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

Prototype NoK mechanism
(Deliverable 2.1 of the KNEU project)

Compiled by

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Content

1 Outline and purpose of the Deliverable

Within the course of the project KNEU, the development and discussion of the prototype for a Network of Knowledge is the major goal of the project and goes on continuously across the whole duration of the project, mainly focused in WP2 and WP5, with input from WP1, WP3 and WP4 See description of work).

Several lines of input are foreseen to develop the NoK prototype – firstly the input from the experts within the consortium, secondly the input from the whole community, thirdly the input from other developments, policy and important networking institutions.

The status of the prototype described here should thus be seen as an intermediate status which continuously develops and will have additional major inputs in April and May 2012 by further developing the prototype via a green paper (which was originally intended to be ready by now) and the first KNEU conference to be carried out in May in Brussels. After that, the prototype will be revised and set into place for the test cases in WP3.

2 Process and results so far

In this first period of the project (November 2010 to February 2012), the main focus was on the input from the consortium (including the input via the work conducted in WP1, see according deliverables D.1.1 and D.1.2). For this, a first prototype version was developed based on first discussion in the working group of WP2.

Major elements where identified and are shortly described in D.1.2. Two version of the prototype were circulated to the partners in summer 2011 and autumn 2011, asking for feedback.

Additionally, the autumn version of the prototype was sent to the participants of 3 regional workshops conducted by the WP2:

- Central European workshop in Budapest, October 2011
- Nordic workshop in Copenhagen, December 2011
- Southern workshop in Aix-en-Provence, December 2011

The discussion and recommendations[1] of the workshops were taken into account for the further revision of the prototype. The new version was again discussed in detail at the

[1] (see Annex 1 in D.1.2. and at http://biodiversityknowledge.eu/index.php?option=com_content&view=article&id=36:biodiversityknowledge-meetings-and-conferences&catid=2:uncategorised)

second KNEU partner meeting in January 2012 in Brussels and revised again afterwards into the current version (version 14, see Annex 1).

To make discussions and feedback easier, the NoK prototype has been developed in a set of presentation slides, thus basically working on the prototype from an illustrative point of view. Also, the slides have been structured according to the five main challenges that have been identified when designing the NoK and discussing it with stakeholders:

1. Ensure proper Networking and exchange: The Network of Knowledge approach
2. How to ensure a proper governance of the process
3. How to ensure that request are properly identify between requesters and the network
4. Procedures to ensure high scientific quality when answering a request
5. Communicating properly

As described in the first description of main elements in WP1 (see D.1.2), the prototype defines main bodies of the NoK, the different roles that knowledge holders and requesters may play, and the steps which should lead to processing requests.

The details are given in the description in Annex 1, so will not be repeated here.

In addition to the prototype itself, the project team has also identified first steps on how to identify the appropriate methods for dealing with requests, as they had been identified in the DOW. The three methods in focus – expert consultation, adaptive management approaches and evidence-based approaches, are described in fact sheets (see Annex 2) which will be a main elements when deciding together with requesters in the NoK prototype on which methods to use. These methodological approaches will also be further developed or summarized (as much experience with them exists) during the course of the project, thus exemplifying via the BiodiversityKnowledge website where there have already been used successfully.

3 Next steps for the further development

Based on the current version of the prototype and the underlying narrative (see Annex 1), the prototype will now be further specified and developed by a green paper to be presented at the delayed first NoK conference (originally planned for month 15, January 2012, it will now take place in May 2012).

Afterwards, the prototype will receive a final revision to be then further tested in the demonstration cases of KNEU in WP3, which is already ongoing, as the test cases have

already started with their scoping process. Finally, the prototype will be evaluated in WP4 and then revised in WP5.

From discussions and exchanges during the last year, at the regional workshops and especially the feedback in the Client Dialogue Group (meeting in March 2012), it will be important, as anticipated in the DOW, to link the potential future NoK in its recommended design to other ongoing processes on the European and global scale. Among others, this will be:

- The founding of IPBES (possibly in April 2012) and the potential role of regional hubs to support it and how a European NoK could support this role – for this we will discuss the European contribution to IPBES at the KNEU conference in May 2012
- Geo-BON and the European support project for it called for in the current call of FP7 – we will contact the successful project proposal to discuss potential links between the project and a NoK
- BISE – the Biodiversity Information System Europe of the EEA – KNEU has already made contact to EEA (Rania Spyropoulou) and started discussions on how a future NoK could be linked to BISE efficiently and support it
- The European (and member state) assessments of ecosystems and their services called for in the EU Biodiversity strategy (Target 2, Action 5) – members of the KNEU project team are also involved in a contract supporting the EU Commission (DG Environment, Anne Teller) to develop a mechanism to coordinate the assessment work and links with a potential NoK will be part of these processes. Knowledge developed in KNEU, especially in WP1 has already been fed into this process.

  For other processes and projects, like BIODIVERSA, GBIF, Liefewatch and DIVERSITAS, direct linkages have been established via the Client Dialogue Group and will be further developed in 2012, as it will be especially important to involve them as major knowledge hubs into the discussions for a potential future NoK.

Annex 1: the NoK prototype, January 2011

The following version (v.14) of the NoK prototype proposal is, as intended, an intermediate product, but has been agreed on as main milestone by the project partners at their meeting in January 2012.

It is also accessible online at:
http://biodiversityknowledge.eu/index.php?option=com_content&view=article&id=17:designing-the-nok-prototype&catid=8:the-project-steps

The online version will be continuously updated and made available in different formats to make it easier accessible for interested parties.

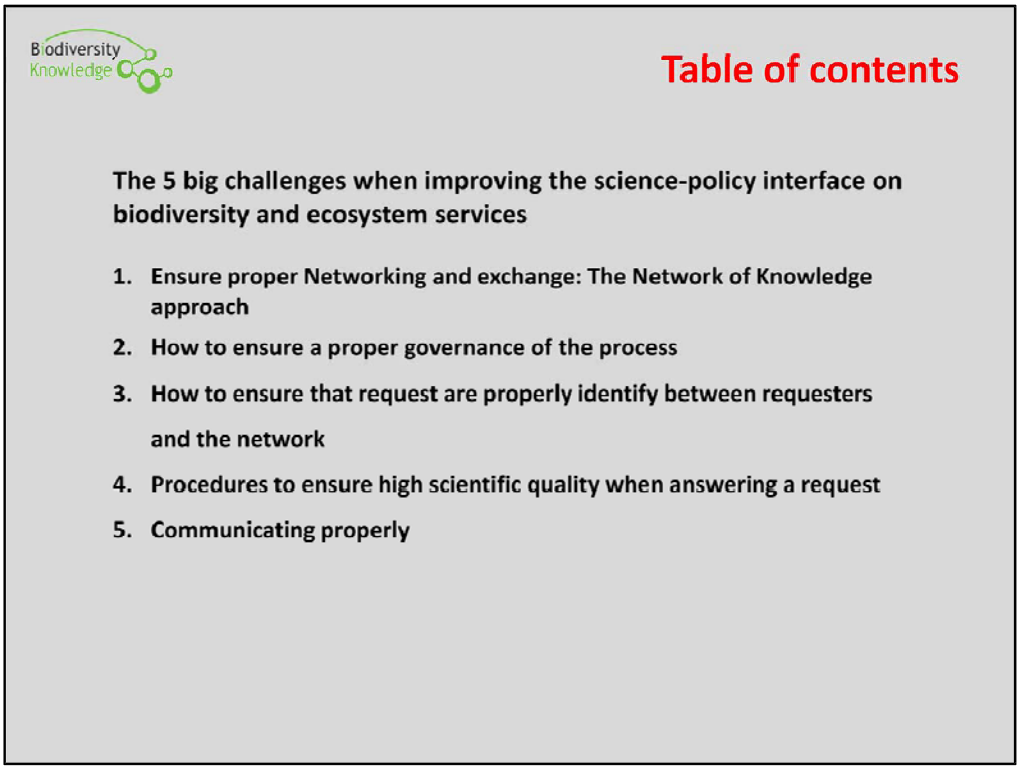
Communicating knowledge between providers and users is not always an easy task. Sometimes it might be straight forward when it comes to standard numbers regularly used in policy (e.g., on the labour market or the economic development), but in complex issues, where such regular numbers don‘t exist and interactions with other areas are high, like in many environmental issues, these communication processes are much more challenging.

This is especially true, when existing knowledge is scattered across many countries and many institutions and individual experts with very different background – as in the field of biodiversity and ecosystem services.

The Network of Knowledge (NoK) approach tries to take up this challenge by opening up possibilities for new kinds of dialogues between knowledge providers and potential knowledge requesters.

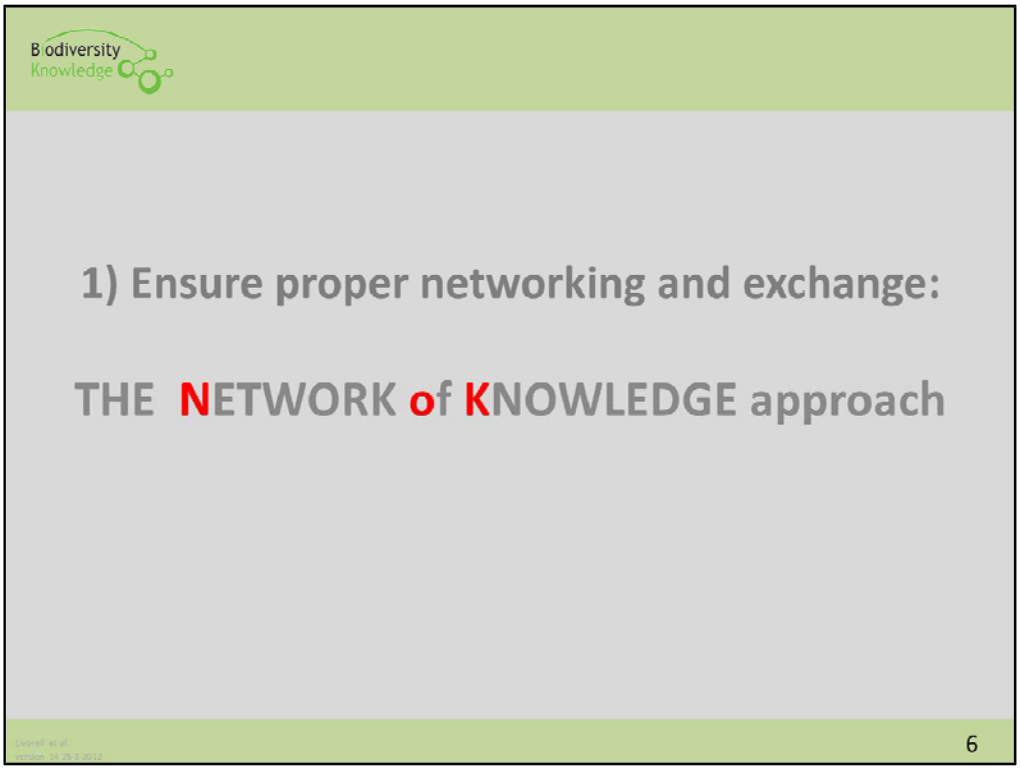
Many issues need to be considered in such an approach, and it needs to balance the main criteria for an appropriate exchange process – ensuring relevance for the clients, ensuring credibility of the process and the results produced and, last not least, finding a way to ensure legitimacy from both sides, the clients as well as the knowledge providers.

The following slides explain a draft structure for a Network of Knowledge, and explain some of the main challenges it will face.

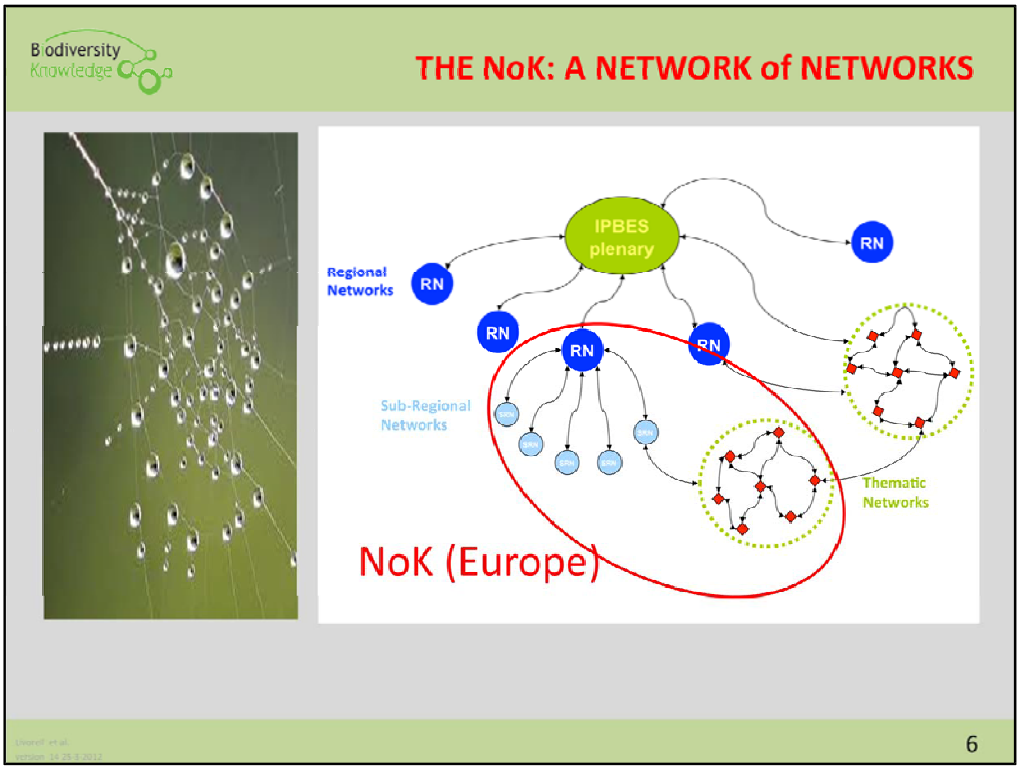


From a general point of view, five major challenges arise when creating a network of different players. This is especially challenging when the topic is diverse and the landscape of the players is diverse, too. The Network of Knowledge approach tries to address this first challenge by first of analysing this landscape and trying to identify the factual needs from networking activities.
To achieve acceptance of such a process, a proper governance structure need to be established, this is the second challenge.
The third challenge, on the science-society interface side, is to find ways to jointly identify the right requests to be posed to a NoK.
The requests taken up will then go through a process of conducting an analysis and providing answers to the request. This process needs to be transparent, but also ensure high scientific credibility – challenge No.4
Finally, linking back the results to the requester, and probably beyond, will be a major challenge as well.

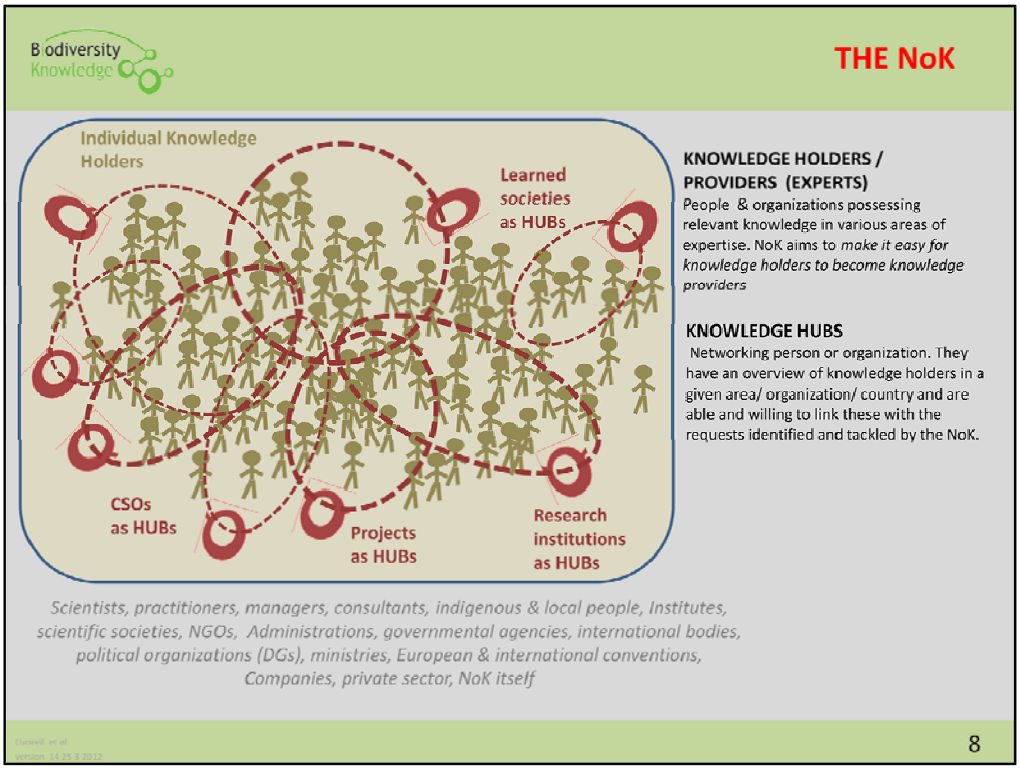
For all these challenges, lots of experiences exist on how to address them properly in science-policy processes. And BiodiversityKnowledge tries to bring them together for the area on Biodiversity and Ecosystem services in Europe. The next 5 following sections will present how the NoK approach can in fact address them in this context.


Biodiversity Knowledge
1) Ensure proper networking and exchange:
THE NETWORK of KNOWLEDGE approach
6

The Network

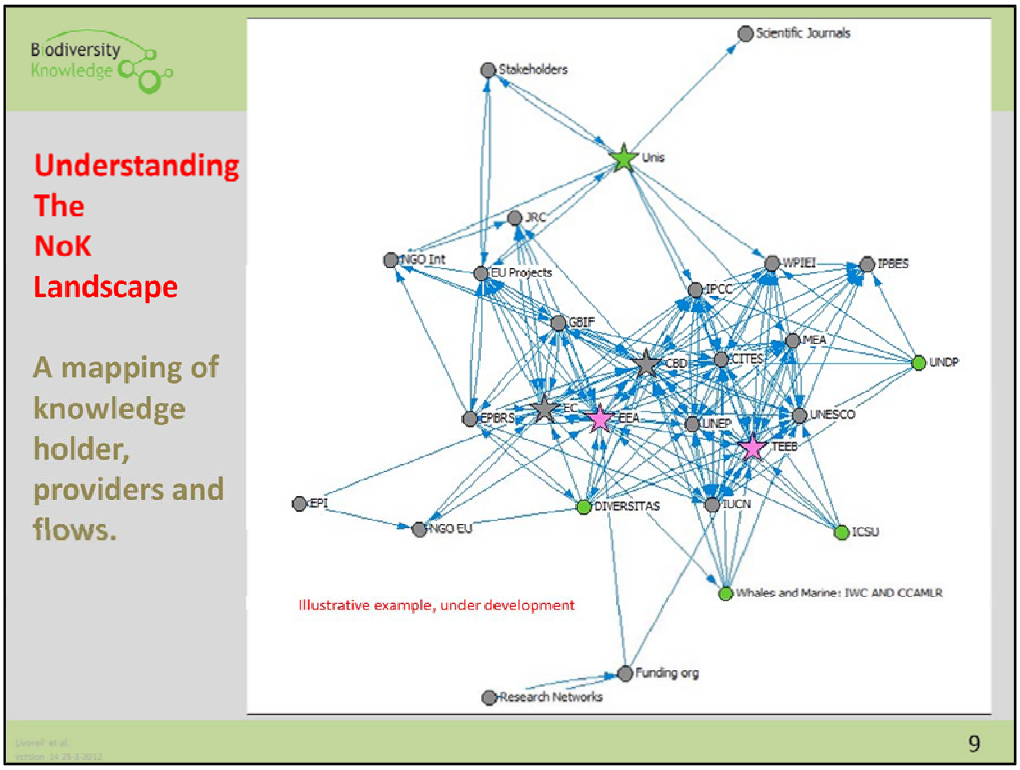


A Network of Knowledge is first and foremost a network of networks of existing institutions, initiatives and projects. It acknowledges the fact that nothing in the area of science-policy interactions starts from scratch and needs to accept that many processes are already going on. Identifying and addressing them is thus of major importance.
In the international level, this can be exemplified very nicely with the IPBES development. Analyses had been made to show, that many international and regional players are already acting it this context, often as networkss themselves, and thus would need to be addressed and strengthened. Also, thematic networks may exist, like GBIF on biodiversity data, or the BIP network on indicators.
A network of knowledge in Euope will them be a subset of these networks again.
The basic idea of a network of networks is then to federate and facilitate knowledge tranfer (incl. Capacity buidling) via some central node (e.g. the NoK for Europe, and IPBES at the global level) which coordinates and plays at the interface, either with ipbes or directly with requesters.
The scale of NoK may makes it relevant to
- address particular regional conditions of biodiversity and ecosystem services
- address the particular linkages to human well-being at different places
- and the specific management problems involved – an aspect will may be difficult to handle on the global scale



The broad community of individual knowledge holders is not explicitly organised to serve one purpose. Instead, the forms of organisation are quite diverse – via research institutions, cross-institutional projects, learned societies, networks in CSOs and many, many more. Many of these organisations exist, with overlapping participants, but covering a quite large number of individuals.
The community as such is a flexible entity, and so are some of the knowledge hubs, especially research projects. So from them, knowledge might get lost or is difficult to identify. Other, continuous knowledge hubs will need to overcome this problem.
The role of a NoK project is to first identify relevant knowledge hubs so that their overview and expertise for some parts of the community can be used and activated, for a mutual profit.
It will never be possible to address a complete community, but the hubs will be needed as multipliers and also as a sort of quality control on the expertise involved in the Nok process.

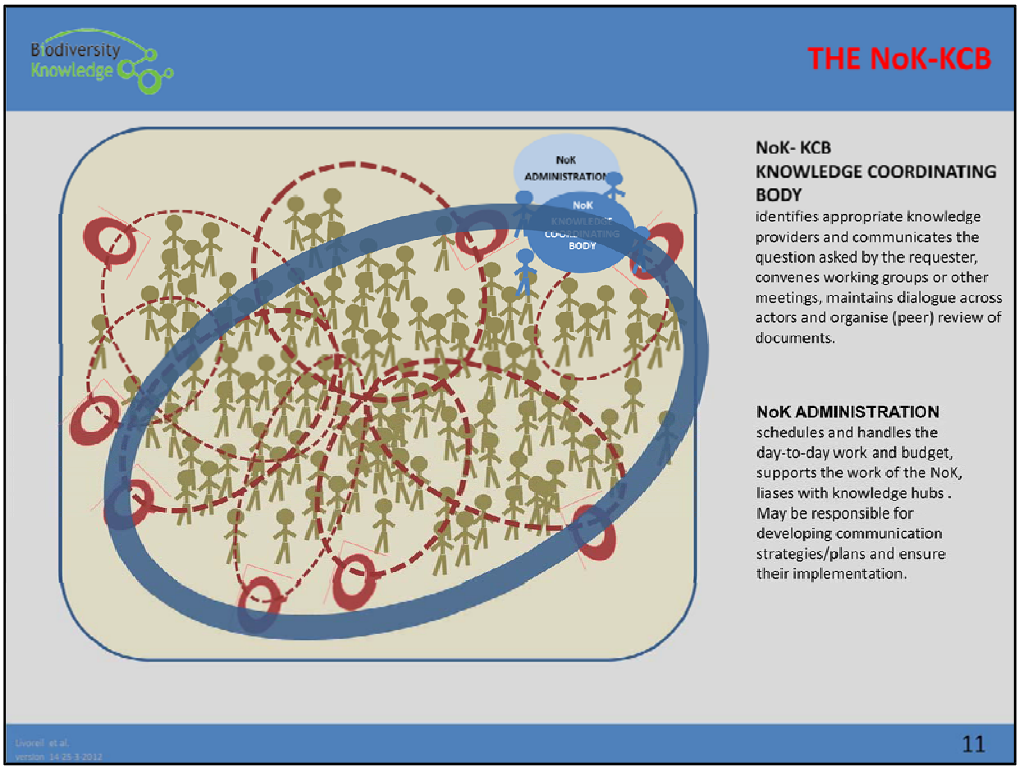
The knowledge within such a community is overwhelming, better then asking a single expert, better in identifying if there is an answer (or study) to a question at all, and more focussed and high-quality then just using a serach engine on the internet.
The challenge is, to infact motivate knowledge hubs and indivuals to join the NoK activily.



With a NoK having many active hubs and participants, many questions posed to the NoK might be answered quite simply: by identifying products and knowledge of the hubs that is out there somewhere and can help- like project reports, studies, databases and other sources, which are not directly available at first sight.
Many material, on the other hand, is already produced for specific policy questions, but we hardly now that they exist and how they are communicated.
This is exemplified in this NetMap, based on interviews conducted in the KNEU project: Stars indicate institutions with a high between-ness, meaning that they receive as well as provide knowledge. Not surprisingly, this includes the EC, the EEA and the CBD, and the recently released and quite influencial TEEB study. Also, the universities are mentioned, but of course not as a single entity. Green elements show institutions which are the main providers of knowledge, while pink one are major demanders – this of course directly fits to the role of the EEA as link between science and policy, but also to the TEEB study as an in first place meta-study.

Such a map could be much more detailed, including individual players, but it shows, where knowledge is situated and which players to address in a NoK. For example, this would include here players basically delivering knowledge, but not broadly linked. This would include for examples the EU projects, universities and research networks (which are not very well linked, according to the recent status of the mapping).

As in many existing processes between science and policy, for example the IPCC or the MA and the forthcoming IPBES, organising an open and transparent process which pays tribute to all relevant interests and identifies and includes relevant knowledge holders is a challenging task.
On the one hand, institutionalisation of clear and reliable processes is needed to ensure credibility and engagement, on the other hand, the diversity of topics and players who could potentially addressed and included in the work, call for a flexible approach.
The proposed framework for a network of knowledge, as outlined in the following slides, tries to address these needs.



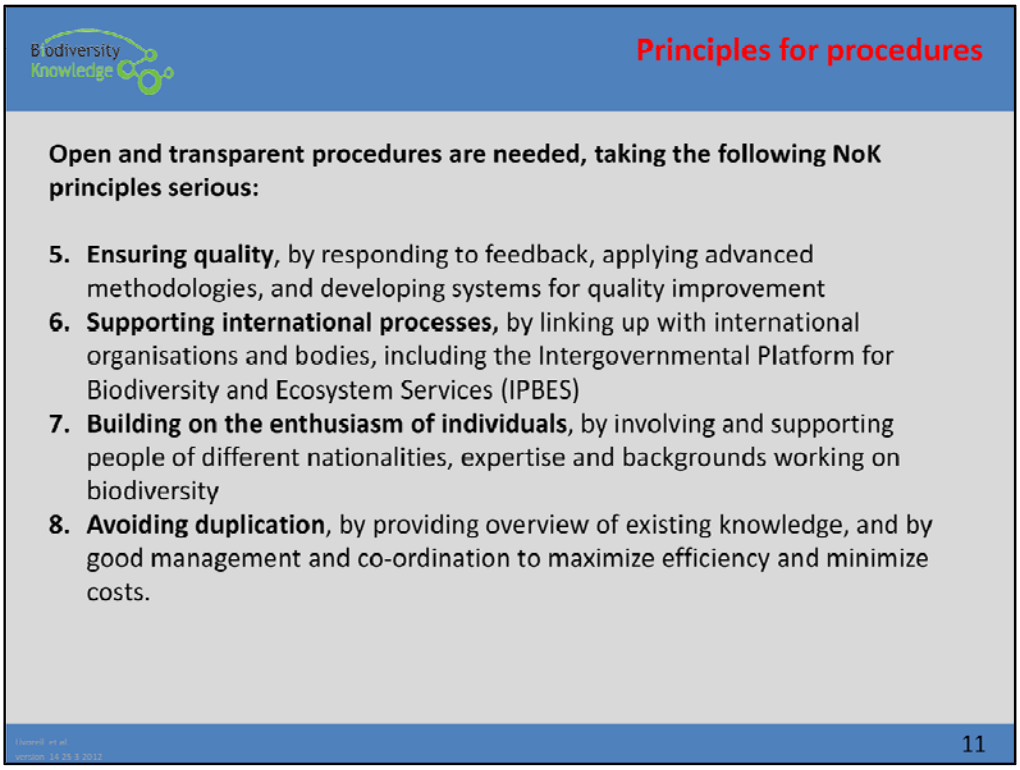
As the basic coordination elements, the NoK will need a knowledge coordination body, a KCB, connecting in first place existing knowledge hubs interested in playing an active role in the NoK, even if over time. This should be complemented by a small NoK administration, taking care of the daily operations.
Most important, The KCB and the administration should not be seen as the tip of a pyramid, or a central core area. But rather like the conductor of an orchestra composed of experts, each in his/her field, sometimes alone (drums) or as a hub of experts (strings), in charge of making them play together several pieces (synthesis) to answer requests from an audience (governments to civil society). In many way, the work of KCB is that of a knowledge « editor » coupled with that of a project manager. The whole mission of the (NoK-KCB) within the whole NoK is that of a knowledge broker in the science-policy realm (including quality assessment).

KCB members belong to the orchestra itself in the sense that they come from it, they have received some training (on issues of biodiversity and ecosystem services), but not only, as this is also a mission of management, coordination, communication. So we can also imagine people in KCB who are not biodiversity scientists (which includes social sciences but are coming from the administration realm, accountancy, communication, management etc… (many scientists are not good at this, let's be honest). If a NoK is supposed to act as a science-policy interface with an official

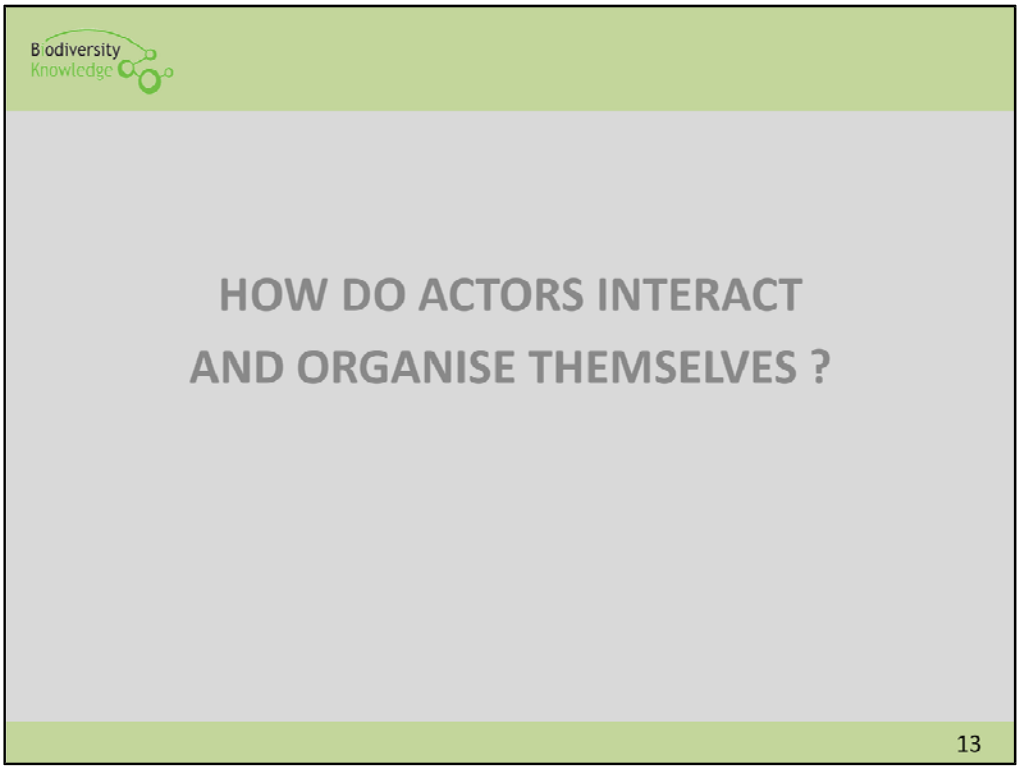
Principles for Procedures

Open and transparent procedures are needed, taking the following NoK principles serious:

1. Ensuring broad collaboration, by enhancing good communication and teamwork with a multidisicplinary team of experts.
2. Minimizing bias, through a variety of approaches ensuring scientific rigour, broad participation, and by avoiding conflicts of interest.
3. Striving for relevant and up-to-date information, by linking the most recent knowledge with ongoing policy discussions on biodiversity and ecosystem services.
4. Promoting access and enabling wide participation, through open communication of procedures as well as outputs of BiodiversityKnowledge, taking advantage of existing networks and strategic alliances in the area of biodiversity research and management



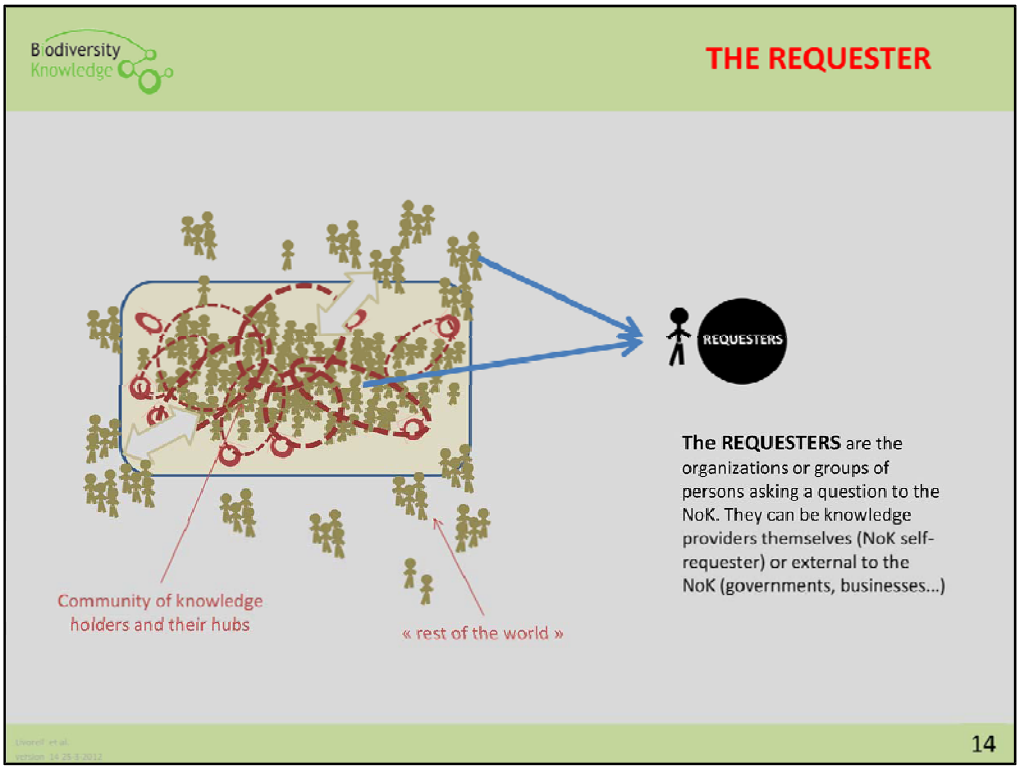
To take these principles into action, BiodiversitKnowledge needs a clearly structured, but nevertheless flexible process, which defines roles of different actors, but also ensures acknowledgement of involvement.



Now the question is « How does this work? »

How do requesters consult and rely on the NoK to answer questions of policy relevance for biodiversity and ecosystem services?

First let's see how do NoK, KCB and requesters interact
Then we will see how a request is processed and how the principles can be achieved.

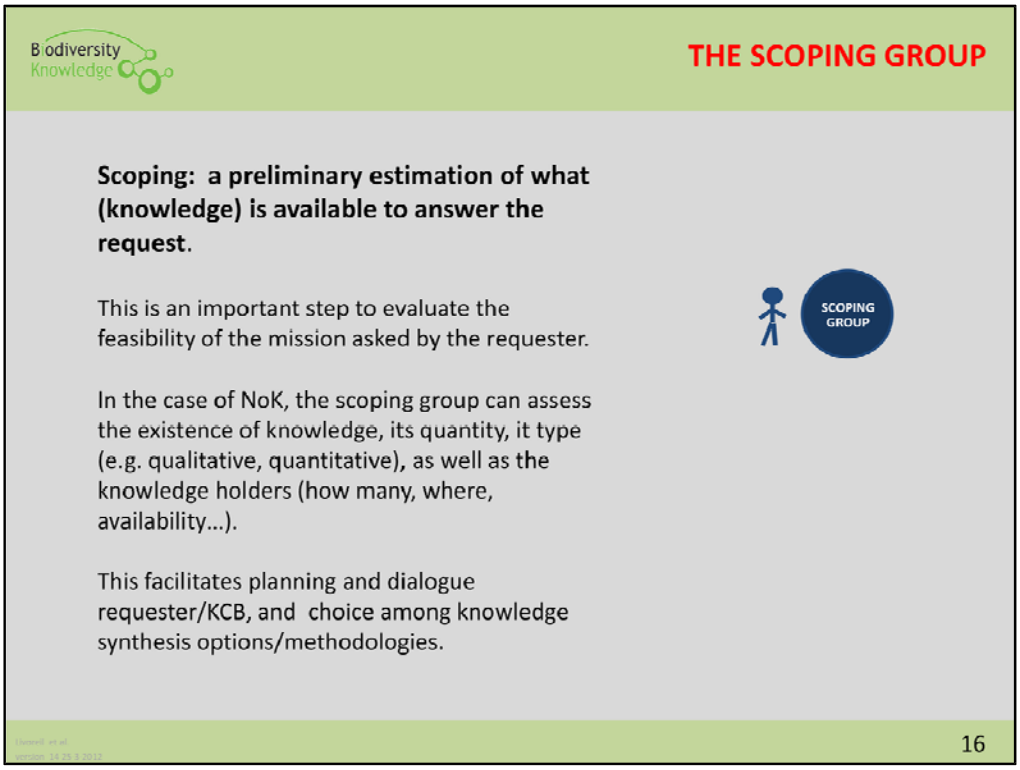


The requester can be external to the network of KN holders and providers or can be from within the NoK. It can be IPBES itself.

It is important to offer the opportunity to the community of knowledge holders to address questions they consider to be of high priority. Often, such bottom-up approaches are carried out within research projects or NGOs, but a NoK could support such processes by providing a broader basis of knowledge, and an open process to communicate the issue.

The requester has its own knowledge or perception of the problem. Nobody is truly without knowledge. But here we consider this role as independent from that of a knowledge holder for the sake of the exercise. This is where a conflict of interest may exist and the need for independency of the work of NoK is of paramount importance.

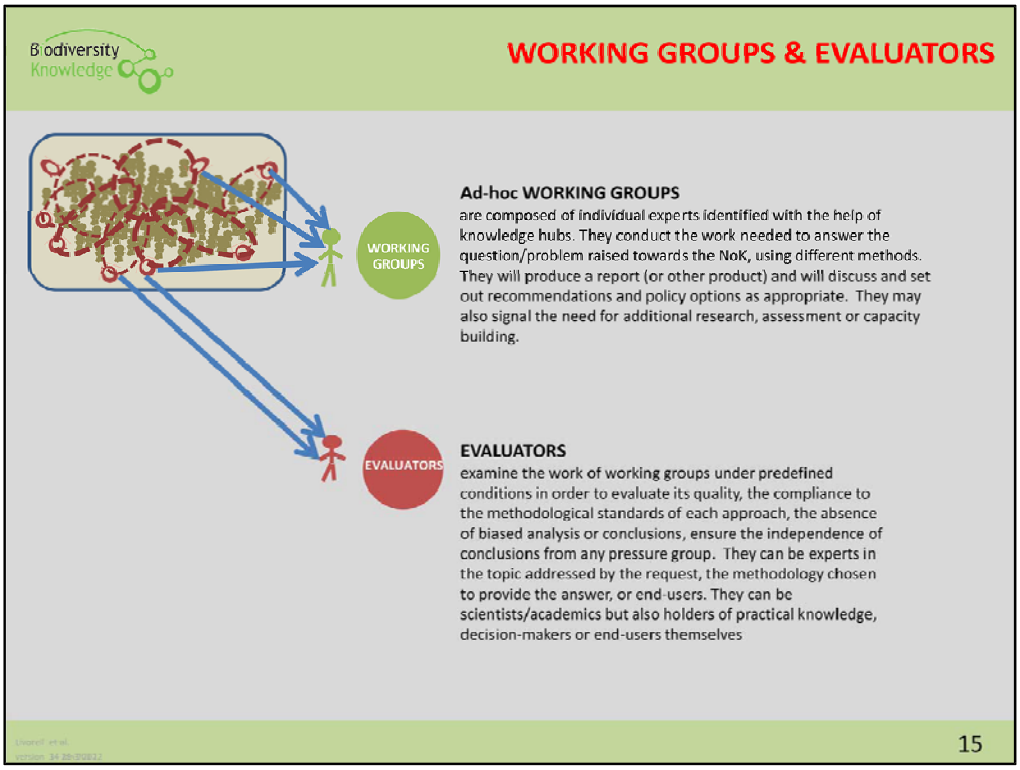
The double-arrow between the community of Knowledge holders and the rest of the world, as well as the similar colours of all individual, is to highlight that there is one big community of human beings. Some of them belong to the subgroup of Knowledge holders when the request is about a topic they know, but do not belong when their knowledge is not needed or irrelevant to the task... Again this is a dynamic pattern constantly moving and re-organizing. – following the concept of a dynamic community of interest.



Within the processing of requests by the Network of Knowledge, different groups of actors might be needed.

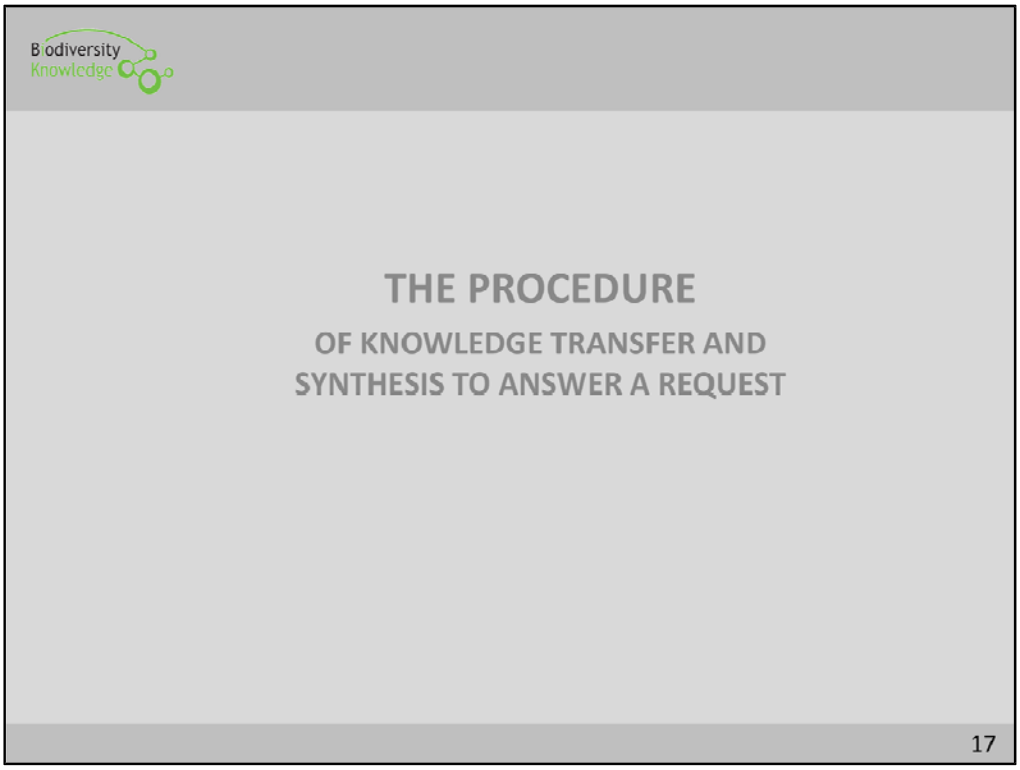
Depending on the nature of the request, the composition might be quite different (see later in the slides), but in general often there will the need for a scoping group with a mixed composition by client(s) and experts form the knowledge landscape. The role of the group is to discuss the request and set up an exact framing for the issue and decide, whether this framing can then be tackles by the approaches of the NoK.
The members of the scoping group may not need to be expert in the field. They need to be highly skilled at finding and classifying the knowledge available, and identify and contact knowledge holders. They are typical resource investigators (Belbin 2010, Elsevier)

They could include librairians or information managers but of course also experts in the area.

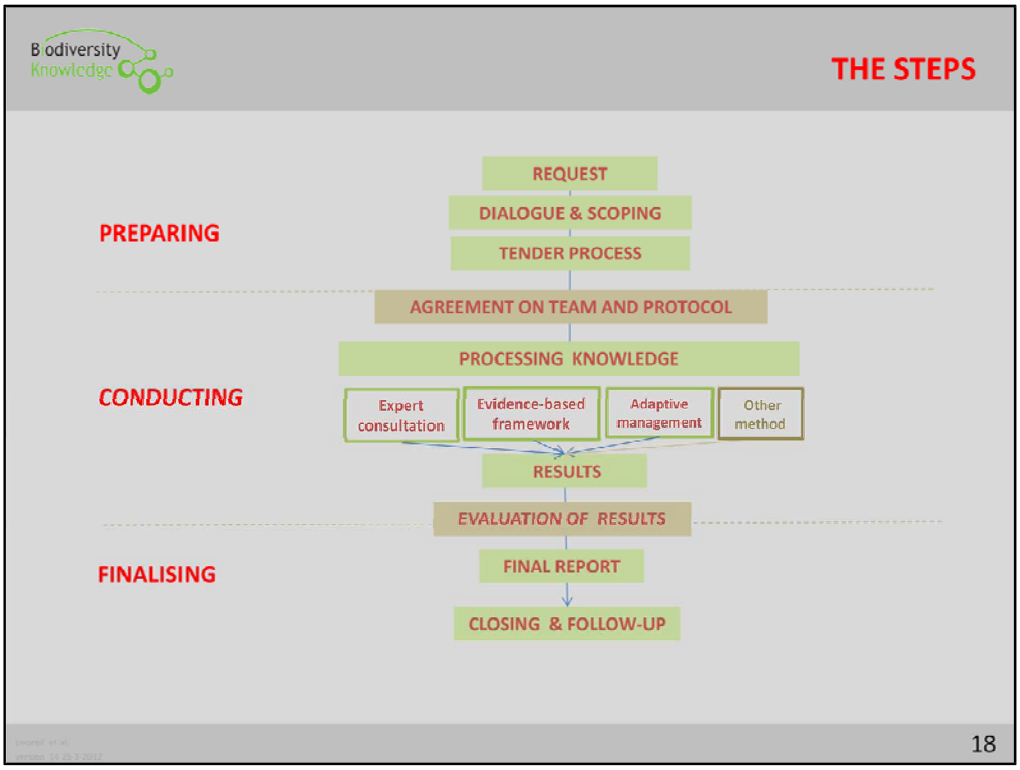


Later in the process, when the scoping process has indentified the exact task to be tackled by the NoK, ad-hoc working groups would be set up to take care of processing the request [continute with text in slide]
Reviewers will then later have the role to check the outcome of the group‘s work. It might be a standard peer-review approach when basicially scientific knowledge needs to be checked, or include review from practitioners and even clients, if applied knowledge
is included as well.

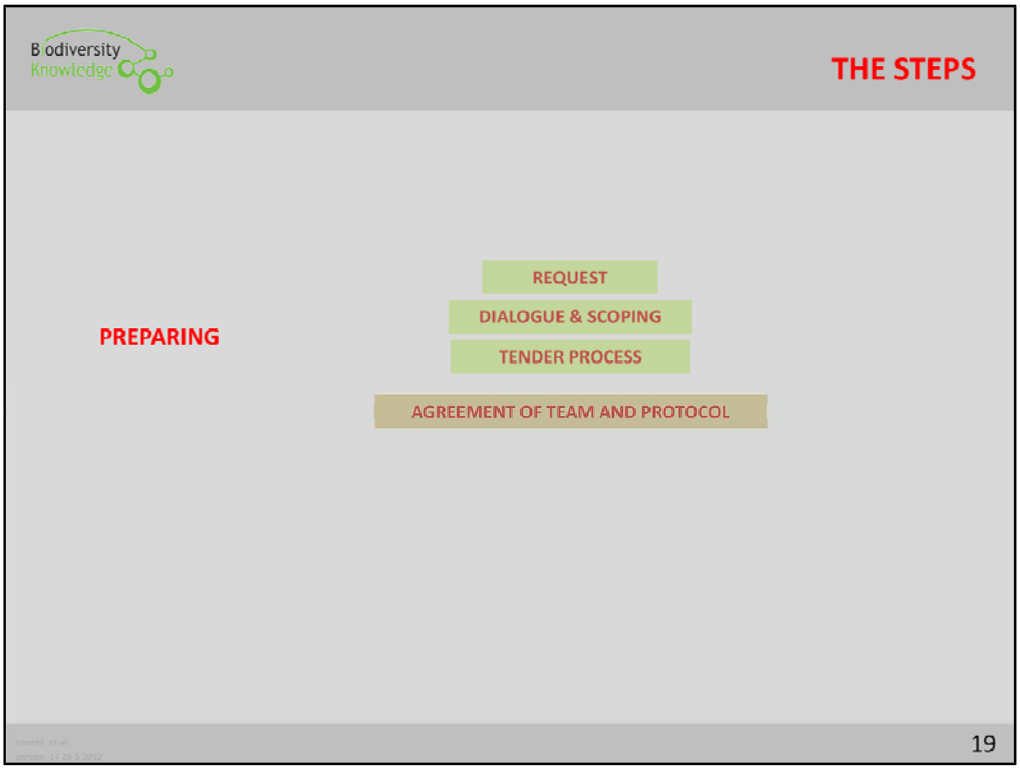
In the following we will see appear 3 other types of actors. Here are the working groups and the evaluators. They all come from the NoK itself. The KCB will establish a recruting/nomination process via includin g the knowledge hubs.



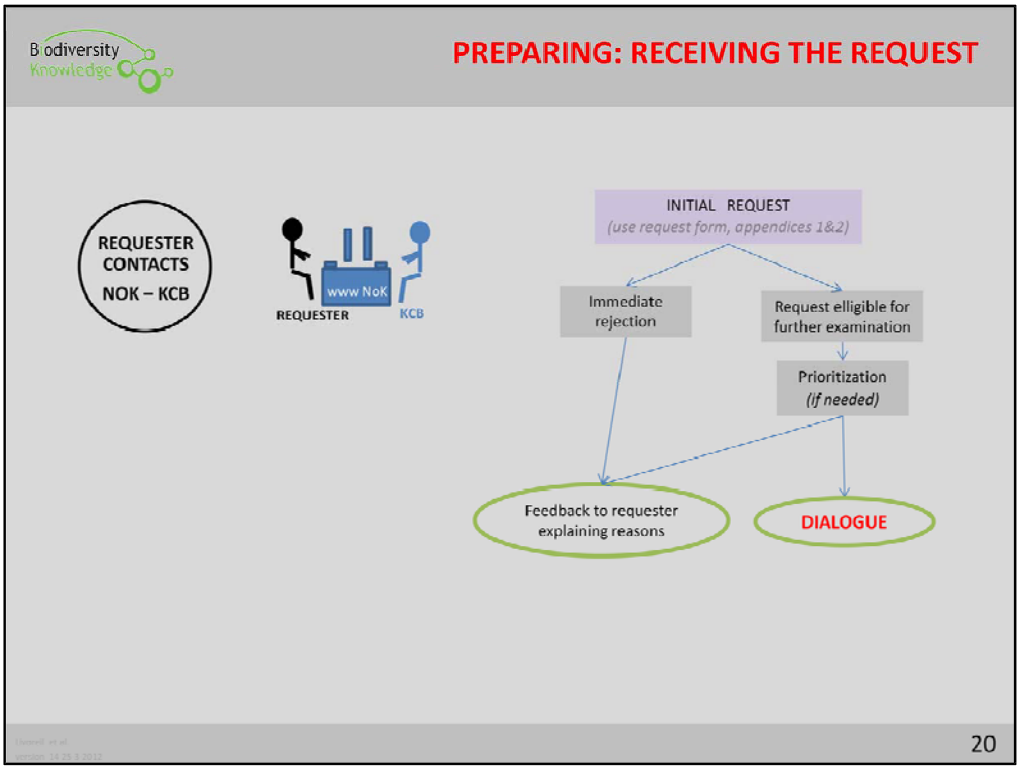
Finally, let's take a look at the biggest challenge, the procedure to work on a request to the NoK.



The groups described in the last slides already hint to the basic steps which need to be taken into account to process a request in the NoK.
A first request will be followed by a dialogue step between client, NoK bodies and if needed already some experts from the knowledge community via a Scoping Group. After that, the planning and conducting steps will follow. For conducting a review, we currently anticipate three approaches, which might be chosen according to the nature of the topic to be addressed and which include different steps within them: A review by expert knowledge; an approach of adaptive management; and an evidence-based approach. Mixtures might also be possible, depending on the topic, and other methods might be added as appropriate, e.g. scenario building or modelling.
Let‘s take a look at the process step by step.

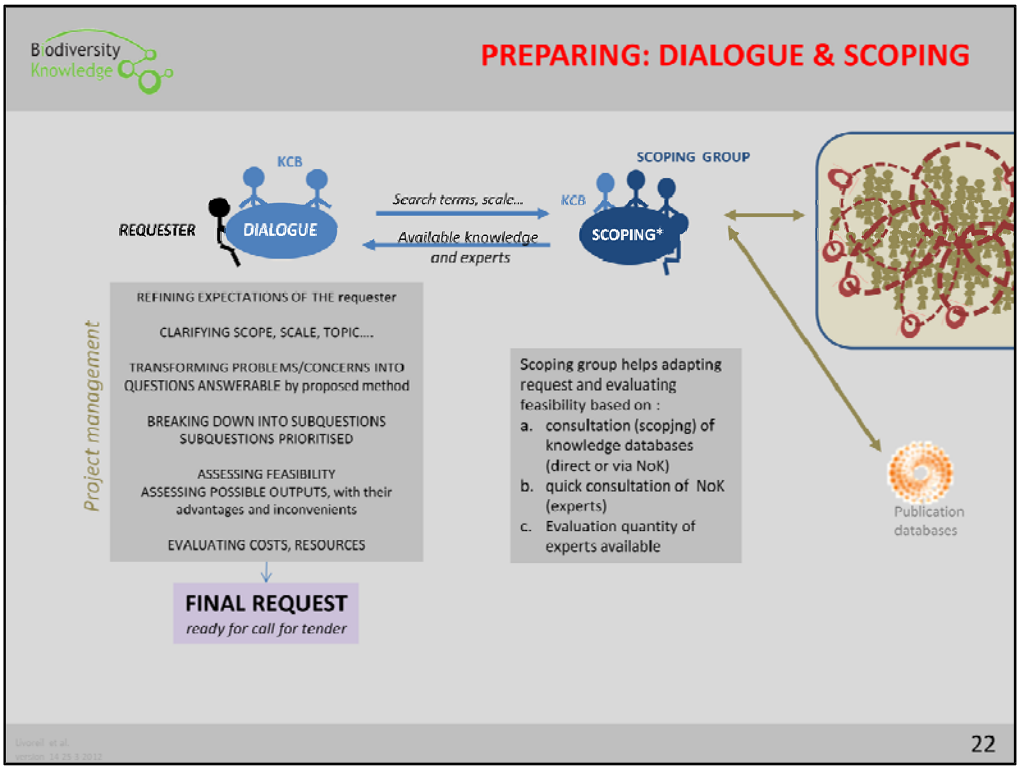


The request from a client (e.g., a DG, a European group concerned with biodiversity management, a private company) would first be posed with a request form (e.g., via the website) outlining the major elements of the request, this would be analysed by the secretariat and then discussed with the KCB.
The decision, of whether a request should be checked further would be subject to a KCB discussion, including criteria, which still need to be set up. These could include: European (EU and beyond) or at least trans-national relevance; applicability of the methodological framework within the NoK; uniqueness of the question in terms of needing a broad knowledge analysis which cannot be conducted within regular contracts, e.g. via consultancies).
If a request is not directly rejected, it would go into step 2, the Dialogue.



THIS PREPARATORY STAGE has a cost that is common to all requests in order to cover expenses of KcB, scoping time and administrative tasks (unless rejected immediately). It is the interest of the requester to prepare their request as well as possible to benefit from a « discount » if the question does not need to be refined/amended.
Even if a request cannot be conducted (because finally appears too expensive) the preliminary stage should always be a win-win strategy as its outcomes can be used as indicators and guidelines for future requests, or can be used again when the resources are available.

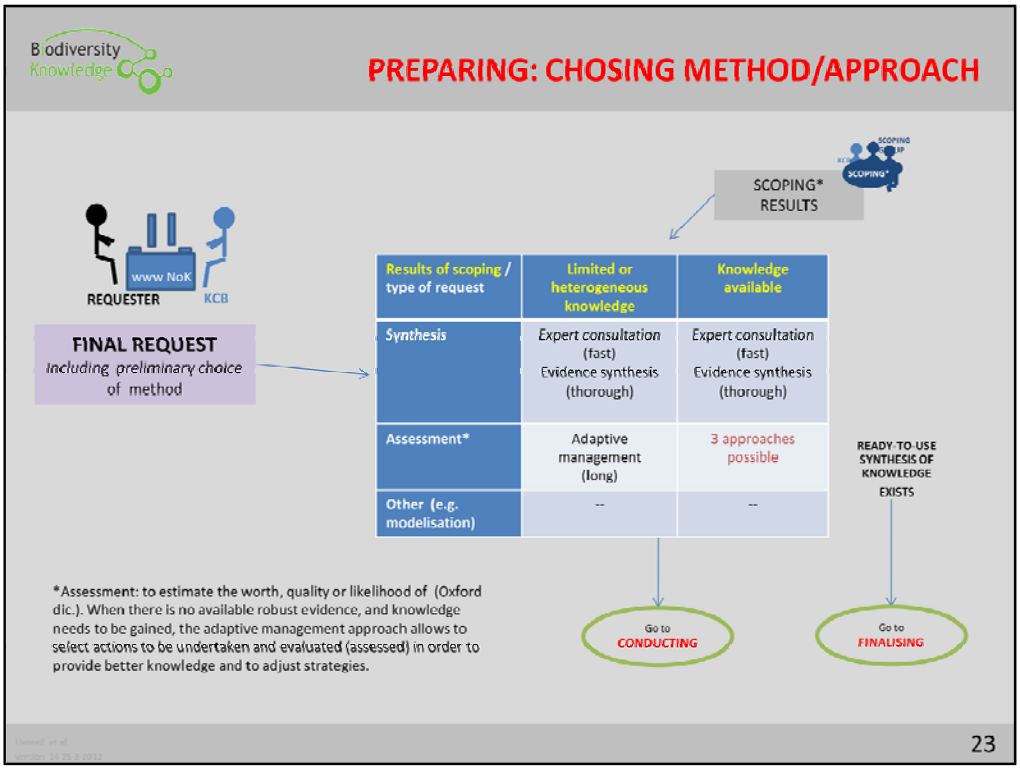
Factsheets (one for each methodology) should be made available to any requesters to make up their mind and express their initial preference. Then KCB based on results of scoping group can bring its own vision about the best methodology (according to type, quantity and nature of knowledge available)



The requester will surely bring in preliminary elements of knowledge into a dialogue, which led him to pose the question.
Nevertheless, the scoping group acts independently, they preliminary retrieve knowledge to assess its quantity and type (quality?) according to a list of criteria. They also launch a call to the NoK and its knowledge hubs to identify experts on the topic and consult them about
1/ the importance of the request for biodiversity & ES,
2/ their perception of current challenges and state of knowledge on this topic,
3/ if they would like to be involved as in what role… Then they report to KCB or with KCB to the requester.
Often, the scoping process might lead to a refinement of questions, breaking them down into sub-questions, and even prioritizing these from a requesters perspective, depending on the means available to conduct the work.
In the end, this might lead to an agreement between the NoK and the client on the future process regarding procedure, timeline and also financial issues.

NOTA: the requester may have done this prior to requesting, using his own resources… in which case it means that the requester thinks it is worth asking NoK to work on this and this step can be skipped. This is a way for the requester to save money and time. It will be similar for the choice of approaches for knowledge synthesis

Quick Consultation of experts could be done by e-conference and otehr electronic means. using NoK structure to relay the call to contribute



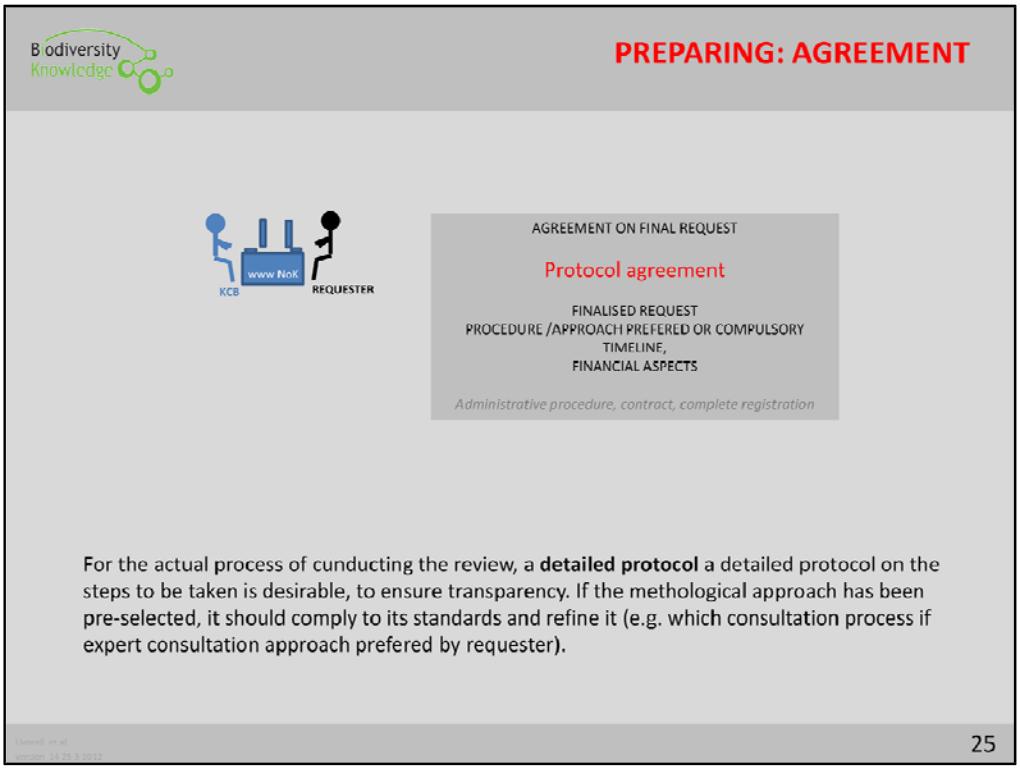
The different methods we proposed for the starting phase of the NoK, expert consultation, evidence-based synthesis and adaptive management, are of course not mutally exclusive, but are interlinked. They will ALL involve some expert consultation, for example.

The main constraints are the availability of resources (knowledge, experts for working groups and peer-review) from the NoK point of view, and the time and funds from the requester perspective.
Nevertheless, the requester should be informed about the advantages, risks and limitations of each approach and also see what is possible with the resources available (money, time, HR).

In all approaches, the common point is to use NoK to gather, evaluate and use the largest quantity of knowledge available.

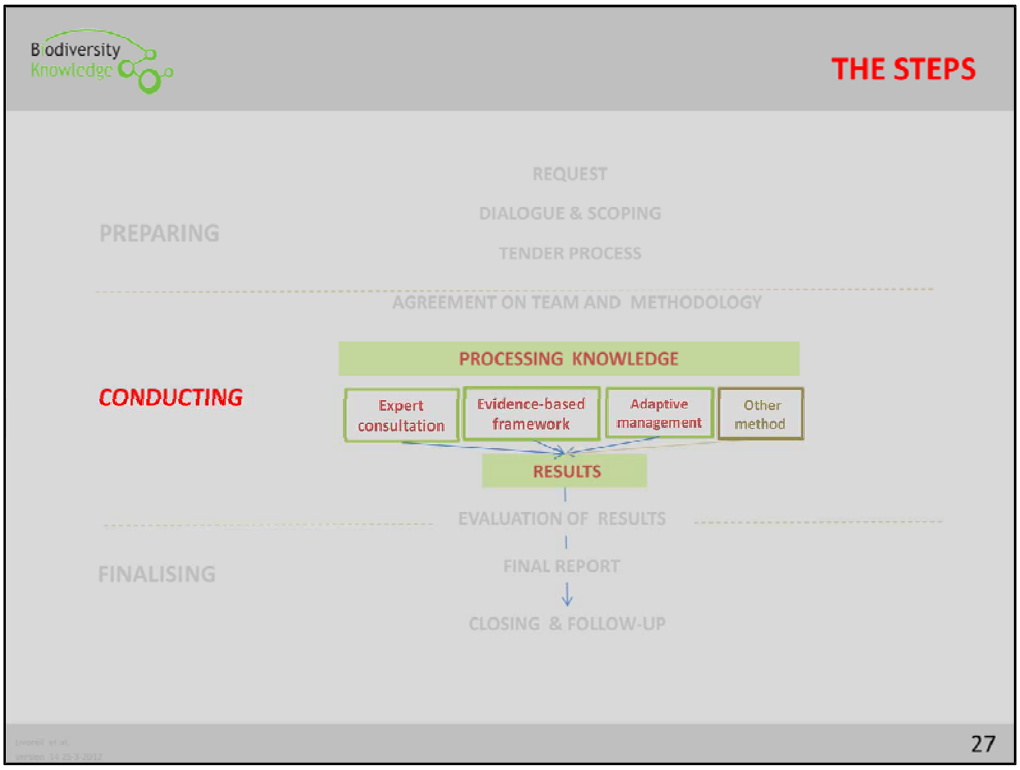
One asset of NoK is this to facilitate expert consultation and knowledge transfer to feed the synthesis or assessment and give the best and most argumented answer to the request as possible. The ability to question a large number of experts, to make this consultation credible and un-biased will be a major goal of the project.

The scoping stage is thus interesting to FRAME the future consultations to be implemented within each approach. And get the approval of the requester to see how far the synthesis and consultation is implemented (scale)

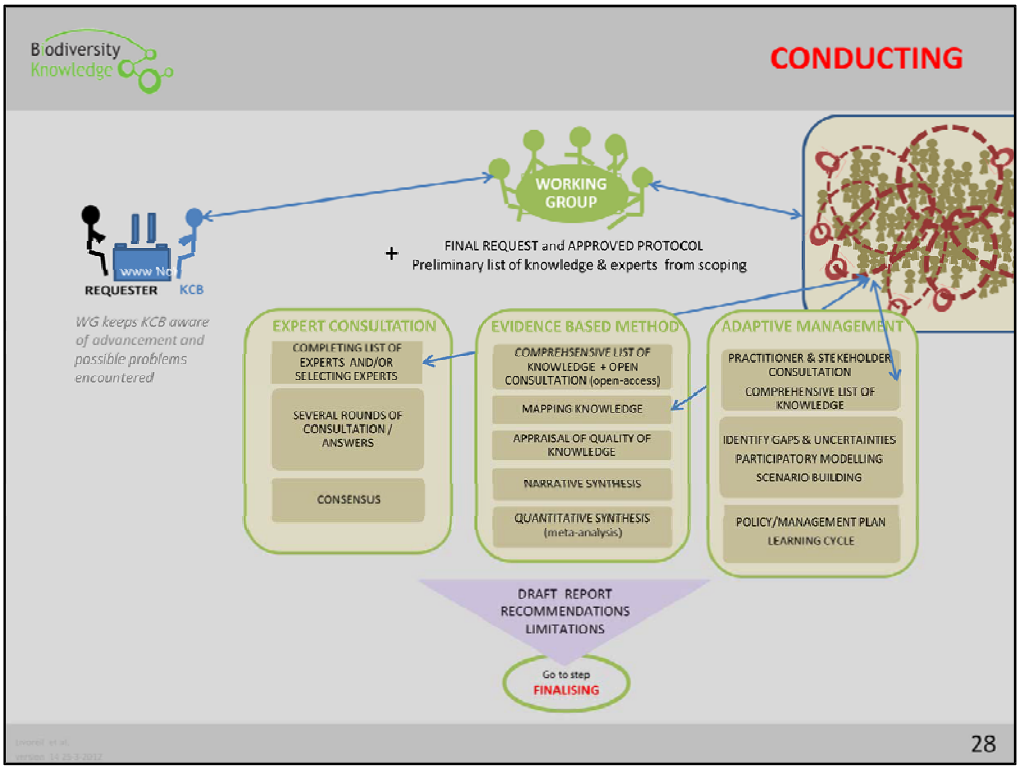


The protocol is identical to a Material & Methods section of a scientific paper. It should give a maximum of details about how the knowledge will be gathered, examined, compiled, about methods used for expert consultation, AM or EBC, sample sizes, timelines, …

The protocol, once approved (see further) should be made available (open-access) so that it would advertise for the on-going mission and may also help reach new experts and gather more knowledge.



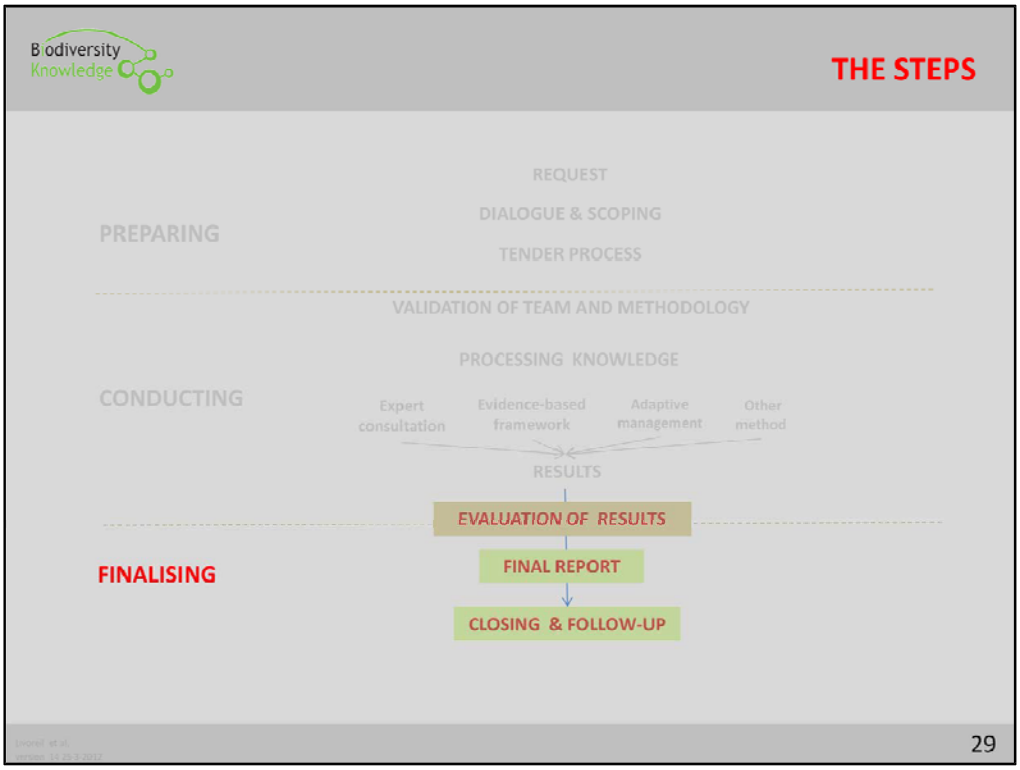
The main step is then, to in fact conduct the review on the request, based on the protocol.



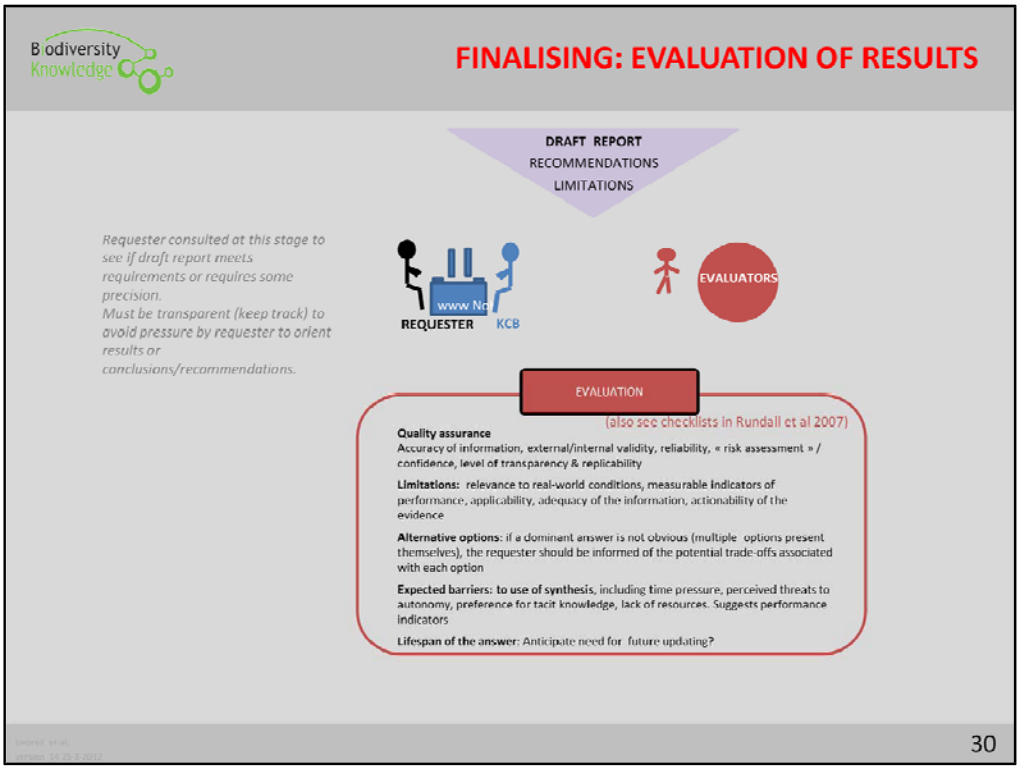
The expert consultation within the evidence-based method is normally more informal and organised as an « open-consultation » (invitation to give feedback) rather than a structured consultation like a Delphi or Townhall approach, depending on the topic, such approaches could of course be chosen as well.
It may be an asset of NOK project to allow a real expert consultation within the evidence-based approach as a mean to add tacit knowledge and indigenious knowledge to the synthesis.

The evaluators could eventually check the quality of the process and work in progress at various stages during this step to prevent any distortion or loss in quality, ensure objectivity and clarity (make sure decisions and methods kept transparent, data recorded…), alternatively, they may only come in at the finalisation stage for a peer- review.

In general, the working group (as in other similar processes like IPCC, MA) will be responsible to oversee and lead the process, based on the protocol agreed with the requester. In an expert consultation, classically the working group may be identical with the writers of the report, which is then opened up for peer-review. Also for the evidence-based method, this might be the case. For adaptive management, engagement of additional experts and stakeholders will be needed.

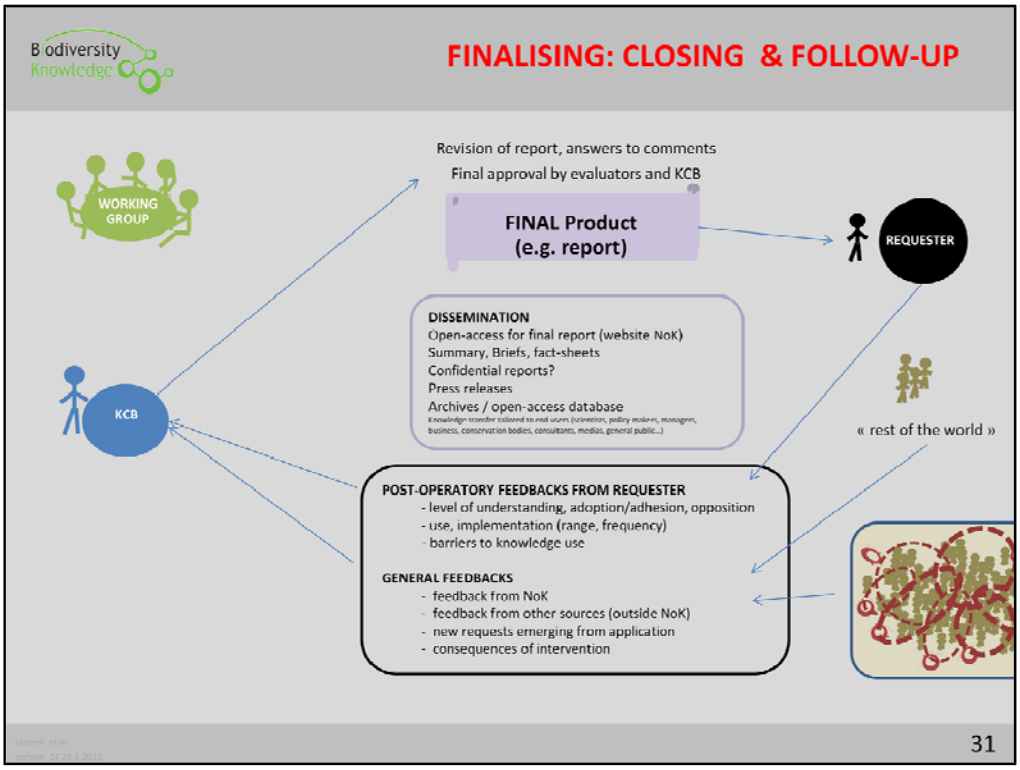


The finalisation of the process is an important step, as it includes review processes of the working group‘s results and is thus of major importance for the credibility of the NoK processes.



With the draft synthesis, the working group will engage, depending on the type of questions, via the KCB with potential stakeholders of the results, the clients and (academic) peer-reviewers to check and feedback on the preliminary synthesis and (if requested) recommendations. These feedback are essential to ensure quality of the work, make its limitations explicit, identify and discuss alternative options in the results, and clearly communicate issues of uncertainty, including the boundaries of applicability and lifespan of results.
The final synthesis will then take into account these issues and would be adopted by the working group and the KCB.

Scientific peer-review with one or more appointed lead-reviewers is the main tool in this step. In addition to that, an open call for comments could be feasible, but such a process would need to be accompanied by a registration process of reviewers to avoid bias and conflict of interest.



Based on the final product (in most cases, it will be a report), the KCB (with feedback from clients and working groups) would produce additional products like policy briefs, press releases, or open databases (to name just a few options), and also a documentary of the process, in order to ensure transparency on how the results were achieved.
In agreement with the client, results could then be used for further dissemination and use, if possible with monitoring its impact on decision making.

This is, in rough terms the outline of the way a NoK could work in handling requests from decision makers. This description focuses on the general process and many challenges are still lying in this process to actually make it work properly. This includes, among others:

• Ensuring that the NoK is only used for requests, where the knowledge of the scientific community as basis is in fact available and could not be processed by another, existing way, e.g. via the work of environmental agencies or by consultancies.

• Ensure motivation and participation: It is by far not a self-running process to engage experts in NoK-like processes. Incentives for experts (and institutions as knowledge hubs) need to be clear, This includes proper and visible acknowledgement of all person involved in products; a strong political linkage and support; and it may also include financial support in cases, where experts cannot afford to take part in process via their institutional support.

• The handling of requests is only one of two main pillars of a functioning NoK. The second and probably more important pillar is, to create an (electronic) environment where the NoK can engage with each other and build the community of interest needed to bring the NoK to life.

These and other aspects of the NoK will be furtehr worked in in the KNEU project, starting with the conference in May.

Acknowledgements

To all who organised and attended the workshops in Budapest,Copenhagen, Aix-en Provence and Brussels. Also,those who have answered questionnaires, surveys, and provided support and feedback at different stages.
Without they input, this prototype would have never gone so far into details. We have learnt a lot from our exchanges, our various backgrounds, expertise and visions, from our different cultures.

This narrative is only a main outline of the procedures of the NoK. They will be further shaped and detailed during the course of the KNEU project and will be subject to continuous revision.

KEY REFERENCES

- Cochrane Collaboration:www.cochrane.org
- Collaboration for Environmental Evidence:www.environmentalevidence.org
- Defra Annex 10- Methodology for the science review of Defra- www.bis.gov.uk/files/file3589l.doc
- Foundations of success-Improving the practice of conservation- www.fosonline.org
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Annex 2: Factsheets on the 3 main methods to be used in the NoK

WP3: Methodological approaches: Fact sheet

Name of the method:
Collaborative Adaptive Management

Brief description of approach:
Collaborative design of a continuous process improvement to natural resource management. Rather than making a single definitive decision despite information gaps or uncertainty about the systems involved, it emphasises learning via the careful monitoring of provisional strategies and changing conditions, and incremental adjustments in the light of new information. Collaborative planning emphasises the involvement of all stakeholder groups to fully exploit local environmental knowledge and ensure mutual gains. The result is a cyclic, iterative strategy at the interface among science, management and policy, designed for learning about the performance of different policy decisions.

When to apply this method/in which context to choose this method?:
When trying to evaluate policy or management options in the face of constraints posed by uncertainty, complexity and knowledge gaps. Offers a way forward when available evidence is inconclusive or contradictory (e.g., in terms of competing goals). Collaborative planning is recommended to overcome key institutional problems, such as overlapping authority, conflicting decision-making processes and tension between stakeholders with different interests.

What are the major steps in applying the approach? Is there a fixed protocol?
The steps are broadly defined and supported by various techniques aided by expert facilitation. The complete process may include all of part of the following steps: (1) definition of a clear overarching goal and concrete, measurable objectives to guide the management process, (2) characterization of the institutional framework, (3) identification of key experts and stakeholders, (4) knowledge/process mapping and uncertainty workshops, (5) fact-finding using protocols that promote shared learning and manage scientific uncertainty, (6) collaborative modeling and scenario-building (or similar tools that facilitate participation and foster collaboration), (7) integration of policy alternatives into adaptive management/policy plans, and (8) design of clear procedures for managing the program adaptively and cultivating long-term capacity building.

What kind of input is needed (processed data, knowlege)?

Collaborative adaptive management is explicitly designed to incorporate different types of knowledge, harmonize discrepant worldviews and negotiate conflicting interests. Availability of quantitative data and process knowledge allows for robust incorporation of facts into the collaborative modeling. Information on the policy process and/or management at the operational level is also of key importance for the design of AM plans and procedures, and it is best incorporated during the mapping and collaborative modeling phases.

Who to involve for processing the knowledge with this method?:

An experienced "AM team" should guide the process and, based on the institutional analysis, identify and involve all relevant experts and stakeholders. The team should at least include a process leader and experienced workshop facilitators (steps 4-6), eventually also modelers/programmers (step 6) and a policy transfer specialist (steps 6-7).

What kind of outcomes do we obtain from this method?:

An adaptive management/policy strategy, including:

- A negotiated definition of goals and objectives, with identification of policy trade-offs
- A characterization of the institutional framework
- A consensus knowledge map, with identification of knowedlge gaps and uncertainties
- A collaborative model and a suite of policy/management scenarios
- A narrative synthesis of the policy/management scenarios
- An adaptive management/policy plan, including procedures for long-term learning and capacity building

What are the limitations of using this method?:

The method requires the participation of all key experts and stakeholders (adequate incentives are required, not necessarily in terms of funding, but also in terms of ensuring due consideration of collaborative results by decision makers). It is also demanding in terms of time and funding, although simplified procedures (e.g. collaborative modeling without computational submodels) may be used to accommodate constraints in either or both.

Indication of costs and other resources needed:

Costs and resources depend on problem complexity (including its institutional dimension) and time-frame available. A simplified review could be performed for an average cost of 70,000-100,000 € (salary costs of 2 persons * 12 months, plus organization costs of at least 3 expert+stakeholder workshops), a full review could range from 100,000 to 300,000 €.

References (e.g. papers and websites with further descriptions):

http://www.adaptivemanagement.net/about

http://www.resalliance.org/index.php/key_concepts

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Susskind et al. 2012 A critical assessment of collaborative adaptive management in practice. Journal of Applied Ecology 49, 47–51.

WP3: Methodological approaches: Fact sheet

Name of the method: **Expert review**

Brief description of approach:
Expert review or expert consultation is the most frequently used method to assess knowledge on a given topic and can be used in general on all questions and circumstances, using different levels of involvement, feedback loops via review and by including specific methods.

When to apply this method/in which context to choose this method?:
Consulting experts and engaging them into conducting a joint report can be done for different purposes and different time frames. First of all, it is the preferred method when tackloing a topic wihtin a short period of time when knowledge is not directly available e.g. via existing studies or meta-analyses. The method becomes stronger when a higher number of experts is involved into a regular assessment process (see below), which also addresses issues of uncertainty by the expert group.

What are the major steps in applying the approach? Is there a fixed protocol?
No fixed protocol, but many processes, especially in international assessment processes are established (e.g., IPCC, MA, IAASTD): These include the steps of:

- Scoping the problem between policy makers and (scientific) experts
- Call for nominiation, and then identification of experts
- Identification and authors/ experts
- Meeting to agree on general content or reports /chapters
- Writing of chapters by teams, including internal review and coordination processes between chapters AND/OR
- Joint meetings to identify consensus or dissensus about state and certainty of knowledge
- Peer-review process by additional experts
- Rework of reports by authors

What kind of input is needed (processed data, knowlege)?
Expert reviews generally rely on the knowledge of the experts involved and the use of existing published knowledge. In general, no own analyses are conducted, but exitsing knowledge is compiled.

Who to involve for processing the knowledge with this method?:

The identification of experts for all aspects of a topic and their involvement is crucial. These can come from the academic area, but depending on the topic, this may include practitioners and managers of biodiversity and ecosystem services as well.

What kind of outcomes do we obtain from this method?:

In first place, smaller or larger assessments of a topic will be the product, including an synthesis specifically tailored to the needs of the demander. Models and scenarios can be included if decided in the beginning, but this enhances the amount of work as this may include original research to develop them.

What are the limitations of using this method?:

The method depends on the identification or knowledgable and motivated experts which need good support in terms of organising the process. Levels of certainty can be incoporated by explicitly identifying the level of agreement (from high to low) and the level of existing evidence (from limited to significant) to main conclusions or even all sections of a report (see for exampkle MA and UK-NEA).

In areas with a low or mixed level of information, it might be the best method, but as the level of information is higher, specific meta-analysis approaches may increase the certainty of conclusions.

Indication of costs and other resources needed:

Depending strongly on the approach used:

- A direct expert consulation with few persons involved can be cost and time effective, but there's a high risk of bias in such an approach [costs < 10.000€]
- Broader expert based assessment with involvement of 20 experts and more (in writing as well as reviewing) will enable processes of certainty/uncertainty (see above). Costs will strongly depend whether experts are involved working for free, or if they will be paid. At least, costs will arise for paying expenses for meetings in the process. [Costs between 20.000€ (small group, few meetings) per case up to several 100.000€ for large scale assessments over a longer period of 18 months and more (e.g., MA, TEEB)]
- Specific forms of expert consultation e.g. via Delphi and other meeting approaches would bring additional costs to ensure involvement of experts on the methods and a detailed planning [>10.000€ per event]

References (e.g. papers and websites with further descriptions):

- IPCC guidelines for selection of authors and peer-review: http://ipcc.ch/pdf/ipcc-principles/ipcc-principles-appendix-a.pdf
- UK-NEA: http://uknea.unep-wcmc.org/, example for structure: http://uknea.unep-wcmc.org/About/WhosInvolved/tabid/63/Default.aspx
- MA: http://www.maweb.org/en/About.aspx (procedural description are available from the BiodiversityKnowledge coordination)

WP3: Methodological approaches: Fact sheet

Name of the method:
Systematic review

Brief description of approach:
Evidence synthesis using a objective, transparent, replicable and updatable methodology. It relies on a comprehensive collection of studies, individually quality-assessed (evaluation of biases, validity) and the calculation of the strength of evidence taking into account the quality of each study

When to apply this method/in which context to choose this method?:
When trying to evaluate the effectiveness of an intervention (action) or impact of exposure to a factor (e.g. pollution). Also possible to evaluate the accuracy of a procedure, the occurrence of a phenomenon. Ideally when facing a controversy, conflicting results of primary studies or whendoubts are expressed about a well-established belief of practice. Ideally, a comparison is implied in the initial concern (between two actions, or before/after…)
Allows for the evaluation of the influence of some confounding variables (e.g. location, age…) on the results.

What are the major steps in applying the approach? Is there a fixed protocol?
The steps are strictly defined by international standards procedures such as those found in the CEE guidelines (www.environmentalevidence.org/Authors.html).
The protocol of the systematic review must be registered and peer-reviewed before the conduct of the review in order to ensure transparency of the process, minimize risks of biases or distortion. The review itself (including results, limitations, recommendations) is peer-reviewed. Stakeholders are consulted during the process and encouraged to comment.

What kind of input is needed (processed data, knowlege)?
Both quantitative and qualitative data can be used. Quantitative data allowing for meta-analysis provide the most robust outputs but this is not a constraint.

Who to involve for processing the knowledge with this method?:
An experienced “review team” acting as a working group should ideally be composed of librarians (search/retrieval of studies and grey literature), expert scientists in the topic (quality assessment), statistician (if required), eventually a knowledge transfer specialist (jargon-free reporting).

What kind of outcomes do we obtain from this method?:
Synthesis of evidence

This includes: map of current knowledge with typology, quality assessment of this knowledge, narrative synthesis of each study, statistical evidence synthesis when possible, prediction interval (when possible), assessment of confidence, limitations, recommendations for policy, research and management

No modelling, no scenario-building

What are the limitations of using this method?:
Time and resources

Indication of costs and other resources needed:
Costs and resources depend on the quantity and type of knowledge available. On average a cost of 80000 Euros per review (depends on cost of labor).
A rough estimate can be given based on 1-2 person.day x 12 month full time (but more people can be involved in a shorter time period in a succession)

References (e.g. papers and websites with further descriptions):

www.environmentalevidence.org