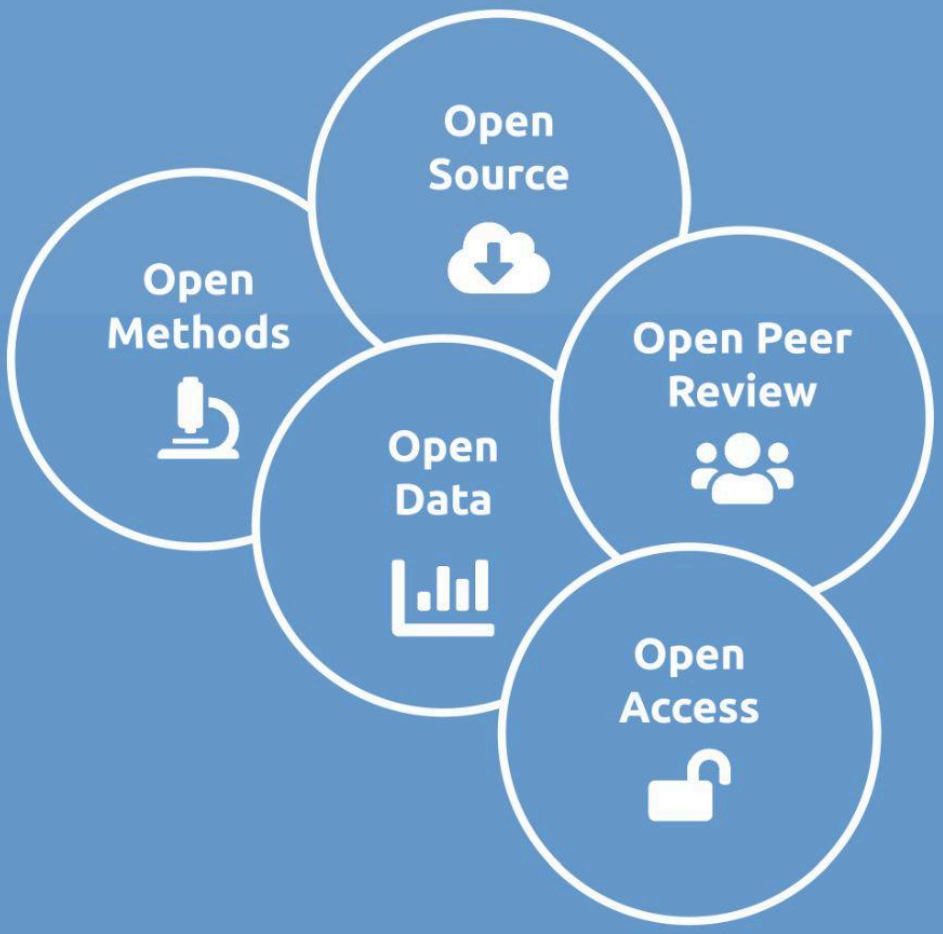
ICArEHB's

Open Science Handbook



ICArEHB

fct Fundação para a Ciência e a Tecnologia

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1. Introduction

Purpose of this handbook

The ICArEHB Open Science Handbook is designed to provide researchers, staff, and collaborators at the Interdisciplinary Center for Archaeology and Evolution of Human Behaviour (ICArEHB) with a clear and comprehensive guide to implementing Open Science practices. Open Science is essential to ensuring that research is transparent, accessible, and reproducible, contributing to the broader scientific community and society as a whole.

This handbook serves as a practical resource, outlining ICArEHB's commitment to Open Science and offering guidance on topics such as Open Access publishing, data management, and pre-registration. By following the practices outlined in this handbook, ICArEHB researchers can align with international standards for research openness, enhance collaboration, and increase the impact of their work.

With this handbook, ICArEHB aims to:

- support ICArEHB members in adopting Open Science principles across all stages of their research.
- ensure compliance with institutional policies, funder requirements, and global Open Science initiatives.
- provide practical guidance and resources for publishing, managing, and sharing research outputs in an open and accessible manner.

Who Should Use This Handbook

This handbook is intended for all members of ICArEHB, including:

- **Researchers**: Principal investigators, postdoctoral fellows, and research assistants involved in producing and disseminating research.
- **Students**: Graduate and undergraduate students conducting research projects at ICArEHB.
- **Collaborators**: External researchers, institutions, and partners working with ICArEHB researchers on joint projects.
- **Administrative and Technical Staff**: Individuals responsible for supporting research projects, ensuring compliance with data management, and maintaining institutional resources.

The guidelines and policies outlined in this handbook apply to all research projects conducted under the ICArEHB umbrella, whether funded internally or externally. By following these standards, all members of ICArEHB contribute to a culture of openness, integrity, and collaboration, ensuring that our research reaches the widest possible audience and has a lasting impact.

Availability

This handbook is designed to be a living document, accessible to all members of ICArEHB and the wider research community. You can find the **latest version** online at https://books.icarehb.com/4/icarehb-open-science-handbook (currently **Version 1.0**), where updates are posted as they become available.

2. ICArEHB Open Science Policy

Institutional Commitment

ICArEHB researchers are highly aware of the ethical, professional, and scientific responsibilities that come with being stewards of the past. In line with this, we embrace the principles of Open Science, ensuring that research is transparent and reproducible at every stage. This means that our projects undergo peer and community review both before and during the research process. It also means that our methods, software, code, and other outputs are made accessible for the benefit of fellow scientists, the public, and policymakers, helping to shape public policy when necessary. Furthermore, our raw data on humanity's past is archived and made available to everyone, ensuring that it benefits our collective future. Open Science is not only a reflection of our core values as a research institution but also a necessity in ensuring that the knowledge we generate contributes meaningfully to global scientific advancement.

By adopting Open Science principles, ICArEHB aims to:

- Increase the **visibility and impact** of our research outputs.
- Enhance **reproducibility and credibility** in the research we conduct.
- Promote **interdisciplinary and international collaboration**.
- Ensure that the knowledge and data generated by our researchers are **freely accessible** to the global community.
- Align with **international standards and funder requirements**, ensuring compliance with Open Science policies from major funding bodies.

Benefits of Open Science

For Researchers

Increased Citations and Visibility: Open access publications and data lead to higher citation rates and greater visibility among both the academic community and the public.

Faster Impact: Preprints and open data allow for quicker dissemination of results, speeding up the research process and ensuring faster recognition of your work.

Collaborative Opportunities: Sharing data and research openly invites collaborations from other researchers, fostering new opportunities for joint projects and interdisciplinary research.

For ICArEHB

Institutional Reputation: By leading the adoption of Open Science, ICArEHB positions itself as a forward-thinking and transparent research institution, enhancing its global reputation.

Funding Opportunities: Many funding agencies, including the European Union, are increasingly prioritizing Open Science practices. ICArEHB's commitment to Open Science aligns with these priorities, improving our competitiveness for research funding.

Capacity Building: Open Science promotes a culture of continuous learning and improvement, where researchers are encouraged to share knowledge, tools, and resources with one another, contributing to the overall growth of the center.

For the Public

Access to Knowledge: Open Science makes our research accessible to a global audience, including policymakers, educators, and the public. This ensures that ICArEHB's discoveries can have real-world impacts beyond academia.

Public Engagement: Open Science encourages citizen science and public participation in research, promoting greater engagement with archaeology and heritage. By sharing our data and methods, we empower communities to take part in preserving and understanding their cultural heritage.

Policy overview

The ICArEHB Open Science Policy establishes guidelines for all researchers, students, and collaborators working under the ICArEHB umbrella. The policy covers key aspects of Open Science that all members must adhere to, ensuring that research outputs are accessible, transparent, and reusable.

Open Access Publishing:

- ICArEHB mandates that all research publications resulting from funded or institutional projects must be made openly accessible. Researchers are expected to publish in Gold Open Access journals or deposit accepted manuscripts in institutional or public repositories (Green Open Access).
- Preprints should be shared whenever possible to accelerate the dissemination of findings.

Data Management and Sharing:

- All ICArEHB research projects must have a Data Management Plan (DMP). DMPs ensure that data collection, organization, storage, and sharing are handled in a structured and compliant manner.
- Research data should be deposited in open repositories and follow the FAIR principles (Findable, Accessible, Interoperable, Reusable) to promote reuse and long-term preservation.

Pre-registration of Studies:

- ICArEHB encourages researchers to pre-register their studies, specifying hypotheses, methodologies, and analysis plans before data collection begins. Pre-registration increases research transparency and reduces the likelihood of biases such as p-hacking or selective reporting.
- Pre-registration platforms like OSF Registrations or AsPredicted should be used where applicable.

Open Methods and Code:

- To ensure research reproducibility, ICArEHB requires researchers to openly share their methods and code. By providing detailed methodologies and code in open repositories (e.g., GitHub, Zenodo), researchers enable others to replicate and build upon their work.
- All shared code must be properly documented and licensed under open licenses, such as MIT or GPL, to facilitate reuse.

Open Peer Review:

- ICArEHB encourages researchers to engage in Open Peer Review whenever possible. Open Peer Review promotes transparency by making review reports

and reviewer identities public, fostering a fairer and more constructive peer review process.

Ethical and Legal Considerations:

- ICArEHB's Open Science practices must adhere to ethical standards, including the protection of sensitive data and compliance with privacy regulations like the General Data Protection Regulation. Researchers are responsible for ensuring that all shared data is ethically managed, particularly when dealing with human participants or confidential information.

Compliance Requirements

To ensure that Open Science practices are fully embedded in all research conducted at ICArEHB, compliance with the Open Science Policy is mandatory for all researchers and students. The following steps outline the expectations for compliance:

Open Access Compliance:

- Researchers must publish all journal articles arising from ICArEHB-funded or institutional research in Open Access journals or make the accepted manuscripts available in an open repository.
- Compliance with funder mandates (e.g., ERC, FCT) is critical. Researchers are responsible for ensuring that their publications meet the Open Access requirements of their funding bodies.
- Trusted repositories like OSF should be used to deposit manuscripts and supplementary materials.

Data Management and Sharing Compliance:

- A Data Management Plan (DMP) must be available at the start of each research project. The DMP should outline how data will be collected, organized, stored, and shared, and it must follow institutional and funder guidelines.
- All research data must be stored in an open-access repository upon project completion, with appropriate metadata to ensure it is FAIR-compliant. Researchers must ensure that sensitive data is anonymized or restricted if necessary.

Pre-registration Compliance:

- For hypothesis-driven research, researchers are expected to pre-register their studies to increase research transparency. Pre-registration must be done before data collection begins, using platforms such as OSF Registrations.
- ICArEHB will monitor compliance with pre-registration practices, particularly for studies that are likely to undergo peer review in high-impact journals or require significant external funding.

Open Methods, Protocols, and Code Compliance:

- Researchers are required to deposit their research methods, protocols, and code in a public trusted repository upon publication of their findings. Methods, protocols, and code should be documented clearly, allowing other researchers to replicate the study.
- Compliance will be monitored through the submission of methods, protocols, and code alongside research outputs, and failure to comply may affect future internal funding or project approvals, and individual evaluation.

Monitoring and Reporting:

- ICArEHB will regularly review compliance with its Open Science Policy. When requested, researchers must provide evidence of their Open Access publications, DMPs, pre-registrations, and data/code sharing.
- ICArEHB annual reports will detail adherence to Open Science practices, including the publication of preprints, the sharing of data and methods, and participation in Open Peer Review.

Support and Resources:

- ICArEHB will provide ongoing support to ensure compliance with Open Science practices. This includes workshops, training sessions, and access to tools such as Argos, DMPTool, OSF, and Protocols.io.
- The ICArEHB Open Science Committee is available to assist researchers in preparing their Data Management Plans, ensuring compliance with funder requirements, and selecting appropriate Open Access journals and repositories.

Failure to comply with the Open Science Policy may result in:

- Restrictions on access to future research funding.
- Non-compliance being flagged in performance reviews or research assessments.

2.1. Open Access Publishing

Policy on Open Access

ICArEHB is committed to making all research outputs produced by its members freely accessible to the public. Researchers are required to ensure that all publications arising from ICArEHB-funded research are openly accessible, either through direct publication in Open Access journals or by depositing accepted manuscripts in open-access repositories.

Mandatory Open Access

All research articles must be made publicly available, either through Gold or Green Open Access.

Compliance with Funder Mandates

Researchers must ensure that they comply with any Open Access requirements set by their funding bodies, including specific timelines for public access.

Repository Submission

Where Gold Open Access is not feasible, researchers must deposit the final accepted manuscript or a preprint in an trusted open-access repository (e.g., OSF, UAlg institutional repository).

Preprints Encouraged

Researchers are strongly encouraged to upload preprints of their work to increase visibility and accelerate the dissemination of their findings prior to formal publication.

Types of Open Access

There are two main types of Open Access, each offering different routes to making research publicly available:

Gold Open Access:

- In the Gold Open Access model, the final published version of the article is made freely available by the publisher immediately upon publication. Gold OA typically requires the payment of an Article Processing Charge (APC) by the author or their institution.
- Researchers publishing in Gold Open Access journals should ensure that the journal follows reputable peer-review processes and adheres to ethical standards.
- ICArEHB encourages Gold Open Access where possible, especially in cases where funders provide support for APCs. Check the Article Processing Charge (APC) of this handbook for more details.

Green Open Access:

- Green Open Access refers to the practice of depositing a version of the manuscript (e.g., the accepted version or preprint) in an open-access repository, typically after an embargo period set by the publisher.
- This approach allows researchers to comply with Open Access mandates even when publishing in subscription-based journals.
- ICArEHB recommends using trusted repositories, such as OSF for Green Open Access.

Preprints

A preprint is a version of a research manuscript that is shared publicly before it undergoes formal peer review. Preprints allow researchers to disseminate their findings rapidly and receive feedback from the academic community. ICArEHB encourages the use of preprints to accelerate the sharing of knowledge and increase the visibility of ongoing research.

Rapid Dissemination

Preprints allow researchers to share their work immediately after completing the manuscript, often months before formal publication. This promotes early access to important findings, lead to early citations, and allows for early feedback from peers, which can improve the manuscript before submission to a journal.

Preprint Servers

Researchers can submit preprints to open-access repositories and preprint servers, such as OSF Preprints, arXiv, bioRxiv, or SoArXiv. These platforms make research accessible to a broad audience while providing a DOI for citation purposes.

Compliance

Many journals allow authors to post preprints without affecting the submission process. Researchers should confirm the preprint policies of the target journal before submitting a preprint. Check also Elseviers Sharing Policy and Springer/Nature Policy.

Selecting Journals

When selecting a journal for Open Access publication, researchers should consider the following factors:

Reputation and Impact:

- Choose a journal that is well-respected in your field and has a solid peer-review process. Look for journals indexed in major databases like Scopus or Web of Science.
- Verify that the journal is not a predatory journal. Use resources such as DOAJ (Directory of Open Access Journals) and Think. Check. Submit. to evaluate journal credibility.

Scope and Audience:

- Ensure that the journal's scope aligns with your research focus and that it reaches your intended audience.
- Consider interdisciplinary journals if your research bridges multiple fields.

Open Access Policies:

- Confirm whether the journal offers Gold or Green Open Access options. For Green Open Access, check the length of the embargo period (if any).
- Ensure that the journal allows the deposit of preprints or accepted manuscripts in open-access repositories if opting for Green Open Access.
- Here are some links for the main Archaeology and Human Evolution journals Open Access Policies:
    - Journal of Archaeological Science
    - Journal of Human Evolution
    - Nature Ecology and Evolution
    - PNAS
    - Quaternary Science Reviews
    - Scientific Reports
    - Journal of Archaeological Science: Reports
    - Anthropological and Archaeological Sciences

Licensing:

- Open Access journals typically use Creative Commons (CC) licenses. Make sure the license meets your needs for sharing and reusing content. CC-BY (attribution) is the most common license, allowing others to share and adapt the work as long as the original author is credited.
- Other licenses, such as CC-BY-NC (non-commercial), can be used if you want to restrict commercial use.

Publication Speed:

- Some Open Access journals have shorter publication times due to streamlined processes. If rapid dissemination is important, factor in the journal’s average time from submission to publication.

Funding APCs

For Gold Open Access, most journals require an Article Processing Charge (APC) to cover the cost of making the article freely available. ICArEHB supports its researchers in navigating APC funding through the following:

Institutional Funding:

- ICArEHB researchers may have access to institutional funds or agreements that cover or subsidize APCs for certain Open Access journals.
- Check with the ICArEHB Open Science Committee to see if there are funds available for APC support or if there are existing agreements with Open Access publishers that reduce APC costs (see FCT Agreements below).

Funder Support:

- Many research funders, particularly under Plan S, provide grants or support for covering APCs. Researchers should consult their funder's Open Access policy to confirm eligibility for APC funding.
- In cases where the funder covers APCs, ensure that you are adhering to their guidelines for Open Access publishing (e.g., immediate Open Access and use of specific repositories).

FCT Agreements

- Elsevier and Portuguese Foundation for Science and Technology (FCT) have established an agreement to support authors in Portugal who wish to publish open access. When publishing in eligible hybrid journals, authors do not have to pay an article publishing charge (APC). The cost of publishing open access is covered under the terms of the agreement. Please note that the number of APCs included under the agreement is fixed and will be allocated based on date of acceptance. See more info here.
- UAlg is also participating in the agreement between Springer Nature and FCT/FCCN/b-on consortium, meaning that corresponding authors are eligible to publish their articles open access with fees covered. The agreement includes hybrid journals across the Springer and Adis portfolios. See more info here.

ERC Policy

- If you publish in a full open access journal or book, or on a full open access publishing platform, publishing fees **are eligible costs** if incurred during the lifetime of your project and in line with the provisions of your grant agreement.
- If you publish in a subscription or hybrid journal, in a book for which some parts are not open access, or on a publishing platform that does not provide all of its scholarly content in open access fees of any kind **are not eligible** costs for the ERC.

- See more info here.

Waivers and Discounts:

- Some Open Access journals offer APC waivers or discounts, particularly for researchers from low-income institutions or countries. Even if ICArEHB has sufficient resources, it is worth inquiring about waivers.

APC Transparency:

- Make sure the journal's APC is transparently listed on its website, and avoid journals that are unclear about APC costs. APCs can range from a few hundred to several thousand euros depending on the journal.

📋 Checklist for Open Access Publishing

Before submitting your paper, use the following checklist to ensure that you are complying with ICArEHB's Open Access policy:

Open Access Requirements:

- Have I reviewed and complied with my funder's Open Access requirements (e.g., European Research Council)?
- Have I ensured that my article will be made openly accessible either through Gold or Green Open Access?

Journal Selection:

- Have I selected a reputable journal that supports Open Access publishing (Gold or Green)?
- Have I checked the journal's policies on preprint submissions and repository deposits?

Funding for APCs:

- Have I checked whether APC funding is available from my institution, funder, or the journal itself (e.g., via waivers)?
- If I'm paying an APC, have I confirmed the total cost and any relevant payment requirements?

Licensing:

- Have I selected the appropriate Creative Commons license (e.g., CC-BY) for my work, ensuring that my article can be shared and reused as I intend?

Repository Deposit:

- If using Green Open Access, have I identified a public repository where I can deposit my preprint or accepted manuscript (e.g., OSF)?
- Have I checked the embargo period (if applicable) and planned for timely deposit of my work?

2.2 Data Management and Sharing

Policy on Data Management

ICArEHB is committed to ensuring that all research data generated by its members are managed according to best practices, preserved for the long term, and made available for reuse whenever possible. Research data must be managed in line with institutional policies, funder requirements, and legal and ethical obligations.

Data Management Plan (DMP) Requirement

All research projects at ICArEHB must have a DMP in place from the project's inception. This ensures that data collection, organization, and sharing are planned according to recognized standards.

Open Data Mandate

Researchers are required to share their research data in a public repository unless there are legal, ethical, or proprietary restrictions that prevent open access. Data should be made available as soon as possible, typically upon publication of the corresponding research article.

Long-Term Preservation

Data generated by ICArEHB researchers must be preserved in a secure and sustainable manner, ensuring long-term accessibility for future research.

FAIR Principles Compliance

All data management practices must adhere to the FAIR principles (Findable, Accessible, Interoperable, Reusable), ensuring that research data can be easily located, accessed, and reused by others.

Data Management Plans (DMPs)

A data management plan (DMP) is a document that outlines how data will be collected, organized, stored, preserved, and shared during a research project. A DMP is usually required by funding agencies, publishers, or institutions as a way to ensure that research data are managed appropriately and meet legal, ethical, and practical standards.

What are the main components of a DMP?

The main components of a DMP may include:

- Description of the data: What type of data will be collected or generated, and how will they be structured?
- Data collection methods: How will the data be collected (e.g., surveys, experiments, observations), and what tools or equipment will be used?
- Data organization and documentation: How will the data be named, labeled, and organized to ensure consistency and usability?
- Data storage and backup: Where and how will the data be stored (e.g., local servers, cloud-based platforms), and how often will they be backed up?
- Data sharing and reuse: Who will have access to the data, under what conditions, and for what purposes?
- Data retention and preservation: How long will the data be kept, and how will they be preserved and made accessible after the end of the project?

General steps to write a DMP

- Identify the key data types and formats you will collect or generate during your research project.
- Determine how you will organize and store the data. Consider factors such as security, backup, and accessibility.
- Decide how you will manage any ethical or legal issues related to your data. This may involve obtaining informed consent from participants, ensuring compliance with privacy regulations, or addressing intellectual property rights.
- Establish guidelines for documenting your data. This may include creating metadata, labeling your files, and maintaining a data dictionary.
- Develop a plan for sharing your data. Consider what data should be shared, with whom, and under what conditions.
- Develop a plan for preserving your data after completing your project. Consider how long you will need to keep the data and how you will ensure that it remains accessible and usable.

Some funding agencies, institutions, or publishers may provide templates or guidelines for writing a DMP. Additionally, there are several online tools available,

such as the DMPTool, DataOne, or Argos that can help guide you through the process of creating a DMP tailored to your specific needs.

When writing your DMP, it is important to be as specific as possible and to consider all aspects of your data management strategy. Consult with colleagues or data management experts if you need guidance or feedback.

Other Resources

- More information about data management (storing, archiving, versioning, data structure, etc.) and backing up and versioning data
- How to name your files
- The costs of data management
- More about privacy and legal aspects
- FCT DMP template
- ERC DMP template

FAIR Principles

The FAIR principles are internationally recognized standards for data management that ensure research data are organized and shared in a way that maximizes their potential for reuse. All data generated at ICArEHB must comply with these principles:

Findable:

- Data should be easily found by both humans and machines. This requires detailed metadata, unique identifiers (e.g., DOIs), and inclusion in searchable repositories.Use clear and consistent file naming conventions.
- Ensure metadata are complete and standardized.

Accessible:

- Data should be accessible and retrievable by authorized users, with clear guidelines on how to access them.
- Deposit data in trusted open-access repositories.
- Clearly define any access restrictions due to privacy or proprietary concerns.

Interoperable:

- Data should be formatted and structured in ways that allow them to be integrated with other datasets and used across different platforms.
- Use open, standardized formats and protocols.
- Ensure data are described using standard vocabularies or ontologies.

Reusable:

- Data should be well-documented and licensed so that they can be reused in future research.Include detailed documentation (metadata, protocols, workflows).
- Use appropriate licenses, such as CC-BY or CC0, to clarify the conditions for reuse.

Data Repositories

Research data must be stored in a secure, trusted repository that provides long-term access and preservation. ICArEHB researchers should deposit their data in reputable open-access repositories that support FAIR data management.

Recommended repositories include:

OSF (Open Science Framework): A widely used platform that supports open data sharing and research collaboration. OSF provides unique DOIs and integrates with various tools for research management.

Zenodo: An open-access repository developed by CERN. Zenodo allows researchers to share datasets, software, and other research outputs with unique identifiers.

Domain-Specific Repositories: For certain types of data, it may be appropriate to use a specialized repository (e.g., PANGAEA for earth and environmental science data, or GenBank for genomic data).

Metadata

Metadata refers to data that describes other data. In other words, it's information about the content, context, quality, and other characteristics of a dataset. Metadata can include details such as the dataset's title, author, date created, variable definitions, and data format.

Metadata is crucial for achieving FAIR data, which stands for Findable, Accessible, Interoperable, and Reusable. Without appropriate metadata, it can be difficult or impossible to find, understand, or effectively use a dataset. For example, if a researcher wants to locate data on a particular topic, they may rely on metadata to search for and identify relevant datasets. Similarly, metadata can help ensure that data are properly documented, formatted, and described, facilitating their use by other researchers. Metadata plays a critical role in enhancing the discoverability, usability, and overall value of research data.

Examples of research metadata

- A project readme containing the information below. Often in a `readme.txt`. Find an example template here or use the information below:
    - **Creator** (PI): name and affiliation of PI
    - **Title**: project title
    - **Funding sources**: names of funders, incl. grant numbers and related acknowledgements

    - **Data collector/producer**: who is responsible for data collection + date and location of data production
    - **Description**: project description, incl. relevant publications
    - **Sample and sampling procedures**: target population and methods to sample it (or link to document describing this), retention rates for longitudinal studies
    - **Coverage**: topics, time period and location covered
    - **Source**: if relevant, citations to original source from which data were obtained
- Metadata for a specific data file, containing, for example, file description, data format, relationship with other files, date of creation and versioning information, etc. This can be a `readme.txt` or other filetypes, such as `nameofdatafile.json` or `nameofdatafile.xml`
- A codebook (data dictionary), which specifies what all variables in your dataset mean.
    - **Question wording** or **meaning**
    - **Variable text**: question text or item number
    - **Respondent**: who was asked the question?
    - **Meaning of codes**: interpretation of the codes assigned to each variable
    - **Missing data codes**, e.g., `999`
    - **Summary statistics** for both valid and missing cases
    - **Imputation and editing**: identify data that have been estimated or extensively edited
    - **Constructed and weight variables**: how were they constructed
    - **Location in the data file**: field or column location, if relevant
    - **Variable groupings**: if you categorize variables into conceptual groupings
- Metadata in systems, such as a data repository. This type of metadata is often enforced and interoperable so that you don't have to manually create this type of metadata. The OSF plataform provides their own metadata profile.

Metadata standards

Metadata standards refer to the frameworks that provide guidelines for the metadata fields, defining the formatting of metadata fields to make them machine-readable and interoperable. An extensive range of metadata standards is available, varying across different disciplines. For the social sciences, the most widely known metadata standards are Dublin Core and Data Documentation Initiative (DDI). Dublin Core consists of basic elements for describing networked resources, such as Title, Creator, Subject, Description, Publisher, Contributor, Date, Type, Format, and Identifier, among others (check this metadata file generator to see all the elements). On the other hand, DDI is commonly used in social, behavioral, economic, and health sciences, including CESSDA (Consortium of European Social Science Data

Archives). Researchers may not always need to work directly with these standards, but it is important to understand that different repositories may adopt different standards. More metadata standards can be found here.

Licensing data

Licensing is a crucial aspect of Open Science that defines how others can access, use, and share your research data. Properly licensing your data ensures that it can be reused in a way that aligns with your preferences while adhering to legal and ethical standards. This section explains how to choose an appropriate license for your data and why licensing is critical for transparency, collaboration, and reproducibility.

When research data are made openly accessible, licensing helps clarify the terms under which the data can be used, reused, and redistributed. Without a clear license, potential users may be uncertain about their rights to use the data, limiting its reuse and impact.

Licensing your data ensures:

Legal clarity: It defines the rights and restrictions on data use, helping to avoid legal disputes.

Open collaboration: A well-chosen license encourages collaboration by making it clear that others can freely use the data for further research, while respecting the terms you set.

Attribution: Licensing often includes provisions for crediting the original data creators, ensuring that you receive recognition for your work.

Consistency with Open Science principles: Licensing promotes transparency and accessibility, key pillars of Open Science.

Types of Data Licenses

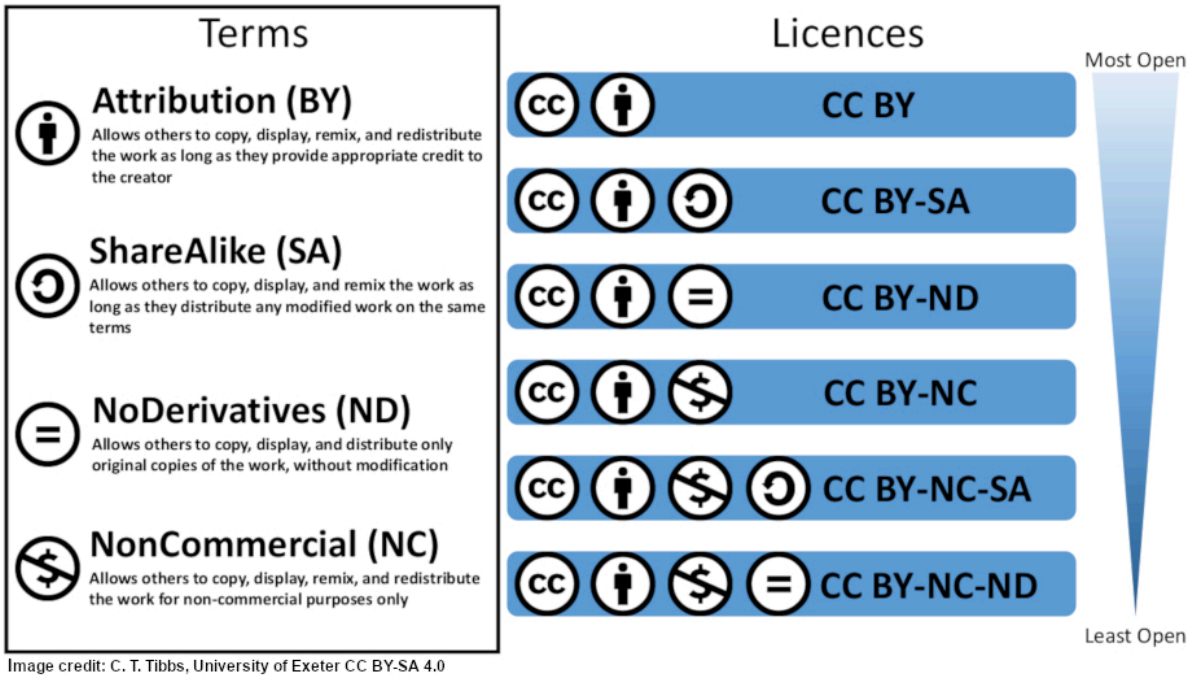
There are several open licenses that researchers can use to make their data openly available while retaining control over how it is reused. ICArEHB recommends the use of Creative Commons (CC) licenses, which are widely recognized and easily understood.

CC0 (Public Domain Dedication) By applying a CC0 license, you waive all copyright and related rights to your data, effectively placing it in the public domain. This allows others to use, modify, and distribute the data without restriction.

CC BY (Attribution) A CC BY license allows others to use, modify, and distribute your data as long as they provide proper attribution to the original creator. This license encourages reuse while ensuring that you receive credit for your work.

CC BY-SA (Attribution-ShareAlike) CC BY-SA is similar to CC BY, but it includes a “ShareAlike” clause that requires anyone who modifies or builds upon the data to share the derivative work under the same license.

CC BY-NC (Attribution-NonCommercial) CC BY-NC allows others to use, modify, and distribute your data, but only for non-commercial purposes. Commercial reuse is prohibited unless additional permissions are granted by the data creator.



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Ethics and Legal Compliance

Research data management must comply with all relevant ethical and legal standards, particularly when dealing with sensitive or personal data. ICArEHB researchers are responsible for ensuring that their data management and sharing practices adhere to the following principles.

Informed Consent

If the data involve human participants, researchers must ensure that informed consent is obtained for data collection, storage, and sharing. Consent forms should specify how data will be used and shared, including potential reuses.

Data Anonymization

When sharing personal or sensitive data, researchers must anonymize the data to protect the privacy of participants. Anonymization should be irreversible and compliant with the General Data Protection Regulation (GDPR).

Intellectual Property Rights

Researchers must respect intellectual property rights and ensure that data are shared in a way that does not violate any copyrights, patents, or proprietary agreements.

Data Licensing

Data should be shared with a clear license, such as Creative Commons, that specifies how they can be used and reused by others. Researchers should choose licenses that align with Open Science principles (e.g., CC-BY, CC0).

Funder and Institutional Requirements

ICArEHB researchers must comply with any specific data management and sharing requirements set by their funding agencies, institutions, or collaborators. Researchers should check these requirements early in the project to ensure compliance.

📋 Checklist for Data Sharing

Before sharing your research data, use the following checklist to ensure that you are following ICArEHB's Data Management and Sharing policies:

Data Management Plan:

- Have I completed a DMP that outlines my approach to data collection, storage, sharing, and preservation?
- Is my DMP compliant with institutional and funder requirements?

FAIR Principles:

- Are my data findable, with clear metadata and a DOI or other unique identifier?
- Have I deposited my data in a trusted repository where they are accessible to others?
- Are my data formatted using standard protocols and described with standard vocabularies to ensure interoperability?
- Are my data accompanied by a clear, open license (e.g., CC-BY) that supports reuse?

Data Repositories:

- Have I selected a suitable repository for long-term preservation and public access to my data (e.g., OSF, Zenodo)?
- Have I checked whether my repository complies with funder and institutional mandates?

Ethical and Legal Considerations:

- Have I obtained informed consent from participants for data sharing and reuse?
- Have I anonymized any sensitive data to protect the privacy of participants, in compliance with GDPR?
- Have I ensured that my data do not infringe on any intellectual property rights?

Data Accessibility:

- Are my data available for reuse immediately after publication, or is there an embargo period?
- If there are restrictions on data access, have I clearly documented the reasons (e.g., proprietary or ethical concerns)?

2.3. Pre-Registrations

Policy on Pre-Registrations

ICArEHB strongly encourages the use of pre-registration for research studies, particularly for hypothesis-driven research. Pre-registration is a powerful tool to improve research transparency, ensuring that analyses and outcomes are not adjusted after the data has been collected. Registrations and pre-registrations help protect the integrity of scientific findings by clearly documenting research plans before data collection or publication.

Encouraged Pre-Registration

All hypothesis-driven research conducted at ICArEHB should be pre-registered prior to data collection. Pre-registration provides a clear record of the planned hypotheses, methods, and analyses, preventing post-hoc adjustments.

Mandatory Registration for Clinical Trials and High-Risk Research

Research that involves clinical trials, human subjects, or high-risk areas (e.g., sensitive data, public health implications) must be registered on approved platforms to ensure full transparency and compliance with ethical standards.

Transparency in Reporting

Researchers must disclose their pre-registration or registration status in all related publications, ensuring that readers can verify that the study followed the pre-registered plans.

What is Pre-Registration?

Pre-registration refers to the practice of documenting and timestamping the study design, hypotheses, and analysis plans before data collection begins. This method increases the credibility and transparency of research by making clear what the researcher intends to do before seeing the data.

Key elements of pre-registration include:

Research Questions: Clearly defining the research questions that will be addressed.

Hypotheses: Specifying the hypotheses that will be tested.

Study Design and Methods: Providing a detailed description of the study design, including the population, sample size, randomization procedures, and planned measurements.

Analysis Plan: Outlining the statistical analyses or qualitative methods that will be used to test the hypotheses.By pre-registering these components, researchers create a permanent, time-stamped record that can later be compared to the final study report to assess the fidelity of the research process.

Pre-Registration vs. Registration

It is important to distinguish between pre-registration and registration:

Pre-registration: This occurs before data collection begins. It documents hypotheses, methods, and planned analyses, ensuring that researchers commit to a specific analysis plan upfront.

Registration: This happens after the study is completed but before the results are published. Registration involves documenting key details about the study and ensuring that the results are accessible to the public, even if they are not published in a traditional journal. Registration is often used for clinical trials or large-scale public health studies to ensure transparency.

Benefits of Pre-Registration

Pre-registration offers several significant benefits for researchers and the broader scientific community:

- **Prevents P-Hacking:** By specifying the hypotheses and analyses upfront, pre-registration helps prevent p-hacking, where researchers selectively report significant results or adjust their analyses to achieve desirable outcomes.
- **Increases Transparency:** Pre-registration creates a publicly accessible record of the study design, ensuring that research findings can be evaluated in the context of the original plan. This increases accountability and trust in the research process.
- **Promotes Reproducibility:** Pre-registration facilitates reproducibility by providing a clear, detailed record of the research plan. Other researchers can replicate the study or use the original design to inform their own research.
- **Encourages Clearer Study Design:** Pre-registering forces researchers to carefully think through their study design, hypotheses, and analysis plan, leading to more thoughtful and well-designed studies.
- **For more reasons to preregister** you may want to read this article.

Steps for Pre-Registration

A full tutorial on how to create a pre-registration at OSF is available here. Overall, ICArEHB researchers should follow these steps to successfully pre-register their studies:

- **Develop Your Study Design:** Define your research questions, hypotheses, and methods. Carefully plan out how you will collect and analyze your data.
- **Choose a Platform for Pre-Registration:** Select a pre-registration platform that suits your research needs (e.g., OSF Registrations, see this link for a tutorial).
- **Submit Your Study Plan:** Complete the pre-registration form, detailing your hypotheses, methodology, and analysis plans. Be as specific as possible to ensure that your study can be evaluated transparently.
- **Time-Stamp and Make It Public:** Once submitted, ensure that your pre-registration is time-stamped and publicly accessible (unless proprietary reasons prevent public sharing).
- **Update as Necessary:** If your study plan changes, update your pre-registration and document any deviations from the original plan in the final report. Transparency about changes is just as important as the original plan.

📋 Checklist for Pre-Registration

Before conducting your study, use the following checklist to ensure that your pre-registration process is complete:

Study Design:

- Have I clearly defined my research questions and hypotheses?
- Have I outlined a detailed plan for data collection, including the population, sample size, and measurement tools?

Analysis Plan:

- Have I specified the statistical or qualitative analysis methods that I will use to test my hypotheses?
- Have I outlined how I will handle outliers, missing data, or any other issues that may arise during analysis?

Platform Selection:

- Have I selected the appropriate platform for pre-registration (e.g., OSF)?
- Have I reviewed the platform's guidelines to ensure that my pre-registration is compliant?

Time-Stamping and Public Access:

- Have I ensured that my pre-registration is time-stamped and made publicly accessible?
- If there are restrictions on public access, have I documented the reasons?

Reporting and Deviations:

- Am I prepared to disclose my pre-registration status in any resulting publications?
- If deviations from the original plan occur, am I ready to document and explain these changes transparently?

2.4. Methods, Protocols, and Code Sharing

Policy on Sharing Methods, Protocols, and Code

ICArEHB is committed to making research methods, protocols, and code openly accessible to ensure transparency, reproducibility, and reusability of research outputs. All research projects that involve the use of custom protocols, methods, or code must make these resources available in an open-access repository.

Mandatory Sharing

ICArEHB requires researchers to share the methods, protocols, and code used in their research, particularly those that are essential for replicating the study or advancing further work.

Open Protocols

All research protocols should be openly accessible to ensure that others can replicate or adapt the research. Protocols provide a detailed step-by-step guide to conducting experiments or fieldwork, ensuring that methods can be transparently followed.

Timely Accessibility

Methods, protocols, and code must be shared no later than the publication of the associated research paper and should preferably be available during peer review.

Compliance with Ethical and Legal Standards

While transparency is key, sharing methods, protocols, and code should not violate ethical agreements, intellectual property rights, or privacy concerns.

Proper Documentation

All methods, protocols, and code must be properly documented to ensure that others can understand and reuse them.

Platforms for Sharing Methods, Protocols, and Code

Researchers should use reputable, open-access platforms to share their methods, protocols, and code. These platforms allow for the secure and long-term preservation of resources while enabling others to access, review, and reuse them.

Recommended platforms include:

- **OSF (Open Science Framework):** OSF supports the sharing of research protocols, methods, and code. Researchers can upload and version their methods alongside data, preprints, and other research outputs, making it a one-stop platform for open research.
- **Protocols.io:** Protocols.io is a dedicated platform for sharing detailed, step-by-step experimental protocols in various fields, from biology to archaeology. It allows researchers to publish and update protocols, receive feedback, and make them openly available for others to replicate.
- **GitHub:** GitHub is widely used for sharing and collaborating on code. Researchers can create repositories for their projects, document their code, and use version control to track changes. GitHub integrates with other platforms like Zenodo to ensure long-term preservation.
- **Zenodo:** Zenodo, developed by CERN, allows researchers to archive and share datasets, code, and protocols. It integrates with GitHub to provide DOIs for code repositories, ensuring long-term accessibility and citation.
- **GitLab:** GitLab offers similar features to GitHub but allows for more control over hosting and infrastructure. It is a good choice for research projects requiring private repositories or internal hosting.

Best Practices for Sharing Methods, Protocols, and Code

To ensure that methods, protocols, and code are accessible, reusable, and understandable, researchers should follow these best practices when sharing their work:

Use Version Control:

- Version control (e.g., Git) is essential for tracking changes to protocols and code, ensuring that previous versions are available and that collaborators can contribute without conflicts.

Provide Detailed Documentation:

- For protocols: Include step-by-step instructions for experimental procedures, fieldwork, or data collection, ensuring that all materials, equipment, and conditions are documented.
- For code: Include README files that explain the code's purpose, usage instructions, dependencies, and installation requirements. Use inline comments to clarify complex code sections.

Ensure Reproducibility:

- Protocols should be described in enough detail that others can replicate the research without ambiguity. Provide exact specifications for equipment, materials, and procedures, and include any contingencies for potential deviations.
- For code, ensure that all dependencies (e.g., specific libraries, software versions) are clearly stated, and include any necessary installation instructions.

Keep Code and Protocols Modular:

- Break protocols and code into smaller, reusable components. This approach makes it easier to update parts of the workflow without affecting the whole, and it facilitates reuse in other projects.

Use Standard Formats and Terminology:

- For protocols, use standardized formats and terminology whenever possible, referencing established procedures or guidelines. This ensures consistency and enables comparison with similar studies.
- For code, use widely recognized programming languages (e.g., Python, R) and avoid proprietary formats that require special software or licenses.

Regularly Update:

- Both methods and protocols may evolve during the course of research. Keep protocols up-to-date, versioning any changes, and ensure that the latest version is always available.

Licensing Code and Protocols

Licensing is a critical part of sharing both protocols and code. It defines how others can reuse, modify, and distribute your work. ICArEHB researchers are encouraged to use open licenses that align with the principles of Open Science.

Common licenses for sharing code and protocols include:

Creative Commons (CC-BY, CC0)

For protocols, CC-BY (attribution) allows others to use and adapt the protocol as long as they give credit to the original author. CC0 places the protocol in the public domain, allowing anyone to use it without restrictions.

MIT License (for code) A permissive open-source license that allows others to use, copy, modify, and distribute the code. It is minimal in restrictions, making it one of the most widely used open-source licenses.

GNU General Public License (GPL) The GPL ensures that any derivative works created using your code must also be open and licensed under the same terms. This ensures that any improvements or modifications remain open to the community.

Apache License 2.0 A permissive license that allows for reuse and modification of the code, while requiring that original copyrights and disclaimers are maintained in derivative works.

📋 Checklist for Sharing Methods, Protocols, and Code

Before sharing your methods, protocols, and code, use the following checklist to ensure that they meet ICArEHB's standards for Open Science:

Protocol Documentation:

- Have I provided a detailed, step-by-step guide to all experimental procedures, data collection methods, and analysis techniques?
- Are the materials, equipment, and conditions clearly specified to ensure replicability?

Code Documentation:

- Have I included a README file that explains the purpose of the code, how to install it, and how to use it?
- Is my code sufficiently commented to allow others to understand its function?

Reproducibility:

- For protocols: Have I ensured that all necessary details are included so that others can replicate the research exactly as it was performed?
- For code: Have I listed all dependencies and libraries needed to run the code? Have I included sample data or test cases?

Version Control:

- Is my code or protocol version-controlled, with a clear history of changes and updates?
- Have I tagged important versions (e.g., version 1.0 for the code or protocol used in the published research)?

Licensing:

- Have I selected an open-source license (e.g., MIT, GPL, CC-BY) that clearly specifies how my code or protocol can be reused and modified by others?
- Is the license information clearly visible in the repository?

Platform Selection:

- Have I selected an appropriate platform for sharing my code and protocols (e.g., GitHub, Zenodo, OSF, Protocols.io)?
- Does the platform provide a DOI or persistent identifier to ensure proper citation and long-term accessibility?

Ethical and Legal Compliance:

- Does my code or protocol comply with all relevant ethical guidelines, especially when handling sensitive data or materials?

- Have I ensured that sharing my code or protocol does not infringe on intellectual property rights or violate any proprietary agreements?

2.5. Open Peer Review

Policy on Open Peer Review

ICArEHB supports and encourages its researchers to participate in Open Peer Review as both reviewers and authors. Open peer review enhances transparency by making the review process more open and accountable, ensuring that both the content and quality of reviews can be assessed. ICArEHB researchers are encouraged to embrace this model, which aligns with the broader goals of Open Science.

Encouragement of Open Peer Review

Researchers should engage in open peer review whenever possible, as it increases transparency and accountability in the scientific process.

Disclosure of Peer Review

When submitting research for publication, ICArEHB researchers are encouraged to disclose the peer review status of the journal (e.g., whether it uses open, single-blind, or double-blind review).

Public Availability of Reviews

When acting as reviewers, ICArEHB researchers are encouraged to allow their review reports to be made publicly available, either with or without disclosing their identity, depending on the journal’s policies.

Opportunities for Open Peer Review

Many journals and platforms now offer Open Peer Review options. ICArEHB encourages researchers to both publish in and review for journals that support these practices. The main forms of open peer review include:

Public Reviewer Reports:

- Reviewer reports are published alongside the article, providing readers with insight into the feedback and suggestions that shaped the final version of the paper. This enhances transparency and can improve the quality of both the review and the research.

Open Identity of Reviewers:

- In some open peer review models, the identities of the reviewers are disclosed either during or after the review process. This creates accountability and recognition for reviewers, and can foster constructive, respectful feedback.

Collaborative Peer Review:

- Some journals enable a more collaborative form of peer review, where authors and reviewers engage in dialogue during the review process, improving the manuscript through direct interaction. This can result in more thorough and constructive reviews.

Platforms supporting Open Peer Review:

- **Open Research Europe:** A platform funded by the European Commission that uses an open peer review process. Articles are reviewed after publication, and reviewer reports are published with the names of the reviewers and their feedback.
- **PeerJ:** Offers open peer review as an option, where review reports are published, and reviewers can choose whether or not to disclose their names.
- **Publons:** While not a publisher, Publons allows reviewers to track and publicly display their peer review contributions across journals, encouraging transparency and providing recognition for peer reviewing efforts.

Best Practices for Peer Review

Engaging in peer review, whether open or traditional, is a critical responsibility for researchers. To ensure that peer reviews are constructive, ethical, and aligned with Open Science principles, ICArEHB researchers should follow these best practices:

Provide Constructive Feedback:

- Reviews should be detailed, respectful, and aimed at improving the manuscript. Criticisms should be constructive and include actionable suggestions for improvement.
- Focus on the content, methodology, and interpretation of the research, ensuring that the study is scientifically sound and conclusions are supported by the data.

Maintain Objectivity:

- Reviews should be unbiased and based solely on the merits of the research, regardless of the author's reputation, institution, or previous work. Avoid personal or ad hominem attacks.

Disclose Conflicts of Interest:

- If you have any conflict of interest that could bias your review (e.g., competing research, personal relationships with the authors), you must disclose this to the editor or decline to review the manuscript.

Be Transparent and Ethical:

- When participating in open peer review, transparency is key. Provide clear, well-reasoned comments that can be publicly shared if requested.
- Reviewers should never misuse privileged information gained through peer review (e.g., sharing data or ideas from the manuscript under review).

Adhere to Timelines:

- Peer reviews should be completed within the timeframe provided by the journal. If delays are unavoidable, notify the editor as soon as possible.

Respect Confidentiality:

- If reviewing for a journal that follows a blinded or traditional peer review process, the content of the manuscript and the review should remain confidential until publication.

Reviewer Recognition

Recognizing the vital contribution of reviewers to the scientific process, ICArEHB encourages its researchers to seek and accept recognition for their peer review work. Reviewer recognition increases accountability and allows reviewers to build a portfolio of their contributions.

Publons:

- Researchers can use Publons to track, verify, and showcase their peer review work. Publons integrates with many journals to automatically record reviews, allowing reviewers to receive recognition for their efforts without compromising the confidentiality of the review process.

ORCID:

- ORCID profiles allow researchers to link their peer review contributions to their unique researcher identifier, providing an easily accessible record of their reviewing activity.

Acknowledgment in Publications:

- Many journals that use open peer review will publicly acknowledge reviewers, either by listing their names in the published article or by making their review reports available with their identity.

Institutional Recognition:

- ICArEHB encourages its researchers to list peer review activities in their professional evaluations and annual reports. Peer review is considered a valuable contribution to the scientific community, and ICArEHB recognizes it as an important component of academic service.

📋 Checklist for Open Peer Review

Before conducting an open peer review, use this checklist to ensure that you are following ICArEHB's policy and best practices:

Constructive Feedback:

- Have I provided clear, respectful, and constructive feedback aimed at improving the manuscript?
- Have I offered specific suggestions for improving the study's methodology, analysis, or conclusions?

Objectivity:

- Is my review based solely on the merits of the research, free from personal bias or external influence?
- Have I avoided personal attacks or subjective criticisms unrelated to the scientific content?

Transparency and Accountability:

- If participating in open peer review, am I prepared to have my comments and identity publicly disclosed?
- Have I ensured that my feedback is clear, well-justified, and can stand up to public scrutiny?

Conflicts of Interest:

- Have I disclosed any potential conflicts of interest that could affect my ability to provide an unbiased review?
- If necessary, have I declined to review due to a conflict of interest?

Timeliness:

- Can I complete the review within the timeframe provided by the journal?
- If delays are unavoidable, have I informed the editor promptly?

Recognition:

- Have I tracked my peer review activities on platforms such as Publons or ORCID for professional recognition?
- Have I ensured that my reviewing efforts are visible and acknowledged where appropriate?

3. Tools and Resources for Open Science

Approved Tools and Platforms

ICArEHB recommends and supports a range of Open Science tools and platforms to ensure that research outputs - data, protocols, methods, code, and publications - are openly accessible, reproducible, and reusable. These platforms facilitate various aspects of the research lifecycle, from study planning and data management to publication and peer review.

OSF (Open Science Framework): OSF is the preferred platform at ICArEHB for managing and sharing research projects, data, and preprints. It provides a secure and flexible environment where researchers can store files, collaborate with colleagues, and share their work openly. Key features:

- Data storage and management.
- Project collaboration and version control.
- Provides DOI
- Preprint hosting and study pre-registration.
- Integration with other tools like GitHub and Cloud Services for seamless workflows.
- OSF is particularly useful for multi-phase research projects, where different outputs - such as data, code, and preprints - can be linked together and accessed in one place.

Protocols.io: Protocols.io is the recommended platform for sharing detailed research protocols, enabling transparency in experimental and methodological practices. Key features:

- Step-by-step protocol sharing for laboratory, field, and computational methods.
- Protocol versioning and updates, ensuring reproducibility.
- Collaborative features for co-developing protocols with colleagues.
- Researchers can use Protocols.io to share methodologies and ensure that others can replicate or build on their experiments.

GitHub and **GitLab:** Widely used for sharing and collaborating on code, GitHub and GitLab offer robust version control and integration with platforms like OSF for long-term preservation.

Zenodo: Ideal for sharing datasets, software, and publications. Zenodo provides DOIs (Digital Object Identifiers), ensuring that shared materials are citable and accessible.

Figshare: A platform for storing and sharing datasets, figures, and other research outputs. Figshare allows for easy data sharing and citation.

European Comission Open Cloud

Templates and Forms

To streamline the adoption of Open Science practices, ICArEHB provides templates and forms that guide researchers through essential processes like data management, pre-registration, and protocol development. These resources help ensure compliance with funder and institutional requirements while promoting best practices.

Data Management Plan (DMP) Templates:

- FCT DMP Template: A template designed to help researchers create a Data Management Plan that complies with FCT (Fundação para a Ciência e a Tecnologia) guidelines, ensuring proper planning for data collection, storage, and sharing.
- ERC DMP Template: A template aligned with European Research Council requirements, ensuring that research data management practices meet European standards.

OSF Project Templates

To use templates please follow the OSF instructions on how to create a project from template.

- ICArEHB Article Template
- Course Management Template
- Research Group Management Template
- Electronic Lab Notebook Template
- Research Teams Coordination Template

Pre-Registration Forms

- Templates for pre-registration can be found on OSF. These forms help researchers outline their research hypotheses, study design, and analysis plan before data collection, increasing transparency and preventing practices like p-hacking.

Protocol Templates

- Protocols.io Templates: These templates guide researchers in creating clear, detailed protocols that include step-by-step instructions for experiments, fieldwork, or data analysis.

Metadata Templates

- Readme Metadata Template
- Dublin Core Metadata Generator

Ethics and Consent Forms

- Templates for informed consent, anonymization protocols, and data protection, ensuring that research involving human subjects complies with legal and ethical standards (e.g., GDPR compliance).

Training Resources

These resources aim to equip researchers with the skills and knowledge needed to use Open Science tools effectively.

Workshops and Webinars

- Training workshops on using OSF, and other platforms. These sessions cover how to set up a project, share data, pre-register studies, and collaborate using these tools.
- Workshops hosted by external Open Science experts at ICArEHB, focusing on emerging practices and new tools in the Open Science landscape. Check the following links for our 2024 Workshop Introduction to Open Science by Dr. Ben Marwick:
    - Day 1
    - Day 2
    - Day 3
    - Slides

Online Tutorials and Guides

- OSF Support: Offers tutorials, FAQs, and guides on setting up projects, sharing data, and integrating OSF with other tools.
- Protocols.io Tutorials: Provides step-by-step guides for uploading, sharing, and updating protocols, as well as tips for ensuring reproducibility.
- GitHub Documentation: Comprehensive documentation and tutorials on using GitHub for version control
- Zenodo Documentation: Comprehensive documentation and tutorials on using Zenodo for archiving and sharing research outputs.
- Journal of Archaeological Science guidelines on reproducibility: Brief guidance on preparing submissions for a reproducibility review.

Peer Support and Mentorship

- ICArEHB encourages the development of peer support groups, where experienced researchers can mentor colleagues in Open Science practices. These groups provide hands-on guidance and troubleshooting for using OSF, Protocols.io, and other platforms.

External Resources

- Access to external training programs such as FOSTER (Facilitate Open Science Training for European Research), which offers free e-learning courses and training on a wide range of Open Science topics.

4. Continuous Improvements and Updates

Policy Review Cycle

ICArEHB will maintain up-to-date and relevant Open Science policies that reflect the latest developments in the field. To achieve this, a structured policy review cycle is in place:

Annual Review

The ICArEHB Open Science Committee will conduct a comprehensive review of the Open Science Handbook annually. This review will assess the effectiveness of current policies, identify areas for improvement, and ensure that the handbook reflects the latest standards, technologies, and best practices in Open Science.

Ad hoc Updates In addition to the annual review, the committee will make ad hoc updates as necessary. These updates may be prompted by significant changes in the Open Science landscape, such as new funder requirements, the introduction of groundbreaking tools or platforms, or feedback from the ICArEHB community.

Alignment with External Standards ICArEHB's policies will be regularly cross-referenced with key external frameworks, such as Plan S, the European Open Science Cloud (EOSC), and policies from major funders like the European Research Council (ERC) and FCT. This ensures that ICArEHB's policies remain compliant with global standards and funder mandates.

Versioning and Documentation All updates to the handbook will be communicated to ICArEHB researchers. The updated handbook will be shared via email and made available on the ICArEHB website, ensuring that all researchers have access to the latest information.

Feedback and Contributions

ICArEHB recognizes that its researchers are integral to the continuous improvement of the Open Science Handbook. Feedback from the research community is essential to ensure that the policies remain relevant, practical, and effective. The following mechanisms are in place to facilitate ongoing input from ICArEHB members.

Open Feedback Channels

- Researchers are encouraged to provide feedback on the Open Science Handbook through email to openscience@icarehb.com. These forms allow researchers to suggest updates, point out areas for clarification, or propose new tools and practices for consideration.
- Direct feedback can also be submitted during the annual ICArEHB's Open Science Day, where ICArEHB researchers can participate in discussions on how to enhance Open Science practices across the center.

Researcher Contributions

- ICArEHB researchers who have implemented innovative Open Science practices or developed new tools are encouraged to contribute to the handbook. Contributions may include case studies, examples of best practices, or the integration of new platforms and methods into the institution’s Open Science framework.
- Contributions can be submitted to the ICArEHB Open Science Committee, which will review and incorporate relevant suggestions during the policy review cycle.

Advisory Board Consultation

- The ICArEHB External Advisory Committee, comprising one external Open Science expert, will be consulted annually to provide external perspectives on best practices, emerging trends, and global standards in Open Science.
- The Committee will offer recommendations on how ICArEHB can align its practices with international Open Science initiatives and ensure continuous improvement.

Continuous Learning and Adaptation

- As Open Science tools and practices evolve, ICArEHB will provide ongoing training sessions and learning resources to keep researchers informed of the latest developments. These sessions will also be used to gather feedback on new tools and platforms, ensuring they are integrated into the handbook in a user-friendly and efficient manner.

Appendix

Glossary of Open Science Terms

- **APC (Article Processing Charge):** A fee paid by the author (or their institution) to make an article freely accessible to the public in a Gold Open Access journal. This fee covers the costs of publishing and providing Open Access.
- **Creative Commons (CC) Licenses:** A set of open licenses that allow creators to specify how their work can be used and shared by others. CC-BY requires attribution, while CC0 places the work in the public domain.
- **Data Management Plan (DMP):** A formal document that outlines how research data will be collected, organized, stored, shared, and preserved throughout and after the research project. DMPs are often required by funders.
- **FAIR Principles:** A set of guidelines for making data Findable, Accessible, Interoperable, and Reusable, ensuring data can be easily located, accessed, and reused by other researchers.
- **GitHub:** A web-based platform used for version control and collaborative development, particularly for code. Researchers use it to share code openly and track revisions.
- **GitLab:** Similar to GitHub, GitLab offers version control, collaborative development, and self-hosting options for projects that need private repositories or additional control over infrastructure.
- **Gold Open Access:** A publishing model where the article is made freely available by the publisher immediately upon publication, often requiring the author to pay an Article Processing Charge (APC).
- **Green Open Access:** A model in which authors deposit a version of their article (e.g., preprint or accepted manuscript) in an open repository, often after an embargo period imposed by the publisher.
- **Metadata:** Structured information that describes, explains, or provides context about data, making it easier to find, use, and understand. Metadata is essential for ensuring that data are FAIR (Findable, Accessible, Interoperable, and Reusable).
- **Open Access:** The practice of making research outputs (e.g., publications, data) freely available to everyone, without access restrictions or paywalls.
- **Open Peer Review:** A peer review process where review reports are made publicly available alongside the published article. Reviewer identities may or may not be disclosed.
- **Open Science Framework (OSF):** An open platform that supports research project management, data sharing, preprints, and study pre-registration. OSF integrates with tools like GitHub and Zenodo.
- **Preprint:** A version of a scholarly paper that precedes formal peer review and publication in a scientific journal. Preprints are shared publicly to facilitate early dissemination and feedback.

- **Pre-registration:** The process of registering a research study's hypotheses, methods, and analysis plan before data collection begins, promoting transparency and preventing questionable research practices like p-hacking.
- **Protocols.io:** A platform for creating and sharing detailed, step-by-step research protocols. It allows researchers to publish, update, and collaborate on protocols, ensuring transparency and reproducibility.
- **Trusted Repository:** A repository that adheres to accepted standards for data storage, preservation, and access, ensuring that research data remain available over time. Trusted repositories, such as OSF and Zenodo, comply with FAIR principles.
- **Zenodo:** An open-access repository developed by CERN that allows researchers to archive and share datasets, software, and research outputs. Zenodo assigns DOIs to shared materials, making them citable and accessible.