23 Things for Researchers and PhD Candidates

An overview of practical resources and tools that you can begin using today to incorporate research data management into your research workflows.

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… to help researchers and PhD candidates engage in research data management!

Research Data Management
Proper Research Data Management (RDM) saves time, allows the easy re-use and citation of data, and is essential for making research truly reproducible.

1. Get inspired and motivated by some visual introductions to the principles and merits of Research Data Management provided by the University of Jena,
   edu.nl/tr4pj

2. Get informed by the practical RDM Toolkit at JISC, or move ahead using the very brief guide of Eugene Barsky,
   edu.nl/p4nke & edu.nl/gk3gq

Data Management Plans
Most researchers and PhD candidates will, at some point, encounter the request to provide a Data Management Plan (DMP) to either their funding agency or hosting research institute. A DMP helps to foresee any challenges regarding data storage and security, data sharing and (re)usability, and ethical and legal matters. A DMP includes solutions for problems around data and calculates the corresponding costs.

3. Grasp the basics of DMP's through the 10 tips for creating and for writing a DMP by LCRDM,
   edu.nl/avpqd & edu.nl/a9jdm

4. Get introduced to and familiar with Data Management Plans through eLearning at DeiC and the catalogues of public DMP's at DCC and LIBER,
   edu.nl/hd4v7 & edu.nl/7abtb & edu.nl/hh8yk

Personal & Sensitive data
If your research data can be related to personal information, or otherwise carry information that should be considered as sensitive information, a strategy has to be defined.

5. For definitions of personal and sensitive data see the ANDS guides, the overview of the UKDS or the EC's information on GDPR for researchers,
   edu.nl/93hmn & edu.nl/rydba & edu.nl/phbgw

6. There are several support services and helpdesks available to assist you with issues around data protection; use the Health-RI ELSI Service Desk for health data, and LCRDM's how-to guides on privacy or the app developed by Erasmus University Rotterdam,
edu.nl/nxprx & edu.nl/kwxyq & edu.nl/ewxpe

7. Before collecting personal or sensitive data, your research subjects should sign an informed consent; have a look at the CESSDA guidelines on this,
edu.nl/vx4jv

8. For different forms of data de-identification see the FPF or the OpenAIRE Amnesia tool,
edu.nl/qbpwu & edu.nl/pwdvh

Metadata & Data Documentation
In order to make data usable for others, researchers add (rich) metadata and data documentation. Three levels of description are relevant here: description of the data itself, description of the data collection process and the tools used, and description of the changes of the dataset over time.

9. A description of the data itself as a simple readme.txt file is simple and effective,
edu.nl/3cm44

10. Information that is added to data should be understandable by others, and preferably also by machines; that's why metadata typically follow a certain standard, often discipline or data repository specific; use controlled vocabulary and authority files for the description of the data; find references at Bartoc, RDA and FAIRsharing,
edu.nl/3mgdg & edu.nl/ct8en & edu.nl/cac6d

11. Turning (raw) data into scientific information is a dynamic process; include information on how your data were collected, processed and analysed; see the examples for computational biologists on lab journals, documentation of scientific software and practices for scientific computing,
edu.nl/h64xg & edu.nl/9guau & edu.nl/4wctq

12. Versioning can be done in various ways, manually or automatically; learn about software which is commonly used for automatic versioning of text files at RDNL and Software Carpentry,
edu.nl/3hmvn & edu.nl/pnjkv

13. The FAIR data principals nicely illustrate the importance of metadata, learn about FAIR to understand the importance of metadata, and consider this EUDAT checklist,
edu.nl/knb87 & edu.nl/y9xje

Digital Preservation & Data Repositories
Uploading data to trustworthy data repositories is an important step towards open science. Data will usually be assigned a persistent identifier, will be described with additional metadata according to the standard chosen by the repository, will be released with a license and will be made available via a standard, open protocol with access restrictions where needed.

14. Find an appropriate repository, after consulting for local requirements, by searching the RDA adopted Re3data and the FAIRsharing registry of research data repositories; select repositories on criteria such as certification, discipline, costs, recommendations by journals and funders,
edu.nl/nt7wx & edu.nl/64kqm

15. Publish and share data by following the archiving considerations by RDNL; if none of the above is available, use free online data repositories such as Zenodo,
    edu.nl/99xug & edu.nl/4mkvu

Data Licensing
When collecting and sharing data, and code, researchers select a proper license to ensure that the research outputs are re-used as intended.

16. Can I reuse someone else's research data? by OpenAIRE helps to decide if data can be (re)used,
    edu.nl/3ujnt

17. Check out the Creative Commons licenses; How do I license my research data? helps you choose a data license; Choose a license helps you choose a software license,
    edu.nl/hyvtv & edu.nl/gdyy9 & edu.nl/6bn3d

Citing Data
Researchers cite code and data to recognise the creators. Data and code citation help promote discovery and reuse, and thus impact, of research outputs.

18. Learn how to cite data in publications,
    edu.nl/jnvxv

19. Learn how to enable citation of your software,
    edu.nl/dtyuh

Community of Practice
Researchers and data supporters are connecting with each other and a larger community of stakeholders to develop solutions and share best practices for research data management.

20. Find out who you can contact at your university or institution to learn more about local infrastructures and policies that are in place to support researchers, usually the research support desk, the library or data steward,
    edu.nl/un6ay

21. Join existing networks to help build social and technical bridges to enable data sharing; start out with your local Open Science community; check out RDA activities in the Netherlands, and RDA activities internationally,
    edu.nl/u6ej4 & edu.nl/p4fvy & edu.nl/tp39u

Learning Resources
Researchers like to learn more about RDM and relevant skills; the following resources provide a relevant overview of learning materials.

22. Go through the comprehensive list of initiatives, tools and freely available training materials at RDNL, or get a comprehensive introduction to research data management and reproducible data science at Alan Turing Institute,
    edu.nl/37rxd & edu.nl/xxehb

23. Learn foundational coding and data science skills for researchers through Software Carpentry, Data Carpentry and Code Refinery,
    edu.nl/mwfnq & edu.nl/tg7tt & edu.nl/3hcxv

Contact Information

This document is an audience-specific version (for researchers and PhD candidates) of the 23 Things for/by the Dutch community, created by the LCRDM task group RDA 23 Things (lcrdm.nl). The original 23 Things can be found at edu.nl/w7e34, the LCRDM adaption for the Dutch community can be found at doi.org/10.5281/zenodo.3465895. If you have any relevant resources for the 23 Things, please contact the LCRDM coordinator.

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