GUIDELINES FOR RESEARCH INTEGRITY AND GOOD SCIENTIFIC PRACTICE AT THE EPFL

FOREWORD

Research in all fields is a significant feature of all societies and represents major commitment, whether from the public or private sector. Results and findings form the basis for policy decisions at all levels of government and the private sector. Therefore, it is of paramount importance that the research itself is 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. Truth and transparency, self discipline, self criticism and fairness are indispensable for behaviour of integrity. They represent the basis of all scientific activity and are preconditions for the credibility and acceptance of science. It is the responsibility of all researchers at the EPFL to uphold the good reputation of the school, to observe its rules, policies and guidelines and undertake activities in accordance with them. All members of the EPFL are expected to conduct research with integrity. The experience shows that, in day-to-day research work, even experienced scientists may have some questions about the best way of properly carrying out research.

The present "Guidelines for Research Integrity and Good Scientific Practice" define the authoritative rules that apply to all researchers at the EPFL in all disciplines. These guidelines are mainly intended to serve as guiding principles for the planning, execution, presentation and assessment of research work at the EPFL. In this way, they help ensuring that intellectually honest research will continue to be conducted at our institution.

Prof. Benoît Deveaud-Plédran
Dean of Research

Ombudsperson

INTRODUCTION

1. The purpose of these guidelines[1] is to define guiding principles for the planning, execution, presentation and assessment of research work.
2. These guidelines apply to **all members** of the EPFL involved in scientific research (incl. students and technical staff).
3. Members of the EPFL involved in large international research consortia should apply the guidelines of good scientific practice provided by the consortium, which may refine the present guidelines.

RESEARCH INTEGRITY AND GOOD SCIENTIFIC PRACTICE

PLANNING OF RESEARCH PROJECTS[2]

1. Definition of research objectives

All members of the scientific community carry out research mainly driven by curiosity and dear academic freedom. Each member chooses its research topics **autonomously**, based on his/her perception of different issues such as for example the long-term needs of society, the enhancement of the quality of life. A responsible perception of this freedom does, however, set certain limits, especially towards the choice of properly ethical research objectives and methods.

2. Compliance with legal and institutional regulations

Every EPFL researcher should comply with all regulations applicable to his/her field of research (Appendix 1).

3. Project management

The **project managers** (often called PI: principal investigator) are the individuals responsible for the execution of a scientific project, e.g. professors, senior scientists, senior assistants and post-doctoral fellows. This function may be performed by one or more individuals, depending on the size of the project.

Within the framework of the research project, the PI should take the lead role in guiding and **supervising the junior scientists**. In particular, he/she must ensure that all research project participants are aware of the present guidelines.

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[1] These Guidelines have been elaborated mainly on the basis of the following document: Swiss Academies of Arts and Sciences: "Integrity in Scientific Research. Principles and Procedures", ISBN 978-3-905870-06-0, 2008 (www.swiss-academies.ch)

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

It is the **task** of the PI to

- ✓ ensure that the junior scientists are provided with sufficient supervision and materials during the estimated duration of the project;
- ✓ help doctoral students to prepare a research plan specifying the content of the thesis and the proposed work schedule in due time as set forth in the "Ordinance on the doctorate at the EPFL"[3] and the associated "Directives concerning doctoral studies at the Ecole Polytechnique Fédérale de Lausanne"[4];
- ✓ support the junior scientists in their efforts to become independent researchers.

4. Rights in third-party projects

The rights concerning the research results from third-party financed projects undertaken at the EPFL will be specified in a contract[5] concluded with the sponsor **before the start** of the project.

5. Project Plan

5.1. Documentation: The research plan of third party financed projects and their subsequent major modifications must be available in writing. They must be fully comprehensible for all participants to the project and for persons in charge of checking the research results. The plan must provide information on the persons responsible for the project and their specific roles, on the financing and its sources and on the handling of the data or materials.

5.2. Conflicts of Interest: There are many professional activities of researchers that have the potential for a conflict of interest[6]. Any professional relationship or action that may result in a conflict of interest must be fully disclosed to the project management, the sponsor or the Dean of Research. When objectivity and effectiveness cannot be maintained, the activity should be avoided or discontinued.

5.3. Patenting: If a patent application[7] is to be considered, the relevant rights and obligations must be established in due time, in the form of an agreement between all participants.

REALISATION OF RESEARCH PROJECTS

1. Data and materials

1.1. Fabrication of data or selective reporting of data with the intent to mislead or deceive is an egregious departure from the expected norms of scientific conduct, as is the theft of data or research results from others[8].

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[3] Ordinance on the doctorate awarded by the Ecole polytechnique fédérale de Lausanne, 414.133.2

[4] Directives concerning doctoral studies at the Ecole polytechnique fédérale de Lausanne, du 21 novembre 2005, révisées le 1er septembre 2008

[5] Directives on research contracts and technology transfer (DCRTT), March 1, 2007

[6] Directives concerning the management of conflicts of interest within the context of activities or public duties engaged in outside the working sphere, October 17, 2005

[7] More information can be found on : http://sri.epfl.ch

[8] Procédure interne en cas de manquements à la probité scientifique (EPFL); Déclaration du FNS à l'égard des frauds scientifiques (Scientific Misconduct), FNS, 13 décembre 2005; "Integrity in scientific research. Principles and procedures » Swiss Academies of Arts and Sciences ; Guidelines of the SAMS (Swiss

1.2. The results of research should be recorded and stored in a form that allows analysis and review by authorized persons. Therefore, records should be compiled and maintained on the research methodology and procedures followed, raw data, decisions taken and the analysis and interpretation of results, including interim results, to create a transparent, linear audit trail of the research decision-making process.

1.3. Records should contain sufficient detail to provide clear answers to questions concerning the validity of data or the conduct of research activities. Such questions may arise following the challenging of research evidence, and the existence of accurate, contemporary, clear, complete, durable and legible records is invaluable should this occur. Errors detected following the publication of results could be mistaken for research misconduct if a researcher could not subsequently provide valid corroborative research evidence.

1.4. Original research evidence, both electronic- and / or paper-based, should be securely stored for an appropriate time period. If necessary, researchers must be able to retrieve or reproduce lost data. Therefore, back up records should be made at regular intervals and kept securely for electronic data stored on a computer. An individual member of the research project staff should be assigned responsibility for this. If possible, for particularly important data, a hard copy should be made, stored in a secure location, and cross-referenced to the original.

1.5. Collaborations are expected to organize the appropriate means to archive (e.g. laboratory logs, electronic data carriers) and verify the research record. This should allow facilitating internal communication and allowing all authors to be fully aware of the entire work; and respond to questions concerning the joint work and enable other responsible scientists to share the data. All members of any given collaboration should be familiar with, and understand, the process.

1.6. Research data should be timely available to scientific collaborators and responsible bodies in the case of an inquiry. Following publication, the data should be retained for a reasonable period in order to be available promptly and completely to collaborating scientists. Exceptions may be appropriate in certain circumstances in order to preserve privacy or to ensure patent protection. Publication of research results does not negate the need to retain original records of research evidence generated during the lifetime of the research project.

1.7. The PI is responsible for ensuring that, after the completion of the project, the data and materials are stored for a period of time appropriate for the specific field. He/she is also responsible for ensuring their durability and protection.

2. Disclosure of information to the project

2.1. Unless otherwise agreed upon with external project partners, primary data[9] from research projects undertaken at the EPFL remain the property of the EPFL.

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

2.3. In every research project, the PI will determine, in writing, the participants who, after having left the project team or the EPFL, should retain access to the primary data or materials, and the purposes for which they may use these data and materials.

Academy of Medical Science) for scientific integrity in medical and biomedical research and for the procedure to be followed in cases of misconduct of May 23, 2003.

[9] Primary data are the original unanalysed data collected from experiments or other sources.

3. Research involving live animals or human beings

3.1. Animal experiments must be justified on the basis of prevailing values and interests. Researchers are obliged to demonstrate the need for and tenability of all experiments on animals and to carefully verify their ethical justifiability through ethical balancing.

3.2. The balancing of the ethical issues involved in all animal experiments is the responsibility of the individual researcher and must be justifiable to the consulting cantonal commission for animal experimentation, the authorizing bodies, the ethical committees for animal experimentation, animal welfare officers and the general public.

3.3. Detailed ethical rules may be found for example in: Ethical Principles and Guidelines for Experiments on Animals http://www.scnat.ch/downloads/Ethik_Tiervers_Nov05_e.pdf **as well as** on http://tki.samw.ch/.

3.4. All research involving human subjects should be conducted 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 equal moral force, guide the conscientious preparation of proposals for scientific studies.

3.5. Research involving human subjects should 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 involve human subjects; the nature and degree of any known risks to the subjects; the sources from which it is proposed to recruit subjects; and the means proposed for ensuring that subjects' consent will be adequately informed and voluntary. The protocol should be scientifically and ethically appraised by one or more suitably constituted review bodies, independent of the investigators.

3.6. Details may be found for example in : International Ethical Guidelines for Biomedical Research Involving Human Subjects, http://www.codex.uu.se/texts/international.html - essential

PUBLICATION AND AUTHORSHIP PRACTICES

1. Principles of publication and access

1.1. EPFL researchers should, as much as possible, publish their work in accordance with the "principle of open access[10]", complying with the requirements of the "EPFL Open Access Policy".

1.2. The results are to be communicated impartially and in their entirety. Research results should not be divided up and published in separate publications for the sole purpose of increasing the number of published papers.

1.3. Planned and ongoing projects and ongoing patent application procedures must be kept in confidence.

1.4. Following completion of the project and publication of the research results, third parties wishing to repeat the experiments and verify the results will, as a rule, be provided with the data required to do so.

2. Author information

2.1. Authorship should be limited to those who meet all the following criteria

2.1.1. have made a significant personal contribution to the concept, design, execution or interpretation of the research study;

2.1.2. participate in the writing of the manuscript; and

2.1.3. approve the final version of the manuscript.

[10] Directive on Open Access to Scientific Publications of Projects Sponsored by the SNSF, July 4, 2007

2.2. Other individuals who have contributed to the study but only partially meet the criteria 2.1.1-3 should be acknowledged ("Acknowledgements"), but not identified as authors.

2.3. A mere hierarchical, administrative or financial function and organizational support to the project does not entitle anyone to appear as author. Honorary or courtesy authorship is not acceptable.

2.4. The question of authorship and the order of the authors in a publication must be discussed and settled among all contributors as early as possible.

2.5. All collaborators share some degree of responsibility for any paper they co-author. Some co-authors have responsibility for the entire paper as an accurate, verifiable, report of the research. These include, for example, co-authors who are accountable for the integrity of the critical data reported in the paper, carry out the analysis, write the manuscript, present major findings at conferences, or provide scientific leadership for junior colleagues.

2.6. Project managers have responsibility for ensuring that the staff of their research group is not engaged in the publication of research that is not authentic.

2.7. It should be recognized that honest error is an integral part of the scientific enterprise. It is not unethical to be wrong, provided that errors are promptly acknowledged and corrected when they are detected.

3. References

3.1. All sources used must be cited in the publication.

3.2. Plagiarism constitutes unethical scientific behavior and is never acceptable. Proper acknowledgement of the work of others used in a research project must always be given.

3.3. The sources of financial support for the project should be fully acknowledged.

4. Institution affiliation information

4.1. When research work executed in whole or in part at the EPFL is published, the EPFL must be mentioned as the institution. This institutional affiliation information must be conform to the uniform EPFL address format[11]:

Laboratory X, or Institute Y
École Polytechnique Fédérale de Lausanne (EPFL)
Station X
CH-1015 Lausanne

4.2. EPFL professors who concurrently work in another institution of the EPFL domain and double professors should indicate both affiliations in publications.

5. PhD theses

PhD theses are of course submitted to exactly the same practices as other publications especially in terms of plagiarism and proper citations of other works. More information and guidelines for the preparation of a PhD thesis can be found on: http://phd.epfl.ch/page55499-fr.html .

[11] Address Legal (**pdf**)

INTEGRITY OF PEER REVIEW

In order to **support scientific quality** and **maintain ethical standards** peer review should be applied to all research proposals, publications …performed at the EPFL. EPFL researchers should be willing to serve as experts, in particular concerning:

- ✓ project financing;
- ✓ acceptance of publications (peer review);
- ✓ selection of applicants (e.g. in case of appointments);
- ✓ evaluation of groups, departments and research organization.

Peer review must be conducted with:

1. **Rigor and Appropriate Selectivity:** The review process should be **tailored to the level of review** (activities in an entire program, portfolio of projects, or individual project), to characteristics of the program/project being reviewed, and to the purpose and goals of the review.
2. **Equity and Fairness:** All research proposals should be assessed against the same set of consistent and **explicit standards** and the process and procedures applied should be open and transparent.
3. **Integrity:** The personal beliefs and interests of the reviewer must not be allowed to influence the outcome of any review. Since peer review, as a system, is open to potential bias all those involved must take steps to guard against this; openness and transparency will help in this regard. Care must be taken to **avoid conflict of interests** between reviewers and applicants and also situations in which such conflict may appear to be present. Reviewers must declare any such conflicts – or potential conflicts – when reviewing a research proposal. Reviewers must not derive **unfair competitive advantage** from the reviewing process and from their knowledge of other researcher's ideas or research plans.
4. **Confidentiality:** The duty of confidentiality to others applies in the reviewing of research proposals and all reviewers have an absolute obligation to protect the work of other researchers.
5. **Openness:** Reviewers must ensure that researchers are fully informed of the process of review and of its outcomes.
6. **Efficiency:** It is acknowledged that the process of peer review is a time-consuming one so that the time and effort required should be kept to the minimum possible consistent with effectiveness and efficiency.

MISCONDUCT IN THE SCIENTIFIC CONTEXT

The ombudsperson provides advice and assistance to EPFL researchers in matters regarding research integrity and good scientific practice and serves as mediator in cases of conflict.

Violations of these guidelines may amount to research misconduct. In case of an allegation of such misconduct, the procedure "Internal procedure in cases of suspected scientific misconduct" (pdf) will be implemented.

DISTRIBUTION

The Research Commission will ensure that these guidelines are brought to the attention of all existing and new members of the EPFL involved in scientific research (incl. students and technical staff).

EFFECTIVE DATE

These guidelines will become effective as of 1 January 2009.

APPENDIX 1

Legal specifications[12] relevant for the research at the EPFL and guidelines 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. « Ordonnance sur la discipline à 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 (**Grants Applications**) 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**

[12] The Swiss Federal Legislation can be found on http://www.admin.ch/ch/f/rs/rs.html ; EPFL laws, ordinances, regulations and guidelines can be found on http://polylex.epfl.ch/ .

Academic Research in Humans

13. Research on Stem Cells – « 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**)
14. Loi fédérale sur les médicaments et les dispositifs médicaux (812.21) ; Ordonnance sur les essais cliniques de produits thérapeutiques (**812.214.2**)
15. Loi fédérale sur la protection des données (235.1)
16. **Biobanks**: Obtainment, preservation and utilisation of human biological material.
17. Somatic Gene Therapy in Humans (pdf)
18. Genetic investigations in humans (pdf)
19. Guidelines and recommendations of the SAMW; www.samw.ch (pdf)

Academic Research in Animals

20. Loi fédérale sur la protection des animaux (LPA) (455)
21. Ordonnance sur la protection des animaux (OPAn) (455.1)
22. Ethical Principles and Guidelines for Experiments on Animals of the SAMW
23. Flowchart for the planification and execution of experiments in animals.

Academic Research with Genetic Modified Organisms

24. « 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

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

Ethics

26. Honor Code - This text underlines the ethical responsibilities of future EPFL engineers, scientists and architects. The code refers to the EPFL ethical charter. Through his commitment to this Honor Code, each student and researcher contributes to the impact and reputation of EPFL.
27. EPFL Ethical Charter - The ethical charter resumes the principles that must guide any action in the domains teaching and research at the EPFL. These ethical guidelines are addresses to all members of the EPFL involved in teaching, researcher or decision making.
28. Code of Ethics Concerning the Citing of Information Sources - Plagiarism is unanimously considered a serious offence, punishable by sanctions imposed by EPFL, or possibly even legal action. Its practice is incompatible with the EPFL Honor Code and ethical charter. In order to ensure the correct use of information sources by EPFL students and members, the EPFL Direction has enacted rules.
29. Directives concerning the management of conflicts of interest within the context of activities or public duties engaged in outside the working sphere.

APPENDIX 2

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

In this article the basic principles of responsible authorship and peer review are surveyed, with special emphasis on (a) guidelines for refereeing archival journal articles and proposals; and (b) how these guidelines 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 Thacker[13], 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 analyzed 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 coauthors on the most deserving individual.

[13] 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.