

DATA MANAGEMENT

The Jacobs School of Engineering aspires to rigorous data management practices supporting the structural foundation for research findings. If the data lack validity or integrity, then all else about a research project will not matter. Depending on the nature of the research, data can be as diverse as numbers written in a lab notebook, images produced with an electron microscope, audio recordings of interviews with human subjects, genetically modified cell lines, customized software or codes, artifacts collected from an archaeological dig, or geological samples from the sea floor.

Because data have so many different forms, it is not practical to be prescriptive about how all data should be handled. However, as a minimum, **research records should be sufficient to reconstruct what was done** for the purpose of future research and to verify work had been done as described in subsequent publications.

Some recommended, nominal “best practices” are that **each research group should be clear about how the following questions are answered** for their particular circumstances, and re-assess periodically as those circumstances change:

- Are there data that **should not be acquired**?
- How will the data be **collected**?
- How should records be **kept and stored**?
- Is **data curation** (e.g., organization, annotation) sufficient to reconstruct what was done?
- How, if at all, will data be **backed up**?
- **How long** should data be kept?
- What **factors other than regulatory** might alter how long the data should be kept?
- **Who owns the data**?
- When and with whom should data be **shared**?

In addition, some key considerations relevant to the specific circumstances of most, if not all, research projects are that researchers should:

- Recognize that **research ownership typically passes** from research funders (e.g., a federal agency such as the NIH or NSF, or a private funder) **to the University**, not to the research investigators. The University does not normally make decisions about what will be done with research data, but has legal standing to do so. For this reason, a researcher leaving the University must negotiate approval with the University before removing data. **For all other practical purposes, rights of ownership largely belong to the head of the research group.**
- Verify specific requirements of funders of their research for **how long research records must be kept** (e.g., research records must be kept for **at least 3 years after the final report** for research funded by the National Institutes of Health (NIH) or National Science Foundation (NSF)).
- Maintain **data and records essential to a patent** throughout the lifetime of the patent.
- Obtain approvals as needed for **research with human or animal subjects** from the Institutional Review Board (IRB) or Institutional Animal Care and Use Committee (IACUC), respectively, and follow data safety and management plans specific to the project. [NOTE: Any research, including Internet studies, involving humans may need review]
- Honor expectations of many journals, funding organizations and agencies (e.g., NIH and NSF) for which publication and funding are **contingent on plans to share research data and products.**
- Obtain necessary review and approval, consistent with restrictions on **export controls, protection of intellectual property, and University policies**, for any transfer of data, materials, or intellectual property, outside the University.

Resources

At UC San Diego

For questions about data ownership, records retention, etc., contact:

- [Research Ethics Program](#) | 858-822-2647 | ethics@ucsd.edu
- [Ombuds Office](#) | 858-534-0777
- [Office of Research Affairs](#) | 858-534-9758
- Research IT Services: Tools for [Data Management](#)
- Research IT Services: [Data Storage](#)
- SDSC: [Data Consulting](#)

Guidelines and Recommendations

1. Burroughs Wellcome Fund – Howard Hughes Medical Institute: Chapter 8. Data management and Laboratory Notebooks. [A Practical Guide to Scientific Management for Postdocs and New Faculty](#). Pp. 143-152.
2. Go FAIR: [FAIR Guiding Principles for scientific data management and stewardship](#)
3. The Menlo Report (2012): [Ethical Principles Guiding Information and Communication Technology Research](#)
4. UC San Diego: [Access and Management of Research Data](#)
5. UC San Diego Research Ethics Program: Overview of [Data Management](#)

Recordkeeping

6. Kanare HM (1985): Writing the Laboratory Notebook, American Chemical Society, Washington, DC.
7. Macrina FL (2014): Chapter 10. Scientific Recordkeeping. In (Macrina FL, au): Scientific Integrity, 4th ed., ASM Press, Washington, DC, pp. 329-359.
8. NIH Office of the Director (2008): [Guidelines for Scientific Record Keeping in the Intramural Research Program at the NIH](#).
9. NSF Office of Inspector General (2009): [Meaningful Laboratory Records](#). Semiannual Report Congress, March 2009, p. 51.
10. Ryan P (2010): [Keeping a Lab Notebook: Basic Principles and Best Practices](#). Office of Intramural Training and Education, National Institutes of Health.

Sharing and Ownership

11. Blum C (2012): [Access to and Retention of Research Data: Rights and Responsibilities](#). Council on Governmental Relations, Washington, DC.
12. Committee on Responsibilities of Authorship in the Biological Sciences (2003): [Sharing Publication-Related Data and Materials: Responsibilities of Authorship in the Life Sciences](#). Board on Life Sciences, Division on Earth and Life Studies, National Research Council of the National Academies, The National Academies Press, Washington, D.C.
13. Mays TD, Macrina FL (2014): Chapter 9. Research Data and Intellectual Property. In (Macrina FL, au): Scientific Integrity, 4th ed., ASM Press, Washington, DC, pp. 287-357.
14. NIH (2015): [NIH Sharing Policies and Related Guidance on NIH-Funded Research Resources](#).
15. Open Data Institute: [About the Open Data Institute](#)
16. NSF: [Dissemination and Sharing of Research Results](#)
17. UC Office of the President Policies and Guidance: [Research Record Retention and Disposition](#).