Standards to ensure good scientific practice and procedures for handling scientific misconduct at the IPN - Leibniz Institute for Science and Mathematics Education

Disclaimer: This English translation of the „Standards zur Sicherung guter wissenschaftlicher Praxis und Verfahren zum Umgang mit wissenschaftlichem Fehlverhalten am IPN“ is provided for informational purposes. The English text was carefully translated and reviewed for accuracy. In the event that the English and German versions permit different interpretations, the German text shall prevail.

Research integrity is the foundation of trustworthy science. It is the scientific community itself that ensures good scientific practice by thinking and acting honestly, not least through organizational and procedural regulations. All research institutions are called upon to protect science and themselves from falsification and to take action against misuse and manipulation of scientific results. Commitment to the rules of good scientific practice is a DFG funding criterion.

The standards described below are based on the Code "Guidelines for Safeguarding Good Research Practice" (August 2019) of the Commission tasked to revise the white paper "Safeguarding Good Scientific Practice" and the "Rules of Procedure for Dealing with Scientific Misconduct" of the DFG as well as corresponding recommendations of the Leibniz Association. Reference is made in each case to the respective guidelines of the DFG Code to which the individual standards refer.

The standards apply to all persons working at the IPN, including all professors, researchers of all qualification levels, employees in service, administration and other business areas. In the following, these persons are generally referred to as employees. Compliance with these standards is mandatory.

1. Standards of good research practice

1.1. Commitment and professional ethics (Guidelines 1 and 2)

IPN employees are obliged to comply with the standards of good research practice. Each employee is responsible for ensuring that his or her own conduct complies with the standards of good research practice and that the fundamental values and norms of scientific work are realized in his or her actions. The IPN management shall ensure that these standards are made known to the researchers and obligate them to comply with them. Teaching the basics of good scientific work begins at the earliest possible stage in academic teaching and scientific training. Researchers at all career levels regularly update their knowledge of the standards of good research practice and the state of research and support each other in doing so.

1.2. Organizational responsibility of heads of IPN (Guideline 3)

The IPN management provides the framework conditions for scientific work. It ensures compliance with and communication of good research practice as well as appropriate career support for all researchers. The IPN management guarantees the prerequisites for the employees to comply with legal and ethical standards. At the IPN, this includes the possibility to

submit one's own research project to the IPN Ethics Committee as well as the obligation to have school research projects approved by the responsible ministry. The framework conditions include clear and written procedures and principles for personnel selection and personnel development (by the staff council in cooperation with management) as well as for the promotion of young researchers (through the “Wissenschaftssausschuss”, the mentoring program and other promotion initiatives) and equal opportunities, as regularly recorded in the equal opportunity policy.

1.3. Good research practice (Guidelines 7-9; 11-16)

General principles of scientific work especially include the following aspects.

1.3.1. General aspects

Good scientific practice means working *lege artis* and always following the latest research findings. It requires knowledge and utilization of the relevant literature and the use of scientifically sound and comprehensible methods according to the latest findings. The identification of relevant and appropriate research questions requires careful research of publicly available research, for which the IPN provides the necessary framework. Findings and ideas of other scientists as well as relevant publications of other authors must be appropriately cited. Special emphasis is to be placed on quality assurance and the establishment of standards in the development and application of new methods. When interpreting data, care is to be taken to apply methods that avoid (unconscious) bias. Consideration is always to be given to whether and, if so, how gender and diversity may be significant to the research project (in terms of methods, work program, goals, etc.). The respective framework conditions are taken into account when interpreting findings.

Good research practice is characterized by doubt and self-criticism, by critical examination of the findings obtained and their control, for example by cross-checking within a working group. It is also characterized by strict honesty with regard to the contributions of partners, competitors and predecessors. The participants in a research project interact on a regular basis. They define their roles and responsibilities in an appropriate manner and adjust them as necessary. An adjustment is appropriate especially if the main work focus of a participant in the research project changes.

1.3.2. Documentation and quality assurance

Meticulous quality assurance is an important characteristic of scientific integrity. In addition to integrity towards oneself and others, it is the basis for scientific professionalism. It is safeguarded by (critical) cooperation in scientific working groups and clear structures of responsibility. If scientists have made findings publicly available and subsequently notice discrepancies or errors, they correct them.

Quality assurance and thus good scientific practice also include the documentation of all work steps and results as well as the secure storage of all records and primary data, ensuring reproducibility prior to publication, and creating access opportunities for authorized third parties. The origin of data, materials and software used or developed in the research process is identified and subsequent use is documented; the original sources are cited; the source code of publicly accessible software should be persistent, citable and documented. The type and scope of research data generated in the research process are described in accordance with professional recommendations. If the documentation of research results cannot meet the

respective professional requirements, the limitations and reasons for this are to be explained in a comprehensible manner. As a rule, individual results that do not support the research hypothesis need also be documented. A selection of results in this context must be avoided. According to the Research Data Policy of the IPN, the publication of data, materials, methods, software (including source code) and results, for example in scientific repositories, is explicitly supported when the FAIR principles ("Findable, Accessible, Interoperable, Re-Usable") are adhered to and when a complete description and comprehensive presentation of the work processes is provided. This may not depend on the interests of any third parties, for example funders.

1.3.3. Authorship and publications

An essential aspect of good scientific practice is the responsibility of (co-)authorship. The authors of scientific publications as well as scientific presentations at conferences and similar events are jointly responsible for their contents. Depending on the conventions of the respective field, an author is someone who has made a genuine, traceable contribution to the content of a scientific text, data or software publication. A comprehensible, genuine contribution exists in particular if a researcher is involved in a scientifically relevant way in

a. the development and conception of the research project or

b. the development, collection, procurement, provision of the data, software, sources, or

c. the analysis/evaluation or interpretation of the data, sources and the conclusions drawn therefrom; or

d. has participated in the writing of the manuscript/presentation/poster.

Honorary authorships are excluded. A managerial or supervisory function does not in itself constitute co-authorship. The researchers agree on who should become the author(s) of the research results. When a contribution is not sufficient to warrant authorship, acknowledgement of support elsewhere is possible in footnotes, acknowledgements, or the preface.

Agreement on the order of authors is reached in a timely manner, usually no later than when the manuscript is formulated, on the basis of comprehensible criteria, taking into account the conventions of each discipline. Required consent to publication of results may not be withheld without sufficient reason. Refusal of consent must be justified by a verifiable criticism of data, methods, or results. The authors are accountable, self-identify with the scientific result and take responsibility for the content of the publication.

Fragmentation of studies for the purpose of separate publications should be avoided. Repeated publication of the same results without explicit reference to the repetition is not permitted. Self-citations are to be limited to the minimum required for understanding.

Authors carefully select the publication medium - taking into account its quality and visibility in the respective field of discourse. The scientific quality of a contribution does not depend on the publication medium in which it is published. Researchers performing the function of editors carefully check the quality of the publication entities they perform this task for. Researchers who evaluate submitted manuscripts, grant applications, or the credentials of individuals are bound to strict confidentiality in this regard, do not disclose the contents to third parties, and do not use them for their own purposes. They shall disclose all facts that may give rise to concern of bias. The obligation to maintain confidentiality and to disclose facts that may give rise to concerns of bias also applies to members of scientific advisory and decision-making bodies.

2 The implementation of standards of good scientific practice at the IPN

2.1 Organizational structures (Guideline 4)

The departments and the projects ensure that

- the objectives of the research work and the tasks, roles, rights and duties of the individual team members are established, defined and distributed,
- each team member is also informed of these responsibilities,
- each team member enjoys an appropriate balance of support and personal responsibility commensurate with their career level, and
- regular checks are carried out to ensure that targets are being met.

The directors of the departments and, in the case of interdepartmental projects, the project leaders are responsible for the quality assurance of the scientific work of the IPN as well as for the settlement of conflicts. The management task also specifically includes ensuring appropriate individual supervision of young researchers - embedded in the overall concept of the IPN - as well as career support for research and support staff, enabling them to shape their own careers through increasing independence. Abuse of power and exploitation of relationships of dependency are to be prevented by means of suitable organizational measures (e.g. involvement of staff representatives or ombudspersons).

2.2 Training and promotion of young researchers (Guideline 4)

The department directors ensure appropriate supervision and guidance of younger researchers, doctoral candidates, and students. The Graduate School as well as the mentoring program of the “Wissenschaftssausschuss”, which provides each doctoral student with two mentors, support this task. In the training and professional support/supervision of young researchers, it is ensured that the standards of good scientific practice are communicated and that young researchers are supported in complying with them.

2.3 Evaluation Criteria (Guideline 5)

A multidimensional approach is required for evaluating the performance of researchers: In addition to scientific, especially qualitative, performance, other aspects such as involvement in the IPN's committees or teaching should also be taken into account. According to the service agreement on the regulation of performance bonuses, achievements that strengthen the reputation of the institute are to be especially valued. As far as voluntarily stated, personal, family or health-related absences or thereby extended training or qualification periods, alternative career paths or comparable circumstances are also appropriately taken into account - in addition to the categories of the General Equal Opportunities Act.

2.4 Data (Guideline 17)

Clear guidelines and rules on the manner of recording and data documentation are to be established in the projects; the responsibility for this lies with the project managers. Primary data shall be stored on durable and secured carriers for at least 10 years at the IPN. The IPN provides the necessary infrastructure for this purpose. The additional use of universally accessible repositories is supported. Archiving is governed by the applicable IPN-internal rules for research data management in the Research Data Policy of the IPN.

In addition, all employees of the IPN are obliged to comply with the rules of data protection according to the European Data Protection Regulation (DSGVO) and, in particular, to handle personal data with care and discretion. Consent to the processing of personal data must generally be obtained, and such data must be deleted again upon request; deadlines for data deletion must be strictly observed. Common procedures for pseudonymization and anonymization are to be applied. The IPN's data protection officer will advise on all questions in this regard.

2.5 Ombudsperson (Guideline 6)

For the arbitration or settlement of disputes or disagreements in connection with good scientific practice, which do not already contain an accusation of scientific misconduct, two persons from among the research staff of the IPN are elected for the ombudsman function (ombudsperson plus deputy in case of concern of bias or prevention). The ombudsperson and his/her deputy may not be a member of the Departmental Administration Meeting (ALK) or chair(s) of the “Wissenschaftsausschuss” (WA) or the Staff Council (PR) while holding this office. The term of office for ombudspersons is limited to five years. An additional term of office is possible. The result of the election to the ombudspersons will be announced via the institute-wide e-mail distribution list. The elected ombudsperson as well as his or her deputy have their own presence on the intranet of the institute and can be reached via a functional e-mail address known to the employees.

The elected ombudspersons are researchers with a doctorate degree and integrity who have experience in conducting and supervising research projects. They advise as neutral and qualified contact persons in questions of good scientific practice and in suspected cases of scientific misconduct and contribute, as far as possible, to solution-oriented conflict mediation. In such cases, IPN employees are free to contact either the IPN ombudsperson, the Leibniz Association ombudsperson or the "Ombudsman for Science" committee set up by the DFG. The ombudsperson receives the inquiries while maintaining confidentiality and, if necessary, initiates further steps such as the establishment of an investigative commission. The ombudsperson and his or her deputy receive the necessary substantive support and acceptance from the management in the performance of their duties and carry them out independently.

All employees of the IPN are requested to inform the ombudsperson immediately in case of suspicion of scientific misconduct.

2.6 Ethical and legal framework (Guideline 10)

Researchers shall handle the constitutionally granted freedom of research in a responsible manner. They take into account rights and obligations, especially those resulting from legal requirements, but also from contracts with third parties, and, if necessary, obtain and submit approvals (especially from the ministries of education) and ethics votes (from the IPN Ethics Commission). A thorough assessment of the research consequences and evaluation of the respective ethical aspects should be carried out with regard to research projects. The legal framework of a research project also includes documented agreements on the rights of use to research data and research results arising from it, which should be reached in each case as early as possible. The researcher who collected the data generally has the first right of access, even if the research institution changes. Further details are regulated by the Research Data Policy of the IPN.

3 Procedures for dealing with research misconduct

3.1 Research misconduct

Scientific misconduct is defined as the deliberate or grossly negligent making of false statements in a scientific context, infringement of the intellectual property of others, or impairment of their research activities in any other way. In particular, misconduct is considered to be:

(1) Misrepresentation

- the fabrication of data,
- falsifying data, for example, by selecting and rejecting undesirable results without disclosing this, or by manipulating a representation or illustration,
- providing incorrect information in an application letter or grant proposal (including misrepresentation of the publication organ and publications in print).

(2) Removal of primary data to the extent that this violates legal requirements or other accepted principles of scientific work

(3) Infringement of intellectual property with regard to a copyrighted work created by another or essential scientific findings, hypotheses, teachings or research approaches originating from others, i.e.::

- the unauthorized exploitation by assuming authorship (plagiarism),
- the exploitation of research approaches and ideas, especially as a reviewer (theft of ideas),
- the presumption or unfounded assumption of scientific authorship or co-authorship,
- the falsification of the content,
- the unauthorized publication and unauthorized making available to third parties as long as the work, the finding, the hypothesis, the teaching or the research approach has not yet been published,
- claiming the (co-)authorship of another without the latter's consent.

(4) Interfering with the research activities of others by

- sabotaging research activity, i.e., including damaging, destroying, or tampering with experimental setups, equipment, records, hardware, software, chemicals, or other items needed by another person to conduct an experiment,
- the grossly erroneous, deliberately false or misleading expert evaluation of the research activity of others and the preparation of favorable opinions.

Joint responsibility in scientific misconduct may result from, among other things, active participation in the misconduct of others, i.e.:

- co-authorship of publications containing falsification,
- gross neglect of supervisory duties.

3.2 Initiation of the procedure (Guidelines 18 and 19)

In case of actual suspicions of scientific misconduct, the ombudsperson is to be informed. The ombudsperson receives the inquiries while maintaining confidentiality and examines the

allegations on the basis of the applicable rules. As a rule, anonymous reports are possible. The presumption of innocence applies at every stage of the procedure, and at every stage the whistleblowers and those affected should be given the opportunity to state their position. The ombudsperson convenes a five-member ad hoc investigation commission, consisting of one unbiased member each from the Heads of Department Meeting (ALK), the “Wissenschaftssausschuss” (WA), the IPN Ethics Commission, and the Staff Council (PR). The ombudsperson is also a member of the commission, but does not chair it and serves only in an advisory capacity. A substitute shall be provided for all members. A designated member may refuse the membership for good cause; likewise, the person affected by the suspicion is permitted to point out a possible bias of one or more designated members, which is to be carefully examined by the commission. All members of the commission are committed to absolute confidentiality. All information needs to be in writing. In case of verbal information, a written memo must be created by the commission.

If the Managing Scientific Director himself/herself is affected by the suspicion of misconduct, the ombudsperson informs the Chairperson of the Scientific Advisory Board of the IPN about the matter.

Establishment of the facts on which the expressed suspicion is based shall be undertaken. The exact determination of what happened shall be made without delay. The investigations shall be initiated or carried out by the investigative commission. They shall be conducted in strict observance of confidentiality and the protection of all persons concerned. The whistleblower's report must be made in good faith. Deliberately false or wanton allegations may themselves constitute scientific misconduct. Even in the case of misconduct that is not later proven, the person making the report in good faith should not suffer any disadvantages for his/her own scientific or professional advancement.

The person(s) affected by the suspicion of misconduct shall be given the opportunity to comment, stating the incriminating facts and evidence, no later than one week after the suspicion becomes known. The time limit for the statement shall be four weeks. Without the informant's consent, the name of the informant will only be disclosed to the person concerned at this stage of the proceedings in exceptional cases, if the person concerned by the allegations cannot otherwise defend him/herself properly or if there is a legal obligation to do so.

Once the statement of the person or persons concerned has been received or the deadline has expired, the investigating committee shall, generally within two weeks, make a decision as to whether the findings to date have invalidated the suspicion of misconduct, whether the suspicion has become stronger or whether misconduct is to be regarded as proven. The principle of the free evaluation of evidence applies, the decision must be made unanimously and recorded in writing in a memo.

Should the suspicion intensify, the Investigation Commission shall decide on the initiation of further actions and inform the Managing Scientific Director or the Chairperson of the Scientific Advisory Board, should the former himself/herself be affected by the allegations.

If it becomes apparent in the course of an investigation that a final clarification of the allegations is not possible internally at the IPN or that the conduct of the proceedings is prevented due to extraordinary circumstances, the ombudsperson shall submit the case to the central ombudsperson of the Leibniz Association.

If the accused is exonerated, this person shall be fully rehabilitated. The investigative

commission shall develop appropriate measures in agreement with the person to be rehabilitated.

3.3 Proven misconduct

Should scientific misconduct be deemed proven, the Managing Scientific Director or the Chairperson of the Scientific Advisory Board, consulting the Staff Council and, if necessary, external expertise, shall decide on the necessity of further measures at their due discretion. Depending on the circumstances of the individual case and in particular the severity of the misconduct found, sanctions from a wide variety of legal areas are possible, if necessary also cumulatively, including:

(1) Consequences under labor law

- Written warning
- Extraordinary termination
- Termination of contract

(2) Academic consequences

- Revocation of the doctoral degree
- Revocation of the authorization to teach

(3) Civil law consequences

- Issuance of a ban from the premises
- Claims for restitution against the person concerned, e.g. for the return of stolen scientific material
- Claims for removal and injunctive relief under copyright law, personal rights, patent law, competition law
- Claims for restitution, e.g. of scholarships or third-party funds
- Claims for compensation by the institute or third parties

(4) Penal consequences

(5) Revocation of scientific publications

Publications that are erroneous due to proven scientific misconduct must be withdrawn if they are still unpublished and corrected if they have already been published (revocation). If necessary, cooperation partners are to be informed in an appropriate form. Authors and publishers involved are always obligated to do so. Should they fail to take action within a reasonable period of time, the Managing Scientific Director shall initiate the appropriate measures available.

Information of the public: In cases of serious scientific misconduct, the Managing Scientific Director informs other affected research institutions or scientific organizations, if necessary also professional organizations. The Managing Scientific Director may be obliged to inform affected third parties and the public in order to protect third parties, to maintain confidence in scientific honesty, to restore the scientific reputation of the IPN, to prevent consequential damage, and in the general public interest.

Effective date

This revised version of the "Standards for Ensuring Good Scientific Practice at the IPN - Leibniz Institute for Science and Mathematics Education and Procedures for Dealing with Scientific Misconduct" replaces the version of November 1, 2019 and becomes effective upon its announcement within the Institute.

Kiel, July 1st, 2021

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