Research Data Management

# Introduction

Research data management (RDM) is fundamental to all stages of the research process and should be established at the outset to safeguard good research practice.

Individual researchers and institutions have a responsibility to ensure research data is managed, stored and shared appropriately in accordance with university and funder policies. They must also ensure all relevant legal, ethical and other requirements (including intellectual property rights and confidentiality agreements) are met fully.

**Disclaimer:** Researchers at other institutions may find this resource useful as an introduction to RDM, but your only definitive source of guidance should be what is provided by your own institution.

# What is RDM?

Research data management (RDM) is the process of looking after your research data. Research data are the evidence that supports your research conclusions. This section explores RDM and presents some of the benefits.

## What is research data?

Research data is the evidence that underpins the answer to the research question and can be used to validate findings regardless of its form (e.g. print, digital or physical).

Research data may take the form of numbers, symbols, text, images or sounds, including computer code, annotated fieldwork observations, transcripts of interviews, survey data, an artwork, manuscripts, or a descriptive record of a physical sample.

Research data may be

* raw or primary (e.g. direct from measurement or collection)
* derived from primary data for subsequent analysis or interpretation (e.g. cleaned up or as an extract from a larger data
* or derived from existing sources where the rights may be held by others.

The primary purpose of research data is to provide the evidence necessary to support or validate a research project's observations, findings or outputs.

## Good research data management

Good research data management enables your future self (or another researcher) to find, assess, understand and re-use your research data with a minimum amount of time and effort.

# What does RDM mean to you?

Whether you are a new or experienced researcher you probably have some thoughts or preconceptions about research data management.

Take a moment to enter your thoughts in the box below. You could mention your ideas about benefits, drawbacks, preconceptions or reflect on some past experiences. We can revisit your thoughts later and see if anything has changed or if anything has been reinforced.

# Summary

Research data management typically includes:

* planning how you will manage your data during and after your research project
* looking after your data e.g. collecting, organizing, documenting, securely storing and backing up your data, and managing the processing and analysis of your data
* preserving your data and making it accessible for re-use (either by yourself or another researcher)

Research funders often require research data management criteria to be met, and a data management plan to be put in place as part of a grant application.

The University of Manchester provides researchers with the tools they need to effectively manage their data in accordance with the policies of this University, funders and any other interested parties. We will explore relevant policies in more detail later in this

resource.

# Benefits

Effective research data management brings you many benefits, including:

* **Enhanced reputation and prestige**: Enhancing the visibility of your data increases the number of citations and creates opportunities for collaboration with other researchers.
* **Improved efficiency:** Save time and effort by streamlining your data processes thereby reducing the need for corrective activity to address data-related problems.
* **Improved research quality:** Preserving your data and enabling others to understand how it can be used, now and in the future, ensures research integrity and allows reliable verification of your results.
* **Protection from data-related risks:** Data security ensures that your data are protected from catastrophic loss, and allows you to control access by others to your data, and to manage sensitive data (e.g. to protect intellectual property, comply with data protection law, respect confidentiality, or honour third party agreements).
* **Compliance:** Satisfy funders' and institutional policies, and any legal, ethical or other requirements.

What are the consequences and effects of bad data management? Watch this [short video](https://youtu.be/N2zK3sAtr-4) demonstrating some of the problems associated with bad data management.

# Policies

This section explores the University of Manchester Research Data Management Policy and funder policies. These policies are designed to help you manage your research data and underpin good research practice.

## The University of Manchester Research Data Management Policy

Below you can see the background and context of the University of Manchester's research data management policy.

There is growing recognition that a systematic approach to research data management and preservation is fundamental to good research practice.

It is also clear that research data acquired using public funding should be treated as a public good and made openly available to other researchers wherever appropriate. At the same time, the trend across many disciplines to work with increasingly large datasets has exacerbated the practical challenge involved in managing data effectively.

Although the primary responsibility for good research data management rests with individual researchers, it is clear that universities have an institutional responsibility to ensure good practice - indeed research funders increasingly impose data management obligations on institutions as a condition of financial support.

Against this background, [Research Councils agreed a set of common principles for data policy](https://www.ukri.org/funding/information-for-award-holders/data-policy/common-principles-on-data-policy/) and individual research funders have published formal guidelines (explored later in this resource). For further background information and access to resources see the [Digital Curation Centre website](https://www.dcc.ac.uk).

The Research Data Management Policy for the University of Manchester been developed with input from a broad range of stakeholders within the University. It aims to establish broad principles, and will be augmented, in due course, with detailed procedures and guidance. This policy is complemented by related University policies relevant to data management, data sharing, and data security.

Four of the UK's leading research organisations (the former HEFCE, UKRI (the former RCUK), Universities UK and the Wellcome Trust have developed a [Concordat on Open Research Data](https://webarchive.nationalarchives.gov.uk/ukgwa/20200923114433/https://www.ukri.org/files/legacy/documents/concordatonopenresearchdata-pdf/). This proposes a series of clear and practical principles for working with research data and represents a set of expectations of best practice developed by the research community itself.

## The policy in brief

[The University of Manchester Research Data Management Policy](https://www.library.manchester.ac.uk/services/research/) covers the following areas.

* The responsibility of a project's principal investigator for ensuring good research data management practice.
* Adherence to the RCUK Common Principles on Data Policy.
* The University's provision of appropriate support services and guidelines for researchers.
* Due regard to the University's intellectual property policy.
* The requirement to create a data management plan.
* Respect for the research data management policies of funders and other interested parties.
* The requirement to store research data in an appropriate manner (e.g. using University approved storage or in a funder compliant repository).
* The requirement to record metadata describing the data, how it was created, and how it can be used.
* Preservation and curation of research data.
* The desirability of making research data openly available in a timely way, with as few restrictions as possible.
* The importance of legal and other requirements in areas such as ethical approvals and consents, the rights of data subjects, and data protection.
* The importance of transparency for verifying the integrity of research.
* The University's Code of Good Research Conduct.

## Related polices

[The University of Manchester Code of Good Research Conduct](https://documents.manchester.ac.uk/DocuInfo.aspx?DocID=2804) sets out the University's overarching policy framework for good research practice, including the management of research data.

The following policies are complementary and related to the University of Manchester Research Data Management Policy.

Please be aware that the list below is not exhaustive. When developing a data management plan, it is good practice to list all policies that affect the management of your research data.

* [The University of Manchester Records Management Policy](https://documents.manchester.ac.uk/display.aspx?DocID=14916)
* [The University of Manchester Data Protection Policy](https://documents.manchester.ac.uk/DocuInfo.aspx?DocID=14914)
* [The University of Manchester Intellectual Property Policy](https://documents.manchester.ac.uk/DocuInfo.aspx?DocID=24420)
* [The University of Manchester IT policies and guidelines](https://www.itservices.manchester.ac.uk/aboutus/policy/)

## Funder policy

Many funder policies now require researchers to create a data management plan as part of grant applications.

The Digital Curation Centre offers guidance on funder expectations and data policies:

* [Overview of funders data policies](https://www.dcc.ac.uk/guidance/policy/overview-funders-data-policies)
* [Funders data polices](https://www.dcc.ac.uk/guidance/policy/funders-data-policies)

To check your funder's research data requirements see the policies page on the [Research Data Management website](https://www.library.manchester.ac.uk/services/research/), which includes requirements from:

* Arts and Humanities Research Council (AHRC)
* Biotechnology and Biological Sciences Research Council (BBSRC)
* Cancer Research UK
* Engineering and Physical Sciences Research Council (EPSRC)
* Economic and Social Research Council (ESRC)
* European Commission / Horizon 2020
* Medical Research Council (MRC)
* Natural Environment Research Council (NERC)
* Science and Technology Facilities Council (STFC)
* Wellcome Trust

# RDM Services

The Research Data Management Service at the University of Manchester offers a range of services, guidance and tools to help you to effectively plan and manage your research data.

This section gives you a brief overview of some of the support available.

## RDM Services Overview

The Library provides the Research Data Management Service to support University of Manchester researchers. For a summary of key services and guidance, see the Research Data Management website which offers guidance on:

* Planning, including creating a data management plan
* Working, including file formats, organising data, documentation and metadata, storage, and security
* Sharing, - including ways to share, licensing data, and data access statements
* Policies, - including the University's and funder's research data policies
* Contact Us - for further assistance

## RDM tools overview

The University of Manchester Research Data Management Service supports and provides advice on the use of several important tools which we will explore in this section. If you are a member of another institution, you may wish to skip this section and refer to your own institution's support.

### Data Management Planning Tool

This tool supports researchers in the development of their data management plans.

### Research Data Storage

A centrally hosted and administered data storage solution for research staff and students.

### Depositing Data

The RDM service provides advice on specialist and institutional data repositories which can be used to store your data.

## Data Management Planning

Creating a data management plan might not always be straightforward, particularly if you're doing this for the first time. The University of Manchester requires all research projects to have a data management plan which is created using [DMPonline.](https://dmponline.dcc.ac.uk) This is an online tool designed to help you create a plan based on funder and/or institutional requirements.

### Overview

DMPonline can be used to:

* create a data management plan (DMP). Your plan will have its own URL with a five-digit number at the end (e.g. dmponline.dcc.ac.uk/plans/12345). This is your DMP reference number which will allow you to complete the RDM Reference Field in the University's Research Application form.
* create a plan based on a specific funder template. All UK Research Councils provide their own template in DMPonline, as well as a few other funders such as the Wellcome Trust and the European Commission (Horizon2020). If your funder doesn't provide a template or your project is unfunded, you can just select the box that says there is 'no funder associated with this plan' and use the University of Manchester generic template.
* share your plan with collaborators or download your plan to include in your grant proposal, if applicable.

## Accessing

You can access DMPonline by visiting [dmponline.dcc.ac.uk](https://dmponline.dcc.ac.uk) or click the link from the RDM website.

You can use your University credentials to log in and create an account, after which you will be able to log in using your usual Manchester username and password.

If you have any problems accessing the tool, please [contact us](mailto:researchdata@manchester.ac.uk).

## Getting started

DMPonline:

* Provides guidance tailored to your funder on how to complete each question within your DMP
* Allows you to request feedback from the Research Data Management Service and add your own comments or questions as you fill in your plan

# Research Data Storage (RDS)

This page is only relevant to members of The University of Manchester.

[The Research Data Storage (RDS) Service](https://ri.itservices.manchester.ac.uk/rds/) is provided to University of Manchester researchers by IT Services. Up to 8TB of storage is available for each academic-led research project at no charge.

Overview

* The RDS Service helps you to manage and protect your data:
* Provides secure storage that is easily accessible from on- campus and off-campus locations.
* Data is replicated with backups at separate locations.
* Files corrupted or accidentally deleted can be recovered for up to 35 days.

# Activity

Instructions:

There are many common types of data storage. Can you think of any reasons why it may not be suitable for storing research data?

## Cloud storage

Cloud services are IT services that are provided remotely and can be delivered to you anywhere.

Look at the list below and try to identify some of the reasons why cloud storage may not be suitable for research data.

* Geography - you do not know where your data is being stored
* May not be secured via University channels
* Easily lost or stolen
* Can suffer failures
* Data not always backed up
* Secure only when encrypted
* Data may be inaccessible without the device
* Easily broken

## Benefits of RDS

The benefits of using RDS are numerous. Some of the key characteristics of RDS are listed below:

* Secure: Controls access to data by authorized users only
* Backup: Data is replicated at separate physical locations and allows recovery of data that has been accidentally deleted or damaged e.g. by human error, disasters (fire, flood, etc.), or hardware malfunctions.
* Policy Compliant: The RDS is complaint with the University’s Reasearch Data Management Policy
* Centrally Managed: RDS is a university service dedicated to providing storage and backup which saves you time and worry
* Free at point of use: Up to 8TB of storage is available for each academic-led research project at no charge

### Accessing RDS

You can access the RDS from [here](https://ri.itservices.manchester.ac.uk/rds/).

Applications to request storage should be made via the [RDS service request form](https://manchester.saasiteu.com/Modules/SelfService/#serviceCatalog/request/E9A4B9A25BE94CC28EF5A39FE1A54892). Requests are then approved by the Faculty IT Team, a member of whom will contact you to discuss the details of your request.

## Getting started

### Using your Storage

There are different types of storage share that can be allocated to you, depending on your requirements. Most are accessed via a network path, just like your P: drive. The network path will be supplied to you and you can view details of how to map a network drive in the [User FAQ section](https://ri.itservices.manchester.ac.uk/rds/user-faq/using-storage/) on the RDS website.

### Deciding What Storage You Want

Several different types of storage are available. Once you have requested RDS, you will be contacted by your Faculty IT team, or the Research Infrastructure team, to determine which type of storage will be allocated to you.

You can find more information on the different storage options on the [RDS Getting Started](https://ri.itservices.manchester.ac.uk/rds/getting-started/) page.

## Summary

You can protect against the risk of data loss by having a backup strategy. The 3-2-1 principle offers a good rule of thumb. Ensure that you store:

* At least 3 copies of your data
* In 2 different geographical locations
* On more than 1 type of storage hardware

The Research Data Storage Service can help you satisfy the 3-2-1 principle since it keeps 2 copies of your data in 2 different geographical locations using 1 type of storage hardware.

# Research data repository

To make your data accessible, you can deposit your data with a specialist data repository or data centre that provides a managed environment for preserving and sharing your data.

## Overview

Some funders expect data to be deposited in specific data centres e.g. ESRC and NERC support dedicated data centres. Similarly, consider whether any agreements with your collaborators include requirements for data deposit.

## Getting Started

Identifying an appropriate repository to look after your data is important. You can check your funder's data archiving policy using [SHERPA/JULIET](https://www.sherpa.ac.uk/juliet/), and the DCC provides an overview of [funders' data policies](https://www.dcc.ac.uk/guidance/policy/overview-funders-data-policies).

### Discipline-specific data repositories

Discipline-specific data repositories are available for a variety of subject disciplines e.g. the [Archaeology Data Service](https://archaeologydataservice.ac.uk), and [GenBank](https://www.ncbi.nlm.nih.gov/genbank/) for genetic sequences.

You can find data repositories for your subject via [re3data.org.](https://www.re3data.org) This registry of data repositories can also help identify whether a repository:

* provides open, restricted or closed access to its data
* uses persistent identifiers such as a DOI (Digital Object Identifier) to make data persistent, unique and citable
* supports a repository standard or has been certified
* supplies the terms of use and licenses of the data it provides
* provides a policy

### Institutional data repository

If no discipline-specific repository is available then [Mendeley Data](https://data.mendeley.com) is the University of Manchester's recommended general-purpose, open research data repository.

### General-purpose data repositories

Other general-purpose data repositories are also available, e.g. [Zenodo](https://zenodo.org) and [Figshare](https://figshare.com).

## Summary

You are now coming towards the end of this resource. You should have an overview of:

* what RDM is, and its benefits for you
* what is required of you under the University's RDM policy
* the tools and services that are available to support you