

Directive concerning research integrity and good scientific practice at EPFL

LEX 3.3.2

1st May 2009, status as at 1st January 2017

The Direction of the Ecole polytechnique fédérale de Lausanne,
based on Art 11, par. 2 a, of the *loi fédérale sur l'encouragement à la recherche et à l'innovation* (LERI RS 420.1),
hereby adopts the following:

Preamble

Research, in all domains, is an important activity of every human society and represents a major commitment on the part of the various people involved, whether in the public or private sector. Research results constitute the basis for political and technical decisions, both at government level and in the private sector. Consequently, it is essential that the research itself be conducted with integrity, in a responsible manner and in accordance with high ethical standards.

« Scientific integrity » defines the commitment of researchers to adhere to the fundamental rules of good scientific practice. Concern for the truth, open-mindedness, self-discipline, self-criticism and rectitude are essential characteristics of ethical behaviour. They represent the basis of all scientific activity and are prerequisites for the credibility and acceptance of science. It is the responsibility of all EPFL researchers to uphold the good reputation of the institution, to respect its rules, policy and guidelines and undertake their activities accordingly. It is thus of the utmost importance that all EPFL members should conduct research with total integrity. Moreover, experience shows that, in day-to-day research work, even experienced scientists may have questions regarding the best way of carrying out their research successfully.

The present « Directive concerning research integrity and good scientific practice at EPFL » defines the rules, based on long experience, that apply to EPFL researchers in all disciplines. These rules are primarily intended to serve as a basis for the planning, execution, presentation and evaluation of research work at EPFL. They have been deeply inspired by the guidelines issued by the *Académies Suisses des Sciences*¹. These rules are recalled with the aim of contributing to the improvement of the level of intellectual rigour of research carried out within our institution.

Article 1 Introduction

¹ The purpose of the present directive is to define the guiding principles for the planning, execution, presentation and evaluation of research work.

² This directive applies to all members of EPFL involved in scientific research (including students and technical staff).

³ EPFL members who are involved in large international research consortiums must also apply the rules of good scientific practice provided by the consortium, which may refine the present directive.

¹ This directive has been drawn up mainly on the basis of the following document : Swiss Academies of Arts and Sciences : "[Integrity in scientific research : principles and rules of procedure](#)", ISBN 978-3-905870-06-0, 2008 ([Swiss Academies of Arts and Sciences](#))

Chapter 1 **Research integrity and good scientific practice**

Section 1 Planning of research projects²

Article 2 Definition of research objectives

All members of the scientific community carry out research mainly motivated by curiosity and academic freedom. Each member selects their own research topics, according to their perception of different issues such as the long-term needs of society or improvement of the quality of life. A responsible exercising of this freedom determines certain limits however, particularly via the choice of research objectives and methods that must comply with ethical rules.

Article 3 Compliance with legal and institutional regulations

Every EPFL researcher must comply with all the rules applicable to their research domain (Annex 1).

Article 4 Project management

¹ **Project managers** (hereinafter PI: principal investigator) are the individuals responsible for the execution of a scientific project, for example, professors, researchers, assistants and post-doctoral students. This function may be performed by one or several individuals, depending on the size of the project.

² Within the framework of the research project, the PI must play the leading role in the guiding and **supervision of junior researchers**. They must particularly ensure that all participants in the project are aware of the present directive.

³ The responsibilities of the PI are to:

- ensure that junior researchers are provided with sufficient supervision and equipment throughout the estimated duration of the project;
- help doctoral students to prepare, in due course, a research plan specifying the content of the thesis and the proposed work schedule, as indicated in the Ordinance on the doctorate conferred by the EPFL³ and the Directive concerning doctoral studies at the Ecole polytechnique fédérale de Lausanne⁴;
- support junior researchers in their efforts to become independent researchers.

Article 5 Rights concerning projects financed by third parties

The rights concerning research results obtained at EPFL within the framework of projects financed by third parties will be specified in the contract concluded⁵ with the financing body **before the start** of the project.

² Research project: any kind of research work or service contract.

³ [Ordonnance sur le doctorat délivré à l'École polytechnique fédérale de Lausanne](#)

⁴ LEX 2.4.1 [Directive concerning doctoral studies](#) l'Ecole polytechnique fédérale de Lausanne

⁵ LEX 3.4.1 [EPFL directive on research contracts and technology transfer \(DSCRTT\)](#)

Article 6 Project plan

¹ Documentation: the research plans of projects financed by third parties and their subsequent major modifications must be recorded in writing. They must be perfectly comprehensible by all participants in the project and persons responsible for checking the research results. The plan must provide sufficient information concerning the persons responsible and their specific role in the project, financing and its sources, and the processing of data or material.

² Conflict of interests: many of the professional activities of researchers generate the possibility of a conflict of interests⁶. Any professional relationship or action that may result in such a conflict of interests must be truthfully disclosed to the body managing the project, the sponsor or the Vice-President for Research. When objectivity and effectiveness cannot be maintained, the activity must be avoided or terminated.

³ Patent application: If a patent application⁷ is being considered, the appropriate rights and obligations must be established in due course, in the form of an agreement between all participants.

Section 2 Carrying out of research projects

Article 7 Data and material

¹ The fabrication of data or the selective publication of data with the intention of deceiving or misleading constitutes serious scientific misconduct. The same applies to the theft or unauthorised copying of the data or research results of others⁸.

² Research results must be recorded and stored in a form that allows their analysis and subsequent examination by authorised persons. Consequently, records must be drawn up and kept of the research methodology and procedures followed, the raw data, decisions made, analysis and interpretation of results, including intermediate results. It is advisable to create a transparent and verifiable archiving system of the results obtained during the research. A team linking the Research Office, the VSPI and the EPFL Library is available for the PI for the implementation of data managements plans: researchdata@epfl.ch⁹.

³ The records must contain sufficient detail to provide clear answers to questions concerning the validity of data or conducting of research activities. Such questions may arise following doubts expressed by third parties regarding the obtained research results, and it is therefore essential to have clear, up-to-date, complete, durable and legible records. Errors detected after the publication of results could be considered as scientific misconduct if a researcher is unable to subsequently provide valid information corroborating the results of their research.

⁴ The original research data must be stored for an appropriate period of time. If necessary, researchers must be able to retrieve or reproduce lost data. Consequently, records must be checked at regular intervals and the electronic data stored on computer safely kept. A member of the research project team must be responsible for this storage. If possible, for particularly important data, a hard copy must be made, stored in a safe place, and references to the original clearly established.

⁵ Collaborations established between several institutions are expected to organise the appropriate means to archive (for example, laboratory logs, electronic data carriers) and verify the research record. This should facilitate internal communication and allow all authors to be fully informed regarding the work as a whole and also answer questions concerning joint work

⁶ LEX 4.1.1 [Directive concerning the management of conflicts of interest](#)

⁷ For more information: <http://tto.epfl.ch>.

⁸ LEX 3.3.3 [Internal procedure in cases of suspected scientific misconduct](#) (EPFL); *Déclaration du FNS à l'égard des fraudes scientifiques* (Scientific Misconduct) ; Académies suisses des sciences: [Integrity in scientific research : principles and rules of procedure](#), ISBN 978-3-905870-06-0, 2008 (www.swiss-academies.ch).

⁹ researchdata@epfl.ch

and enable other scientific project managers to share the data. All those involved in any collaboration must be familiar with and understand the process.

⁶ Research data must be available at the appropriate time to scientific collaborators and the responsible bodies in the event of an inquiry. Following publication, data must be stored for a reasonable period so that it is promptly and completely available for scientists. Exceptions may be required under certain circumstances, to preserve privacy or ensure patent protection. The publication of research results in no way affects the necessity to keep the original documents concerning results generated during the research project.

⁷ The PI is responsible for ensuring that, after completion of the project, data and material are stored for a period of time appropriate for the specific domain. They are also responsible for ensuring their long-term protection.

Article 8 Disclosure of information concerning the project

¹ Unless otherwise agreed with external project partners, primary data¹⁰ from research projects carried out at EPFL remain the property of EPFL.

² EPFL researchers are not required to disclose primary data and material to non-participants before having carried out their own analysis, evaluation and publication, with the exception of disclosure to committees.

³ In every research project, the PI will determine, in writing, the participants who, after leaving the project team or EPFL, may retain access to the primary data and material, and the purposes for which they may use the data and material.

Article 9 Research involving live animals or human beings

¹ Experimenting on animals must be justified on the basis of acceptable values and interests. Researchers are required to demonstrate the necessity of all experiments and meticulously verify their legitimacy.

² The balancing of ethical issues in all experiments involving animals is the responsibility of the individual researcher and must be submitted to the [*commissions cantonales sur l'expérimentation animale*](#). It must be justifiable before the authorising bodies, ethical committees, animal welfare officers and the general public.

³ Detailed ethical rules can be found on page: [Ethics Committee for Animal Experimentation](#), for example in [Ethical Principles and Guidelines for Experiments on Animals](#).

⁴ All research activities involving human subjects must be carried out in accordance with three basic ethical principles, namely respect for persons, beneficence and justice. It is generally agreed that these principles, which in the abstract have the same moral force, guide the conscientious preparation of proposals for scientific studies. All research projects involving human beings or biological material originating from human beings must be submitted for approval to the [Commission cantonale d'éthique de la recherche sur l'être humain \(CER-VD\)](#). This obligation is not restricted to biomedical research, but also applies to any research involving human beings as subjects. Outside of the HRA¹¹, the Human Research Ethics Committee (HREC; in French the Comité d'éthique de la recherche humaine de l'EPFL¹²) has the authority to approve or reject, from an ethical point of view, the carrying out of a non-invasive research project involving human beings. The Committee intervenes when project approval is required from EPFL on an institutional level with the aim of obtaining external funding.

¹⁰ Primary data are the original data collected from experiments or other sources.

¹¹ Federal Act of Research Involving Human Beings (HRA) from its entry into force on 1st January 2014.

¹² <http://research-office.epfl.ch/recherche-ethique/research-ethics-assessment/epfl-human-research-ethics-committee/hrec>

⁵ Research involving human subjects must be carried out only by, or strictly supervised by, suitably qualified and experienced investigators, and in accordance with a protocol that clearly states:

- the aim of the research;
- the reasons for proposing that it should involve human subjects;
- the nature and degree of risks for the subjects;
- the sources from which it is proposed to recruit subjects;
- the means proposed to ensure that consenting subjects are sufficiently informed and willing.

⁶ The protocol must be scientifically and ethically evaluated by one or several appropriately constituted bodies, independent of the investigators.

⁷ Details can be found for example in the Swiss Academies of Arts and Sciences Handbook "Research with Human Subjects"¹³ and "International Ethical Guidelines for Biomedical Research Involving Human Subjects"¹⁴.

Section 3 Rules regarding publication and authorship

Article 10 Principles concerning publications and access

¹ EPFL researchers must, as far as possible, publish their work in accordance with the "principle of open access"¹⁵, in keeping with the requirements of the "EPFL open access policy". For this purpose they can use the infoscience server <http://infoscience.epfl.ch/>.

² Research results must be communicated impartially and in their entirety. They must not be divided up into separate publications with the sole aim of increasing the number of published papers.

³ Ongoing projects and patent application procedures must be kept strictly confidential.

⁴ Following completion of the project and publication of the results, third parties wishing to repeat the experiments and verify the results will, as a rule, be provided with all the necessary data.

Article 11 Information for authors

¹ In order to be considered as an author, a researcher must fulfil the following criteria:

- have made an essential contribution to the planning, carrying out, evaluation and verification of the research work;
- have participated in the writing of the manuscript;
- and have approved the final version of the manuscript.

² Other persons who have contributed to the study, but only partially fulfil the criteria in par. 1, must be acknowledged ("Acknowledgements"), but are not designated as authors.

³ A mere hierarchical, administrative or financial function in a research group and/or organisational support does not entitle anyone to acquire the title of author. Honorary authorship does not exist.

⁴ The question of the list and order of authors in a publication must be discussed and decided upon between all contributors as soon as possible.

⁵ All collaborators share a certain degree of responsibility for the scientific work in which they appear as co-authors. Some co-authors are responsible for the whole document if the latter is an accurate and verifiable report of the research results. These include for example co-authors

¹³ <http://www.samw.ch/fr/Publications/Guides-pratiques.html>

¹⁴ http://www.cioms.ch/publications/guidelines/guidelines_nov_2002_blurb.htm

¹⁵ Berlin Declaration signed by EPFL:
https://en.wikipedia.org/wiki/Berlin_Declaration_on_Open_Access_to_Knowledge_in_the_Sciences_and_Humanities

who are responsible for the integrity of the basic data in the document, who carry out the analysis, write the manuscript, present the major results at conferences or supervise young colleagues.

⁶ Project managers are responsible for ensuring that members of their research group are not involved in the publication of results that are not authentic.

⁷ It must be acknowledged that genuine error is an integral part of scientific enterprise. It is not unethical to make a mistake, providing that such errors are promptly acknowledged and corrected as soon as they are detected.

Section 4 Rules concerning the citing and referencing of sources¹⁶

Article 12 Definitions

The terms used in the present section correspond to the following definitions:

Source: any information from which the author has drawn inspiration for the writing of their work

Citation: word-for-word repetition of certain passages from a source

Copying of the substance from a source: copying all or part of the content (notions, concepts, ideas, methods, results, experiments, discoveries presented in existing works) of a source, but described according to a personal structure and wording

Borrowed material: any citation or copying of the substance from a source

Source reference: indication in a written work of the source of all borrowed material, by a reference to the contact details of the source.

Article 13 Responsibility

As author of a scientific work, the researcher is considered responsible for its content and form.

Article 14 Borrowed material and personal contribution

¹ All scientific written work must distinguish between:

- a. Material borrowed from other works (see Art. 15) and
- b. The researcher's personal and original contribution.

² All borrowed material must be recognisable as such in the written work thanks to a reference to the source.

³ If the borrowed material is not clearly indicated in the work, the author allows the reader to think that it is his¹⁷ personal and original contribution. This amounts to scientific misconduct (plagiarism Art. 18).

Article 15 Forms of borrowed material

¹ All scientific written work must then distinguish, concerning the borrowed material (Art. 14 par. 1 a.), between:

- a. citations (Art. 16) and
- b. substance borrowed from a source (Art. 17).

² If a copied passage is not mentioned as being a citation (Art. 16 par. 1), the researcher allows the reader to think that he has re-transcribed borrowed material in his own words. This constitutes scientific misconduct (plagiarism Art. 18).

¹⁶ Amendment of 1st January 2013

¹⁷ The masculine form is used to designate persons of either gender.

Article 16 Rules concerning citation

The copying of a passage from an existing work, as such or translated, is authorised under the following conditions:

- a. the copied passage serves as a comment, reference or demonstration;
- b. the use of the copied passage justifies its length;
- c. the quoted passage is clearly indicated (e.g. in brackets, italics or by a separate paragraph);
- d. the source is referenced (before or just after the quotation, or by a footnote)¹⁸. This source reference is necessary even if the passage is taken from a previous personal work.

² It is forbidden, even if the rules in par. 1 are respected, to:

- a. use a quotation, altering the original text or making editorial adaptations;
- b. cite a complete work – only extracts may be copied;
- c. copy an illustration (figure, picture, video, graph, data graphics) without the authorisation of its author (or publisher) in cases where this illustration constitutes an original work in itself (protected work);
- d. copy all or part of a computer source code:
 - unless the software user licence permits it, or if
 - the legal exception applies (Art. 21 of the *Loi sur le droit d'auteur*)¹⁹.

Article 17 Rules concerning substance copied from a source

¹ Copying the substance from a source is authorised on condition that the scientific work makes reference to the source.

² The reference must allow the reader to clearly identify the source. This rule also applies if the copied elements are taken from previous personal works.

Article 18 Plagiarism

¹ Plagiarism consists of representing oneself as the author of all or part of the work or results in fact originating from one or several other person(s), by failing to respect the rules concerning the citing and referencing of sources as defined under Articles 16 and 17.

² The act commonly referred to as «self-plagiarism» consists of copying all or part of a previous personal work without citing or referencing it, and consequently presenting this work as an original contribution.

³ Plagiarism or self-plagiarism, whether committed intentionally or by omission, constitutes misconduct, which gives rise to the launching of an internal disciplinary procedure.

⁴ Other consequences: plagiarism brings discredit to its author, which has repercussions on his research team, negates the value of the work carried out and brings disgrace on the institution involved. It may also give rise to external procedures.

Article 19 Institutional affiliation information

¹ When research work carried out entirely or partly at EPFL is published, EPFL must be mentioned in the address given. This institutional affiliation information must conform to the standard EPFL address format²⁰ :

Institute X and Laboratory Y
École polytechnique fédérale de Lausanne (EPFL)

¹⁸ Information concerning the rules applicable can be obtained from the EPFL Library <http://library.epfl.ch/info/en>

¹⁹ http://www.admin.ch/ch/f/rs/231_1/a21.html

²⁰ LEX 3.1.3 [Adresse légale](#)

Station Z
CH-1015 Lausanne

² EPFL professors who also work in another institution of the EPF Domain and those holding dual professorships must indicate both affiliations in their publications.

³ Bodies that contributed to the support of the project must be mentioned in accordance with their regulations.

Article 20 Doctoral theses

Doctoral theses are subjected to exactly the same practices as other publications, particularly regarding the appropriate citing and referencing of other works.

Section 4 Integrity of peer review

Article 21 Peer review

¹ In order to support scientific quality and maintain ethical standards, research proposals should, as far as possible, be subjected to peer review. In return, EPFL researchers must be prepared to act as experts, particularly concerning:

- project financing;
- acceptance of publications (peer review);
- selection of candidates (for appointments for example);
- evaluation of groups, departments and research organisation.

² Peer review must be conducted with:

1. **rigour and selectivity:** the review process must be adapted to the level of the application (activities of the programme as a whole, individual project, etc.), the characteristics of the programme / project under review and the purpose and objectives of the review;
2. **equity and fairness:** all research proposals must be evaluated according to the same set of consistent and explicit standards. The process and methods applied must be open and transparent;
3. **integrity:** the personal convictions and interests of the reviewer must not influence the results of the process. Since peer review, as a system, is open to potential bias, all those involved must take measures to guard against such bias. Openness and transparency will be fundamental in this regard. Precautions must be taken to avoid conflicts of interest between reviewers and applicants. Reviewers must declare any such conflicts – or potential conflicts – when reviewing a research proposal. Reviewers must not take advantage of the reviewing process and their knowledge of other researchers' ideas or research plans;
4. **confidentiality:** the duty of confidentiality applies in the reviewing of research proposals and all reviewers have an absolute obligation to protect the work of other researchers;
5. **transparency:** reviewers must ensure that researchers are fully informed of the review process and its results;
6. **efficiency:** it is acknowledged that the peer review process is a long and delicate one. The efforts required must however remain as compatible as possible with optimal efficiency.

Section 5 Cases of scientific misconduct

Article 22 Advice and procedure

¹ The ombudsperson provides advice and assistance to EPFL researchers in matters concerning research integrity and good scientific practice. He acts as contact person in cases of suspicion.

² Violations of the present directive can be considered as professional misconduct. In the event of an allegation of such misconduct, the [Internal procedure in cases of suspected scientific misconduct](#) will be implemented.

Section 7 Distribution

Article 23 Distribution

The Research Commission will ensure that the present directive is brought to the attention of all existing and new EPFL members involved in scientific research (including students and technical staff).

Chapter 2 Final provisions

Article 24 Coming into force

¹ The present document came into force on 1st May 2009 under the title « Guidelines for Research Integrity and Good Scientific Practice at EPFL ». It was amended on 1st January 2013, and renamed directive. Version 1.2, status as at 1st January 2016. Version 1.3, status as at 1st January 2017.

On behalf of the EPFL Direction:

President:
Patrick Aebischer

General Counsel:
Susan Killias

Annex I

The relevant legal references²¹ for research at EPFL and directives are:

General

1. *Loi sur le personnel de la Confédération (172.220.1)* ; *Ordonnance-cadre relative à la loi sur le personnel de la Confédération (172.220.11)* and *Ordonnance du Conseil des EPF sur le personnel du domaine des écoles polytechniques fédérales (172.220.113)*
2. *Loi fédérale sur les écoles polytechniques fédérales (414.110)* and *Ordonnance sur le domaine des écoles polytechniques fédérales (414.110.3)*
3. *Règlement disciplinaire concernant les étudiants de l'Ecole polytechnique fédérale de Lausanne (414.138.2)*
4. *Ordonnance sur le doctorat délivré par l'Ecole polytechnique fédérale de Lausanne (414.133.2)*
5. *Directives sur la formation doctorale à l'Ecole polytechnique fédérale de Lausanne*

Intellectual property

6. *Loi fédérale sur le droit d'auteur et les droits voisins (231.1)*
7. *Loi fédérale sur les brevets d'invention (232.14)*
8. *Loi fédérale sur la recherche (420.1)* and *Ordonnance relative à la loi sur la recherche (420.11)*
9. *Ordonnance du Conseil des EPF sur les biens immatériels et les participations dans le domaine des EPF (414.172)*

Research

10. Funding requests (*Demande de subventions*) to national and international agencies or private sponsors: <http://grants.epfl.ch>
11. Regulations of the **Research Commission**
12. **Internal procedure in cases of suspected scientific misconduct**
13. EPFL Directives on Research Contracts and Technology Transfer

Academic research involving humans

14. "Federal Act on Research involving Human Beings (HRA)":
<https://www.admin.ch/opc/en/classified-compilation/20061313/201401010000/810.30.pdf>
15. "Ordinance on Human Research with the Exception of Clinical Trials (HRO)":
<https://www.admin.ch/opc/en/classified-compilation/20121177/201401010000/810.301.pdf>
16. "Ordinance on Clinical Trials in Human Research (ClinO)":
<https://www.admin.ch/opc/en/classified-compilation/20121176/201705010000/810.305.pdf>
17. "Ordinance on Organisational Aspects of the Human Research Act (OrgO-HRA)":
<https://www.admin.ch/opc/en/classified-compilation/20121179/201401010000/810.308.pdf>
18. Stem cell research – *Loi fédérale relative à la recherche sur les cellules souches embryonnaires (810.31)* and *Ordonnance relative à la recherche sur les cellules souches embryonnaires (810.311)*
19. *Loi fédérale sur les médicaments et les dispositifs médicaux (812.21)* ; *Ordonnance sur les essais cliniques de produits thérapeutiques (812.214.2)*
20. *Loi fédérale sur la protection des données (235.1)*
21. **Biobanks**: Procurement, preservation and utilisation of human biological material.
22. Somatic Gene Therapy in Humans ([pdf](#))
23. Genetic Investigations in Humans ([pdf](#))
24. Directives and recommendations of the SAMS; www.samw.ch

²¹ For more information concerning Swiss legislation : <https://www.admin.ch/gov/fr/accueil/droit-federal/recueil-systematique.html> and EPFL laws, ordinances, regulations and directives : <http://polylex.epfl.ch/>.

Academic research involving animals

25. *Loi fédérale sur la protection des animaux* (LPA) (455)

26. *Ordonnance sur la protection des animaux* (OPAn) (455.1)

27. *Principes éthiques et directives pour les **Expériences sur les Animaux*** of the SAMS

28. **Flow chart** for the planning and execution of experiments involving animals.

Academic research with genetically modified organisms

29. *Loi fédérale sur l'application du génie génétique au domaine non humain* (814.91) ; *Ordonnance sur l'utilisation d'organismes dans l'environnement* (814.911) and *Ordonnance sur l'utilisation des organismes en milieu confiné* (814.912)

Academic research on genetic resources

30. Access and Benefit Sharing. Good practice for academic research on genetic resources. (<http://abs.scnat.ch>)

Ethics

31. **Honor Code** – This text underlines the ethical responsibilities of future EPFL engineers, scientists and architects. The code refers to the EPFL Ethical Charter. Thanks to their commitment to this Honor Code, each student and researcher contributes to the impact and reputation of EPFL.

32. **EPFL Ethical Charter** – The Ethical Charter resumes the principles that must guide any action in the teaching and research domains at EPFL. These ethical guidelines are intended for all EPFL members involved in teaching, research or decision-making.

33. **Directive concerning the citing and referencing of sources in written work submitted by students** – In order to guarantee the correct use of information sources by EPFL students, the EPFL Direction has adopted certain rules.

34. **Directives concerning the management of conflicts of interest** in the context of activities or public duties exercised outside the working sphere.

Annex II

From: “Responsible Authorship and Peer Review.” James R. Wilson. *Science and Engineering Ethics* (2002) 8, 155-174.

In this article, the basic principles of responsible authorship and peer review are studied, with special emphasis on (a) directives for refereeing articles in scientific journals and projects and (b) how these directives should be taken into account at all stages of writing:

“Principles of Primary Authorship”

The primary author (that is, the author listed first in the article’s byline) must have demonstrated the ability and willingness to exert scientific leadership of the project so as to (a) assume responsibility for a major professional aspect of the work, and (b) ensure that all the project objectives are met. Thus the primary author of a paper is generally chosen based on an evaluation of that individual’s contributions to the conception, planning, and execution of the study. Selection of the primary author often occurs after the experimental work has been performed but just before the paper is written. If two or more authors have contributed equally to the project, then the primary author should be the one who by mutual consent actually coordinates the overall writing of the paper. According to Houk and Thacker²², individuals who satisfy one or more of the following criteria should be considered as candidates for primary authorship:

- ✓ *Originality of contribution*—the primary author made an original theoretical or methodological contribution that proved to be a highly important basis for the paper.
- ✓ *Major intellectual input*—throughout the study, the primary author generated ideas on the study design and modifications, on ensuring availability and use of appropriate experimental subjects or material, on productively conducting the study, on solving measurement problems, on analyzing and interpreting data in a particular way, and on preparing reports.
- ✓ *Major feature of the manuscript*—the primary author originated and developed the feature of the paper that is of central importance.
- ✓ *Greatest overall contribution*—the primary author did the most work, made the study succeed, provided intellectual leadership, and analysed and interpreted the data.

No one is entitled to primary authorship solely because of administrative position or expertise in a particular subject or discipline. Selection of the primary author should reflect a consensus of the paper’s co-authors on the most deserving individual. »

²² Houk, V. N., and Thacker, S. B. (1990): The responsibilities of authorship, in: CBE Editorial Policy Committee, eds. *Ethics and Policy in Scientific Publication*, Council of Biology Editors, Bethesda, Md., pp. 181–184.