

Member Organisation Forum

European Peer Review Guide

Integrating Policies and Practices
into Coherent Procedures

European Science Foundation

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An ESF Member Organisation Forum is an output-oriented, issue-related venue for the Member Organisations, involving other organisations as appropriate, to exchange information and experiences and develop joint actions in science policy. Typical subjects areas discussed in the Fora are related to:

- Joint strategy development and strategic cooperation with regard to research issues of a European nature.
- Development of best practices and exchange of practices on science management, to benefit all European organisations and especially newly established research organisations.
- Harmonisation of coordination by MOs of national programmes and policies in a European context.

Acknowledgements

ESF is grateful to the Forum members and observers, as well as for the special contribution of Cristina Marras (seconded to the ESF by CNR) and Farzam Ranjbaran (ESF) for preparing the Guide. The MO Forum has been chaired by Marc Heppener (ESF) and coordinated by Laura Marin (ESF).

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Foreword



Excellence in research depends on the quality of the procedures used to select the proposals for funding. Public and private funding organisations at the national and international levels face the challenge of establishing and maintaining the best procedures to assess quality and potential. This is a demanding task as each proposal is scientifically unique and originates from varying research cultures. As a result, many different systems and criteria are currently in use in European countries. In order to address the issue of peer review collectively, the common needs have to be specified first. The needs then have to drive development of policies that are both convergent and complementary, whereafter coherent procedures can be conceived, promoted and implemented.

The Heads of the European Research Councils (EUROHORCS) and the European Science Foundation (ESF) recognised in their *Vision on a Globally Competitive ERA and their Road Map for Actions* the need to develop common peer review systems that are useable, credible and reliable for all funding agencies. To identify the *good practices* of peer review, the governing bodies of both organisations invited the ESF Member Organisation Forum on peer review to compile a Peer Review Guide to be disseminated to their members and other interested stakeholders in Europe and beyond. The Forum included over 30 European research funding and performing organisations from 23 countries, with the partnership of the European Commission and the European Research Council. The Forum established dedicated working groups, ran workshops and undertook a comprehensive survey on the peer review systems and practices used by research funding and performing organisations, councils, private foundations and charities. The results served to iden-

tify good practices across Europe on the evaluation of grant applications for individual and collaborative research projects.

Consequently, this Peer Review Guide illustrates practices currently in use across the members of ESF and EUROHORCS, while also reflecting the experiences of the European Commission in its Framework Programmes. It describes good practices by setting a minimum core of basic principles on peer review processes commonly accepted at a European level. In addition to the quality of the basic procedures, peer reviewers and organisations face other challenges such as assessing multidisciplinary proposals and defining the appropriate level of risk inherent in frontier research. The management of peer review of proposals by large international consortia poses yet another challenge, and this is why the Guide has been designed to address the assessment procedures of large scale programmes such as Joint Programming.

This Guide should serve to benchmark national peer review processes and to support their harmonisation, as well as to promote international peer review and sharing of resources. It should be considered as a *rolling reference* that can be updated and revised when necessary.

ESF wishes to acknowledge the key contributions of its Member Organisations to the development of this Guide.

Professor Marja Makarow

Chief Executive

Dr Marc Heppener

Director of Science and Strategy Development

Part I

Overview of the Peer Review System

1.

Introduction



Research funding bodies are charged with delivering public spending programmes in the pursuit of objectives set at the national level. In the basic interests of good governance, it is incumbent on these bodies to ensure that their funding decisions are accountable and target the most deserving research activities in accordance with the programme objectives, and that the process for doing this delivers value for money to the public. To ensure that funding decisions are fair and credible, research agencies use experts in a *peer review* or *expert review* process to identify research proposals for subsequent funding.

This *European Peer Review Guide* draws on European and international good practice in peer review processes, and seeks to promote a measure of coherence and effectiveness in the form of a practical reference document at the European level. While applicable to national settings – in Europe and beyond – it also aims to engender *integrity* and *mutual trust* in the implementation of transnational research programmes. The content of the Guide has been shaped by input from the representatives of more than 30 European research funding and performing organisations who participated in the ESF Member Organisation Forum on Peer Review. In addition, a comprehensive survey on peer review practices targeted at the ESF member organisations as well as other key organisations has been conducted in order to benchmark and identify good practices in peer review. The analysis and conclusions of the survey have also served as evidence in drafting this Guide and its recommendations. The results of the survey are available as Appendix 2 of this document and through the ESF website at: <http://www.esf.org/activities/mo-fora/peer-review.html>.

The Guide presents a minimum set of basic core principles commonly accepted at a European level, including those of the EU Framework Programme. It also presents a series of good practices, identifying possible alternatives where appropriate. It is intended to be useful to European research funding and performing organisations, councils, private foundations and charities.

The Guide addresses the peer review processes of grant applications for selected funding instruments that comprise the majority of European research programmes and initiatives, for example, *Individual Research Programmes*, *Collaborative Research Programmes* or *New Research Infrastructures Programmes*. In addition to the specific scope and nature of each funding instrument, there may be programmatic or operational variants of the instruments as practised in different countries across Europe. For example, thematic versus non-thematic, responsive versus non-responsive, and monodisciplinary versus pluridisciplinary can be considered as variants for the different funding instruments.

This Guide is divided into two parts: the common principles and building blocks of the practice of peer review are set out in Part I. More detailed and explicit recommendations applying to particular funding instruments are provided in Part II.

1.1 Key definitions

In order to facilitate the establishment of a common set of terminologies for the purpose of interpreting the content of this Peer Review Guide, a few key definitions are provided in the Appendix 1: Glossary.

1.2 Applicability

This document is aimed at any organisation involved in funding and performing research, notably:

- Public research funding organisations;
- Research performing organisations;
- Research councils;
- Private foundations;
- Charities.

The Guide has been developed in a European context, but will be largely relevant beyond the continent. The suggested guidelines are designed to promote common standards that adhere to accepted good practices on a voluntary basis. In particular, they aim to support intergovernmental or inter-organisational activities through the identification and establishment of benchmarks and prevailing approaches necessary to manage multi-stakeholder programmes.

The applicability of the Guide stops at the level of granting of the awards. Hence, for example, ex-post evaluation of funded research – which generally has strong reliance on peer (or expert) review – has not been explicitly included in the Guide¹.

1.3 How to use this Guide

In order to make the best use of this document, readers with a general interest in the subject are recommended to browse through the chapters of Part I. The content of the first Part is structured according to three thematic and easily recognisable areas: the first comprises an introduction to peer review in a general sense (Chapter 1); a typology of funding instruments (Chapter 2); and the pillars of good practice in peer review (Chapter 3). A second area focuses on peer review methodology (Chapter 4, from Sections 4.1 to 4.10) and a third area specifically describes the variants of the funding instruments and their implication for peer review (Sections 4.11 to 4.13).

Science management practitioners with the intention of gathering concrete information on good practices specific to the peer review of particular funding instruments are advised first to review the chapters of Part I, with particular attention given to Chapter 4, and then to consult their programme of interest in the corresponding chapter in Part II. The chapters of Part II are meant to provide information on the state-of-the-art and benchmarking of peer review practices specific to the selected funding instruments.

1. For ex-post evaluation, see the ESF Member Organisation Forum on Evaluation of Funding Schemes and Research Programmes' activities, in particular the report: *Evaluation in National Research Funding Agencies: approaches, experiences and case studies*, at: http://www.esf.org/index.php?eID=tx_nawsecured1&u=0&file=fileadmin/be_user/CEO_Unit/MO_FORA/MOFORUM_Evaluation/moforum_evaluation.pdf&t=1296135324&hash=9a6f476733d58e8f9ff738ceb755bfo8

2.

Typology of funding instruments



Characterising the appropriateness of peer review practices can be meaningful only when considered in the context of the specific programmes or funding instruments to which they must apply. Therefore, in order to establish common approaches and understanding of the practices of peer review, it is necessary to establish common definitions and meanings in the context in which they are to be used. This context is defined by various funding opportunities with specific objectives that different organisations have developed in order to select competing proposals and to allocate merit-based funding using clearly defined objectives and selection criteria. In this document, these funding opportunities are referred to as ‘funding instruments’.

Across European countries, all major funding instruments that rely on peer review as their main selection tool have been considered for inclusion in the Guide (see Table 1, below). However, based on the input received from the ESF Member Organisation Forum on Peer Review and the results of the ESF Survey on Peer Review Practices, the final list of instruments elaborated in Part II of the Guide excludes two of the instruments outlined in the table below, namely *Knowledge Transfer* and *Major Prizes and Awards*.

Brief descriptions of typical funding instruments are provided in the next section, while the specific peer review process for each of them is elaborated in Part II. Many of these funding instruments or programmes have different variations in terms of scope and disciplinary characteristics. Therefore, a separate section is devoted to elaborating on these features. When these variants have noticeable implications on the practice of peer review, they are further elaborated in Chapter 4, or in the corresponding chapters of Part II.

| Instrument | Description |
|--|---|
| Individual research projects | Funding line dedicated to proposals submitted by a single investigator or a group of investigators in the same team. These proposals typically include only one set of self-contained research goals, work plan and budget. |
| Collaborative research projects | Funding line dedicated to proposals comprising groups of applicants enhancing national/international collaboration on specific research projects. |
| Career development opportunities | Funding line dedicated to supporting career progression of researchers and scholars through awards, fellowships, appointments, professorships, Chairs, etc. |
| Creation of centres or networks of excellence | Funding line dedicated to proposals submitted by a large group of researchers and targeting the establishment of institutional or regional centres, or networks for given areas of research. |
| Knowledge transfer and dissemination grants | Funding line dedicated to projects supporting the transfer of results from science to industry or other private/public sectors. |
| Creation or enhancement of scientific networks | Funding line dedicated to promoting networking of researchers in the form of meetings, conferences, workshops, exchange visits, etc. |
| Creation or enhancement of research infrastructure | Funding line dedicated to financing development, enhancement, maintenance and/or operation of research infrastructures. |
| Major prizes or awards | Funding line dedicated to rewarding outstanding contributions of a single researcher and/or a group of researchers. |

Table 1. List of typical funding instruments

2.1 General description of main funding instruments

(see Table 1 above)

2.2 Variants of funding instruments

The main scope and objectives of some of the funding opportunities mentioned in the previous section may be tailored through policy or strategy considerations, giving rise to specific variations. Some of the main categories identified are briefly described here.

2.2.1 Non-solicited (responsive mode) versus solicited funding opportunities

Regardless of the nature of a funding instrument (scope, objectives and target applicants), the timing and frequency of the call can vary from organisation to organisation or from programme to programme. In this sense, two variants of any typical funding instrument may be envisaged as: (a) when applicants submit their proposals to a call for proposals with a fixed duration and specified date for its open-

ing; these are solicited funding opportunities, also known as ‘managed mode’² funding. (b) When the call for proposals for a given funding line is continuously open and ideas are submitted in an unsolicited manner; this is known as ‘responsive mode’ funding in some research councils^{3,4}. In terms of the process of peer review and selection of proposals, there are some differences between the two modes that will be described in Chapter 4, §4.II.I.

2.2.2 Thematic versus non-thematic focus

Another variant of most typical funding instruments can be considered to be the thematic (or topical) versus non-thematic (open) scope of the call for proposals. Thematic opportunities can be used for strengthening priority areas of research that the funders may identify through their sci-

2. See Biotechnology and Biological Sciences Research Council, BBSRC Research, Innovation and Skills Directorate, “BBSRC Research Grants. The Guide, October 2010”, p. 9 in: http://www.bbsrc.ac.uk/web/FILES/Guidelines/grants_guide.pdf

3. See Natural Environment Research Council: <http://www.nerc.ac.uk/research/responsive/>

4. See Engineering and Physical Sciences Research Council (EPSRC): <http://www.epsrc.ac.uk/funding/grants/rb/Pages/default.aspx>

ence policy or strategic plans. In some programmes, themes of research areas or topics may themselves be identified by investigators using peer review and through calls for proposals. Some councils use so-called ‘signposting’ for flagging priority areas in their responsive mode funding streams. The implication of a thematic versus non-thematic nature of a call for proposals on the process of peer review is not very significant but will be briefly discussed in Chapter 4, §4.11.2 of this Guide.

2.2.3 Monodisciplinary versus pluridisciplinary focus

For the purposes of fine-tuning and sharpening the process of peer review according to the scope of the proposals, it may be of interest to categorise proposals into ‘monodisciplinary’ and ‘pluridisciplinary’ when appropriate. Research proposals increasingly draw on knowledge and expertise outside of one main discipline. In some programmes, there are no specific modalities incorporated to deal with pluridisciplinary proposals while other instruments may be designed to specifically foster and manage these kinds of research.

Currently in the specialised literature there are ongoing discussions on the different types of pluridisciplinary research⁵. For the purposes of this Guide the term ‘pluridisciplinary’ may be used in the widest sense, *i.e.*, research proposals that *clearly* and *genuinely* require expertise from a broad range of different disciplinary domains. However, for completeness, a brief review of the types of pluridisciplinary research as described in the literature is provided in Chapter 4, Section 4.12 of this Guide^{6,7}. In the same section relevant peer review specificities and recommendations for the assessment of these types of research proposals are also described.

2.2.4 Breakthrough research

Breakthrough research aims at radically changing the understanding of an existing scientific concept, and could lead to changes of paradigms or to the creation of new paradigms or fields of science. The level of risk associated with the success of these projects is generally higher than mainstream research, *i.e.*, research activities that in general lead to incremental gains with lower risks of failure.

The survey on peer review practices shows that 70% of the respondents do not have instruments specifically designed for breakthrough proposals,

and 20% of the organisations have only one such dedicated instrument⁸. While 33.3% of the responding organisations have reported that they regularly see breakthrough proposals in their conventional instruments, 50% of them have stated that they see this type of proposal only rarely⁹.

Explicit identification and handling of breakthrough research is generally more complex than mainstream research. In the context of research subjects, priorities and goals, breakthrough research is characterised not only by exceptional potential for innovation, and creation of drastically new knowledge, but also by consciously acknowledging and taking the associated risks¹⁰. This can have implications for the process of peer review as briefly described in Chapter 4, Section 4.13 in this Guide.

5. See Lattuca (2003) or Aboelela (2007).

6. See Frodeman, Thompson Klein and Mitcham (2010).

7. See UNESCO (1998), *Transdisciplinarity ‘Stimulating synergies, integrating knowledge’*.

8. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular §3.12.1, Question 67: “How many funding instruments does your organisation have which are dedicated exclusively to breakthrough proposals?”

9. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular §3.11.2, Question 69: “How often does your organisation see breakthrough proposals within your conventional instruments, *i.e.* instruments not specially dedicated to breakthrough proposals?”

10. See Häyrynen (2007), p. 11.

3. Pillars of good practice in peer review



Based on a comprehensive review of the existing practices and the available literature¹¹, five elements are identified as key supporting pillars of good practice in the edifice of peer review (see Figure 1). These pillars will ensure that the overall processes, procedures and operational steps including decisions are of high levels of quality, equity and public accountability without being excessively rigid, bureaucratic, inefficient and costly.

The central pillar consists of a set of *core principles* that are commonly accepted by the relevant organisations engaged in peer review. These are the



Figure 1. Five pillars supporting good practices of peer review with quality and equity

key guiding principles that need to be safeguarded in order to achieve credible, equitable and efficient peer review. Four other pillars that have been identified are: safeguarding of the integrity of the process; sound methodology; strong means of assuring quality; and appropriate governance structure.

3.1 Core principles of peer review

Guiding principles have been defined and used by various organisations that deal with peer review. Although there are strong similarities between different sets of these principles, there are also slight differences in their scope and formulations. For the purpose of this Guide, it is necessary to adopt a set of principles as the guiding framework, in which peer review standards are anchored.

The list of the seven core principles presented below (Table 2) are included in the Peer Review Framework Conditions for the EU's Joint Programmes¹². It also covers the items identified and elaborated by the ESF Member Organisation Forum on Peer Review.

Although identifying core principles as the central pillar for good practice in peer review is a necessary step, it will not be sufficient without ensuring other organisational and procedural ingredients necessary for realising good practice. As mentioned above, four other supporting pillars are briefly described in the following sections.

11. See the list of references at the end of this document.

12. See European Research Area Committee, High Level Group for Joint Programming: *Voluntary guidelines on framework conditions for joint programming in research 2010*, Annex, at: <http://register.consilium.europa.eu/pdf/en/10/sto1/sto1309.en10.pdf>

| | |
|--|--|
| 1. Excellence | Projects selected for funding must demonstrate high quality in the context of the topics and criteria set out in the calls. The excellence of the proposals should be based on an assessment performed by experts. These experts, panel members and expert peer reviewers should be selected according to clear criteria and operate on procedures that avoid bias and manage conflicts of interest. |
| 2. Impartiality | All proposals submitted must be treated equally. They should be evaluated on their merits, irrespective of their origin or the identity of the applicants. |
| 3. Transparency | Decisions must be based on clearly described rules and procedures that are published <i>a priori</i> . All applicants must receive adequate feedback on the outcome of the evaluation of their proposal. All applicants should have the right to reply to the conclusions of the review. Adequate procedures should be in place to deal with the right to reply. |
| 4. Appropriateness for purpose | The evaluation process should be appropriate to the nature of the call, the research area addressed, and in proportion with the investment and complexity of the work. |
| 5. Efficiency and speed | The end-to-end evaluation process must be as rapid as possible, commensurate with maintaining the quality of the evaluation, and respecting the legal framework. The process needs to be efficient and simple. |
| 6. Confidentiality | All proposals and related data, intellectual property and other documents must be treated in confidence by reviewers and organisations involved in the process. There should be arrangements for the disclosure of the identity of the experts. |
| 7. Ethical and integrity considerations | Any proposal which contravenes fundamental ethical or integrity principles may be excluded at any time of the peer review process. |

Table 2. Set of core principles of peer review

3.2 Integrity of the process of peer review

All research institutions (research funding and performing organisations as well as academies and universities) have the role and the obligation to promote relevant research and good research practice and to ensure the integrity of their conduct¹³.

Fundamental principles of good research practice and peer review are indispensable for research integrity^{14,15}. Funding organisations and reviewers should not discriminate in any way on the basis of gender, age, ethnic, national or social origin, religion or belief, sexual orientation, language, disability, political opinion, social or economic condition.

Integrity of the peer review process should be ensured through appropriate resources, policies and practices, management interventions, as well as training and monitoring, such that in essence we can “*say what we do and do what we say we do*”. To this end, upholding the advertised set of core principles is a cornerstone of the integrity of the process. Different organisations have various means of assuring integrity of their practices; however, there are common basic principles that must be incorporated. Flexibility and pragmatic interpretations may be exercised only with extreme care and according to the context and without ignoring the core meaning of these principles or violating their spirit. Furthermore, the flexibility exercised in the sphere of one principle should not violate or come into conflict with other principles.

To safeguard integrity it is absolutely essential to avoid discretionary decisions and changes. Effective and transparent communication is a crucial element in safeguarding the integrity of any multi-stakeholder system such as peer review. Therefore, guidelines on integrity must be formulated and promoted to help all parties implicated

13. See European Commission (2005), *The European Charter for Researchers*.

14. See European Science Foundation (2010a), *Fostering Research Integrity in Europe*, pp. 8-9.

15. See European Commission (2005), *The European Charter for Researchers*, p. 11.

in the peer review process, namely, applicants, reviewers, panels, committee members, Chairs, programme officers and staff. These principles include¹⁶:

- Honesty in communication;
- Reliability in performing research;
- Objectivity;
- Impartiality and independence;
- Openness and accessibility;
- Duty of care;
- Fairness in providing references and giving credit;
- Responsibility for the scientists and researchers of the future.

3.2.1 Conflicts of interest

The prevention and management of conflicts of interest (CoIs) are the most important ingredients for ensuring equity and integrity in peer review, and to preserve the credibility of the process and that of the responsible organisation. A CoI involves the abuse or misuse – be it actual, apparent, perceived or potential – of the trust that the public and the clients must be able to have in professionals and administrators who manage or can influence decisions on research funding.

A CoI is a situation in which financial or personal considerations have the potential to compromise or bias the professional judgement and objectivity of an individual who is in a position to directly or indirectly influence a decision or an outcome. In fact, CoIs are broadly divided into two categories: intangible, *i.e.*, those involving academic activities and scholarship; and tangible, *i.e.*, those involving financial relationships¹⁷.

In peer review it is important to set out in advance in as much detail as possible those conditions that are deemed to constitute *perceived* and *real conflicts of interest*. It may be appropriate to distinguish conditions that would automatically disqualify an expert, and those that are potential conflicts and that must be further determined or resolved in the light of the specific circumstances. To uphold the credibility of the process, both real and perceived conflicts should be addressed.

Typical disqualifying CoIs might relate to:

- The expert's affiliation;
- Whether he or she stands to gain should the proposal be funded (or not);
- Personal or family relationship with applicant;

- Research cooperation/joint publications/previous supervisory role.

In these situations, the reviewers should avoid assessing a proposal with which they have conflicts of interest. In the case of panel discussions, these individuals should not be present when the proposal in question is being discussed.

While every effort should be made to avoid having reviewers assessing proposals with which they have a potential CoI, there may be circumstances where these situations can be resolved or mitigated without fully excluding the reviewer with a declared conflict. For example, when the expertise of all parties in a review panel is needed, and provided that the potential CoIs of individuals have been declared and recorded, it may be decided to allow the reviewer(s) to assess the proposal and/or participate in the panel discussion. In this situation the individual(s) with the potential conflict should clearly state their own disposition on whether or not their views are biased and continue their participation only if they clearly state that despite the potential conflict they do not feel biased in any way.

The rules for CoIs may vary according to the stage of the evaluation, and the role of the expert. For every proposal evaluated, each expert must sign a declaration that no CoI exists, or must report such a condition to the responsible staff member. While agency staff must be alert at all times, there should be a strong measure of trust exercised with respect to the invited experts and their honesty and objectivity.

3.2.2 Managing confidentiality

Each expert should sign a code of conduct before the start of the evaluation process. The code should deal both with the requirement to declare any CoI (see above), and with the obligation to maintain the confidentiality of the information when required.

Measures to avoid leaks of confidential information (both deliberate and inadvertent) include: secure IT systems (password, etc.); watermarks; restricted use of WIFI, GSM, etc. when appropriate. The appropriate measures will depend on the stage of the evaluation, and on the sensitivity of the research topics under review. Differing levels of transparency are also important for a good and impartial peer review. We can broadly identify three systems:

- **Double-blind review:** the identity of both the reviewers and of those being reviewed is kept confidential from each other;
- **Single-blind review:** the identity of the applicants

16. See European Science Foundation (2010a), *Fostering Research Integrity in Europe*, p. 6.

17. See Columbia University (2003-2004), *Responsible Conduct of Research: Conflict of Interest*.

being reviewed is revealed to the reviewers but not *vice versa*;

- **Open review:** the identity of both the reviewers and of the applicants being reviewed is revealed to each other.

According to the peer review survey, single-blind reviews are predominantly used across most organisations in most of the programmes; for example, for *Individual Research Programmes* the identity of individual/remote reviewers is not disclosed to the applicants in 80% of the organisations; while in 62% of the organisations the identity of the panel reviewers is not disclosed to the applicants¹⁸. However, in some Scandinavian countries as noted by the members of the ESF Member Organisation Forum on Peer Review, the situation can be very different as national legislations may call for full transparency when dealing with public funding and peer review.

3.2.3 Applicants' rights to intervene

It is of utmost importance for a credible peer review system to provide one or both of the following features to ensure that the applicants have the right to understand the basis of the decisions made on their proposals and consequently to be able to influence the outcome of such decisions in cases where these are made based on incorrect or inaccurate information, or influenced by factual errors or wrongdoing.

- **Right to appeal or redress:** this feature allows the applicants to appeal at the end of the selection process after the final decision is made. The appeal is normally made to the funding organisation or to a dedicated independent office based on a known and transparent process of redress. Through the process of redress the applicants do not influence the peer review during the selection process, but can object to its outcome. In a general sense, redress only concerns the evaluation process or eligibility checks and applicants cannot question the scientific or technical judgement of the reviewers. Depending on the situation and in the case where decisions have been made incorrectly, the applicants should be given another chance with a fresh review of their proposal.
- **Right to reply:** in contrast with redress, the 'right to reply' is included as part of the peer review process itself. It is normally applied to two-stage peer review systems where a panel of experts makes a

selection, prioritisation or ranking of proposals based on external referee assessments. Feedback and intervention from applicants are not provided to amend or elaborate the initially submitted proposals or to change them in any way. It is only meant to allow the applicants to identify and comment on possible factual errors or misunderstandings that may have been made by the referees while assessing the proposal. The external referees as well as the applicants and the members of the review panels should be made fully aware of the procedures and timing related to the 'right to reply' stage (more details on this feature can be found in §4.7.4 of this Guide).

3.3 Quality assurance

Another important pillar for ensuring good practice is the adoption of explicit means of assuring quality in all relevant aspects of the process and operations.

In order to assure quality of the process and procedures, it is necessary to monitor and measure the quality of the main products and services provided based on known criteria and indicators. For monitoring quality the following elements may be used:

- Staff members with an explicit mandate within the organisation;
- Dedicated office within the organisation;
- Dedicated committees or boards outside of the organisation.

According to the survey on peer review practices, the quality of the peer review system is often assured through external *ad hoc* or standing committees (47.7% of respondents), or by a group of staff members with an explicit mandate (46.7% of respondents). Only 6.7% of the respondents reported that there is a dedicated office with an explicit mandate for assuring quality in their organisation¹⁹.

3.4 Governance structure

Another supporting pillar for achieving and maintaining good practice in peer review is the presence of strong governance that is put in place to ensure organisational and operational coherence and quality. Some of the key features of a good governance

18. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 4.12, Tables 4.36 and 4.37.

19. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 3.2, Question 19: "What means does your organisation use for assuring the quality of its peer review system?" (Table 3.4).

structure are: effectiveness, clarity and simplicity. The governance structure is meant not only to ensure that all the relevant players and stakeholders are made fully aware of their roles and assigned tasks, their expected contributions and their responsibilities but also to ensure that all contributions are made according to the required standards and within the scheduled deadlines. Finally, the governance structure is meant to be able to hold the relevant bodies accountable for any deviations or shortfalls.

Some of the main attributes of credible and effective governance are outlined below:

- Identification of the relevant actors, and clarification of the scope and levels of their responsibilities (*e.g.*, decision makers, clients such as researchers and the public, other stakeholders such as regional or national governments);
- Definition of roles and responsibilities of the key actors: programme officers, management committees, review panels, other decision making or consulting panels (such as ethical panels or monitoring panels or committees), readers, external observers, etc.;
- Definition and dissemination of key decision making processes and approval processes;
- Definition and dissemination of procedures to effect continuous improvement through appropriate changes to the process;
- Availability and effective allocation of the required resources (financial, human resources, technical resources and infrastructure, etc.);
- Terms of reference and, if possible, code of conduct for all the participants (terms of appointment, confidentiality agreement, declaration of conflict of interest, integrity code, etc.).

3.5 Methodology

The final important pillar for achieving good practice in peer review is the actual adopted methodologies and approaches for conducting peer review. Since it is under ‘methodology’ that the main building blocks and common approaches of peer review are described, a dedicated chapter, Chapter 4, is provided to illustrate the different steps and the sequential order of the peer review process in a general sense.

4.

Peer review methodology



In this chapter an overall methodology is suggested that is based on the most common approaches and good practice in use across various organisations and for different types of instruments. It breaks down the overall process into the main sub-processes or building blocks at the highest level as illustrated in Figure 2. This is the scheme of the peer review process across the entire set of instruments covered in this document.

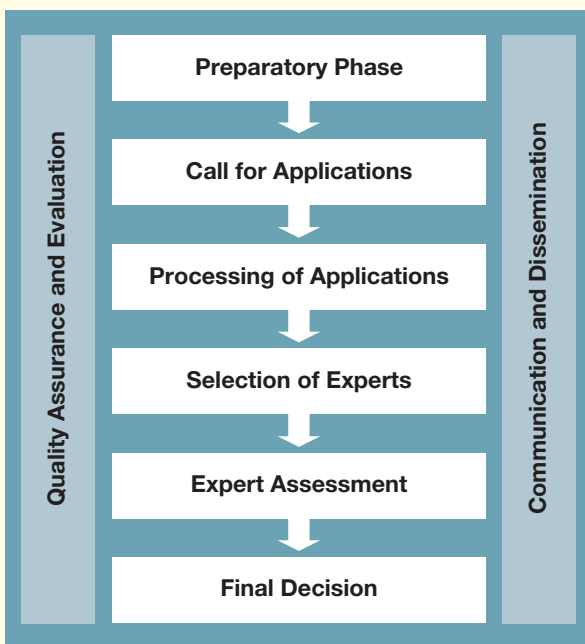


Figure 2. High-level process description of a typical peer review system

In what follows, each of the main sub-processes illustrated above will be described separately in the form of a general model. For particular funding instruments the models described in this chapter need to be *instantiated* and elaborated to suit the specific needs and characteristics of the required peer review for a given instrument. This is done in Part II where for each instrument a dedicated chapter is provided, outlining an end-to-end cycle with the required details.

The variants of the typical funding instruments described previously in Chapter 3 can also impose specific nuances and variations on the requirements of the peer review process. These variations are described in a general sense at the end of this chapter while further instrument-specific fine-tuning of the practice based on variations of the types of instrument is described in the corresponding chapter of Part II as appropriate.

4.1 Preparatory phase

In this section a summary of all the elements required for consideration, preparation and elaboration before the launch of a given programme is provided²⁰. The preparatory phase is marked by a mandate and decision to launch or re-launch a funding instrument and ends when all technical, organisational and procedural components are in place and ready for being launched. The intensity and duration of the preparatory phase varies from instrument to instrument and depends on whether

²⁰. To complement this chapter, a guide on call implementation in the context of ERA-NETS can be found here: <http://netwatch.jrc.ec.europa.eu/nw/index.cfm/static/eralearn/eralearn.html>

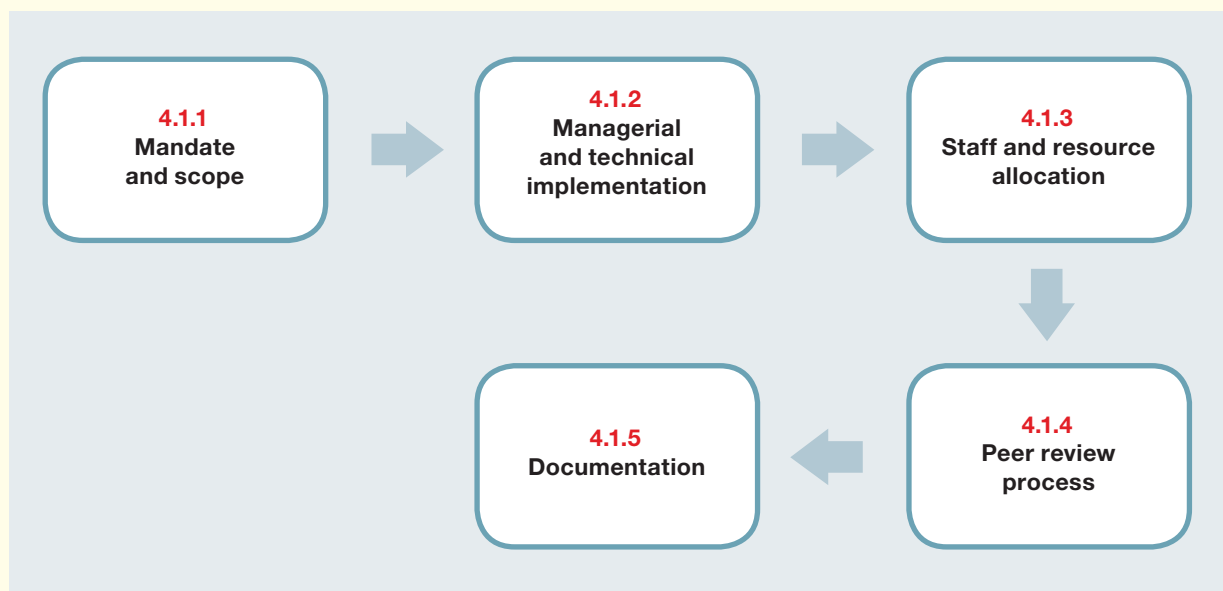


Figure 3. Preparatory phase

or not the programme is responsive or solicited. However, for a given instrument that recurs periodically (*e.g.*, annually) the duration and intensity of the activities in this first phase are diminished since resources, information, knowledge and tools will be reused as long as major changes are not necessary.

For those instruments that are launched for the first time or for one-off programmes, or in situations where major changes are applied to existing funding streams, this phase may be considerably longer and more involved. Some of the main sub-processes of the preparatory phase are outlined here in Figure 3.

Under each sub-process included in Figure 3 and described below, the list of items that need to be considered is also provided. These lists are not exhaustive but cover the most typical aspects used across different organisations.

4.1.1 Mandate and scope

In order to establish the programme efficiently and coherently, the following aspects need to be clearly defined by the responsible bodies and communicated to all relevant parties:

- Programme needs;
- Programme objectives;
- Overall programme budget;
- Potential stakeholders (beneficiaries, clients, decision makers and other relevant parties);
- Performance measures (if required);
- Research classification system (if required);
- Typology of funding instrument or variants (if required).

4.1.2 Managerial and technical implementation

Once the mandate and scope of the programme are clearly established and understood, the responsible organisation, department(s), or group(s) of staff is charged with establishing the required technical and managerial components needed to implement or run the programme. Some of these are listed below:

- Work plans and logistics;
- Human resources;
- Detailed budget for distribution and indicative budget for peer review;
- Timeline;
- Other resources (information systems, facilities, databases, etc.);
- Overall decision making process;
- Roles and responsibilities, delegation of authority, procedures for approval and sign-offs.

4.1.3 Staff and resource allocation

Having established the mandate, scope and higher levels of organisational structure and assignments, responsible departments, groups and units will take charge. Some of the items necessary to keep in mind are listed below:

- Task allocation;
- Budget allocation;
- Assign roles and responsibilities (contact points for applicants, check of eligibility, conflict of interest, completeness of the application, reviewer assignment);
- Programme and science officers have a pivotal role before, during and after the peer review process.

The responsible staff will therefore need to have a level of education and training in research that gives them not only credibility but also equips them with the basic knowledge and intellectual tools to understand the field of research and research activity; these aspects need to be complemented by strong managerial skills.

4.1.4 Peer review process

Once the responsibilities are assigned and the nature of the programme and its objectives are established, an appropriate, fit-for-purpose peer review process has to be defined. To this end, the following items need to be considered:

- Main stages of the required peer review process: one-stage submission of full proposals, versus two-stage outline proposals (or letters of intent) followed by full proposals. Outline proposals are normally sifted through by a dedicated panel, committee or board. Full proposals normally go through a complete peer review either in one or in two or more steps, *i.e.*, either selection through remote assessments or using remote reviewers plus review panel;
- Main features of the required peer review model: overall decision making process using panels, individual/remote (external) reviewers, other committees (for prioritisation, funding, etc.), expert readers, observers, redress or rebuttals, whether or not re-submissions are accepted and their conditions if any, etc.;
- Operational details and lower-level requirements such as timelines, workflow, reporting, communication, etc.;
- Assessment process: identify specific features such as the nature and number of assessors, the source of identifying experts, multidisciplinary considerations, work load for external experts, and panel members including rapporteurs, etc.;
- Schemes for the flow of information and documentation, necessary IT tools and resources (web pages, online submission forms, guidelines, etc.);
- Process monitoring and evaluation, including audits, observers and feedback to relevant sponsoring or commissioning parties and clients.

4.1.5 Documentation

All documents (including guidelines, manuals and reports) must be comprehensive and provide all the necessary information, and at the same time they must be efficient and as short as possible. Some of the main features for effective documentation are:

- Availability and clarity of all relevant documents

on funding instruments and specific guidelines and manuals for applicants;

- Availability of all relevant manuals, guidelines or Standard Operating Procedures for the staff members responsible for the management of the peer review at various stages;
- Availability of all the relevant documents defining the process, and the roles/responsibilities of the various actors to reviewers, members of the panels and committees.

A list of commonly required documents is provided below:

- *Call for Proposals (call text)*: the call for proposals normally comprises two main parts: first, the scientific part which describes the scope and objectives of the programme; defines the scientific context; and outlines the scientific topics and subtopics to be covered. The second part of the call text describes the necessary programmatic aspects of the programme. It clearly describes the peer review process and its various stages. It defines the required format, length and language of the proposals, lists eligibility and assessment criteria, informs about the available budgets and eligible costs, and describes the timelines and main milestones throughout the process including various upcoming communications to applicants.
- *Guidelines and instructions to the applicants*: these documents should contain mandatory templates, predefined section structure, length per section, list of mandatory annexes and supporting documents, list of optional annexes, list of required signatures.
- *Reference documentation*: guidelines for applicants, reviewers and panel members, description of the governance structure, detailed description of the peer review process, description of selection and decision making processes including eligibility and assessment criteria, code of conduct, redress and right to reply procedures, proposal and consortium agreements if applicable, guidance on preparation of agreements or dealing with the issues regarding intellectual property and commercialisation.
- Frequently Asked Questions and glossaries.
- Online forms and web pages.

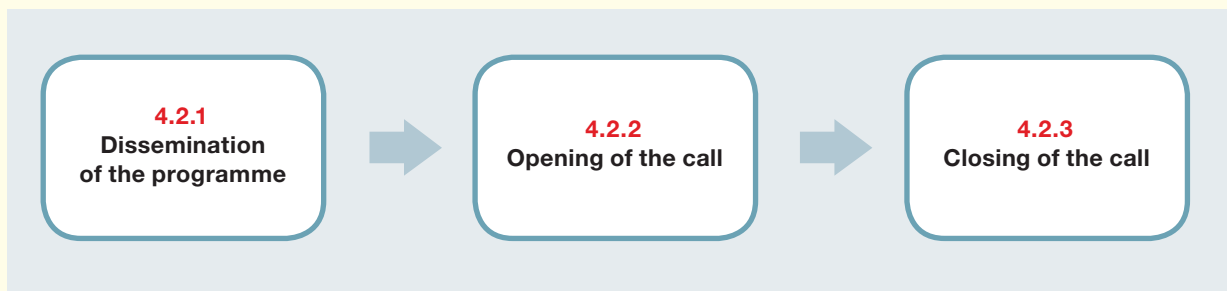


Figure 4. Launch of the programme

4.2 Launch of the programme

Once all the preparatory steps for the launch of solicited funding opportunities or programmes are in place and communicated, the actual opening and implementation phase can begin. In a general sense, the elements shown in Figure 4 need to be covered. For responsive mode programmes, where the call is continuously open, periodic communication and promotions are still necessary, although some of the steps described below may not apply.

4.2.1 Dissemination of the programme

In order to reach out to all the eligible applicants and reviewers and encourage participation, it is essential that the launch of the programme is disseminated through all the applicable means and in good time.

Groundwork for the dissemination of the opportunity should have started in the preparatory phase and be completed in this phase. A continuous dissemination of the call for proposals should be in place for responsive mode programmes. In addition, particular attention should be given to targeting the information streams to the appropriate communities, for example in the case of collaborative (national or international) research programmes, thematic or topical programmes, or for breakthrough research.

Some of the main means of disseminating the opportunity are:

- Web-based promotion;
- Advertisement in scientific media (newspapers, journals and magazines, etc.);
- Dedicated mailing lists to which researchers can freely subscribe.

4.2.2 Opening of the call for proposals

Calls should open at the stated date and time and a communication to all relevant parties and stakeholders should be made announcing the launch of

the call. Before the actual opening of the call for proposals the following items should be already in place:

- The procedures and conditions by which funding decisions are to be made must be spelled out in the call documentation as described above;
- A clear plan of communication of the main decisions;
- As far as possible, dedicated and secure web pages and databases for online management of all the processes and interactions;
- Online and clear access to all documentation.

4.2.3 Closing of the call

The closing of the call has to be communicated as soon as possible to all stakeholders (such as the applicants, reviewers, staff members and other relevant parties). The announced deadline for the closing of the call has to be clearly stated well in advance as part of the preparatory phase and must be respected.

Postponing the deadline for the closure of the calls should be avoided and be considered only in very exceptional and unpredictable circumstances. In these situations, and especially if the extension can be seen as considerable for the applicants, efforts should be made to allow resubmission of proposals to all those applicants who had submitted their proposals at the time the extension was announced and who may wish to take advantage of the additional time given. At any rate, in the case of extensions, clear statements must be widely disseminated describing the reason for and nature of the extension.

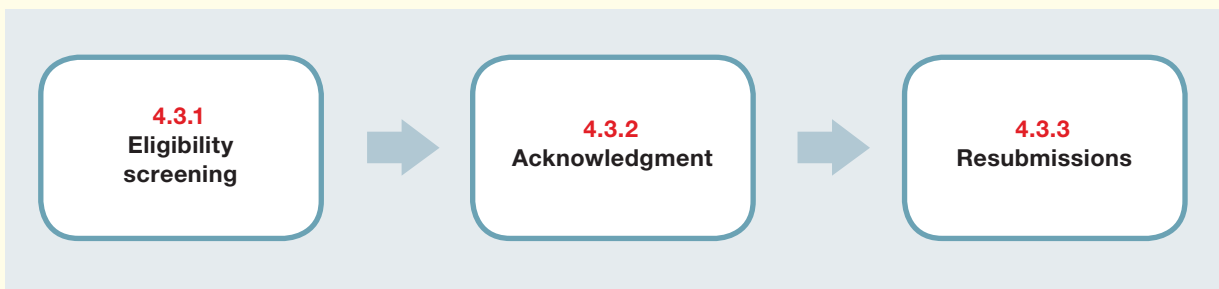


Figure 5. Processing of applications

4.3 Processing of applications

In responsive mode programmes for which the call for proposals is continuously open, applications are processed in batches and therefore their timing cannot be determined in the same way as for the general case of solicited opportunities. For the latter it is possible to group the subsequent activities of the processing phase into the following three steps (Figure 5).

Depending on the size and scope of the programmes, proposals may be solicited in either one stage or in two stages. Hence, for one-stage calls the entire process must be completely described in the call, whereas for two-stage schemes a first call is issued through which promising ideas are selected and retained for a second round of submitting full proposals based on which final selection and funding decisions will be made.

The preliminary selection is normally done by a review panel based on outline proposals, or letters of intent. These outline proposals contain a short description of the nature and overall objectives of the research as well as indications on the required resources, infrastructures, budgets and the proposing team. The secondary stage is normally done using full proposals through a two-stage peer review system by remote assessment followed by review panel deliberation and ranking.

4.3.1 Eligibility screening

Eligibility screening is generally an administrative process, and is carried out by responsible members of the staff in the funding organisation. However, in some cases, notably in assessing eligibility in relation to the scientific scope of the call, scientific expert advice should be sought and used.

In the case of multidisciplinary or breakthrough (high-risk and high-return) research, it will also be necessary to involve scientific experts to screen proposals or letters of intent for eligibility.

Any eligibility criteria used to screen proposals must be defined and clearly stated in advance of the call and made available to all as part of the disseminated information. Eligibility criteria should not be open to interpretations and must be applied rigorously to all applicants in the same way. Some of the usual eligibility criteria used by funding organisations are listed below:

- Completeness of the proposal (inclusion of all requested information, documents, chapters, sections, annexes, forms and signatures);
- Timeliness of the submission;
- Eligibility of the applicants for receiving grants and for working in the host organisation;
- Eligibility of the scope of the research proposed in relation to the call;
- Ethical concerns (*e.g.*, applicable national and international regulations and directives on safety and security, embargos, use of animals and human subjects, controlled information, hazardous research, environmental considerations, etc.).

To uphold the principle of impartiality and to promote equal playing fields, eligibility screening should be conducted strictly and consistently. Applicants who have failed the eligibility checks should be informed as soon as possible.

4.3.2 Acknowledgment

During the phase of processing the submitted proposals, the applicants as well as other relevant stakeholders must be informed of the intermediate steps. Ideally, the steps below should be considered and included in the overall plan:

- Acknowledgment of receipt of the proposals giving information on the subsequent steps and communications;
- Acknowledgment of the eligibility screening as soon as it is determined. In the case of ineligible proposals, sufficient information describing the decision must be communicated;

- For the sake of transparency, it is advisable to inform the applicants of the general statistics on submission, *e.g.*, overall numbers received versus eligible proposals, etc.

4.3.3 Resubmissions

In some organisations, particularly for larger programmes, the eligibility checks do not immediately lead to non-compliance and exclusion of the proposals. In these situations, there may be a period of feedback and negotiation between the office and the applicants during which the ineligible applications are provided the opportunity to improve their proposals and to resubmit. This practice, if necessary, should be handled with great care, openly and diligently by competent and experienced members of the staff in order to avoid personal influences and inconsistencies. In these cases it is crucial to be fully transparent and consistent in applying known and clear criteria and in providing equitable opportunities and attention to all applicants consistently and to the same degree.

In most cases, however, the eligibility checks are final and determining, without the possibility of resubmission in the current call. For these situations, it is also necessary to be clear on the possibilities and means of resubmitting improved proposals in the next round of the call for proposals.

4.4 Selection and allocation of experts

One of the most important and challenging phases of the peer review process is to collect the required number of willing and available experts who would agree to conduct the task of expert assessments both as individual/remote reviewers and/or members of panels and committees as described below.

The activities to be undertaken for typical programmes are grouped under the following four steps (Figure 6).

4.4.1 Identification of the types of experts needed

Depending on the nature of the programme and the adopted peer review model, different types of expert referees and evaluators may be required. For example, there are instruments for which peer review is conducted by remote experts only. However, for the majority of the instruments both remote and panel review are used. Therefore it is first necessary to consider the types of experts needed. Evidently,

this process should start in the preparatory phase, but be implemented during this phase.

Means of identification of expert reviewers

Funding organisations often have a database of reviewers which is structured based on a given and often multi-level research classification system (taxonomy of research profiles). As discussed below, with the advent of increasingly more advanced information management systems and tools, the original need for conventional multi-level classification systems may be reconsidered now. Currently, however, most of the existing operational systems across different science management organisations seem to rely on some kind of hierarchical structuring of research profiles in terms of disciplines and sub-disciplines.

The peer review survey shows that 90% of the organisations use a multi-level research classification system for the structuring of their research profiles and proposals. The results of the survey point to a strong tendency to rely on internal sources for the definition of these classification systems: for example, 50% of respondents rely on their organisation's staff; 39% on their scientific council, while 28.6% of the organisations use the system offered by the OECD *Frascati Manual*²¹. The data collected through the ESF Survey suggests that the current classification systems in place may not be fully compatible. To move towards more comparable and therefore more widely accepted common peer review practices, it is crucial that the *peer reviewers* are assigned scientific/expert profiles that can be interpreted clearly and without ambiguity across different organisations and their databases.

Furthermore, detailed analysis of the survey data suggests that those organisations that have indicated using the OECD *Frascati Manual* as the basis of their classification system have by and large also been more satisfied with the effectiveness of their classification system; this is in contrast to those that use internally defined classification systems²².

Therefore, the use of commonly accepted systems such as the OECD *Frascati Manual* or of any other classification system that allows a unique mapping of the research profiles from one system into another without ambiguity should be encouraged;

21. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 3.1, Question 11: "Does your organisation use a research classification system for the grouping of your proposals?" (Table 3.1) and Question 12: "What is the source of this classification?" (Figure 3.1). See also Appendix B to the Report: *Research Classification System: A preliminary map of existing European approaches*.

22. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, Section 3.1, §3.1.4, Table 3.3.

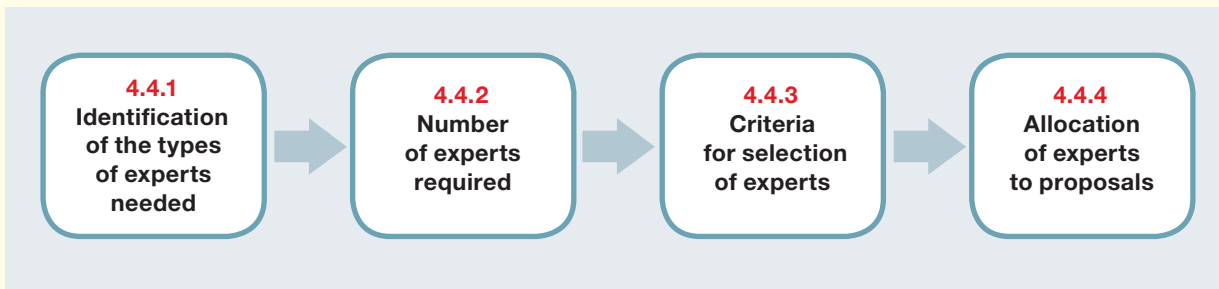


Figure 6. Selection and allocation of experts

this will help to create the needed ingredients for cross-referencing and therefore comparable interactions and collaborations at the European level.

Funding organisations normally use their ‘conventional’ research classification system in order to match the profiles of the required experts to the scientific scope of the proposals under review. This may be referred to as ‘discipline matching’ when selecting reviewers and it relies on updated, accurate and compatible research classification systems.

In contrast to this standard method and enabled by the adoption of more automated and more advanced information management systems, many organisations are considering the use of matching of *keywords* between proposals and reviewers’ profiles. This means searching for reviewers in databases using electronic matching (‘text mining’) of keywords or key phrases stemming from the proposals to the keywords attached to the profiles of the reviewers within their dedicated database. This may be referred to as ‘keyword matching’.

The two aforementioned methods have strengths in addressing the selection of reviewers in different ways. For example, ‘discipline matching’ may not be as effective in identifying specialised reviewers such as those needed for multi-, inter-, cross- and trans-disciplinary (MICT) proposals, whereas keyword matching will generally be more adequate in finding reviewers with particular research expertise. On the other hand, as described in Section 4.12, it may be advantageous to maintain disciplinary perspectives when dealing with peer review of MICT proposals. Hence, it may be quite advantageous to use the two schemes in conjunction and complementing one another.

Experts who take part in the peer review process

In a general sense there are two main groups of experts who take part in the peer review process:

- *External or individual remote reviewers* who assess the proposals on their own and separately from

other members who may look at the same proposals. These reviewers do not discuss the proposals with anyone and provide their assessments using known and clear criteria and scores²³.

- *Members of review panels* who will collectively discuss and evaluate groups of proposals. The main function of the panel is to evaluate and consolidate external assessments by experts on a group of competing proposals and to rank or prioritise them based on clear and stated criteria and parameters. The review panel’s contributions are normally needed within the last phase of the peer review as described in this Guide, *i.e.*, when final decisions are made. However, it is possible that in a one-stage peer review system, assessments of proposals are done by a panel.

It is important not to mix the two functions mentioned above and to keep the two groups separate as much as possible, *i.e.*, to have different individuals providing remote assessments from those who will participate in ranking, prioritisation or consolidation meetings in order to make sense of the multiple assessments for each proposal.

Four distinct formats can be used for setting up the remote and panel reviewers as illustrated in Figure 7. The results obtained from the ESF survey on peer review indicate that across all organisations that have responded and considering all funding instruments, the format of choice for constituting remote and panel membership is option A illustrated in Figure 7; the second choice has been identified as option B.

The nature and scope of the funding instrument will determine the required nature of the peer

23. One exception is the Commission’s evaluation system for FP7 (non-ERC). Here, after the individual review, the experts concerned take part in an in-depth discussion of the proposal concerned, and draw up a consensus report of comments and scores. It is this consensus report, not the individual review, which is passed on to the panel review stage.

review bodies, although clearly a two-stage peer review comprising external assessments followed by a review panel deliberation is considered optimal and should be used as much as possible. For smaller programmes with narrower scientific scope lighter models can be used and therefore a one-stage review may be sufficient²⁴.

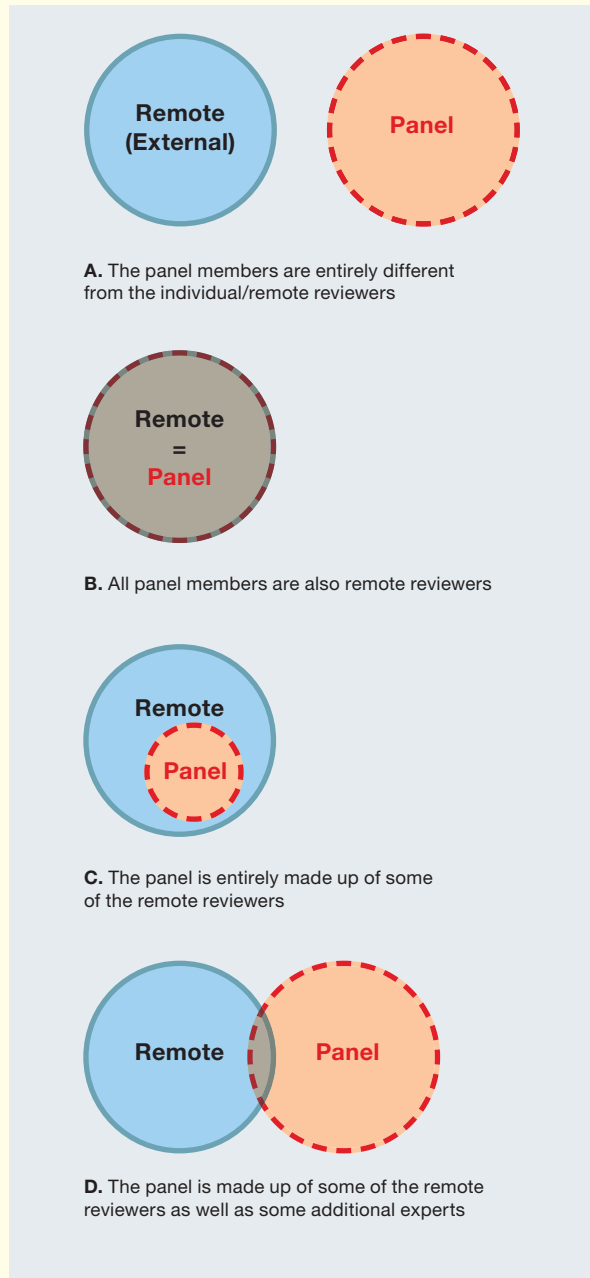


Figure 7. Types of reviewers

24. Part II of this Guide provides more specific information on this point.

RECOMMENDATIONS

- Invite non-European experts (it is also important to involve experts from emerging regions), both to ensure availability of scientific expertise and perspectives, and also to decrease the chances of conflicts of interest.
- Provide concise and clear instructions and guidance to the identified reviewers and panel members; this should cover all aspects of their involvement, including their tasks and contributions, requirements on conflicts of interest, confidentiality, language proficiency, etc.
- Provide as much advance notice to reviewers as possible, in order to increase chances of availability.
- Use dedicated and reliable information management systems including a reviewer database. The use of a common European database that would include its own quality assurance and possibly certification system would clearly help in promoting good practice.
- • • •

From the survey a need for a common European Reviewer Database (also known as ‘College’) emerges, which could better meet the growing demands for highly qualified and experienced reviewers and ensure their availability²⁵.

This is particularly evident for cross-border collaborations and mobility of scientists across Europe. Such a common database would have clear advantages and strengths by creating an opportunity to further develop the common methodologies, processes, criteria and requirements of peer review, and for the selection and assignment of reviewers across different nations. Moreover, through availability of this potential shared resource, common approaches in defining and managing conflicts of interest could be promoted and practised more extensively and consistently²⁶.

As a result of the ESF peer review survey, several research organisations have indicated their willingness to contribute to constituting such a database providing high-quality reviewers (63.3%) and then to frequently use the common database (46.7%)²⁷.

25. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 3.4, §3.4.2, Question 34: “From your organisation’s perspective, is there a need for a common European database?” (Figure 3.7).

26. Currently the European Commission maintains a database of experts in order to administer the Seventh Framework Programme. While this is its primary purpose, the database can be made available to other public funding bodies.

27. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 3.4, Questions 35 and 36, Tables 3.15 and 3.16.

However, some concerns have also been expressed in the survey and by the members of the ESF Member Organisation Forum in relation to the cost and means of maintaining such a system.

4.4.2 Number of experts required

The minimum number of referees and possibly panel members assigned per proposal will depend on the format of peer review, number and size of the proposals expected, scientific scope of the programme, and the size of the grants requested.

The goal should be to ensure availability of diverse viewpoints, scientific perspectives and scholarly thinking. This is particularly important when preliminary assessments are to be generated for a subsequent panel stage prioritisation or ranking.

In general, the aim should be to provide at least three expert assessments before a final decision is made²⁸.

For the review panel stage that may follow remote assessments, it is recommended to assign rapporteurs from the panel to each proposal. For larger programmes, three rapporteurs are essential while for smaller programmes (in terms of size, scope, funding), one rapporteur may be sufficient.

4.4.3 Criteria for the selection of experts

It is important to identify the right individuals with the responsibility of selecting and inviting the experts. These persons should stay in contact with the reviewers from the beginning to the end of the process. They will treat all proposals and all reviewers in the same way and provide the same support and information to all.

As mentioned in the previous section, as an element of good practice in peer review, a safe distance should be maintained between panel membership and individual/remote reviewers. The choice of reviewers is usually under the responsibility of programme officers and through their own searches or suggestions from others such as the review panels or other advisory committees and boards, and applicants' suggestions of names either for possible inclusion or exclusion.

The goal should be to attract qualified reviewers with all the necessary attributes in proportion with the scope of the task. When required, selection of internationally recognised and leading scientists and researchers has to be encouraged and should be given a high priority for certain programmes, but

this may not be feasible (or even necessary) for all peer review assignments across all funding instruments. Therefore, it is extremely important to pay some attention at the outset to defining the range of required expertise and levels of eminence and track record of the reviewers suitable for the task at hand.

Selection criteria for identification of individual/remote reviewers and panel members have to be defined and communicated to the responsible individuals. There are a number of possible features to keep in mind when selecting reviewers, some of which are:

- Scientific excellence, measured through contributions and track records;
- Coverage of the scope and objectives of the call;
- For membership of panels (especially for chairing them), it is necessary to include active researchers who are well established and who have broader disciplinary perspectives;
- Appropriate levels of expertise in relation to the nature of the task such that authoritative judgments and comments can be expected without excess;
- Level of familiarity/proficiency of the language used. This requirement applies substantially differently from discipline to discipline and according to the necessary levels of mastery of the language used;
- A solid record of publications: bibliometric indices are increasingly used for assessing publication track records. Care should be taken when applying these quantitative measures; these must be used as complementary information and not as sole determining factors in valuing publication track records. An authoritative and elaborate set of recommendations on the usage of bibliometric in peer review and evaluation is provided in a ministerial report prepared by the French Academy of Sciences²⁹;
- Previous participation in other research and academic adjudication committees;
- Diversity (gender balance, scholarly thinking, background, geography, turnover);
- Independence: external to the funding body;
- Conflict of interest: reviewers should not be from the same institution as the applicant(s). For very large institutions this requirement may be relaxed to some extent; reviewers should not have been a research supervisor or graduate student of the applicant during a period of at least 10 years preceding the application; have collaborated with the applicant or any of the co-applicants within

28. For details on the common practices across various funding instruments see Part II of this Guide and European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, Chapter 4.

29. Institut de France, Académie des Sciences, *Du bon usage de la bibliométrie pour l'évaluation individuelle des chercheurs*, 17 January 2011 – <http://www.academie-sciences.fr/actualites/nouvelles.htm>.

the past five years; have plans to collaborate with them in the immediate future; be in any other potential conflict of interest, *i.e.*, personal, financial or immediate family-related;

- Selection of gender-balanced reviewers: conscious and explicit attention must be paid to ensuring gender balance for both remote and panel reviewers as well as in chairing panels according to national and European standard norms and objectives.
- Selection of international reviewers (outside the funding organisation's country) is considered good practice.
- When assessing scientific standing of the experts, attention should be paid to individual career paths and circumstances caused by career interruptions and changes, *e.g.* due to family reasons or inter-sectoral and non-academic mobility such as working for industry³⁰.

RECOMMENDATION

Provide equal playing fields

Effort should be made to consistently increase the number of representatives of the underrepresented gender in peer review activities where the percentage of the minority gender is less than 40% of the selected experts. For reviewers, it is therefore recommended that a gender ratio of at least 40% of women to men should be attained. Furthermore, individual "non-standard" career paths affected by changes or interruptions due to professional mobility and family-reasons should be considered when selecting experts.

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4.4.4 Allocation of experts to proposals

Experts are allocated to proposals on the basis of the best possible match between their expertise and the topics covered by the various proposals. Depending on the type of programme and the nature of the peer review process, the criteria used for allocating reviewers to proposals may differ. Disciplinary expertise and depth of knowledge of the field are crucial for providing remote assessments where the core of the evaluation is usually aimed at the scientific and intellectual merit of the proposal. However, for panel members it is not always necessary that every person who is assigned to a proposal is an expert and active researcher in every topic or aspect covered by the proposal; rather, as a group, the panel

should collectively bring the overall perspectives and expertise needed to decipher the judgments of the remote specialists and possibly the views of the applicants in the case of rebuttals (see §4.7.4 for detail on rebuttals or the right to reply).

Therefore, the necessary scientific and disciplinary expertise while aiming to diversify the groups should be used wherever possible.

Some of the features to be considered when allocating experts to proposals are:

- Clarity of the roles, responsibilities and expectations including timing of events and deliverables;
- Effectiveness of communications in the above. This may include an electronic or paper copy of signatures, confirmation, agreements or acknowledgments;
- Effective and timely identification and, when appropriate, resolution of conflicts of interest as described in the previous sections. In cases of deviations from the advertised rules and procedures, it is essential to keep a record of how the conflicting situation was resolved. This should include clear statements from the reviewer in question stating that he/she does not feel that his/her judgment is biased in any way as a result of the apparent conflict identified;
- Confidentiality (single- or double-blind). Members of panels and committees who may have access to confidential information (both content of proposals and identity of proposers) should sign a confidentiality agreement (either electronically or through paper copies). As mentioned in §3.2.2, in some countries national legislation may call for complete transparency of the process including identities of applicants and reviewers;
- Reviewers must be instructed to inform the programme officer if they feel their expertise is not relevant or adequate for conducting the required assessment.

30. European Science Foundation (2009), Research Careers in Europe – Landscape and Horizons, Page 4.

4.5 Reader System

In order to overcome some of the inherent variability and inconsistency of the conventional approaches of peer review the so-called ‘Reader System’³¹ has been proposed as an alternative method. A potential problem with the conventional methods is the “measurement error due to the idiosyncratic responses when large numbers of different assessors each evaluate only a single or very few proposals”. In the proposed reader system approach, a small number of expert readers are chosen for each sub-discipline. The same readers review all the proposals in their remit. They will then prioritise or rank all the proposals they have read. However, the results of the survey on peer review practices show that the reader system procedure is only rarely applied, at least for the three most common funding instruments: *Individual Research Programmes*, *Career Development Programmes* and *International Collaborative Research Programmes*³².

4.6 The use of incentives

Participating in peer review and evaluation exercises in varying capacities is now considered as a necessary ingredient of the activities of scientists and researchers throughout their careers. Those who publish and who submit research proposals create demands for peer review. They must therefore be prepared to contribute their share of peer review in order to maintain the levels of self-organisation required for the selection of the best science to receive public funds through peer review and evaluation.

Items listed below are pertinent to the use of incentives:

- The aforementioned self-organisation expected of the peer review system is under stress, perhaps because of increased demands;
- Some organisations pay their reviewers (both external and panel) to conduct assessments while others do not;
- Although monetary incentives tend to increase the chances of acceptance by the targeted reviewers, it is not clear whether or not it will increase the quality of assessments;
- It is recommended to use monetary incentives only when really necessary;

- It is recommended to consider other types of incentives either to the reviewers directly or to their institutes. Some organisations pay the institutes of their reviewers for every review completed;
- Incentives should have a motivational impact as they are meant to be a token of acknowledgment and appreciation. They should not contribute to creating additional adverse side-effects and expectations such as a race to pay more for better reviewers; compromise of quality for quantity; giving rise to an exaggerated commercial value for peer reviewing which is inherently an intellectual and scientific endeavour regarded as normal professional contributions in each field.

4.7 Expert assessments

Once the experts have been selected, invited and confirmed as reviewers, and proposals are assigned to them, the actual process of assessment will begin.

There are substantial differences between the roles of the individual/remote reviewers and the panel members when conducting their assessment or evaluation tasks (Figure 8).

4.7.1 Briefing

Before the tasks of both individual/remote reviewers and panel members begin, it is essential that their assignments are clearly described and communicated. This is normally done through briefing sessions (possibly using video or teleconferences), orientation sessions, emails and documentation including manuals, protocols, recommendations and instructions.

The information provided should, as a minimum, cover the scope and objectives of the call, the process of peer review, evaluation criteria and the timeline to be followed. Other relevant information that could be communicated to the reviewers may contain explicit instructions and guidance on the use of bibliometric indices, and on providing equal playing fields through promotion of gender balance and recognition of individual non-standard career paths (See §4.4.3).

During remote evaluations and until the assessments are submitted, the channel for information exchange should be kept open to respond to questions that may arise.

4.7.2 Evaluation criteria

At this stage it is assumed that a clear set of evaluation criteria specific to the funding instrument at hand has been determined and included in the

31. See Jayasinghe, Marsch and Bond (2006).

32. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 4.2, Question 102: “Do you proceed according to the ‘reader system’ when organising the review for this instrument?” (Table 4.5).

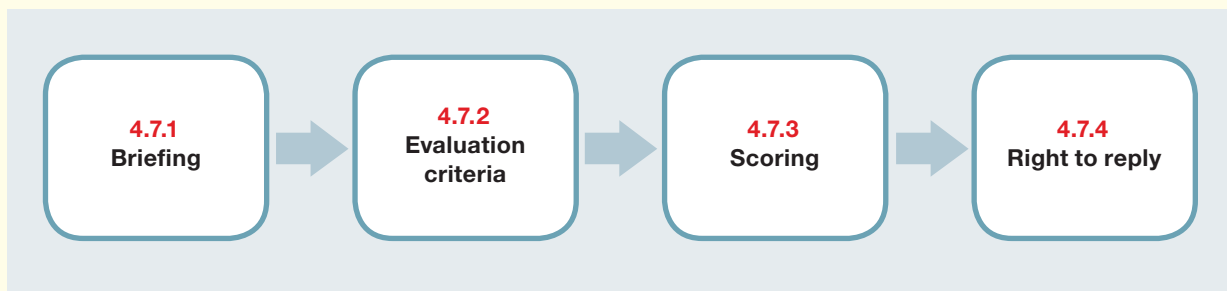


Figure 8. Expert assessments

promotional material and in the call for proposals. These criteria must be sharp, clear and concise. They should be formulated such that the key aspects of the proposals can be measured in relation to the main scope and objectives of the programme. The assessment criteria should not attempt to be exhaustive and include criteria that will not be strongly relevant and determining in the decision making process for the given instrument.

The criteria must be clearly drafted and easily applicable. All attempts must be made to minimise room for diverging interpretations of the criteria and for ambiguity. Evaluation criteria in the most general sense may be grouped into four categories as described below. It should be noted that, depending on the funding instrument and the variants under consideration, different combinations of these main groups of criteria may be applicable³³.

I. Relevance and expected impacts (driven by programme policy, strategy, mandates, etc.)

- Relevance of the proposed work to the scope of the call;
- Broader impact (scientific, knowledge creation, socio-economic, etc.);
- Incremental versus transformative gains;
- Associated risks;
- Requested resources:
 - budget: although it may be inevitable for some organisations to actually scrutinise the overall amounts requested by the proposers, it is more appropriate to avoid this and instead to assess the appropriateness of the cost items mentioned below that can be used as a measure of confirming the requested budget,
 - staff effort,
 - access to infrastructure,
 - equipment and consumables,

- travel,
- networking and dissemination;
- Ethical issues: compliance with standard norms and ethical practices when dealing with safety and security, use of animals and human subjects, environment, embargos and sanctions;
- Gender balance: some organisations pay specific attention to promote gender balance within their national programmes.

II. Scientific quality

- Scientific/intellectual merits of the proposed research: clear, convincing and compelling;
- Thoroughness: definition of the problem and proposed solutions, review of state of the art;
- Novelty and originality:
 - unconventional,
 - potential for the creation of new knowledge, exciting new ideas and approaches,
 - use of novel technologies/methodologies,
 - innovative application of existing methodologies/technologies in new areas,
 - potential for the creation of new fundamental questions and new directions for research,
 - feasibility: scientific, technological, access to infrastructure, recruitment, project timeline, management plan and deliverables, associated risks,
 - appropriateness of the research methods, infrastructures, equipment and fieldwork.

III. Applicant

- Academic qualifications and achievements in relation to their stage of career;
- Research experience and level of independence;
- Demonstrated expertise of the applicant(s) in similar projects;
- Applicants' scientific networks and ability to successfully disseminate research findings, *i.e.*, knowledge transfer activities;
- Appropriateness of the team of applicants in terms

³³. Part II of this Guide will provide more detail on criteria for each instrument.

of availability and complementarities of all the relevant expertise and synergies;

- Publication track record. It is suggested to require the applicants to report only on a selected number of their most relevant and important articles (5 to 10 maximum) instead of providing long lists;
- Bibliometric indices: As mentioned in §4.4.3, for the use of bibliometric indices, reviewers should be explicitly advised to apply these with care and only as a complementary tool and not as a sole determining factor without taking into consideration a variety of other factors that can influence publication patterns and scientific standing of the applicant (see footnote 29 on page 25).
- When assessing scientific standing and qualification of the applicants, conscious attention should be paid to individual career paths and circumstances caused by career interruptions and changes, *e.g.* due to family reasons or inter-sectoral and non-academic mobility such as working for industry (See footnote 30).

IV. Research environment

- Availability and accessibility of personnel, facilities and infrastructures;
- Suitability of the environment to conduct the proposed research;
- Availability of other necessary resources;
- Mobility and career development aspects.

4.7.3 Scoring

In order to synthesise and compare assessments of proposals under evaluation, it can be very beneficial to assign a scoring scheme to each of the adopted criteria. Most evaluation criteria used for assessment come with a set of multiple choices for the reviewer to select from. These are normally comparative statements that carry a numeric or alphabetic score. The resolution of the scoring system for individual criterion may vary according to the particular circumstances of the call and assessment criteria but, generally speaking, a scale of four or five statements with determining scores or points may be used. For example: A. for Excellent; B. for Very Good; C. for Good; and D. for Poor. It should be noted that adopting an odd number of choices for a criterion may lead to implicitly created biases towards the middle.

Different weighting factors may be applied to the different criteria with a differing degree of importance. However, it is advisable to keep such a system as simple as possible. It is also common to calculate the average of all the scores or to provide a single overall score for the purpose of comparison

and ranking. A threshold could be set as a cut-off line for the overall scores or for the scores on a given criterion in order to determine fundable versus non-fundable proposals.

The relative position of the cut-off line on the full spectrum of scores will have to be determined by the funding organisation in charge of the programme and based on the size of the available budget. Experts are asked to provide a score for each criterion, substantiated by written comments. The comments should justify and be in line with the given score. Reviewers' comments should be checked to ensure usability, legibility and tone of language before they are used for further steps.

There are different sets for scoring the main assessment criteria described above that can be adopted, each with slight advantages and disadvantages. In Table 3 an example of a five-point scoring system is provided.

For example, when measuring the scientific quality of a proposal, the following definitions can be used³⁴:

Poor: "The criterion is addressed in an inadequate manner, or there are serious inherent weaknesses."

Fair: "While the proposal broadly addresses the criterion, there are significant weaknesses."

Good: "The proposal addresses the criterion well, although improvements would be necessary."

Very Good: "The proposal addresses the criterion very well, although certain improvements are still possible."

Excellent: "The proposal successfully addresses all relevant aspects of the criterion in question. Any shortcomings are minor."

Evidently, different organisations may use other schemes based on their particular requirements and existing practices. According to the specific nature of the funding schemes and the call, it may also be decided to assign differing weights to some or all of the criteria.

Budget

When assessing the requested budget for typical programmes the following scoring scheme may be used:

- 4 (or A): Highly appropriate
- 3 (or B): Appropriate
- 2 (or C): Marginally appropriate
- 1 (or D): Inappropriate.

34. See European Commission (2008), *Rules for submission of proposals, and the related evaluation, selection and award procedures*, in particular Section 3.6, p. 14.

| Applicant | Relevance and impact of the proposed research | Scientific quality of the proposal | Numeric score | Alphabetic score |
|-------------|---|------------------------------------|---------------|------------------|
| Outstanding | Highly significant | Excellent | 5 | A |
| Very good | Significant | Very good | 4 | B |
| Good | Average | Good | 3 | C |
| Sufficient | Low | Fair | 2 | D |
| Poor | Insignificant | Poor | 1 | E |

Table 3. Five-interval scoring scheme

4.7.4 Right to reply

In contrast with redress or appeal that can be invoked to contest the final decision of the selection process, the ‘right to reply’ is intended as an integral part of the peer review process itself. It is normally applied to two-stage peer review systems where a panel of experts will make a selection, prioritisation or ranking of proposals based on external referee assessments. Before the panel members see the external assessments, the applicants are provided with the opportunity to study the assessments of the external referees and to comment on the arguments and evaluations of the referees. Written feedback statements are invited within a short period of time, normally in about one week. Applicants should be aware of this step of the process and its timing through advance notice and possibly reminders.

As noted in §Applicants’ rights to intervene this step is not provided to amend or elaborate the initially submitted proposals or to change them in any way. It is only meant to allow the applicants to comment on factual errors or misunderstandings that may have been made by the referees while assessing the proposal. In addition to the applicants, the external referees and the members of the review panel should also be made fully aware of the procedures and timing related to the rebuttal stage.

Results obtained from the survey on peer review practices indicate that only 46% of the responding organisations give their applicants the right to reply during the peer review process. This includes 13% that do this across all funding instruments and 33% applying it only to some of their instruments. The procedure is considered “too time consuming” by 50% of the respondents and “too costly” by 6% of these.

The majority of the responding organisations have confirmed the very high importance and added value of the right to reply as a component of the

review process³⁵. For those organisations that include the right to reply, the main consequences resulting from the applicants’ replies are stated to be very significant. Specifically, 64.3% have indicated, as a consequence of the applicants’ replies, consideration of the feedback in the further review and selection process, for 50% the consequence has been stated as consideration of the feedback at the stage of funding decision and for 28% the consequence is stated as a modification of the reviewers’ statements³⁶.

RECOMMENDATION

Incorporate the ‘right to reply’ in the process of peer review whenever possible. This step brings significant reliability and robustness to the decision making process and will increase the overall quality and equitability of the peer review.

• • • •

35. However, other studies have concluded that the peer review process without the right to reply is fast and cost effective, for example see the FWF Discussion Paper by Fischer and Reckling (2010), p. 6.

36. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 3.8, Question 55: “Does your organisation allow applicants to reply to the assessment of their proposals during the peer review process and before the final funding decision is made?” and Question 57: “Which consequences might the applicant’s replies have?” (respectively Tables 3.35 and 3.36).

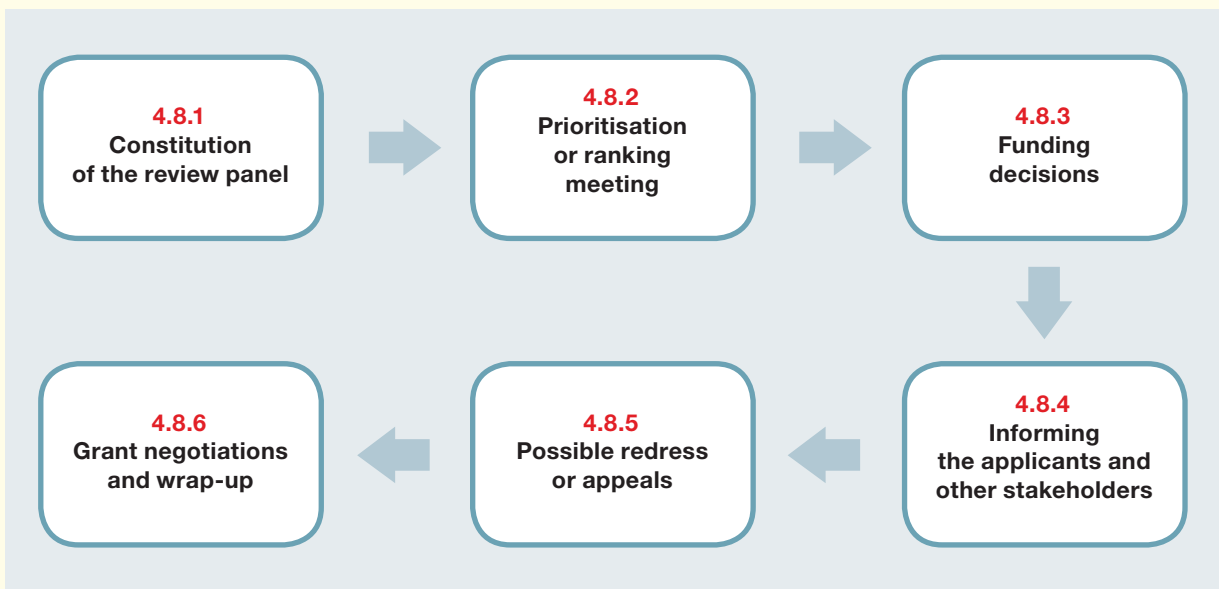


Figure 9. Final decision

4.8 Final decision

The final stage of a generic peer review system typically consists of the steps that are described in this section and illustrated in Figure 9. For specific funding instruments, some of the building blocks suggested here may not apply to all funding instruments as further elaborated in Part II. In a general sense this last stage consists of the prioritisation or ranking of proposals which leads to the final decisions on the funding of selected applications as briefly outlined below.

4.8.1 Constitution of the review panel

It is assumed that some of the preliminary work in identifying the membership of the review panel starts at the preparatory stage. At this stage, the panel needs to be fully constituted with a sufficient number of experts required to cover the depth and breadth of the expertise needed. In some programmes, the panel may be created per call and according to the disciplines concerned, and in some other cases the panel may be a standing or a dedicated committee.

Once the panel has been assembled, the following two items should be considered:

I. Terms of reference, or terms of participation for the panel members

- Conflict of interest and confidentiality agreements.

II. Mandate of the panel members (some of the items below may not apply to all instruments)

- Review and appraisal of external (remote) assessments;
- Prioritisation (*e.g.*, for responsive mode) and/or ranking of proposals;
- Recommendations on funding threshold;
- Recommendations on the appropriateness of the requested resources, equipment and infrastructure;
- Preparation of the pre-meeting assessment reports and evaluation summaries;
- Preparation of the consensus reports summarising the decisions and feedback to applicants;
- Approval of the minutes of meetings.

4.8.2 Prioritisation or ranking meeting

The ranking or prioritisation meetings are the most decisive steps in peer review for both the one-stage and the two-stage selection schemes.

Normally, while the review panel is being constituted preparatory work for the scheduling and convening of the meeting should start. For one-stage selection schemes the panel will make the final selection of the proposals based on their own expert assessments of the competing proposals. For two-stage schemes, the panel relies on expert assessment by individual/remote reviewers who may or may not be part of the panel. The review panels are in these situations responsible for arriving at consensus decisions on the competitive merits of the proposals using external assessments and possibly the replies from the applicants to the remote/indi-

vidual assessments. The funding decisions should normally follow and be according to the ranking and prioritisation suggested by the review panels.

Some of the aspects to be considered are listed below:

I. Effective planning and running of the meeting

- Sufficiently long advance notice and schedules;
- Provision of reliable IT tools and resources such that panel members can access the proposals, remote assessments and applicants' replies online and ideally be able to provide their pre-meeting comments and evaluations also online. In this way, supporting documentation for the meeting can be generated very efficiently;
- Agenda for the meeting allocating enough time for the different parts of the meeting;
- Provision of all background and supporting documents – it is recommended to use electronic files wherever possible and not to print files if not really necessary;
- Description of the required deliverables from the meeting and from the members;
- Ensure the meeting is of sufficient length such that the panel is able to discuss all proposals with the required levels of attention and is able to conduct the ranking/prioritisation and draft their consensus report(s);
- Ensure an experienced science officer and possibly an administrator are assigned and available to provide secretariat support to the meeting.

II. Assigning an authoritative Chair for the panel

- It is very important that the Chairs understand clearly what is expected of the meeting;
- Briefing notes particularly prepared for the Chairs with clear instructions, rules of procedure and list of deliverables need to be communicated to the Chairs in advance.

III. Assigning rapporteurs and/or designated reviewers to all proposals

- Normally two or three rapporteurs or reviewers should be designated for each proposal;
- The profile of the rapporteurs should collectively cover all disciplinary perspectives that are needed;
- Ensure uniformity and consistency of attention to all proposals (number of rapporteurs, coverage of the scope, etc.);
- Normally (especially for two-stage peer review systems) the members of the panel are not asked to assess their assigned proposals using the same criteria used by the individual/remote reviewers;

rather they are asked to appraise and make sense of the proposal in relation to the remote assessments and, if available, to the applicants' replies to the remote assessments;

- Avoid assigning an excessively high number of proposals to each member. The appropriate limit could vary substantially in proportion to the size of the programme and the length of the proposals.

IV. Running the meeting (rules of procedure)

- Declaring and recording conflicts of interest, how they were dealt with and any major objections to decisions of the panel;
- Ensure active, all-inclusive and rich participation;
- Ensure clear understanding on the mode of collective decision making and approval by the panel: to decide between unanimous agreement versus consensus driven by majority; how to deal with major objections to final decisions; the weight and priority of the views of rapporteurs on their proposal versus the views of the other members of the panel, versus the potential intervention of the Chairs;
- In the case of having more than one or two rapporteurs, it is advisable to assign a 'lead rapporteur' with the mandate of starting the discussion on a given proposal by first providing a brief summary of the work proposed followed by their appraisal of the remote assessments and the applicants' reply;
- Conduct the prioritisation or ranking in at least two rounds. During the first round, divide the proposals into three priority bins of high (to be funded), medium (may be funded) and low (not to be funded). In consecutive second or possibly third rounds, the relative position of the proposals in and across the three groups will be further refined and a final prioritised or rank-ordered list will be determined;
- The panel should approve the final rank-ordered list.

V. Consensus reports³⁷

- Consensus reports are prepared by the rapporteurs and approved by the panel. These reports contain statements on behalf of the panel that can be forwarded to the applicant describing the final

³⁷ Disagreement is an integral part of scientific discussion and science develops through a dialectic confrontation and dialogue. Therefore, although the process of achieving consensus among reviewers can sometimes appear as a formidable task, it should be followed consistently and persistently and in accordance with the agreed terms of reference for the deliberating group.

decisions. Consensus reports should not replace the minutes of the meeting but rather be attached to the final approved minutes. Consensus reports should strongly reflect the relative position of the proposals on the rank-ordered or prioritised list;

- The comments provided by the rapporteurs should be of high scientific quality, be objective and to the point. They should be descriptive of the final decision of the panel on the proposal, especially if that decision is not in line with the overall views of the remote assessors;
- As far as possible, ensure that the consensus reports are written and approved before the meeting is adjourned;
- The minutes of the meeting are prepared after the meeting by the assigned science officer/administrator and must be approved by the panel before being released. The minutes will also include the final prioritised or rank-ordered list, as well as the consensus statements and intermediate changes, conflicts of interests, etc.

4.8.3 Funding decisions

Normally the final funding decision is made for the funding organisation by a dedicated committee or board based on the recommendations of the review panel and their suggested rank-ordered or prioritised list.

It is recommended that the rank-ordered or prioritised lists are consistently and thoroughly respected when funding decisions are being made. If the body which makes the final decision on funding is to be given the right to change the order of proposals on the rank lists, despite the recommendations of the review panel, clear criteria and justifications for such changes should be described in advance and recorded as the cases present themselves.

Most funding organisations negotiate the amount of the requested grants with the applicants, while some organisations provide the grants as requested without any changes.

RECOMMENDATIONS

- The rank-ordered or prioritised list must be consistently and thoroughly respected when funding decisions are made.
- The feedback from the review panel on the appropriateness of the requested budgets should be used if funding negotiations are to be included.
- • • •

4.8.4 Informing the applicants and other stakeholders

Applicants should be informed of the outcome of the review panel and be given access to the consensus reports on their proposal as soon as possible.

Whether or not the ranking position of a proposal is given to the applicants differs across funding organisations; this feature is therefore to be decided by each organisation. It is recommended that if the ranking positions are not to be disseminated, necessary efforts are made to keep the list confidential and to prevent the information from leaking. If, however, the decision is made to release ranking positions, it is advisable that the rank order of any one proposal is only provided to the applicants of that proposal.

4.8.5 Possible redress or appeals

Applicants should be given the chance of appealing or contesting the final decision on their proposal. A clear description of the procedure and potential outcomes should be prepared and disseminated to all applicants when they submit their application.

Redress is important when there has been a substantial procedural error in the adjudication process leading to results unfavourable to the application, for example, when there are major deviations from the policy regarding conflict of interest, compromises in quality and integrity of the process, and any other clear wrongdoing. It is important that the redress process is transparent and fast.

Appeals with a favourable outcome towards the applicants must lead to at least one of the following two remedies:

- Fresh peer review;
- Revoking of the first decision resulting from the peer review process in favour of the application.

4.8.6 Grant negotiations and wrap-up

As previously mentioned, before the grants are awarded there may be a period of grant negotiation between the funding organisation and the applicants. Depending on the nature and size of the grants being awarded, and on the national regulations and standard practices, the scope and intensity of the negotiation can vary substantially. In some organisations, the grants requested are awarded fully with no changes across all funding instruments, whilst in some organisations, and depending on the size of the programmes, the final amounts granted could be quite different from the requested budgets.

- As briefly noted in previous sections, sometimes the peer or expert reviewers are asked to provide comments on the appropriateness of the requested resources as part of their assessments,

e.g., commenting on the number of researchers and graduate students to be employed, procurement of major equipment and access to infrastructure. This information can be used by the funding organisation as part of their final decision and during their negotiations with the applicants.

- Make conscious and clear decisions at the outset during the preparatory phase on whether or not the funding organisation will scrutinise and possibly make changes to the requested budgets. If such changes are part of the process, the eligibility of all cost items needs to be specified in the call, including possible limits or other conditions that may apply to individual items or the overall requested amounts.

RECOMMENDATIONS

- Discretionary and *ad hoc* adjustments of the requested budgets by members of staff at the funding organisations should be avoided as much as possible.
- If negotiations and changes are to be included as part of the process, the expert assessors' views must be used as much as possible as the basis for refining the funding allocations. Organisations' dedicated scientific boards, councils and committees could also provide input as appropriate.
- • • •

As part of the negotiations and grant agreements, the following elements could also be considered:

- Clarification of the Intellectual Property Rights (IPR) directly generated under the contract, depending on the nature of the research being funded (*e.g.*, commercialisation potential and value);
- Care must be given as the details and stringency of the agreements defining the ownership of the IPR by various parties involved (researchers, research institutes and the funders) may be applied differently. This becomes more critical when programmes are multinational or multi-agency;
- IPR may (depending on the nature of the research) include and delineate both the Foreground and the Background Intellectual Properties;
- Engage (when necessary) the parties in *licensing* or *commercialisation agreements* on the generated Intellectual Properties;
- Reporting requirements: frequency, scope, format, etc.;
- Adherence to any other national, European or international directives, regulations or good practices in research;
- Ex-post evaluation requirements: nature, frequency, format, required self-evaluation reports, etc.

4.9 Communication

Communication is a crucial element required across the entire process of peer review described in the previous sections. In order to safeguard the integrity of the process, it is necessary that all the implicated parties in the process are clearly informed of the process, procedures and decisions.

- Communication should occur in a timely fashion.
- Communication should be effective in delivering the right message to the correct recipients.
- Communication should be efficient (both concise and clear).

4.9.1 Communication to applicants

During the peer review process communication with the applicants is of crucial importance. Effective and timely feedback to the applicants determines to a large extent the level of transparency of the process. Some of the items needing attention are listed below:

- Acknowledgment of receipt of proposal – immediately after submission;
- If required, intermediate communication to the applicants informing them of possible incompleteness of their application or lack of successful submission (especially when this is due to technical issues such as IT tools and resources);
- Communication for further information (if applicable);
- Communication on eligibility requirements and status (if applicable);
- Communication on the right to reply (if applicable);
- Communication on the decision of the review panel;
- Communication on the final decision;
- Communication on redress applications and their outcome (if applicable).

4.9.2 Communication to experts

The individual/remote reviewers, as well as the members of the review panels and any other committees or boards that may be involved in making decisions, should be informed of all the main elements and steps of the programme they take part in as well as the detailed description of their assignment, roles and responsibilities. The following items should be considered:

- Maintain the right balance between providing necessary and useful information without overdoing it;
- Divide the information to be communicated into two groups:

1. **Minimum necessary information:** This comprises the information that the experts need in order to easily understand the nature of their assignment, *i.e.*, roles, responsibilities, main deadlines and required deliverables. Some level of description of the peer review and selection process directly relevant to the experts is necessary (*e.g.*, on whether there is a rebuttal in the process, double-blind versus single-blind versus fully transparent assessments). The minimum necessary information should be communicated to all reviewers explicitly through official emails or letters, clearly and in good time;
2. **Complementary and good-to-have information:** This may include background information about the programme, the overall peer review process, statistics, etc. The complementary information should be easily accessible to the reviewers in case there is the interest. This information could be included as an annex to letters or emails or on dedicated websites.

4.9.3 Communication to commissioning parties (*e.g.*, funders)

This item becomes relevant in cases where the implementing body is not the same as the commissioning organisation, for example, for multi-organisational collaborations where there may be a coordinating or implementing organisation different from the participating funding organisations. In these cases, the requirements for communication protocols and reporting should be made clear at the outset and should be included in the multilateral agreements defining the collaboration. Some of the items that will be necessary to consider are:

- Effective and timely communication to responsible Management Committees (a body representing all participating organisations and charged with decision making responsibilities on their behalf);
- Details of the entire process from the preparatory to the final phases, should be communicated to the commissioning parties, including:
 - opening and closing of the call,
 - number and nature of proposals received,
 - dates and agenda of meetings,
 - remote assessments,
 - replies from the applicants to the remote assessments (rebuttal comments),
 - review panel deliberations,
 - minutes of meetings,
 - rank-ordered or prioritised list of proposals, etc.

4.10 Quality assurance

Section 3.3 of this Guide provides a brief review of quality assurance as one of the supporting pillars of good practice in peer review. In this section, more practical and elaborated approaches and methodologies are outlined for assuring the quality of the processes and the results through careful monitoring and evaluation.

4.10.1 Standard practices for assessment of quality

It is recommended that the following elements be considered:

- Guidance and coaching of staff members;
- Instructions and training for external reviewers to ensure coherence and consistency;
- Provision of briefing notes and instructions to members of review panels;
- Configuration control (tracking of documents and their changes).

4.10.2 Quality of reviewers

The scientific or research profile and competencies of the remote/individual reviewers as well as of the members of review panels play the most important role in achieving effective, equitable and efficient selection. Therefore incorporating explicit measures to monitor the quality of these individuals in relation to their specific mandate and assignment will be most advantageous.

It is noted that, depending on the nature of the programmes at hand, different profiles may be considered for remote reviewers versus members of ranking or review panels (see §4.4.3).

For example, members of the panels are normally expected to be more established/senior academics or researchers with similar broad experiences in the past, while the remote or individual reviewers could be very much early career experts with in-depth scientific knowledge.

Validated and proven advanced information technology and automation can play a role in establishing the means of:

- characterising the research profile and performance of different individuals within the organisation's databases;
- carrying out a reliable search for reviewers in the database while automatically matching scientific scope of proposals to the required reviewer profiles and expertise.

4.10.3 Measure of quality and usability of the reviewers' assessments

Some of the items defining the quality and usability of the assessments made by individual/remote reviewers are:

- Conflicts of interest;
- Completeness;
- Comprehensibility and clarity;
- Appropriateness of the language used;
- Fit for purpose;
- Timely;
- Substantiated judgments and scores.

4.10.4 Evaluation

Evaluation entails appropriate measures and means of supervising and scrutinising the process and its implementation by authoritative and experienced individuals or groups of individuals. This could comprise parties either internal or external to the organisation or a mixture of the two. The term 'evaluation' used here does not refer to ex-post evaluation of the funded research³⁸.

It is important to clearly describe to all relevant parties and at the beginning of the process the following items:

- The purpose of the evaluation;
- The scope of the evaluation;
- The means available to conduct the evaluation;
- What could be the outcome of the evaluation.

4.10.5 Overall recommended measures in support of quality assurance

To support quality assurance the following aspects may be considered:

- Identify and mandate dedicated individuals or groups of individuals responsible for the conceptualisation and administration of quality reviews; as far as possible, ensure continuity by avoiding the use of temporary assignments and frequent staff changes. Make clear the roles and the responsibilities of the programme officers and administrators and thus demand accountability;
- Ensure consistency and clarity of the published material and all other communication streams to all stakeholders;
- Offer clear instructions, briefing notes and, if possible,

sible, training sessions for reviewers and panel members to ensure the coherence and consistency of their approaches;

- Keep the procedure as simple as possible, increase the level of standardisation and automation whenever proven technologies and resources are available. Systematic tracking of reviewers' quality can be very beneficial.
- Conduct periodic reviews of the processes and procedures. The cycle length of the reviews – whether they are programme-based, department/unit-based or institution-based – may vary according to disciplinary or institutional needs.

The survey on peer review practices has shown that the responding organisations adopt the following correcting actions in cases when the quality and usability of the assessments fall short of their standards:

- The entire review may be discarded and not used according to 56% of the respondents;
- The review might be returned to the reviewer for completion/additional information (according to 52% of the respondents) or for modification (according to 32%);
- 40% of the responding organisations indicated that reviewers may be tagged based on the quality and usability of their assessments³⁹ with qualifying information that may be used for future references;
- The data protection laws of each country may dictate the nature and usage of this information.

4.11 Variants of funding instruments and their implication for Peer Review

One of the main challenges for structuring both the Guide and the supporting peer review survey has been to categorise main funding instruments common to European research funding and performing organisations and councils. The conclusion has been to treat the task of grouping of instruments along two dimensions.

The first dimension considers the main typology of the funding instruments that is driven only by the nature and size of the funding opportunity; the second dimension relates to the different program-

38. Ex-post evaluation of the funded research has not been included as part of this Guide. On this topic see, for example, the Reports of the ESF Member Organisation Forum on Evaluation of Publicly Funded Research at: <http://www.esf.org/activities/mo-fora/evaluation-of-publicly-funded-research.html> and the ESF Member Organisation Forum on Evaluation of Funding Schemes and Research Programmes at: <http://www.esf.org/activities/mo-fora/completed-mo-fora/evaluation-of-funding-schemes-and-research-programmes.html>

39. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 3.2, §3.2.2, Question 22: "What concrete actions can result from the evaluation of a review's quality and usability by your organisation?" (Table 3.7).

| Key distinguishing features | Peer review implications | |
|-----------------------------|--|--|
| | Solicited mode | Non-solicited (responsive) mode |
| Peer review format | One-stage or two-stage submission of proposals; one-stage assessment by individual/remote reviewers; or two-stage assessment by remote reviewers followed by a panel ranking | A one-stage submission of proposals; plus two-stage assessment by individual/remote reviewers followed by prioritisation done by a review panel |
| Preparatory phase | In addition to defining the scientific scope and objectives of the call, clear definition of the timeline for opening and closing of the call and for the ensuing peer review stages | Changes to the scope and objectives of the calls and to the procedures occur as the needs arise throughout the year |
| Processing of proposals | Different stages of peer review occur at fixed intervals | Proposals are checked for eligibility and then retained until a desired number is accumulated before passing them through the peer review stages |
| Selection of experts | More work can be done upfront as the expected nature of proposals is predetermined | Normally from a dedicated database of reviewers who are familiar with the process and the various funding streams covered by responsive mode in the organisation |

Table 4. Solicited versus non-solicited calls: peer review implications

matic variations of the given instruments. This is referred to as variants of the funding instruments, for example ‘solicited versus non-solicited or responsive’ are considered as variants that can be applied to any of the funding instruments.

Section 2.2 of this Guide briefly describes the main categories included and the potential variants of these. In the present section, the main variants are revisited with the aim of elaborating on any specific peer review implications that they may require.

4.11.1 Solicited versus non-solicited or responsive mode

As mentioned in §2.2.1, responsive-mode calls for proposals are continuously open and applications can be submitted at any time. When reaching a desired number, applications are grouped and processed through the peer review stages of remote assessment plus a prioritising panel. This is in contrast with solicited-mode programmes in which clearly defined timelines identify the opening and closing of the call for proposals and therefore the ensuing peer review stages.

4.11.2 Thematic versus non-thematic

Although the implications of these variants of funding instruments are not substantial with regard to the peer review process, the evaluation of the applications should, however, address the thematic or

non-thematic coverage of the research proposals. Non-thematic calls have an open scope within a certain defined domain or discipline or groups of domains or disciplines. On the other hand, thematic or topical programmes are meant to focus research efforts on given themes or subjects in and/or across domains.

According to the results of the survey on peer review practices, from 190 programmes reported across all instruments 103 have been identified as being Thematic/Topical⁴⁰.

In terms of specificity of peer review the following items should be considered when dealing with thematic calls:

- Clarity on the definition of the scope:
 - themes, topics, subtopics;
- Means of selecting themes or topics:
 - investigator-driven ‘grass-root’, ‘bottom-up’ versus policy, strategy driven at organisational level ‘top-down’;
- Eligibility criteria:
 - covering a minimum number of topics or subtopics within the theme,
 - including minimum number of investigators representing the topics;

40. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*. Annex A: *Survey*, Question 2: “Please indicate the scientific scope of the instrument”.

- Assessment criteria:
 - Relevance to the thematic/topical scope,
 - Potential impact in and across various subtopics of a theme,
 - Synergy between different elements covering interrelating or complementary research topics within a theme,
 - Coherence and degree of integration of different elements within the proposals.

4.12 Peer Review of monodisciplinary versus pluridisciplinary research⁴¹

The history, science and politics of ‘pluridisciplinary’ (often referred to as ‘multidisciplinary’, or ‘interdisciplinary’) research have been the subject of academic debates and inquiry. In addition to these two generic terminologies that have sometimes been used interchangeably, other delineations and refinements of ‘pluridisciplinary research’ have been suggested (see §2.2.3 of this Guide).

The need for academic attention and precision in characterising and defining various types of pluridisciplinary research has been driven by the fact that pioneering scientific discovery and scholarly achievements have increasingly occurred at the intersections of, or through the involvement of collaborators from, more than one traditional discipline or field of study. Despite these developments, implications of the disciplinary character of research topics on defining optimal peer review processes have not received equal attention within the interested scientific communities.

A comprehensive analysis of the literature focusing – in parallel – on ‘performance’ and ‘evaluation’ is provided in Klein (2008). While recognising the inherent heterogeneity of the different types of pluridisciplinary research, this review article presents seven *generic principles* each with several *key insights* that are aimed at creating a coherent framework for addressing evaluation. These are: (1) variability of goals; (2) variability of criteria and indicators; (3) leveraging of integration; (4) interaction of social and cognitive factors in collaboration; (5) management, leadership and coaching; (6) iteration in a comprehensive and transparent system; and (7)

41. For the purpose of this Guide a ‘discipline’ underlying a given research topic is considered to be a domain of research activity as delineated within the Research Classification Systems used by the organisation conducting the peer review. It is further understood that the research topic in question falls entirely or significantly within the scientific remit of the organisation.

effectiveness and impact⁴². This article also suggests that it is becoming increasingly important to critically examine the unquestioned assumptions about three underlying concepts of *discipline*, *peer* and *measurement* in the context of pluridisciplinary evaluation.

Defining effective and fit-for-purpose approaches of peer review applicable to multi-, inter-, cross- and trans-disciplinary (MICT) proposals is the subject of this section. Despite some apparent misalignments of scholarly and disciplinary outlooks on pluridisciplinary research (for example, going across the health sciences, to engineering, to arts and humanities), it is hoped that the scheme proposed in this section will create a baseline point of reference including a set of general recommendations for dealing with these variants in a consistent manner. Indeed, if the idea is to promote research collaboration across geographical and disciplinary borders, a common point of reference would be of real value in reconciling or at least in contextualising the different perspectives.

In these approaches the standard peer review models described in previous sections must be sharpened and calibrated, while the interactions among the different disciplinary approaches and perspectives are carefully considered. Before further details can be provided on the format or requirement of the various peer review processes suitable to each type, it is necessary to revisit commonly adopted definitions in order to explore both shared and distinctive features of these groups so that a minimum number of peer review procedures can be conceived. That is, to define how many different peer review methods should be implemented in order to cover the full spectrum as defined by the four categories when dealing with selection and funding of pluridisciplinary research proposals.

Table 5 illustrates the interaction of disciplines that give rise to MICT-type research topics⁴³. The boundaries separating some of the four categories from each other may be subject to interpretation when it comes to applying this scheme to real examples. Hence some of the examples provided in the table may be categorised differently.

For the purpose of calibrating an appropriate peer review process for MICT proposals, it will be useful to consider the following three preliminary key criteria/questions and adapt the procedures accordingly:

42. See Klein (2008), pp. 117–118.

43. Definitions and corresponding diagrams used in this table are based on Vanegas (2009).

Multidisciplinarity

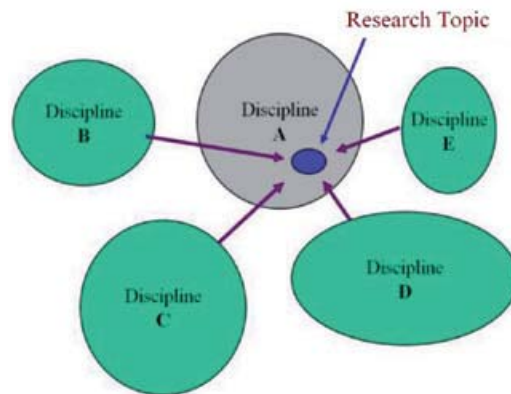
is concerned with the study of a research topic within one discipline, with support from other disciplines, bringing together multiple dimensions, but always in the service of the driving discipline. Disciplinary elements retain their original identity. It fosters wider knowledge, information and methods.

Examples

Research Topic: Discovery of a particular drug

Host discipline: Pharmacology

Complementing disciplines: Biochemistry, Chemistry, Medicine.

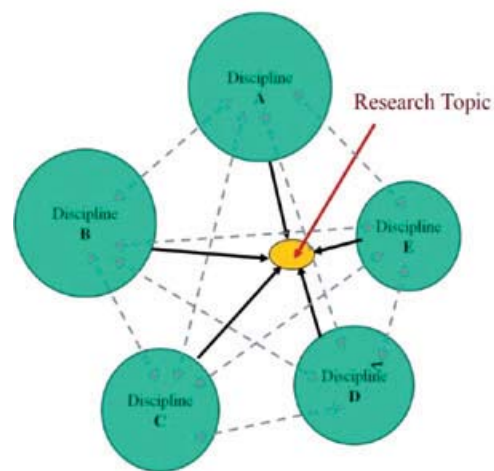
**Interdisciplinarity**

is concerned with the study of a research topic within multiple disciplines, and with the transfer of methods from one discipline to another. The research topic integrates different disciplinary approaches and methods.

Example

Research Topic: Robotics

Host versus complementing disciplines: this has changed over the years and with the expansion of the field, there could be different host(s) and complementing disciplines from Mechanical, Electrical and Computer engineering, Mathematics, Informatics and Computer Science, Neuroscience or Psychology.

**Crossdisciplinarity**

is concerned with the study of a research topic at the intersection of multiple disciplines, and with the commonalities among the disciplines involved.

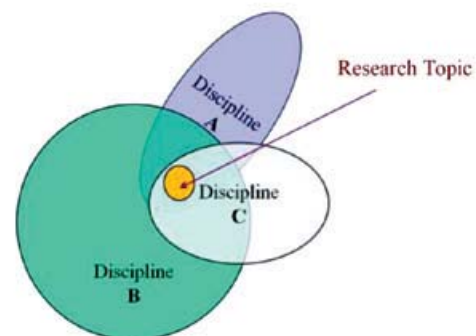
Example

Research Topic: Biologically Inspired Engineering

Host disciplines: Engineering, Material science

Complementing disciplines: Biology, Zoology

Interactions are very strong with commonalities in the way biological systems and engineering counterparts are viewed.

**Transdisciplinarity**

is concerned at once with what is between, across and beyond all the disciplines with the goal of understanding the present world under an imperative of unity of knowledge.

Examples

Research Topic: Synthetic Biology, Cognition, Artificial Intelligence

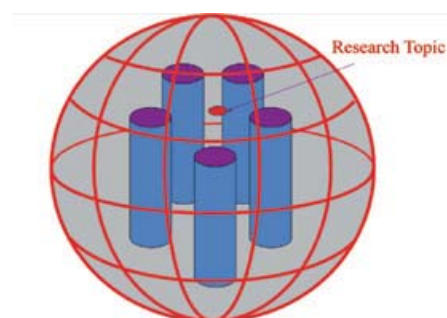


Table 5. MICT definitions and examples

Key Criterion 1:

Whether or not – for the purpose of peer review – the research proposal being considered is genuinely one of the MICT type; is it possible to identify one single discipline that could encompass the whole of the proposed ideas in the proposal and therefore be treated as monodisciplinary? That is, whether the extent of the required interests and engagements from the different disciplines being touched upon by the proposal would really call for an explicitly tailored pluridisciplinary peer review approach or should a ‘standard’ monodisciplinary approach suffice or even be more appropriate?

Key Criterion 2:

For a proposal recognised to be genuinely of pluridisciplinary character, how and to what extent the various scientific perspectives and judgments from the various disciplines involved should be considered, prioritised and integrated in order to arrive at a fully informed and coherent decision on the merits of the proposed ideas in expanding the disciplinary boundaries and making impact (for example, in creating new knowledge, innovation, new applications, new paradigms, or even new disciplines).

Key Criterion 3:

For a given pluridisciplinary proposal having real and strong links to more than one discipline, is it possible to identify a subset of these disciplines (ideally one) that could be described as *central* to the scope of the proposal with the other disciplines being *complementary*, *enabling* or *supporting*? That is, is it possible to predict, with an acceptable degree of certainty, that the expected results will touch one (or two) discipline(s) more directly and strongly than the other disciplines implicated?

Addressing these three criteria effectively can pose a challenge to science managers and officers who may not cover the required levels of scientific depth and breadth on all disciplines involved. However, to do justice in valuing MICT-type research it is necessary to provide all the required scientific/expert perspectives and judgments while minimising the risks of unduly penalising the MICT proposals by excessive assessments and inflated scrutiny. It is therefore crucial to consider the above-mentioned criteria even if that means seeking the required expert advice from dedicated or *ad hoc* boards or committees at an earlier stage of the process.

4.12.1 Categorisation of Peer Review Practices

As a first categorisation of the peer review practices suitable for pluridisciplinary research, it is beneficial to divide the funding instruments into two main groups:

1. Instruments that are exclusively designed to fund research that is of MICT type;
2. Instruments that are not exclusively designed to fund MICT-type research but encourage this alongside monodisciplinary proposals.

I. Instruments that are exclusively designed to fund research that is of MICT type

For these instruments, the preparatory phase should include explicit attention to promoting the opportunity, its aims and objectives across the appropriate communities. Information about the specific peer review process should also be disseminated.

As mentioned previously, the first and foremost step in the peer review process that is appropriate to genuinely pluridisciplinary research is the ability to identify the nature and levels of interactions required or expected from the various existing or possibly emerging disciplines. As the first step, proposals should be *screened* by a group of scientific staff with the required level of expertise. The result may be that some proposals are identified as monodisciplinary and are therefore rejected. Those proposals found to be of genuine MICT character will then be *categorised* according to their nature and with the goal of *selecting* one of the scenarios described below in §4.12.2 and the related recommendations on *peer review implementation*.

II. Instruments that are not exclusively designed to fund MICT-type research but encourage it alongside monodisciplinary proposals

For these instruments, although not explicitly designed, it is quite possible that MICT types of proposals are submitted along with monodisciplinary ones. To do justice to these proposals, the process should have the means of identifying them as such and ideally channelling them through the specific and tailored processes as described for Category I above.

Figure 10 summarises the flow of the peer review steps for the two main instruments designed for pluridisciplinary research:

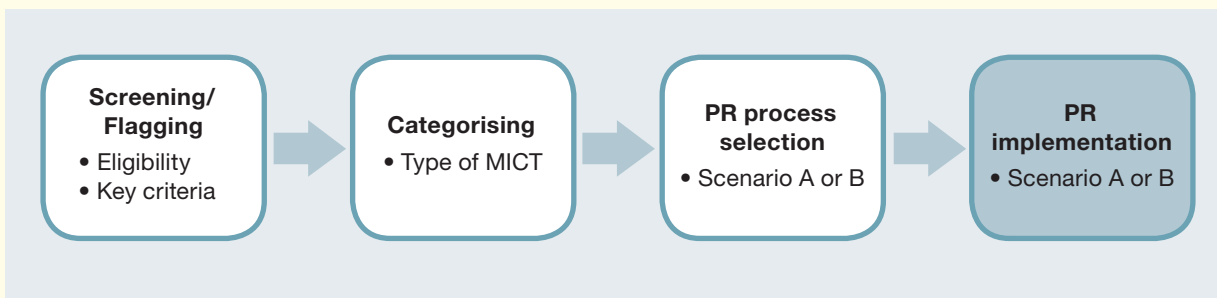


Figure 10. Schematic description of the peer review process for Category I and II

RECOMMENDATIONS

- Whether or not a programme is exclusively designed for pluridisciplinary research, it is recommended to devote the necessary time, expertise and attention at an early stage of filtering or eligibility screening such that proposals that are genuinely of MICT type can be identified and undergo the most appropriate peer review process according to their disciplinary characters.
- For any instrument (whether or not explicitly devoted to pluridisciplinary research), it is recommended to have proposals that are found to be genuinely of MICT character peer reviewed in a two-stage or three-stage evaluation process using individual expert assessments followed by appropriate review panel deliberations and decisions.
- • • •

4.12.2 Peer Review scenarios for pluridisciplinary proposals

It appears that for the purpose of peer review and to cover the full spectrum of pluridisciplinary research, it is sufficient to consider at most three scenarios: A, B and C as outlined below.

The first two (A and B) are actually very similar and could effectively be regarded as one approach with slight differences in conducting the individual assessments and review panel ranking. All dedicated peer review processes for MICT proposals must include the opportunity for the applicants to exercise the right to reply to the remote assessments before the review panel meeting. Therefore all three assessments suggested below should include a step to collect feedback from the applicants.

Scenario A

For most multidisciplinary proposals (as defined in this Guide), a *central* or a *host* discipline may be *clearly identifiable* as being the main *driver* of the research objectives. In these cases the engage-

ment of the other disciplines is seen as *supporting* or *complementary*. Within this scenario the resulting scientific discoveries, innovations, new knowledge or breakthroughs are expected to occur predominantly within the host discipline, facilitated by the support from the other disciplines; for example, development of new applications within the host discipline for concepts, methods, devices and systems that are primarily conceived within the complementing disciplines.

A suggested approach for Peer Review Implementation in Scenario A

For this scenario a two-stage process of individual assessments followed by panel reviews is recommended. The following features are suggested:

- *Stage 1: Individual assessments.* For this stage, one of the following two options may be considered:
 - a) Matching of reviewers' profiles with research topics: if available, a sufficient number of experts (minimum of three) with appropriate depth and breadth of expertise to assess all the crossdisciplinary merits stemming from the interactions between the host and all the complementing disciplines. In this option, topical keyword matching may be used to identify the required profiles instead of matching of disciplines and profiles.
 - b) Matching of reviewers' profiles with disciplines: include at least three individual referees from the host discipline plus one expert reviewer from each of the complementary disciplines. For this option, slightly different assessment criteria may be considered for the two groups of individual reviewers (from the host versus complementary disciplines) in order to sharpen the respective evaluations seen from the various disciplinary vantage points.
- *Stage 2: Panel assessment.* One review panel should synergise all the information and decide on ranking, prioritisation and the final decision. The membership of the panel will be from the host

discipline and should include members with the relevant crossdisciplinary profiles.

RECOMMENDATION

Care should be taken in putting in the right context the assessments from the host and the complementing reviewers, especially when having large numbers of assessments, such that the chances of unduly penalising the proposals is minimised.

• • •

Scenario B

It may happen that for many of the MICT-type proposals as defined in this Guide, one *host* discipline may be *identifiable* as being the main *driver* for the formulation of the research objectives. However, the linkages or triggers from other disciplines in motivating the scope of the proposal are strong enough such that cross-fertilisations, innovations and new applications are probable and expected not only in the host discipline, but also to varying degrees within the other disciplines. The expected cross-fertilisation in this scenario goes beyond finding new applications in the host discipline for concepts, methods, devices and systems that are primarily conceived within one of the other disciplines.

A suggested approach for Peer Review

Implementation in Scenario B

The same general peer review approach described for Scenario A may be used for cases falling within Scenario B with the following features needing particular attention:

- *Stage 1: Individual assessments.* To account for stronger synergy and interactions that may be present between the host and any of the complementing disciplines, and in case it is not possible to use A.I.a (*i.e.*, matching of required research profiles to topics), it will be important to incorporate more than one assessment from the complementing discipline having strong interactions (*i.e.*, in applying A.I.b).
- *Stage 2: Review panel.* Similar to the first scenario, one review panel should synergise all the information and decide on ranking, prioritisation or the final decision. However, in this scenario, although the panel membership should be predominantly from the host discipline, it is recommended to include experts from the complementing disciplines with strong relevance and expectations.

Scenario C

In contrast to the two groups above, when dealing with some of the MICT-type and the majority of transdisciplinary proposals, it may not be possible to identify only one host discipline. In these cases, it is necessary to engage all the driving disciplinary perspectives to the same level and in the same manner within the peer review process. In this scenario the need for strong integration is present and cross-fertilisation across disciplines is expected. Successful transdisciplinary research can lead to the creation of new paradigms or disciplines.

A suggested approach for Peer Review

Implementation in Scenario C

For this scenario a three-stage process of individual assessments followed by two levels of review panel discussions may be considered. The following features are worth mentioning:

- a) Enough experts (ideally three) from each of the *host* disciplines are needed. Efforts are to be made in identifying reviewers who are familiar with pluridisciplinary research, ideally on the same topics but if not possible on closely related topics;
- b) One individual/remote reviewer from each of the complementary disciplines is also needed;
- c) Reviewers from all host disciplines use the same assessment criteria while those from the complementing disciplines use a slightly different set of criteria;
- d) Applicants are given the opportunity to reply to the remote assessments as part of the information to be considered by the review panel meeting;
- e) One review panel for each host discipline is assembled to synergise individual assessments coming from that discipline plus the ones from the complementing discipline;
- f) As the final stage of peer review, a consolidating panel will decide on the proposal based on the recommendations of the single disciplinary panels. The members of the consolidating panel could be either completely independent or representatives of the disciplinary panels.

The three suggested peer review scenarios and related specificities are summarised in Table 6 below.

| | Multidisciplinary | Interdisciplinary | Crossdisciplinary | Transdisciplinary |
|---------------------------------|---|---|--|-------------------|
| | Scenario A | Scenario B | Scenario C | |
| Main features | <ul style="list-style-type: none"> • Clear distinction between the relevance of ONE driver or host discipline with other complementing disciplines • Scope of the research motivated in host discipline • Expected results will occur in host discipline • New applications within the host discipline for concepts, methods, devices and systems that are primarily conceived within the complementing disciplines | <ul style="list-style-type: none"> • Distinction between the relevance of ONE host discipline and other complementing disciplines • Scope of the research motivated in host discipline but triggered by or strongly linked to other complementing disciplines • Cross-fertilisation expected in host and some of the strongly complementing disciplines • Results go beyond finding new applications in the host discipline | <ul style="list-style-type: none"> • Similar degree of relevance and connection to all implicated (host) disciplines • Scope of the research motivated collectively by all host disciplines • Strong need for integration of disciplinary perspectives and approaches • Cross-fertilisation expected across host disciplines • May lead to new paradigms or new disciplines | |
| Peer review stages | <ul style="list-style-type: none"> • Two-stage: individual assessments plus one review panel with rebuttal | <ul style="list-style-type: none"> • Two-stage: individual assessments plus one review panel with rebuttal | <ul style="list-style-type: none"> • Three-stage: individual assessments in each host discipline plus two review panels with rebuttal | |
| Individual assessment reviewers | <ul style="list-style-type: none"> • Three from the host discipline + one from each of the complementing disciplines, or • at least three experts covering all the topical expertise (keyword matching) | <ul style="list-style-type: none"> • Sufficient number of experts (at least three) with the required levels of topical expertise (keyword matching), or • three from the host discipline + two from the strongly complementing discipline + one from other disciplines | <ul style="list-style-type: none"> • Three from each of the host disciplines • One from each of the complementing disciplines | |
| Review panel | <ul style="list-style-type: none"> • One panel with members from host discipline will make final peer review decision | <ul style="list-style-type: none"> • One panel with members from host discipline and from strongly complementing disciplines will make final peer review decision | <ul style="list-style-type: none"> • One panel for each host discipline with members from that discipline making a preliminary disciplinary judgment • A second consolidating panel will synergise all the information and make a final decision • Some or all members of the consolidating panel may be representatives from the disciplinary review panels | |

Table 6. Summary of the suggested peer review scenarios

4.13 Programmes explicitly designed for breakthrough research

A comprehensive review of the topic of ‘breakthrough’ or ‘high-risk/high-gain’ research has been conducted at the Academy of Finland providing both international and national contexts⁴⁴. The key difference between interdisciplinary and breakthrough research is that “whereas interdisciplinary research should set out its strategic challenges and commitments in advance, breakthrough research should remain open in this respect”.

Breakthrough research may result from all fields of science with potential for profound scientific or societal consequences and transformations, for example: fully understanding and developing treatments for life-threatening diseases such as cancer, or genetic disorders in life sciences and medicine; answers to some of the fundamental questions in physics and cosmology; consciousness, cognition and evolutionary psychology in social sciences and humanities.

As noted in §2.2.4, the survey’s results show that there are not many programmes explicitly designed for breakthrough research in Europe. Some organisations regard their standard instruments as being targeted to breakthrough research by default. The comments received in response to this question point to a clear need to establish common approaches or raise awareness on the complex relationship between breakthrough research and appropriate peer review. Several organisations that currently do not have a dedicated instrument have commented that they would be considering these in the future.

The main intent of this section is therefore to help raise awareness on the issues and the available approaches. Hence, it seems necessary first to provide some of the main features that separate breakthrough research as a dedicated instrument from normal means of dealing with innovative and original research ideas that are proposed through standard instruments. One main problem with the promotion of breakthrough research using conventional instruments is that the latter are often conservative when dealing with exploratory or adventurous ideas.

Breakthrough research is original, novel, ambitious, innovative, unique, at the forefront, and aims to radically change the understanding of an existing scientific concept, or lead to the creation or chang-

ing of paradigms or fields of science. It is bold in adventuring into the borders of current understanding and states-of-the-art. This is in contrast with original and innovative research proposals that normally lead to *incremental* results and are submitted through standard ‘mainstream’ instruments. Because of their adventurous character, there is an inherent level of risk associated with breakthrough ideas that is generally higher than would normally be expected in mainstream instruments. Therefore, breakthrough research is also referred to as high-risk/high-return.

It should be underlined that breakthrough research is desirable not because it is risky but because of its scientific potential for major advancements and transformations. However, due to the uncertainties and risks in taking on ‘adventurous’ ideas, it is necessary to balance through appropriate peer review systems the potential for gains versus the risks for failure and therefore loss of investments. In fact, this balancing act is a central challenge when designing a peer review process dedicated to breakthrough research and thus forms the basis of the elaborations in this section.

4.13.1 Peer review process for breakthrough research

In the context of peer review and selection of breakthrough research ideas, it seems appropriate to pay more attention first to the means of effectively measuring the potential for breakthroughs, impacts and long-term advancements rather than to effectively determining the levels of associated risks as a filter. Once ‘good’ ideas are identified with an acceptable degree of confidence, associated risks can then be considered and traded off against the potential gains.

It is therefore clear that instruments dedicated to promoting breakthrough research in the sense mentioned above stand out separately from the instruments that are in place to promote or maintain a national research base for the overall advancement of science, education and technology. Thus, to be able to truly promote and identify breakthrough ideas, it appears more appropriate to design dedicated instruments with specialised peer review procedures. If the right amount of attention and structure are not provided, it is quite possible to miss the target by creating yet another *de facto* ‘standard’ instrument.

Using the aforementioned interplay between the potential gains versus the risk, and the loss of investment, the following two different scenarios can be considered:

44. See Häyrynen (2007), p. 22; Danish Agency for Science Technology and Innovation (2009); and NordForsk NORIA-net (2010)

1. Breakthrough research funded by one-stage grants

Some of the main features of the peer review process suited for this suggested scheme are:

- The grants are full-size and are awarded to successful proposals in order to develop their suggested research from beginning to end;
- The amount of funding for each grant can therefore be significant considering the risky nature of the proposals;
- Because of the ‘higher-than-normal’ levels of risk in achieving the stated objectives of the proposals, it is necessary to pay equal or more attention to effectively determining the levels of risks while measuring the potential for impact and transformation or innovation, etc.;
- The peer review process appropriate to this scheme may thus entail a two-stage proposal submission (*e.g.*, outline followed by full proposals) and a two-stage assessment through individual reviewers (minimum of three) plus a dedicated and authoritative committee or review panel capable of identifying ideas with reasonable potential for breakthroughs;
- Because of the potentially high stakes under this scheme, care should be taken in maintaining the required levels of ambitiousness and risk-taking for both individual assessments and especially for the review panel consensus making.

2. Breakthrough research funded by two-stage grants

In contrast to the one-stage grants, and because of the elevated levels of risk, the two-stage grant schemes would first aim at providing smaller-size funding of selected breakthrough ideas (*e.g.*, as *seed projects*) followed by full-size development grants given to thriving and promising seed projects.

In this format, risk-taking or adventurous peer review can be promoted while maintaining potential loss of investments under better anticipation and control.

Some of the main features of the peer review process suited for this suggested scheme are:

- First, a responsive-type opportunity to promote and select breakthrough ideas based on short outline proposals;
- Breakthrough ideas may be flagged by dedicated and experienced scientific staff with the required levels of disciplinary knowledge (who are also active in their respective fields) within the organisation, or dedicated review panels should conduct this first-stage selection;
- Seed grants given to successful applicants can then

be regarded as feasibility studies in order to demonstrate the real potential of the proposed ideas, and to characterise and propose ways of achieving the main results while analysing the associated risks for failure;

- Based on the progress made by the small grants at their target completions, applications are to be submitted for larger full-size grants suitable to conduct the entire envisaged research. Full proposal submissions can be applied to all seed projects or through invitations based on the recommendation of the dedicated review panel;
- A second-phase peer review should select among competing breakthrough proposals the ones with the highest merits, *i.e.*, higher scientific value and expected transformations; progress made within the seed projects; acceptable levels of risk for failure as demonstrated in the seed projects, etc. These are to be measured based on the initial small grant proposal and the reports illustrating the achievements and progress made therein. This would normally include:
 - At least three individual assessments covering all disciplinary perspectives, followed by
 - Dedicated and authoritative review panels to provide consensus, ranking or prioritisations.

Part II

Guidelines for Specific Funding Instruments

Introduction to Part II

Despite some particularities and nuances that differentiate the processes of peer review adopted across different programmes and their variants, the general logic, architecture and main building blocks remain the same for similar instruments. Part II of the Guide is meant to complement Part I by elaborating on these particularities.

Key characteristics and variations are elaborated in more detail in the following chapters, dedicated to specific instruments. These instantiations and elaborations of the generic models described in Part I are made based on the results of the survey on peer review practices, other available and relevant literature, as well as consultations with practitioners, principally the ESF Member Organisation Forum on Peer Review.

The survey on peer review practices, which was intended to map out the current landscape of peer review practices in Europe⁴⁵, highlighted some particularities inherent in peer review procedures and provided data mainly for three selected instruments: *Individual Research Programmes*, *Career Development Programmes* and *International Collaborative Research Programmes*. These instruments were regarded as most representative for the purpose of the study by the Member Organisation Forum on Peer Review. For the other programmes where valuable information has been provided but by fewer respondents (*i.e.*, *National Collaborative Research Programmes*, *Scientific Networks*, and *Centres of Excellence Programmes*) the results are included when appropriate. Hence, although the *ESF Survey Analysis Report on Peer Review Practices* contains data only for the three selected instruments mentioned above, it should be noted that in Chapter 7 of this Guide devoted to the *Creation and Enhancement of Scientific Networks*, some of the key observations emerging from the survey results are quoted.

As a result of these differences, and despite having made conscious efforts to maintain uniformity of the structure of Part II, the format of the chapters can vary to some extent. For example, some chapters make more substantial use of the survey results to support the suggested good practice while some others – having access to fewer data from the survey – have in turn relied more on the expertise of the MO

Forum on Peer Review and on consultation with members of the other ESF Member Organisation Fora.

In particular, Chapter 5, *Individual Research Programmes and Career Development Programmes*, and Chapter 9, *New Research Infrastructures Programmes*, have been presented for comments and contribution to the forum's observing members from the European Commission, the European Research Council and to key members from the ESF MO Fora on Career Development and on Research Infrastructures.

45. 30 research funding and performing organisations from 23 European countries, one from the USA, and some supranational European organisations participated in the survey. The ESF Survey Analysis Report on Peer Review Practices is available at: <http://www.esf.org/activities/mo-fora/peer-review.html>

5.

Individual Research Programmes and Career Development Programmes



5.1 Purpose and scope

Although very different in scope and objectives, *Individual Research Programmes* and *Career Development Programmes* share commonalities in their implementation and their required peer review steps. Hence, the detailed process description for adopted good practices on peer review is described for both instruments in this chapter.

Individual Research Programmes are intended to finance research projects enabling individual researchers to pursue their ideas and projects. Collaboration and networking are often not explicitly promoted and covered by *Individual Research Programmes*. Under these programmes, each grant is awarded to one research team with one budget line and one set of work-plan and research objectives.

Career Development Programmes are intended to support career progression of researchers and scholars and to recognise their achievements.

The main purpose of *Individual Research Programmes*, whether thematic or non-thematic, is to support scientific research. Therefore, the main focus of these programmes is on the *research* being proposed. This is in contrast with the *Career Development Programmes* in which the main focus is on the *proposers* of the research and on supporting or recognising their career progression and achieve-

ments through awards, fellowships, appointments, professorships, Chairs, etc.^{46,47}.

Breakthrough research applications may be supported in particular for *Individual Research Programmes* where the speculative, experimental or exploratory nature of the work means that results or outcomes are uncertain or cannot be guaranteed, *i.e.*, a significant degree of risk is present in achieving the anticipated breakthroughs (see Section 4.10 of this Guide for the peer review features that need to be considered). Furthermore, some types of more advanced Career Development grants could also contain higher levels of risks. As an example, academy professorships in Estonia are granted according to the past achievements of the applicants while providing them with great flexibility on how to use their grants in conducting their research.

There is a significant degree of variation in the aims, target groups, length of funding, etc. across the various *Career Development Programmes*, including, for example, awards that are given in recognition of outstanding contributions to a particular research field either with or without a bursary (*e.g.*, EMBO Gold Medal, valued at 10,000 €⁴⁸); awards which also provide substantial funding for research (*e.g.*, NWO Spinoza Prize, providing up to 2.5 M€⁴⁹); first postdoctoral research fellowships and professorships for two or more years. Furthermore, there are

46. Scholarship is a form of financial aid awarded to students to further their education and training. Fellowship is a stipend, or a financial endowment, to support graduate students and, most often, postdoctoral candidates in completing or enhancing their academic careers (teaching or research).

47. The definitions of the career steps are very heterogeneous. A first attempt to develop taxonomy (and a common terminology) for research career can be found in: European Science Foundation (2009) *Research Careers in Europe. Landscape and Horizons*.

48. <http://www.embo.org/aboutembo/embo-gold-medal.html>

49. http://www.nwo.nl/nwohome.nsf/pages/NWOP_5VNCW6_Eng

other programmes which combine elements from both *Individual Research* and *Career Development Programmes*; examples include the DFG's Emmy Noether Programme, the SFI's Starting Investigator Research Grant (SIRG) and the SNF's Ambizione Programme, to name but a few from across Europe's national funding agencies.

Such programmes may aim to support researchers who are at the stage of starting or consolidating their own independent career with additional aims such as promoting the incoming or outgoing mobility of researchers. As a distinct example in the European Commission's 'Marie Curie Actions', mobility is a fundamental aspect of the programme. This chapter does not attempt to provide a comprehensive overview of all these types of programmes, but rather to provide general guidelines on the peer review process involved, while touching on some aspects specific to career development.

The progression of research careers differs significantly between national systems and even across disciplines and, as pointed out in footnote 47, the terms normally used to define the different career steps are extremely heterogeneous. Therefore, the nature and scope of the funding programmes can vary according to the location of funding organisation or to their specific programmes. For example, the European Research Council (ERC) uses the terms 'starting grants' and 'advanced grants'; the first grant addresses researchers with 2 to 12 years of experience after their PhD, and the second is meant for research leaders with at least 10 years of experience and significant research achievements.⁵⁰ There are other similar distinctions used by other organisations when referring to the two foregoing broad categories of career development regimes, e.g., young (or early career) researchers and advanced (well-established) researchers.

The *ESF Member Organisation Forum on Research Careers* has proposed a four-stage scheme for grouping European research careers, based on a mapping survey of research career structure in Europe. These are: Stage I – Doctoral training; Stage II – Postdoctoral fellowships; Stage III – Independent research; Stage IV – Established research. In some countries Stages II and III are combined⁵¹.

For the purpose of this chapter, the following four categories with the related specific features that may have an impact on peer review are considered:

50. See <http://erc.europa.eu/index.cfm?fuseaction=page.display&ctopicID=498>

51. European Science Foundation (2009), *Research Careers in Europe. Landscape and Horizons*, p. 9 and pp. 16-28.

1. Doctoral Training Grants (DTG)

Doctoral training is the third cycle of the Bologna Process⁵², but the specific titles and durations vary throughout Europe and could also depend on the disciplines.

DTG are commonly intended for qualifying doctoral students and to facilitate advanced academic training and conducting research. These grants are normally funded by government (national and regional), universities or foundations, and they can be embedded in large funding schemes or *ad hoc* university grants⁵³. A single grant is awarded to a doctoral student, offered for three or four years depending upon the nature of the project and/or research training needs. The grant usually covers academic fees, annual living allowances and additional funds for fieldwork and travel.

The peer review is usually carried out by internal committees evaluating full applications (in particular in the case of university grants) or by panels and individual/remote reviewers or boards of trustees, including international reviewers and representatives of the funding organisation (usually directors and faculty members).

2. Postdoctoral Fellowships and Grants

Postdoctoral (Training) Fellowships provide to researchers who have completed their doctorate degree a vehicle for further training in basic or applied research either in their own country or elsewhere. The postdoctoral fellows are normally given the opportunity to work on research projects with certain degree of autonomy but under overall supervision of a designated adviser. These awards may not be offered beyond five to eight years after the completion of the relevant doctorate degree. The grants are offered to candidates of outstanding ability who wish to make research a significant component of their career.

The peer review is usually carried out by *ad hoc* internal committees evaluating full applications and/or by panels or individual/remote reviewers. In many organisations eligible applications are selected for an interview. For example, for the *EMBO Long-Term Fellowships*, which are awarded for a period of up to two years and support postdoctoral research visits to laboratories throughout Europe and the world, the peer review is organised according to the following steps⁵⁴:

52. See the related documents available at: <http://www.ond.vlaanderen.be/hogeronderwijs/bologna/>

53. See, e.g., the *EU Marie Curie Network* or the DTGs scheme in UK.

54. See <http://www.embo.org/programmes/fellowships/long-term.html>

- a) **Eligibility check:** The applications are examined at the EMBO Fellowship office for completeness and other eligibility criteria;
- b) **Pre-screening:** A Fellowships Committee conducts pre-screening of all eligible applications;
- c) **Interview with experts:** An individual expert in the area of the application may be assigned to conduct an interview with the selected applicant;
- d) **Overall assessment of the application:** All dossiers are considered by an *International Selection Committee* of EMBO Members. Each application is scored independently and the scores forwarded for compilation to the Fellowship office;
- e) **Consensus meeting:** The *Selection Committee* convenes to examine and discuss all the applications and their scores in order to make a final selection.

3. Grants for the creation of Independent Research Groups

These very competitive and prestigious grants are meant for emerging research leaders with great potential who aim to create or consolidate an independent research team. Grants are usually offered to finance outstanding young scientists, in the initial period of their independent careers, in a position to formulate and carry out innovative and fertile research projects^{55,56}.

The peer review is usually carried out in the following main stages⁵⁷:

- a) **Remote assessments:** These are conducted by individual reviewers who could also be members of the review panel;
- b) **Panel review:** Members of the review panel convene to discuss applications and make a selection for the next step;
- c) **Interviews:** Depending on the programme, there may an interview required in which some or all members of the panel will meet and interview the applicants;
- d) **Final decision:** This is usually taken by an *ad hoc* programme committee.

55. See http://www.hfsp.org/how/PDFs/LI_Guidelines_2011.pdf

56. See ERC Starting Independent Researcher Grants (ERC Starting Grants): <http://erc.europa.eu/index.cfm?fuseaction=page.display&topicID=65>

57. See, for example, the *European Young Investigator Awards* (EURYI) scheme designed by the European Heads of Research Councils (EUROHORCS) and the European Science Foundation to attract outstanding young scientists to create their own research teams at European research centres: <http://www.esf.org/activities/euryi.html>

For some organisations⁵⁸ the submission stage includes first a letter of intent based on which a pre-selection is made and a number of applicants are invited to submit full applications (*i.e.*, *Young Investigator Grants* for the Human Frontier Science Programme). For other funding programmes, such as, for example, the *EMBO Young Investigators programme*⁵⁹ supporting young researchers in the start-up of their first independent research laboratories, the eligible applications are sent to a Selection Committee for pre-screening and then candidates are invited for interview by an EMBO Member expert in their area of research. The subsequent steps of the selection follow a similar approach as those described above under EMBO's Long-Term Fellowships.

Interdisciplinary consideration: Under the schemes described above, interdisciplinary applications are usually considered by two or more panels as appropriate.

4. Advanced career grants

These are prestigious grants meant to support outstanding independent leaders to conduct risk-taking, interdisciplinary and frontier research. Candidates must have a distinguished scientific or research track-record and profile. The European Research Council, for example, has a dedicated funding scheme, the *ERC Advanced Investigator Grant*⁶⁰ supporting scientists for up to five years.

The peer review procedure of this funding scheme is based on a single-stage submission and a two-step evaluation and selection assessing both the Principal Investigator and the research being proposed. The process outlined below is used for peer review and selection of the *ERC Advanced Investigator Grants* Scheme which does not include interviewing the applicants as a step in peer review and selection. However variations may exist in the application and selection process used for national grant schemes with comparable purpose and scope⁶¹:

- a) **Eligibility:** This is conducted by the Executive Agency of the ERC (ERCEA);
- b) **Remote assessments:** In addition to the members of the review panel, this stage is conducted by external expert referees;

58. See http://www.hfsp.org/how/appl_forms_RG.php

59. See <http://www.embo.org/programmes/yip/programme.html>

60. See *ERC Grant Schemes Guide for Applicants for the Advanced Grant 2011 Call*, 11/11/2010, pp 3-5: <http://erc.europa.eu/index.cfm?fuseaction=page.display&topicID=66>

61. For example, interviewing all or possibly a short-listed group of applicants is part of the selection process for the *vici-stage* (the highest stage grant) in the NWO Career Development Scheme. A two stage submission is used for this grant, *i.e.*, pre-proposals followed by detailed applications submitted by a selected group. See: http://www.nwo.nl/nwohome.nsf/pages/nwop_sttcva_eng

- c) **Review Panel deliberations and selection:** The panels comprising 10-15 members in each disciplinary domain will convene to discuss the applications and the remote assessments;
- d) **Consolidation meeting:** Final meeting of the panel chairs to consolidate the results of the different panels.

Interdisciplinary consideration: The broad definition of the panels allows many interdisciplinary proposals to be treated within a single panel. Interdisciplinary proposals will be flagged as such, and the panel may request additional reviews by appropriate members of other panel(s) or additional remote referees. This funding scheme makes provision for a so-called ‘fourth domain’ where interdisciplinary proposals not funded within the individual panel budgets can be brought forward for further discussion by the panel chairs.

5. Mobility Grants

For more than 15 years the European Commission has offered research grants on the condition that the individual researchers involved must move from one country to another in order to carry out the research – the ‘Marie Curie Actions’. These grants, typically but not invariably for two years, are offered to researchers of all levels, from postgraduate upwards, through a variety of funding schemes, some aimed directly at individual researchers and some funding networks.

The actions are peer-reviewed according to the good practices outlined elsewhere in this document, with the additional consideration that the value of the mobility to the researcher’s career, and to the European Research Area, must be assessed. For this reason the international character of the expert panel mentioned above is not only desirable, but absolutely necessary for a rigorous process.

5.2 Recommended peer review approaches specific to Individual Research and Career Development proposals

In this section some of the specific features will be highlighted. Although there seems to be some degree of variability in the processes and the way these are applied across different programmes and different scientific domains, the procedures suggested below are meant to be applied across various domain and programmes.

5.2.1 Proposal submission

For both instruments, *Individual Research Programmes* and *Career Development Programmes*, applicants are generally required to submit a full proposal, rather than a letter of intent or outline proposal followed by selection and invitation to submit a full proposal.

5.2.2 Peer review stages

The most common peer review process adopted in European organisations for both of these instruments is based on a *two-stage process*. This includes assessments by three individual/remote reviewers (see §4.4.2) followed by a prioritisation or ranking done by a dedicated review panel or a committee. The peer review process is ended by a final funding decision often carried out at the organisation level.

For both instruments, applicants are generally required to submit a full proposal, rather than a letter of intent or outline proposal followed by selection and invitation to submit a full proposal. The latter practice tends to be more common for Collaborative Research Programmes.

For larger and more competitive grants, it may be a common step to include interviews or a presentation by the applicants as part of the peer review process, while for smaller programmes this step may not be necessary.

The following elements can complement the peer review process:

- **Review Panel**

As explained above, for a two-stage evaluation there are two groups of experts: individual/remote reviewers and review panel members. One common practice is to have a clear distinction between the two groups.

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According to the *ESF Survey Analysis Report on Peer Review Practices*, 15 out of 22 organisations indicated that their process included a review panel

for their Individual Research Programmes while for Career Development Programmes this was 11 out of 19 organisations. For both types of instruments, the size of the review panel depended on factors such as the number and length of the proposals submitted and the grant durations and amounts.

- **Reader System** (see §4.5) is not routine across the two programmes but can be used for specific cases such as short-term fellowships or small-scale grants.

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Results from the *ESF Survey Analysis Report on Peer Review Practices* showed that 4 out of 27 respondents use it for Individual Research Programmes while, similarly, 3 out of 25 respondents use it for Career Development Programmes⁶².

- **Right to Reply:**

Applicants are provided the right to comment on individual/remote reviewers' reports, before the review panel or committee makes a selection, prioritisation or ranking of proposals (see §4.7.4).

For calls that are continuously open or have fixed collection dates during the year, instead of a right to reply, the applicant can submit the proposal again, taking the individual/remote reviewers' and panel reports into consideration.

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According to the *ESF Survey Analysis Report on Peer Review Practices*, from 30 respondents, 16 organisations do not use the right to reply for any of their instruments, 4 organisations use it across all their instruments and 10 organisations use it for some of their instruments. For Individual Research Programmes, 7 out of 27 respondents use the right to reply while for Career Development Programmes 7 out of 25 respondents use it. This is an element that can add robustness and reliability to the process⁶³.

- **The use of 'consensus', 'ranking', or prioritisation meetings between the individual reading and the review panel** (See §4.8.2).

5.2.3 Conflict of interest

According to survey results, in response to the question "How is a possible bias/conflict of interest identified on the side of the reviewers in this Instrument?" the following table illustrates the responses provided for Individual Research Programmes and Career Development Programmes respectively (see table).

5.2.4 Timelines

The timeline (from launch of the call until the final decision, including the final communication to the applicants) for both *Individual Research* and *Career Development Programmes* should be limited to a maximum of one year. Other timelines can be adapted depending on the nature and number of proposals submitted; the duration and amount of the grant; and whether the call is a regular or an exceptional⁶⁴ one.

5.3 Processing of applications

Depending on the number of proposals submitted, an organisation can opt to make a preliminary selection of proposals, which is commonly based on either an outline or full proposal. For larger *Individual Research Programmes*, applicants may submit the outline proposal first, followed by selection and invitation to submit a full proposal. It must be noted that such a process lengthens the timeline of the call. Another possibility is to ask the applicant to submit both an outline and full proposal at the same time. The preliminary selection, generally made by either individual/remote reviewers or review panel members, will then be based only on the outline proposal.

Submission of outline proposals is appropriate for the first stage of a call when there are a great many project proposals submitted, while full proposals are suitable in a second stage when a reduced number of applicants apply. In this way the quality of the evaluation process improves.

The practice of preliminary selection may appear to be less commonly used for Career Development Programmes because of the greater variability among those programmes, which can tend

62. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, §4.2.2, in particular Question 102, Table 4.5.

63. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 3.8, Questions 55 and 58, Tables 3.35 and 3.37.

64. As an example, 500 submissions for a four-year research grant may require longer timeline; while 100 submissions for a first postdoctoral fellowship of two years could be managed faster. Moreover, duration of the decision making process is important in postdoctoral grant programmes in that as a usual practice candidates just after receiving or while finishing a PhD, may submit proposals to several host organisation and, if the timeline is too long, optimal opportunities and matching may be lost.

| Individual Research Programmes | Individual/ Remote Reviewers | Panel Reviewers |
|--|---------------------------------|-----------------|
| Checked by the members of staff in the organisation. If there are conflicts, the potential reviewer is excluded | 64.0% 16/25 | 79.2% 19/26 |
| Reviewers are asked to check for potential conflicts themselves and possibly withdraw from the assessment | 92.0% 23/25 | 95.8% 23/26 |
| Reviewers have to sign a statement confirming that there are no conflicts of interest | 60.0% 15/25 | 75.0% 18/26 |
| Other | 4.0% 1/25 | – |
| There is no conflict of interest | 4.0% 1/25 | – |
| Career Development Programmes | Individual/ Remote Reviewers | Panel Reviewers |
| Checked by the members of staff in the organisation. If there are conflicts, the potential reviewer is excluded | 77.3% 17/22 | 71.4% 15/21 |
| Reviewers are asked to check for potential conflicts themselves and possibly withdraw from the assessment | 90.9% 20/22 | 95.2% 20/21 |
| Reviewers have to sign a statement confirming that there are no conflicts of interest | 59.1% 13/22 | 71.5% 15/21 |
| Other | – | – |
| There is no conflict of interest | – | – |

to be smaller in scale than Individual Research Programmes.

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According to the *ESF Survey Analysis Report on Peer Review Practices*, 36.8% of the responding organisations do a preliminary selection carried out by the organisation's scientific staff (50%) or by external reviewers based in institutions outside the organisation country (50%). The preliminary selection is based on a preliminary proposal for 85.7% of the respondents, and on a letter of intent for 14.1%. 78.9% proceeds without a preliminary selection; in this latter case the evaluation is based on full proposals for 42.9% of the organisations⁶⁵.

Applicants should be provided with clear and concise guidelines for submitting their proposal.

Depending on the aim and scope of the programme, either English or the organisation's national language can be used for the application and review process. However, if international individual/remote reviewers or review panel members

are to be selected, the language used should be English.

5.3.1 Eligibility criteria

The main criteria for the eligibility screening are those detailed in §4.3.1, in Part I of this Guide. In the case of Individual Research Programmes that are targeted at researchers starting or consolidating their independent research career, some additional eligibility criteria can be included (see below).

For some calls the Scientific Councils (or standing committees) can decide to consider scientific and other research results as eligibility criteria. So, for (potential) applicants, pre-filtering focused on scientific criteria is already done in a stage of eligibility screening. Hence funding schemes do provide a minimum threshold requirement on the scientific production of the applicants, normally in the form of number of publications over a five-year period prior to the time of the application.

The summary of the results of the survey on peer review practices on most used eligibility criteria applied to *Individual Research Programmes* is provided in the table below:

65. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 4.7, §4.7.2, Question 94, Table 4.19.

For *Career Development Programmes* the survey's results are the following:

| Eligibility Criteria: | Completeness of the application | General fit of the proposal with the Instrument's purpose | Timeliness of the submission | Institutional, regional, national affiliation of applicants | Other |
|-------------------------|---------------------------------|---|------------------------------|---|----------------|
| Total of 27 Respondents | 92.6% 25/27 | 70.4% 19/27 | 74.1% 20/27 | 66.7% 18/27 | 51.9% 14/27 |

For *Career Development Programmes*, and pertinent to the five categories mentioned before, the following specific eligibility criteria may also be considered in addition to the general items provided above:

| Eligibility Criteria: | Completeness of the application | General fit of the proposal with the Instrument's purpose | Timeliness of the submission | Institutional, regional, national affiliation of applicants | Other |
|-------------------------|---------------------------------|---|------------------------------|---|----------------|
| Total of 25 Respondents | 88.0% 22/25 | 84.0% 21/25 | 84.0% 21/25 | 56.0% 14/25 | 40.0% 10/25 |

1. Doctoral Training Grants

- Applicant's Career Stage:
 - Full-time graduate students pursuing a doctoral study (diploma equivalent to the minimum qualification needed to study for a doctorate in a given country),
 - Completed graduate coursework (usually for grants awarded by universities a certified list of the exams/courses taken at university, grades/marks awarded and (if applicable) the final degree result is required);
- Two or three letters of recommendation or the names of two or three academic referees.

2. Postdoctoral Fellowships and Grants

- Applicant's Career Stage:
 - Candidates are eligible after the successful completion of their PhD degree,
 - There is a wide-ranging upper limit for the eligibility condition in terms of the time after completion of the PhD degree of the applicants. This range generally varies from four to 10 years;
- Two letters from referees;
- Mobility: Candidates are often required (or encouraged) to conduct their postdoctoral training in universities and institutes other than those they graduate from;
- Appropriateness of the host institution.

3. Grants for the creation of Independent Research Groups

- Applicant's Career Stage:
 - Eligible during the two to 12 year period following the completion of their PhD (exceptions may

be made in some organisations for periods not spent in research – notably compulsory military service, parental leave).

4. Advanced career grants

- Applicant's Career Stage:
 - At least 10 years of significant research achievements (for example for the ERC Advanced Grant Scheme: three major research monographs of which at least one is translated into another language – especially for humanities and social science – 10 publications as senior author in major international peer-reviewed multidisciplinary scientific journals, and/or in the leading international peer-reviewed journals of their respective field⁶⁶).

5.3.2 Evaluation criteria

The general evaluation criteria that can be used in these programmes are described in §4.7.2 in Part I of this Guide.

Besides these, for Individual Research Projects particular attention should be devoted to:

- Independent thinking and leadership abilities of the applicant;
- The balance between the disciplines involved in the case of interdisciplinary proposals.

In the case of *Career Development Programmes* some different criteria can be applied according to the target category of the funding programme:

1. Doctoral Training Grants

66. See http://erc.europa.eu/pdf/Guide_for_Applicants_%20Advanced_Grants_2011.pdf pp. 11-12.

- The originality of the Ph.D. project;
- The feasibility (access to the resources, etc.) and the impact of its potential outcomes;
- Applicant's academic performance.

2. Postdoctoral Fellowships and Grants

- Scientific/technological quality and potential of the project;
- Training quality (relevance, capacity, complementary skills, etc.);
- Applicant (experience, publications, suitability to perform the project, etc.);
- Feasibility and implementation (access to infrastructure, management, practical arrangements);
- Impact (on career development).

3. Grants for the creation of Independent Research Groups

- Focus on person;
- Evidence of excellence (awards, achievements, publication record).

4. Advanced career grants

- Outstanding track record of research;
- Proven scholarly and scientific contributions;
- Scientific/research independence;
- Creativity and originality of proposed approaches;
- Unconventional methodologies and investigations.

5.4 Final selection and funding decisions

The final decision is normally taken by a committee or board within or on behalf of the organisation in charge of the programme. Usually the final decision is taken on the basis of a priority list proposed by a review panel and made on the basis of the external peer review recommendations (remote reviews), comments and arguments of applicants, and discussion during a panel session.

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According to the [ESF Survey Analysis Report on Peer Review Practices](#), in 40% of the responding organisations the final decision is taken by a Standing Scientific Committee composed of well-established researchers who in turn make their decision based on remote peer review recommendations. In 24% of the organisations the final funding decision is taken by the organisation's executive management that also decides on the basis of the external peer review recommendations⁶⁷.

67. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Question 91, Figure 4.1.

6.

Collaborative Research Programmes



6.1 Purpose and scope

Collaborative Research Programmes (CRPs) offer opportunities for groups of scientists, researchers and, if appropriate, other specialists from the public and private sectors to join forces in tackling problems that would require joint actions. They promote collaborative research targeting broader or more complex topics of research within or across scientific domains. In general, collaborative research projects are in fact larger in size and scope than typical individual research projects. They must involve several principal investigators and may sometimes comprise more than one individual project. Therefore, CRPs may include projects with more than one set of research goals, work plans or work packages as they may also include different budget lines integrated into a collaborative framework. Moreover, the CRPs are a particularly appropriate vehicle for supporting pluridisciplinary research.

There are variations that may influence specific aspects of the peer review process as elaborated below:

(i) Thematic or non-thematic calls

In the former, the themes or topics that are to be addressed by the project are defined in advance. The proposed research must therefore fall within the thematic or topical scope of the call, and the relevance of the proposal to the call can be an important measure in the peer review evaluation. In non-thematic calls, normally, a broad scientific field or domain of research activity is determined within which collaboration is to be promoted. The scope of the proposals can then vary substantially within that field.

(ii) National versus multinational

Whether a programme is national or international can significantly affect the nature of the required peer review process. The implications can span the whole life-cycle of the process from beginning to end. National programmes can be used to:

- Stimulate research within targeted areas with the goal of enhancing innovation capacities;
- Promote synergies;
- Maintain or enhance research and knowledge base within the country;
- Promote pluridisciplinary research.

Within a larger context, the above-mentioned targets can be defined for a group of countries. These can take the form of bilateral agreements or larger scale multilateral programmes.



According to the survey, from the 30 respondents, 19 organisations have reported that they have *International Collaborative Research Programmes* while only two indicated they (also) have *National Collaborative Research Programmes*⁶⁸.

(iii) Responsive (continuous calls) versus non-responsive (through solicited and time-bound calls)

Because of their nature, *it is usually preferable to consider non-responsive mode for managing collaborative programmes*, particularly for multinational collaborative programmes, since they require specific preparatory steps that need careful attention (*e.g.*, programmatic agreements, guidelines, dissemination needs, themes or domains of research, etc.).

68. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular §4.1.2, Table 4.1.

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The results of the survey show that for *International Collaborative Research Programmes* 31% (6/19) of the responding organisations have continuous calls (responsive mode) while 36% (7/19) have indicated that they issue these calls regularly at intervals of 12 months (for 57% of respondents or 4/7) and 24 months (for 42.9% or 3/7)⁶⁹.

6.2 Recommended peer review approaches specific to Collaborative Research proposals

In this section some of the specific features will be highlighted. Although there seems to be some degree of variability in the processes and the way these are applied across different scientific domains, the procedures suggested below are meant to apply across various domains.

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According to the survey, for *International Collaborative Research Programmes*, 13 respondents (out of 19) have indicated that in their organisations the procedures and their applications are the same across all scientific domains; while three organisations have indicated that for them the procedures differ only slightly; another three have reported substantial differences across different scientific fields⁷⁰.

6.2.1 Proposal submission

Calls may be organised on the basis of *one- or two-stage submissions*. A two-stage process may be most appropriate when a high volume of proposals is expected (and a relatively low success rate). This approach saves time and effort for applicants who are ultimately unsuccessful. Other factors to be considered are the increased total time to a final grant, and the greater administrative effort required of the funding body.

It is generally found that a two-stage approach is more appropriate for collaborative research.

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For *International Collaborative Research Programmes*, 7/19 (36.8%) of the responding organisations have reported that their peer review process contains a preliminary selection. Preliminary selection based on an outline proposal is indicated by the majority of these

69. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Chapter 2, Question 6, Table 2.3.

70. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 4.1, §4.1.2, Question 6, Table 4.2.

respondents at 85.7% (6/7); the preliminary selection is carried out both by external reviewers working outside the organisation's country (50% or 3/6) and by organisation's own scientific staff (50%)⁷¹.

In addition to the conventional and most used channels for the diffusion of the call and information on the programme, *National Collaborative Research Programmes* are mainly advertised in the national press and generally at a national level while international collaborative opportunities should be disseminated widely and using diverse means of communication to the appropriate targeted communities.

With regard to the language regime, it is common for proposals to be written in English. This is an important factor when proposals are submitted by multinational teams, and/or when the peer review will be carried out by international panels of experts. However, other national languages may be acceptable in the case of *National Collaborative Research Programmes*, or multilateral collaborations involving a shared common language.

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For *International Collaborative Research Programmes*, the survey shows that 78.9% (15/19) of the participants use English, while 16% (3/19) use the official language(s) in their own country⁷².

As described in Chapter 4 it is recommended good practice to provide detailed guidelines for applicants, describing the submission process, the rules of the game, and explaining the subsequent steps in the selection process.

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In *International Collaborative Research Programmes*, 14 out of 19 (73.7%) provide the applicants with detailed Guidelines⁷³.

6.2.2 Peer Review stages

A *two-stage evaluation process*, which includes individual/remote reviewers (at least three) and a panel assessment, is usually *most appropriate for collaborative research projects*.

71. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 4.7, Table 4.17.

72. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 4.2, Question 78: "Which language is commonly used in the application and review process for this instrument?", Table 4.11.

73. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular §4.2.2, Question 84: "Does your organisation provide the applicants with detailed guidelines (*i.e.* dedicated document) for writing the proposals for this instrument?" (Table 4.6).

Some variants can occur in the number and the typology of the reviewers as individual/remote (external) versus members of the review panel according to the type of proposals.

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From the 19 responding organisations for *International Collaborative Research Programmes*, 15 (or 79%) have indicated that they utilise such a two-stage evaluation. According to the results of the survey, 10/15 (or 67%) of the respondents for international collaboration schemes indicate that there is no overlap between the set of individual/remote reviewers and the members of the panel they employ⁷⁴.

• Individual/Remote Reviewers

- Conventional proposals: the number can typically vary between three and four; some organisations require at least two;
- Interdisciplinary proposals: can require a higher number of individual/remote reviewers;
- Breakthrough proposals: reviewers should be able to flag the transformative character of the proposed research;

••••

According to the survey, seven out of the 10 respondents (with fixed-duration calls for *International Collaborative Research Programmes* using individual/remote reviewers) assign as a minimum 1-10 proposals per individual/remote reviewers. For three of the 10 respondents there is no fixed range. For five respondents 1-10 is both the minimum and the maximum range while five organisations do not specify a range for maximum⁷⁵.

• Confidentiality

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16 out of 17 respondents in the survey have indicated that the identity of the individual/remote reviewers is kept confidential from the applicants. One organisation has indicated that the applicants themselves suggest the reviewers. All 17 organisations disclose the identity of the applicants to the individual/remote reviewers. 14 organisations do not disclose the identity of their individual/remote reviewers, two organisations always disclose this information and one does this only on demand⁷⁶.

74. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular §4.10.2, Question 99: “Please specify the composition of the review panel.” (Figure 4.7).

75. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular §4.12.2, Question 112.4: “How many proposals is every reviewer responsible for on average per call in this instrument?” (Figure 4.11).

76. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 4.13.

• Review panel

- Interdisciplinary proposals: The composition of the panel should comprise a core group of experts representing a wide range of disciplines to ensure the necessary disciplinary expertise in any given competition, including where possible individuals who themselves have an interdisciplinary outlook;
- Proposals per reviewers.

••••

According to the survey, five out of the 10 respondents with fixed-duration calls for *Collaborative Research Programmes* using review panels assign 1-10 proposals per reviewer as both minimum and maximum ranges. One organisation uses 11-20 as both the minimum and maximum ranges and the rest do not apply a fixed range⁷⁷.

• Reader system

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According to the survey, a reader system is rarely used for *International Collaborative Research Programmes* with only one out of the 19 using it⁷⁸.

• Right to reply

The inclusion of right to reply when applied as part of the peer review process will add to the robustness and quality of the selection process and should be considered whenever feasible.

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According to the survey, only 3/19 (or 15.8%) of the respondents include the right to reply (or rebuttal) as a component of the review procedure for *International Collaborative Research Programmes*⁷⁹.

6.2.3 Conflicts of Interest

Collaborative proposals often bring together large sections of the available scientific community in a particular field, and so can present particular difficulties when it comes to avoiding conflicts of interest. If the proposal language and thematic content so permit, it is *strongly encouraged to use international reviewers and panels of experts* including experts from emerging countries.

77. European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 4.12, Table 4.30.

78. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 4.2, §4.2.2, Question 102, Table 4.5.

79. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 4.2, §4.2.2, Question 98, Table 4.4.

| International Collaborative Research Programmes | Individual/ Remote reviewers | Panel reviewers |
|--|---------------------------------|-----------------|
| Checked by the members of staff in the organisation. If there are conflicts, the potential reviewer is excluded | 82.4% 14/17 | 86.7% 13/15 |
| Reviewers are asked to check for potential conflicts themselves and possibly withdraw from the assessment | 82.4% 14/17 | 73.3% 11/15 |
| Reviewers have to sign a statement confirming that there are no conflicts of interest | 58.8% 10/17 | 66.7% 10/15 |

According to the survey's results, in response to the question "How is a possible bias/conflict of interest identified on the side of the reviewers in this Instrument?" the following responses were provided for *International Collaborative Research Programmes* (see table above).

6.2.3 Timeline

Collaborative projects can present particular administrative challenges, and funding agencies are encouraged to streamline their procedures as far as possible to minimise the time to grant. For national programmes a shorter timeline is usually possible, and 6 months represents a useful benchmark, whereas a period of the order of 12 months may be the norm for multinational programmes.

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According to the survey, for *International Collaborative Research Programmes* the entire process from submission deadline to grant takes normally about one year with the following stages:

- From launch of the call to deadline for submission (duration of the call): 1-5 months for 10 out of 13 (or 76.9%) respondents with fixed-duration calls. This average is subject to changes according to the particularity of the call and the specific guidelines.
- From proposal submission deadline to funding decision: 6-10 months (13/19 or 68.4%).
- The time granted to the individual/remote reviewers to complete their assessment is 16 to 30 days (for 7/17, or 41%); this range is stated to be 1-15 days for three of the respondents⁸⁰.

80. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 4.3, Table 4.10.

6.3 Processing of applications

6.3.1 Eligibility criteria

Beside the recommended standard criteria (see §4.3.1 in Part I of this Guide), some additional criteria should be considered, depending on the nature of the programme:

- In *National Collaborative Research Programmes*, applicants would usually be expected to be affiliated to a research institution or region in the funding organisation's country;
- In the case of *International Collaborative Research Programmes*, there are normally a minimum number of countries that must be represented by applicants.

Generally it is recommended that in the case of calls requiring interdisciplinary and breakthrough research, the eligibility screening is carried out by experienced and dedicated administrative staff or science officers. Some of the issues surrounding the peer review of these variants are discussed in Part I of the Guide.

The summary of the results of the survey on most used eligibility criteria applied to *Collaborative Research Programmes* is provided in the table below.

6.3.2 Evaluation criteria

With reference to the criteria described in §4.7.2 in Part I of this Guide, the following should be taken into consideration in evaluating collaborative proposals:

- Relevance to the scope of the call (if the scientific scope is described in the call, for example, in the case of thematic calls);
- Evaluation of the applicant implies an evaluation not only of the competence of the project leader, but of the whole proposal team;
- The evaluation of broader impact may be left as a task solely for the panel review, and not necessarily for the individual experts;

| Eligibility criteria | Completeness of the application | General fit of the proposal with the Instrument's purpose | Timeliness of the submission | Institutional, regional, national affiliation of applicants | Other |
|-------------------------|---------------------------------|---|------------------------------|---|---------------|
| Total of 19 Respondents | 94.7% 18/19 | 78.9% 15/19 | 78.9% 15/19 | 73.7% 14/19 | 36.8% 7/19 |

- Evaluation of the leadership and management aspects;
- It is good practice to include some form of assessment of:
 - added value: why is a collaborative approach necessary?
 - integration: how well do the teams devoted to various components and work packages link together?
 - synergy: is the proposed work likely to yield benefits greater than the sum of the parts?
- In the specific case of *National Collaborative Research Programmes* the strategic and national importance of the proposed research should also be evaluated. However, this may be a task for the funding body rather than expert evaluators.

6.3.3 Referee assessments

As noted in Part I of this Guide (Chapter 4) it is recommended as good practice to use standard assessment forms and online procedures.

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The survey shows that 88.2% (15/17) of the organisations use online standard assessment forms for the reviews of *International Collaborative Research* proposals made by individual/remote reviewers and 73.3% (11/15) for those used by panel reviewers⁸¹.

6.4 Final selection and funding decisions

Final decisions are usually taken by a committee or board within or on behalf of the organisation in charge of the programme.

It is very important to set clear ground rules on the procedure for making final decisions, particularly in the case of transnational programmes. Even when the national organisations maintain the responsibility for final funding decisions nationally, there should be a strong expectation that the ranking established by the expert evaluators will be respected.

In the case of proposals having an equal rank, it may be legitimate for the funding body to differentiate proposals, where necessary, using previously agreed methods. Here, diversity issues (*e.g.*, gender) might be taken into account.

According to the survey results, for *International Collaborative Research Programmes* the following practices have been stated:

| | International Collaborative Research Programmes |
|---|---|
| Organisation's own executive management decides on the basis of peer review recommendations | 31.6% 6/19 |
| A standing scientific committee composed of researchers decides on the basis of the peer review recommendations | 31.6% 6/19 |
| A board or committee composed of researchers, administrators and/or politicians decides on the basis of the peer review recommendations | 26.3% 5/19 |
| The review panel decides | 10.5% 2/19 |

81. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 4.9, Table 4.22.

7.

Programmes for the Creation or Enhancement of Scientific Networks



7.1 Purpose and scope

Programmes for the *Creation or Enhancement of Scientific Networks* are meant to promote networking, by facilitating discussion and exchange of ideas on a specified thematic area, issue or problem. Unlike the *Collaborative Research Programmes*, these programmes do not contain funding of the research itself. The main aim of *Scientific Network Programmes* is to facilitate interactions among researchers with established research programmes and between researchers and stakeholders, to create interdisciplinary fora, to encourage sharing knowledge and expertise, to develop new techniques and to train new scientists. To this end, the organisation of science meetings (workshops, seminars, conferences or schools), networking activities, exchange visits or other events are supported.

Furthermore, some programmes support activities related to scientific diffusion, such as the publication of information brochures and leaflets, CDs, books and meeting proceedings as well as the creation and management of dedicated scientific websites or scientific databases. These networks may also serve to stimulate new debate across boundaries, for example, disciplinary, conceptual, theoretical, methodological, at national and (especially) at international level. This may lead in particular to later pluridisciplinary proposals.

There are variations that may influence specific aspects of the peer review process as elaborated below:

(i) Thematic or non-thematic calls

In the former, the theme or topics to be addressed by the project are defined in advance. The proposed network must therefore fall within the thematic or topical scope of the call, and the relevance of the proposal to the call can be an important measure in the peer review evaluation. In non-thematic calls, a broad scientific field or domain is normally determined within which collaboration is to be promoted. The scope of the proposals can then vary substantially within that field.

(ii) National versus multinational

Whether a programme is national or international can significantly affect the nature of the required peer review process. The implications can span the whole life-cycle of the process from beginning to end. National programmes can be used to:

- Create new networks in order to stimulate research within targeted areas with the goal of enhancing synergy;
- Further enhance synergies among disparate existing networks;
- Extend the scope of national networks into international arenas;
- Promote and/or create pluridisciplinary networks.

Within a larger context, the above-mentioned targets can be defined for a group of countries. These can take the form of bilateral agreements or larger scale multilateral programmes.



According to the survey, from the 30 respondents,

only six organisations have indicated that they have programmes for the *Creation or Enhancement of Scientific Networks*⁸².

(iii) Responsive (continuous calls) versus non-responsive (time-bound calls)

Because of their nature, it is usually preferable to consider the non-responsive mode for managing networking programmes, particularly for multinational programmes, since they require specific preparatory steps that need careful attention (*e.g.*, programmatic agreements, guidelines, dissemination needs, themes or domains of research, etc.).

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The results of the survey show that for programmes for the *Creation or Enhancement of Scientific Networks*, from the six respondents, one has indicated a continuous call and four with calls at regular intervals, of 6 months (for 1/4 respondents) and 12 months (for 3/4).

7.2 Recommended peer review approaches specific to Scientific Network proposals

In this section some of the specific features will be highlighted. Although there seems to be some degree of variability in the processes and the way these are applied across different scientific domains, the procedures suggested below are meant to apply across various domains.

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According to the survey, for the *Creation or Enhancement of Scientific Networks*, all six respondents have indicated that their procedures are the same across all disciplines.

7.2.1 Proposal submission

Calls may be organised on the basis of one- or two-stage submissions. A two-stage process may be most appropriate when a high volume of proposals is expected (and a relatively low success rate).

Other factors to be considered are the increased total time to a final grant, and the greater administrative effort required of the funding body. It is generally found that a single submission stage may be sufficient.

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For programmes for the *Creation or Enhancement of Scientific Networks* two of the six respondents of

the survey have indicated that they have preliminary selection, with one using outline proposals and the other based on full proposals.

With regard to the language regime, it is common for proposals to be written in English. This is an important factor when proposals are submitted by multinational teams, and/or when the peer review will be carried out by international panels of experts. However, other national languages may be acceptable in the case of national network programmes, or multilateral collaborations involving a shared common language.

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For the *Creation or Enhancement of Scientific Networks* programmes, three out of six organisations responded that English is used as the language of their calls and two organisations (33%) stated that they use their own country's official language(s).

As described in Part I of this Guide (Chapter 4) it is recommended good practice to provide detailed guidelines for applicants, describing the submission process, the rules of the game and explaining the subsequent steps in the selection process.

7.2.2 Peer Review stages

A *two-stage evaluation process*, which includes individual/remote reviewers (at least three) and a panel assessment, is usually the *most appropriate*. However, for *Scientific Network Programmes* a *single stage may be sufficient*.

Some variants can occur in the number and the typology of the reviewers as individual/remote (external) versus members of the review panel according to the type of proposals.

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For programmes for the *Creation or Enhancement of Scientific Networks* two out of the six survey respondents reported using a two-stage selection process: one utilises fully disjointed individual/remote reviewers and panel members, the other one sometimes allowing some overlap between the two sets.

• Individual/Remote Reviewers

- Conventional proposals: the number can typically vary between three and four;
- Interdisciplinary proposals: can require a higher number of individual/remote reviewers;
- Breakthrough proposals: reviewers should be able to flag the transformative character of the proposed research;
- Confidentiality: similar to the Collaborative Research programmes discussed in the previ-

82. See European Science Foundation (2010b), *ESF Survey Analysis Report on Peer Review Practices*, in particular Section 4.1, Table 4.1.

ous chapter, and using the results of the survey, it is recommended to keep the identity of the reviewers confidential as much as possible. In some European countries, due to constitutional requirements on openness of the peer review process, this may not be possible.

- **Review Panel**
 - Interdisciplinary proposals: the composition of the panel should comprise a core group of experts representing a wide range of disciplines to ensure the necessary disciplinary expertise in any given competition, including where possible individuals who themselves have an interdisciplinary outlook;
 - Proposals per reviewer.
- **Reader system**
 - • • •
 - According to the survey, none of the six respondents for *Creation or Enhancement of Scientific Networks* programmes have indicated the usage of reader system.
- **Right to reply:**

The inclusion of right to reply when applied as part of the peer review process will add to the robustness and quality of the selection process and may be considered whenever feasible. Although, for programmes for the *Creation and Enhancement of Scientific Networks*, none of the six respondents have indicated its use.

7.2.3 Conflicts of Interest

Networking proposals often bring together large sections of the available scientific community in a particular field, and so can present particular difficulties when it comes to avoiding conflicts of interest. If the proposal language and thematic content so permit, it is strongly encouraged to use international reviewers and panels of experts including experts from emerging countries.

According to survey results, in response to the

question “How is a possible bias/conflict of interest identified on the side of the reviewers in this Instrument?” the following responses are provided for programmes for the *Creation or Enhancement of Scientific Networks* (see table below)

7.2.4 Timeline

Since Networking programmes normally do not contain funding for research, funding agencies are encouraged to streamline their procedures as far as possible to minimise the time to grant.

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- For programmes for the *Creation or Enhancement of Scientific Networks*, the consensus of the six respondents indicates that their process takes about 10 months with the following breakdown:
 - Duration of the call: 1-5 months for 3/6 organisations.
 - From proposal submission deadline to funding decision: 1-5 months for 3/6 respondents.

7.3 Processing of applications

7.3.1 Eligibility criteria

Beside the recommended standard criteria (see §4.3.1 in Part I of this Guide), some additional criteria should be considered for networking proposals:

- It is good practice to indicate what is expected to be an optimum range for the number of partners, while still allowing proposals falling outside of this range, duly justified;
- in order to maximise viability and in light of the fact that these grants normally do not include funding of research, it may be considered to include criteria that would ascertain the existence of current and relevant research funding at the disposal of the participants.

Generally it is recommended that in the case of calls requiring interdisciplinary and breakthrough research, the eligibility screening is carried out by experienced and dedicated administrative staff or

| Programmes for the <i>Creation or Enhancement of Scientific Networks</i> | Individual/ Remote reviewers | Panel reviewers |
|---|------------------------------|-----------------|
| Checked by the members of staff in the organisation. If there are conflicts, the potential reviewer is excluded | 100.0% 3/3 | 100.0% 3/3 |
| Reviewers are asked to check for potential conflicts themselves and possibly withdraw from the assessment | 66.7% 2/3 | 100.0% 3/3 |
| Reviewers have to sign a statement confirming that there are no conflicts of interest | 66.7% 2/3 | 100.0% 3/3 |

| Eligibility criteria: | Completeness of the application | General fit of the proposal with the Instrument's purpose | Timeliness of the submission | Institutional, regional, national affiliation of applicants | Other |
|------------------------|---------------------------------|---|------------------------------|---|--------------|
| Total of 6 Respondents | 83.3% 5/6 | 66.7% 4/6 | 66.7% 4/6 | 16.7% 1/6 | 83.3% 5/6 |

science officers. Some of the issues surrounding the peer review of these variants are discussed in Part I of the Guide.

The results of the survey on most used eligibility criteria applied to programmes for the *Creation or Enhancement of Scientific Networks* are summarised in the table above.

7.3.2 Evaluation criteria

With reference to the criteria described in §4.7.2 in Part I of this Guide, the following should be taken into consideration in evaluating networking proposals:

- **Scientific Quality:** As mentioned before, proposals submitted for the creation of scientific networks do not contain request for research funding, and therefore scientific quality is less relevant for evaluating these proposals. Instead, the scientific context and rationale for creating the network should be considered, *e.g.*, why would such a network be needed or add value?
- Assessment of applicants might involve not only the core team submitting the proposal but also the wider network which they plan to form, and the criteria (possibly including diversity issues) to be used to that end;
- When briefing experts, it is important to emphasise the main intention of this type of grants and that it is not meant to fund research activities.

As noted in Part I of this Guide (Chapter 4) it is recommended as good practice to use standard assessment forms and online procedures.

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For programmes for the *Creation or Enhancement of Scientific Networks*, the survey shows that for the individual/remote reviewers only two of the three respondents provide standard assessment forms and both do this electronically, while for panel reviewers two of the three provide paper copies of the forms and one makes available electronic assessment forms.

7.4 Final selection and funding decisions

Final decisions are usually taken by a committee or board within or on behalf of the organisation in charge of the programme.

It is very important to set clear ground rules on the procedure for making final decisions, particularly in the case of transnational programmes. Even when national organisations maintain funding decisions nationally, there should be a strong expectation that the ranking established by the expert evaluators will be respected.

In the case of proposals having an equal rank, it may be legitimate for the funding body to differentiate proposals, where necessary, using previously agreed methods. Here, diversity issues (*e.g.*, gender) might be taken into account.

According to the survey results, for programmes for the *Creation or Enhancement of Scientific Networks* the following practices have been stated:

| | Programmes for the <i>Creation or Enhancement of Scientific Networks</i> |
|---|--|
| Organisation's own executive management decides on the basis of peer review recommendations | 33.3% 2/6 |
| A standing scientific committee composed of researchers decides on the basis of the peer review recommendations | 16.7% 1/6 |
| A board or committee composed of researchers, administrators and/or politicians decides on the basis of the peer review recommendations | 16.7% 1/6 |
| The review panel decides | 0.0% 0/6 |

8. Centres of Excellence Programmes



8.1 Purpose and scope

This funding line is dedicated to proposals, often submitted by a large group(s) of researchers, which target the establishment of an institutional or regional centre for given areas of research. Such centres should encourage the pursuit of excellence in research at national and international levels, promoting knowledge, technology transfer, training and international competitiveness. The centre might also interlink research institutions, establish research topic priorities and promote high-quality research in the long term. When applicable, the centre should integrate research and enterprises, and also represent a solid base for national and international innovation. Centres should harness existing research talent and be attractive to new world-class researchers, as well as making efficient use of the existing resources⁸³.

Proposals in this type of programme are usually funded for a long period of up to 10 years, although their longer-term sustainability (beyond 10 years) and evolution are vital considerations that should be incorporated into the longer view when planning new calls, making funding decisions and progressing reviews.

It is also important to recognise and encourage different models of centres. For instance, both physical centres and virtual centres involving networks of smaller groups and clusters are increasingly relevant and should be included in the key considerations made in this chapter. Also, if a centre presents a national resource, the means by which access to that resource is organised and funded needs to be given careful evaluation. An example might be a national access programme, where projects with spe-

cific investigators at a national level are undertaken within the centre.

The review of centres of excellence presents unique and specific challenges, making it important to fully appreciate that no single mechanism of review will accommodate the various possible models and structures that proposals for centres may include. While it is only possible to present key principles in this chapter, it is important to recognise that different approaches of peer review should be taken in the design of a particular call.

8.2 Recommended peer review approaches specific to Centre of Excellence proposals

In this section some of the specific features of the overall process will be highlighted. Although there seems to be some degree of variability in the process, the procedures suggested below are meant to apply across various domains.

A high-level illustration of the main components of the selection process applicable to the creation of centres of excellence is provided in Figure 11.

8.2.1 Proposal submission

In the case of a multi-stage process, the call can include a pre-proposal or letter of intent. This stage of a pre-proposal or letter of intent evaluation often requires a panel or remote-based evaluation (followed by internal agency considerations) resulting in the selection of a small number of proposals that will progress to the next stage. Full proposals will be specifically invited (following the first stage of review) or will be received during the call opening period in the case when no pre-proposal is required (see below).

⁸³. See Academy of Finland (2001).

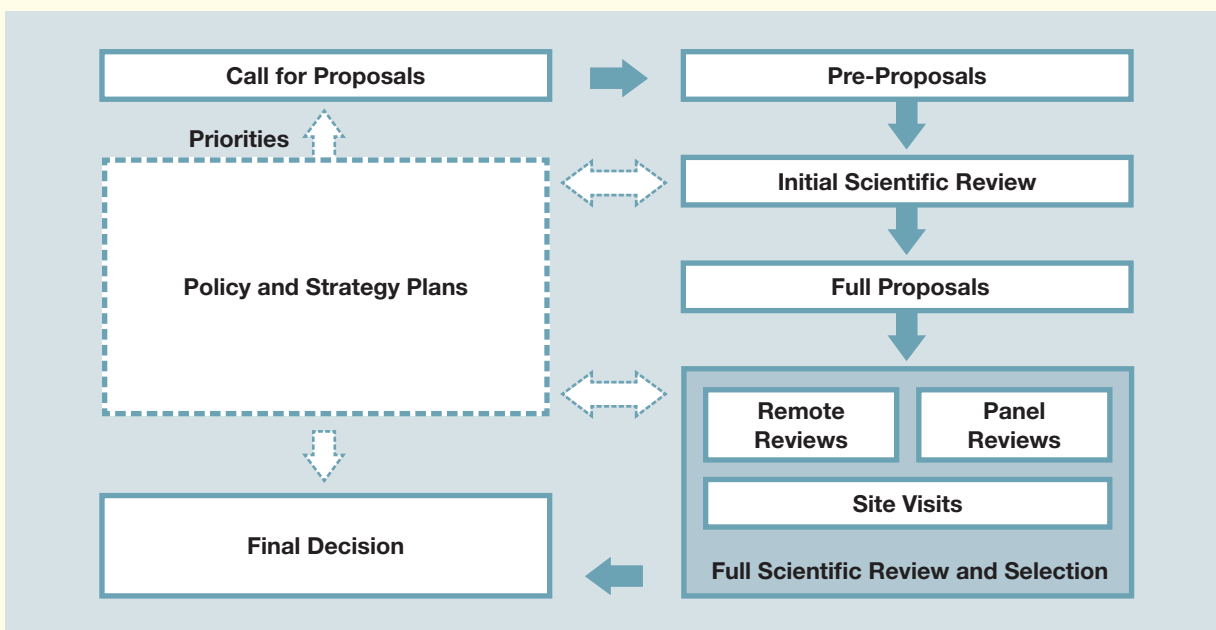


Figure 11. Overview of the whole process for the peer review and selection of Centres of Excellence

8.2.2 Peer review stages

Peer review as part of the evaluation of a *Centres of Excellence* programme will usually be a *two- or three-stage process*, utilising high-level and experienced reviewers culminating in a panel-based site review, usually conducted by the same members (or extended version) of the panel involved in earlier stages of review. In addition, it is likely that a form of strategic review will be incorporated in the process, so that national priorities and the needs of industry can be appropriately assessed. The process in fact may begin with a strategic decision for area(s) of national priority, resulting in open calls or dedicated calls for thematic areas or grand challenges.

Although several stages are likely to be involved in the review of centre proposals, other models, such as specifically invited applications or one-stage review, may also be appropriate.

In the case of a multi-stage process, the following are likely to be incorporated:

- **Call for proposals:** The call can optionally include a pre-proposal or letter of intent;
- **Pre-selection:** This stage of a pre-proposal or letter of intent evaluation often requires a panel or remote-based evaluation (followed by internal agency considerations) resulting in the selection of a small number of proposals that will progress to the next stage;
- **Formal invitation for full application:** Full proposals will be specifically invited (following the first stage of review) or will be received during the call opening period in the case when no pre-proposal is required;
- **Remote written reviews:** The full application will usually be sent for evaluation by individual/remote experts who submit detailed written reviews. The reviews will usually contain sections focusing on the detailed scientific proposal, track record of the applicants, as well as other criteria that are outlined in later sections and also considered by the visiting panels;
- **Panel site visit(s) and scientific review:** For centres of excellence, particularly those of large scale, a detailed site visit is critical. These will ideally use an international panel of experts with a broad range of expertise and experience. The panel will often include experts who provide some of the written evaluations from earlier stages.
 - Centres are often, but not necessarily, defined by their pluri-interdisciplinary nature and the panel constitution should be tailored to reflect such differences.
 - As with the written reviews, the panel will evaluate scientific quality of the proposal and competence of the applicants. The review may very likely also examine areas such the governance and management of the centre, training and education and possibly any industrial collaborations that the centre may have.
- **Strategic review:** A strategic evaluation of a centre proposal may often be required and should be made in the context of the scientific review, but performed separately. It may consider the following criteria:
 - National priorities, other science policy issues;
 - May involve a variety of national agencies and

other relevant stakeholders, scientists and industry experts. Importantly, the potential for such stakeholders to overtly influence the final funding decision needs to be carefully taken into account;

- As outlined in Figure 11 a formal strategic review may be specifically undertaken as part of the full review, although more generally the national policy and strategy plans, or those of the funding agency, may influence any stage of the process, from the launch of the call to the final decision.
- **Progress Reviews:** Once funded the centre will likely be subject to progress evaluations over its lifetime. This is especially important given that the review may often be made prior to the start of the centre and any physical structure. Progress reviews should be regular and begin as soon as the project is underway and may take the form of agency visits and scientific panel-based site visits.

8.2.3 Timeline

The timeline for evaluating centres is by necessity often extensive, largely because of the scale of the projects and the requirement for two or three principal review stages and site visits.

- The timeline for centres will inevitably be influenced by the scale and scope of the project, as well as by the extent of interdisciplinary research or if large networks are involved. Nevertheless, it would generally be expected that an 18-month time frame would be usual between the call launch and the funding decision.
- Mechanisms should be put in place within the review process to ensure that scientific evaluation is executed within defined time periods, to avoid unnecessary delays in the process. The process is well coordinated with the strategic review that will take place in a ‘parallel mode’.
- Timelines and procedures should be established ahead of the call and delineated on procedural maps.

8.3 Processing of applications

Commonly, applications will be submitted directly by the institutions, or have a clear documentation of support by the principal institution(s). A number of additional points should be made in processing these applications:

- Optimally, dedicated Programme Officers should be assigned to the application and be responsible for looking after it, from the application through

to the funding decision. It is also ideal if the same programme officer takes custody of the award after it has been made, so that major issues can be dealt with efficiently as they arise and so that working knowledge of the award can be brought to bear during further evaluation and progress reviews;

- Strong administrative support will be needed by the agency in managing the review process and resources appropriate with the scale of the investment should be provided and decided well ahead of the start of the review process;
- In case of preliminary selection, clear guidelines for succinct and well written pre-proposals should be given to aid effective panel evaluation.

Preliminary selection

The outline of the proposal accompanied by an expression of interest and/or letter of intent will be evaluated internally by the funding agency in conjunction with individual/remote reviewers in the first stage of the peer review process.

Preliminary selection can involve remote or physical panel input. This will be followed by internal agency considerations of the reviews.

For applications that are not progressed beyond this initial stage, a good level of feedback should be provided, given the potential scale and scope of the projects in such applications. This may be done via face to face meetings between the agency and applicants.

8.3.1 Eligibility criteria

Eligibility criteria for applications will be largely similar to those of other proposals in other funding instruments (for the standard criteria see Section 4.5 in Part I of this Guide). However, some specific eligibility considerations related to *Centres of Excellence* programmes that may apply are as follows, in particular in the case of proposals involving a host institution:

- The host institution should be an eligible research body in the eyes of the funding agency, (also for other partners if the centre represents a network cluster of collaborating centres);
- The host institution should present the application through its research office, signed by an appropriately senior individual (Dean or Provost of the University, for example);
- Appropriate evidence of support should be presented by the host institution.

8.3.2 Evaluation criteria

The evaluation of the proposal will not only concern the scientific quality of the proposal and of the

applicant(s) (for the standard criteria see §4.7.2 in Part I of this Guide) but, according to the specificity of the programme, the following criteria can be also taken into consideration:

- Scientific profile and excellence of the key leaders in the project;
- Excellence of the research plan;
- Feasibility of the research plan;
- Business plan including a proposed budget;
- Good management, governance oversight and clear strategic aims;
- Level of potential impact for the research system (at both national or international levels);
- Interdisciplinary nature of the project and collaborative efforts;
- Long-term potential impact and sustainability;
- For existing research centres: progress report in which is described the centre's progress in achieving its own goals and objectives since the last review was undergone⁸⁴.

Additional criteria will also be evaluated:

- Whether the centre will provide an innovative and target-oriented research environment;
- Whether the application presents a clear and challenging research vision;
- Whether there is clear documentation of efficiency of the proposed administration;
- Critical mass of the researchers in the proposed centre;
- Promotion of young researchers and training at all stages – career progression;
- Gender balance;
- National and international collaboration/networking provided;
- Expected international impact;
- Societal impact.

Ongoing evaluation of the award once it has been made

- Evaluation of large centres will require ongoing monitoring of the award and with investments of this scale will usually also require independent peer review.
- Regular reporting to the funding agency on outputs and performance of the centre will be vital. This is ideally done at pre-defined intervals (*e.g.*, half-yearly or quarterly) using standard reporting documentation. This may also involve a specific

reporting structure such as: Governing Board, host institution's research office, funding agency.

- Progress reviews and mid-way evaluation by external reviewers will also help in effective monitoring of the award and early detection of problems and issues.
- Managing conflicts will be important, given the size of awards.
- Again, the above issues will benefit from the familiarity of an experienced officer within the agency which would be important in helping to facilitate this.

8.3.3 Budget

Financing for centres is a long-term commitment and financing should aim to achieve a balance between investment and operational resources and resources to enable researchers to conduct their work. Governance and management plans will be essential to include in the budgets presented for evaluation.

It is important to understand how researchers will be funded under their own grants and how much central funding under the *centre award* will contribute to their support and those of their teams. In addition, it is also important to understand how common shared resources, such as equipment and large infrastructural facilities will be funded and managed (*e.g.*, indirect funds such as overheads and how the host institution will use these in supporting the centre need careful evaluation, *e.g.*, operational costs such as energy, rent and salaries). Supplementary awards for usage, such as equipment charges and other access, need particular clarity to avoid double costing on awards.

8.4 Final selection and funding decisions

The final decision to fund will be made by the funding agency taking into account all the above input. Internal agency procedures for assessing the case for final funding decisions should be decided upon before the launch of the call to ensure fairness and consistency.

84. See the Program Guide for the Centres of Excellence for Commercialization and Research (CECR) – of the Networks of Centres of Excellence of Canada at: http://www.nce-rce.gc.ca/ReportsPublications-RapportsPublications/CECR/Program-Guide-Programme_eng.asp#eligib (May 2010).

9. New Research Infrastructures Programmes

9.1 Purpose and scope

This funding line is dedicated to supporting the creation of new Research Infrastructures (RIs). According to the definition of the European Strategy Forum on Research Infrastructures (ESFRI), RIs are defined as follows⁸⁵:

The term ‘research infrastructures’ refers to *facilities, resources and related services* used by the scientific community to conduct top-level research in their respective fields, ranging from social sciences to astronomy, genomics to nanotechnologies. Examples include singular large-scale research installations, collections, special habitats, libraries, databases, biological archives, clean rooms, integrated arrays of small research installations, high-capacity/high-speed communication networks, highly distributed capacity and capability computing facilities, data infrastructure, research vessels, satellite and aircraft observation facilities, coastal observatories, telescopes, synchrotrons and accelerators, networks of computing facilities, as well as infrastructural centres of competence which provide a service for the wider research community based on an assembly of techniques and know-how.

RIs may be ‘single-sited’ (a single resource at a single location), ‘distributed’ (a network of distributed resources), or ‘virtual’ (the service is provided electronically).

As a consequence of the *EUROHORCS and ESF Vision on a Globally Competitive ERA and their Road Map for Actions*⁸⁶, an ESF Member Organisation

Forum on Research Infrastructures was launched in particular for discussing and sharing best practice in funding and operating research infrastructures. Delegates from more than 30 member organisations and convened observers from the European Commission, ERC, ERF, ESFRI and ALLEA work within this framework on a joint understanding of modern research infrastructures, with evaluation being a major focus. Readers of this chapter are strongly recommended to consult the dedicated MO Forum on Research Infrastructures for more specific information^{87,88}.

Research infrastructures vary widely, not only in the scientific fields and communities they serve, but also in their organisational form, their size and – last but not least – their costs. There are probably almost as many ways of establishing a new research infrastructure as there are research infrastructures themselves.

The ESFRI process, for instance, has foreseen an individual preparatory phase for each ESFRI project of typically two to four years to define the governance and legal model, the funding streams and the operational model. But the ESFRI roadmap contains only mature projects that have already been developed to a certain expected degree of maturity by the scientific community. Altogether it usually takes several, if not many, years from the original idea to the beginning of the construction phase. In the

85. See the website of the European Commission on research and infrastructures: http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=what

86. The Road Map can be downloaded at: <http://www.esf.org/publications/science-policy-briefings.html>

87. See <http://www.esf.org/activities/mo-fora/research-infrastructures.html>; also see Swedish Research Council’s Guide to Infrastructure, 2007, 2nd edition, Stockholm.

88. The support and development of European RIs is also the subject of the European Council Regulation, dated 25 June 2009, entitled *Community legal framework for European Research Infrastructure Consortium (ERIC)* available at: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:206:0001:0008:EN:PDF>

course of developing a new research infrastructure there will typically be one or several steps where peer review will be used to assess a proposal asking for funding or for political support.

This chapter will not deal with the whole process towards the decision to build a new RI. Instead it concentrates on the peer review steps included in the process, which are also applicable to small scale Research Infrastructures. In addition to the general aspects of peer review discussed in Part I, in this section some of the specific features relevant to selection of RI proposals will be indicated.

9.2 Recommended peer review approaches specific to New Research Infrastructure proposals

Research infrastructures are often of unique character and can be quite expensive, concerning both the costs of implementation and the running costs. Medium- to long-term commitments are in many cases required in order to recruit the staff, to maintain and renew equipment, to update databases and so forth. Thus, the establishment of RIs will typically not follow uniform procedures but is rather the result of complex, sometimes dedicated discussions on the needs and requirements of the research community.

Moreover, infrastructures will often represent both nationally and internationally relevant investments. Sometimes, it will be critical to ensure that the review and evaluation should carefully consider how the projects align to European research agendas or national/European road maps, *e.g.*, ESFRI, Joint Programming, etc. On the other hand, distributed RIs require special consideration of the collaboration and networking of the sites forming a research infrastructure while the costs of a part of the distributed RI might not be so critical. Information-based RIs might focus on adoption of accepted standards or working in close connection with similar RIs elsewhere.

There are many other features that might play a significant role. Therefore it is difficult to establish merely a set of procedures covering all research infrastructures. However, some common elements can be identified that are strongly recommended to be part of any modern funding scheme, be it an open programme, a specific call, or even a tailor-made process.

- Any process towards the establishment of research infrastructures should contain a peer review step. Already within the initial steps towards the idea of

a new research infrastructure one has to consider if the infrastructure will meet the needs of the scientific community and carry out an assessment of the scientific scope and (inter)disciplinary nature of the project. Regardless of how this stage of the discussion is conducted⁸⁹, there should be a call for a detailed proposal. This is the moment at which peer reviewing is required to ensure the assessment and selection of the applications. Peer review will usually be the method of choice to measure the success of an established research infrastructure.

- Review panels will be established with membership from scientific experts, active scientists and also experts in evaluating and/or managing infrastructures and large capital projects⁹⁰. It might be reasonable to nominate members who would serve for designated periods if the future evaluation of the RI can already be foreseen. This would allow continuity, experience and competency to review infrastructural projects to be retained.
- The review process will typically be based on a proposal indicating the scientific and strategic concept of the RI. The process may additionally offer the opportunity to discuss open questions with the applicants. The review panel would primarily assess the scientific merit of the application according to a well-defined set of critical criteria, as well as other review criteria as described below.
- The review panel evaluation report will form the most important basis for the final selection of the proposal.
- In addition to the review panel there is a decision board with membership different from the review panel. This decision board might consider additional aspects such as strategic goals, financial budgets and others. The discussion in the decision board would benefit from the evaluation report provided by the review panel.

9.2.1 Timeline

Like the Centres of Excellence, infrastructural projects, particularly those larger projects, require longer timelines for the whole decision process.

89. It might be a competitive process selecting a proportion of projects for further evaluation which would already mean a peer review process on initial concepts. In other cases, individual or political decisions might determine the procedure.

90. Though not in the focus of this chapter but for the sake of completeness, peer review will also be used in any cases of major updates or upgrades of existing RIs, for instance of instrumentation, databases, etc. Finally, peer review plays a role in assessing proposals submitted to RIs to get access to the RIs' resources.

Exceptions may be smaller awards, such as databases described above.

Although timelines may inevitably be protracted, mechanisms should be incorporated to minimise delays.

9.3 Processing of applications

In evaluating research infrastructure projects it is essential to consider the full life-cycle of the project – from concept and construction to operation and phase-out. Though it is essential that the funding should facilitate long-term planning and promote long-term projects in operating and using infrastructures, a proposal has to focus on the funding period which could for instance be a five-year term.

Two particular aspects of the peer review when applied to RI are eligibility and evaluation criteria. The first set of criteria will determine which proposals are accepted to go through the peer review and which ones will not be accepted. Evaluation criteria are used for the peer review and selection process to determine comparative merits of competing proposals.

9.3.1 Eligibility criteria

Applicants will generally be eligible research bodies or institutions, although in other cases applications may be made directly by scientists, with commitment of support from the host institution. National eligibility criteria will apply.

9.3.2 Evaluation criteria

The evaluation concerns not only the scientific quality of the proposal and competence of the applicants, but also the detailed evaluation of the infrastructure itself. National or European priorities might play a significant role as well. Usually, the criteria for assessing proposals on research infrastructure will comprise the scientific excellence of the research to be performed, the management of the infrastructure, and the service the infrastructure can provide. A set of criteria could, for instance, verify that the infrastructure should:

- Provide scope for unique, outstanding research;
- Represent a truly relevant resource to be used by several research groups/users with highly advanced research projects;
- Be of broad national or European interest;
- Have clear plans for maintenance and management of the infrastructure;
- Have a long-term plan addressing scientific goals, financing and use;

- Be open and easily accessible for researchers and have a plan for improving accessibility (concerns both use of the infrastructure, access to collected data and presentation of results).

Other criteria that may be addressed are:

- Training requirements and availability of the programmes (*e.g.*, seminars, workshops) associated with the infrastructures;
- Concepts for scientific service (*e.g.*, sample preparation, data analysis, etc.);
- Contribution to the development or enhancement of relevant standards.

Apart from judging the fulfilment of the criteria above, there is also an assessment of the infrastructure's relevance to the research that it intends to support. In addition, an assessment of the infrastructure's potential users is also included in the evaluation.

9.3.3 Budget

Financing for research infrastructures is usually long-term funding. Financing should aim to achieve a balance between investment and operational resources and resources to enable researchers to use the infrastructures. A planning grant, which could run for one or two years, is adequate when an infrastructure is in a preparatory phase. The planning grant will essentially cover costs for salaries, meetings, maintenance of the equipment, training, etc.

An investment grant is suitable for an infrastructure in the construction phase and would fund essentially equipment and salaries/material for the construction.

Finally, for an infrastructure in operation, an operation grant, which would essentially fund operational costs like energy, rent and salaries, is adequate.

Governance and management plans will be essential to include in the budgets presented for evaluation. It may be suitable to have:

- Different budget lines for the different phases of a research infrastructure;
- Supplementary awards for usage – but also avoiding double costing on awards;
- Personnel dedicated to building up infrastructure as opposed to those engaged directly in research need to be included.

9.4 Final selection and funding decisions

The final decisions on selection and funding should include broad strategic relevance and importance of the infrastructure for research, or its role in building up expertise.

The funding decisions are usually taken by boards described above. The government(s) involved or the funding bodies will establish these decision boards. The final selection of which infrastructures to fund is based upon the recommendation made in the peer review process described above.

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Part III

Appendices

Appendix 1. Glossary

Ad hoc (scientific) committee

Committee set up for a limited duration (typically less than one or two years) and for a particular purpose.

Administrative staff

Staff members who are mainly responsible for supporting the scientific staff and dealing with routine tasks.

Eligibility criteria

The minimum conditions which a proposal must fulfil if it is to be retained for further evaluation.

Evaluation criteria

The criteria against which eligible proposals are assessed by independent experts.

Expert

An individual who is qualified to evaluate a research proposal, by virtue of his or her scientific background, and/or by knowledge of broader aspects relevant to the evaluation process.

Funding instrument

An activity with the aim of distributing funding based on explicit requirements. These requirements are typically related to scientific focus, eligibility, competitive selection, etc. A funding organisation will normally make use of a number of instruments to meet its needs.

Grants

Funding awarded through *competitive merit-based selection*: competitive selection of proposals on the basis of the quality of the applicant(s) and/or the quality of the proposed research activity and/or the quality of the research environment.

Incentives

Distribution of monetary or other forms of rewards meant to motivate and encourage participation in peer review.

Individual/remote review

The evaluation of a proposal by one or more experts who do not discuss their views with other experts. In some organisations these are also referred to as 'external reviewers'.

Letter of intent

Short document containing a brief scientific summary and a list of participating scientists and/or institutions, stating the interest to apply for funding. This is the first step in expressing interest and is normally followed by a more detailed proposal.

Panel review

The collective evaluation of a number of proposals by a group of experts, involving a discussion or other interaction before arriving at a conclusion.

Peer review

The process of evaluating research applications (proposals) by experts in the field of the proposed research.

Preliminary or outline proposal

Research proposal containing an overview of the scientific scope of the project, the requested budget, project plan and the scientist(s) involved.

Redress

Formal opportunity offered to the applicants of proposals under peer review to clarify correction of procedural mistakes and/or legal issues, after the final decision.

Scientific staff

Staff members who are mainly responsible for tasks needing scientific experience, background or judgment, for example, on selection of reviewers, writing of review minutes, reports, analysis, etc.

Standing (scientific) committee

Committee set up with a mandate for a relatively longer duration (typically several years) and for one or multiple purposes.

Appendix 2. **ESF Survey Analysis Report on Peer Review Practices**

The results of the ESF survey on peer review practices are available in the *ESF Survey Analysis Report on Peer Review Practices* through the ESF website at:

<http://www.esf.org/activities/mo-fora/peer-review.html>

European Code of Conduct for Research Integrity

This code – developed through a series of workshops involving the ESF (European Science Foundation) and ALLEA (All European Academies) – addresses the proper conduct and principled practice of systematic research in the natural and social sciences and the humanities. It is a canon for self-regulation, not a body of law. It is not intended to replace existing national or academic guidelines, but to represent Europe-wide agreement on a set of principles and priorities for the research community.

The Code

Researchers, public and private research organisations, universities and funding organisations must observe and promote the principles of integrity in scientific and scholarly research.

These principles include:

- honesty in communication;
- reliability in performing research;
- objectivity;
- impartiality and independence;
- openness and accessibility;
- duty of care;
- fairness in providing references and giving credit; and
- responsibility for the scientists and researchers of the future.

Universities, institutes and all others who employ researchers, as well as agencies and organisations funding their scientific work, have a duty to ensure a prevailing culture of research integrity. This involves clear policies and procedures, training and mentoring of researchers, and robust management methods that ensure awareness and application of high standards as well as early identification and, wherever possible, prevention of any transgression.

Fabrication, falsification and the deliberate omission of unwelcome data are all serious violations of the ethos of research. Plagiarism is a violation of the rules of responsible conduct vis-à-vis other researchers and, indirectly, harmful for science as well. Institutions that fail to deal properly with such wrongdoing are also guilty. Credible allegations should always be investigated. Minor misdemeanours should always be reprimanded and corrected.

Investigation of allegations should be consistent with national law and natural justice. It should be fair, and speedy, and lead to proper outcomes and sanctions. Confidentiality should be observed where possible, and proportionate action taken where necessary. Investigations should be carried through to a conclusion, even when the alleged defaulter has left the institution.

Partners (both individual and institutional) in international collaborations should agree beforehand to cooperate to investigate suspected deviation from research integrity, while respecting the laws and sovereignty of the states of participants. In a world of increasing transnational, cross-sectional and interdisciplinary science, the work of OECD's Global Science Forum on *Best Practices for Ensuring Scientific Integrity and Preventing Misconduct* can provide useful guidance in this respect.

The principles of research integrity

These require *honesty* in presenting goals and intentions, in reporting methods and procedures and in conveying interpretations. Research must be *reliable* and its communication fair and full. *Objectivity* requires facts capable of proof, and transparency in the handling of data. Researchers should be *independent and impartial* and communication with other researchers and with the public should be *open* and honest. All researchers have a *duty of care* for the humans, animals, the environment or the objects that they study. They must show *fairness* in providing references and giving credit for the work of others and must show *responsibility for future generations* in their supervision of young scientists and scholars.

Misconduct

Research *misconduct* is harmful for knowledge. It could mislead other researchers, it may threaten individuals or society – for instance if it becomes the basis for unsafe drugs or unwise legislation – and, by subverting the public's *trust*, it could lead to a disregard for or undesirable restrictions being imposed on research.

Research misconduct can appear in many guises:

- *Fabrication* involves making up results and recording them as if they were real;
- *Falsification* involves manipulating research processes or changing or omitting data;
- *Plagiarism* is the appropriation of other people's material without giving proper credit;
- Other forms of misconduct include *failure to meet clear ethical and legal requirements* such as misrepresentation of interests, breach of confidentiality, lack of informed consent and abuse of research subjects or materials. Misconduct also includes *improper dealing* with infringements, such as attempts to cover up misconduct and reprisals on whistleblowers;
- *Minor misdemeanours* may not lead to formal investigations, but are just as damaging given their probable frequency, and should be corrected by teachers and mentors.

The response must be proportionate to the seriousness of the misconduct: as a rule it must be demonstrated that the misconduct was committed intentionally, knowingly or recklessly. Proof must be based on the preponderance of evidence. Research misconduct should not include honest errors or differences of opinion. Misbehaviour such as intimidation of students, misuse of funds and other behaviour that is already subject to universal legal and social penalties is unacceptable as well, but is not 'research misconduct' since it does not affect the integrity of the research record itself.

Good research practices

There are other failures to adhere to good practices – incorrect procedures, faulty data management, etc. – that may affect the public's trust in science. These should be taken seriously by the research community as well. Accordingly, *data practices* should preserve original data and make it accessible to colleagues. Deviations from *research procedures* include insufficient care for human subjects, animals or cultural objects; violation of protocols; failure to obtain informed consent; breach of confidentiality, etc. It is unacceptable to claim or grant undeserved authorship or deny deserved authorship. Other *publication-related* lapses could include repeated publication, salami-slicing or insufficient acknowledgement of contributors or sponsors. Reviewers and editors too should maintain their independence, declare any conflicts of interest, and be wary of personal bias and rivalry. Unjustified claims of authorship and ghost authorship are forms of falsification. An editor or reviewer who purloins ideas commits plagiarism. It is ethically unacceptable to cause pain or stress to those who take part in research, or to expose them to hazards without informed consent.

While principles of integrity, and the violation thereof, have a universal character, some rules for good practice may be subject to cultural differences, and should be part of a set of national or institutional guidelines. These cannot easily be incorporated into a universal code of conduct. National guidelines for good research practice should, however, consider the following:

- 1. Data:** All primary and secondary data should be stored in secure and accessible form, documented and archived for a substantial period. It should be placed at the disposal of colleagues. The freedom of researchers to work with and talk to others should be guaranteed.
- 2. Procedures:** All research should be designed and conducted in ways that avoid negligence, haste, carelessness and inattention. Researchers should try to fulfil the promises made when they applied for funding. They should minimise impact on the environment and use resources efficiently. Clients or sponsors should be made aware of the legal and ethical obligations of the researcher, and of the importance of publication. Where legitimately required, researchers should respect the confidentiality of data. Researchers should properly account for grants or funding received.
- 3. Responsibility:** All research subjects – human, animal or non-living – should be handled with respect and care. The health, safety or welfare of a community or collaborators should not be compromised. Researchers should be sensitive to their research subjects. Protocols that govern research into human subjects must not be violated. Animals should be used in research only after alternative approaches have proved inadequate. The expected benefits of such research must outweigh the harm or distress inflicted on an animal.
- 4. Publication:** Results should be published in an open, transparent and accurate manner, at the earliest possible time, unless intellectual property considerations justify delay. All authors, unless otherwise specified, should be fully responsible for the content of publication. Guest authorship and ghost authorship are not acceptable. The criteria for establishing the sequence of authors should be agreed by all, ideally at the start of the project. Contributions by collaborators and assistants should be acknowledged, with their permission. All authors should declare any conflict of interest. Intellectual contributions of others should be acknowledged and correctly cited. Honesty and accuracy should be maintained in communication with the public and the popular media. Financial and other support for research should be acknowledged.
- 5. Editorial responsibility:** An editor or reviewer with a potential conflict of interest should withdraw from involvement with a given publication or disclose the conflict to the readership. Reviewers should provide accurate, objective, substantiated and justifiable assessments, and maintain confidentiality. Reviewers should not, without permission, make use of material in submitted manuscripts. Reviewers who consider applications for funding, or applications by individuals for appointment or promotion or other recognition, should observe the same guidelines.

The primary responsibility for handling research misconduct is in the hands of those who employ the researchers. Such institutions should have a standing or *ad hoc* committee(s) to deal with allegations of misconduct. Academies of Sciences and other such bodies should adopt a code of conduct, with rules for handling alleged cases of misconduct, and expect members to abide by it. Researchers involved in international collaboration should agree to standards of research integrity as developed in this document and, where appropriate, adopt a formal collaboration protocol either *ab initio* or by using one drafted by the OECD Global Science Forum.

Appendix 4. ESF Member Organisation Forum on Peer Review

List of Forum Members 2007-2010

* Current Forum Participation

Member Organisations

| Country | Organisation | Contact Person |
|-----------------|---|---|
| Austria | Austrian Science Fund (FWF) | Christian Fischer* Falk J. Reckling* Rudolf Novak |
| | Austrian Academy of Sciences (ÖAW) | Walter Pohl* Arnold Schmidt* |
| Belgium | Fund for Scientific Research (FNRS) | Pascal Perrin |
| | Research Foundation – Flanders (FWO) | Hans Willems* |
| Croatia | The National Foundation of Science, Higher Education and Technological Development of the Republic of Croatia (NZZ) | Alenka Gagro* Janja Trkulja* |
| Czech Republic | Czech Science Foundation (GAČR) | Bohuslav Gaš* Radka Smrzova |
| Denmark | Danish Agency for Science, Technology and Innovation | Jette Kirstein* |
| | The Danish Council for Independent Research – Technology and Production (FTP) | Marcel A.J. Somers |
| Estonia | Estonian Science Foundation (ETF) | Meelis Sirendi* |
| Finland | The Academy of Finland | Risto Vilkkio* Riitta Mustonen Saara Leppinen |
| France | French National Research Agency (ANR) | Nakita Vodjdani* |
| | National Centre for Scientific Research (CNRS) | Pierre Gilliot* |
| | French National Institute of Health and Medical Research (Inserm) | Isabelle Henry* |
| Germany | German Research Foundation (DFG) | Catherine Kistner* Frank Wissing |
| | Max-Planck-Society (MPG) | Helene Schruff* |
| Hungary | Hungarian Scientific Research Fund (OTKA) | Előd Nemerkenyi* |
| Iceland | Icelandic Centre for Research | Magnus Lyngdal Magnusson* |
| Ireland | Health Research Board (HRB) | Oonagh Ward* Aoife Crowley Anne Cody* |
| | Science Foundation Ireland (SFI) | Stephen Simpson* |
| Italy | National Research Council (CNR) | Marta Caradonna* |
| | National Institute for Nuclear Physics (INFN) | Valerio Vercesi* |
| Luxembourg | National Research Fund (FNR) | Frank Bingen* |
| Netherlands | Netherlands Organisation for Scientific Research (NWO) | Anko Wiegel* Patricia Vogel |
| | Royal Netherlands Academy of Arts and Science (KNAW) | Jacco van den Heuvel |
| Norway | Research Council of Norway | Janicke Anne Giæver* |
| Portugal | Foundation for Science and Technology (FCT) | Maria do Rosário Costa* Maria Anjos Lopez Macedo* |
| Slovak Republic | Slovak Research and Development Agency (APVV) | Martin Filko* Sonia Ftáčnikova |
| Slovenia | Slovenian Research Agency (ARRS) | Stojan Pečlin* |
| Spain | Council for Scientific Research (CSIC) | José González de la Campa* |

| | | |
|----------------|---|--|
| Sweden | Swedish Research Council (VR) | Jonas Björck* Sofie Björling |
| Switzerland | Swiss National Science Foundation (SNF) | Thomas Zimmermann* Juliette Pont |
| Turkey | The Scientific and Technological Research Council of Turkey (TÜBİTAK) | Arif Adli* M. Necati Demir* |
| United Kingdom | Engineering and Physical Sciences Research Council (EPSRC) | Susan Morrell* Andrew Bourne Jo Garrad |
| | Medical Research Council (MRC) | David Cox Declan Mulkeen |

Observers

| Country | Organisation | Contact Person |
|---------------|--|--|
| | European Commission (EC) | Alan Cross* Jimmy Bruun-Felthaus* |
| | European Research Council (ERC) | Fiona Kernan* Frank Kuhn* |
| Italy | Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) | Gian Piero Celata* Carlo Cremisini* |
| Poland | Foundation for Polish Science | Marta Lazarowicz-Kowalik* |
| | Research Executive Agency (REA) | Renat Bilyalov* |
| United States | National Science Foundation (NSF) | David Stonner |

Coordination of the Forum

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|-------------------------------|
| Marc Heppener, Chair, ESF |
| Laura Marin, Coordinator, ESF |

Contributions from ESF Staff

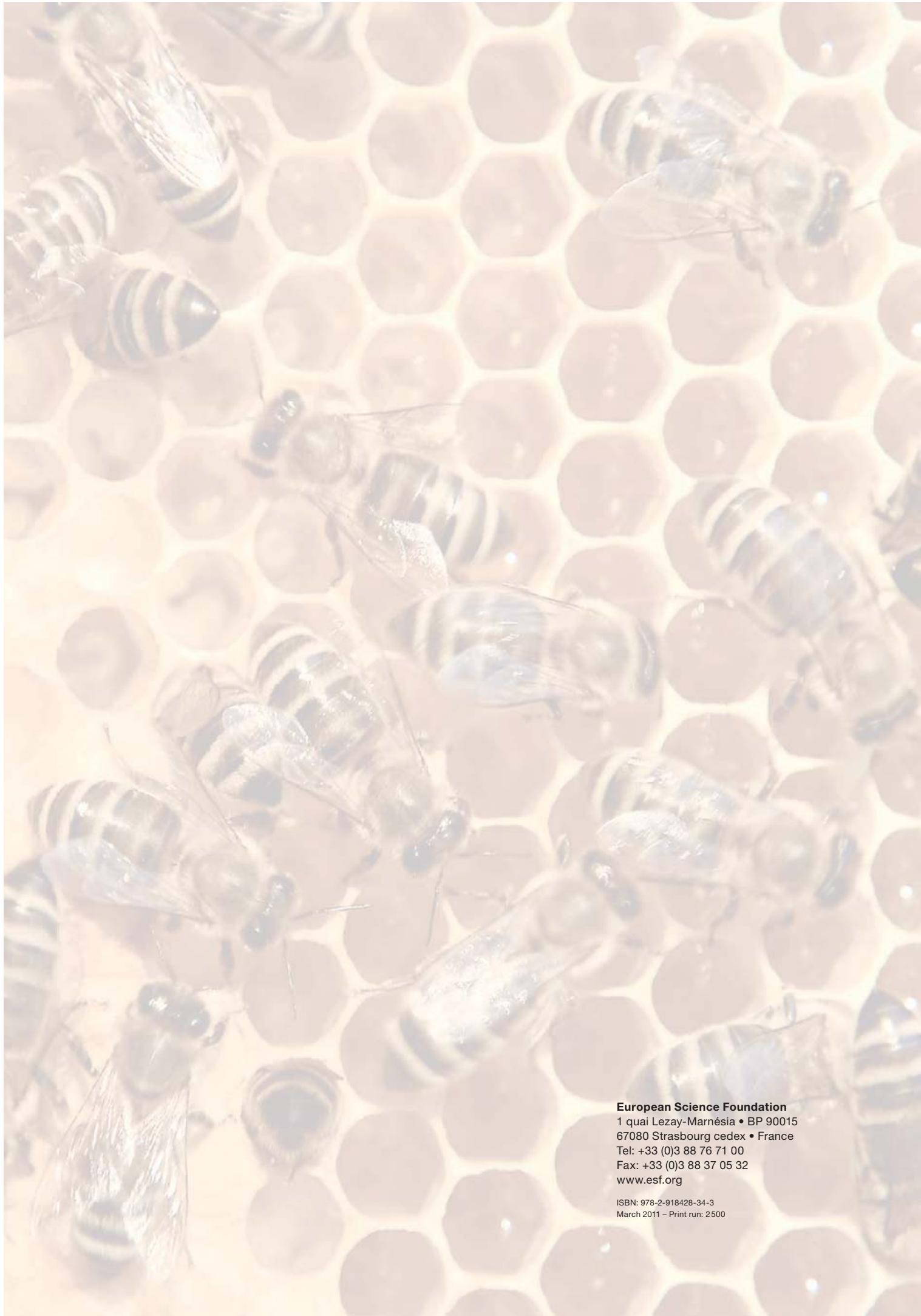
| Staff member | Role |
|---|--|
| Cristina Marras (on Secondment from CNR, Italy) | Co-author |
| Farzam Ranjbaran | Co-author |
| Katharina Fuchs-Bodde | Editorial advice and coordinator of the Survey |
| Hilary Crichton | Editorial advice |

The first part of the text discusses the importance of maintaining accurate records in a laboratory setting. It emphasizes the need for consistency and thoroughness in data collection and reporting. The author notes that any discrepancies or errors in the data can lead to incorrect conclusions and potentially compromise the safety of the research. Therefore, it is crucial to double-check all measurements and calculations before recording them.

In the second part, the author describes the experimental setup used for the study. This includes details about the equipment used, the materials, and the procedures followed. The goal is to provide a clear and detailed account of the methodology so that other researchers can replicate the experiment if needed. The author also mentions any challenges encountered during the process and how they were addressed.

The third part of the text presents the results of the experiment. The author provides a detailed analysis of the data collected, including any trends or patterns observed. Statistical analysis is used to determine the significance of the findings. The author also compares the results with previous studies in the field to provide context and highlight any differences or similarities.

Finally, the author concludes the paper by summarizing the key findings and discussing their implications. The author suggests potential areas for further research and provides recommendations for future studies. The overall tone of the paper is professional and objective, focusing on the scientific aspects of the research.



European Science Foundation
1 quai Lezay-Marnésia • BP 90015
67080 Strasbourg cedex • France
Tel: +33 (0)3 88 76 71 00
Fax: +33 (0)3 88 37 05 32
www.esf.org

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