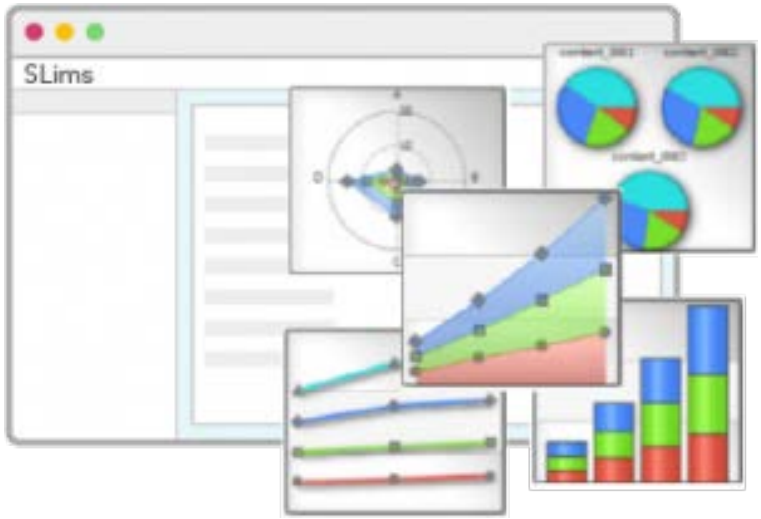
Intégrité scientifique: Data Research Management



Definition of research data

Research data are collected, observed or created, for the purposes of analysis to produce and validate original research results.

Data can also be created by researchers for one purpose and used by another set of researchers at a later date for a completely different research agenda.

Digital data can be:

- created in a digital form ('born digital')
- converted to a digital form (digitised)

What is data research management (RDM)

Data management is a general term covering how to organise, structure, store, and care for the data used or generated during the lifetime of a research project.

It includes:

- How you deal with data on a day-to-day basis over the lifetime of a project,
- What happens to data after the project concludes.

RDM is considered an essential part of good research practice.

Why data research management

To meet funder / university / industry requirements.

So you can find and understand it when needed.

To avoid unnecessary duplication & increase efficiency.

To validate results if required, f

Fraud detection, prevention

So your research is visible and has impact.

To get credit when others cite your work.

To avoid data loss

To facilitate data sharing (Open Data, FAIR)

What is a data management plan (DPM) ?

DMPs are written to define:

- **What data will be collected or created?**
- **How data will be documented and described?**
- **Where data will be stored?**
- **Who will be responsible for data security and backup?**
- **Which data will be shared and/or preserved?**
- How **data will be shared and with whom?**

DMPs are often submitted as part of grant applications, but are useful in their own right whenever you are creating data

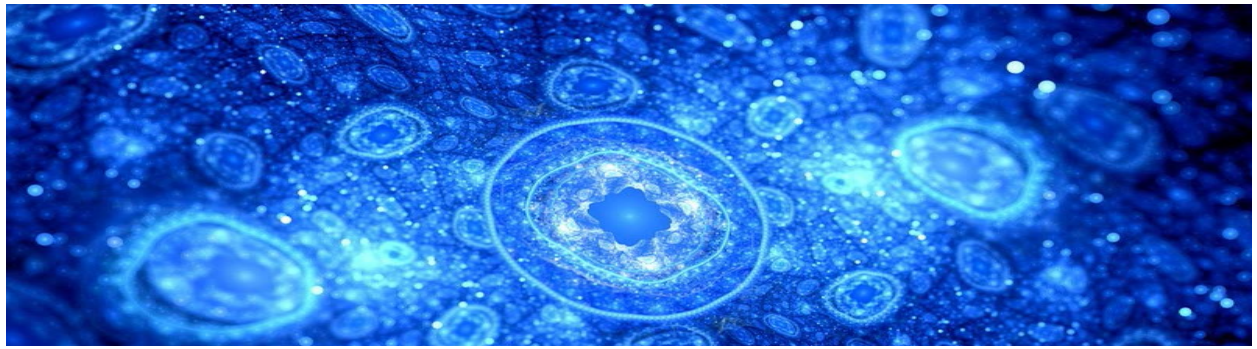
Funder Requirements

Funders are increasingly requiring researchers to meet certain data management criteria.

When applying for funding, you need to submit a technical or data management plan.

You are expected to make your data publicly available (where appropriate) at the end of your project.

Swiss National Science Foundation (**SNSF**)



University of Geneva’ s RDM Policy requirements

Research data will be managed to the highest standards throughout the research data lifecycle as part of the University’s commitment to research excellence.

All new research proposals must include research data management plans…

Research data management plans must ensure that research data are available for access and re-use where appropriate…

“Publicly funded research data are a public good, produced in the public interest, which should be made openly available with as few restrictions as possible in a timely and responsible manner that does not harm intellectual property.”

RCUK Common Principles on Data Policy
http://www.rcuk.ac.uk/research/datapolicy/

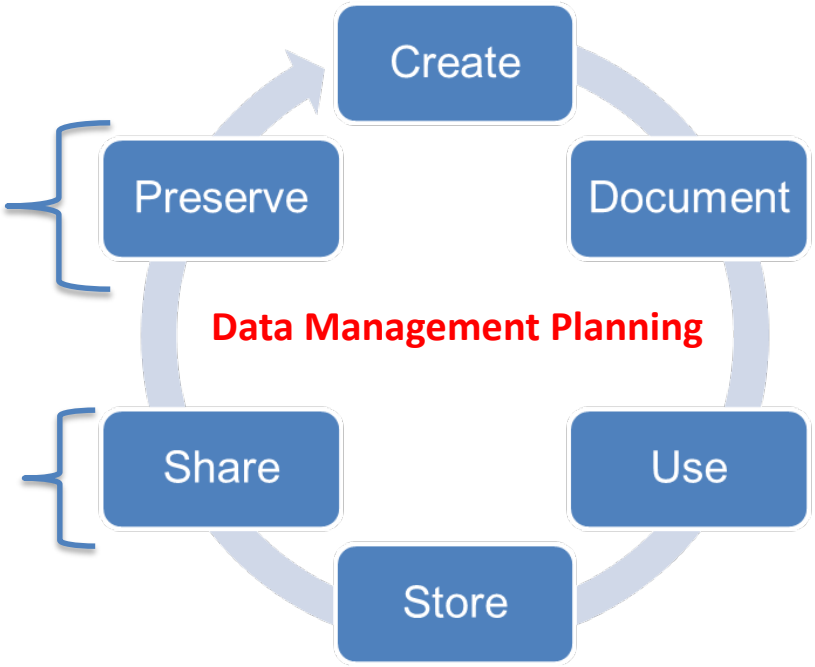
Activities involved in RDM

Type, format volume of data, chosen software for long-term access, secondary data, file naming, structure, quality

Long-term management of data

Select retention period, repository choice, costs involved in long-term storage?

Make data publicly available (where possible) at the end of a project/publications



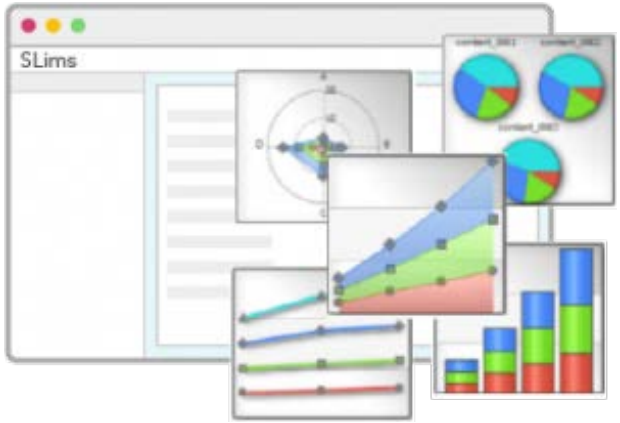
Information needed for the data to be understood. metadata standards, methodology, definition of variables, format & file type of data.

Access restrictions, risks to data security, methods to transfer / share data, encryption, legal, ethical issues.

Day-to-day management of data

Secure & sufficient storage for active data, regular backups, disaster recovery

Paperbound / Electronic laboratory notebook (PLN/ELN)



Hard-back and water proof binding
Impossible to tear out a page without leaving evidence
Pre-numbered pages and places for date

Recording of data: images, movies tables
Easy indexing and searching of data
Easy copy/paste. Reduce redundancy
Creation of links between records
Easy sharing of data with peers
Integrate data already is in electronic form
Content is dated and archived - reliable and retrievable form of record keeping

Why ELNs are normally appealing or not appealing ?

Pros

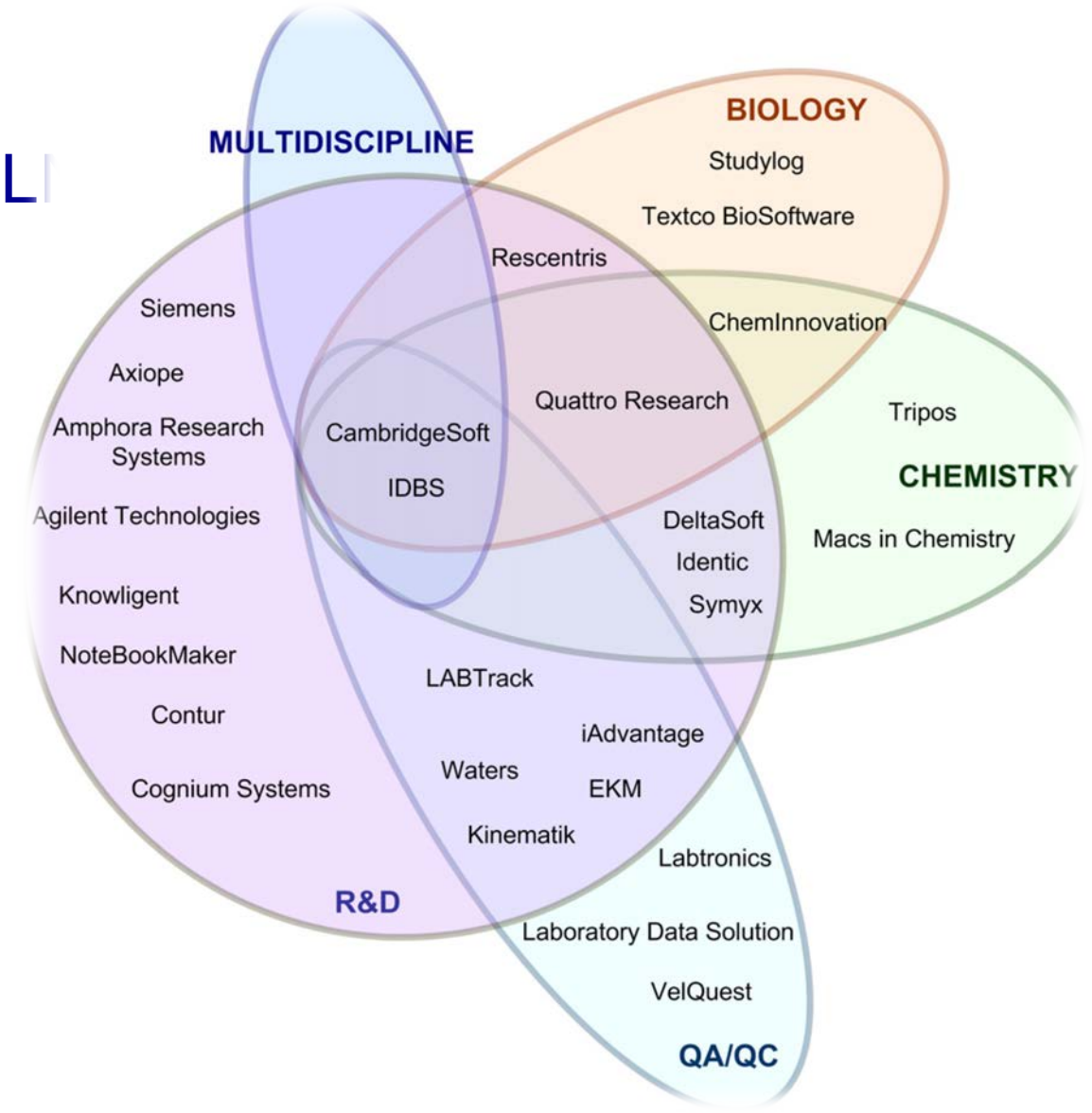
Easy Notetaking
Comfortable Interface
Visualisation
Searchability
Ability to clone previous entries and frequently used protocols
Decent learning curve to master it

Cons

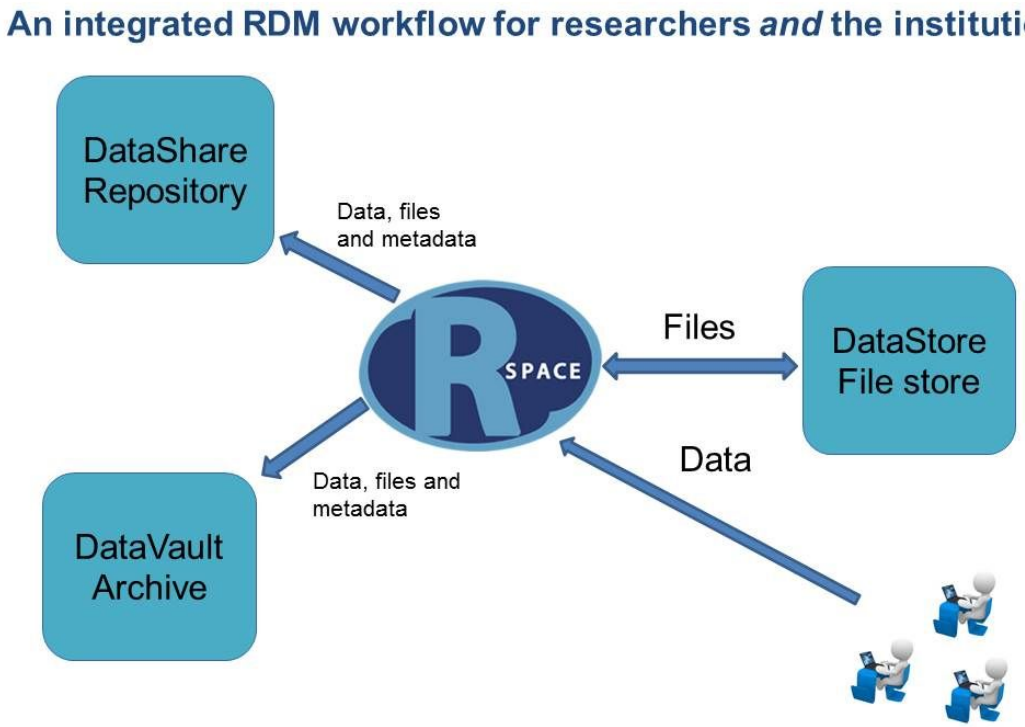
Reputation for being hard to learn
Expensive
Lack of ability to freehand directly PLNs are easy to carry around
Just used to used to it

Electronic Laboratory Notebooks (EL

- There’s not a one-size fit all solution
- Adherence with Good Laboratory Practice
- Access files in DataStore
- Costs and sustainability of the systems



Electronic Laboratory Notebooks (ELNs)



RSpace ELN (a Lab-Ally product) is a secure enterprise grade Electronic Lab Notebook (ELN) - http://lab-ally.com/products/rspace-eln/

Institution Software

Standard Operating Procedures (SOPs)

Lab equipment

SLIMS
LIMS + ELN

Sample database

Research Project

Sample Storage and inventory

Experiment A

Experiment B

PI, Postdoc, PhD Students

External collaborator

Research misconduct

Fabrication is making up data or results and recording or reporting them.

Falsification is manipulating research materials, or changing or omitting data or results such that the research is not accurately represented in the research record.

Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit.

Research misconduct does not include honest error or differences of opinion.

Responsible conduct of Research

Common Principals of Research Integrity:

Honesty in all aspects of research

Accountability in the conduct of research

Professional courtesy and fairness in working with others

Good stewardship of research on behalf of others

Good Practice in data research management

Sources of information and acknowledgments

Open data management – an example
Hadrien Demagny, Hao Li and Johan Auwerx EPFL, Switzerland

Directives sur l'intégrité dans le domaine de la recherche scientifique
Rectorat de l'Universite de Geneve

L'intégrité dans la recherche scientifique
Académies suisses des sciences

Electronic Laboratory Notbook
https://www.limswiki.org/index.php/Electronic_laboratory_notebook
RDM & ELN Information Sharing Workshop for HE
Stuart Macdonald Associate Data Librarian EDINA & Data Library Scottish Universities Insight Institute University of Strathclyde

Integrity in Research Avoiding and Investigating Research Misconduct
Lynne Chronister Associate Vice Chancellor for Research and Wendi Delmendo Director, Research Compliance University of California, Davis

Research Misconduct
Thomas J. Inzana, Ph.D. Associate Vice-President for Research Programs and Research Integrity Officer, Virginia Tech USA

Scientific integrity and social responsibility
the role of academies of sciences and humanities, Prof. Dr. Pieter J.D.Drenth, President All European Academies