

Questionnaire on the design of a realistic working model for a European Distributed Institute of Taxonomy (EDIT WP3.1 & 3.5)

Considerations

The EU Network of Excellence (NoE) EDIT (towards a European Distributed Institute of Taxonomy) started 1 March 2006 and has two main approach strategies. The first is at the practical level, through several work packages (e.g., WP6-8) dealing with concrete joint action by member institutions. These work packages lead to well-defined products, but also enable scientists to cooperate and create an international collaborative atmosphere. On the other hand, WP3 (designing EDIT's physical infrastructure) has a more abstract approach, which is to design the building blocks for a feasible and durable organisation. The key objective of the entire NoE, "to integrate European taxonomic effort within the ERA and to build a world leading capacity", highlights the importance of both approaches.

The WP3 description of work states that adaptation and collaboration of the European taxonomic infrastructures are necessary to undertake large-scale challenges in established institutional and digital networks. There are some considerations for this statement. Most important is that the taxonomic practice and the collection institutes have to change to meet a number of challenges. New digital and molecular technologies open up a new area of scientific opportunities, but also require working together in larger networks. The outside world forces us to give more attention to the various applications of taxonomic knowledge, which also implies more emphasis on multidisciplinary cooperation. This goes together with changes in financial mechanisms, requiring working in larger and multidisciplinary consortiums. Taxonomy has to develop into a pro-active community with joint activities and common work processes. Several other EDIT work packages are therefore focussed on new technologies for cooperative development, such as web-based taxonomy and DNA-barcoding. WP3 deals with the implications on the infrastructures: the organisation of taxonomic collection institutes and, possibly, lab facilities. In order to decide about the way European taxonomic infrastructures have to adapt, it is necessary to start with categorising the infrastructure operations and to analyse to which extent and how these ideally should be integrated. By describing the requirements to enter a process of change, it will become clear which obstacles are present and to which extent these can be removed. This may end up in (alternative) approaches to start implementing a realistic process of change already in the lifetime of EDIT.

WP3.1 is mainly concerned with describing, comparing and choosing between decision models for the physical infrastructure that in a few years' time will dominate the European taxonomic and, in a broader sense, the natural history scene. The main objective of WP3.5 is to secure a joint approach in design and construction of taxonomic infrastructures around the world, defining mutual goals and common benefits. Hence, it is logical that WP3.1 and 3.5 will operate in close collaboration.

In our view, EDIT is in a test phase during the first 18 months, possibly even during its full 5 years. Besides their own specific tasks, WP1 and WP3 are concerned with a continuous reflection on decision-making processes in other WP's. Practical and often *ad hoc* decisions on ATBI+M areas (WP7), on demonstrator taxa (WP6), database structures (WP3.2, WP5), research aims (WP4), human resources (WP2), collections and lab facilities (WP3.1), should ideally be done in a cautionary and preliminary way, rather than hastening into activities that later will prove to be non-optimal. However, these WP's quickly develop their own momentum and internal decision making processes, which are difficult to control or guide, as many scientists simply want to go ahead and do science. From our perspective, the other WP's are testing grounds where we can study mechanisms of collaboration, impediments and catalysers for decision-making, etc.

Which operations need to be integrated and in what way?

The following is a draft list of issues to consider for various levels of European integration:

Communication

- Relation management, PR, lobbying

Corporate operations (internal organisational functioning)

- Conservation (storage systems and specimens)
- Safety measures
- Job stratification and staffing plans
- Task division
- Inter-institutional departments
- Management at various levels
- Performance assessment

Common work processes

- Project priority setting, development, execution and management
- Collection priorities
- Web-based taxonomy; digitisation efforts (already promoted by GBIF)
- Selection of and logistics in collecting and research sites
- (Super) labs and equipment
- Publication mechanisms & IPR

Product development

- Project proposal development
- Taxonomic services (i.e. identification services; admission of visiting researchers)
- Business plans
- Education / training

Obstacles, and how to remove these?

There will be various obstacles on the way towards the desirable adaptation to an integrated EDIT. These can be psychological, nationalistic, legal or political. Collections are distributed through a very large number of public and private organizations. Present day scientific collections have very often grown from older collections and may still reflect outdated structures and practices. They operate in diverse ways, are financed with diverging mandates from different ministries, agencies, foundations, universities etc, and cannot always share common goals in, for example, joint research programs. The Global Science Forum of the OECD recognised this as a major problem for the functioning of scientific collections that have to work together tackling present-day scientific and societal challenges. A workshop of the Global Science Forum will address these issues in Leiden, June 12-13, 2007, with the objective to develop a set of recommendations to OECD member states. Getting agreements on the way forward to establish the EDIT goals, and dealing with any obstacles, will be a major challenge for the cooperating institutes.

The role of the EDIT WP3 questionnaire

We designed a questionnaire on some of the fundamental issues mentioned above. It contained 49 questions grouped under 5 themes (necessity for cooperation, preferred integration level, arguments for integration, possible obstacles, overall approach), and one open question (role models for EDIT). The questionnaire was intended as a first consultation to help us in designing a feasible approach to our workpackage. The questionnaire was presented at the CETAF20 meeting in Leiden, October 24, 2006 and sent out to all EDIT institutions. The results will form the basis for a much broader discussion on the vision, mission and implementation of a durable European taxonomic infrastructure.

Results and interpretation

The 49 questions were answered by 33 respondents, mostly at high executive level, with on average 97% of questions filled in. Table 1 shows all the questions and summarizes the results in terms of "Importance" of each issue (scored according to rank order derived from the average value for each issue). Column 2 shows the level of "Controversy" of each issue (scored according to rank order derived from the standard deviation). Before determining the ranking of each question in this table, scores were scaled to enable better comparison between questions.

Table 1

Requirement for more intense cooperation or integration	Importance	Controversy
European collection policy (e.g., collection priorities, division of tasks)	37	16
transnational laboratory facilities	26	26
transnational field site facilities	18	33
standard laboratory practices & protocols (e.g., safety; best procedures)	15	48
performance assessment (e.g., performance indicators; visitations & organisational reviews)	17	31
taxonomic database infrastructure & standards (collections, data)	49	1
transnational services (e.g., access to collections & databases; metadata services)	44	17
transnational species registers	31	46
sharing human resources (e.g., scientific and technical experts)	34	6
taxonomic training within EU institutions	38	10
taxonomic training in developing countries	28	39
setting research priorities	24	35
common external communications (e.g., lobbying, PR)	39	28
output policy (e.g., publication strategy, IPR)	27	27
Desired level of cooperation or integration	Importance	Controversy
European collection policy (e.g., collection priorities, division of tasks)	11	23
transnational laboratory facilities	12	4
transnational field site facilities	9	14
standard laboratory practices & protocols (e.g., safety; best procedures)	13	37
performance assessment (e.g., performance indicators; visitations & organisational reviews)	4	21
taxonomic database infrastructure & standards (collections, data)	43	11
transnational services (e.g., access to collections & databases; metadata services)	33	7
transnational species registers	21	34
sharing human resources (e.g., scientific and technical experts)	6	5
taxonomic training within EU institutions	25	24
taxonomic training in developing countries	7	13
setting research priorities	16	22
common external communications (e.g., lobbying, PR)	29	30
output policy (e.g., publication strategy, IPR)	20	15
Main arguments for transnational cooperation or integration	Importance	Controversy
enhancing the status and impact of taxonomy/systematics	48	2
becoming a global player in biodiversity related issues	47	3
reaching critical mass for bids to EU funding, Worldbank tenders, etc.	40	29
decreasing reaction time of bids to EU funding, Worldbank tenders, etc.	19	43
obtaining a key position at national and EU level	42	12
becoming a center of gravity for applied taxonomy	35	25
standardized output (e.g., stable nomenclature) for end-users	32	42

Table 1

Questions from the questionnaire (column 1) were scored on a scale of 1 to 3, except the questions in the second block (desired level of cooperation), which were on a scale of 1 to 5. Answers were recoded to increase their comparability and missing values were filled in with the intermediate score 3. The results were ranked according to their level of "Importance" (column 2, the highest scores are the most important) as derived from the average score of 33 respondents. Colour coding: top 5 issues: blue; high ranks 44 to 36: green; intermediate ranks 35 to 16: yellow; low ranks 15 to 6: orange; bottom 5 ranks: red.

In column 3, scores were ranked according to their level of "Controversy", based on the standard deviation (the highest scores are the most controversial). Colour coding: 5 issues with lowest controversy: blue; low controversy (ranks 6 to 15): green; intermediate controversy (ranks 16 to 35): yellow; high controversy (ranks 36 to 44): orange; 5 issues with highest controversy: red.

Table 1 continued

Main obstacles/impediments that need to be overcome	Importance	Controversy
legal	30	40
social and psychological	10	49
cultural	2	47
traditional	14	45
political	36	32
technical	5	38
lingual	1	41
financial	45	8
scientific	3	44
competitive attitude	8	36
Suggestions for overall approach	Importance	Controversy
Enhancing consortium management competence	22	18
Setting up flagship transnational projects or infrastructures	46	9
Extending the scope of standards and protocols in taxonomic procedure	23	19
Linking to large-scale initiatives in adjacent scientific domains	41	20

On 14 issues both the necessity for cooperation (Fig. 1) and the desired level of cooperation or integration (Fig. 2) were investigated. On average, all issues were considered moderately to highly important (Fig. 1). The highest importance is attached to “taxonomic database infrastructure & standards”, followed by “transnational services” and “taxonomic training within EU institutions”. The lowest importance is attached to “transnational field site facilities”, “standard laboratory practices & protocols” and “performance assessment”. Several respondents indicated that cooperation to the level of taking centralized decisions is not desirable or even impossible. Others expressed the idea that there should be common access to standardized products or common levels of standards, without prescribing standard protocols. On the issue of human resources, an inventory of available specialists and taxonomic training for young scientists were deemed useful. These tasks are being tackled by EDIT WPs 2 and 8.

Cooperation or integration:

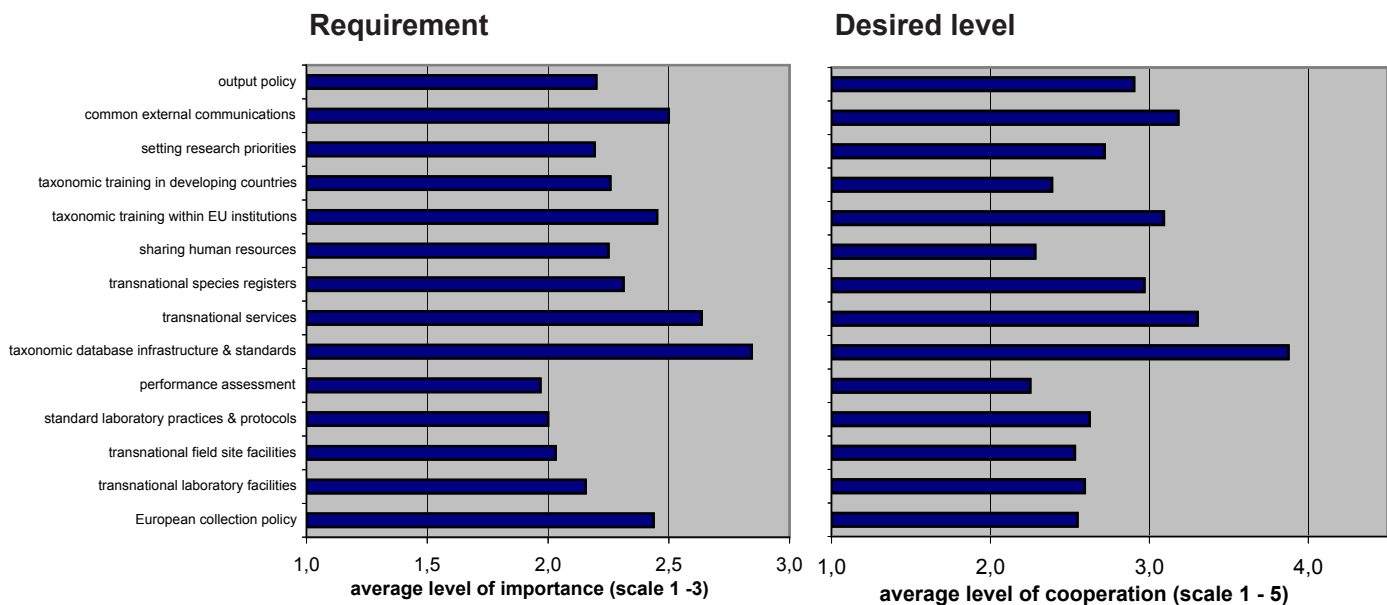


Figure 1 Requirement for more intense cooperation or integration: For each issue, the level of importance was scored on a scale from 1 (unimportant) to 3 (highly important). Shown are the actual average levels, before scaling to compare these with the other results.

Figure 2 Desirable level of cooperation or integration: For each issue, the level of cooperation was scored on a scale from 1 to 5 (1: exchange of information; 2: loose agreements; 3: binding agreements; 4: common decisions; 5: centralized decisions).

Importance versus desired level

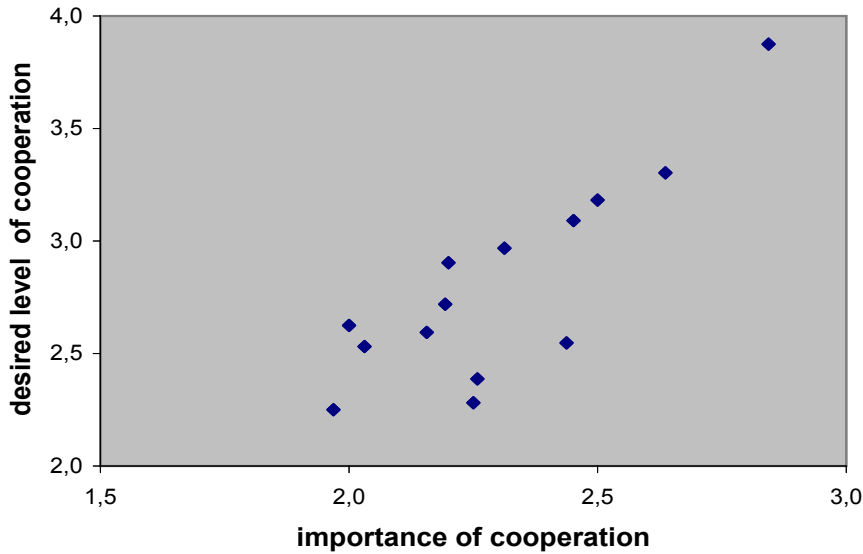


Figure 3

Relation between the (original) average scores for importance of each issue and its desired level of cooperation or integration. Based on the ranking scores (see Table 1), a significant positive relationship is found in terms of Importance ($r\text{-Spearman}=0.66, p<0.01$), indicating an association between requirement and desired level. In terms of controversy the relationship is near-significant ($r\text{-Spearman}=0.50, p<0.07$)

There is a significant positive correlation between importance of issues and desired level of cooperation (Fig. 3), suggesting that higher importance attached to an issue also leads to a higher preferred integration level. Respondents indicated that for the most important issue, “taxonomic database infrastructure & standards”, integration should be at the level of joint decisions (level 4), whereas for “performance assessment” and “sharing human resources”, the lowest levels of integration were chosen (loose agreements, level 2). Overall, the respondents consider some issues to be in need of far-reaching European integration and others that are best kept at institutional level.

The main arguments for transnational cooperation / integration (Fig. 4) are considered to be “enhancing the status and impact of taxonomy/systematics” and “becoming a global player in biodiversity related issues”. Common external communications may be essential for the taxonomic community to be heard. “Decreasing reaction time of bids to tenders” and “providing standardized output (e.g., stable nomenclature) for end-users” seem to be less valued as arguments for integration. In our view, however, the latter two issues are closely related to end-user demands: governments may wish European institutions to react to tenders with a dedicated part of the workforce; and ecologists urgently need a stable nomenclature.

Main arguments for transnational cooperation or integration

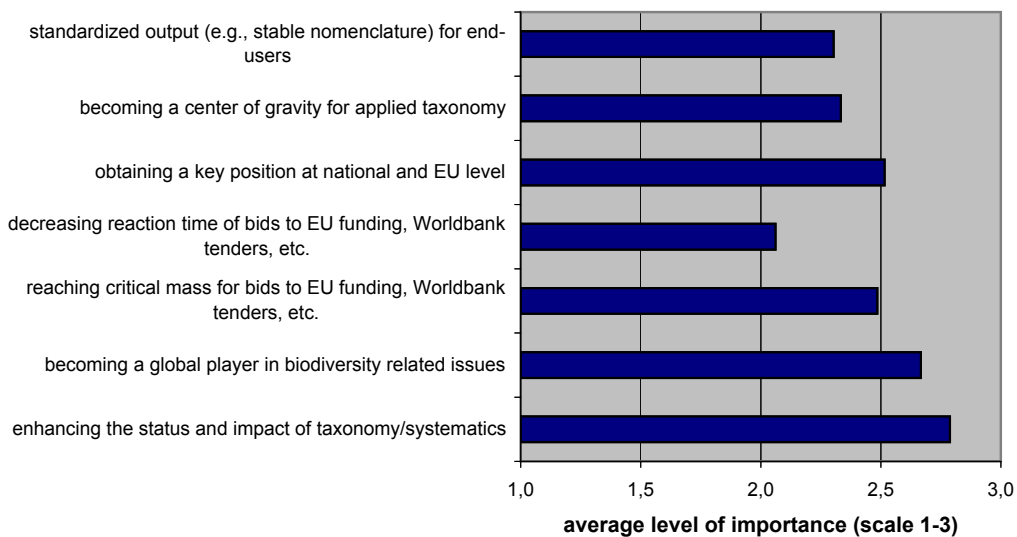


Figure 4

Main arguments for transnational cooperation or integration: For each issue, the level of importance was scores on a scale from 1 (unimportant) to 3 (highly important). Shown are the actual average levels, before scaling to compare these with the other results.

The main impediments to taxonomic integration (Fig. 5) are considered to be political and financial, whereas the smallest barriers highlighted include scientific, technical and cultural aspects. This suggests that the outside world is regarded as the culprit for the “taxonomic impediment”, a view that in our opinion is common, but questionable. As for the overall approach (Fig. 6), the highest importance is attached to “setting up flagship transnational projects or infrastructures” and “linking to large-scale initiatives in adjacent scientific domains”. In our view, this is only possible when setting research priorities and sharing human resources receive far more attention. In addition, standard laboratory practices & protocols may be a crucial step to professionalize the European infrastructure.

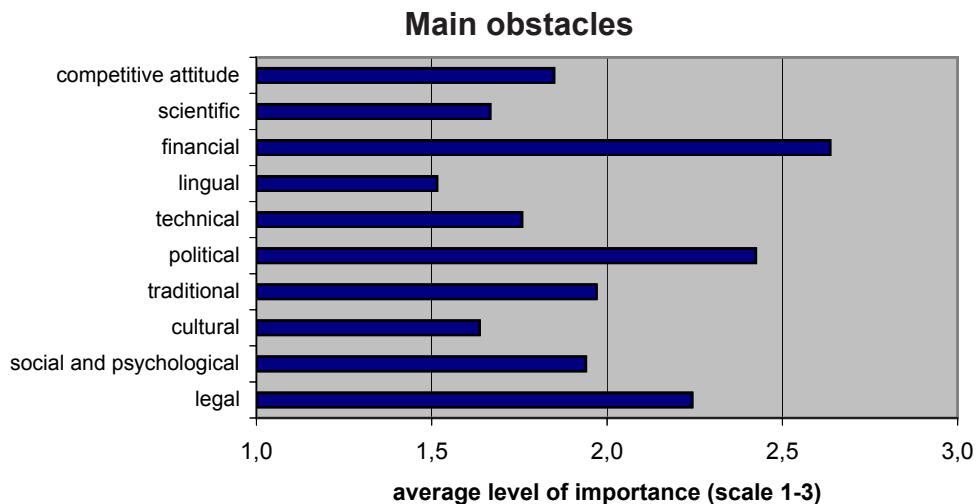


Figure 5
Main obstacles and impediments that need to be overcome: For each issue, the level of importance was scores on a scale from 1 (unimportant) to 3 (highly important). Shown are the actual average levels, before scaling to compare these with the other results.

In the last question the respondents were asked to suggest international scientific infrastructures that can function as a role model for EDIT. Answers included:

- HUGO (the Human Genome Organisation): an international organisation of scientists who investigate, characterize and study (variations in) the human genome and relevant model organisms (aimed at disease); promotes and sustains international collaboration in the field of human genetics
- ESA (European Space Agency): aims to shape the development of Europe’s space capability and ensure that investment in space continues to deliver benefits to the citizens of Europe; ESA is spread over 6 locations throughout Europe
- EMBL (European Molecular Biology Laboratory): a facility dedicated to basic molecular biology research, technology development, service provision and advanced training; EMBL has 5 locations in Europe, one of which is the EBI
- EBI (European Bioinformatics Institute): Open access bioinformatics service center with data on sequences, genomes, expression, structures, interactions, pathways, etc; provides analytical tools and maintains a comprehensive range of molecular databases
- GenBank® is the NIH genetic sequence database, an annotated collection of all publicly available DNA sequences. It is part of the International Nucleotide Sequence Database Collaboration, which comprises the DNA DataBank of Japan (DDBJ), the European Molecular Biology Laboratory (EMBL) database, and GenBank at National Center for Biotechnology Information (NCBI). The NCBI was established as a national resource for molecular biology information. It creates public databases, conducts research in computational biology, develops software tools for analyzing genome data, and disseminates biomedical information - all for the better understanding of molecular processes affecting human health and disease
- CERN (European Organisation for Nuclear Research): Particle physics (research) center that provides necessary tools (accelerators and detectors) to scientists
- US NSF PEET (National Science Foundation Partnerships for Enhancing Expertise in Taxonomy): this programme seeks to enhance taxonomic research and help prepare future generations of experts. Through its Special Biennial Competition in Systematic Biology, NSF supports competitively reviewed projects that target groups of poorly known organisms for modern monographic research. Projects must train new taxonomists and must translate current expertise into electronic databases and other products with broad accessibility to the scientific community.
- IUGS (International Union of Geological Sciences): a non-governmental scientific organization; promotes and encourages the study of geological problems, especially those of worldwide significance, and supports and facilitates international and interdisciplinary cooperation in the earth sciences.
- WMO (World Meteorological Organization): United Nations Specialized Agency: an intergovernmental organization; facilitates the free and unrestricted exchange of data and information, products and services on matters relating to safety and security of society, economic welfare and the protection of the environment; contributes to policy formulation in these areas at national and international levels

Future activities

Using the results of the questionnaire as a stepping-stone, we intend to hold in-depth interviews at high executive level on the best design for European collaboration and integration. At the same time, we intend to do a bottom-up survey on the facilities required for the physical infrastructure. We will also present a discussion paper at the Global Science Forum (OECD) workshop on policy regarding scientific collections in Leiden, June 12-13, 2007.

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