

## Helmholtz Association – Scientific Evaluation

In view of the scientific evaluation of the centers in 2017-18, this white paper outlines the profile of the Helmholtz Association and the framework of the evaluation.

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### 1) Mission of the Helmholtz Association

The eighteen German national research centers jointly pursue long-term research goals within the Helmholtz Association. The association contributes to solving grand societal, scientific and technological challenges, by conducting interdisciplinary strategic research in the fields of *Aeronautics, Space and Transport, Earth and Environment, Energy, Health, Key Technologies, and Matter*. In order to meet these grand challenges, the Helmholtz Association brings together the resources of various disciplines and research centers and cooperates with key national and international partners in science, especially from universities and industry. By combining research and development with innovative application- and prevention-oriented strategies, the association aims to shape, preserve and improve the foundations of human life. The association is also responsible for planning and operating large-scale facilities and scientific infrastructure within the framework of national and international collaborative research alliances. It strongly promotes high-tech development and raises the international visibility of Germany as a major and attractive hub for science and technology.

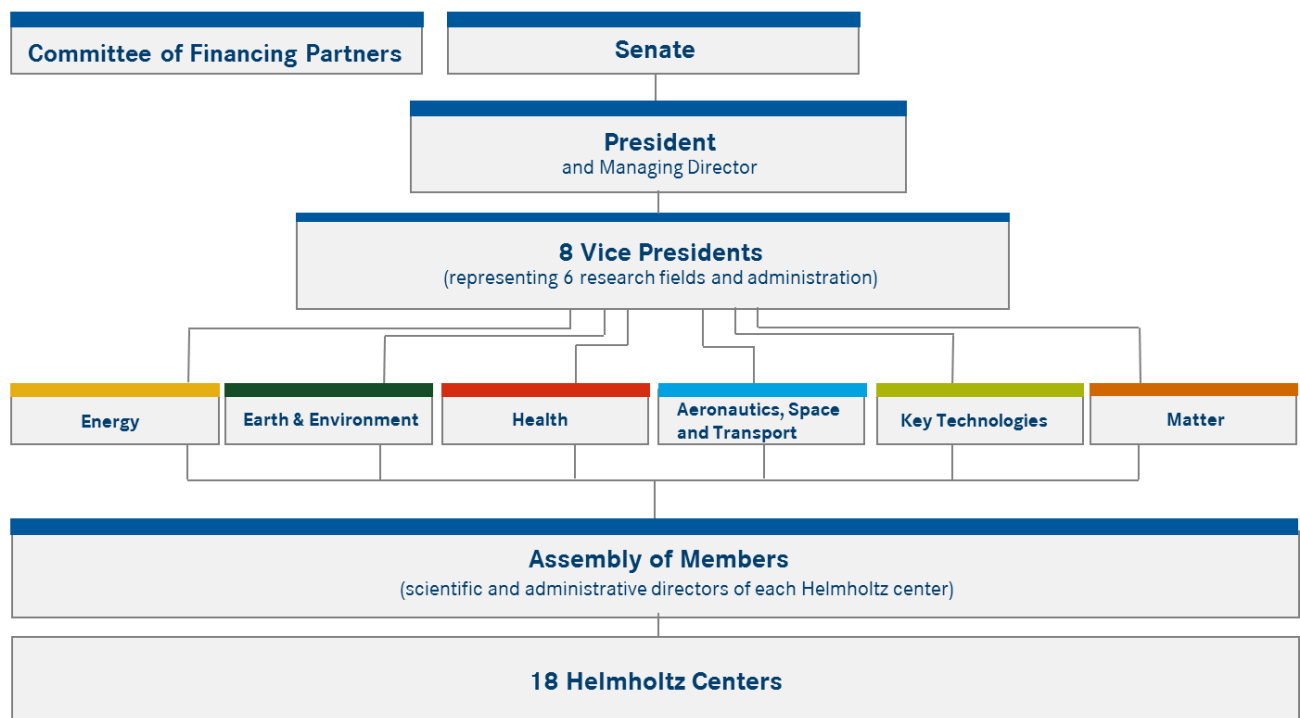
Research activities are organized in long-term programs, which are periodically reviewed by international experts. This forms the basis for the funding of Helmholtz's research by the federal government (90 percent) and the federal states (*Länder*, 10 percent) that host the Helmholtz centers.

The expertise, creativity and motivation of its staff are of utmost relevance for the Helmholtz Association. It therefore offers a large variety of opportunities for professional and personal development including scholarships and excellent working conditions. The association promotes equal opportunity, supports young scientists, contributes to their professional advancement by providing training in its research fields. Moreover, the Helmholtz centers train highly qualified technical personnel. Finally, the Helmholtz Association supports the dialogue between science and society, by communicating relevant research findings to the public, and promotes decision-making processes.

### 2) Overview of the Helmholtz Association

Research in the six research fields is performed in eighteen Helmholtz research centers. The centers are legally independent entities, organized under the umbrella of the *Helmholtz Association of German*

*Research Centers e. V.* The Helmholtz Association is led by a president, who is supported by the managing director and the Helmholtz head office. The president of the Helmholtz Association is responsible for implementing the program-oriented funding (PoF) system and developing the Association's general strategy. The president represents the Association internally, externally and internationally. He is the head of the executive committee composed of six scientific vice presidents (one for each research field) and two administrative vice presidents. The vice presidents are scientific or administrative directors of the Helmholtz centers. The scientific and administrative directors of all Helmholtz centers form the Helmholtz assembly of members, in which all relevant developments and decisions are discussed in regular meetings. The central decision-making body of the Helmholtz Association is its senate. It is composed of elected highly reputable experts from academia and industry and appointed "ex officio" representatives of federal and state government departments, the parliament and research organizations. The senate deliberates on all major decisions, such as program evaluations and funding, major investments, and elects the president and vice presidents. The members of the senate are elected by the representatives of the federal and state governments in the Committee of Financing Partners (*Ausschuss der Zuwendungsgeber*). This board decides on the strategic guidelines for program-oriented funding (see below). The following diagram gives an overview of the structure of the association.



The research activities are structured in six research fields,

- Aeronautics, Space and Transport,
- Earth and Environment,
- Energy,
- Health,
- Key Technologies,
- Matter

Within these six research fields, research activities are organized in research programs, pooling the unique research competences of centers in a complementary approach to jointly tackle long-term challenges with a strategic focus. The composition of the portfolio and budget distribution of the individual programs are determined, evaluated, monitored and managed through the process of program-oriented funding (PoF). Discussions in each research field take place in meetings of the management board consisting of the

executive directors of the participating Helmholtz centers; the research field platform comprising the members of the management board and representatives of the federal and the states ministries; and the strategic advisory board, which serves as an advisory committee for the research field and prepares the decisions of the Senate.

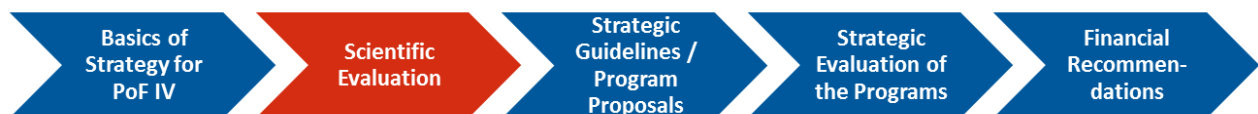
An important national task performed by the Helmholtz Association is the operation of large-scale facilities as user facilities for the national and international scientific community. Helmholtz is committed to operating these facilities for decades. The periodical review allows the association to plan future developments of the facilities and subsequently provide outstanding service to their users.

### 3) Principles of Program-oriented Funding

Program-oriented funding (PoF) was established in 2001 to strengthen cooperation between the legally autonomous Helmholtz centers, with competent research groups focusing their complementary competences in joint programs. The PoF provides the financial, strategic and scientific framework for coherent multi-year research programs within each research field.

Currently, all six research fields are in the third program period (PoF III). The research fields *Aeronautics, Space and Transport, Earth and Environment, and Health* have been in PoF III since 2014, while the research fields *Energy, Key Technologies, and Matter* have been in PoF III since 2015.

The transition to the fourth program period (PoF IV) is executed in five stages.



**First,** the management board of each research field initiates a strategic planning process to discuss and define its strategy and the cornerstones of the research in the upcoming years, giving rise to a comprehensive outline of the strategy. This strategy will be presented to the senate in spring 2017, and provides a strategic framework of the research field, in which the current research activities are embedded.

**Second,** the research and development activities of each Helmholtz center within each research field are evaluated. These scientific reviews will take place between October 2017 and April 2018 and assess the scientific performance of the centers. Further it addresses the research strategy of the centers and their corresponding contribution to the scientific portfolio of the research programs and the research field.

**Third,** the results of this evaluation provide the basis for discussing and finalizing the strategic guidelines for the strategic positioning of the research field with representatives of the federal and state ministries. After the guidelines for the research strategy are determined, the research field will enter the phase of strategy formation, in which the principal investigators of the research field will compose comprehensive proposals for new Helmholtz research programs.

**Fourth,** these proposals are evaluated in a strategic review.

**Finally,** the PoF process concludes with the recommendations of the senate for implementation and funding of the new programs, deduced from the results of both the scientific and strategic evaluations.

## 4) Scientific Evaluation of Helmholtz Centers and Research Programs

### a) Scope of the review

The scientific evaluation covers a center's scientific performance and its contribution to the current research programs within one research field. It is based on a written status report and an on-site review. The president of the Helmholtz Association and the directors of the center under review act as joint principals.

The review encompasses research work that is funded from the PoF budget. Supporting research funded otherwise (research grants or other institutional funding) at the Helmholtz Center or research carried out by a collaborating partner of another research organization can be presented in the review, if they are clearly earmarked as such in the review.

The review addresses three distinct levels:

#### Research Unit

The review panel evaluates the scientific performance (status, standing and future prospects) for each research unit (smallest unit defined by the director of the center) under review. This assessment should include a detailed statement and a rating (cf. Appendix E). The period under review covers the past four years for all research fields. In addition, the reviewers are requested to evaluate the unit's contribution to the current program and its topics, as well as its contribution to the center's goals and future research plan.

#### Research Program

The reviewers evaluate the past center's contribution to each research program with regard to the overall scientific performance and relevance. The period under review is the current program period. The reviewers will also give recommendations regarding the contribution of the planned research to the strategic priorities of the research field and its constituting programs.

#### Center

The reviewers rate the international standing of the center and its overall contribution to the research field<sup>1</sup>, and the alignment of the center's strategy with the goals of the current Helmholtz programs. Furthermore, the reviewers should assess the center's contribution to achieving the objectives of the Joint Initiative for Research and Innovation<sup>2</sup> (e.g. transfer of technology and knowledge, international cooperation, career development and equal opportunity).

The review includes the **program activities as well as the user facilities**, if applicable.

The criteria are listed in more detail in Appendix C.

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<sup>1</sup> In a few cases, the contributions to more than one research field are subject of one evaluation.

<sup>2</sup> Germany's federal and state governments launched the *Joint Initiative for Research and Innovation* to guide the future direction of research. An annual 3% increase in funding serves to ensure the effectiveness of Germany's research and opens up the freedom needed to foster scientific development.

As partner in the joint initiative the Helmholtz Association made a firm commitment to contribute to growth and prosperity by focusing on excellence; creating new forms of cooperation and networking; promoting early career scientists and researchers; and, encouraging innovation through new approaches.

## **b) Review Panel**

The review panel is composed of international high-caliber experts, who cover all aspects of the research activities of the center under review. It should include at least 30% international reviewers and 30% female reviewers and researchers from academia and industry. For this purpose, numerous national and international research organizations, federal ministries as well as the scientific advisory boards of the Helmholtz centers propose candidates in agreement with impartiality criteria shown in Appendix D, giving rise to a long-list of potential candidates for each center. The directors of the centers subsequently comment on the suitability of the competences of these individual candidates for the research portfolio of their center.

The responsibilities of the panel chair, who is appointed by the senate, include conducting the entire review process, and compiling the evaluation report for the center. The chair composes a short-list of potential candidates for the review panel in consultation with the scientific advisory board of the center, the president, and the members of the Helmholtz senate with expertise in the relevant fields. Potential conflicts of interests will be discussed on a case-by-case basis in accordance with the general rules and guidelines (Appendix D). To ensure the comparability of individual reviews, 10 full time equivalents (FTEs) (only program-financed scientists, excluding doctoral candidates and third-party funded staff) should be reviewed on average by 2 reviewer days (number of reviewers multiplied by the number of days equals 2).

The involvement of a limited number of experts from previous PoF evaluations or interim evaluations has proven to be very advantageous.

In general, a Helmholtz center participates in several research programs within one research field. To cover the full scope of the research activities, cross reviewers and program reviewers are appointed.

**Cross reviewers:** As a review panel only evaluates the center's contribution to a particular program, cross reviewers should be appointed to allow for an overall assessment of the entire program by one expert. A cross reviewer is a member of the review panels of those centers that cooperate in one particular program. Cross reviewers can also be appointed if two programs are linked tightly and contribute to joint research objectives.

**Program reviewers:** A program reviewer participates in one evaluation and is responsible for evaluating the center's contribution to one particular program. He will put the center's contribution to the program into the context of the overall portfolio of the program.

The cross and program reviewers are nominated by the president in consultation with the panel chairs and the chairs of the scientific advisory boards of the centers. They play a key role in preparing the evaluation report for the program.

## **c) Status Report**

The center prepares a status report for the review, which includes reporting on the performance of previous years as well as an outlook on the next program period.

The **status report** consists of two volumes:

- Volume 1 focusses on the research activities at the center and at program and research field levels, and their alignment with the future research strategy.
- Volume 2 includes the resource planning and indicators, and the curricula vitae of the principal investigators.

In addition, the reviewers will receive a questionnaire that addresses a set of questions for evaluating the status report regarding the scientific activities and the underlying strategy.

Both status report and questionnaire will be mailed six weeks prior to the on-site review. The reviewers are asked to return the completed questionnaire within four weeks to the Helmholtz head office. The response will serve as a basis for the chair for the preparation of the on-site review.

#### **d) On-Site Review**

During the on-site review (scheduled between October 2017 and April 2018), the review panel convenes at the site of the center. The agenda of the review is determined by the number and size of the research units under review and the number of reviewers involved.

In addition to the president, the scientific director of the center, the vice president of the research field, the respective program spokespersons and the head of the scientific advisory board of the center should be involved appropriately in the review process. User representatives should be involved for user facilities.

In an opening meeting, the president, the scientific director of the center and the vice president of the research field give an introduction to the review and explain the role of the reviewers in the process. The director outlines the center's strategy, and the vice president of the research field describes the current and future strategy of the research field. The program speakers present the respective programs.

Essential elements of the on-site review will be: the presentation of the units to be reviewed; discussions with scientists; interviews with representatives of the scientific advisory boards as well as several closed sessions of the panel for internal discussions and the preparation of the evaluation report. The on-site review concludes with the presentation of the main results in the presence of the president, the director of the center and others involved in the review. For user facilities, specific discussion of user aspects as well as a site visit (as far as possible) will be part of the review.

Optional elements such as poster sessions, laboratory visits, sessions with junior scientists, talks with representatives of important external partners and strategic matters, i.e. extent to which the objectives set out in the Joint Initiative for Research and Innovation (see above) have been achieved, can be discussed in an additional session.

The final decision on the agenda of the review will be made by the panel chair, in agreement with the Helmholtz head office and the center.

#### **e) Evaluation Report**

After the review, two review reports are issued:

**The evaluation report for the center** contains ratings and verbal remarks on the scientific performance for each unit reviewed as well as an assessment of its contribution to the center's strategy and to the programs and their topics. For each program and topic, there should be an assessment of the scientific performance of the center's contributions and the progress of implementation of the goals of this topic or program. It should comment on the center's (and its units') contribution to the planned programs. In addition, the report should include statements on the center's strategy pertaining to the research field, on the implementation of the objectives of the Joint Initiative for Research and Innovation (in so far as these lie in the responsibility of the centers, e.g., transfer of technology and knowledge, international cooperation, career development and equal opportunity). An assessment of the talent management should be given for individual units.

Special aspects for user facilities such as user access and management, in-house research, and life cycle analysis will be taken into account.

The responsibility for preparing the report lies with the panel chair. It should be completed within two weeks after the on-site review.

After the review, an **evaluation report for each program** is prepared on the basis of the evaluation reports for the centers. This process is coordinated by the Helmholtz head office in close cooperation with the respective review panel chairs as well as the cross and program reviewers. This evaluation report for the program should be completed within four weeks after the last on-site review of the participating centers.

## A. Profile of the Scientific Evaluation

<b>Principal:</b>	President of the Helmholtz Association as well as directors of the center
<b>Subject of review:</b>	Helmholtz center and its contribution to programs and the research field
<b>Perspective of review:</b>	Retrospective
<b>Systematics of review:</b>	Scientific performance including infrastructures, based on indicators
<b>Size of the panel:</b>	Benchmark: two to three reviewer days (number of reviewers multiplied by the number of days equals 2) per ten FTEs (PoF funded scientists excluding PhD students and third party funded staff)
<b>Reviewed period</b>	Past four years
<b>Scope of review:</b>	Evaluation of research units defined by the center. The scientific work will be presented at the level of research groups (about ten to fifteen FTE).
<b>Documents:</b>	Status report of the centers in two volumes:  Volume 1: overview of the Helmholtz Association, the research field and its programs as well as the center; scientific performance of the units and their contributions to the center and programs.  Volume 2: resource planning and indicators; CVs of the PIs.
<b>Preparation:</b>	Answers to a questionnaire on the status report.
<b>On-site review:</b>	Schedule: between October 2017 and April 2018 Duration: 2-4 days according to the benchmark of two to three reviewer days per 10 FTEs,

## B. Tasks of the Stakeholders

### a) Panel Chair

The panel chair bears a crucial role during the whole review process, and is involved in every important step of the procedure. The representative, who responsible for the research field at the Helmholtz Association's head office, assists the chair prior and during the entire evaluation process. A vis-à-vis meeting is planned for a detailed preparation of the review, which should also be attended by a representative of the center.

The tasks of the chairs include:

- Scheduling of the review
- Composition of the review panel
- Preparation of the on-site review
- Preparation of the review report
- Participation in the strategic advisory board of the research field

**Scheduling of the review:** Each of the 32 on-site reviews will take place between October 2017 and April 2018. The specific date will be set by the president upon suggestion of the chair and in consultation with the centers and their advisory boards. The head office will coordinate the scheduling of the 32 on-site reviews.

**Composition of the review panel:** The panel chair may add suggestions for reviewers and will submit a prioritized proposal for the composition of the panel.

**Preparation of the on-site review:** The chair sets the agenda for the on-site review in agreement with the head office and the center.

**Preparation of the review report:** During the on-site review, the draft of the evaluation report for the center will be compiled. This draft should be finalized within two weeks after the on-site review. A template for the review report will be provided by the Helmholtz head office.

**Participation in the strategic evaluation and strategy board of the research field:** It is of great benefit to link the scientific and strategic evaluations. Thus the Helmholtz-Association would be very grateful if the panel chairs participate in the strategic evaluation anticipated for 2019 or 2020.

In addition, Helmholtz establishes strategic advisory boards of the research fields, which will meet annually. The members of the strategic evaluation panel will be asked to join this advisory board during the following funding period.

## **b) Reviewers, Program Reviewers and Cross Reviewers**

The tasks of the panel include:

**General tasks:** All reviewers will receive the center's status report in preparation for the review. Along with this, a questionnaire will be sent to the reviewers that contains a set of questions on the status report. The answers should be sent to the head office and the center. The answers itself are not part of the review and do not prejudice its assessment.

**Cross reviewers and program reviewers:** Programs comprising substantial contributions of several centers will be reviewed by different panels. Hence cross reviewers and program reviewers should be appointed:

- A cross reviewer for each program, i.e., a reviewer who is a member of the review panels of those centers that cooperate in one program
- A program reviewer for each program participates in one evaluation and is responsible for evaluating the center's contribution to that program. He or she receives additional information on the program as a whole prior to the evaluation.

The cross reviewers and program reviewers are nominated by the president in consultation with the panel chairs and the chairs of the scientific advisory boards of the centers participating in the program. They play a special role in preparing the evaluation report for the Helmholtz program.

## **c) Centers and Principal Investigators**

### **Tasks of the Centers**

The centers are responsible for the preparation of the report and the execution of the on-site review. Their tasks can be grouped in following aspects:

The centers will compile the status report (in two volumes) based on a provided template. It will be sent to the reviewers six weeks prior to the on-site review. Along with the status reports, a questionnaire, and some detailed information about the Helmholtz Association and its strategy will be sent to the reviewers.



The centers arrange for the travel planning of the members of the review panel including transfer and accommodation.

They organize the on-site review according to the standards given by the Helmholtz Association and the agenda set by the panel chair.

### **Tasks of Principal Investigators and Scientists**

The scientists of the centers and especially the principal investigators are in the spotlight of the review. Therefore, they have an important role in the preparation of the status report and the presentation for the on-site review:

Preparation of the status report: Each research unit presents its research of the previous four years, down to the level of research groups of approximately ten FTE. Each principal investigator should provide a CV for volume 2 of the status report.

On-site review: The principal investigators present their research to the review panel. In addition to the principal investigators, postdocs and doctoral students might be interviewed during the on-site review.

### **Tasks of the directors of the centers**

The president of the Helmholtz Association and the directors of the centers are joint principals of the review. Thus the directors of the centers have an important role in governing the review. The directors are also involved in the on-site review and they will receive the review reports.

### **Tasks of the scientific advisory boards**

Their chairs of the scientific advisory boards of the centers are involved in the selection of the reviewers and in the on-site review. They will participate in special sessions. After the review, the scientific advisory boards will receive the evaluation reports with a request for comments. In addition, they will advise the directors on how to implement the recommendations of the report.

### **d) Helmholtz Head Office**

The head office of the Helmholtz Association coordinates the entire process of the scientific evaluation on behalf of the president. It supports the president and the panel chairs. The main operational assignments of the head office are:

- Preparation of prioritized proposals for selection of reviewers
- Preparation of standards and templates for the evaluation and the documents
- Coordination of the scheduling of the review
- Support of the panel chair, in particular in preparation of the review report on center level
- Coordination of the compilation of the review report on program level written by the chairs and the program reviewers

## **C. Review Criteria**

### **a) Criteria with regard to the units to be reviewed**

The review should be based on a few, well-formulated questions covering the following aspects:

#### (1) Scientific performance

- Overall quality and innovative potential of the conducted research
- Scientific achievements in relation to unit's size (Full time equivalents of the program-funded scientists), available infrastructure and funding)
- International standing
- Future plans and prospects
- Career development

Inter alia, as for the specific strengths/weaknesses, the criteria should elucidate the balance between “high-risk, high-reward” and “bread-and-butter” projects, and also the national and international competitiveness.

The management boards of the research fields can add criteria such as the “uniqueness” of the unit under review.

#### (2) Contributions to the programs and their topics

Assessment of the contribution to the main objectives and milestones of the programs and their topics; as basis serves the topic/program as presented in the spokespersons' brief description of the program/topic (main objectives / milestones / strategic recommendations from the previous PoF review).

#### (3) Contribution to center's strategy

Assessment of the contributions of the organizational to the center's strategy

### **b) Criteria with regard to topic and program level**

The criteria for the topic and program level are split into three areas:

#### (1) Center's contribution to the program within the research field:

- its scientific quality and performance
- its strategic relevance
- the alignment with the topic and program structures and their objectives

#### (2) Recommendations for further development

Recommendations for improvement and further development of the center's contributions to the current programs

#### (3) Contribution to future research strategy

Assessment of the potential of the center's contribution to future research strategy of the research field and its constituting programs

### **c) Criteria with regard to user facilities**

- instrumentation and technical realization
- scientific quality and performance
- strategic planning and relevance (for the research center, the programs, the research field, and the international science community)
- user availability and service

## D. Conflicts of Interest

In order to ensure integrity and impartiality in the scientific evaluation processes of the Helmholtz Association, reviewers are selected carefully according to a strict and standardized procedure. Candidates have to disclose potential bias or conflicts of interest during the recruiting phase prior to the evaluation.

Conflicts of interest can exist between potential reviewers and individual principal investigators or between reviewers and the research institution under review.

The list given below comprises criteria for the determination of conflicts of interest, with exclusion criteria referring to evident conflicts of interest. On the basis of these criteria, the president of the Helmholtz Association and the chair of the review panel will jointly decide whether or not the person may be considered as a reviewer. However, if a potential candidate fulfills at least one exclusion criterion, the candidate will be excluded from participating in the review.

Any potential conflicts of interest of the participating reviewers have to be disclosed prior to the review and will subsequently be documented in the review report.

**A person is obliged to disclose any connection, association or affiliation to the entity under review, to which at least one of the following criteria applies:**

- a)** Recent (within the last six years), ongoing or specifically planned
  - joint publications with principal investigators
  - scientific collaborations with the center or a principal investigator (a scientific collaboration generally gives rise to the exclusion from the panel, unless the collaborative project is conducted in a large consortium)
  - membership in supervisory or advisory boards of the center (exclusion criterion)
  - use of (joint) infrastructure or facilities of the Helmholtz Association
- b)** Past, ongoing or specifically planned (ongoing and specifically planned connections qualify as exclusion criteria)
  - employment at the center or involvement in a recruiting process
  - dependencies in a capacity as a supervisor or advisor to principal investigators or due to contractual commitments
- c)** **Close personal relationship with a principal investigator**
- d)** **Direct scientific competition**
- e)** **Own economic interests**

## E. Rating

Rating will be conducted according to the following five-point scale.

Grade	
outstanding	Extremely strong performance at the level of international leadership. Groundbreaking research with high potential for transformative societal impact. Essentially no weaknesses.
excellent	Very strong performance and innovative research at an exceptionally high international level. High potential for significant societal impact. Some negligible or minor weaknesses.
very good	Strong research at the level of national leadership. Considerable potential for significant impact on the field. Several minor weaknesses
good	Overall performance at a nationally competitive level with solid potential for impact on the field. Several minor and at least one moderate weakness.
fair	Mediocre performance and unconvincing research approaches. Limited potential for relevant impact on the field. At least one major weakness.

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