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Leibniz Institute on Aging –
Fritz Lipmann Institute

Guidelines of Good Research Practice at the Leibniz Institute on Aging – Fritz Lipmann Institute



We dedicate this handbook to PD Dr. Matthias Görlach (1955-2023),
long-time ombudsperson¹ and colleague at FLI.

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¹ <https://www.nature.com/articles/d41586-019-03529-w>

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Foreword

These “Guidelines of Good Research Practice at the Leibniz Institute on Aging – Fritz Lipmann Institute” (FLI) are based primarily on the Code of Conduct of the German Research Foundation (DFG) “Guidelines for Safeguarding Good Research Practice” published in 2019 and the “Leibniz Code for Good Research Practice” adopted in 2021.²

The DFG Code of Conduct is a reference work on scientific integrity that is aimed at both scientists and universities and non-university research institutions to which the FLI belongs. It summarizes the central standards of good research practice and describes procedures in the event that these standards are not observed. The legally binding implementation of the guidelines (first level of the Code) and of the explanations (second level) by institutions is a prerequisite for receiving funding from the DFG.

The DFG Code of Conduct is substantiated and interpreted by practical and subject-specific commentaries in the associated online portal.³ Its predecessor, the memorandum “Safeguarding Good Scientific Practice,” published in 2013, continues to serve as a supplementary reference guide.⁴

The Guidelines of Good Research Practice at the FLI implement the DFG Code of Conduct and its supplements and adapts them to the specific needs of the FLI. It is intended as a local supplement to the “Leibniz Code for Good Research Practice,” which is recognized and implemented by the FLI.

In particular with regard to the tasks of the ombudspersons and to the rules of procedure for suspected scientific misconduct, these Guidelines are supplemented by the “Guidelines for Good Scientific Practice in the Leibniz Association.”

² The term “Good scientific practice” used in the 2013 DFG Memorandum was replaced by “Good research practice” in the DFG Code of Conduct, but both terms can be used interchangeably.

³ <https://wissenschaftliche-integritaet.de/en/>.

⁴ Stephan Rixen: Gute wissenschaftliche Praxis. Der neue Kodex der DFG. Forschung & Lehre 9/2019, pp. 818ff.; https://forschung-und-lehre.epaper-archiv.de/fileadmin/user_upload/forschungUndLehre/2019/09/818/. (In German only.)

1. Scope

The research bodies institutionalized in the Federal Republic of Germany enjoy the privilege of freedom of research and concomitant academic self-government. This privilege includes the duty of the institutions to adopt rules of good research practice. In the form of these Guidelines, the FLI informs its employees of the locally established rules of good research practice, which they are obliged to observe.

Employees include, in particular, all scientifically active persons, regardless of their position, qualifications, or activities. This also includes persons with a guest contract, for example students. For this group of persons, this document also applies if someone is no longer working at or for the FLI and is affected by an allegation of possible research misconduct made in connection with their former activity at or for the FLI.

Beyond the rules set out in the Guidelines, all other relevant local, national, and international codes of good research practice, research integrity, and research ethics apply to FLI staff. In the event of contradictions or inconsistencies, the more specific or stricter regulations apply as a rule. A list of important documents can be found in the appendix starting on page 24.

The employees of the FLI are obliged to read the relevant contents of these Guidelines in a timely manner, at the latest when starting work, and to put them into practice. In the event of questions, ambiguities, or issues regarding the interpretation of the Guidelines, the following can be contacted: the ombudspersons, the research coordinator, the data steward, the coordinator career development, and the coordinator for third-party funding.

The employees of the FLI are obliged to act according to good research practice, e.g. in the planning and execution of research projects, in the publication process, as reviewers, editors, as lecturers or interviewees, as supervisors and teachers, and as members of scientific commissions.

The employees of the FLI are obliged to update their knowledge of the rules of good research practice regularly and independently. This includes attending the training events offered at the FLI or at universities.

If necessary, the members of a working unit of the FLI should adopt additional rules of good research practice (e.g., for the handling of data or for the documentation of the research process) and update them as required.

2. Principles of Good Research Practice

Research is driven by the will to search for truth and requires the absolute integrity of all those involved in the research process. This integrity is also the basis of society's trust in scientists. Dishonesty is not only contrary to the purpose of research, but damages people's trust in researchers, in the research process, and in research results.

Researchers must strive for objectivity and for intersubjective comprehensibility in their work, train their critical faculty, and cultivate their willingness to accept criticism. One's own results, as well as the work of other researchers, must always be critically evaluated.

The repetition of research and the reproducibility of research results require the recording of the research process *lege artis*, that is, according to the rules of the profession. Reproducibility, comparability, and transferability require transparency, i.e., the complete preservation and accessibility of the research data required for this purpose. Research data that can be accessed via

online services must be prepared in accordance with the FAIR principles.⁵ Please find a summary in appendix 3 on page 31.

Research results obtained at the FLI are made publicly available as a matter of principle. Even unexpected, contradictory, or inconclusive results are published, provided they are plausible and reproducible and not the result of technical or other errors, and if they may be of interest to the scientific community.

The research process is a social practice. It succeeds only if those involved cooperate and support each other, if they treat each other with respect, strive for successful communication, recognize and appreciate achievements in an equitable manner, and use the available resources sparingly. All those working in research at the FLI are obliged to implement these principles in their social practice.

Heads of scientific working units, supervisors, and superiors have a special responsibility for communicating and monitoring good research practice at the FLI. They always act in an exemplary manner and ensure that the rules of good research practice are known to all their staff. They promote a culture in which learning from mistakes is possible and refrain from any kind of abuse of power. In this context, care is always taken to ensure that the basic rules of the FLI Code of Conduct are observed among colleagues.

FLI employees must know their tasks, rights, and duties. It is the responsibility of their respective supervisors and superiors to ensure this.

Junior researchers are entitled to appropriate supervision (see chapter 7).

Third-party intellectual property must always be respected. Material taken from the relevant works of others must be credited.

Legal and ethical standards must always be observed.

Quality always takes precedence over quantity when applying performance and evaluation criteria.

FLI employees check whether they are exposed to a conflict of interest in their work (e.g., as reviewers) and, if so, make such a conflict transparent.

FLI staff consider the context of their research when collecting and evaluating data, and when interpreting results, and make the context transparent in all publications.

FLI staff clearly state their own scientific expertise in all scientific communications (e.g., conferences, interviews, Twitter).

3. Research Design, Planning, and Preparation

Research is concerned either with further substantiating and validating existing bodies of knowledge through repetition or with generating new bodies of knowledge by identifying and filling a knowledge gap, whether hypothesis-driven or exploratory.

All research is based on prior research. Therefore, when planning a research project, the state of the relevant literature and existing research data is carefully researched, acknowledged, and documented. FLI staff trace the path from existing literature to a research idea and on to the research question or hypothesis and research design/plan in such a way that the genesis of the hypothesis or guiding research question and all sources can be traced.

Preliminary studies for the establishment of a future research project are justifiable within reasonable limits and may be necessary. These are presented as such in publications, proposals, and other texts.

⁵ FAIR Principles: F – findable, A – accessible, I – interoperable, R – reusable.

When planning an empirical or experimental research project, care should be taken to plan the statistics carefully: sample size, effect size, variance, appropriate statistical methodology, etc. To ensure this, the statistical planning should be discussed with suitable experts (e.g., staff of CF Life Science Computing) before submitting the application or before starting the practical work.

Already during the planning of a research project, but also at any time during its implementation, FLI employees assess possible consequences of their research and take them into account in the research product (see chapter 5). They handle their research freedom in a responsible manner.

Subjective influences on the conduct and on the results of research should be avoided as much as possible. Methods to avoid bias, e.g., blinding, should be planned and applied. Relevant contextual variables should be identified, documented, and reported.

Prior to conducting a research project, FLI staff shall obtain and document all necessary permissions and licenses (ethics votes, software licenses, access authorizations, approvals, briefings, etc.) in a timely manner. Research Group and Core Facilities leaders are responsible for ensuring they are obtained in time. They must be presented upon request.

The principles of good research practice also apply when writing applications for approval or for funding of a research project.

If possible, research plans including hypotheses, methodology, sample size, and statistics are pre-registered in recognized portals. A selection of portals can be found in the appendix starting on page 24.

To answer research questions, FLI staff correctly apply scientifically sound and plausible methods. Staff must be trained and instructed before applying methods or operating equipment. Responsibility for ensuring timely training or instruction rests with the respective entity heads. The possession of the necessary competencies is to be verified and documented, if necessary (see chapter 4.1 and 4.6). Competencies for which there is no structured instruction can also be acquired and documented through their application in practical circumstances.

Subject-specific standards must be observed. When establishing new standards, care must be taken to document all steps as carefully as possible; see appendix 2 on page 29.

Arrangements for cooperation and the individual and institutional responsibilities shall be communicated at the beginning of the cooperation and throughout its duration in accordance with the Montreal Statement, the Guideline Risk Management (see appendix 1 page 24) and authorship considerations for members of Core Facilities and Core Services (see appendix 8 page 36).

The management of research data should be governed by a specific data management plan (DMP). This plan should be formulated at the latest at the beginning of a research project, or should be developed from the plan created in connection with the funding application. The creation of a DMP should be supported by the person responsible for data management support, e.g., through individual advice and training or text modules on the FLI intranet.⁶

The DMP will be made available to all parties involved in the research project in a timely manner, reviewed regularly, and updated as needed.

The elements to be included in the DMP are explained on the web pages listed in the appendix 1.3 on page 27.

⁶ <https://www.leibniz-fli.de/research/good-scientific-practice/data-steward-at-fli>

4. Conducting Research

4.1. Communication among participants about the research project

At the beginning and as needed, those involved in a research project should discuss their roles, rights, duties, and responsibilities with regard to the research project. These agreements are recorded in writing and are accessible to everyone at all times (e.g., as part of a checklist for onboarding/offboarding). The agreements are reviewed regularly and adjusted, if necessary, especially when new employees join the team.

At the start of a research project or after new staff members have joined, the entity heads ensure that good research practice is observed. This means that they make sure, in particular, whether and to what extent:

- employees are clear about their roles, duties, and responsibilities in the research process and beyond;
- employees are familiar with the use of equipment, machines, computers, processes, etc.;
- employees are familiar with the protocols and statistical procedures to be used;
- employees are familiar with the criteria for scientific documentation;
- the basics, procedures, and tools of research data management are known (see FLI website⁷).

If the required knowledge or skills are insufficient, the entity heads shall instruct the employees accordingly; the instruction may be delegated to qualified persons. The entity heads must ensure that their employees have understood the instruction provided. The instruction provided shall be documented in writing and confirmed by signature.

4.2. Documentation of the research process

The entire research process must be appropriately documented, regardless of whether or not it leads to a research product (master's/bachelor's thesis, dissertation, postdoctoral thesis, journal publication, book contribution, poster, contributions to conference proceedings or on social media, etc.).

The research process must be documented in such a way that a professionally qualified person is able to trace the research process seamlessly and, if necessary, replicate and evaluate the results and conclusions.

Findings that do not support hypotheses, assumptions, or conclusions are also recorded and made publicly available as appropriate.

A list of criteria of appropriate documentation, recording, storage, and archiving can be found in the appendix 2 on page 29. If there is any deviation from the established documentation criteria, this must be plausibly justified and documented.

During the research process, the responsibility for proper documentation of the research process, for appropriate recording of analog and digital research data, and for the correct storage of samples and other substances lies with those FLI employees who have the closest contact with the data, documents, and substances, i.e., who collect, produce, gather, evaluate, interpret, or otherwise process them.

4.3. Research data

Research data are both the basis and the result of scientific work. They can be divided into original data, processed data, metadata, and research-related records.

⁷ <https://www.leibniz-fli.de/research/good-scientific-practice/rdm-at-fli>

Original or raw data are those research data that are collected, generated, or used directly at the source; these include, but are not limited to, experimental data documented electronically or in analog form, samples or objects, software and hardware, scripts and codes, information on equipment used, working materials and consumables, protocols, methods, observations, error records, parameters, settings, environmental and contextual variables.

Processed or derived data are produced by statistical or other forms of processing of data; the processing path (e.g., by statistical procedures, calculations, script applications, or command line calls) must also be appropriately documented.

Metadata are data necessary to understand original or processed data or the processing path; they must be appropriately documented.⁸ Standardized schemes for metadata are provided in FLI internal archiving.⁹

The research-related records comprise those documents that enable the research process to be traced in its entirety; this includes, among other things, grant applications, expert assessments and votes, permissions, access authorizations and licenses, the relevant correspondence of all participants (especially emails and letters), meeting notes, agreements, contracts, manuscript versions, literature lists, hypotheses, and presentations.

The data generated at the source are (usually) stored unchanged in redundant form (see below) and archived in such a way that they can be retrieved without difficulty by the persons authorized to do so. Further processing steps are performed (exclusively) on working copies and documented.

The process from the acquisition of raw data to its processing and presentation in research products must be seamlessly traceable. It must be possible to match all process steps to the respective persons carrying them out.

4.4. The use of research data

At the earliest possible stage of a research project involving FLI staff, all parties involved shall enter into written documented agreements on the rights and obligations concerning the use of their own and third-party research data, which shall also apply beyond the period of employment or qualification (e.g., for a master's or doctoral degree). The agreements should be reviewed regularly and updated as necessary.

Written documented agreements are particularly necessary if, in addition to FLI staff, persons from other academic and/or non-academic institutions are involved in a research project or in the event that FLI staff members leave and wish to continue using the data they have generated for (their own) research purposes (see chapter 4.6).

The use of research data occurs, among other things, through storage, archiving, evaluation, interpretation, merging, selection, modification, transmission, duplication, destruction/deletion, withholding, sharing, making accessible, publication, or integration into simulations.

The use of research data within the scope of a patent is regulated by law (see FLI intranet site¹⁰).

The use of research data may be restricted or otherwise regulated by other laws, regulations, or agreements, e.g., for the handling of patient data or genetically modified organisms.

The use of research data for the preparation of a qualification thesis or other research product is particularly granted to the person who collects/generates them; if several persons are involved in the

⁸ <https://datamanagement.hms.harvard.edu/collect-analyze/documentation-metadata>

⁹ <https://flida.leibniz-fli.de>

¹⁰ http://www2.leibniz-fli.de/internals/forschungskoordination/TT_Flyer_en.pdf

collection/generation of research data, their respective shares in the collection/generation should be appropriately documented and made transparent.

If the employee who collected/generated research data voluntarily refrains from using them for plausible reasons (“abandoned” data), the decision how to use them shall pass to the entity head; the abandonment shall be documented in writing. This waiver shall be retained with the research data.

If the employee who collected/generated research data does not issue a statement on the further use of the research data even after sufficiently intensive search or inquiry (“orphaned” data), the decision how to use them shall pass to the entity head; the procedure for the inquiry and its failure shall be documented in writing.

If an employee who collected/generated research data dies before or during the intended use, the decision how to use data not protected by copyright passes to the entity head.

In all cases of use of the research data by others, the regulations of the respective publication media shall be considered, if applicable.

In the case of licensing, the procedures of the Technology Transfer Manual and the requirements of the Employee Inventions Act shall apply (see FLI intranet site¹¹).

4.5. Retention of research data

All research data should be retained in accordance with the 3-2-1 backup rule and be protected from tampering to the greatest extent possible. Exceptions must be justified and documented. 3-2-1 backup rule: All digital research data are to be cloned into two additional objectively identical copies as soon as possible after being generated. The two clones must be stored on different media (analog-digital; different storage media, e.g., in the instrument and on a server next door, or on a computer and an external hard drive). One of the clones is stored in a remote location on the primary data management and archiving environment at the FLI fliDA.¹²

If primary data and processed data are the basis for a qualification thesis or another research product, these data, including their metadata and the research-related records, must be retained for at least ten years after public access is established or after the qualification date.

If research data are subsequently used for further publications or qualification work, the retention period begins again after public access has been established or after the qualification date.

If longer storage periods are prescribed by other regulations (e.g., by the Genetic Engineering Records Ordinance/Gentechnik-Aufzeichnungsverordnung), by regulations of funders or by cooperation agreements), then these apply.

If there are plausible reasons for a shortened retention period, these are clearly explained. The explanatory document (destruction/deletion protocol) is retained without a time limit.

After expiry of the minimum retention period, the research data can be retained for longer on one’s own responsibility and in one’s own interest (see chapter 4.6).

If research data are not used for publication or qualification work for plausible reasons, these data can be deleted or destroyed at the earliest ten years after the end of the funding period of the project in which they were generated.

If research data are lost prior to the expiration of the minimum retention period, an informal loss protocol will be prepared documenting the circumstances of the data loss. The loss protocol must be retained by the entity head for a period of at least ten years after the creation of the loss protocol in a manner that maintains transparency of the relationship to related data that have not been lost.

¹¹ http://www2.leibniz-fli.de/internals/forschungskoordination/TT_Flyer_en.pdf

¹² <https://fliida.leibniz-fli.de>

If research data must be deleted for important reasons (e.g., to protect the personal rights of test subjects), an informal deletion protocol is prepared. The deletion protocol must be retained by the entity head for a period of at least ten years after the creation of the deletion protocol.

The process of (final) archiving of research data is governed by the “Rules for archiving publication-relevant data” (appendix 9) or the “‘How-To’ for archiving and external assessment before submission of publications and theses” (appendix 10).

4.6. Access to research data and responsibility for their recording, storage, transfer, and archiving

In the context of an ongoing or completed research project, the authorized users also decide (in particular in accordance with data protection regulations) whether third parties should have access to the data. The decision is documented informally.

The employee who collects the data is responsible for the proper recording of digital research data during his/her employment/qualification period.

Proper storage of non-digital research data (e.g., samples, materials) and their transfer to the physical storage location is the responsibility of the employee working with these data during his/her employment/qualification period.

These employees must be appropriately instructed and supervised for this purpose and the implementation must be reviewed at regular intervals. Instruction, supervision, and review must be documented in writing, e.g., in a note; these tasks may be delegated by the entity head to appropriate competent persons.

Resources necessary for record keeping and retention shall be provided by the FLI and shall be the responsibility of the respective entity head.

When a new employee joins the FLI, and again before leaving, they are advised by the entity head or delegated person that they may create and take along a private copy of their research data for their future use. For convenience, the personal copy may be created at regular intervals during the employment period (e.g., once a month) on suitable storage media.

For research data that cannot or must not be copied for plausible reasons (e.g., samples, very large data volumes, sensitive data), access rights are agreed upon and documented.

Before an employee of the FLI leaves, they must hand over or transfer the research data that they collected, generated, or processed and that need to be archived at the FLI, including the handover protocol in the exit slip/off-boarding checklist, to the entity head or a designated person.

Research-relevant communications (emails, letters, etc.) are also handed over.

Private documentation such as research diaries (e.g., with conference transcripts) will not be handed over. It is recommended that the leaving person preserves them securely and permanently.

After the departure of an employee of the FLI, the entity head is responsible and accountable for the safe and permanent storage of the research data in the interests of the involved persons and institutions for the purpose of verifiability and traceability of the research process and the (possible) research products.

After dissolution of a research group, the head of the superordinate organizational unit assumes responsibility for the permanent and secure storage of the research data.¹³

¹³ <https://www.leibniz-fli.de/institute/organization>

5. Research Products

5.1. Principles of GSP for publications

The findings obtained in research projects at the FLI are generally made publicly available unless there are good reasons for not doing so. These are to be documented in a comprehensible manner.

It is recommended that manuscripts be published in advance on a preprint server (e.g., BioRxiv¹⁴). Before uploading, the FLI publication process must be followed (see appendix 8).

Transparency, comprehensibility, and completeness in the research product must be of such an extent that research results or findings can be replicated/rechecked by others.

All own and external preliminary work is documented truthfully and traceably.

The origin of the data (digital, analog, physical; samples, materials, software, etc.) is identified.

Original sources must always be cited; secondary citations are to be avoided. For this purpose, all sources must already be appropriately documented in the preceding research process.

Visual representations of data in graphics, figures, tables, pictures, etc. must be easily, immediately, and unambiguously understandable, supplemented by suitable explanations in text form if necessary. Peacocking, i.e., the exaggerated or misleading presentation of certain statements, is to be avoided.

If possible, research data (e.g., OMICS data) on which a publication is based are made available in recognized repositories in accordance with FAIR principles. See examples in the appendix 7.

It is recommended that all research data on which a publication is based be consolidated and made available to all authors.

Even findings that contradict the leading research question, the hypothesis, or recognized bodies of knowledge (so-called “negative results”) are to be published.

Junior researchers should be given the opportunity to write manuscripts independently and under supervision and to go through the publication process.

If authors have made findings publicly available and subsequently become aware of discrepancies or errors, these must be corrected immediately by means of a “correction” or “erratum” using the procedure provided by the publication medium. If the discrepancies or errors should result in the retraction of a publication, the authors must work with the relevant publisher or infrastructure provider as quickly as possible to ensure that the retraction takes place and is marked accordingly (“retraction”). This applies in particular if the authors are informed of such discrepancies or errors by third parties.

5.2. Publication medium and authorship

The publication medium - journal, conference proceedings, repository, etc. - is carefully selected by the authors. General criteria for the selection of the publication medium are outlined in the appendix 4.

The selected medium should have its own established standards of good research practice. These are to be adhered to as a matter of principle.¹⁵ There is to be no publication in “predatory journals.” For the identification of such journals see the appendix 5.

An employee of the FLI can only become an author of an original scientific publication if he/she has personally contributed significantly to the research process and the research product, i.e.,

¹⁴ <https://www.biorxiv.org>.

¹⁵ Committee on Publication Ethics: <https://publicationethics.org>.

- to the conception or design of the work; or to the acquisition, analysis, or interpretation of data for the work;
- and to drafting the work or revising it critically for important intellectual content.

Furthermore, the employee must

- approve of the publication of the text
- and agree to be accountable for the publication and the preceding research process.

In particular, the following contributions do not qualify for authorship (so-called "honorary authorship"):

- merely organisational responsibility for obtaining the funds for the research,
- providing standard investigation material,
- the training of staff in standard methods,
- merely technical work on data collection,
- merely technical support, such as only providing equipment or experimental animals,
- regularly providing datasets only,
- only reading the manuscript without substantial contributions to its content,
- directing an institution or working unit in which the publication originates.

If an employee of the FLI refrains from using her/his data in the context of a publication for plausible reasons ("abandoned data") and thus does not wish to become an author, this renunciation is documented in writing and the renunciation document (waiver) is kept together with the research data.

If a (former) employee of the FLI who is entitled to authorship has not made any claims regarding his or her cooperation in the preparation or critical revision of a publication ("orphaned data"), even after intensive inquiry or subsequent investigation, the failure of the search will be documented in writing in a traceable manner.

In both cases the use of the research data is regulated in chapter 4.4. The particularities of the respective publication media for the publication of abandoned or orphaned research data are to be taken into account.

All authors shall fully and truthfully describe their contributions to the research process and the research product.

To avoid conflicts over authorship, those involved in the research project communicate about their expectations regarding authorship at the beginning and as needed. They agree on a procedure for determining authors according to the valid criteria for authorship and document their agreements in writing (see appendix 6).

With regard to the sequence of authors, the respective conventions of the subject disciplines involved should be taken into account. In particular, when authors from different subject cultures cooperate, the agreement reached at the beginning of the collaboration should also include a procedure for determining the sequence of authors.

During the course of the project, the participants shall prepare a list of all contributors and update it regularly.

Prior to writing a multi-author manuscript, the participants will discuss and agree on whose research contributions will be represented in the manuscript and how, and what portions of the text will be written by whom. The order of authors is determined according to the agreement.

When contributions are of similar significance, "shared authorship" should be considered, especially for prominent positions on the author list. To avoid problems with cumulative doctorates, the relevant doctoral regulations should be consulted before deciding on shared authorship.

If, in the writing process or during the review of the manuscript, contributions of authors are removed, become more significant, or are added, this is discussed by the parties involved, consensus on the change is documented, and the list of authors is adjusted accordingly, if necessary. The procedure for changes to the list of authors after submission is governed by the guidelines of the publication medium.

The final list, including the names of the authors and those mentioned in the acknowledgements, is mutually agreed upon prior to submission. This shall be suitably documented.

If an FLI employee does not meet the criteria for authorship in a research project, he or she should be mentioned in the acknowledgement. The guidelines of the respective publication medium are to be followed.

As a rule, a mention in the acknowledgement should only be made with the consent of the named person.

Consent to publication by an author may not be withheld or delayed (obstruction) without scientific justification. Refusal or delay of consent must be justified by a verifiable criticism of data management, documentation of the research process, or any component of the manuscript (data, methods, figures, literature, text components, results, etc.).

When citing affiliation(s), the guidelines of the publication medium must be followed.

The FLI is named as an affiliation if the majority of the research work was done at the FLI. The decisive factor for affiliation is the fulfillment of the criteria for authorship. This is the case, for example, if the research data used for the publication were collected at the FLI. The FLI is also cited as an affiliation if a departed employee publishes research data collected at the FLI in a position at another institution.

If data collected at another institution are published by an employee of the FLI, the other institution is named as an affiliation. The FLI is given as “current address.” See also the guidelines of the German Rectors’ Conference, the HRK.¹⁶

Multiple affiliations are possible, e.g., for PhD students or for employees of the FLI who have another institute affiliation.

5.3. Misconduct in the publication process

Misconduct in the publication process includes the following:

- the splitting of research data to produce multiple publications (“salami slicing”);
- duplicate and multiple publications (unless well justified, e.g., after invitation for second publication, pre-publication on preprint servers, or by translation into a more common language with reference to the original publication);
- the simultaneous submission of the same manuscript to more than one publication medium, if this is prohibited by regulations of the publisher;
- so-called “honorary authorship,” in particular authorship obtained by collusion (“authors’ club”) or reference to tradition (“default authorship”), or forced by abuse of power (“coercive authorship”);
- the denial of authorship, in the case that substantial contributions were made to the planning or execution of a scientific research project;

¹⁶ <https://www.hrk.de/press/press-releases/press-release/meldung/hrk-guidelines-on-institutional-attribution-of-research-publications-4381/>

- unjustified self-citation, participation in a citation cartel, or other manipulation of literature lists as author, reviewer, or editor (e.g., to increase impact factor);
 - submitting or publishing a manuscript without first having obtained the explicit consent of all authors;
 - the unjustified delay or prevention of the publication of a scientific paper (obstruction);
 - the alteration of an agreed list of authors without consent of all authors;
 - naming a known researcher as an author to increase the likelihood of acceptance of the manuscript (“author doping”);
 - publication in a predatory journal;
 - naming as an affiliation an institution that does not meet the criteria for affiliation;
-
- manipulation of the review process, e.g., through courtesy reviews or unjustified rejection of manuscripts as a reviewer or editor;
 - collusion between author, reviewer, and/or editor for the purpose of manipulating the publication process;
 - the review of one’s own manuscript, e.g., by pretending to be someone else (self-review);
 - knowingly participating as a reviewer or editor of a predatory journal;
 - purchasing authorship of texts offered by “paper mills”¹⁷ or selling professional articles to them;
 - concealing conflicts of interest;
 - accepting a peer review despite the existence of a concealed conflict of interest;
 - conducting a peer review without sufficient expertise;
 - delegating a review to a third party without the prior consent of the editor;
 - the exploitation of data of others as a reviewer or editor (e.g., by stealing ideas, results, or conclusions);
-
- the unauthorized publication or release to third parties of a work, finding, hypothesis, teaching, or research approach that has not yet been published in the manner customary in the profession.

5.4. Procedure before the submission of manuscripts

Prior to submission, manuscripts of research products must be prepared and checked in accordance with the “‘How-To’ for archiving and external assessment before submission of publications and theses” (RESIS) (see appendix 10) and the “Rules for PhD thesis submission” (see appendix 11) or the “Rules for publishing research articles” (see appendix 8).

6. Evaluation and Peer Review

Before accepting an evaluation or a peer review by an employee of the FLI, the employee must carefully check whether a conflict of interest exists. If the conflict of interest makes a neutral and

¹⁷ Jana Christopher: The raw truth about paper mills. FEBS Letters 595 (2021) 1751–1757; doi:10.1002/1873-3468.14143.

objective review difficult (e.g., because of a close personal acquaintance with one of the authors), the request for evaluation/peer review must be rejected.

Evaluations and peer reviews may only be carried out by persons qualified to do so.

Junior researchers should be given the opportunity to learn how to peer review manuscripts under supervision. Usually, permission to do so must be obtained from the editor in advance.

To prepare for the first peer review by a junior researcher, he or she should make use of a training course or the online learning programs of the major publishers, e.g., Springer Nature.¹⁸

All assessments primarily follow qualitative standards. Quantitative indicators should only be included in the overall assessment in a differentiated and reflected manner.

7. Research Support and Promotion of Junior Researchers

All participants in the research process are entitled to supervision and support.

All participants in the research process are entitled to support for their own independence and career opportunities.

More detailed information for PhD students and postdocs can be found in the Leibniz Graduate School on Aging (LGSA) Training Guidelines and in the Career Development Guidelines for postdoctoral fellows (see the FLI intranet site¹⁹ and Postdoc Guideline²⁰).

All participants in the research process should provide regular communication about the progress of their research projects. The frequency of formal discussions should be in line with the respective needs of the participants and the progress of the research process.

Notes of all formal discussions (e.g., between cooperation partners or between supervisor and supervisee; see e.g., chapter 7 of the LGSA Training Guidelines) shall be taken and preserved. If the content of the conversation relates to a publication or qualification thesis, the notes must be preserved for at least ten years after the publication/qualification date.

Entity heads should create conditions for successful cooperation of all members of the work unit. The entity head may delegate tasks to competent persons after instruction has been given and with appropriate guidance and supervision; management responsibility, on the other hand, cannot be delegated.

All FLI staff involved in research or research coordination are required to attend regular GSP training. Students and junior researchers should conclude a supervision agreement with the supervisor/entity head.

FLI staff members pursuing a scientific qualification are obliged to carefully read the respective examination regulations, doctoral regulations, or habilitation regulations of their faculty. In the event of any ambiguities, the office responsible for examinations, doctorates, or habilitations must be consulted.

8. Ombudspersons at the FLI

8.1. Election of ombudspersons to ensure good research practice

The scientists and technical staff of the FLI elect two reciprocally representing ombudspersons from among the scientists with doctorates, who should not belong to the same working group. At least one

¹⁸ <https://www.springernature.com/gp/authors/campaigns/how-to-peer-review>.

¹⁹ http://www2.leibniz-fli.de/internals/phd/LGSA_Training_Guideline_Package.pdf

²⁰ http://www2.leibniz-fli.de/internals/phd/Postdocs/Postdoc_Guideline.pdf

ombudsperson should be a woman. Ombudspersons may not be members of the institute management. The Executive Board of the FLI is responsible for conducting the secret election. The term of office of the ombudspersons is four years. Re-election is possible once. Employees are notified of the incumbent ombudspersons and they are announced on the institute's internal website.

If it no longer appears possible for an ombudsperson to reliably fulfill his or her duties in the long term, or if confidence in the proper fulfillment of duties is no longer justified, an ombudsperson may be voted out of office. An ombudsperson is voted out if at least 2/3 of the scientists and technical staff of the FLI agree. Before the scientific director of the FLI schedules a deselection, the ombudsperson must be given the opportunity to make a statement (hearing). The reasons for the voting out and the hearing of the ombudsperson concerned must be recorded in writing.

8.2. Tasks of the ombudspersons to ensure good research practice

Neutral and qualified contact persons (ombudspersons) advise current and former employees of the FLI on matters of good research practice. They also have the task of receiving possible allegations of scientific misconduct in confidence and, if necessary, passing them on to the investigative body (see chapter 10). All ombudsperson matters are subject to confidentiality, which must be maintained by all parties involved even after the conclusion of a procedure.

The ombudspersons of the FLI do not have formal rules of procedure, but are guided by the principles of confidentiality, procedural fairness, and transparency for the parties involved. Conflict resolution is pursued – as far as possible – in consensus with the parties involved and with the aim of finding a mutually agreeable solution for all parties involved (mediation) and in compliance with good research practice.

The ombudsperson submits allegations of scientific misconduct to a preliminary examination. If this gives rise to a concrete initial suspicion of scientific misconduct (see chapter 9), a procedure for dealing with scientific misconduct is initiated (see chapter 10).

Ombudspersons may also address indications of scientific misconduct on their own initiative, without having to disclose the identity of a whistleblower to third parties.

It is not the task of the ombudspersons to determine academic misconduct and to impose sanctions.

8.3. Advice seekers, whistleblowers, and accused persons

Anyone who has a concern or question regarding good research practice (advice seeker), who suspects scientific misconduct (whistleblower), or who is accused of scientific misconduct (accused person) can contact one of the ombudspersons of the FLI at any time.

Employees from the research group of an ombudsperson contact the ombudsperson who is not a member of their own research group.

Employees of the FLI also have the right to turn to the supra-regional body "German Research Ombudsman"²¹ or the Central Ombuds Committee of the Leibniz Association.²² Members of a university working at the FLI may contact the ombudspersons of their university. The simultaneous notification of several ombuds bodies is to be avoided.

A whistleblower's report of possible scientific misconduct must be made in good faith. Allegations must not be made without verification and without sufficient knowledge of the facts. Careless handling of allegations of scientific misconduct, and even more so the making of deliberately incorrect allegations, may constitute a form of scientific misconduct.

²¹ <https://ombudsman-fuer-die-wissenschaft.de/?lang=en>.

²² <https://www.leibniz-gemeinschaft.de/en/about-us/leibniz-integrity/good-scientific-practice-and-ombuds-services>.

Anonymous reports are always possible.

The names of all persons involved are treated confidentially by the ombudspersons of the FLI. Disclosure of the name to the person concerned may be necessary in individual cases if the person concerned cannot otherwise defend him/herself properly.

The facts discussed with an ombudsperson of the FLI are to be treated confidentially by all parties involved. A violation of this obligation may constitute a form of scientific misconduct.

To protect themselves, whistleblowers can express a suspicion of misconduct in the form of a question about good research practice during the initial contact with an ombudsperson. It is advisable to consult an ombudsperson sooner rather than too late; an erroneous suspicion can thus be dispelled without coming to the attention of third parties, and misconduct can possibly be prevented. If several employees of the FLI have the same suspicion, they can go to the ombudsperson together; in this case, the obligation of confidentiality among each other does not apply.

Whistleblowers who report their suspicions of possible scientific misconduct to the relevant institution perform an essential function for self-regulation in science. It is not the whistleblower who expresses a justified suspicion who damages research and the institution, but the researcher who is guilty of misconduct. Therefore, a whistleblower's career should not be disadvantaged or academic progress hindered by a disclosure. Particularly for early career researchers a report of this nature should not result in delays or obstacles during their education; there should be no disadvantage to their final dissertations and doctorate; this applies to working conditions and to possible extensions to their contracts.

The protection of whistleblowers is ensured at the FLI by the ombudspersons, the Panel for the Investigation of Allegations of Scientific Misconduct at the FLI, and the Scientific Director or the Chair of the Scientific Advisory Board.

9. Scientific Misconduct

- (1) Scientific misconduct occurs when the standards of good research practice are violated intentionally or through gross negligence. This includes, in particular, the violation of ethical standards, misrepresentation and manipulations, disregard for the intellectual property of others, and interference with or obstruction of the research activities of others.
- (2) Scientific misconduct exists in particular in the case of:
 1. misrepresentation of information through
 - a. fabricating data, sources, research hypotheses;
 - b. falsifying data and sources, e.g., by
 - i. suppressing sources, data, documents, or texts relevant to the research questions,
 - ii. manipulation of sources, data, representations, or figures,
 - iii. cherry-picking results and discarding undesirable findings without disclosure;
 - c. incorrect information in an application letter or grant proposal (including false information about the publication medium, publications submitted and/or in print, qualification work supervised, participation of third parties, etc.);
 - d. incorrect information on the scientific achievements of applicants in selection or review committees;
 - e. concealment of conflicts of interest;
 2. Infringement of intellectual property
 - a. with respect to a copyrighted work created by another person or

- b. essential scientific knowledge, hypotheses, teaching, or research approaches originating from another person through
 - i. unauthorized use under presumption of authorship (plagiarism),
 - ii. unauthorized use of research approaches and ideas, especially in or after the review process (theft of ideas),
 - iii. unauthorized use of contributions from bachelor's and/or master's theses,
 - iv. usurpation of scientific authorship or co-authorship without own scientific contribution,
 - v. falsification of the content, e.g., through the arbitrary omission or addition of results and/or information relevant to the subject matter,
 - vi. unauthorized publication or release to third parties as long as the work, finding, hypothesis, teaching content, or research approach has not yet been published,
 - vii. claiming (co-)authorship of another person's work without that person's knowledge or consent,
 - viii. other violations of good research practice in the publication process (see chapter 5.3).
 3. Passing off work written by another person as one's own and/or actively participating in a misstatement of authorship.
 4. Interfering with or impeding the research activities or qualification opportunities of others, e.g., through
 - a. sabotage of another person's research activities by
 - i. damaging, destroying, removing, or manipulating experimental setups, equipment, records, hardware, software, chemicals, or other materials needed by another person to conduct his or her research,
 - ii. malicious misappropriation or theft of books, archival records, manuscripts, data sets,
 - iii. intentionally rendering scientifically relevant material, such as information carriers, unusable,
 - iv. deletion of data, if this would violate legal regulations, recognized principles of scientific work, regulations of the respective institution, or these Guidelines,
 - v. arbitrarily delaying the publication of a scientific paper, especially as an editor, reviewer, or co-author,
 - vi. unauthorized destruction or unauthorized sharing of research material;
 - b. violation of supervisory duties;
 - c. termination of scientific collaboration without sufficient reason or prevention of the publication of research results as a co-author, especially if the other authors are dependent on the consent for publication. Refusal to give the required consent for publication constitutes misconduct if there are no sufficient factual reasons for the refusal ("obstruction"). In such cases, the publication of the data can also take place without the consent of the co-author terminating the scientific collaboration and after approval by the ombudspersons,²³ provided that there are no copyright reasons to the contrary.
 5. Refusal to cooperate or deliberate delay in clarifying scientific misconduct, e.g., in the context of an ombuds procedure or a formal investigation procedure.
- (3) Shared responsibility for misconduct may result from, among other things,

²³ Deutsche Forschungsgemeinschaft. Sicherung guter wissenschaftlicher Praxis. Denkschrift. Weinheim: Wiley-VCH; 1998. pp. 31, 83f.

1. active participation in the misconduct of others,
2. being aware of scientific misconduct of others without taking or initiating appropriate action,
3. co-authorship of publications containing fraudulent material, and
4. grossly neglecting supervisory duties.

10. Procedure at the FLI in the event of suspected scientific misconduct

In the event of justified initial suspicion of scientific misconduct, the ombudsperson informs the Scientific Director of the FLI. If the Scientific Director is affected by the suspicion, the Chairperson of the Scientific Advisory Board will be informed. The informing of the Scientific Director or the Chairperson of the Scientific Advisory Board usually takes place in a written form; in the event of being informed orally, the Scientific Director or the Chairperson of the Scientific Advisory Board prepares a written note.

The Scientific Director or the Chairman of the Scientific Advisory Board commissions the Panel for the Investigation of Allegations of Scientific Misconduct at the FLI to further examine the facts of the matter.

The Panel for the Investigation of Allegations of Scientific Misconduct at the FLI consists of the legal counsel, the respective other ombudsperson (not the one initiating the investigation), and the research integrity officer of the compliance management system. For the clarification of facts, professionally qualified experts can be consulted. Such investigations shall be conducted with due regard for confidentiality and the protection of all parties involved.

The panel is entitled to obtain all information and opinions necessary to clarify the facts of the case, while safeguarding the legitimate interests of the persons concerned, and shall examine whether scientific misconduct has occurred in the light of independent evidence.

The person affected by the suspicion of misconduct shall be given the opportunity to comment, with reference to the incriminating facts and evidence. A deadline shall be set for the submission of a written statement. The identity of a whistleblower shall not be disclosed to the person concerned without his or her consent at this stage of the procedure.

The panel shall take into account the basic principle of the presumption of innocence vis-à-vis the person concerned at every stage of the proceedings within the framework of a case-by-case consideration. As a matter of principle, the person affected by the allegations should not suffer any adverse consequences from the investigation into the suspicion until scientific misconduct has been formally established.

After completion of the investigation, the committee reports the results of the investigation in writing to the Scientific Director or the Chair of the Scientific Advisory Board. Based on the report received, the Scientific Director or the Chair of the Scientific Advisory Board, as the case may be, shall make a decision within a reasonable time as to whether the findings by that point have invalidated the suspicion of misconduct, whether further investigation is necessary, or whether misconduct is to be considered proven. This decision shall be set forth in writing in a memorandum. This report, in particular in accordance with the “Guidelines for Good Scientific Practice in the Leibniz Association” (Leibniz Guidelines),²⁴ should do the following:

²⁴ https://www.leibniz-gemeinschaft.de/fileadmin/user_upload/Bilder_und_Downloads/Über_uns/Integrität/Guidelines_for_Good_Scientific_Practice_in_the_Leibniz_Association.pdf

- a) present and evaluate the extent of such scientific misconduct; and
- b) establish and substantiate whether such conduct was negligent, grossly negligent, or deliberate; and
- c) determine whether a sanction is appropriate and should be implemented (see chapter 11).

The individual steps should be completed without avoidable delay or within the specified time limits, and should be accurately recorded and documented.

If, in the course of a case, it becomes apparent that a final clarification of the allegations by the FLI is not possible or that the proceedings are impeded by extraordinary circumstances, the ombudsperson of the FLI shall, according to §4(2) of the Leibniz Guidelines, submit the case in written form according to §5(1) of the Leibniz Guidelines to the central ombudsperson of the Leibniz Association, who shall take over the proceedings according to §5(2)–(6) of the Leibniz Guidelines. Within the framework of this procedure, the central ombudsperson may, in accordance with §5(5) of the Leibniz Guidelines, decide on the necessity of setting up an investigation committee, which, in accordance with §5(7) of the Leibniz Guidelines, shall be appointed by resolution of the Presidium of the Leibniz Association.

After completion of the investigation procedure, the ombudsperson and the investigation committee shall advise any persons who may have been involved in processes of scientific misconduct through no fault of their own, in particular junior researchers and students, on how to safeguard their personal and scientific integrity.

11. Consequences of Scientific Misconduct

1. If scientific misconduct is to be considered proven, the Scientific Director or the Chairperson of the Scientific Advisory Board, as the case may be, shall decide on the necessity of further measures, if necessary by obtaining legal expertise.

Depending on the circumstances of the individual case and in particular the seriousness of the misconduct established, sanctions from a wide variety of legal areas are possible, also cumulatively if applicable, e.g.:

- a. consequences under labor law:
 - i. warning,
 - ii. extraordinary or ordinary dismissal,
 - iii. termination of contract;
 - b. academic consequences:

informing universities of serious scientific misconduct in connection with the acquisition of an academic qualification, so that the university can revoke the doctoral degree or teaching authorization if applicable;
 - c. consequences under civil law:
 - i. imposing a ban from the premises,
 - ii. claims for restitution against the person concerned, for example for the return of stolen scientific material,
 - iii. claims for removal (e.g., of published results) and injunctive relief under copyright law, personal rights law, patent law, competition law,
 - iv. claims for repayment, e.g., of scholarships or third-party funds,
 - v. claims for compensation by the Institute or third parties;
 - d. consequences under criminal law;
 - e. retraction of scientific publications.
2. Scientific publications that are erroneous due to proven scientific misconduct must be withdrawn if they are still unpublished and corrected or retracted if they have already been

published. Cooperation partners are to be informed in an appropriate manner, if necessary. As a matter of principle, the author(s) and editors involved are obliged to do so; if they do not take action within a reasonable period of time, the Scientific Director or the Chair of the Scientific Advisory Board will initiate the appropriate measures available to them in order to achieve a correction or retraction.

3. In cases of serious scientific misconduct, the Scientific Director or the Chairperson of the Scientific Advisory Board shall inform other affected research institutions or research organizations, including professional organizations if necessary.
4. The Scientific Director or the Chairperson of the Scientific Advisory Board 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 institute's scientific reputation, to prevent further consequences, and in the general public interest.

Severability clause

Should a provision of these Guidelines be or become void or unenforceable, whether in part or in its entirety, the validity of the other provisions included in these Guidelines remain unaffected. In place of the void or unenforceable provision, a new provision that comes closest to reflecting the spirit and purpose of the Guidelines should be considered as agreed upon. The same applies in the event that a loophole is found in the Guidelines.

Entry into Force

These Guidelines were approved by the Executive Board of the FLI on May 2nd 2023 and enter into force on May 2nd 2023. These Guidelines are a component of the rules of good research practice in line with the corresponding provisions of the employment contract.

Appendix

1. Links to documents and portals

1.1. Good research practice and research integrity (version 11/2022)

Some documents are available only in German.

DFG Code of Conduct (2019)

https://www.dfg.de/en/research_funding/principles_dfg_funding/good_scientific_practice/index.html



DFG Memorandum Safeguarding Good Scientific Practice (2013)

https://www.dfg.de/download/pdf/foerderung/rechtliche_rahmenbedingungen/gute_wissenschaftliche_praxis/empfehlung_wiss_praxis_1310.pdf



Leibniz Code for Good Research Practice (2021)

https://www.leibniz-gemeinschaft.de/fileadmin/user_upload/Bilder_und_Downloads/Über_uns/Gute_wissenschaftliche_Praxis/Leibniz_Code_for_Good_Research_Practice.pdf



Guidelines für Good Scientific Practice in the Leibniz Association (2019)

https://www.leibniz-gemeinschaft.de/fileadmin/user_upload/Bilder_und_Downloads/Über_uns/Integrität/Guidelines_for_Good_Scientific_Practice_in_the_Leibniz_Association.pdf



Singapore Statement on Research Integrity (2010)

<https://wcrif.org/guidance/singapore-statement>



Montreal Statement on Research Integrity in Cross-Boundary Research Collaborations (2013)

<https://wcrif.org/guidance/montreal-statement>



Guideline for Risk Management in International Scientific Cooperation of the Leibniz Association (2021)

https://www.leibniz-gemeinschaft.de/fileadmin/user_upload/Bilder_und_Downloads/Über_uns/Internationales/Risk_management_in_international_scientific_cooperation.pdf



Hong Kong Principles for Assessing Researchers (2019)

<https://wcrif.org/guidance/hong-kong-principles>



Hochschulrektorenkonferenz – Gute wissenschaftliche Praxis an deutschen Hochschulen (2013)

<https://www.hrk.de/positionen/beschluss/detail/gute-wissenschaftliche-praxis-an-deutschen-hochschulen/>



ALLEA (All European Academies) The European Code of Conduct for Research Integrity (2017)

<https://allea.org/code-of-conduct/>



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1.2. Portals for pre-registration of research projects or data management plans (version 11/2022)

Center for Open Science

<https://www.cos.io/initiatives/prereg>



Animal Study Registry

https://www.animalstudyregistry.org/asr_web/index.action



Preclinical Trials

<https://preclinicaltrials.eu>



Publishing on Zenodo

<https://zenodo.org>



1.3. Data Management Plans (version 11/2022)

Research Data and Research Data Management

<https://forschungsdaten.info/english-pages/>



HORIZON 2020

https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/data-management_en.htm



Stanford University Libraries

<https://library.stanford.edu/research/data-management-services/data-management-plans>



Information about Data Management Plans in the Research Data Management Helpdesk of Friedrich-Schiller-Universität Jena

<https://www.researchdata.uni-jena.de/information/datenmanagementplan>



DMPOnline Public Data Management Plans

https://dmponline.dcc.ac.uk/public_plans



RWTH Aachen University Vorlage Datenmanagementplan

https://www.rwth-aachen.de/global/show_document.asp?id=aaaaaaaaasvnen



Universität Kiel Datenmanagementplanung

<https://www.datamanagement.uni-kiel.de/de/service/materialien>



California Digital Library DMPtool<https://dmptool.org>**Research Data Management Organiser**<https://rdmorganiser.github.io>**Data Stewardship Wizard**<https://ds-wizard.org>

2. Criteria of appropriate documentation, recording, storage, and archiving (version 11/2022)

To ensure the traceability of the research process and the research product, the associated documentation must be procured or carried out in accordance with the following principles:

Unaltered	Everything that is documented must be recorded authentically.
Complete	Everything that is relevant to the research process or research product is recorded according to the Five Ws ²⁵ . As a general rule, something that is not recorded never happened.

Timely	Documentation is done as quickly as plausibly possible so that nothing is forgotten or mistakenly falsified.
Regularly	Procedures that need to be repeated regularly should be done at plausible intervals.

Who?	The documentation is labeled with the name of the person documenting.
When?	The time of production, modification, transfer, destruction, etc. is documented.

Commented	The documentation is provided with explanations, if necessary (e.g. via a list of abbreviations, a README file or an explanation of a code/script).
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Understandable	Professionals must be able to comprehend the content without difficulty.
Precise	The documentation must be unambiguous, accurate, and clear.
Detailed	All descriptions should be as detailed as necessary, but also as brief as possible.
Technical language	The documentation is written in German or English, if necessary including special technical terms.
Legible	Handwritten documents must be readable and understandable by all participants and qualified third parties without any problems.

Secure	Sufficiently secured against loss, theft, destruction, and other unplanned or unforeseeable events.
Protected	Protected against loss of information or integrity (samples are stored in appropriate atmosphere, temperature, etc.; data on electronic media are to be protected against degradation and/or copied to new media on a regular basis).

²⁵ Who, what, when, where, why – and how

3-2-1 Backup Rule	Present in at least three identical copies, two of which are on different media, one of which is in a remote location.
Witnessed	Confirmed with the necessary signatures by witnesses, e.g., provided with a manual or electronic signature after checking the laboratory notebook, instruction, data transfer, or similar.
Forgery-proof	The documentation is protected as well as possible against manipulation.
Final	Original data is kept unchanged; all procedures are performed on copies only.

Structured	The documentation (files, folders, forms, etc.) is structured in a clear and orderly manner.
Standardized	If necessary, by using templates or predefined process schemas.
Consistent	The documentation is to be prepared in a uniform manner.

3. The FAIR Guiding Principles for scientific data management and stewardship

Mark D. Wilkinson et al., DOI: 10.1038/sdata.2016.18, p. 4.

<https://www.nature.com/articles/sdata201618>



“To be Findable:

- F1. (meta)data are assigned a globally unique and persistent identifier
- F2. data are described with rich metadata (defined by R1 below)
- F3. metadata clearly and explicitly include the identifier of the data they describe
- F4. (meta)data are registered or indexed in a searchable resource

To be Accessible:

- A1. (meta)data are retrievable by their identifier using a standardized communications protocol
 - A1.1 the protocol is open, free, and universally implementable
 - A1.2 the protocol allows for an authentication and authorization procedure, where necessary
- A2. metadata are accessible, even when the data are no longer available

To be Interoperable:

- I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
- I2. (meta)data use vocabularies that follow FAIR principles
- I3. (meta)data include qualified references to other (meta)data

To be Reusable:

- R1. meta(data) are richly described with a plurality of accurate and relevant attributes
 - R1.1. (meta)data are released with a clear and accessible data usage license
 - R1.2. (meta)data are associated with detailed provenance
 - R1.3. (meta)data meet domain-relevant community standards”

Further information on what the FAIR principles mean and how they can be implemented in scientific work can be found, for example, here:

GO-FAIR Website on FAIR Principles

<https://www.go-fair.org/fair-principles/>



FAIRsFAIR – Fostering FAIR Data Practices in Europe

<https://www.fairsfair.eu/>



To assess in how far a data set conforms to the FAIR principles and where adjustments can be made, this tool can be recommended:

F-UJI Automated FAIR Data Assessment Tool

<https://www.f-uji.net/>



4. Criteria for the selection of publication media (version 11/2022)

Before selecting a journal, the following aspects should be considered:

- What do I want to publish? (New) results, methods, protocols, technical reports, review articles, repeat study?
- What audience or subject do I want to address? Special topic vs. knowledge relevant to all researchers in a broad field? Who should read my article?
- Which journals should be considered? The content of the planned manuscript and the scope of the journal as well as the importance of the own contribution in comparison to already published ones have to match in order not to risk a rejection of the manuscript by the editor directly after submission (“desk rejection”).
- In which journals have my colleagues published similar work? Review bibliographies of journals that I frequently consult myself to get more ideas for possible journals.
- How “visible” is the journal? In which databases (PubMed, etc.) are the published papers listed?
- How long is the manuscript allowed to be? Are there restrictions on the number of visual representations or references allowed?
- How complicated are preparation and initial submission of the manuscript? Reasonable journals can have many dozen pages of guidelines (e.g., PLOS One). Plan and act accordingly.
- How and how quickly does peer review proceed? Is it described on the website? Trusted journals describe it transparently and completely.
- Does the journal allow a direct transfer from preprint servers to its submission portal?
- Does the journal allow for a “presubmission inquiry”? If yes: study publication guidelines carefully and then decide whether to attempt a presubmission inquiry.
- If a desk/editorial rejection should occur – is there the possibility that a transfer to another journal at the same publisher can be carried out? This might be suggested by the editor.
- What are the fees due for submission, for production, or after acceptance for publication? Do longer manuscripts or more figures result in additional costs? Are there waivers or discounts?
- Are there any restrictions or requirements on the part of the doctoral regulations or the institution?
- Are there any restrictions or requirements on the part of the funding institution? Must the manuscript be published in an open access model? If yes: What are the options? Diamond/gold/green/hybrid, online first, embargo periods? (How) must raw data etc. be made available? Is there a permanent online archive? Which rights to the published article are transferred to the publisher, which rights do the authors retain or acquire?
- What prestige, what reputation does the journal enjoy? The assessment should not be based solely on quantitative criteria, e. g. the impact factor.

5. Avoiding predatory publishing and predatory conferencing (version 11/2022)

If little is known about a journal: use Beall's List and Think.Check.Submit to check whether it might be a predatory journal.

Before submitting a conference contribution or registering for a conference: check via Think.Check.Attend whether it could be a predatory conference.



Beall's list

<https://beallslist.net>



Think.Check.Submit

<http://thinkchecksubmit.org>



Think.Check.Attend

<https://thinkcheckattend.org>

6. Guidelines for avoiding authorship disputes (version 11/2022)

Tim Albert, Elizabeth Wager: The COPE Report 2003, pp. 32f.

“How to reduce the incidence of authorship problems

People generally lie about authorship in two ways:

- by putting down names of people who took little or no part in the research (gift authorship, see below)
- by leaving out names of people who did take part (ghost authorship, see below).

Preventing a problem is often better than solving it and we recommend the following three principles.

(a) Encourage a culture of ethical authorship

One problem is that people who are being unethical about authorship are simply following local customs and practice. They need to be made aware of the views of editors, so that in time the culture will change. As a junior researcher you can make sure your departmental library has at least one book on publication ethics (see list below). You can also inquire if there is a university or departmental policy on authorship, and suggest that you start working on one if there is not.

(b) Start discussing authorship when you plan your research

Raise the subject right at the start. Start gathering views of all team members and if possible discuss authorship at a face-to-face meeting. Even before a study is finished, you should have some idea of the publications that might come out of it, such as a conference abstract, the full paper, then some supplementary papers, and who is likely to be most involved in these. Continue to discuss ideas about authorship as the project evolves, and especially if new people get involved. Keep a written record of your decisions.

(c) Decide authorship before you start each article

Many authorship difficulties arise because of misplaced expectations and poor communication. So it is important that, before you start to write up your project, you confirm in writing who will be doing what – and by when. Ideally you should do this face to face, though this may not always be possible. Keep everyone informed of any changes with a written note.”

7. Selected repositories (version 11/2022)

Proteomexchange

<http://www.proteomexchange.org>



NCBI Gene Expression Omnibus

<https://www.ncbi.nlm.nih.gov/geo/>



European Nucleotide Archive

<https://www.ebi.ac.uk/ena/browser/home>



Registry of Research Data Repositories

<https://www.re3data.org>



8. Rules for publishing research articles (version 07/2023)

Please inform the research coordination (koordinator@leibniz-fli.de) about all published articles, books, book chapters, editorials, and other publication formats.

These rules²⁶ apply from January 1, 2018 onwards and are for submissions of (1) publications with a corresponding author at the FLI, and (2) publications with data generated at the FLI with non-FLI corresponding authors. The responsible author is in case (1) the corresponding author and in case (2) the leading FLI co-author.

Authorship

Please assign authors according to common GSP (Good Scientific Practice) rules – see guideline 14 of the DFG codex (see appendix 1.1) or chapter 2.8 in the Leibniz Code for Good Research Practice (see appendix 1.1), including co-authorship by core facility members, technicians, and internal and external collaborators. If a contribution is not sufficient to justify authorship, the individual's support may be properly stated in an acknowledgement (see below).

Publication procedure

The responsible author informs research coordination (Ivonne Röppnack-Jahnke or Wilfried Briest – WB) about a publication with the (i) publication form and (ii) the electronic version of the manuscript, and (iii) provides the publication-relevant data for central archiving electronically.

- You will get a manuscript number (GWP-ID), which serves as the unique identifier of the manuscript in the archiving and payment process.
- The manuscript will be screened for potential IP protection. Please indicate if you consider the results of the work worthy of protection. Ascension GmbH will do the clearance.
- Please provide publication-relevant data for central archiving electronically. You might create a new folder on “science/public/resis/” so it can be transferred to the GWP-server. Please see separate archiving rules for details.
- The manuscript will also be independently scrutinized by electronic means for image manipulations, plagiarism, and soundness of statistical data by an external company. To check for soundness of statistical data, the archived original data will be used.
- Please indicate third-party funding; licenses, such as for animal experiments; and the contributions of Core Facilities and Services that have contributed to the publication (reverse side of the publication form).

The responsible author gives notice when the manuscript has been accepted (information: expected publication time; which journal; should it appear on the group's website; suitable for press release)

- It is considered a high-ranking publication if $IF \geq 7$. The IF or the five-year impact factor of the current edition of Thomson Reuters is used.
- When a high-ranking publication comes from the FLI (first or senior authorship by FLI authors), then:
 - o Open Access fees are paid by the FLI (please ask Ivonne Röppnack-Jahnke how to proceed)
 - o other costs of the publication, as for costs for publications with $IF < 7$, are paid by the research groups (group leaders are responsible for cost centers).

A press release will be prepared if the topic is interesting for the public at large (the Communications Department is responsible for this). If a paper is of public interest, the IF is not decisive. A press release

²⁶ This version replaces the version 11/2022 and include now the first sentence with the request to inform the research coordination about published work.

will then be prepared and the paper will appear on the FLI's home page (decision of the group leader meeting on June 9, 2015).

The publication will be placed on the FLI's home page when the publication has appeared on PubMed. This is done by weekly updates of the website via FactScience. This will also update the publications on the group's website. If a group leader does not want this, this must be noted in FactScience.

- When the publication appears in PubMed, it will be entered into FactScience (responsible: Claudia Müller).
- The archive has to be updated, when necessary. Please contact research coordination (see above).
- When the publication is published, details in FactScience have to be updated.

Statements in all FLI publications

Please implement the following statement in "Acknowledgements":

- *If it applies:* The Core Facilities and Services (SPECIFY CF/CS AND PEOPLE TO BE CONSIDERED) of the FLI are gratefully acknowledged for their technological support.
- The FLI is a member of the Leibniz Association and is financially supported by the Federal Government of Germany and the State of Thuringia. *The latter is always required, unless there is a separate funding statement (see below).*
- *Additional funding for open access costs should be mentioned as well:* The publication of this article was funded by the Open Access Fund of the Leibniz Association and the Leibniz Institute on Aging – Fritz Lipmann Institute (FLI), Jena, Germany.

Please implement the following statement in "Funding Statement" (if demanded and reasonable):

- Leibniz Graduate School on Ageing and Age-Related Diseases (LGSA) [to XX - PhD candidate, who was funded by the LGSA]. Funding for open access charge: Leibniz Institute on Aging – Fritz Lipmann Institute (FLI), Jena, Germany. The FLI is a member of the Leibniz Association and is financially supported by the Federal Government of Germany and the State of Thuringia.

Payment procedure

Different kinds of costs can be incurred when publishing papers. Some journals already charge a fee during the application process. Other journals charge costs for printing, for printing color images, or for open access. The FLI would like to increase the visibility of the institute's excellent research by financing the open access fees for publications in journals with a high impact ($IF \geq 7$). These costs are borne by the institute. This was decided in the group leader meeting on March 9, 2010 and this procedure was affirmed in another group leader meeting on February 20, 2012. Thus the research groups should be encouraged not to worry about the open access fees, which can be very high. This concerns the costs for open access only and no other costs incurred.

- If costs are expected, a request (BANF) has to be registered in the SAP procurement portal. This includes following steps:
 - o Initiate an office organization/public relations process
 - o Input free text
 - o Choose "allocation object" -> allocation (account assignment)
 - o Choose commodity group -> publication (Veröffentlichung/Publikationen) and add the manuscript number (GWP-ID) you received at the start of the publication process from FoKo (please ask Ivonne Röppnack-Jahnke, if you are not sure)

The manuscript number must be provided to the publishers so that invoices can be allocated correctly. If there are different fees (e.g., for color images or printing costs), additional items can be added on the purchase order form.

- The cost center (or the internal order) of the research group is used as the account assignment object. Approval is given according to the signature regulations.
- In the event of publication in a journal with $IF \geq 7$, the open access version should ideally be chosen. These fees must be declared as such. Ivonne Röppnack-Jahnke or Wilfried Briest will confirm that the invoice is for publication in a journal with $IF \geq 7$ and that open access costs are incurred. The budget of the research group will be increased by that amount by the controlling department. Another signature of the group leader is not necessary.

These rules should help you to publish your research article. Please contact Wilfried Briest with any concerns or suggestions for improving the publication process.

9. Rules for archiving publication-relevant data (version 12/2017)

These rules are to ensure proper archiving of original data from publications in compliance with the rules of good scientific practice (GSP). These rules apply from January 1, 2018 onwards and are for submissions of (1) publications with a corresponding author at the FLI, (2) data generated at the FLI for publications with non-FLI corresponding authors, and (3) Bachelor's, Master's, and PhD theses conducted at the FLI. In the case of (1) the corresponding author is responsible for compliance with documenting and archiving all data, and in (2) the leading FLI co-author is responsible for compliance with documenting and archiving the FLI-generated data. In the case of (3) the supervising PI is responsible for compliance with documenting and archiving all data.

How primary data are archived and how this data is referenced will be redefined once the central primary data archiving system (see Guidelines Quality Control) is in place.

Theses and publications with first or last authorships from the FLI can only be submitted when accompanying publication-relevant files have been transferred to the FLI for electronic archiving. Initial submissions are possible only after all steps as specified in the FLI-publication form have been fulfilled. The electronic archive must be updated after acceptance of the manuscript, including its FactScience entry.

1. Data in Bachelor's, Master's, and PhD theses and in publications:

It is not only important to present the data in a publication in a clear and transparent publication-quality style, but also to be able to back up all data shown/conclusions drawn by archiving the original data accompanying a publication in a complete and clearly organized manner.

a) Overview file

As guide to the original data, an overview file accompanies all theses/publications. This file contains information about all shown data and gives the location of the original data. The term "original data" is defined below.

For example: transfected cells or a Western Blot are shown in a figure. The overview file must then provide information about who/when/where:

- who performed the experiment (important in the case of papers with many co-authors)
- when did the experiment take place and when were the replicates that led to the conclusion
- where is the original image/film/data stored that was used to make the figure (typically this will be the read-only archive, see c)
- where are the representative original images/films/data sets from the replicates stored (typically this will be the read-only archive, see c).

Example, adaptable to lab- and data-specific needs:

Heinz Maier et al. JCS2016 original data overview

Figure	made by	date of experiment/replicate	original source
1A	Christoph	10.3.16, Replicates: 14.3.16, 21.8.15	Heinz Maier et al. JCS2016 original data DVD/data/Fig1/Fig1A
1B	Heinz	10.1.16, Replicates 14.3.16, 21.8.15	Heinz Maier et al. JCS2016 original data DVD/data/Fig1/Fig1B

b) Figure legends

Every figure legend must contain information including but not limited to the number of independent experiments, number of cells/organelles/mice analyzed; genetic background, age, genotype, etc. In cases where a journal has divergent regulations this information should be given in the manuscript material and methods section or in a supplementary information section.

Example:

*The images in **a** and **b** are representative of >100 cells per condition from three independent experiments each. (**c**) Quantification of the variance of pixel fluorescence intensity (PFI-Var) in regions of interest from $n = 3$ experiments, as shown in **a**. For each condition, at least ten regions of interest were measured. The data are displayed as the mean \pm s.e.m. RU, relative units. The mean PFI-Var value at time 0 was set to 1, and the other values are shown in relation to that.*

c) Archive

A read-only archive (details to be specified by FLI-IT) accompanies all theses/publications and contains:

- the overview file (see 1a)
- the originals of all data shown (i.e., all original images, full-size Western blots (labeled), FACS data, etc. Originals also include tables with quantification data to calculate graphs with means, SD/SEM, etc. Tables must contain the dates or other unequivocal identifiers of the experiments used for quantification as well as some title/explanation/reference indicating to which experiment they belong. With the indicated dates the experimental details must be traceable in the lab book.
- All images/files used for quantification, including replicates, must be stored. All files must be labeled or named in a self-explanatory manner or accompanied by an explanatory text.
- Where applicable, extracted parts of images/blots/etc. should be clearly indicated on the full-size originals.

2. Definition of original data

Original data in this context refers to digital data.

Microscopy

Unmodified images as they were generated at the microscope, ideally in the original format (.cvi or others). Uncompressed or lossless compressed TIFF with preserved bit depth of the camera is also acceptable, but no compression such as JPEG, unless files are extremely large. Glass slides with coverslips are not considered original data – notably, immunofluorescence staining fades after a couple of weeks and therefore does not have to be stored.

Quantification data derived, for example, from intensities in regions of interest (ROI) must be clearly understandable with the help of an example image. If possible, ROIs, length measurements, etc. should be saved on the images and stored.

Gels

If parts of gels (Coomassie, silver, etc.) are shown, a scan of the full-sized gel needs to be stored. Size standards have to be clearly visible on that full-size image.

Western Blots

Full-size scans from original films and data files from the luminescence imager need to be stored. If possible, regions of interest (ROI) for quantifications should be saved, to make quantifications understandable. Of course, the table containing the quantified numbers, SD/SEM, etc. must be stored. Scans of blots must be labeled or accompanied by a file describing the details.

Animal data

All experimental records, such as measurements, tables with weights, etc., need to be stored and recorded and are a legal requirement for animal protection authorities. For data shown in publications or theses, for example brain slices, Western Blots, etc. the identification number (for example from Pyrat) of the respective animal must be indicated.

Nucleic acid sequencing data

The following data should be stored and documented:

- FASTQ files (unprocessed as provided by the facility)
- A processed file in addition, e.g.:
 - RNA-Seq: normalized count table or table with RPKM values plus differential gene expression (DGE) list as .txt, .csv, or .xls
 - ChIP-Seq: a file that allows inspection of the experiment in a genome browser, e.g. bedgraph or .bigwig format
 - the same applies for other sequencing applications, e.g. WGBS, 4C-Seq, MeDIP, 4-sU-Seq, etc.
- A documentation of A) the reference genome (e.g. mm10), B) bioinformatics tools (including the exact version and parameters) that were used to get from primary data (FASTQ) to processed data (if available, a .txt file containing the whole analysis pipeline should be provided).

Proteomics

For Proteomics data requirements will be based on guidelines:

- for submission of proteomics data to one of the standard repositories, PRIDE: <http://www.ebi.ac.uk/pride/help/archive/submission>
- for reporting of proteomics data to a major specialized proteomics journal, MCP: <https://www.mcponline.org/guidelines>

Current requirements for files/file types include the following:

- **Raw files:** the MS instrument output files
- **Search engine result files:** the original output from your search engine or your analysis pipeline
- **Peak list files:** peak list files (e.g., mgf files prepared for a Mascot search) that were used for the original search
- **Quantification result files:** quantification-related files reporting on peptide/protein quantitative values/ratios should be provided (e.g., PSM TMT intensity value exported from Proteome Discoverer, LFQ/iBAQ values exported from MaxQuant, Log2FC ratios provided from Spectronaut)
- **Sequence database files:** the sequence database file (usually in FASTA format) that was used to perform the mass spectral search
- **Spectrum libraries:** the spectral library file that was used for performing the mass spectrometry search if DIA data was used for the quantitative label free analysis in Spectronaut (also a description of how this library was made)
- **Gel image files:** if gel electrophoresis has been used as a separation method for proteins the gel image files have to be provided
- **Post-processing files:** everything else that did not fit into the categories above – for instance protein inference files generated by post-processing of the search engine results or R scripts used for differential expression.

HCS/image analysis

Data from automated microscopes

- All image data in its native format if this format is open source or a conversion tool is available; if not, then both the native and an open-source format such as uncompressed or lossless compressed TIFF or PNG format spanning the bit depth of the camera (e.g. 16bit). Alternatively, in the case of large files, a list of all references to the central/workgroup storage sites / archive site should be provided.
- The image analysis pipeline if exportable in connection to the image data.

- Annotation files in Excel format and result files in native format if this format is open source or also a conversion into Excel. Censoring or relabeling has to be indicated.

Image analysis

- All image raw data and the image data in the analyzed format. Preferably open source format such as uncompressed or lossless compressed TIFF or PNG format.
- The image analysis pipeline in connection to the image data and an explanation of the analysis strategy
- Annotation files in Excel format, result files in native format if open source or Excel.

FACS

The original .fcs file plus an accompanying .pdf with the gate settings, etc. must be stored.

Plate reader, real time PCR

Original data from plate reader, RT-PCR, etc. need to be stored, ideally in a common format such as .csv or .xml. Additionally, the protocol to process the data and the Excel sheets containing the final data must be stored, with reference to the respective lab book entries. Files (for example for checking a requested plasmid) do not need to be archived in a publication data folder, but need to be traceable via, for example, a plasmid map that has a reference to a lab book entry.

Data from other techniques not mentioned above.

Follow the same scheme as above. Original data coming from instruments/analyses need to be stored as well as, whenever necessary, the procedure of how the data were analyzed and/or validated.

10. “How-To” for archiving and external assessment before submission of publications and theses (version 11/2022)

The FLI rules & guidelines regarding Good Scientific Practice, effective January 1, 2018, apply to data archiving and subsequent data checking by an external company (RESIS) *before* submission of

(1) *publication manuscripts with a corresponding author from the FLI*, (2) *publication manuscripts with data generated at the FLI with non-FLI corresponding authors*, as well as (3) *PhD theses*. As data archiving and the preparation of data files for checking go hand in hand, both aspects are summarized here in the form of a “How-To” description. Please read it carefully.

The checking of manuscripts before submission is to be considered a “technical proofreading,” rather than a “distrustful investigation.” It is intended to safeguard the standards of Good Scientific Practice at the FLI and to prevent undesirable issues from arising after publication.

It should be emphasized that the papers/theses sent to RESIS for checking remain *anonymous* – so that any information regarding author/institution, etc. (which is irrelevant to the checking process) is not transmitted to RESIS.

How-to:

Please archive and submit manuscripts/theses for RESIS assessment ONLY in their final form. Complex documents and the organization of their data can, of course, be discussed in advance.

A) Checking of manuscripts (including supplementary information):

- prepare an archive containing *FLI-generated data* according to the Rules for Archiving, including an “original data overview file” (see example attached as picture). **DO NOT USE** special characters in file names (DO NOT USE: ! ” \$ % & ? ä ö ü: etc.), while “-” (dash) or “_” (underline) are allowed. Also *avoid blanks* in file names: use “-” or “_” instead. Special characters or blanks may interfere with automated processing! Do not use too long file names (max. 256 characters including folder names).
- This archive must contain:
 - The *manuscript* text – needed in two forms: a) as a pdf, b) as a .docx file (or similar word processor). The word processor file is important to allow complete anonymization prior to submission to RESIS. Of course, the manuscript text may contain embedded figures, tables, graphs, etc.
 - The original data files of *FLI-generated data* that were used for image-containing figures (both figures and supplementary figures). This enables rapid action in the event that checking produces questions regarding the “quality” of a figure (which e.g., might simply be due to compression artifacts in the pdf procedure). If the figures in the manuscript are very small (reduced in size to fit e.g., 1 column or less) please also provide their larger version (before reducing them to fit the manuscript requirements). This is important, because below a certain size or resolution, image checking is not reliable, and we will be asked to provide the larger version. Should questions arise about figures compiled from data *not* generated at the FLI, the external co-authors will be informed by the leading FLI author. Do not provide compressed image formats, e.g., jpeg, since these are prone to compression artifacts. Instead, use high-resolution tiff, png or similar formats. Please complement files in proprietary formats, for example with a hi-res tiff. If a hi-res tiff is not possible, provide at least a large(!) pdf. Original microscopic images in the proprietary format (e.g., .czi) are to be included in the original data files. Do not use the WINDOWS-specific .emf format!
 - For graphs compiled from *FLI-generated data*, provide “Graph_Data” files (“Graph_Data.xlsx” – see example below; alternatively, files from GraphPad Prism or other standard spreadsheet/statistics software). The graph data file should contain *for each individual panel* the X,Y plotting data, complemented by statistical information (such as, e.g.: n, standard dev.,

mean, median, p value, type of statistics, etc.). Provide a *separate* data sheet/tab for every *individual* graph (bar graph, curve, pie graph, etc.). It is very (!) helpful if the individual sheet/tab in the file also contains a thumbnail picture copy of the panel in the paper for quick identification (see example attached). Should questions arise about graphs showing data *not* generated at the FLI, the external co-authors will be informed by the leading FLI author.

If scripts, programs, web tools, or similar have been used to generate the final output (graphs, figures), also provide information on this in an accompanying README file describing the procedure and the stage at which that tool/software (incl. version) was used. Scripts (e.g. *Python*, *R*) used to evaluate data and to generate the final output (graphs/figures, etc.) are to be archived together with the original data to which they were applied.

- In order to *complete* the archive, prepare:
 - all FLI-generated original data/original figures/micrographs, etc., including “replicate experiments/data” (see also attached archive example), of the results, etc. shown in the paper.
 - an “original data overview file” as defined in the “Rules for archiving publication-relevant data” (see attached example). In this file it should also be indicated which Figure/Graphs/Table were NOT generated at the FLI.
 - For large data sets from Facilities (e.g. Sequencing, MS data) the storage location of the data sets (path to data) should be specified in the “original data overview” file. In these – and only these – cases, the data sets do not need to be delivered in duplicate with the other data to the archive. But the author is responsible for organizing storage of these large data sets in such a way that they are traceable and retrievable for ten years.
- Provide Wilfried Briest with this archive. You might create a new folder on “science/public/resis/” so it can be transferred to the GWP-server.

The complete final pdf and the FLI publication form for the intellectual property check can be sent in advance by email to Wilfried Briest and Ivonne Röppnack-Jahnke.

The ombudsperson will be informed about this process and will select, from the archive provided, the relevant files for checking by RESIS.

Checking of a paper takes 2–3 *business* days, if no inconsistencies are detected. To resolve inconsistencies might take extra day(s), and may require some input from the author(s). In such cases, having provided original data files from the very beginning (see above) will minimize delays.

Manuscripts that have undergone *major* revisions, e.g. after the changing/addition of figures, new data, etc. need to be checked again *before* resubmitting the manuscript.

Please be aware: Saturday and Sunday are not business days at RESIS and the *company’s vacation periods usually are: August 10th to 25th and December 21st to January 3rd*. You will be informed in advance if those dates have changed. Make sure to submit a publication for checking *at the latest 3 business days* before the start of the vacation periods – and it would be wise to inform the ombudsperson beforehand if the time is tight.

B) Checking of theses

This follows in principle the same scheme as above (incl. archiving, etc.). Here also a word processor file of the thesis (not only pdf) is required for the plagiarism check. (The search for text plagiarism is currently only carried out for theses, not for publication manuscripts). For large archives an upload space is available upon request – allow enough time to organize this.

Please be aware that:

- checking of a thesis takes 4-5 *business* days, but only if no further clarifications are necessary;

- even more time is required if there are several theses submitted simultaneously (~3 additional days per thesis), which tends to happen, e.g., just before the “last” submission date at the university in a given semester;
- it is thus *strongly recommended* to start the process of checking a thesis well before the intended submission date! Calculate a reasonable time for potentially required error correction before the submission date.

Also, as there are certain LGSA processes attached to submitting a thesis, the student should contact Claudia Müller *8 weeks before* the intended submission date at the latest! Further details on the LGSA procedure will be available on the *intranet*.

CHECKLIST to assemble a publication/thesis archive and examples for archive organization -> see next page

Incomplete sets will NOT be archived/assessed by RESIS!

CHECKLIST to assemble a publication/thesis archive and examples for archive organization

PLEASE make sure that you have checked all boxes to avoid wasting time in the process!!

- ☐ All publications have to be accompanied by the FLI publication form; include this with your delivery of the archive material (see below)
- ☐ ALL files/directories/subdirectories have to be organized and named in a self-explanatory way (e.g. by Fig. and Panel number, e.g. Fig3F_...), to allow immediate and *intuitive tracing and finding* in the event that a particular panel of a figure has to be traced back to the raw/original data!!
- ☐ Manuscript/thesis as word processor file (include Supplementary Material)
- ☐ Manuscript/thesis as pdf file (include Supplementary Material)
- ☐ Image panels and *larger* versions if size of figure embedded in manuscript/thesis is small; best are pixel-based formats (tiff, large png, etc.; pdf is possible – NO jpeg!)
- ☐ Image original data files (microscopic images, uncropped blots, gels, etc.): NO jpegs. Preferred: hi-resolution tiff or png, proprietary format images also as hi-res tiff or png – czi files ok; definitely avoid images/figures embedded in Powerpoint!
- ☐ Graph data as “Graph Data” files (Excel/GraphPad/other standard software)
- ☐ Table data as spreadsheet (if e.g. data shown in a table are calculated from original sets)
- ☐ Original data: data of replicate experiments must also be included; for data sets on *publicly* available servers, only the link to the files/data on that server need to be provided
- ☐ Script files/home-made programs or similar that have been used to evaluate data and/or to generate the final figure/graph panel (with a README on how to use the script, its required system environment, etc.)
- ☐ Original_Data_Overview file as Excel; include path(s) to storage location(s) for LARGE data sets; for data sets on publicly available servers, only the link to the files/data on that server need to be provided
- ☐ Other particularities of a given manuscript (contact the ombudsperson to clarify) – or provide a clear README file.
- ☐ IF you want to deliver your archive via link, make sure you have enough space on fli-share. Otherwise use an external USB-hard disk/USB-stick – or contact the ombudsperson well in advance.

Examples

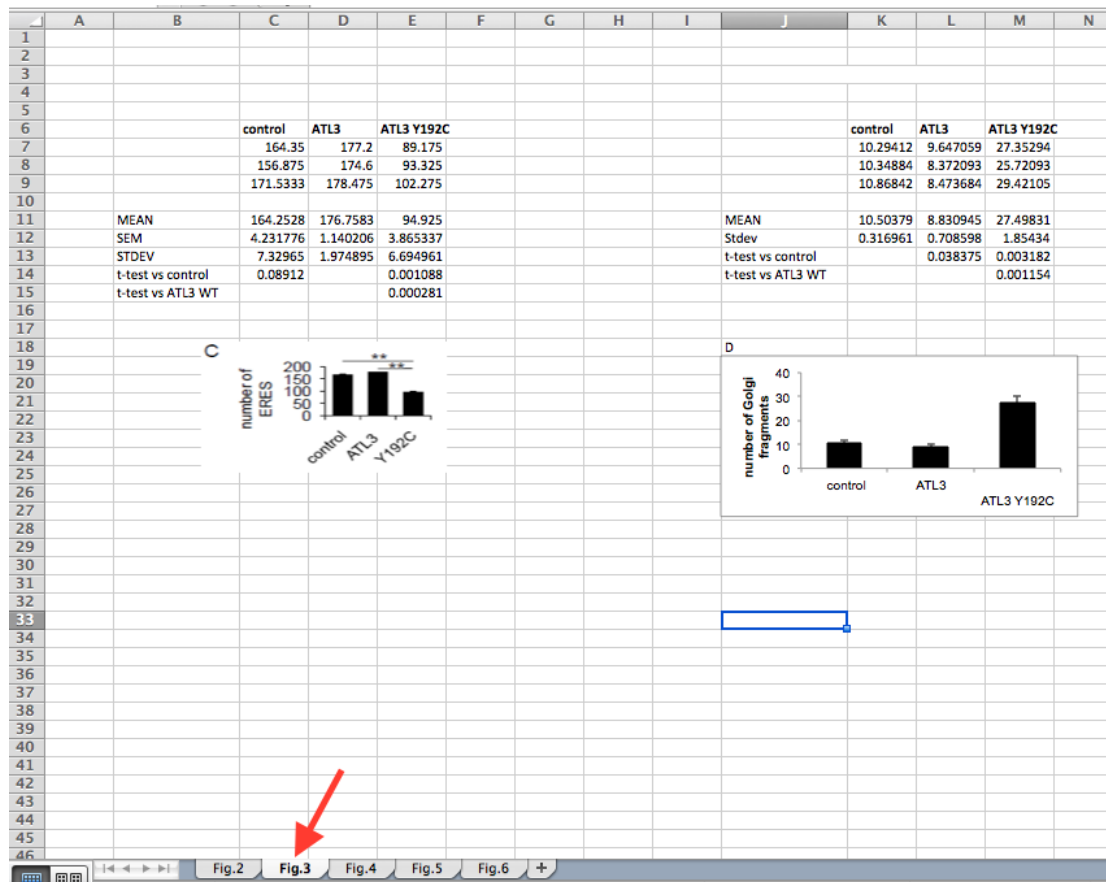
One example of a publication archive (screen shot) – adapt to your manuscript, but see checklist to provide a complete archive:

Name	Date Modified	Kind
Original data	Today, 16:15 PM	Folder
Fig. 6 Originals	08. May 2018, 08:54 AM	Folder
Originals ER morphology	25. Apr 2018, 09:08 AM	Folder
Thumbs.db	28. Feb 2018, 16:04 PM	Document
WT1_rtn4_3_ROI_c1+2.tif	24. Jan 2018, 14:02 PM	TIFF image
WT2_rtn4_7_c1+2.tif	24. Jan 2018, 14:02 PM	TIFF image
ATL3p_rtn4_8_c1+2.tif	24. Jan 2018, 14:02 PM	TIFF image
ATL3p_rtn4_8_ROI_c1+2.tif	24. Jan 2018, 14:01 PM	TIFF image
WT1_rtn4_3_c1+2.tif	24. Jan 2018, 14:01 PM	TIFF image
WT2_rtn4_7_ROI_c1+2.tif	24. Jan 2018, 14:01 PM	TIFF image
Autophagy patient cells representative	25. Apr 2018, 09:08 AM	Folder
autophagosomes-patient cells_CK.xlsx	06. Mar 2018, 15:41 PM	Microsoft Excel Workbook
Fig. S2 Originals	25. Apr 2018, 09:08 AM	Folder
Fig. S1 Originals	25. Apr 2018, 09:08 AM	Folder
Fig. 5 Originals	25. Apr 2018, 09:08 AM	Folder
Fig. 4 Originals	25. Apr 2018, 09:08 AM	Folder
Fig. 3 Originals	25. Apr 2018, 09:08 AM	Folder
Fig. 2 Originals	25. Apr 2018, 09:08 AM	Folder
Fig. 1 Originals	25. Apr 2018, 09:08 AM	Folder
original data overview1.xlsx	21. Mar 2018, 11:20 AM	Microsoft Excel Workbook
Thumbs.db	06. Mar 2018, 17:54 PM	Document
submitted files	25. Apr 2018, 09:08 AM	Folder
Behrendt_supp.pdf	25. Apr 2018, 09:27 AM	Adobe PDF Document
JOCES-2018-217844v1-Kaether.pdf	25. Apr 2018, 09:27 AM	Adobe PDF Document
Replicates	25. Apr 2018, 09:10 AM	Folder
Graph_Data.xlsx	25. Apr 2018, 09:08 AM	Microsoft Excel Workbook

Example of an Original Data overview file

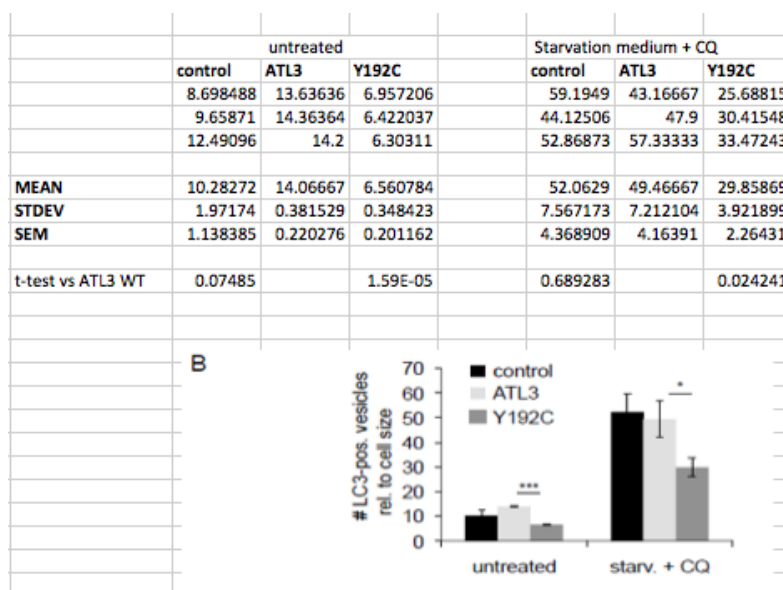
	A	B	C	D	E	F	G
1	Figure	Data from	figure made by	date of experiment and replicates	file names used for figure	original file names	folder with representative images/replicates
2		all Laura	Laura/Christoph				
3	1A			10.03.2018, 26.02.2018, 01.02.2017	empty_calnexin_green_myc_red_1_c1+2+3.tif; ATL3WT_calnexin_green_myc_red_2_c1+2+3.tif; ATL3Y192C_calnexin_green_myc_red_6_c1+2+3.tif	all czi (10.03.18); empty_calnexin_green_myc_red_1; ATL3WT_calnexin_green_myc_red_2; ATL3Y192C_calnexin_green_myc_red_6	S:\Laura\ATL paper
4	1B			06.12.2016, 13.03.2018	ATL3blot.jpg	20180313_1545_atl3_seitenverkehrt_1_5a.tif	S:\Laura\ATL paper
5	1C			23.11.2016, 26.08.2017, 23.08.2017	ATL3_wt_1.tif; zoom_ATL3 wt.tif; mild ATL3 mutant_3.tif; zoom_mild ATL3 mutant_3.tif; ATL3 mutant_3.tif; zoom_atl3 mutant_3.tif	all czi (23.11.16); ATL3_wt_1; zoom_ATL3 wt; mild ATL3 mutant_3; zoom_mild ATL3 mutant_3; ATL3 mutant_3; zoom_atl3 mutant_3	S:\Laura\ATL paper
6	1D			01.02.2017, 20.01.2017, 20.05.2017, 24.04.2017	HeLa_ATL3wt_atl3green_laminred_1_ROI_c1+2+3; HeLa_ATL3Y192C_atl3green_laminred_1_ROI_c1+2+3; HeLa_empty_atl3green_laminred_1_ROI_c2+3	all czi (01.02.2017); HeLa_ATL3wt_atl3green_laminred_1; HeLa_ATL3Y192C_atl3green_laminred_1; HeLa_empty_atl3green_laminred_1	S:\Laura\ATL paper

Example of the Graph_Data.xlsx with tabs; alternative GraphPad files (not shown here)



Of course, files from other standard applications (e.g. GraphPad, SigmaPlot, etc.) can be provided instead of Excel files. Label the files clearly (Fig. number/panel).

Example of the single graph data tab Fig. 6 (taken from above example file)



11. Rules for PhD-thesis submission (version 01/2023)

These rules apply from January 1st 2023 onwards and are an integral part of the submission of a PhD thesis. They intend to safeguard compliance of the PhD thesis with good scientific practice.

The Leibniz Association has guidelines on good scientific practice (GSP)¹. All researchers should be aware of the Safeguarding GSP issued by the Deutsche Forschungsgemeinschaft (DFG)². The FLI homepage contains comprehensive information concerning these policies and the FLI rules and guidelines on GSP³.

The rules of good scientific practice in particular include (adopted from the Leibniz guidelines for GSP¹):

- to fully document all stages and results of an experiment or study in the lab book and the thesis if applicable, and securely store the records and primary data in the FLI archive for publications (see rules for archiving publication-relevant data at the FLI³);
- to critically and consistently examine the validity and reproducibility of all experimental results and other research projects;
- to be stringently honest with regard to the contributions of collaborators as well as including external funding providers;
- to observe the intellectual property of others and appropriately highlight all citations and appropriations in all publications. Referenced scientific publications should describe scientific results and how they were derived in a comprehensive and comprehensible manner.
- primary data must be stored in an accessible format for a minimum of 10 years (see rules for archiving publication-relevant data at the FLI³). Original data and lab books are the property of the FLI. Data for which there are central, public repositories should be made accessible to the same.
- it is mandatory to cite own previous publications appropriately to avoid self-plagiarism. Unpublished manuscripts must be clearly labeled (e.g. in press, accepted, submitted).

Procedure for the review of the PhD thesis:

Milestones for thesis submission (doctoral candidates should keep holiday seasons, typical vacation periods and public holidays in mind when planning the timeline):

- **at the latest 6 weeks** prior to thesis submission at the university:
Announcement of thesis submission to the LGSA coordination office and discussion of the appropriate time plan for internal and external checking.
- **4 weeks** prior to thesis submission at the university:
Contact the LGSA office to find out the latest date for submission for the external checking (assessment before submission – ABS). The **processing time depends on the number of theses submitted concurrently**. The external checking needs at least 4 business days for one and additional 3 days per each additional thesis.
- **At latest 2 weeks** prior to thesis submission at the university, or at the confirmed last date for submission (see above):
The final version of the thesis ready for submission at university including additional files, original data and the checklist must be submitted to the ABS officer (see procedure below).

¹ http://www.leibniz-fli.de/fileadmin/media/downloads/Leibniz_Association_GUIDELINES_Good_Scientific_Practice_2015.pdf, (call date: 24.10.2017).

² DFG Guidelines for Safeguarding - Good Research Practice Code of Conduct 2019 https://www.leibniz-fli.de/fileadmin/media/downloads/kodex_gwp_en.pdf

³ <http://www.leibniz-fli.de/research/good-scientific-practice/>

The procedure

The thesis will be independently and *confidentially* assessed by **electronic means for image manipulations, plagiarism and soundness of statistical data** by an external company. To check for soundness of statistical data and graphs (e.g. bar graphs, curves), submission of the immediate data in the form of a spreadsheet file (e.g. MS Excel or GraphPad Prism) to re-produce those graphs/curves is required. For this final check a

- searchable electronic PDF and a Word file of the final version (or equivalent) with the embedded pictures, graphs, tables of the final thesis together with Excel files for all tables and graphs supplied on a storage medium like a DVD, an USB stick for archiving or via a server link
- and the checklist for PhD-thesis submission with signatures on pages 1 and 2 must be submitted to the ABS officer two weeks at the latest before the intended submission at the university. For details on what to submit at this stage, see the [How To: Archiving and computer-based checking of publications / theses](http://www.leibniz-fli.de/research/good-scientific-practice/gsp-measures-at-fli/) on the FLI GSP web site (<http://www.leibniz-fli.de/research/good-scientific-practice/gsp-measures-at-fli/>)

To ensure timely completion of this process, it is **imperative for the PhD candidate** to communicate the **intention to submit a thesis at least six weeks before** the intended submission date to the LGSA office.

The result of the external checking will be transferred confidentially to the PhD candidate and in case of major issues to the ombudsperson.

In case no issue is found by the external checking, the ABS officer and the PhD candidate inform the LGSA office, and the thesis may be submitted.

If there are issues to be resolved, submission at this stage is NOT possible.

It has to be clarified if minor or major corrections are required or if a *bona fide* case of scientific misconduct (e.g. forgery, manipulation, plagiarism) is to be dealt with.

In case of minor corrections of e.g. simple unintended errors, corrections have to be done accordingly and PhD candidate and supervisor have to agree, that those corrections are sufficient.

Such correction(s) must be documented in and signed on the check list. The ABS officer is to be informed about the corrections. Subsequently, thesis may be submitted.

In case of major corrections (e.g. re-working of an entire graph/figure/panel/table), the appropriate corrections have to be carried out, and PhD candidate and supervisor have to agree on their appropriateness and document those corrections in the check list. The ombudsperson is to be informed about the corrections. The ombudsperson might demand a second external checking. Following this, the thesis may be submitted.

In case of suspicion of scientific misconduct, the ombudsperson informs the scientific director of the FLI according to §9 of the GSP FLI rules.

For periods of foreseeable unavailability of either the ABS officer, or the ombudsperson agreement between the two functions and the PhD candidate must be reached prior to absence on who would replace those functions. Potential replacements: dean of LGSA, LGSA coordinator, scientific coordinator of the FLI. In case of unexpected unavailability of ABS officer/ombudsperson/editor (e.g. sickness), the LGSA office and PhD candidate organize and agree on a replacement.

The PhD candidate keeps a copy of the checklist with the results and submits the original list to the LGSA coordination office after thesis submission. The PhD candidate submits a new copy (DVD) of the thesis for university library submission to the LGSA office after thesis defense and, if applicable, additional original data (clearly marked as such) for archiving.

The checklist for the review of the PhD thesis:

A checklist (see below) must be worked through and filled out and any questions or possible issues will be addressed and documented. This list should be used as a guide for the PhD candidate and has to be completed before thesis submission. It is for FLI internal use only.

It is recommended to have a meeting with the ABS officer concerning questions or possible revisions of the thesis before submission to the university and submission for the external checking.

Pages 1 and 2 of the checklist for the PhD-thesis submission must be finished and signed before submission to the ABS officer for the external checking.

The results of the external checking will be documented on page 3 of the checklist and/or communicated to the PhD candidate via email. The PhD candidate will receive the original check list upon completion of the archiving and checking procedure.

The checklist with results of each thesis review will be collected and kept confidentially by the LGSA office. For data protection reasons, the documents will be destroyed after 10 years. In the case of problems with the thesis, there will be a compilation by group name only to try to determine if a recurrent problem is evident and the group will be advised. Only the LGSA office, ABS officer and the ombudsperson will have access to this data collection.

Additional information:

Please double check early enough with the university, which material you have to provide together with your thesis. The Faculty of Biological Sciences of the FSU for instance would like to have a declaration about the use of animal experiments. The appropriate animal license has to be included in the submission, in case you have performed animal experiments for your thesis.

This service is intended to safeguard the process of a doctoral project and to meet the PhD candidate needs.

Please contact the LGSA coordination office with any concern or suggestion you may have relating to your thesis.

12. Checklist for PhD-thesis submission (version 01/2023)

Checklist page 1 of 4:

Thesis title: _____

Name of PhD candidate: _____

The first supervisor and if applicable, the second supervisor confirms with their signatures that the thesis is ready for submission at university, no further changes are planned (please consider the plagiarism check for dissertations) and that:

☐ All stages and results of an experiment or study are fully documented and described in appropriate detail.

☐ All original data, including computer scripts for data evaluation, are stored in an accessible format for archiving for a minimum of 10 years.

☐ Acknowledgments are complete, results or experiments done in collaboration with or by another person are clearly indicated as such and proper credit is given.

☐ Funding sources and information on licenses are fully documented.

All thesis relevant original data were archived in compliance with the FLI archiving rules; location:

(Information on archiving in the FLI publication archive, e.g. name of the folder or files)

Supervisor signature(s) / date: _____

Checklist page 2 of 4:

The PhD candidate confirms the compliance with the rules of good scientific practice and the correctness of the information given below to the best of his/her knowledge.

- ☐ The declaration statement is included.
- ☐ The bilingual summary is concluded from the thesis project work.
- ☐ Cited publications are properly annotated and appropriate. The citations are included in the thesis.
- ☐ Tables and figures were actually produced by the PhD candidate or properly referenced when taken from a publication or co-worker.
- ☐ The tables and figures should be clear and original data available to confirm the accuracy of the results/conclusions when needed. When a table or figure is a summary of data, the original summary information should be available.
- ☐ The material and methods section should be detailed enough that the procedures would be reproducible. Sufficient information on reagents, equipment etc. is given to allow repeating the experimental procedure. Check that all of the procedures used for results are explained in the materials and methods section and that computer scripts for data evaluation are accessibly archived.
- ☐ If animal experiments are included all licenses/ permits are clearly documented.
- ☐ The PhD candidate's CV is included.

I confirm with my signature that the work submitted to RESIS is ready for submission at university, that no further changes are planned, and that only subsequent changes requested by RESIS are permitted

PhD candidate signature/date:.....

Checklist page 3 of 4:

The original data are archived in the **FLI archive for publications** and the **final form of the thesis, the spreadsheet files for all tables and graphs** (see rules for PhD-thesis submission) and **page 1 and 2 of the checklist for PhD thesis submission** with signatures were submitted to the ABS officer for GSP check on:

(date): _____

(filled in by the ABS officer)

A. The external assessment

- was carried out by:

Date / company: _____

- Result of the checking as reported by the company:

(please use an additional page if necessary)

Overall results of the review (outcome):

- ☐ 1. Thesis review finished - no GSP issues found → submission allowed.
- ☐ 2. Thesis review finished – minor corrections → submission allowed after correction.
- ☐ 3. Thesis needs major corrections → no submission at this stage.
- ☐ 4. Suspicion of misconduct → information to the Scientific Director, supervisor and the PhD candidate.

Comments: _____

B. Archiving of original data

- ☐ 1. Original data archive appears sufficient → submission allowed.
- ☐ 2. Original data archive needs correction/restructuring → submission allowed after correction
- ☐ 3. Sufficient original data not archived and/or not available → no submission at this stage.

Comments: _____

ABS officer signature/date:

In addition for outcome A3/4 and B3

Ombudsperson signature/date:

Checklist page 4 of 4:

In case of outcome **A2 or B2** (see: Checklist for PhD-thesis submission - page 3 above)

The doctoral candidate confirms that he/she received the comments on the checklist and accepted the necessary actions that needed to be taken.

The following corrections were made (please use an additional page if necessary):

Doctoral candidate - date/signature:.....

Corrections approved/submission allowed: Supervisor - date/signature:.....

In case of **A3 or B3** (see: Checklist for PhD-thesis submission - page 3)

The doctoral candidate confirms that he/she received the comments on the checklist and accepted the necessary actions that need to be taken. A second ABS check is mandatory after correction.

The following corrections were made (please use an additional page if necessary):

Doctoral candidate - date/signature:.....

Corrections approved/submission allowed:

For A3 & B3 supervisor - date/signature:.....

For A3 date/signature: TAC member:

For A3 date/signature: TAC member:.....

In case of outcome **A4** (see: Checklist for PhD-thesis submission - page 3 and above):

☐ Case clarified; new result corresponds to A 1-3 and/or B1-3:.....

☐ Initiating a procedure according to the FLI Rules of GSP

Ombudsperson – date/signature:.....

Submission to university allowed:

ABS officer – date/signature:

In case of outcome **A1 and B1** or any other outcome with finished corrections and approval (see: Checklist for PhD-thesis submission - page 3 above):

The doctoral candidate confirms that he/she submitted the thesis:

to (name of university and faculty):.....

on (date):.....

Please submit the checklist to the LGSA office.

Doctoral candidate - date/signature:.....

In addition, please submit a DVD with the copy of the final version submitted to the library after the defense to the LGSA office.