
Do you have any ideas for solutions to the barriers/impediments?	- Bring information into a open environment - Open access at no charge - Free access to scientific journals - Centralized point with all the latest information and knowledge - Centralize the information by topic - Create tools to enable the exchange of information (e.g. BISE) - Further development of BISE - Promote joined up thinking via the EEA - A web-based information page which positively informs about new developments (not a newsletter, something that alerts about new information published, new developments) - Portals that do the filtering for you and reduce the information overload - Ensure that information is filtered at source - Streamlined starting points - Search engine more selective than Google, able to discriminate information and discard unnecessary references - Port of call for European biodiversity that linked to institutional/reputable sources of published work

Questions	Response/Notes
	- Web page with links
	- Create specific databases
	- Common portals for raw data (e.g. EMODNET). Raw data can be supplied and brought together for processing and analysis by researchers; research institutions can take the data and provide processed data and information in report form, useful for EC and wide range of stakeholders
	- Create centres of excellence
	- Have a hub for ecosystem services and biodiversity related information, containing information that is there and gaps
	- Each country should have a knowledge hub, institution, ministry, that networks between different organizations and makes information accessible
	- One person dedicated to knowledge sharing in each ministry
	- Have a team working daily on filtering information (e.g. Science for Environment Policy newsletter)
	- Networks that circulate important information
	- Engage national experts
	- Make information from EC services easily accessible
	- A Commission website on EU policy
	- Member States should be responsible for the data they upload and share with each other
	- Improve the communication between data providers
	- Develop systems for rapid data and information verification
	- Get to agreements on common standards
	- Establish more consistent and comparable standards
	- Develop something that helps you find the information you need
	- Reliable source that you could ask a question and get a reply in short time
	- Digests (e.g. newsletters)
	- Snapshot providing entirety of current picture in relation to a selected topic (be confident that is relatively broad reaching)
	- Good synthesis papers
	- Executive summaries in English
	- Briefings about novel research
	- Provide simple representation/illustration of results
	- Initiatives which involve citizens' science (e.g. 'Eye on earth')
	- A timeline can help compare and validate information (e.g. LIFE funding with fish)
	- Create own databases
	- Legislation/instrumental requirements that force the provision of data and information and mandatory monitoring by signatory states. Countries are obliged to provide data and if not they can be subject to infringements
	- Concentrate on essential and legally binding information
	- Provide better spatial and temporal coverage
	- Develop more indicators with methodological approaches to drive the reporting and data collection by Member States
	- Support already existing initiatives (e.g. Red Lists for Species)
	- Demonstrate applicability to the policy agenda
	- A sustainable solution needs a change of the economic system; the value of biodiversity needs to be anchored in the society
	- More money, more people, more time
	- Less to do with technology and search engines (stop, think and revise the ways that we are working). We can actually be distracted with all the gadgets we have
	- Mendele (system for sharing reports, references, etc)
	- Visual thesaurus
	- Google translate
	- Good twitter
	- Social networks in real world sense
	- Online meetings

Questions	Response/Notes
	- Avoid white elephants!
Preferences and expectations	
What are your preferences in relation to how and where you gain access to information and data?	- Public information - Open access - No login or password (you cannot transfer the information to others) - Also available for external stakeholders, so that everybody has the same information - Easily accessible - Fast - Simple - Reliable - Comparable - Complete/full coverage - Internet based - There should be a personal contact point - Live topics - Centralized information - Central repository of information - Platform which collates the information around a number of areas such as clusters. These could be geographic and/or thematic (e.g. like BISE) - Something like BISE - Natura 2000 viewer - A single entrance for all information should be available in a useful way - Compile news and important results, publications and ongoing projects on a website organized by topic - Database that allows you to go in with key words - Good to see directly what is new in a website - Good knowledge website, avoid having to go to different websites - Something like updates, hub where you can go and shows the new information, where information is located - Decrease duplication - Network - Expert network - Expert groups - Forums - New bulletins - Digested information - Solid written documents - Internet - Websites - Google - Twitter - Less Google (fast, but not reliable) - Personal repository of digital papers, reports - Face to face - E-mail experts (e.g. from existing expert networks) - Phone experts (e.g. from existing expert networks) - Validate using the Topic Centres - Check with colleagues - National focal points - 1st internet, 2nd ask colleagues, 3rd mail known people; if urgent, phone. The advantage of e-mail is that you can transfer the information to others easily (you do not need to type the phone conversation), but by phone you can get more information - For small issues send e-mail to expert network; for bigger issues use telephone contact - Search with questions is quite restrictive - Lists of links are not attractive

Questions	Response/Notes
	- Help desk/help line, somebody that you can interrogate in relation to your question - Expert to whom you can send an e-mail is not useful. You need an urgent answer and it takes a long time to elaborate the e-mail with some background information and to get a response - Person or system that you could ask a question: they would have to do the search and digestion of information, so that is one more step, prefers to do it himself - Expectations from INSPIRE - Get data to look into, at least see them - Do not like e-mail spam bombarding
What kind of expectations would you have for a solution (such as that provided by this project)?	- Open access information - Shared information - Two types of access: restricted, for sensitive information; and open, for rest of information - Free - Public - No registration hassle - Make as many data and information publically available - Fast - Information sources have to be transparent and traceable - Independent (no policy influence) - Reliable - Trustable - Transparent - Credibility - Considered official - Quality control - Validated - Up-to-date content (regularly updated, ensure that it is up to date) - Full coverage - User friendly - Easy to the reader - Clear illustration/representation of information - Portal based approach - Multidisciplinary - Classified by topic - Layered issues - Concentric layers to extend a search; working from detailed to more extensive kinds of search - Include information which is relevant for the implementation of legal provisions - Organized around the key emerging issues in the policy agenda (e.g. analysis of impacts of CAP) - Should be relevant to policy objectives and needs - Policy related – real world (e.g. organic agriculture, by-catch, Marine Protected Areas, etc) - Provide information on specific issues - Provide a snapshot of the entirety of the picture in relation to a certain topic - The current state of research should be reflected - Broad reaching - Use language that can be related to the audience - Takes researchers, users and knowledge holders into the process - Overview of what is going on (e.g. projects; projects exist in their own framework, but if you do not know what is going on it is hard to find them). - Overview of expertise/experts - Expert networks - Link to biodiversity knowledge hubs in Member States - Should create energy and synergy

Questions	Response/Notes
	- Should be an enabling and supporting mechanism - Get people together - Link to taxonomists in particular fields - Mechanism that allows new people to get in the exchange network - Much work is done, but many times we are not aware of it if we are not in the distribution channel - Allow you to drill all the way down to the data (at least the contact institutions). - Startrek idea, a machine that answers your questions. Ask a reliable source your question in a question format. The response could be to answer the question directly or point at a contact person. In any case keep the ability for critical thinking. - 'Facebook for knowledge'
What would be the key elements in such a solution?	- Web portal - Portal which provides guidance to the user, e.g. type of user, with a question box where you can type a question (e.g. Ask Nature) - Be logically and clearly structured so that you get a good understanding of the information and data that you can find - Say clearly what it does not provide - Completeness: anything and everything about an available topic (policy, references, most up to date information) - Trustable - Reliable - Legitimacy - Plausibility - Free - Open access - Equally accessible - Egalitarian - Speed - Well managed - Institutional structure - Aligned with relevant institutions - Personal contact should be possible - Regularly updated - Produce synthesis/digests of topical subjects and issues - Thematic layers - Thematic entry points - Link to key issues - Well founded knowledge related to international developments - Link to the policy process - Links between the scientific base and policy processes - Policy relevant - Pertinent to civil society - Meta source: with links based on clearly organized list of items - Simple way of presentation and use, no expert tools and complicated databases - Pioneers and advanced thinkers (what are the most important future questions) - Topics for particular users - Include different disciplines - Maps (e.g. detailed maps down to provincial level) - Database of what we have - Network of excellence - Network of experts - Share networks (rather than individuals) - Easy to find in Google - Help tool like the one provided by Word, where you type a question and get a list of connected answers already elaborated - Use of descriptors and processes to organize information - Should have a way to ask questions

Questions	Response/Notes
	- Search option - Good internal search engine - FAQ are useful sometimes, but in general he has more complex requests - No FAQ - Good visual cue - Provide a way to contact the right people quickly, by e-mail or chat - A helpdesk (person/expert) who could point at the sources, link you to who has the information or answer the question directly would be useful - Not an office desk sitting there in a call centre - Social networks kind of approach. Biodiversity is technical but social aspects need to be considered when focusing on the biodiversity question. Examples include the abandonment and urban sprawl issues
Who should maintain/pay for a Network of Knowledge?	- A public body at national level or European level - Public money for public access to information/data/knowledge - Public institutions or foundations - Governments - All Member States - It is in the interest of EU policy makers, so the EC should be involved - EC - At European level it should be a European Institution, like the EEA, DG ENV - Maintenance to be done by EU agency (e.g. EEA, ETC, JRC, Eurostat) - If it is a European system, the framework should be a European source such as JRC, DG Research and Innovation, EEA - One of the European institutions should take it on. It should be part of the internal strategy and institution and therefore should be part of their core funding (they should use it to secure more funding, from a pragmatic perspective) - The Commission should pay for the infrastructure to help research; research should be paid for by the Member States - The science institutions - No one paymaster: Member States at national level; synergy and networking at EU level - IPBES could be a good starting point - Find a solution to support the network, national or European bodies. You cannot ask people to subscribe and pay at this stage - There is also valuation, economic valuation of biodiversity and ecosystem services; integrated into accounting systems. These values should be taken into account in project decisions, so it is also of interest to Member States - Individual governments; located in one place but the funds should be from all over - Donor funding, by partners in a consortium - Decisions are important for society, so part of it should be decided up-down; governments or decision making bodies should put the right framework that would set up the decision making at local level. Citizens also need to be involved, be aware, gain ownership, cofinance, so that they are touched personally - Public/private partnerships - Not financed by private economic sector - Business financing should be avoided - Sponsoring options from innovative approaches of private economy should be checked and considered - Users should pay for it, similar to the polluter pays principle - Environmental users, but needs a core team - Include it in the project proposal - Allocate money for it at organizational level - Low subscription fee and small budget for maintenance from EC - Subscription if at a genuinely low cost

Questions	Response/Notes
	- People would pay by putting in their personal time if their knowledge and information is acknowledged/rewarded - Those people who want to check and cross-reference - Key users should pay for it. If it is the users of the system, should they pay a certain amount per answer? That will not work. - Find an added value; if it works well people will come back to it - Something like Wikipedia, where people can contribute work independently, but should be moderated - Who pays for Facebook? Social network philosophy
Who should be responsible for Science-Policy Interfaces (i.e. is 'science' responsible or 'policy')?	- Organizations that work in the interface and know about both, policy and science. - Both science and policy - Science responsible for content and policy responsible for financing and infrastructure - EC but also representation of the national level - Institution that has credibility (determined by the fact that it is a global level institute/has a clear reputation for reliability; e.g. JRC, Topic Centre) - Some institutions and groups should be responsible for the facilitation of the interface. A network of EEA, JRC... with the ones who hold the knowledge; alliance with research institutions (including national ones), universities, expert organizations, NGOs. - Organizations like the EEA. Then come down to individuals (aptitude and attitude). Projects, programmes and initiatives (which should have mixed partnerships including science/policy/ managers). In this context they can learn from each other - Science responsible to prepare scientific information and data easy understandable with the help of professional communication agencies - Relevant public institutions which are in charge of the implementation of legal directives should also be involved - Should be independent and not coming from an official source - Difficult to generalize, a combination. Make people who deal with certain issues responsible for those issues. For example, data providers should be responsible for the provision of data. The coordination should be at the upper levels and institutions - For some important issues it might be unrealistic to expect initial steps from the policy side - Partnerships: public decision making, knowledge producers, industries and funding agencies - Policy should make arrangements with the scientific community via network representatives (suppliers on demand). Scientist should organize for updates on policy developments - IUCN for species and ecosystems - It should gather lessons from the scientific field and the policy field - Have to have a dialogue with the users - Think tanks - Independent watchdog - Specific institutes with this as their responsibility - Scientists with knowledge of policy - The ones who pay for it - People developing background papers from the policy level - Philanthropic/charitable organizations - Who is responsible for Facebook? - Not sure; maybe funded projects? - New species of person, not from policy or research, translators in transition zone
Any other final questions/ comments to close the interview	
Have you heard of the	- Yes (19)

Questions	Response/Notes
concepts of adaptive management and evidenced based conservation?	- No (5)
Are you satisfied regarding the follow up of big research projects and regarding synergies and overview for the many separate events and projects? What should be improved?	- No (21) - Not really in touch (1) - Very positive (1) (e.g. based on experience of COPI, followed up by COPI2, COPI3, TEEB) - Success depends on committed individuals at policy/requester side - A success factor is the ability for a scientific that has built up scientific expertise to jump on a political opportunity - Once the project is finished there is no follow-up - Follow up should be guaranteed (specified in the contact, force the project to keep running in a small scale) - Guidelines for follow up should be part of project results - Every project should have an organization in it that will take it on and outdated - Designate a contact person for the project after the project ends - Data available after the project ends - It is a challenge to provide viability afterwards - The products of the projects are in general not used after the project finishes - Difficult to get the full picture of what is going on; no common entry by topic - If you are not connected to the project it is often difficult to find information or even to know what is active and operational - Completed projects are often very difficult to find - There is no good tool to follow past and on-going research - Hard to find relevant information - Better means to find projects (e.g. Interreg programme where local and regional offices maintain databases for all projects and the responsibility to communicate) - Big gap: production of a metadata compilation of projects - Make a review to catalogue everything that exists already and link it to policy, what is useful for management, etc - Use thematic leaflets, search system per theme (e.g. LIFE funding) - Executive summaries that are clear and accessible and which have been tagged to appear on Google in relation to relevant searches - EU funded project results should be available and centralized; CORDIS has abstracts, but it is not accessible enough and appealing - More publications emanating from projects - Outputs from funded projects are highly fragmented and hard to find - Outputs of EU projects are not communicated to decision-makers - Publications and results from projects should be widely available in open access - Outputs of projects are too technical, too long and too complicated - Outputs are not useful and realistic guidelines for implementation - Data and information from the project should be available in a standard version - Billions are spent, but the dissemination systems are completely outdated - Maintenance of the website, dissemination of results - Project websites are often good on promoting partners, giving extensive minutes and action points, but usually low on conclusions and results - Involve stakeholders before the end of the project - Involve SMEs in the projects - Put it in the policy framework - More politically applied questions - Projects tend to pursue non-policy relevant questions - No sharing of information onto policy-making

Questions	Response/Notes
	- Researchers and scientists who implement projects do not know enough about policy; they are unable to bridge the gap - It should be a requirement in the project design and through the negotiation process to have better science policy interfaces - There is a gap between the science and the management community - Little use for the benefit of countries which are being included as case studies in the projects - Projects should highlight gaps and where they need to be filled - Important to maintain research capacities of countries and of Europe - Not using sufficiently/not exploiting added value of research - Report available of a scan of 300 FP6 and FP7 projects that represent themselves in a comprehensive way with the best ones in targeting policymakers
Do you/your organisation have a relation with traditional knowledge holders?	- No (13) - Yes (7) - Indirectly (1) - To a certain extent (1) - Very marginally. In some specific projects we get knowledge from local municipalities (1) - Not relevant to his role - Disperse experience based on work with local farmers/site managers in Europe and with projects in developing countries - In touch with associations of farmers who hold traditional knowledge - Involved in the past interviewing farmers about grassland management - Volunteer birdwatchers make up the majority of the recording effort - Work streams that involve indigenous people - Sami people, collaboration on reindeer herding, Arctic projects - Through the Topic Centres - 'Eye on Earth' - Citizens science
Do you think that lack of data or that problems related to the knowledge flow are the primary obstacle for your work?	- No (16) - Yes (7) - Mainly content wise - One of the main ones - Both lack of data and problems related to knowledge flow - The enhancement of accessible, comparable and practice-oriented data is desirable - Too much information is the main problem - No, it is not the main problem. There is already enough information to take the lack of information as an excuse not to take action. There are still gaps of data and information related to certain fields and topics, but there is already a lot available - Fragmentation/dispersed nature of information and data is the key issue - Time constraints is the main problem - Not sure, the main difficulty is to know if something exists and how to access it - The situation has improved since the time-lag between paper submission and on-line publication has decreased substantially - There will always be some questions which cannot be fully answered - In a few cases, specially related to new emerging issues - Occasionally in relation to information about specific species linked to mediation/infraction
Any final comments?	- Try not to duplicate (e.g. with BISE or other already existing similar initiatives) - Build on existing systems (e.g. EEA) - Suggests to take BISE and develop it further - What is the relationship of this project with IPBES?

Questions	Response/Notes
	- Another important issue is how to disseminate the information, make it reach other people easily
	- In relation to emerging issues for biodiversity it would be helpful to have training/special source of information on how to put it all together; how to make an overview of such things. This would mean that others would be trained in providing such information and that would help the users
	- Social science and economic aspects should be included
	- Further discussion on who can be the requester and differentiation of possible requesters might be helpful
	- A target-oriented and pragmatic approach is desirable
	- The NoK should also provide information which is geared to the relevant legal framework and political goals
	- Experts on legal knowledge and knowledge related to the implementation of legal directives should be integrated in the NoK
	- Do not search too long for the perfect solution because it might not exist
	- Sometimes it is difficult to search in existing interfaces, each person searches in a different way, has a different approach and it is difficult to reflect this in the interface
	- The Natura 2000 exchange website is not very much alive; it would be very helpful to rejuvenate it
	- Agriculture is a business that delivers biodiversity but it is not about biodiversity; communication has to relate to the interest of farmers
	- Overall positive about availability and access and sharing of knowledge/data between research institutes and policy makers. This used to be different in the past, especially with data holders selling data
	- Priority setting; what questions are important?
	- Start as little as possible, do not think that you have to answer all questions
	- What will the knowledge holders get for their inputs/participation in the NoK?
	- Which motivations will ensure the participation of the knowledge holders in the Nok?
	- Will the NoK answer only 'official requests' from Member States or also requests from individual requesters?
	- 'Knowledge is like a jungle' (at least that it is how it is when working with DG research); you can recognize individual plants and trees, but you cannot see the jungle. Rely on discussions with people. Partly because the way the questions need to be answered is never that simple